

**PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA**

**REPAIR CAPONIERE 26 AND COUNTERSCARP
OF RICHMOND BASTION**

TECHNICAL SPECIFICATIONS

PROJECT No. R.079726.001

FOR TENDER

DO NOT USE THIS DOCUMENT FOR CONSTRUCTION PURPOSE.

WSP Canada Inc.
5355 des Gradins Blvd
Quebec, Quebec
G2J 1C8
Tel: 418 623-2254
Fax: 418 622-1137
File: 131-21559-02



Marie-Ève Hinse Ouellet, Engineer

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Part 1 - GENERAL

1.1 Work covered by contract documents

- .1 Work of this Contract comprises the repair caponiere 26 and counterscarp of Richmond bastion in the Québec Citadel.

1.2 Contractor use of premises

- .1 Unrestricted use of site until Substantial Performance.
- .2 Co-ordinate use of premises under direction of Departmental Representative.

1.3 Existing services

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Provide alternative routes for personnel, pedestrian and vehicular traffic.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .4 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .5 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .6 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .7 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .8 Record locations of maintained, re-routed and abandoned service lines.
- .9 Construct barriers in accordance with Section 01 56 00 (Temporary Barriers and Enclosures).

1.4 Documents required

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.

- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.

1.5 Historical/archaeological control

- .1 The Québec Citadel is considered to be a national archaeological site. Notify Departmental Representative immediately of any archaeological discovery made during Work and await written instructions before resuming Work in the area of the discovery.
- .2 During excavation Work, PWGSC will supply and pay for an archaeologist to be present on site to determine the possibility of archaeological discoveries.
- .3 Notify Departmental Representative 48 hours prior to beginning excavation, to ensure a PWGSC archaeologist will be present.
- .4 Contractor to facilitate archaeologist's access to construction site and ensure collaboration to provide any desired information.
- .5 Contractor to include one fifteen-minute work stoppage per half-day of work in their Contract and at their cost, during which time archaeological surveys will take place. Work stoppages not used may be taken at any time and accumulated for a longer interruption, if necessary, but only for archaeological purposes.
- .6 Contractor shall plan for four prolonged work stoppages, four hours each, in the event of unexpected discoveries that would require more time than the previously described fifteen-minute stoppage. These four-hour periods may be used as needed or may be combined. Contractor to take these stoppages into account when establishing tenders and may not subsequently claim supplementary payment due to application of said stoppages.
- .7 If discoveries occur requiring a stoppage over and above allotted time, Contractor shall assign machinery to a different task in a different area of the construction site to allow archaeological work to take place in original location. If such re-assignment of machinery is impossible, Contractor shall be compensated, subject to Departmental Representative approval, for the delays and costs effectively and directly caused by said situation (when applicable).
- .8 Due to the possibility of archaeological discoveries, manual excavation may be required. The presence of archaeological resources could also necessitate slowing of excavation activities, in order to be able to uncover certain type of remains and protect them from damage. In that event, Contractor shall be compensated, subject to Departmental Representative approval, for the delays and costs effectively and directly caused by said situation (when applicable).
- .9 Protection of remains and structures: Contractor shall take all reasonable precautions necessary during excavation work to protect any remains brought to light so that said remains may be uncovered for examination by archaeologists. The Departmental Representative tolerate no exceptions in this regard. The Contractor shall be held responsible for any negligence resulting in remains being damaged. The Departmental Representative will determine the impact.
- .10 Provide historical, archaeological, cultural and biological resources plan that defines procedures for identifying and protecting historical, archaeological, cultural resources and biological resources known to be on project site, and/or identifies procedures to be followed if historical archaeological, cultural resources and biological resources not previously known to be onsite or in area are discovered during construction.

- .11 Plan to include methods to ensure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.
- .12 Any element of historical/archaeological nature discovered on site during excavation work shall be returned to the Departmental Representative.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Access and egress

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 Use of site and facilities

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Closures: protect work temporarily until permanent enclosures are completed.

1.3 Alterations, additions or repairs to existing building

- .1 Execute work with least possible interference or disturbance to normal use of premises. To this end, arrange with Departmental Representative to facilitate execution of specified Work.

1.4 Special requirements

- .1 Noise generating work shall be interrupted Monday to Friday between 10 and 11 AM from June 24 to September 1st.
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.

1.5 Security

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

1.6 Building smoking environment

- .1 Comply with smoking restrictions. Smoking is not permitted.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

.1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Unit or lump sum price

- .1 The total contract amount is broken down into a description of the work paid on a lump sum basis and the work paid on a unit price basis.
- .2 Each of the broken down unit or lump sum prices shall include all expenses, all work, disbursements, payments, direct or indirect costs, mobilization, demobilization; Contractor's actions and deeds, and all liabilities, obligations, omissions and errors related to the performance of this work. These prices also include the transportation and roll-out of materials, as well as all the costs of doing business: administration, insurance, contributions, interest, rent, taxes and other incidental expenses. Prices must cover the losses and damages resulting from the nature of the work, the fluctuation of prices and wages, business risk, strikes, delays not caused by the Departmental Representative, restrictions on transport, accidents and the action of natural forces.

1.2 Definitions

- .1 Lump sum price (fixed): work is globally determined with accuracy and in detail and a price is agreed upon and accepted by both parties.
- .2 Unit price: work specifications are determined accurately and in detail and all quantities on the bid form are estimates.

1.3 Description of items in the lump sum price schedule

Part A - Phase A work (Repair of the caponiere 26 and Richmond Bastion counterscarp capital)

- .1 Site layout:
 - .1 This item includes signage and temporary traffic lights, flaggers, bypass road (if required), construction trailers, relocating traffic signs, dust abatement, protection of existing utilities, all the elements described in this section and all requirements described in Division 1 (General Requirements) of this specification. This item finally includes all other work not included in other items of the bid form.
 - .2 Payment of this item to be made as follows:
 - .1 25% with the first monthly payment.
 - .2 50% evenly distributed among payments of subsequent steps.
 - .3 25% with the payment at issuance of the "Certificate of substantial (provisional) completion".
- .2 Excavation and backfilling:
 - .1 Item 2a) includes all the work involved with excavation as shown on the drawings, cross sections, elevations and details; lawn removal, stripping of top soil and hard surfaces, saw cuts in pavement, dewatering and drainage of excavation bottoms, as well as backfilling with specified materials. This item also includes the stockpiling of materials for environmental characterisation, and the removal and disposal off site of non-contaminated materials in excess, and any incidental expense. Costs related to preservation of the historic and archaeological character of the site specified in Section 01 11 00 (Summary of Work) are also included in this item.

- .2 Item 2b) includes all the work involved with excavation and backfilling as specified inside the caponiere as well as any incidental expense.
- .3 Drainage:
 - .1 Item 3a) includes the supply and installation of perforated drains, clean stone and geotextile, fittings, cleanout port holes and repairing the outlet. This item includes the topographic survey required to establish the pipe levels and bedding to acceptable drainage slopes and any incidental expense.
 - .2 Item 3b) includes the supply and placement of concrete for rebuilding the cunette to drainage slopes and levels established by the Contractor, including developing drainage slopes on top of the caponiere. The item also includes the shaping of the cunette along the geometry of the backside of the wall and the rock profile, and any incidental expense.
- .4 Masonry work:
 - .1 Item 4a) includes the work described in section 04 03 06 (Historic – Cleaning Historic Masonry) of this specification, the supply of cleaning equipment and products, the supply and installation of protection measures, cleaning and any incidental expense.
 - .2 Item 4b) includes the removal of existing coping elements, disposal of excess materials off site, survey of existing and special conditions, preparation of shop drawings and samples, the supply and placement of new stones and their anchors as well as any incidental expense.
- .5 Waterproofing: this item includes costs related to removing the first layer of brick on the top of casemates and laying the membrane protection systems and drainage board (if required) on top of the walls and abutments, on top of the caponiere and the backside of the walls, and on top of the tunnel; also includes preparing the wall and abutment surfaces as well as the caponiere surfaces; metal flashing, the necessary reworking around the anchors of new stones, and any incidental expense.
- .6 Miscellaneous site features:
 - .1 Item 6a) includes costs related to the removal of all elements identified, signage and other elements that must be removed or dismantled to perform the work. This item also includes the reinstallation of signage elements at work completion, and any incidental expense.
 - .2 Item 6b) includes the construction of a new trail and associated substructure as well as geometric modifications required for connecting the trail to existing trail sections outside the work area.
 - .3 Item 6c) includes the construction of various materials incorporated in the granular infrastructure under the pavement; the second saw cut required, removal of pavement along the cut, placement of paving, and any incidental expense.
- .7 Electrical work: Item 7 includes the complete performance of dismantling work; repair and replacement of electrical wiring, conduits and luminaires in the construction zone, as well as providing and installing four extra luminaires with their wiring and conduits. Costs related to the planning and coordination of this work with that of masonry and others shall be listed in this item.
- .8 Scaffolding and temporary support structures: this item includes the installation of scaffolding required to perform the work, engineering design and installation of temporary support structures described in 31 04 31 of this specification; any other incidental expense.

Part B – Phase B work (repair of the left and right faces of Richmond Bastion counterscarp

- .1 Site layout:
 - .1 This item includes signage and temporary traffic lights, flaggers, bypass road (if required), construction trailers, relocating traffic signs, dust abatement, protection of existing utilities, all the elements described in this section and all requirements described in Division 1 (General Requirements) of this specification. This item finally includes all other work not included in other items of the bid form.
 - .2 Payment of this item to be made as follows:
 - .1 25% with the first monthly payment.
 - .2 50% evenly distributed among payments of subsequent steps.
 - .3 25% with the payment at issuance of the "Certificate of substantial (provisional) completion".
- .2 Excavation and backfilling:
 - .1 Item 2a) includes all the work involved with excavation as shown on the drawings, cross sections, elevations and details; lawn removal, stripping of top soil and hard surfaces, saw cuts in pavement, removal and disposal of the tree, dewatering and drainage of excavation bottoms, as well as backfilling with specified materials. This item also includes the stockpiling of materials for environmental characterisation, and the removal and disposal off site of materials in excess, and any incidental expense. Costs related to preservation of the historic and archaeological character of the site specified in Section 01 11 00 (Summary of Work) are also included in this item.
- .3 Drainage:
 - .1 Item 3a) includes the supply and installation of perforated drains, clean stone and geotextile, fittings, cleanout port holes and repairing the outlet. This item includes the topographic survey required to establish the pipe levels and bedding to acceptable drainage slopes and any incidental expense.
 - .2 Item 3b) includes the supply and placement of concrete for rebuilding the cunette to drainage slopes and levels established by the Contractor, including developing drainage slopes on top of the caponiere. The item also includes the shaping of the cunette along the geometry of the backside of the wall and the rock profile, and any incidental expense.
- .4 Masonry work:
 - .1 Item 4a) includes the work described in section 04 03 06 (Historic – Cleaning Historic Masonry) of this specification, the supply of cleaning equipment and products, the supply and installation of protection measures, cleaning and any incidental expense.
 - .2 Item 4b) includes the removal of existing coping elements, disposal of excess materials off site, survey of existing and special conditions, preparation of shop drawings and samples, the supply and placement of new stones and their anchors as well as any incidental expense.
- .5 Waterproofing: this item includes costs related to laying the membrane protection systems and drainage board (if required) on top of the walls and abutments, on top of the caponiere and the backside of the walls, and on top of the tunnel; also includes preparing the wall and abutment surfaces as well as the caponiere surfaces; metal flashing, the necessary reworking around the anchors of new stones, and any incidental expense.

- .6 Miscellaneous site features:
 - .1 Item 6a) includes costs related to the removal of all elements identified, signage and other elements that must be removed or dismantled to perform the work. This item also includes the reinstallation of signage elements at work completion, and any incidental expense.
 - .2 Item 6b) includes the construction of a new trail and associated substructure as well as geometric modifications required for connecting the trail to existing trail sections outside the work area.
 - .3 Item 6c) includes the construction of various materials incorporated in the granular infrastructure under the pavement; the second saw cut required, removal of pavement along the cut, placement of paving, and any incidental expense.
- .7 Scaffolding and temporary support structures: this item includes the installation of scaffolding required to perform the work, engineering design and installation of temporary support structures described in 31 04 31 of this specification; any other incidental expense.

1.4 Description of included items in the unit price schedule

Part C - Phase A work (Repair of the caponiere 26 and Richmond Bastion counterscarp capital)

- .1 Management and disposal of contaminated soils: this item is paid per weight (M.T.) of contaminated soils in excess removed from the work site, accounted for by shipping bills and unloading receipts. The price submitted must include the cost difference between :
 - .1 hauling from the work site and unloading at a landfill compatible with the contamination at hand, and
 - .2 hauling from the work site and unloading at a landfill for non-contaminated materials,as well as any incidental expense.
- .2 Masonry work, counterscarp wall:
 - .1 Item 2a) – Replacement of exposed veneer stones: this item paid per square metre (m²) of exposed stone surface to be replaced. The unit price includes the removal of identified stones and of additional stones indicated on the drawings which will be identified on site by the Departmental Representative; disposal off site of materials non-reusable in the reconstruction of the masonry core; measurement of stones to be replaced, preparation of shop drawings and construction of samples, supply and placement of new stones and mortar and anchors if required, repointing around the replaced stones as well as any incidental expense.
 - .2 Item 2b) – Replacement of concealed veneer stones (backside of walls and abutments): this item to be paid per square metre (m²) of concealed stone surface to be replaced. The unit cost includes the removal of deteriorated stones and of additional stones indicated on the drawings which will be identified on site by the Departmental Representative; disposal off site of materials non-reusable in the reconstruction of the masonry core; measurement of stones to be replaced, supply and placement of new stones and mortar and anchors if required, repointing around the replaced stones as well as any incidental expense.
 - .3 Item 2c) – Repointing of concealed stone veneer (backside of walls and abutments): this item paid per square metre (m²) of repointed stone veneer surface area. Unit price to include the preliminary cleaning of the masonry in contact with

the ground (walls and abutments), raking masonry joints, jointing and finishing in stages, the supply of equipment, materials (i.e., mortar) and labour. Costs also include the protection of the structures during curing and any incidental expense.

- .4 Item 2d) – Dismantling and reconstruction of exposed stone veneer: this item to be paid per square metre (m^2) of exposed stone veneer surface area after dismantling and reconstruction. Unit price to include raking mortar joints in the dismantled zone; marking the veneer stones including gun-port dimensions stones, their removal and stowage as indicated; reconstruction of the veneer faces; installation of specified anchors, placement of mortar and repointing of the surfaces. Cost of work also includes the protection of the structures during curing and any incidental expense.
 - .5 Item 2e) – Dismantling and reconstruction of concealed stone veneer (backside of walls and abutments): this item paid per square metre (m^2) of exposed stone veneer surface area after dismantling and reconstruction. Unit price to include raking mortar joints in the dismantled zone; removal and stowage as indicated of the stone veneer on the backside of the walls and abutments, and veneer reconstruction; installation of specified anchors, placement of mortar and repointing of the surfaces. Cost of work also includes the protection of the structures during curing and any incidental expense.
 - .6 Item 2f) – Dismantling and reconstruction of the masonry core: this item to be paid in volume, per cubic metre (m^3) of dismantled and reconstructed core. Unit price to include dismantling and reconstructing the core, and placing the mortar, as well as the supply and installation of vertical & horizontal fiberglass reinforcing bars shown on the drawings. Cost of work also includes the protection of the structures during curing and any incidental expense.
- .3 Masonry work inside the caponiere:
- .1 Item 3a) – Repointing of the veneer and brick arch (incl. anchors): this item to be paid per square metre (m^2) surface area of repointed brick veneer. The unit price includes raking of masonry joints, placement of anchors, jointing and finishing in stages, supply of equipment, materials (i.e., mortar) and labour. Price of work also includes the required cleaning of surfaces, construction of samples, protection of the structures during the curing period and any incidental expense (scaffolding or other installation).
 - .2 Item 3b) – Repointing of the stone veneer: this item to be paid per square metre (m^2) of repointed stone veneer. Price to include the raking of masonry joints, jointing and finishing in stages; the supply of equipment, materials (i.e., mortar) and labour for the inside stone veneer surfaces (bottom of the spiral stair). Costs also include the required cleaning of surfaces, construction of samples, protection of the structures during curing and any incidental expense.
 - .3 Item 3c) – Punctual replacement of the veneer redclay brick (action 3): this item to be paid per unit of replaced brick, i.e., the number of replaced bricks. Unit price to include, in the repointing area, the removal and replacement of altered bricks with existing units recovered in the dismantled walls and pillars, or with new bricks; disposal off site of waste; placement of mortar and anchors, reworking of the exposed cut brick walls and any incidental expense.
 - .4 Item 3d) – Punctual replacement of the veneer sand-lime (yellow) brick (action 3): this item to be paid per unit of replaced brick, the number of replaced bricks. Unit price to include, in the repointing area, the removal and replacement of altered bricks with existing units recovered in the dismantled walls and pillars, or with new bricks; disposal off site of waste; placement of mortar and anchors, reworking of the exposed cut brick walls and any incidental expense.

- .5 Item 3e) – Punctual replacement of the veneer sand-lime (yellow) vault bricks (action 2): this item to be paid per unit of replaced brick, i.e., the number of replaced bricks. Unit price to include, in the repointing area, removal and replacement of altered bricks with existing units recovered in the dismantled walls and pillars, or with new bricks; disposal off site of waste; placement of mortar and anchors; reworking of the exposed cut brick walls and any incidental expense.
- .6 Item 3f) – Dismantling and reconstruction of the interior brick veneer with new bricks: this item to be paid per square metre (m^2) surface area of dismantled and reconstructed brick veneer. Unit price to include raking of mortar joint in the dismantled area, removing salvageable brick units, their cleaning and stowage as indicated, and the disposal off site of non reusable bricks; reconstruction of the veneer with new bricks; reworking of the exposed cut brick walls; placement of specified anchors and mortar; and repointing of the surfaces. Costs also include protecting the structures during curing and any incidental expense.
- .7 Item 3g) – Dismantling and reconstruction of the stone masonry core behind the brick veneer excluding the counterscarp core: this item to be paid in volume, per cubic metre (m^3) of dismantled and reconstructed core. Unit price to include dismantling and reconstructing the core, and placing the mortar. Cost of work also includes the protection of the structures during curing and any incidental expense.
- .8 Item 3h) – Stone step repair: this item will be paid at a unit price for the complete repair of a stone step, that is, drilling to socket an anchor, injection of the fissure, installation and sealing of the anchor bar; cleaning of surfaces to match existing finish of the stones, and any incidental expense.

Part D – Phase B work (repair of the left and right faces of Richmond Bastion counterscarp

- .1 Management and disposal of contaminated soils: this item is paid per weight (M.T.) of contaminated soils in excess removed from the work site, accounted for by shipping bills and unloading receipts. The price submitted must include hauling from the work site and unloading at a landfill compatible with the contamination at hand, and any incidental expense.
- .2 Masonry work, counterscarp wall:
 - .1 Item 2a) – Replacement of exposed veneer stones: this item paid per square metre (m^2) of exposed stone surface to be replaced. The unit price includes the removal of identified stones and of additional stones indicated on the drawings which will be identified on site by the Departmental Representative; disposal off site of materials non-reusable in the reconstruction of the masonry core; measurement of stones to be replaced, preparation of shop drawings and construction of samples, supply and placement of new stones and mortar and anchors if required, repointing around the replaced stones as well as any incidental expense.
 - .2 Item 2b) – Replacement of concealed veneer stones (backside of walls and abutments): this item to be paid per square metre (m^2) of concealed stone surface to be replaced. The unit cost includes the removal of deteriorated stones and of additional stones indicated on the drawings which will be identified on site by the Departmental Representative; disposal off site of materials non-reusable in the reconstruction of the masonry core; measurement of stones to be replaced, supply and placement of new stones and mortar and anchors if required, repointing around the replaced stones as well as any incidental expense.

- .3 Item 2c) – Repointing of exposed stone veneer: this item paid per square metre (m^2) of repointed stone veneer surface. Unit price to include the raking of masonry joints, jointing and finishing in stages; the supply of equipment, materials (i.e., mortar) and labour for the outside stone veneer surfaces. Costs also include the required cleaning of surfaces, construction of samples, protection of the structures during curing and any incidental expense.
- .4 Item 2d) – Repointing of concealed stone veneer (backside of walls and abutments): this item paid per square metre (m^2) of repointed stone veneer surface area. Unit price to include the preliminary cleaning of the masonry in contact with the ground (walls and abutments), raking masonry joints, jointing and finishing in stages, the supply of equipment, materials (i.e., mortar) and labour. Costs also include the protection of the structures during curing and any incidental expense.
- .5 Item 2e) – Dismantling and reconstruction of exposed stone veneer: this item to be paid per square metre (m^2) of exposed stone veneer surface area after dismantling and reconstruction. Unit price to include raking mortar joints in the dismantled zone; marking the veneer stones including gun-port dimensions stones, their removal and stowage as indicated; reconstruction of the veneer faces; installation of specified anchors, placement of mortar and repointing of the surfaces. Cost of work also includes the protection of the structures during curing and any incidental expense.
- .6 Item 2f) – Dismantling and reconstruction of concealed stone veneer (backside of walls and abutments): this item paid per square metre (m^2) of exposed stone veneer surface area after dismantling and reconstruction. Unit price to include raking mortar joints in the dismantled zone; removal and stowage as indicated of the stone veneer on the backside of the walls and abutments, and veneer reconstruction; installation of specified anchors, placement of mortar and repointing of the surfaces. Cost of work also includes the protection of the structures during curing and any incidental expense.
- .7 Item 2g) – Dismantling and reconstruction of the masonry core: this item to be paid in volume, per cubic metre (m^3) of dismantled and reconstructed core. Unit price to include dismantling and reconstructing the core, and placing the mortar, as well as the supply and installation of vertical & horizontal fiberglass reinforcing bars shown on the drawings. Cost of work also includes the protection of the structures during curing and any incidental expense.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Related requirements

- .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 follows:
 - .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 Mill tests and certificates of compliance.
 - .4 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.
 - .5 Additional tests specified as follows:
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.3 Contractor's responsibilities

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .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 Provide Departmental Representative with advance notification (48 hours) 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 at no cost to Departmental Representative.
- .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.

END OF SECTION

Part 1 - GENERAL

1.1 Definitions

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 Requirements

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract.

1.3 Action and informational submittals

- .1 Submit to Departmental Representative within 10 working days of Notice of Acceptance of Offer Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

- .2 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 Master plan

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 Project schedule

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award;
 - .2 Mobilization;
 - .3 Shop Drawings, Samples;
 - .4 Excavation;
 - .5 Masonry work;
 - .6 Concreting;
 - .7 Backfill;
 - .8 Improvements;
 - .9 Correction of deficiencies;
 - .10 Final acceptance.

1.6 Project schedule reporting

- .1 Update Project Schedule on a weekly basis or prior to every site meeting in order to reflect activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.7 Job site meetings

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

Part 2 - PRODUCTS

2.1 Not used

.1 Not used.

Part 3 - EXECUTION

3.1 Not used

.1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Administrative

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for submission of complete and accurate documents and samples to requirements of Contract Documents is not relieved by Departmental Representative's review of submittals.
- .9 Keep one reviewed copy of each submission on site.

1.2 Shop drawings and product data

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Québec.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 10 days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

- .7 Accompany submissions with transmittal letter 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.
- .8 Submissions include:
 - .1 Date and revision dates;
 - .2 Project title and number;
 - .3 Name and address of:
 - .1 Subcontractor
 - .2 Supplier
 - .3 Manufacturer
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents;
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances
 - .3 Setting or erection details
 - .4 Relationship to adjacent work
- .9 After Departmental Representative's review, distribute copies.
- .10 Submit 2 copies of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit 2 copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit 2 copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative:
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 2 years of date of contract award for project.
- .13 Submit 2 copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative:
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

- .2 Certificates must be dated after award of project contract complete with project name.
- .14 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 Samples

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

1.4 Mock-ups

- .1 Erect mock-ups in accordance with Section 01 45 00 (Quality Control).

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Protection of public traffic

- .1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- .2 When working on travelled way:
 - .1 Place equipment in position to present minimum of interference and hazard to travelling public.
 - .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
 - .3 Do not leave equipment on travelled way overnight.
- .3 Do not close any lanes of road without approval of Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with applicable regulations.
- .4 Keep travelled way graded, free of pot holes and of sufficient width for required number of lanes of traffic.
 - .1 Provide minimum 7 m wide temporary roadway for traffic in two-way sections through Work and on detours.
 - .2 Provide minimum 5 m wide temporary roadway for traffic in one-way sections through Work and on detours.
- .5 Follow Departmental Representative's instructions and provide gravelled detours or temporary roads to facilitate passage of traffic around restricted construction area.

1.2 Informational and warning devices

- .1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
- .2 Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Departmental Representative.
- .3 Continually maintain traffic control devices in use by:
 - .1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
 - .2 Removing or covering signs which do not apply to conditions existing from day to day.

1.3 Control of public traffic

- .1 In the following situations, provide competent flag persons, properly trained and equipped as specified in the applicable regulations and standards:
 - .1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.

- .2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.
- .3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
- .4 Where temporary protection is required while other traffic control devices are being erected or taken down.
- .5 For emergency protection when other traffic control devices are not readily available.
- .6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
- .7 Delays to public traffic due to contractor's operators: maximum 15 minutes following approval by the relevant authorities.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Section includes

- .1 Contractor shall manage his operations so that safety and security of the public and of site workers always take precedence over cost and scheduling considerations.

1.2 References

- .1 Canada Labour Code - Part II, Canadian Occupational Safety and Health Regulations.
- .2 Canadian Standards Association (CSA).
- .3 Workplace Hazardous Materials Information System (WHMIS).
- .4 Act Respecting Occupational Health and Safety, R.S.Q. Chapter S-2.1.
- .5 Construction Safety Code, S-2.1, r.4.

1.3 Submittals

- .1 Submit the documents required according to Section 01 33 00 (Documents and samples to be submitted).
- .2 Submit to Departmental Representative, the CSST and the *Association paritaire en santé et sécurité du secteur de la construction* (ASP Construction) the site-specific safety program, as outlined in 1.8 at least 10 days prior to start of work. The Contractor must review his program during the course of the project if any change occurs in work methods or site conditions. The Departmental Representative may, after receiving the program or at any time during the project, ask the Contractor to update or modify the program in order to better reflect the reality of the construction site and activities. The Contractor must make the required changes before work begins.
- .3 Submit to Departmental Representative the site inspection sheet, duly completed, at the intervals indicated in 1.13.1.
- .4 Submit to Departmental Representative within 24 hours a copy of any inspection report, correction notice or recommendation issued by federal or provincial inspectors.
- .5 Submit to Departmental Representative within 24 hours an investigation report for any accident involving injury and any incident exposing a potential hazard.
- .6 Submit to Departmental Representative all safety data sheets for hazardous material to be used at the site at least three days before they are to be used.
- .7 Submit to Departmental Representative copies of all training certificates required for application of the safety program, in particular:
 - .1 General construction site safety and health courses;
 - .2 Safety officer attestations;
 - .3 First aid in the workplace and cardiopulmonary resuscitation;
 - .4 Lockout procedures;
 - .5 Wearing and fitting of individual protective gear;
 - .6 forklift truck;

- .7 positioning platform;
- .8 Any other requirement of Regulations or the safety program.
- .8 Emergency plan : The emergency plan, as defined in 1.8.3, shall be submitted to Departmental Representative at the same time as the site-specific safety program.
- .9 Notice of site opening : Notice of site opening shall be submitted to the *Commission de la santé et de la sécurité du travail* before work begins. A copy of such notice shall be submitted to Departmental Representative at the same time and another posted in full view at the site. During demobilization, a notice of site closing shall be submitted to the CSST, with copy to Departmental Representative.
- .10 Plans and certificates of compliance : Submit to the CSST and to Departmental Representative a copy signed and sealed by engineer of all plans and certificates of compliance required pursuant to the Construction Safety Code (S-2.1, r. 6), or by any other legislation or regulation or by any other clause in the specifications or in this contract. Copies of these documents must be on hand at the site at all times.
- .11 Certificate of compliance delivered by the CSST: The certificate of compliance is a document delivered by the CSST confirming that the contractor is in rule with the CSST, i.e. that he had pay out all the benefits concerning this contract. This document must be delivered to Departmental Representative at the end of the work.

1.4 Hazards assessment

- .1 The contractor must identify all hazards inherent in each task to be carried out at the site.
- .2 The contractor must plan and organize work so as to eliminate hazards at source or promote mutual protection so that reliance on individual protective gear can be kept to a minimum. Where individual protection against falling is required, workers shall use safety harness that meets standard Can - CSA- Z-259.10 - M90. Safety belts shall not be used as protection against falling.
- .3 Equipment, tools and protective gear which cannot be installed, fitted or used without compromising the health or safety of workers or the public shall be deemed inadequate for the work to be executed.
- .4 All mechanical equipment shall be inspected before delivery to the site. Before using any mechanical equipment, submit to Departmental Representative a certificate of compliance signed by a qualified mechanic. Whenever he suspects a defect or accident risk, Departmental Representative may at any time order the immediate shut-down of equipment and require a new inspection by a specialist of his own choosing.
- .5 For use of equipment for lifting persons or materials, ensure that the inspections required by the standards are met and be able to provide a copy of certificates of inspection upon request of Representative of the Ministry.

1.5 Meetings

- .1 Contractor decisional representative must attend any meetings at which site safety and health issues are to be discussed
- .2 Set up a site safety committee, and convene meetings every in accordance with the Construction Safety Code (S-2.1, r.4).

1.6 Legal and regulatory requirements

- .1 Comply with all legislation, regulations and standards applicable to the site and its related activities.
- .2 Comply with specified standards and regulations to ensure safe operations at site containing hazardous or toxic materials.
- .3 Regardless of the publication date shown in the construction safety code, always use the most recent version.

1.7 Site-specific conditions

- .1 At the site, the contractor must take account of the following specific conditions:
 - .1 Proximity to the Cap-Diamant cliff;
 - .2 Adjacent to a military and touristic site.

1.8 Safety and health management

- .1 Acknowledge and assume all the tasks and obligations which customarily devolve upon a principal Contractor under the terms of the Act Respecting Occupational Health and Safety (R.S.Q., chapter S-2.1) and the Construction Safety Code (S-2.1, r.4).
- .2 Develop a site-specific safety program based on the hazards identified and apply it from the start of project work until close-out is completed. The safety program must take account of all information appearing in 1.7 and must be submitted to all parties concerned, in accordance with the provisions set forth in 1.3. At a minimum, the site-specific safety program must include :
 - .1 Company safety and health policy.
 - .2 A description of the work, total costs, schedule and projected workforce curve.
 - .3 Flow chart of safety and health responsibility.
 - .4 The physical and material layout of the site.
 - .5 First-aid and first-line treatment standards.
 - .6 Identification of site-specific hazards.
 - .7 Risk assessment for the tasks to be carried out, including preventive measures and the procedures for applying them.
 - .8 Training requirements.
 - .9 Procedures in case of accident/injury
 - .10 Written commitment from all parties to comply with the prevention program.
 - .11 A site inspection schedule based on the preventive measures.
- .3 The contractor must draw up an effective emergency plan based on the characteristics and constraints of the site and its surroundings. Submit the emergency plan to all parties concerned, pursuant to the provisions of 1.3. The emergency plan must include:
 - .1 Evacuation procedure;
 - .2 Identification of resources (police, firefighters, ambulance services, etc.);
 - .3 Identification of persons in charge at the site;

- .4 Identification of those with first-aid training;
- .5 Training required for those responsible for applying the plan;
- .6 Any other information needed, in the light of the site characteristics.

1.9 Responsibilities

- .1 No matter the size of the construction site or how many workers are present at the workplace, designate a competent person to supervise and take responsibility for health and safety. Take all necessary measures to ensure the health and safety of persons and property at or in the immediate vicinity of the site and likely to be affected by any of the work.
- .2 Take all necessary measures to ensure application of and compliance with the safety and health requirements of the contract documents, applicable federal and provincial regulations and standards as well as the site-specific safety program, complying without delay with any order or correction notice issued by the Commission de la santé et de la sécurité du travail.
- .3 Take all necessary measures to keep the site clean and in good order throughout the course of the work

1.10 Communications and posting

- .1 Make all necessary arrangements to ensure effective communication of safety and health information at the site. As they arrive on site, all workers must be informed of their rights and obligations pertaining to the site specific safety program. The Contractor must insist on their right to refuse to perform work which they feel may threaten their own health, safety or physical integrity or that of other persons at the site. The Contractor must keep and update a written record of all information transmitted with signatures of all affected workers.
- .2 The following information and documents must be posted in a location readily accessible to all workers:
 - .1 Notice of site opening;
 - .2 Identification of principal Contractor;
 - .3 Company OSH policy;
 - .4 Site-specific safety program;
 - .5 Emergency plan;
 - .6 Data sheets for all hazardous material used at the site;
 - .7 Minutes of site committee meetings;
 - .8 Names of site committee representatives;
 - .9 Names of those with first-aid training;
 - .10 Action reports and correction notices issued by the CSST.

1.11 Unforeseen circumstances

- .1 Whenever a source of danger not defined in the specifications or identified in the preliminary site inspection arises as a result of or in the course of the work, immediately suspend work, take appropriate temporary measures to protect the workers and the

public and notify Departmental Representative, both verbally and in writing. Then the Contractor must modify or update the site specific safety program in order to resume work in safe conditions.

1.12 Health/safety/hygiene/environmental specialists

- .1 As soon as work starts, hire a safety officer, pursuant to the provisions of sections 2.5.3 and 2.5.4 of the Construction Safety Code (S-2.1, r. 6) and give him/her/them the necessary authority to carry out the duties of this position, including authority to stop work on safety and health grounds.
- .2 At the very outset of construction, hire a qualified person whose duties will be to ensure compliance with and application of all rules, regulations and standards and all contractual requirements.
- .3 Provide this person with the authority, resources and tools needed to perform his/her duties.
- .4 The person selected shall:
 - .1 Have in-depth knowledge of legislation and regulations applicable to the site.
 - .2 Develop and disseminate a safety orientation program for all site workers.
 - .3 Ensure that no worker is admitted to the site without having taken the safety orientation program and met all the training requirements of the applicable legislation and the site-specific safety program.
 - .4 Inspect the work and ensure compliance with all regulatory requirements and those of the contract documents or the site-specific safety program.
 - .5 Keep a daily log of actions taken and submitting a copy to Departmental Representative each week.

1.13 Inspection of site and correction of hazardous situations

- .1 Inspect the work site and complete the site inspection sheet at least once week.
- .2 Immediately take all necessary measures to correct any lapses from legislative or regulatory requirements and any hazards identified by a government inspector, by the Departmental Representative, by the site safety and health coordinator or during routine inspections.
- .3 Submit to Departmental Representative written confirmation of all measures taken to correct lapses and hazardous situations.
- .4 Give the safety officer or, where there is no safety officer, the person assigned to safety and health responsibilities, full authority to order interruption and resuming of work as and when deemed necessary or desirable in the interests of safety and health. This person should always act so that the safety and health of the public and site workers and environmental protection take precedence over cost and scheduling considerations.
- .5 Without limiting the scope of sections 1.8 and 1.9, Departmental Representative may order cessation of work if, in his/her view, there is any hazard or threat to the safety or health of site personnel or the public or to the environment.

1.14 Blasting

- .1 Blasting and other use of explosives are forbidden unless authorized in writing by Departmental Representative.

- .2 Any operation involving explosives must be carried out under the supervision of a qualified shot firer.
- .3 The purchase, carriage, storage and use of explosives must comply with all applicable federal and provincial legislation:
 - .1 Canada: Explosives Act (E-17), Explosives Regulations (C.R.C. CH. 599), Standard for Storage of Blasting Charges and Detonators, Transportation of Dangerous Goods Act and Regulations.
 - .2 Quebec: Explosives Act (E-22), Explosives Regulations (E-22, r.1), Safety Code for the Construction Industry (S-2.1, r.4), Transportation of Dangerous Goods Regulations.
- .4 Contractor shall obtain all permits required pursuant to the legislation and regulations referred to above and keep copies on hand at the site.
- .5 Contractor shall facilitate inspection of the site, stored explosives and vehicles used to transport explosives by any government representatives or police officers whose jurisdiction encompasses explosives.

1.15 Powder actuated devices

- .1 Use of power hammers and other explosive-actuated devices must be authorized by Departmental Representative.
- .2 Any person using a power hammer shall hold a training certificate and meet all requirements of Section 7 of the Construction Safety Code (S-2.1, r. 6).
- .3 Any other explosive-actuated device shall be used in accordance with the manufacturer's directions and applicable standards and regulations.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Definitions

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably 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 Fires

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

1.3 Disposal of wastes

- .1 Do not bury on site rubbish and waste materials, which must be disposed of in appropriate landfill sites in accordance with section 01 74 21 (Construction/Demolition Waste Management and Disposal).

1.4 Drainage

- .1 Provide erosion control plan and indicate the control measures implemented, including monitoring and reporting requirements to assure that control measures are in compliance with 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 excavations and 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 authority requirements.

1.5 Site clearing and plant protection

- .1 Protect trees and plants on site and adjacent properties where indicated.
- .2 Wrap in burlap, trees and shrubs adjacent to construction site, storage areas and truck lanes.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.

1.6 Pollution control

- .1 Maintain temporary erosion and pollution control features installed under this contract.
- .2 Control emissions from equipment and tools to local authorities emission requirements.
- .3 Prevent sanding dust and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .5 Remove dust daily on existing public roads that have been borrowed and muddied by the Contractor and subcontractors.

1.7 Historical/Archaeological control

- .1 Provide historical, archaeological, cultural and biological resources plan that defines procedures for identifying and protecting such resources known to be on project site, and/or identifies procedures to be followed if such resources not previously known to be onsite or in area are discovered during construction.
- .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.8 Notification

- .1 Departmental Representative will 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.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Inspection

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

1.2 Independent inspection agencies

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Contractor shall correct defect and irregularities as advised by Departmental Representative at no extra cost. Pay costs for retesting and reinspection.

1.3 Access to work

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

1.4 Procedures

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

1.5 Rejected work

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

1.6 Tests and mix designs

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

1.7 Mock-ups

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

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Installation and removal

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

1.2 Dewatering

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.3 Water supply

- .1 Provide continuous supply of potable water for construction use.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.

1.4 Temporary heating and ventilation

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 15 °C in areas where construction is in progress.
- .5 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

- .6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
- .7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 Temporary power and light

- .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools.
- .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .3 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

1.6 Fire protection

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

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Installation and removal

- .1 Based on the provided work site layout map, prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Indicate areas that must be covered with geotextile and gravel to prevent mud deposits and the deterioration of existing features.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

1.2 Scaffolding

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.

1.3 Hoisting

- .1 Supply and install, maintain and operate hoists and cranes required for moving workers, materials and equipment; ensure the maintenance and operation. Take the necessary financial arrangements with subcontractors for their use of lifting equipment.
- .2 Hoists and cranes to be operated by qualified operators.

1.4 Site storage/loading

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.5 Construction parking

- .1 Parking will not be permitted on site.
- .2 Provide and maintain adequate access to project site.

1.6 Security

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays and special events.

1.7 Offices

- .1 Provide office heated to 22 °C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.8 Equipment, tool and materials storage

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.9 Sanitary facilities

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.10 Construction signage

- .1 No signs indicating the names of the Contractor and consultants is permitted on the construction site.

1.11 Clean-up

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

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Installation and removal

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

1.2 Hoarding

- .1 Erected around work site a temporary steel fence, new, 2.4 m high, lined inside with a dust net.
- .2 Provide lockable access gates for trucks and at least one pedestrian gate as indicated and in accordance with traffic restrictions on adjacent streets. Provide locks and keys for the gates.
- .3 Erect where required and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
- .4 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.3 Guard rails and barricades

- .1 Provide and install secure, rigid guard rails and barricades around deep excavations.

1.4 Dust tight screens

- .1 Provide dust screens to enclose the spaces where dust generating activities are conducted in order to protect workers, the public and the finished surfaces or work areas.
- .2 Maintain and relocate protection until such work is complete.

1.5 Access to site

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.6 Public traffic flow

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

1.7 Fire routes

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.8 Protection for off-site and public property

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

Part 2 - PRODUCTS

2.1 Not used

.1 Not used.

Part 3 - EXECUTION

3.1 Not used

.1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Action and informational submittals

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

1.2 Materials

- .1 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 (Submittal Procedures).

1.3 Preparation

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 Execution

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2 Fit several parts together, to integrate with other Work.

- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .6 Cut materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Project cleanliness

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at daily regularly scheduled times.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris.
- .5 Dispose of waste materials and debris off site.
- .6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 Final cleaning

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris.
- .5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .7 Remove dirt and other disfiguration from exterior surfaces.
- .8 Sweep and wash clean paved areas.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

.1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Waste management goals

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.
- .2 Accomplish maximum control of solid construction waste.
- .3 Preserve environment and prevent pollution and environment damage.

1.2 Definitions

- .1 Class III: non-hazardous waste - construction renovation and demolition waste.
- .2 Inert Fill: inert waste - exclusively asphalt and concrete.
- .3 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .4 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .5 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .6 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .7 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .8 Separate Condition: refers to waste sorted into individual types.
- .9 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.

1.3 Submittals

- .1 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
 - .1 Failure to submit could result in hold back of final payment.
 - .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, co-mingled and separated off-site or disposed of.
 - .3 For each material reused, sold or recycled from project, include quantity in tonnes and the destination.
 - .4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

1.4 Storage, handling and protection

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .4 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off-site processing facility for separation.
 - .3 Provide waybills for separated materials.

1.5 Disposal of wastes

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil and paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
 - .1 Number and size of bins;
 - .2 Waste type of each bin;
 - .3 Total tonnage generated;
 - .4 Tonnage reused or recycled;
 - .5 Reused or recycled waste destination.
- .4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Application

- .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 Cleaning

- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION

Part 1 - GENERAL

1.1 Inspection and declaration

- .1 Contractor's Inspection: Contractor and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
 - .2 Request Departmental Representative Inspection.
- .2 Departmental Representative Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Work is complete and ready for final inspection.
- .4 Inspection or statement of final completion: when items noted above are completed, request final inspection of Work by Owner, Departmental Representative and Contractor. If Work is deemed incomplete by Owner and Departmental Representative, complete outstanding items and request reinspection.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Provide evidence, if requested, for type, source and quality of products supplied.

1.2 As -built documents and samples

- .1 Maintain at site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.3 Recording information on project record documents

- .1 Record information on set of opaque drawings, provided by Departmental Representative.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of buried elements.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements;
 - .3 Field changes of dimension and detail;
 - .4 Changes made by change orders;

- .5 Details not on original Contract Drawings;
- .6 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos for site records, and namely with respect to the marking of existing stones.

1.4 Warranties and bonds

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

Part 2 - PRODUCTS

2.1 Not used

- .1 Not used.

Part 3 - 3 EXECUTION

3.1 Not used

- .1 Not used.

END OF SECTION

Part 1 - GENERAL

1.1 References

- .1 Abbreviations and Acronyms
 - .1 Portland Cement: hydraulic cement or blended hydraulic cement (where 'b' denotes blended).
 - .1 Type GU, GUb and GUL: General use cement.
 - .2 Fly ash
 - .1 Type F: with calcium oxide (CaO) content less than 15%.
 - .3 Type S: granulated blast furnace slag.
- .2 References
 - .1 Refer to the latest applicable editions of the following standards:
 - .1 Canadian Standards Association (CSA)/CSA International
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A283, Qualification Code for Concrete Testing Laboratories.
 - .3 CSA A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.2 Delivery, storage and handling

- .1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
 - .1 Modifications to maximum time limit must be agreed to in writing by Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by Departmental Representative.
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- .3 Packaging waste management: recover packaging waste for reuse/recycling.

Part 2 - PRODUCTS

2.1 Materials

- .1 Portland cement: general use to CAN/CSA-A3001, Type GU.
- .2 Water: to CSA A23.1.
- .3 Aggregates: to CSA A23.1/A23.2.

2.2 Mixes

Description	Type-Class of exposure	Compressive strength at 28 days (MPa)	Max. Water/ Cement Ratio ⁽¹⁾⁽²⁾	Coarse aggregates (mm)	Air content ⁽³⁾ (%)	Slump ⁽⁴⁾⁽⁵⁾ (mm) ±20
Lean concrete	N	15	As needed	20	2-4	80

- (1) Ternary cement, type GUb-S/SF or GUb-F/SF. The total mass of supplementary cementing materials (fly ash, silica fume and slag) shall not exceed 30% of the total weight of the binder.
- (2) Where silica fume is used, the water/cement ratio becomes the water/(cement + silica fume) ratio.
- (3) Air content is always the same, whether a superplasticizer is added or not.
- (4) Tolerances in specified slump values slump apply only for control.
- (5) When pumping is used to place concrete, slump without the addition of superplasticizer may be increased by 20 mm. However, the water/cement ratio must be maintained.

2.3 Ready-mix supplier

- .1 The ready-mix supplier shall be responsible for the mix of this concrete and shall control at own cost the quality and uniformity of his products.
- .2 Selection of the concrete supplier is subject to acceptance by the Departmental Representative.

Part 3 - EXECUTION

3.1 Preparation

- .1 Obtain Departmental Representative's approval in writing before placing concrete. Provide 24h notice prior to placing of concrete.
- .2 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .3 Protect existing structures Work from staining.
- .4 Clean and remove stains prior to application for concrete finishes.

3.2 Concrete making and delivery

- .1 Prepare and mix concrete at ready-mix plant and deliver to the work site in mixers that comply with the requirements of CSA-A23.1.
- .2 Take appropriate steps to ensure that concrete poured is carried out within ambient air temperature limits stated in Table 16 of CSA-A23.1.
- .3 Organise and schedule concrete deliveries to ensure that each concreting operation is conducted without interruption
- .4 Where superplasticizer is required to improve concreting, proceed to addition of superplasticizer on site after all other ingredients are thoroughly mixed. Add superplasticizer in such way that the properties of concrete are maintained during unloading, placement and consolidation. Comply with the requirements and methods recommended by the manufacturer. Proportion the superplasticizer to obtain concrete slump between 100 mm and 150 mm.

- .5 Do not add water to concrete before unloading the mixer without prior authorisation by Departmental Representative. Water quantities added to concrete shall be indicated on the delivery slip.

3.3 Placing

- .1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.
- .2 Where placement operations involve dropping the concrete more than 1.5 m in formwork, place vertically using a suitable tubular conduit..

3.4 Cure and protection

- .1 When the concrete has set sufficiently, the exposed surfaces shall be kept wet continually for at least seven (7) consecutive days after placing. The water used for curing shall be clean and free of any material likely to stain or discolor the concrete.
- .2 During exceptional weather conditions such as when temperature is hot, winds high and relative humidity low, take special measures throughout concrete hardening period. Wall and column formwork shall then be kept thoroughly damp.
- .3 Freshly placed concrete shall be protected against direct sunlight, dry winds, frost, excessive heat and running water using adequate tarps or other membrane or sheeting to cover or fully enclose all freshly finished surfaces during entire concrete hardening period.

3.5 Cold weather concreting

- .1 Where ambient temperature is 5 °C or lower, or when it is likely that temperature will drop below this limit during placement or hardening, the requirements of this subsection concerning cold weather concreting shall apply.
- .2 Where concrete must be placed in cold weather conditions, all that is necessary to execute the work must be readily available. The tools and materials at hand shall maintain the required temperatures during concrete placement and hardening. Heating systems shall not be detrimental to concrete quality or adversely affect in any way the finishing materials. Heating devices that release carbon monoxide shall not be permitted.
- .3 Concrete shall not be laid on or against formwork, on grade or on any surface displaying a temperature lower than 5 °C.
- .4 The temperature of fresh concrete at time of placement shall read between 15 °C and 30 °C. Where the ambient temperature is relatively low, concrete temperature should come close to the 30 °C upper limit.
- .5 Implement efficient measures to maintain all concrete surfaces at 20 °C minimum during three (3) days or at 10 °C minimum during five (5) days after placement. Where dry heat is used, moisten the air in the enclosure and maintain both concrete and formwork continuously moist.
- .6 Concrete shall be kept at a temperature above freezing for a 7-day period; avoid alternating freeze-thaw cycles for a minimum of fourteen (14) days after concrete placement.

.7 Protection methods:

- .1 The above protection specifications may be complemented using adequate insulation and covering concrete surfaces with raised tarps (sheeting in contact with the concrete is absolutely counter-productive) or by fully enclosing the concrete and providing an opening for the introduction of heat in the enclosure as needed.

Note: Adequate protection depends on outside temperature, wind velocity and massivity of concrete.

- .2 Where the outside temperature is likely to drop below -12 °C during placement or during the above mentioned protection period, fully enclose the concrete structure and provide supplementary heating source.
- .3 Where the ambient temperature is likely to drop below -4 °C but not lower than -12 °C during placement or during the above mentioned protection period, cover all concrete surfaces using adequate raised tarps or insulating blankets in addition to supplementary heating source.
- .4 Where the ambient temperature is likely to drop to -4 °C during placement or during the above mentioned protection period, cover all concrete surfaces using adequate raised tarps or insulating blankets and supplementary heating should be available.
- .5 At the end of the specified protection period, withdraw protection and heating gradually such that air temperature around concrete does not drop by more than 10 °C per day until ambient temperature is reached.
- .6 Do not use salt or other so-called chemical freezing-point reducers unless written authorisation is obtained from the Departmental Representative.

3.6 Cleaning

- .1 Proceed to cleaning at work completion.
- .2 Waste management: separate waste for recycling.
 - .1 Divert unused concrete and concrete materials from landfill to local facility approved by Departmental Representative.
 - .2 Provide an appropriate area on the job site where concrete trucks can be safely washed.
 - .3 Remove and dispose of waste in accordance with applicable local, Provincial and Federal regulations.

END OF SECTION

Part 1 - GENERAL

1.1 Work of this section

- .1 All stone wall surfaces are subject to thorough cleaning of the masonry before work is undertaken.

1.2 Action and informational submittals

- .1 Provide proposed cleaning method and type of protection from cleaning residue for in-place conditions.

1.3 Quality assurance

- .1 Regulatory Requirements: ensure that Work is performed in compliance with all applicable Provincial regulations.
- .2 Work sample:
 - .1 Notify Departmental Representative 48 hours before commencing cleaning of each test patch. Obtain approval from Departmental Representative before commencing test.
 - .2 Conduct tests to determine effectiveness of following parameters for cleaning of masonry: water pressure and temperature, nozzle types and spraying distances.
 - .3 Start with lowest impact tests and stop testing when desired level of cleaning is achieved. Stop testing immediately when damage occurs.
 - .4 Test brushing and spraying as an alternative to pressure washing. Submit test outcomes to Departmental Representative for review. Use method approved by Departmental Representative.

1.4 Ambient conditions

- .1 Do not use wet cleaning method when there is a risk of frost.

Part 2 - PRODUCTS

2.1 Materials

- .1 Use clean potable water free of contaminants.
- .2 Treat water which has high metal content before use in cleaning.
- .3 Use clean air, free of oil and other contaminants.

2.2 Hot water

- .1 Use water at 20 °C.
- .2 Generate hot water in flash boilers or other suitable appliance.

2.3 Tools and equipment

- .1 Use only brushes with natural or soft plastic bristles.
- .2 Use only scrapers of wood or plastic.
- .3 Use water pumps fitted with accurate pressure regulators and gauges capable of being preset and locked at maximum specified levels. Water pumps to have rating of 150 kPa.
- .4 Use air compressors equipped with on-line oil filters to avoid spraying oil onto masonry.
- .5 Use gun equipped with pressure gauge at nozzle end.
- .6 Use plastic or non-ferrous metal piping and fittings.

Part 3 - EXECUTION

3.1 Site verification of conditions

- .1 Record existing conditions with photographs before and after cleaning. Notify Departmental Representative of potential complications with existing conditions.
- .2 Report to Departmental Representative conditions of deteriorated masonry or joints not noted on Contract Drawings and identified before and during cleaning.
- .3 Obtain written approval of Departmental Representative before cleaning areas of deteriorated masonry.

3.2 Preparation

- .1 Protect operatives and other site personnel from hazards.
 - .1 Ensure good ventilation in work area.
 - .2 Ensure workers wear eye, head, face protection, protective gloves, coveralls, boots and respirator to relevant MSHA/NIOSH standards.

3.3 Protection of in-place conditions

- .1 Cover and protect non-masonry finishes and surfaces not to be cleaned.
- .2 Protect wood and metal surfaces adjacent to masonry.
- .3 Protect plants, gardens, shrubs from watering and chemicals. Lime soil or Construct lime-filled trenches to neutralize effects of acid cleaners.

3.4 Execution of cleaning

- .1 Proceed with cleaning in accordance with written instructions on methods, systems, tools and equipment approved by Departmental Representative.
- .2 Dry brush or scrape surface deposits on walls.
- .3 Pre-wet masonry surface when necessary. Work from bottom of wall upwards.
- .4 Do not exceed maximum pressure at nozzle or have nozzle closer to masonry than approved by Departmental Representative during tests.
- .5 Stop work when cleaning has detrimental effect on plants and surrounding historic material.

- .6 Soften and loosen heavy dirt and calcite deposits with extended water spraying, then brush stained surfaces. Remove thick deposits with wooden scrapers.
- .7 Remove vegetation and any organic growth in or on masonry.
 - .1 Soak masonry with low-pressure water.
 - .2 Follow soaking by gentle scrubbing with natural bristle brush.
- .8 Medium-Pressure Water Cleaning:
 - .1 Remove stains and accumulated dirt with water at medium-pressure between 350-2700 kPa.
 - .2 Use a fan-type nozzle with minimum 375 mm spread.
 - .3 Hold nozzle minimum 450 mm from masonry surface.

3.5 Protection of work

- .1 Protect finished Work from damage until take-over.

END OF SECTION

Part 1 - GENERAL

1.1 Related requirements

- .1 Section 04 03 08 – Historic: Mortaring.

1.2 References

- .1 Definitions
 - .1 Raking: the removal of loose or deteriorated mortar to 100 mm depth in stone veneer and to 30 mm in brick veneer.
 - .2 Repointing: filling and finishing of masonry joints from which mortar is missing, has been raked out or where no mortar existed.
 - .3 Tooling: finishing of masonry joints using appropriate tool to provide final contour.
 - .4 Low-pressure water cleaning: water soaking of masonry using less than 350 kPa (50 lb/po²) measured at nozzle tip of hose.
- .2 Canadian Standards Association (CSA)/CSA International
 - .1 CAN/CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA A179, Mortar and Grout for Unit Masonry.

1.3 Quality assurance

- .1 Masonry Contractor:
 - .1 Call upon one only masonry contractor to perform masonry work at hand.
 - .2 Masonry contractor will have to be capable of demonstrating his skills and will present three (3) realizations in historic stone masonry work on projects of similar size and complexity to Work of this Contract during the last 10 years.
 - .3 Masonry contractor to have good level of understanding of structural behaviour of masonry walls when masonry work involves replacing or repairing stonework or brickwork which are part of structural masonry work.
- .2 Masons:
 - .1 Mason to have certificate of qualification with 5 years' minimum experience in historic stone or brick masonry work.
 - .2 Masons to have proof of license certification for proprietary restoration mortars.
- .3 Mock-ups:
 - .1 Construct two (2) work samples 1,5 m x 1,5 m where indicated by Departmental Representative to demonstrate raking and repointing procedures.
 - .2 Provide Departmental Representative with at least 24 hours notice prior to construction of the mock-ups.
 - .3 Carry out mock-up construction under the supervision of Departmental Representative to demonstrate one's full understanding of specified procedures, techniques and formulations is achieved before work is undertaken.

- .4 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with Work.
- .5 Accepted mock-up will demonstrate minimum standard for this work. Mock-up will remain as part of finished work.

1.4 Delivery, storage and handling

- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Keep material dry. Protect from weather, freezing and all forms of contamination.
- .3 Ensure that manufacturer's labels and seals are intact upon delivery.
- .4 Remove rejected or contaminated material from site.

1.5 Ambient conditions

- .1 Maintain masonry temperature between 5 and 25 °C for entire duration of work.
- .2 Ambient temperature lower than 5 °C: store mortaring materials for immediate use within heated enclosure in accordance with section 04 03 08 (Historic - Mortaring) and allow them to reach minimum temperature of 10 °C before use. Masonry work shall be protected against weather conditions (rain and snow) during the curing period.
- .3 Only water can be heated before use. Provide hot water to a maximum 40 °C on site during cold weather.
- .4 Maintain mortar at temperatures between 5 and 40 °C.

Part 2 - PRODUCTS

2.1 Mortar

- .1 Mortar: to CAN/CSA A179 and in accordance with section 04 03 08 (Historic - Mortaring).

Part 3 - EXECUTION

3.1 Raking joints

- .1 Use manual raking tool to remove deteriorated and bonded mortar from masonry units. The use of saws is strictly prohibited.
 - .1 Remove deteriorated mortar and adhered mortar from masonry elements to sound mortar or 100 mm in depth in stone veneer and to 30 mm in depth in brick veneer, leaving square corners and a flat surface at back of cut.
 - .2 Clean out voids and cavities encountered.
- .2 Ensure that no stones and other masonry units are chipped, altered or damaged by work to remove mortar in joints.
- .3 Clean surfaces of joints by compressed air or water under low pressure without damaging texture of masonry units.

- .4 Flush open joints and voids; clean open joints and voids with low pressure water and if not free draining blow clean with compressed air.
- .5 Leave no standing water.

3.2 Anchoring of the veneer and of the brick arches

- .1 Place anchors as specified. Obtain Departmental Representative's approval of such placement before mortar is applied.

3.3 Repointing

- .1 Dampen joints as well as masonry units.
- .2 Keep masonry damp while pointing is being performed.
- .3 Completely fill joint with mortar. Use type « N » mortar in stone veneer and type « O » mortar in brick veneer.
 - .1 Where surface of masonry units has worn rounded edges keep pointing back from surface to keep same width of joint.
 - .2 Avoid feather edges.
 - .3 Pack mortar solidly into voids and joints.
- .4 Build-up pointing in layers not exceeding 25 mm in depth.
 - .1 Allow each layer to set before applying subsequent layers.
 - .2 Maintain joint width to full depth.
- .5 Tool and finish joints to match existing joints or as directed by Departmental Representative. Tool, compact and finish using jointing tool or mason's slick.
- .6 Remove excess mortar from masonry face before it sets.

3.4 Protection during curing process

- .1 Cover completed and partially completed work not enclosed or sheltered at end of each work day. Membranes should be tightly installed to prevent finished work from drying out too rapidly.
- .2 Cover with waterproof tarps to prevent weather from eroding recently repointed material.
 - .1 Maintain tarps in place for minimum of two (2) weeks after repointing.
 - .2 Ensure that bottoms of tarps permit airflow.
- .3 Anchor coverings securely in position.
- .4 Damp cure:
 - .1 Provide damp cure for pointing mortars.
 - .2 Install and maintain wetted burlap protection throughout the curing process and over minimum three (3) days.
 - .3 Wet mist burlap only — ensure no direct spray reaches surface of curing mortar.
 - .4 Shade areas of work from direct sunlight and maintain constant dampness of burlap.
- .5 Protect from drying winds. Pay particular attention at corners of structure.

- .6 Maintain ambient temperature of minimum 5 °C after repointing masonry for:
 - .1 Minimum three (3) days in summer.
 - .2 Minimum thirty (30) days in cold weather conditions using dry heated enclosures.

3.5 Cleaning

- .1 Clean surfaces of mortar droppings, stains and other blemishes resulting from work of this contract as work progresses.
- .2 Remove droppings and splashings using clean sponge and water.
- .3 Do further cleaning using stiff natural bristle brushes after mortar has attained its initial set and has not fully cured.
- .4 Clean masonry with stiff natural bristle brushes and plain water only if mortar has fully cured.
- .5 Clean masonry with low pressure 15 to 45 lb/po² clean water and soft natural bristle brush.

3.6 Protection of completed work

- .1 Protect adjacent finished work against damage which may be caused by on-going work.

END OF SECTION

Part 1 - GENERAL

1.1 Related sections

- .1 Section 04 03 07 – Historic: Masonry Repointing
- .2 Section 04 03 31 – Historic: Replacing Brick
- .3 Section 04 03 42 – Historic: Replacement of stone
- .4 Section 04 03 43 – Historic: Dismantling Stone Masonry

1.2 Alternates

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

1.3 References

- .1 Canadian Standards Association (CSA)/CSA International
 - .1 CAN/CSA-A179, Mortar and Grout for Unit Masonry.

1.4 Technical data sheets

- .1 Submit technical data sheets of products used at least fifteen (15) days prior to commencing work.

1.5 Testing standards

- .1 Flow and cube strength: to ASTM C 270.
- .2 Vicat cone test: to ASTM C 780.
- .3 Cube strength: to CAN/CSA-A179, annexe B.
- .4 Flexural bond strength: to ASTM C 1072.

1.6 Ambient conditions

- .1 Execute work when ambient temperature is above 5 °C. When ambient temperature is below 5 °C, cover and heat work as directed by Departmental Representative.
- .2 Prepare and maintain temperature of mortar between 5 and 40 °C until used.
- .3 Maintain the temperature of receiving surfaces and mortar between 5 and 25 °C for 72 hours after application in summer and for 30 days in winter.

Part 2 - PRODUCTS

2.1 Mortars

- .1 Type N joint and bedding mortar: based on proportion specifications, consisting of 1-part grey Portland cement, 1-part lime, and 6 parts sand.

- .2 Type S joint and bedding mortar: based on proportion specifications, consisting of 2 parts grey Portland cement, one (1) part lime, and nine (9) parts sand.
- .3 Type O joint and bedding mortar: based on proportion specifications, consisting of 1-part grey Portland cement, two (2) parts lime, and nine (9) parts sand.
- .4 All dry mortar materials shall be premixed at the plant, bagged and originate from one (1) only manufacturer.

2.2 Compressive strength

- .1 Compressive strength measured on collected samples shall comply with the following:
 - .1 Type N mortar:
 - .1 compressive strength 2 MPa at 7 days
 - .2 compressive strength 3,5 MPa at 28 days
 - .2 Type S mortar:
 - .1 compressive strength 5 MPa at 7 days
 - .2 compressive strength 8,5 MPa at 28 days
 - .3 Type O mortar:
 - .1 compressive strength 2,5 MPa at 28 days.

2.3 Air content

- .1 Type N mortar: 18 % maximum.
- .2 Type S mortar: 18 % maximum.
- .3 Type O mortar: 14 % maximum.

2.4 Workability

- .1 Bedding mortar: Vicat cone penetration test to be between 40 and 50 mm depending on outside temperature, as directed by the Departmental Representative.
- .2 Repointing mortar: Vicat cone reading to be between 20 and 30 mm depending on outside temperature, as directed by the Departmental Representative.

Part 3 - EXECUTION

3.1 Mortar batching

- .1 Mix mortar in a clean mortar mixer. Use potable water in quantities recommended by the manufacturer and mix as indicated. Comply with manufacturer's recommendations and that of this document.
- .2 Mortar mixing should always be carried out by the same person.
- .3 Rebatching of mortar is not authorised.
- .4 In collaboration with the laboratory representative, determine the water/binder ratio and the mixing time to meet in order to obtain the desired consistency for the bedding mortar and the repointing mortar. Measure subsequently the water added to each batch and time the mixing to meet the determined values.

3.2 Cleaning

- .1 Remove droppings and splashings using clean sponge and water.
- .2 Clean masonry with low pressure clean water between 15 to 45 lb/po² and soft natural bristle brush.

END OF SECTION

Part 1 - GENERAL

1.1 Related requirements

- .1 Section 04 03 07 – Historic: Masonry Repointing
- .2 Section 04 03 08 – Historic: Mortaring
- .3 Section 31 04 31 – Historic: Subgrade Shoring and Bracing

1.2 References

- .1 CSA International
 - .1 CAN/CSA-A82-06, Fired Masonry Brick Made from Clay or Shale.
 - .2 CSA A82.3-M1978 (R1999), Calcium Silicate (Sand-Lime) Building Brick

1.3 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Product Data: Provide manufacturer's printed product literature and data sheets for brick and materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Submit samples: Two (2) of each type of masonry unit specified.
- .4 Certificates: Provide certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
- .5 Test Reports: Provide certified test reports showing compliance with specified performance characteristics and physical properties.

1.4 Quality assurance

- .1 Construct mock-up panel of masonry wall construction 1000 x 1000 mm showing masonry layout pattern, reinforcement detail, connectors and mortar joints, joint finishing, cleaning method and workmanship.
- .2 Construct mock-up where directed by Departmental Representative.
- .3 Notify Departmental Representative minimum of 24 hours prior to construction of the mock-up.
- .4 Work not to proceed prior to approval of mock-up. Allow 24 hours for inspection of mock-up by Departmental Representative. Accepted mock-up becomes standard for this Work.

1.5 Delivery, storage and handling

- .1 Delivery and Acceptance Requirements:
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
 - .2 Provide weather protection and construction protection in accordance with CSA-S304.1.
 - .3 Provide weather protection to newly opened or dismantled sections in assembly.

- .4 Protect bricks and store bricks to facilitate their resetting.
 - .1 Store dismantled masonry units protected from exposure to water, elements, and potential mechanical damage.
 - .2 Submit storage and identification system to Departmental Representative for review.
 - .3 Store detached face bricks, back-up bricks and bricks showing evidence of soluble salts on separate pallets.
- .2 Place detached bricks on wood surfaces during handling. Prevent contact with metal surfaces or elements.
- .3 When bricks are lowered to ground, place directly on wooden platform that will be used for transport or storage.
- .4 Transport and store bricks on wooden platforms.
- .5 Ensure that sharp edges of bricks do not come into contact with hard objects.
- .6 At request of Departmental Representative, turn over any remaining salvaged bricks to Owner at completion of contract.
- .7 Packaging Waste Management: remove for reuse in accordance with Section 01 74 21 (Construction/Demolition Waste Management and Disposal).

1.6 Ambient conditions

- .1 Maintain materials and surrounding air to minimum 5 °C prior to and for minimum 72 hours after completion of brick repairs.
- .2 Maintain temperature of mortar materials in accordance with Section 04 03 07 (Historic - Masonry Repointing).
- .3 Maintain masonry temperature between 5 °C and 25 °C for duration of the Work.

Part 2 - PRODUCTS

2.1 New face brick and backing brick

- .1 Red clay brick: to CAN/CSA-A82.
 - .1 Type: Type S, category EG.
 - .2 Size: to match existing being replaced.
 - .3 Colour and texture: to match existing.
 - .4 Maximum 24-hour cold water absorption: 8%.
 - .5 Maximum Saturation Coefficient: 0.78.
 - .6 Compressive strength: over 20 MPa
- .2 Yellow sand-lime brick: to CAN/CSA-A82.1.
 - .1 Type: Type S, category EG.
 - .2 Size: to match existing being replaced.
 - .3 Colour and texture: to match existing.

- .4 Maximum 24-hour cold water absorption: 8%.
- .5 Maximum Saturation Coefficient: 0.78.
- .6 Compressive strength: over 20 MPa
- .7 Chemical composition:
 - .1 Silicon dioxide (SiO_2): 56%.
 - .2 Alumina (Al_2O_3): 37,5%.
 - .3 Others: 6,5%.

2.2 Existing brick

- .1 Where sound, existing brick units salvaged on site shall be used for replacement purposes especially for replacement in the vault facing.
- .2 Be careful not to alter units during dismantling and sorting of existing brick veneer.

2.3 Mortar

- .1 Mortar: in accordance with CAN/CSA A179 and Section 04 03 08 (Historic – Mortaring).

Part 3 - EXECUTION

3.1 Site verification of conditions

- .1 Check for evidence of repairs, cracks, moisture, soluble salt contamination and other defects not noted on Contract Drawings, and report to Departmental Representative before starting Work.

3.2 Preparation

- .1 Install and remove shoring or other supports in accordance with Section 31 04 31 (Historic - Subgrade Shoring and Bracing).

3.3 Brick removal

- .1 Verify location and condition of brick masonry surfaces to be removed with Departmental Representative.
- .2 In areas of work, identify salvageable bricks with Departmental Representative.
- .3 Remove identified areas of salvageable brickwork as follows:
 - .1 Cut through unsupported load bearing brickwork in length not exceeding the length of 5 brick units, at one time.
 - .2 During removal, protect sound areas to remain. Use mechanical hand methods of removal.
 - .3 Remove adhered mortar from surface of adjacent bricks that remain in place.

3.4 Brick salvage

- .1 Carefully clean, and store bricks for re-use. Store and protect bricks in accordance with Article 1.5, DELIVERY, STORAGE AND HANDLING.

3.5 Raking joints and unsealing

- .1 Use manual raking tool to remove deteriorated mortar and adhered mortar on masonry units.
- .2 Remove mortar without chipping, altering or damaging masonry units.

3.6 Brick replacement

- .1 Install masonry anchors as specified. Prior to placing mortar, obtain approval of Departmental Representative of placement of ties and connectors.
- .2 Co-ordinate bond pattern, coursing height and joint width with existing brickwork in area selected by Departmental Representative.
- .3 Mix and blend brick units within each pallet and with other pallets to ensure uniform blend of colour and texture.
- .4 Except in cold weather, pre-wet bricks having an initial rate of absorption exceeding 30 g/minute-194 cm² to uniform degree of saturation, 3 to 24 hours before laying. Do not lay until surface is dry.
- .5 Rework exposed cut faces of the new bricks to match the finish of other exposed faces.
- .6 Clean dust and brick fragments from slot. Before proceeding with Work, inspect cleaned surface with Departmental Representative.
- .7 Dampen slot's surfaces before applying mortar.
- .8 Apply mortar and lay bricks.
 - .1 Lay bricks on full beds of mortar.
 - .2 Fill vertical joints buttered and placed full in face and back-up bricks, and at vertical joint between wythes.
 - .3 Lay bricks and tool joints in one operation, tooling with a round jointer to provide smooth joints compressed uniformly concave.
 - .4 Rake bedding mortar back to a minimum depth of 25 mm and make ready for pointing with pointing mortar in separate operation. Provide minimum 3-day damp cure to bedding mortar prior to pointing.
- .9 Apply pointing mortar: Fill raked joints with pointing mortar.
- .10 Finish joints to match those of existing brickwork, in area identified by Departmental Representative.
- .11 Keep new mortar damp for 3 days at a minimum temperature of 5 °C.
- .12 Clean finished brickwork as work progresses.
 - .1 Remove mortar splashings on exposed brickwork.
 - .2 Leave no mortar on face of bricks.
 - .3 Remove mortar staining before it sets.
 - .4 Clean masonry with clean water and soft bristle brush only.
- .13 Inspect finished brickwork with Departmental Representative.

3.7 Repointing

- .1 Do pointing work in accordance with Section 04 03 07 (Historic - Masonry Repointing)
- .2 Dampen joints and porous masonry units.
- .3 Keep masonry damp while pointing is being performed.
- .4 Completely fill joint with mortar.
 - .1 Masonry units with worn rounded edges: maintain joint width by pointing back from exterior face.
 - .2 Avoid feather edges.
 - .3 Pack mortar solidly into voids and joints.
- .5 Build-up pointing in layers not exceeding 20 mm in depth.
 - .1 Allow each layer to set before applying subsequent layers.
 - .2 Maintain joint width.
- .6 Finish and tool joints to match existing profile as directed by Departmental Representative. Tool, compact and finish using mason's slick to force mortar into joint.
- .7 Remove excess mortar from masonry face before it sets.

3.8 Cleaning

- .1 Clean brick work surfaces after repairs have been completed and mortar has set.
- .2 Clean brick surfaces of adhesive or mortar residue resulting from work performed without damaging bricks or joints.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 21 (Construction/Demolition Waste Management and Disposal).

3.9 Protection of work

- .1 Cover completed and partially completed work not enclosed or sheltered at end of each work day. Membranes should extend to 0.5 m over surface area of work and be tightly installed to prevent finished work from drying out too rapidly.
- .2 Cover with waterproof tarps to prevent weather from eroding recently repointed material.
 - .1 Maintain tarps in place for 2 weeks after repointing.
 - .2 Ensure that bottoms of tarps permit airflow to reach mortar in joints.
- .3 Anchor coverings securely in position.
- .4 Damp cure: Provide damp cure for pointing mortars.
 - .1 Install and maintain wetted burlap protection on repointed masonry during entire curing process: Minimum 3 days.
 - .2 Wet mist burlap only, ensure no direct spray reaches surface of curing mortar.
- .5 Protect from drying winds. Pay particular attention at corners of structure.

- .6 Maintain ambient temperature of minimum 5 °C after repointing masonry for:
 - .1 Minimum 7 days in summer.
 - .2 Minimum 30 days in cold weather conditions using dry heated enclosures.
- .7 Protect adjacent finished work against damage which may be caused by on-going work.

END OF SECTION

Part 1 - GENERAL

1.1 Related sections

- .1 Section 04 03 07 – Historic: Masonry Repointing
- .2 Section 04 03 08 – Historic: Mortaring
- .3 Section 04 03 43 – Historic: Dismantling Stone Masonry
- .4 Section 31 04 31 – Historic: Subgrade Shoring and Bracing

1.2 References

- .1 ASTM International
 - .1 ASTM C 97/C 97M, Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
 - .2 ASTM C 170/C 170M, Standard Test Method for Compressive Strength of Dimension Stone.
 - .3 ASTM C 568, Standard Specification for Limestone Dimension Stone.
 - .4 ASTM C 616, Standard Specification for Quartz-Based Dimension Stone.

1.3 Action and informational submittals

- .1 Shop Drawings:
 - .1 Submit shop drawings describing method of stone replacement, including removal, shoring and erection.
 - .2 Submit drawings stamped and signed by professional engineer registered or licensed in Québec.
 - .3 Keep in mind that no technical document in DWG format will be provided to contractor and/or subcontractor.
- .2 Drawings of stone cutting:
 - .1 Submit a drawing for each type of stone being replaced showing dimensions, type finish on exposed and unexposed faces, bedding planes, location of anchors and other details.
 - .2 Submit drawings along with samples.
- .3 Samples:
 - .1 Submit required samples of replacement stones not less than fifteen (15) days before masonry work begins.
 - .1 Submit two (2) of each type of masonry unit specified: sandstone, limestone rubble, and sandstone coping.
 - .2 Submit one (1) of each type of masonry reinforcement and tie proposed for use in this project.
 - .3 Submit samples in sandstone required for testing:
 - .1 Five (5) samples 150 mm x 100 mm x 50 mm for compressive strength testing to ASTM C 170.

- .2 One (1) sample 150 mm x 150 mm x 12 mm for porosity test to ASTM C 97.
- .4 Submit technical data sheets containing the tested chemical and physical-mechanical properties issued by a recognized laboratory. Information on data sheets not date back to more than twenty-four (24) months. Where such product data is not available, provide for costs associated with these laboratory tests.
- .5 Submit the following stone samples:
 - .1 Veneer stone: 300 mm x 300 mm x 300 mm.
 - .2 Coping stone: 200 mm x 300 mm x 300 mm (including the rounded part).
 - .3 Rubble: 300 mm x 200 mm x 100 mm.
- .6 Choose samples from the currently mined bed in the quarry and provide a certificate issued by the quarry.

1.4 Quality assurance

- .1 Allow Departmental Representative access to mason's workshop for inspection of current work-in-progress.
- .2 Qualification:
 - .1 Masonry contractor will have to be capable of demonstrating his skills and will present three (3) realizations in historic stone masonry work on projects of similar size and complexity to Work of this Contract during the last 10 years.
 - .2 Execute work of this section by personnel experienced in preservation of historic masonry.
 - .3 Masons engaged by Masonry Contractor to have minimum of five (5) years' experience with historic masonry.
 - .4 Departmental Representative has right to reject masons who do not demonstrate appropriate abilities or experience.

1.5 Delivery, storage and handling

- .1 Deliver, store and handle materials to avoid altering or staining their finish.
- .2 Keep materials dry. Protect materials from weather conditions, frost, and all forms and sources of contamination.
- .3 Do not place stones directly on the ground.

1.6 List of stones

- .1 Make a list of each of the stones to be replaced, indicating their accurate dimensions, their location in the structure and a reference to the stone cutting drawings submitted.

Part 2 - PRODUCTS

2.1 Materials

- .1 Obtain new stone from a single quarry source acceptable to Departmental Representative. Ensure single quarry source has resources to provide materials of consistent quality and matching existing stone or to specifications.

- .2 Limestone rubble: clayey limestone from Château-Richer.
- .3 Sandstone: to ASTM C 616, type II (quartzitic sandstone), Saint-Léon Formation and originating from the Lower St. Lawrence, colour green.

2.2 Properties of sandstone units

- .1 Mechanical properties:
 - .1 Density: 2700 kg/m³ minimum.
 - .2 Absorption: 0,1 to 0,3 %.
 - .3 Compressive strength: 120 MPa minimum.
- .2 Mineral composition:
 - .1 Aluminate (Al₂O₃): 8 % ± 1 %.
 - .2 Silicon dioxide (SiO₂): 60 % ± 10 %.
 - .3 Calcium oxide (CaO): 12 % ± 5 %.
- .3 Stones shall not display any trace of sediment deposit bed or quartz vein.

2.3 Bedding plane

- .1 All types of stone with horizontal bedding plane.

2.4 Dressing of stone units

- .1 Cut stone to shape and dimensions and full to square with joints as indicated.
 - .1 Dress exposed faces true. Finish exposed faces of stones to match finish of existing stones or as specified on the drawings.
 - .2 The five (5) unexposed faces of the stones shall be roughened after sawing and display perfectly rough surfaces offering good adherence with mortar to full depth of stones. No sawed surface will be accepted.
- .2 Execute profiled work from full size details and templates. Make exposed arises in true alignment and ease slightly to prevent snipping.
- .3 Drill holes in stone to fit lifting hooks.
 - .1 Provide Lewis pin and clamp holes in pieces which cannot be manually lifted.
 - .2 Do not cut holes in exposed surfaces and at less than 150 mm from an arise.
- .4 Finish exposed faces and edges of stones to comply with requirements indicated for finish and to match approved samples and field-constructed mock-up.

2.5 Fabrication tolerances

- .1 Fabricate dimension stone to the following tolerances:
 - .1 Length: plus or minus 2 mm.
 - .2 Height: plus or minus 2 mm.
 - .3 Deviation from Square: plus or minus 2 mm, the longest edge as the base.
- .2 Use calipers, a square and a level to measure the space to fill. Provide mortar joints of 10 mm to 12 mm thick.

- .3 Drill stones for anchors, cramps, dowels and support systems as specified on the drawings.

2.6 Existing stones

- .1 Use hard, sound, and clean existing stone salvaged on site as approved by Departmental Representative to replace stones of smaller dimensions. Sawed faces shall be roughened as indicated above.
- .2 Existing stones may be used in reconstructing masonry core. Cut stones to fit the dimensions of the work.

2.7 Rejects

- .1 Rubble and sandstone from blasted quarry bed will be refused.
- .2 Sandstone from naturally fractured beds will be refused.
- .3 After cutting and dressing, sandstone units shall display none of the following imperfections:
 - .1 Chipping and pick marks;
 - .2 Crack, fracture and traces of stone splitting;
 - .3 Continuous traces of quartz more than 1.0 mm thick.

2.8 Mortar

- .1 Mortar: in accordance with section 04 03 08 (Historic - Mortaring).

2.9 Anchoring adhesive

- .1 Hybrid adhesive mortar composed of methacrylate resin, hardener, cement and water.

2.10 Anchors

- .1 Anchors: A316 grade stainless steel to AWS D1.6, sealed with anchoring adhesive.

Part 3 - EXECUTION

3.1 Preparation

- .1 Move and lift stone units using means to prevent damage. Submit stone units dropped or impacted to Departmental Representative for inspection and approval.
- .2 Indicate bedding planes of stone units. Duplicate bedding marks on usable pieces of cut stone.
- .3 Install and remove shoring or other supports in accordance with section 31 04 31 (Historic - Subgrade Shoring and Bracing).

3.2 Removal of stones

- .1 Proceed to the removal of deteriorated and identified stones in accordance with section 04 03 43 (Historic - Dismantling Stone Masonry).
- .2 Remove dust, loose fragments and mortar from slots and voids as specified on the drawings.

3.3 Joint raking

- .1 Rake joints around stones to be removed in accordance with section 04 03 07 (Historic - Masonry Repointing).

3.4 Moving stones

- .1 Use Lewises or dogs to lift stones to working level.
- .2 Slide stones into place on wood ramps.
- .3 Protect edges of stone from damage when hoisting and lifting from position. Use separators or wood shims to isolate units from hoisting belts. Incorporate only undamaged stones in Work.

3.5 Stone replacement

- .1 Install masonry ties and connectors in accordance with CAN/CSA A-370 unless indicated otherwise. Prior to placing mortar, obtain approval of Departmental Representative of placement of ties and connectors.
- .2 Co-ordinate bond pattern, coursing height and joint width with existing masonry work.
- .3 Clean dust and stone fragments from slot where new veneer stone will be inserted. Remove altered masonry fill to minimum 300 mm behind stone or to sound masonry. Before proceeding with Work, inspect cleaned surface with Departmental Representative.
- .4 Dampen stone and slot surfaces before applying mortar.
- .5 Apply mortar and lay stones.
 - .1 Lay stones on full beds of mortar.
 - .2 Fill vertical joints buttered and placed full in face, and at vertical joint between wythes.
 - .3 Lay stones and tool joints in one operation, tooling with a round jointer to provide smooth joints compressed uniformly concave.
 - .4 Rake bedding mortar back to a minimum depth of 25 mm and make ready for pointing with pointing mortar. Provide minimum 3-day damp cure to bedding mortar prior to pointing.
- .6 Lay heavy stones and projecting stones after mortar in courses below has hardened sufficiently to support weight.
- .7 Prop and anchor projecting stones until wall above is set.
- .8 Set stones to match alignment of adjacent stones or plumb, true and level in full bed of mortar with vertical joints buttered and placed full. Completely fill anchor, dowel and lifting holes and voids left by removed edges.
- .9 Apply pointing mortar. Fill raked joints with pointing mortar.
- .10 Finish joints identical to existing.
- .11 Keep fresh mortar damp for three (3) days at minimum temperature of 5 °C. Refer to section 04 03 07 (Historic - Masonry Repointing).
- .12 Clean masonry as work progresses.
 - .1 Remove mortar dropping from face of stone.
 - .2 Clear face of veneer masonry of any trace of mortar.

- .3 Remove mortar residue from face of stone before mortar is set.
- .4 Use only clean water and soft natural bristle brush to clean masonry.
- .13 Inspect finished work with Departmental Representative.

3.6 Filling joints / Pointing

- .1 Fill joints and repoint masonry in accordance with section 04 03 07 (Historic - Masonry Repointing).

3.7 Cleaning

- .1 Confirm acceptance of mock-up cleaning operations to demonstration from Departmental Representative before starting cleaning work.
- .2 Clean stone work surfaces after repairs have been completed and mortar has set.
- .3 Clean stone surfaces of adhesive or mortar residue resulting from work performed without damaging stone or joints.
- .4 At work completion, clear site of debris, surplus material and equipment, leaving work area in clean and safe condition.

END OF SECTION

Part 1 - GENERAL

1.1 Related sections

- .1 Section 04 03 07 – Historic: Masonry Repointing
- .2 Section 04 03 08 – Historic: Mortaring
- .3 Section 04 03 42 – Historic: Replacement of stone

1.2 Action and informational submittals

- .1 Develop a complete and detailed photographic corpus of the structures to be dismantles and reconstructed.

1.3 Quality assurance

- .1 Qualification:
 - .1 Masonry Contractor: work of this section executed by contractor specializing in historic stone conservation work, using similar stone dismantling techniques.
 - .2 Masonry contractor will have to be capable of demonstrating his skills and will present three (3) realizations in historic stone masonry work on projects of similar size and complexity to Work of this Contract during the last 10 years.
 - .3 Supervisor:
 - .1 Provide competent trade foreperson specializing in type of work required.
 - .2 Foreperson experience: Minimum five (5) years successful experience in deconstruction of historic stone masonry. Must be present on site throughout Work.
 - .4 Dismantlers of stonework: workers to have minimum (5) year record of successful stone masonry dismantling.

1.4 Delivery, storage and handling

- .1 Protect stones and take appropriate measures to facilitate resetting.
 - .1 Store dismantled masonry units protected from exposure to water, elements, and potential mechanical damage on wood pallets fully covered under polyethylene or within a shed.
 - .2 Submit storage and identification system to Departmental Representative for approval.

1.5 Ambient conditions

- .1 Loosen wet masonry only when temperature is above 5 °C.
- .2 In temperature 5 °C and below:
 - .1 Keep stones dry
 - .2 Protect wet stones from freezing.

Part 2 - PRODUCTS

2.1 Mortar

- .1 Mortar: in accordance with specifications in section 04 03 08 (Historic – Mortaring).

2.2 Anchor adhesive

- .1 Hybrid adhesive composed of urethane methacrylate resin, hardener, cement and water.

2.3 Anchors

- .1 Anchors: grade A316 stainless steel to AWS D1.6, sealed with anchoring adhesive.

Part 3 - EXECUTION

3.1 Examination

- .1 Examine masonry, staging and storage areas and notify Departmental Representative in writing of conditions detrimental to acceptable and timely completion of Work.

3.2 Protection

- .1 Prevent damage to surrounding structures and features which are to remain. Make good damage incurred.
- .2 Protect surrounding surfaces and components from damage during work.
- .3 Make good damage to historic fabric.
- .4 Obtain Departmental Representative's approval for repair methodology.

3.3 Marking and Recording

- .1 Mark stone on face before removal using marking product which can be completely erased when required without damaging masonry unit:
 - .1 Ball-point pen on diachylon, attached to stone
 - .2 Waxless chalk directly on stone.
- .2 Develop a photographic documentary of structures to be dismantled and reconstructed, the number of each stone to appear on photographs.
- .3 Ensure that temporary marking will remain in use resistant to weather, handling and cleaning until final marking of stones (if required).
- .4 Remove markings and adhesive without damaging units. Use a brush with vegetable fibre, either dry or with water without damaging masonry units. Use no solvent, acid or other chemical product.
- .5 Make record of dimensions of each stone removed from structure.

3.4 Support

- .1 Construct shoring and cradling, and other temporary framing work needed to support structure, or parts of it, during removal operations, and in anticipation of resetting if structure is not to be completely dismantled, according to approved shop drawings bearing the seal and signature of a qualified engineer with experience in rehabilitating historic structures registered or licensed in Québec, Canada.

3.5 Method for loosening stones

- .1 Use approved methods to loosen stones which will cause no damage either to stones or to other elements or features.
- .2 Use only hand held tools.
- .3 Obtain Departmental Representative's approval for use of power tools before commencing removal work.
- .4 No loosening or removal activity may be undertaken on wet masonry when temperature is below freezing point.

3.6 Special techniques

- .1 Avoid damaging arrises of stone when removing mortar and freeing up.
- .2 Use wood wedges where required to remove or dislocate stone. Use flat pry bars protected with impact absorbing protection (burlap, cardboard).
- .3 Use nylon hoisting belts. Use minimum 2 belts per stone.
- .4 Use separators or wood shims to isolate units from hoisting belts and prevent damage to arrises of stone when hoisting and lifting from position or during handling along the wall. Where damage occurs to stone, replace stone in accordance with section 04 03 42 (Historic - Replacement of stone) at own cost.

3.7 Temporary storage

- .1 Place stones in designated area of site for cleaning, detailed inspection and for final marking, before storage.
- .2 Make stones accessible and readily retrievable when required.

3.8 Handling

- .1 Place detached stones on wood surfaces during handling. Prevent contact with metal.
- .2 When stones are lowered to ground, place directly on wooden platform used for transport or storage.
- .3 Transport and keep stones on wooden platforms.
- .4 Ensure that sharp edges of stones do not come into contact with hard objects.

3.9 Reconstruction of masonry structures

- .1 The masonry against which the work will be reconstructed shall be sound and free of loose particles.
- .2 Before placing reconstruction elements, clean with water jet and dampen surfaces before applying bedding mortar.
- .3 Install new veneer stones on water impregnated softwood wedges. Leave until mortar has hardened and wood has dried. Remove wedges without breakage.
- .4 Anchor stones with stainless steel A-316 threaded rods. Drill hole as recommended by adhesive manufacturer and inject adhesive mortar. Use plastic mesh screen tubes where required to contain the adhesive.
- .5 Perform reassembly of masonry to alignment of adjacent stones. Provide joints of same thickness as former joints and that match with joints in adjacent area.
- .6 Construct masonry core with new materials or sound, recovered stones as directed.

3.10 Cleaning

- .1 Do cleaning operations at above freezing temperature. After cleaning, protect wet stones against freezing until dry.
- .2 Clean stones by wet scrubbing with vegetable fibre brush unless otherwise instructed.
- .3 Remove excess mortar with hand tools.

3.11 Filling and pointing

- .1 Fill masonry joints and point in accordance with section 04 03 07 (Historic - Masonry Repointing).

END OF SECTION

Part 1 - GENERAL

1.1 Related requirements

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 31 23 33.01 – Excavating, trenching and backfilling.

1.2 References

- .1 CSA A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems
- .2 Prefabricated membrane, complies with CAN/CGSB 37-GP-56M (9th draft)-1985, Membrane Modified, Bituminous, Prefabricated, and Reinforced for Roofing

1.3 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Submit samples of products, modified bitumen membrane of 250 x 250mm at least fifteen (15) days prior to work inception.

1.4 Quality Assurance

- .1 Works covered by this section must be executed by qualified sealing and roofing workers.

1.5 Delivery, storage and handling

- .1 All materials will be delivered and stored in their original packaging, displaying the manufacturer's name, product name, weight, and reference standards, as well as all other indications or references considered standard.
- .2 At all times, materials will be adequately protected and stored in a dry and properly ventilated area, away from any welding flame or spark and sheltered from the elements or any harmful substance. Only materials destined for same-day use can be removed from this storage area. In cold weather, these materials should be stored in a heated area at a minimum temperature of 10 °C and removed prior to application. If rolls cannot be stored in a heated environment, they may be pre-conditioned before installation.
- .3 Store adhesives and emulsion-based waterproofing mastics at a minimum 5°C. Store adhesives and solvent-based mastics at sufficient temperatures to ensure ease of application. Materials delivered in rolls will be carefully stored upright.

Part 2 - PRODUCTS

2.1 Materials

- .1 Separator sheet: root barrier, thickness 0.46 mm
- .2 Drainage and filtration board (properties):
 - .1 Thickness 10 mm.
 - .2 Compressive Strength: 719 kN/m².
 - .3 Maximum Flow Rate: 211 l/min/m.

- .3 Roof membrane Base Sheet:
 - .1 Description: Roofing membrane with non-woven polyester reinforced elastomeric bitumen. The top face is sanded; the underside is covered with a thermofusible plastic film.
 - .2 Components: non-woven polyester reinforcement of 180 g/m², a mixture of bitumen and polymer SB, protection by colored granules.
 - .3 Properties:
 - .1 Breaking strength (N/5 cm): longitudinal = 1060, transversal = 785.
 - .2 Ultimate elongation (%): longitudinal = 8%, transversal = 58%.
 - .3 Cold bending at -30 °C: No cracking.
 - .4 Softening point: ≥ 110 °C.
 - .5 Static puncture resistance (N): ≥ 245N.
 - .6 Complies with ONGC 37.56-M.
 - .4 Primer for heat welded membranes: a blend of elastomeric bitumen, volatile solvents and adhesive enhancing additives used to prime concrete substrates to enhance the adhesion of torch-applied waterproofing membranes.
 - .5 Liquid membrane:
 - .1 Bituminous base layer.
 - .1 In compliance with CGSB 37-GP-9Ma.
 - .2 Product: 56170 conditioner.
 - .2 Heat-applied rubberized asphalt:
 - .1 In compliance with CGSB- 37.50.
 - .2 Product: 6125 conditioner.

Part 3 - EXECUTION

3.1 Surface examination and preparation

- .1 Before roofing work begins, the Departmental Representative and roofing foreman will inspect and approve deck conditions (including slopes and wood blocking) as well as upstands and parapets, construction joints and others. If necessary, a non-conformity notice will be issued to the contractor so that required corrections can be made. The start of roofing work will mean roofing conditions are acceptable for work completion.
- .2 Do not begin any work before surfaces are smooth, dry, and free of ice and debris. Use of calcium or salt is forbidden for ice or snow removal.
- .3 No materials will be installed during rain or snowfall.

3.2 Method installation

- .1 Install roofing elements on clean and dry surfaces, in conformance with manufacturer's instructions and recommendations.

- .2 Roofing work must be completed in a continuous fashion as surfaces are readied and weather conditions permit.
- .3 It's preferable to seal all seams that are not covered by a cap sheet membrane in the same day. The cap sheet cannot be installed if any moisture is present at/in the base sheet seams.
- .4 Whenever membranes are torch-applied, a continuous and even bead of molten bitumen must be visible as the membrane is unrolled and torched.
- .5 Ensure waterproofing conditions for roofs at all times, including protection during installation work by other trades and progressive protection as work is completed (e.g. drains, etc.).
- .6 The dampproofing liquid membrane shall be applied as recommended by the manufacturer in two (2) stages, i.e., application of the base layer and application of the rubberized asphalt layer.

3.3 Application primer

- .1 Roofing substrates of concrete or masonry will receive a coat of asphalt. All surfaces to be primed must be free of rust, dust or any residue that may hinder adherence. Cover primed surfaces with roofing membrane as soon as possible

3.4 Field quality control

- .1 Require site attendance of roofing materials manufacturer's representative during installation of Work.
- .2 Correct identified defects or irregularities.

3.5 Cleaning

- .1 Confirm acceptance of demonstrated cleaning procedures from Departmental Representative before starting cleaning work.
- .2 Protect adjacent grounds from cleaning water accumulation.
- .3 Clear site of debris, surplus material and equipment, leaving work area in clean and safe condition.

END OF SECTION

Part 1 - GENERAL

1.1 Related requirements

- .1 Section 04 03 42 – Historic: Replacement of stone
- .2 Section 04 03 43 – Historic: Dismantling Stone Masonry

1.2 References

- .1 Canadian Standards Association (CSA)/CSA International
 - .1 CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA O86.1, Engineering Design in Wood.
 - .3 CSA O121, Douglas Fir Plywood.
 - .4 CSA O122, Structural Glued-Laminated Timber.
 - .5 CSA O151, Canadian Softwood Plywood.
 - .6 CAN/CSA-S16, Limit States Design of Steel Structures.
 - .7 CSA W59, Welded Steel Construction (Metal Arc Welding).

1.3 Definitions

- .1 Bracing: temporary support installed in excavation or structure to stabilize against collapse or deformations.
- .2 Shoring: temporary support installed in an excavation or structure to relieve loads.

1.4 Performance requirements

- .1 Ensure that materials, equipment and procedures safely supporting existing structure and construction live loads; that allow work to be accomplished as planned and that minimize risk of damage to historic and archaeological elements.

1.5 Action and informational submittals

- .1 Shop drawings to indicate shop and erection details in accordance with performance requirements in 1.4.
- .2 Submit to Departmental Representative for review of shoring, bracing and temporary framing drawings signed by professional engineer registered or licensed in Québec, Canada.
- .3 Departmental Representative will authorise dismantling or excavation work only after receiving engineer's written statement that bracing and shoring is adequately designed and complies with drawings.
- .4 Keep in mind that no technological document in DWG format will be provided to contractor or subcontractor.

Part 2 - PRODUCTS

2.1 Materials

- .1 Structural wood members: timber or glued-laminated timber No. 1.
 - .1 Forest Stewardship Council (FSC) certified: FSC certified lumber.
- .2 Structural steel members: to CSA G40.21, grade 350, type W.
- .3 Nails: to CSA B111.
- .4 Bolts, lag screws, nuts and washers: to CAN/CSA O86.1.
- .5 High-tensile bolts: to ASTM A 325M or ASTM A 490M.
- .6 Welding materials: to CSA W59.

Part 3 - EXECUTION

3.1 Preparation

- .1 Remove machinery installations, utility services and stored materials from building. Store in area designated by Departmental Representative.
- .2 Before shoring or bracing is begun, drain areas adjacent to foundation and ground to support bracing. Maintain area dry for the duration of the contract.
- .3 Treat wood in contact with ground and water.

3.2 Installation

- .1 Obtain approval from Departmental Representative before execution if alteration to bracing or shoring system is necessary.
- .2 Support individual elements that become loose during shoring or bracing installation.
- .3 Erect structural timber to CAN/CSA O86.1.
- .4 Erect structural steel work to CAN/CSA-S16 and CAN/CSA-S136.
- .5 Weld to CSA W59.
- .6 Bracing of structures:
 - .1 Install packing after review by Departmental Representative behind wall pieces to compensate for unevenness of wall surfaces.
 - .2 Install bracing system to stabilize deformations, as indicated on drawings.
- .7 Shoring of structures:
 - .1 Cut rectangular hole to dimensions of needle, as detailed on drawings, in wall to firmly accommodate needle. To ensure snug fit, fill with mortar.
 - .2 Install packing behind wall pieces to compensate for unevenness of wall surface.
 - .3 Before final raking shores are erected, install temporary shores, consisting of an upright against wall and raker notched in, to stabilize wall.
 - .4 Install boards, between needles of dead shores, to prevent core escaping.

- .8 Shoring of masonry arches:
 - .1 Install dead shoring before erecting centering.
 - .2 Align centering against the face of intrados of vault or arch.
 - .3 Allow seven (7) days for mortar to set before removing centering and dead shoring.

3.3 Adjustment

- .1 Monitor bracing or shoring system performance and maintain its effectiveness by making adjustments and where needed replacing or repairing damaged and weakened elements of system.
- .2 If adjustments are frequent and repetitive, notify Departmental Representative.

END OF SECTION

Part 1 - GENERAL

1.1 Related requirement

- .1 Section 03 30 00 – Cast-in-place Concrete

1.2 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D 422-63(2002), Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D 698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D 1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .6 ASTM D 4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 CCDG (Cahier des charges et devis généraux du ministère des Transports du Québec), latest edition.

1.3 Definitions

- .1 Classes of excavation materials: two (2) classes of excavation materials are recognized, common materials and rock materials.
 - .1 Rock excavation: excavation of material from solid masses having individual volume in excess of 1,00 m³ which cannot be removed by mechanical excavator fitted with a 0,95 to 1,15 m³ bucket. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in work.
- .3 Top soil
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .2 Any material reasonably free of subsoil, clay lumps, stones, debris and other objects, scrub, noxious weeds, roots, stumps and other objectionable material over 25 mm in diameter.
- .4 Waste material: excavated material unsuitable for use in work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of work.
- .6 Unsuitable material: weak, chemically unstable, and compressible materials..

- .7 Dimensionally stabilised backfill materials: very yielding mix composed of cement, concrete aggregates and water that will not slump after placement in trenches designed to receive utility conduits and which can be readily excavated (i.e., without preparation).
- .8 Contaminated materials: common excavation materials that can be reused for backfilling excavations where indicated, but where in excess should be disposed of in appropriate locations based on the level and type of contamination.

1.4 Action and informational submittals

- .1 Quality Control:
 - .1 Submit for review by Departmental Representative proposed dewatering and heave prevention methods.
 - .2 Submit to Departmental Representative written notice when bottom of excavation is reached.
- .2 Preconstruction Submittals
 - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
 - .2 Submit records of underground utility locates, indicating:
 - .1 location plan of existing utilities as found in field
 - .2 clearance record from utility authority
 - .3 location plan of relocated and abandoned services (as required).
 - .3 At least two (2) weeks prior to start of work, submit for review by Departmental Representative the particle size data sheets of all borrow materials that will be used.

1.5 Waste management and disposal and piled soil

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 (Construction/Demolition Waste Management and Disposal).
- .2 Divert excess aggregate materials from landfill to local quarry for reuse as directed by Departmental Representative.
- .3 All the soil that was not reused will have to be piled and before its disposal characterized in accordance to the MDDEFP Policy (Policy of Soil Protection and Rehabilitation of Contaminated Land), by a specialised firm.

1.6 Existing conditions

- .1 Examine soil analysis and characterization report provided by Departmental Representative.
- .2 Buried services:
 - .1 Before commencing work verify location of buried services on and adjacent to site.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
 - .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs with female plugs.
 - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

- .5 Prior to beginning excavation Work, establish location and state of use of buried utilities and structures and notify authorities having jurisdiction. AHJ to clearly mark such locations to prevent disturbance during Work.
- .6 Confirm locations of buried utilities by careful test excavations.
- .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
- .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
- .9 Record location of maintained, re-routed and abandoned underground lines.
- .10 Confirm locations of recent excavations adjacent to area of excavation of this section.
- .3 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.
 - .3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

Part 2 - PRODUCTS

2.1 Materials

- .1 Properties of Type 1 and Type 2 fill and requirements as follows:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.2.
 - .3 Table

Sieve designation	% Passing	
	Type 1	Type 2
75 mm	-	100
50 mm	-	-
37,5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12,5 mm	-	-
9,50 mm	50-100	-
4,75 mm	30-70	22-85
2,00 mm	20-45	-
0,425 mm	10-25	5-30
0,180 mm	-	-
0,075 mm	3-8	0-10

- .4 Type 1 fill may be replaced with MG-20 type fill as defined in CCDG.
- .5 Type 2 fill may be replaced with MG-112 type fill as defined in CCDG.

- .2 CG-14 type fill: sand as defined in CCDG.
- .3 Type 3 fill: selected material from other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .4 Dimensionally stabilised backfill materials: proportioned and mixed to provide following properties:
 - .1 Maximum compressive strength of 0,4 MPa at 28 days.
 - .2 Maximum Portland cement content of 25 kg/m³ with 40% fly ash replacement: to CSA-A3001, type GU.
 - .3 Minimum strength of 0.07 MPa at 24 h.
 - .4 Concrete aggregates: to CSA-A23.1/ A23.2.
 - .5 Cement: type GU.
 - .6 Slump: 160 to 200 mm.
- .5 Permeable granular material:
 - .1 Sand or screenings, sieved and clean size 5-80 µm.
 - .2 Gradation:

Sieve designation	% Passing
10 mm	100
5 mm	95-100
2,5 mm	80-100
1,25 mm	60-90
0,63 mm	25-65
0,315 mm	10-35
0,160 mm	2-10
0,080 mm	0-3
- .6 Clean stone:
 - .1 Crushed stone: 20 mm.
 - .2 Gradation:

Sieve designation	% Passing
19 mm	100
12,5 mm	0-10
- .7 Stone dust 0-10 mm :
 - .1 Granitic crushed stone.
 - .2 Gradation:

Sieve designation	% Passing
10 mm	100
5 mm	75-100
0,160 mm	4-25
0,080 mm	0-10
- .8 Foundation drain: perforated HDPE conduit 150 mm diameter, to BNQ 3624-120 or « Boss 2000 » type with smooth inner walls or approved equivalent.

- .9 Geotextile membrane: synthetic membrane in non-woven polypropylene fiber, 1,1 mm minimum thickness, « Texel 7609 » or « Technitex TX-90 » type or approved equivalent.

Part 3 - EXECUTION

3.1 Erosion and sediment control

- .1 Implement temporary erosion and sediment control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Comply with sediment and erosion control plan, specific to site, in accordance with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain control measures during construction until permanent vegetation has been established.
- .3 Remove controls on a timely basis and restore and stabilize areas disturbed during removal.

3.2 Site preparation

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 Preparation/protection

- .1 Protect existing features as indicated and in accordance with applicable regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

3.4 Stripping of topsoil

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.
- .2 Do not mix topsoil with excavation fill material stockpiled for reuse or landfill disposal.
- .3 Stockpile reusable top soil in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil off site.

3.5 Stockpiling

- .1 Stockpile all common fill materials for environmental characterization purposes, by a specialised firm. Costs related to environmental characterization will be borne by the Departmental Representative.
- .2 Stockpile fill materials in areas designated by Departmental Representative, in manner to prevent segregation.

- .3 Protect fill materials from contamination.
- .4 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries.

3.6 Cofferdams, shoring, bracing and underpinning

- .1 Protect sides and slopes of excavations by appropriate methods and in accordance with *Health and Safety Act*.
- .2 Construct temporary Works to depths, heights and locations as indicated.
- .3 Unless otherwise indicated or directed by Departmental Representative remove sheeting and shoring from excavations during backfill operation.

3.7 Dewatering of excavations and heave prevention

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative's review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water to authorised collection areas and in a manner not detrimental to public and private property, or portion of Work completed or under construction. Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

3.8 Excavation

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .6 Restrict vehicle operations directly adjacent to open trenches.
- .7 Dispose of surplus and unsuitable excavated material off site.
- .8 Do not obstruct flow of surface drainage or natural watercourses.
- .9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .10 Notify Departmental Representative when bottom of excavation is reached.
- .11 Obtain Departmental Representative approval of completed excavation.
- .12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

- .13 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.
- .14 Install foundation drains and geotextile membranes as indicated and directed by the supplier. Develop drainage slopes and cunettes at the foot of structures with lean concrete (cf. Section 03 30 00).

3.9 Backfill materials and compaction

- .1 Use types of fill as indicated on drawings. Compact indicated surfaces to densities indicated on drawings. Compaction densities are percentages of maximum densities obtained from ASTM D 698 or ASTM D 1557.

3.10 Bedding and surround of underground services

- .1 Place and compact granular material for bedding and surround of underground services as indicated.
- .2 Place bedding and surround material in unfrozen condition.

3.11 Backfilling

- .1 Do not proceed with backfilling operations until completion of following:
 - .1 Departmental Representative has inspected and approved installations.
 - .2 Departmental Representative has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of shoring and bracing.
 - .5 Backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
- .6 Place dimensionally stabilised fill in areas indicated.
- .7 Consolidate and level dimensionally stabilised fill with internal vibrators.

3.12 Restoration

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as indicated.

- .3 Reinstall lawns to elevation which existed before excavation.
- .4 Reinstall pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstall areas affected by Work as directed by Departmental Representative.
- .6 Use temporary plating to support traffic loads over dimensionally stabilised fill for initial 24 hours.
- .7 Protect newly graded areas from erosion, traffic and maintain free of trash or debris.

END OF SECTION

Part 1 - GENERAL

1.1 Scope of this section

- .1 This section governs the supply and workmanship of bituminous mix placement including the preparation of receiving surfaces.
- .2 Contractor to supply all materials, labour and equipment required to perform complete works herein described.

1.2 Action and informational submittals

- .1 Technical data sheets: submit manufacturer's instructions, printed product literature and data sheets for asphalt paving mix, aggregate, and coatings. Product data to include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Samples: submit asphalt concrete mix design and trial mix test results for review and approval.

1.3 Weather conditions

- .1 Contractor to spread bituminous concrete when ambient conditions allow placement of asphalt pavement to requirements set forth in the specifications and on the drawings. The Departmental Representative reserve the right to interrupt work where weather conditions appear unfavourable especially if the temperature of receiving surface is below 5 °C.
- .2 Do not spread bituminous concrete when receiving surface is wet, covered with puddles or mud.
- .3 Moreover, do not apply primer when air temperature is below 5 °C, when it rains or on damp surface.

1.4 Alignment and profile

- .1 Perform placement of concrete asphalt to typical alignment, profile and cross section indicated on the drawings and/or as directed by Departmental Representative. Contractor shall implement these field data from benchmarks provided by the Departmental Representative.

1.5 Retakes

- .1 Any element deemed unsuccessful by the Departmental Representative (joint, mix, placement, profile, etc.) shall be redone by the Contractor to Departmental Representative satisfaction at no extra cost.

1.6 Traffic signs

- .1 Contractor to control vehicular traffic off newly paved areas until paving surface has hardened.
- .2 Contractor to install adequate traffic signs at both ends and along work area to ensure proper control.
- .3 Contractor shall not block section of road completely prior to seeking and obtaining Departmental Representative's approval.
- .4 At completion of work in zone or section, the Contractor shall remove from area any sign now useless and all unused materials including waste and debris.

1.7 Machinery

- .1 The Departmental Representative reserve the right to require the replacement of or modification to any piece of machinery deemed inadequate. Contractor shall therefore provide equipment appropriate for operations described on the drawings and in the specifications in order to deliver top quality work.

1.8 Standards and tests

- .1 Tests and standards are those described in MTQ's CCDG, 2010 edition.

Part 2 - MATERIALS

2.1 Asphalt binders

- .1 Apply a thin and uniform layer of bituminous binder on all vertical contact surfaces of curbs, sidewalks and other structures including construction joints to obtain permanent and watertight joint.
- .2 Asphalt binder grade:
 - .1 Asphalt binders are fluidized bitumen or bitumen emulsions. From June 1st to September 1st the asphalt binder is a bitumen emulsion.
 - .2 Fluidized bitumen shall be Type 1 Class R-30 to Standard 4104, Ministère des Transports du Québec. Bitumen emulsions shall be Type SS-1 to Standard 4105, Ministère des Transports du Québec.
 - .3 The asphalt binder grade in use may be modified when the receiving substrate is subject to specific conditions in which case the Contractor shall follow Departmental Representative instructions.

2.2 Bituminous concrete

- .1 Composition:
 - .1 The main components of asphalt concrete are bitumen and aggregates.
- .2 Aggregates:
 - .1 Aggregates incorporated in asphalt shall comply with the requirements of standard 4201, Ministère des Transports du Québec.
 - .2 Unless otherwise indicated on the drawings and/or in the specifications the basic fabrication of aggregates and their properties are as follows:

	Characteristics	
	Coarse aggregate	Fine aggregate
Single layer	3	b
- .3 Limestone aggregates will be accepted in the wearing course if the Polished Stone Value (PSV) is 0.45 or better.
- .3 Bitumen:
 - .1 Bitumen used in the composition of asphalt shall comply with the requirements of standard 4101, Ministère des Transports du Québec.

- .2 Unless otherwise indicated on the drawings and/or in the special specification, bitumen used in the fabrication of asphalt shall belong to performance class PG 58-34.
- .4 Mix (requirements):
 - .1 The physical and mechanical characteristics of hot mix asphalt shall comply with the requirements of standard 4201, Ministère des Transports du Québec.
 - .2 The characteristics and requirements of the most common mixes used in paving are presented in Table 1 (below).

2.3 Production of asphalt mixes

- .1 Drying of the aggregates: aggregates must be dried immediately before mixing. Maximum moisture shall be lower than 0,5% except where mixing is performed in the drying drum. In this instance, aggregates shall be dried in such way that moisture content in the mix does not exceed 2% when discharged.
- .2 Production control:
 - .1 Contractor to provide asphalt mix to ASTM-D35.5. Mixing temperature is always between 110 °C and 150 °C. At the time of mixing the temperature of aggregates and bitumen should be substantially the same: a difference of 15 °C must be considered as a maximum.
 - .2 Control mixing time to obtain homogeneous mixture and that all particles are uniformly coated. Loss of temperature of asphalt mix between loading in truck at the plant and spreading at the site shall not exceed 15 °C.

2.4 Marking

- .1 Work includes erasing outdated marking, the pre-marking and painting of surface markings onto pavement in parking lots.
- .2 Pavement markings shall comply with specifications of Transport Québec standards Tome V, Ch. 6 and that of bike paths in Ch. 7.
- .3 Use paint responsive to the specifications set forth in « Caractéristiques des peintures pour le marquage des routes », Ministère des Transports du Québec, Tome VII Matériaux, norme 10201.
- .4 The paint should be ready-to-use (no dilution for application), homogeneous and dispersed with uniform consistency. The paint should not form skins, compact lumps, should not thicken, coagulate, or gel. The paint must be free of broken skin, dirt or other foreign substances. The paint shall not contain lead chromate, rosin or any of its derivatives.
- .5 Before the start of work, the Contractor must provide technical data sheets indicating the type and characteristics of the paint he intends to use. The paints approved are indicated in MTQ's certification list:
 - .1 Program HOM 8010-201 « Peinture alkyde pour le marquage des routes » (alkyd-based paint for road marking).
 - .2 Program HOM 8010-301 « Peinture à base d'eau pour le marquage des routes » (water-based paint for road marking).

TABLE 1
CHARACTERISTICS AND REQUIREMENTS — MAIN ASPHALT MIXES

Type of bituminous mix	EB-20 (1996)	EB-14 (1996)	EB-10S (1996)	EB-10C (1996)	EB-5 (1996)	CH-10 (1996)
Uses	Base	Single layer or surface layer	Surface layer	Surface layer or correction layer	Manual patching or correction layer	Waterproofing course
Minimum number of distinct granular classes to use	3	3	2	2	1	2
Sieve	(% Passing)					
28 mm	100					
20 mm	95-100	100				
14 mm	65-88	95-100	100	100		100
10 mm	48-78	75-90	92-100	94-100	100	96-100
5 mm	34-55	50-65	50-65	66-78	85-100	75-85
2,5 mm	24-45	29-47	27-50	45-65	65-90	57-75
1,25 mm	16-39	20-40	18-42	30-50	—	—
630 µm	9-31	14-34	12-35	20-40	25-65	25-50
315 µm	6-23	10-26	8-26	14-29	18-48	15-40
160 µm	4-15	5-17	5-17	7-18	8-30	7-25
80 µm	3-8	3-8	4-10	4-10	4-12	4-13
Binder (% min.)	4,2	4,7	4,8	5,2	6,0	5,5
Creep (mm)	2-4	2-4	2-4	2-4	2-4,5	2-4
Stability (N)(min.)	9000	9000	9000	9000	7000	9000
Voids (%)	2,0-5,0	2,0-5,0	2,0-5,0	2,0-5,0	2,0-5,0	2,0-5,0
VAM filled (% max.)	85	85	85	85	85	85
Compacity (% min.)	92	92	92	92	92	92
Rutting resistance on 100 mm plate at 60 °C 30 000 cycles (Deformation % max.)	10	10	—	—	—	—
Rutting resistance on 50 mm plate at 60 °C 1000 cycles	—	—	10	10	—	—
3000 cycles (Deformation % max.)	—	—	20	20	—	—
Water resistance (% min.)	70	70	70	70		

Part 3 - EXECUTION

3.1 Surface preparation

- .1 Gravel surface:
 - .1 General:
 - .1 Before any work is undertaken, the Contractor is responsible for ensuring that the load bearing capacity of the base is adequate.
 - .2 Contractor to perform the final shaping of the surface by correcting the longitudinal and transverse profiles with a layer of crushed aggregate as specified on the drawings and in the specifications, and as instructed by the Departmental Representative. Contractor to provide proper arrangement of profiles at intersections and approaches to structures
 - .3 Before placing correction layer of aggregate, the Contractor shall clear the surface to be covered of any foreign material; all unsuitable material must be collected and discarded. Contractor must then determine the longitudinal and transverse profiles that will provide its final shape to the road.
 - .4 The final shaping of the granular surface is graded; longitudinal and transverse profiles indicated on the drawings and in the specifications must be complied with and the surface must be smooth and ready to receive the bituminous mix.
 - .2 Compaction: to complete surface preparation, Contractor to compact the granular base to 98% maximum dry density based on "Modified Proctor". Pay special to sumps, manholes, valve boxes and curbs to achieve the specified degree of compaction. Areas inaccessible to equipment must be compacted manually with appropriate tampers and vibrators.
- .2 Paved surface:
 - .1 General: street cleaning is provided by the Contractor. Perform mechanical sweeping and watering of already paved surfaces. Clear surface to be coated of any hardened mud and non-adherent material.
 - .2 Correction of the profiles: a correction of the profiles may be required before surface is covered. This correction is performed by the Contractor.

3.2 Asphalt concrete paving

- .1 General:
 - .1 The mechanical spreader used for placing asphalt mixes must have the necessary features to ensure the production of a surface course that meets the requirements of the plans and specifications.
 - .2 Place asphalt mix manually in areas not accessible to the spreader. Place carefully and ensure asphalt is evenly distributed and spread out in a loose layer of uniform density while avoiding segregation and patches or spots.
- .2 Delivery:
 - .1 Bituminous mix shall be delivered in vehicles specially designed for this purpose. Dump truck bins must be free of any foreign material (soil, screenings, oil).

- .2 All trucks must be equipped with a cover to protect the asphalt mix during both the transportation and waiting period on site against cooling and weather conditions. Contractor to proceed according to an appropriate transport schedule to prevent cooling of the asphalt mix. Loss temperature of the asphalt mix from time of loading and time of placement on the site shall not exceed 15 °C. Any asphalt mix of temperature or composition that does not comply with the specifications must be rejected.
- .3 Joints:
 - .1 Contractor to pay special attention to longitudinal (parallel to the lines of the course) and transverse (perpendicular to the course) joints. Make joints seamless, continuous and impervious.
 - .2 When placing the asphalt mix, the inside edge of the first lift must be vertical, clean and straight before the next section is added.
 - .3 Contractor to manage traffic control by appropriate means to prevent damage caused by vehicular traffic.
- .4 Compaction:
 - .1 Before rolling is begun, the Contractor shall verify the surface of the new layer to correct patches and spots if necessary.
 - .2 Perform rolling to best practices and yield specified surface course and compacity. Ensure that joints are impervious and display substantially no difference with the rest of the surface.
- .5 Manholes, sumps and valve boxes: Contractor shall take into account the presence of manholes, sumps and valve boxes during installation of asphalt concrete.
- .6 Joints with existing pavement: where joint is performed between existing and new pavement, the Contractor must execute cold milling of the existing pavement in order to provide continuity between old and new pavement. Before laying the new pavement, the Contractor shall clean the pavement after milling, apply a bituminous binder over the entire milled surface and the sawn longitudinal joint.

END OF SECTION