

**PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA**
REPAIR OF THE MONTCALM BASTION AND WALL
REPAIR OF THE CANOTERIE WALL

TECHNICAL SPECIFICATIONS

PROJECT No. R.054985.400

FOR TENDER

DO NOT USE THIS DOCUMENT FOR CONSTRUCTION PURPOSE.

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| SECTION | SUBJECT | NUMBER OF PAGES |
|--------------------|--|--------------------|
| DIVISION 1 | | |
| 01 11 00 | Summary of Work | 3 |
| 01 14 00 | Work Restrictions | 2 |
| 01 29 00 | Measurement and Payment..... | 8 |
| 01 29 83 | Payment: Testing Laboratory Services | 2 |
| 01 32 16.07 | Construction Progress Schedule - Bar (Gantt) Chart | 3 |
| 01 33 00 | Submittal Procedures | 3 |
| 01 35 00.06 | Special Procedures for Traffic Control | 2 |
| 01 35 29.06 | Health and Safety Requirements | 6 |
| 01 35 43 | Environmental Procedures..... | 2 |
| 01 45 00 | Quality Control | 2 |
| 01 51 00 | Temporary Utilities | 2 |
| 01 52 00 | Construction Facilities | 2 |
| 01 56 00 | Temporary Barriers and Enclosures | 2 |
| 01 73 00 | Execution | 2 |
| 01 74 11 | Cleaning | 2 |
| 01 74 21 | Construction/Demolition Waste Management and Disposal | 3 |
| 01 77 00 | Closeout Procedures..... | 1 |
| 01 78 00 | Closeout Submittals | 2 |
| DIVISION 3 | | |
| 03 10 00 | Concrete Forming and Accessories | 2 |
| 03 20 00 | Concrete Reinforcing | 3 |
| 03 30 00 | Cast-in-place Concrete | 5 |
| 03 45 00 | Precast Architectural Concrete | 3 |
| DIVISION 4 | | |
| 04 03 06 | Historic - Cleaning Historic Masonry..... | 3 |
| 04 03 07 | Historic - Masonry Repointing | 4 |
| 04 03 08 | Historic - Mortaring..... | 2 |
| 04 03 42 | Historic - Replacement of stone | 6 |
| 04 03 43 | Historic - Dismantling and Reconstruction of Stone Masonry | 4 |
| DIVISION 6 | | |
| 06 10 00 | Rough Carpentry..... | 5 |
| DIVISION 7 | | |
| 07 55 60 | Protected membrane roofing | 3 |
| DIVISION 31 | | |
| 31 04 31 | Historic - Subgrade Shoring and Bracing..... | 3 |
| 31 11 00 | Clearing and Grubbing | 3 |
| 31 23 33.01 | Excavating, Trenching and Backfilling | 11 |

DIVISION 32

| | | |
|-------------|---|---|
| 32 12 16.02 | Asphalt Paving for Building Sites | 6 |
| 32 93 10 | Trees, Shrubs and Ground cover planting | 8 |

| SHEET | TITLE |
|--------------|---|
| 1 | PLAN VIEW – BASTION MONTCALM SECTOR PHASE A |
| 2 | PLAN VIEW – MONTCALM WALL SECTOR PHASE A |
| 3 | PLAN VIEW – DE LA CANOTERIE WALL SECTOR PHASE B |
| 4 | PLAN VIEWS – PHASES OF THE WORK PHASES A AND B |
| 5 | MONTCALM BASTION SECTOR RIGHT FLANK AND RIGHT FACE – EXTERIOR ELEVATIONS |
| 6 | BASTION MONTCALM SECTOR LEFT FACE AND LEFT FLANK – EXTERIOR ELEVATIONS |
| 7 | BASTION MONTCALM SECTOR LEFT FLANK, LEFT FACE, RIGHT FACE AND RIGHT FLANK INTERIOR ELEVATIONS |
| 8 | MONTCALM WALL SECTOR – EXTERIOR ELEVATIONS |
| 9 | MONTCALM WALL SECTOR – INTERIOR ELEVATIONS |
| 10 | DE LA CANOTERIE WALL SECTOR – EXTERIOR ELEVATIONS |
| 11 | DE LA CANOTERIE WALL SECTOR – INTERIOR ELEVATIONS |
| 12 | BASTION MONTCALM SECTOR CROSS SECTIONS – CURRENT AND PROPOSED |
| 13 | MONTCALM BASTION AND WALL SECTORS CROSS SECTIONS – CURRENT AND PROPOSED |
| 14 | MONTCALM WALL AND DE LA CANOTERIE WALL SECTORS CROSS SECTIONS – CURRENT AND PROPOSED |
| 15 | DE LA CANOTERIE WALL SECTOR CROSS SECTIONS – CURRENT AND PROPOSED |
| 16 | DE LA CANOTERIE WALL SECTOR – CROSS SECTIONS AND DETAILS |
| 17 | CROSS SECTIONS AND DETAILS |
| 18 | CROSS SECTIONS AND DETAILS |
| 19 | CARPENTRY WORKS – CROSS SECTIONS AND DETAILS |
| 20 | CARPENTRY WORKS – CROSS SECTIONS AND DETAILS |

Part 1 - GENERAL

1.1 Work covered by contract documents

- .1 Work of this Contract comprises:
 - .1 Repair of the Montcalm bastion walls;
 - .2 Repair of the Montcalm wall (intersection of des Remparts and Côte de la Canoterie streets);
 - .3 Repair of the Canoterie wall (intersection of de la Canoterie and côte du Colonel-Dambourgès streets).

1.2 Timeline for completing

- .1 The dates for work completion and closing of construction site for both project phases are the following:
 - .1 Phase A:
 - .1 Completion of masonry work: October 30, 2015.
 - .2 Closing of construction site: November 27, 2015.
 - .2 Phase B:
 - .1 Completion of masonry work: October 28, 2016.
 - .2 Closing of construction site: November 25, 2016.
- .2 In order to meet project deadlines, the Contractor shall provide and pay for any temporary protection and heating of work.

1.3 Contractor use of premises

- .1 Contractor is granted unrestricted use of the work site as defined within the boundaries outlined on the drawings until Substantial Performance.
- .2 Co-ordinate use of premises under direction of Departmental Representative.

1.4 Existing services

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Foresee alternative routes and provide road signs in the vicinity of work site 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).

1.5 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.

1.6 Historical/archaeological control

- .1 The walls subject to the work of this project are part of the Fortifications of Québec which is considered a historic site of national significance as it contains numerous archaeological resources (known or suspected). Should an archaeological finding be made during construction, notify at once the Departmental Representative and await written instructions before resuming work at the site of the discovery.
- .2 During excavation Work, Departmental Representative 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 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. Departmental Representative tolerates no exceptions in this regard. The Contractor shall be held responsible for any negligence resulting in remains being damaged.
- .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.
- .5 No storage space is available or allowed on the worksite.

1.3 Special requirements

- .1 Unless otherwise indicated, available traffic width should be at least 4.5 m on côte de la Canoterie, free of any obstructions at all times.
- .2 Côte de la Canoterie shall be free of any construction installation and be paved in asphalt concrete over entire width between September 1 and 14, 2015.
- .3 A stretch of rue des Remparts, between rue Ste-Famille and Ferland, may be closed to traffic until June 19, 2015. Pedestrian traffic must be maintained at all times on the "south" sidewalk of the street.
- .4 Rue des Remparts must be free of any construction installation and be paved in asphalt concrete over entire width between August 30 and September 12, 2016.
- .5 Maintain access to private parking at all times during construction (phases A and B).
- .6 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .7 Keep within limits of work and avenues of ingress and egress.
- .8 The Contractor shall allow the City of Quebec to make municipal repair work within the site, all in a coordinated manner between parties concerned.

1.4 Security

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

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 as follows:
 - .1 Description of lump sum price work (lump sum price schedule – Parts A, B, and C);
 - .2 Description of unit price work (schedule of included unit prices – Parts D, E and F);
- .2 Each of the broken down unit or lump sum prices shall include all expenses, all work, disbursements, payments, direct or indirect costs, mobilization and 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: work is globally determined with accuracy and in detail.
- .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

- .1 Item 1 – Site layout:
 - .1 This Item includes signage and temporary traffic lights, flaggers, bypass lanes (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 Item 2 – Excavation and backfilling:
 - .1 This Item article includes all the work involved with excavation as shown on the drawings, cross sections, elevations and details; removal of existing surface course in excavation zones, saw cuts in pavement, false works, 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.
 - .2 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 Item 3 – Drainage:
 - .1 Item 3a) includes removal of existing drains; supply and installation of perforated and non-perforated drains, clean stone, geotextile, and fittings. This Item includes the topographic survey required to establish the pipe and bedding levels to acceptable drainage slopes as well as any incidental expense.
 - .2 Item 3b) includes the supply and placement of concrete toward the construction or rebuilding of the drainage cunette according to the drainage slopes and levels determined by the Contractor.
- .4 Item 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, supply and installation of protection measures, cleaning, and any incidental expense.
 - .2 Item 4b) includes the removal of unexposed veneer stones, that is, unearthed after excavation of quantities indicated on the drawings, disposal off site of materials not reusable in the reconstruction of the core, measurement of stones to be replaced, the supply and placement of new stones and mortar and their anchoring (where required), repointing at the edge of replaced stones; stones to be replaced as identified on site by the Departmental Representative, and any incidental expense.
 - .3 Item 4c) includes the pre-cleaning of masonry in contact with soil, raking the masonry joints, jointing and finishing in stages; supply of equipment, materials (i.e., mortar) and labour. Costs also include the protection of the work during the curing period and any incidental expense.
 - .4 Item 4d) includes raking the masonry joints, jointing and finishing in stages; supply of equipment, materials (i.e., mortar) and labour. Costs include the cleaning of surfaces as required, fabrication of samples and protection of the structures during the curing period and any incidental expense.
- .5 Item 5 - Copings
 - .1 Item 5a) includes the removal of existing coping, disposal off site of waste materials, supply of new materials toward the construction of new wooden coping, placement of new anchors in the masonry and any incidental expense. This item also includes the supply of 50 linear metres of new terrace planking delivered to 280, rue Saint-Dominique.
 - .2 Item 5b) includes preparing the substrate supporting the new membrane, laying the specified waterproofing materials, and sealing around the anchors.
- .6 Item 6 – New concrete base: this Item includes rock excavation and surface preparation, drilling for insertion of new anchors, installing reinforcement and anchors; dressing veneer stones where required, supplying, placing and finishing of concrete including curing and protection, and any incidental expense.
- .7 Item 7 – Miscellaneous construction work
 - .1 Item 7a) includes the removal and reinstallation of all elements identified or found in the work zone (i.e., guard rails, lanterns and their base), fences, sidewalks, curbs and platforms, pavers and pavement, street furniture, canons, signage and any elements that needs to be removed to allow performance of work, and any incidental expense. This item to include as well the supply and delivery of 75 linear metres of new terrace decking wood.

- .2 Item 7b) includes the removal and disposal off site of trees and shrubs identified, or found in the work zone, removal of roots embedded in the structures such as masonry walls, removal and reconstruction planting pits, the supply and plantation of new trees as specified, and their maintenance.
- .8 Item 8 – Scaffolding and false works: this Item includes the installation of scaffolding and protection assemblies required to perform the work; engineering design and installation of retaining structures and temporary shoring in accordance with Section 31 04 31 (Historic – Subgrade Shoring and Bracing), and any incidental expense.

1.4 Description of items in the lump sum price schedule – Part B

- .1 Item 1 - Site layout:
 - .1 This Item includes signage and temporary traffic lights, flaggers, bypass lane (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 Item 2 – Excavation and backfilling:
 - .1 This Item includes all the work involved with excavation as shown on the drawings, cross sections, elevations and details; removal of existing surface course in the excavation zone, required saw cuts, installation and removal of false works, dewatering and drainage of excavation bottoms, as well as backfilling with the 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.
 - .2 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 Item 3 – Masonry work:
 - .1 Item 3a) 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 and recovery of residues, cleaning and any incidental expense.
 - .2 Item 3b) includes removal of unexposed veneer stones, that is, unearthed after excavation of quantities indicated on the drawings, disposal off site of materials not reusable in the reconstruction of the core, measurement of stones to be replaced, the supply and placement of new stones and mortar and their anchoring (where required), repointing at the edge of replaced stones; stones to be replaced as identified on site by the Departmental Representative, and any incidental expense.
 - .3 Item 3c) includes raking the masonry joints, jointing and finishing in stages; supply of equipment, materials (i.e., mortar) and labour. Costs to include the cleaning of surfaces as required, fabrication of samples and protection of the structures during the curing period and any incidental expense.

- .4 Item 3d) includes the pre-cleaning of masonry in contact with soil, raking the masonry joints, jointing and finishing in stages; supply of equipment, materials (i.e., mortar) and labour. Costs also include the protection of the work during the curing period and any incidental expense.
- .4 Item 4 - Copings
 - .1 Item 4a) includes the removal of existing coping, disposal off site of waste materials, supply of new materials and the construction of new coping, placement of new anchors in the masonry and any incidental expense.
 - .2 Item 4b) includes preparing the substrate supporting the new membrane, laying the specified waterproofing materials, and sealing around the anchors.
- .5 Item 5 – Miscellaneous construction work: this item includes the removal and reinstallation of all elements identified or found in the work zone (i.e., guard rails, lanterns and their base), fences, sidewalks, curbs, pavers and pavement, street furniture, signage and any elements that needs to be removed to allow performance of work, and any incidental expense. This item also includes the supply of 50 linear metres of new planking delivered to 280, rue Saint-Dominique.
- .6 Item 6 - Scaffolding and false works: this Item includes the installation of scaffolding and protection assemblies required to perform the work; engineering design and installation of retaining structures and temporary shoring in accordance with Section 31 04 31 (Historic – Subgrade Shoring and Bracing), and any incidental expense.
- .7 Item 7 – Consolidation of the wall course: this item includes costs incurred for the removal of loosened material (rock or masonry) at the two locations indicated, cleaning the cavities thus created, forms and concreting (4 m³), curing, formwork removal, disposal of waste materials off site and any incidental expense.

1.5 Description of items in the lump sum price schedule – Part C

- .1 Item 1 - Site layout:
 - .1 This Item includes signage and temporary traffic lights, flaggers, bypass lane (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 also 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 Item 2 – Excavation and backfilling:
 - .1 This Item includes all the work involved with excavation as shown on the drawings, cross sections, elevations and details; removal of existing surface course in the excavation zone, required saw cuts, installation and removal of false works, dewatering and drainage of excavation bottoms, as well as backfilling with the 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.

- .2 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 Item 3 – Masonry work:
 - .1 Item 3a) includes the work described in section 04 03 06 (Historic – Cleaning Historic Masonry), the supply of cleaning equipment and products, the supply and installation of protection measures and recovery of residues, cleaning and any incidental expense.
 - .2 Item 3b) includes removal of unexposed veneer stones, that is, unearthed after excavation of quantities indicated on the drawings, disposal off site of materials not reusable in the reconstruction of the core, measurement of stones to be replaced, the supply and placement of new stones and mortar and their anchoring (where required), repointing at the edge of replaced stones; stones to be replaced as identified on site by the Departmental Representative, and any incidental expense.
 - .3 Item 3c) includes raking the masonry joints, jointing and finishing in stages; supply of equipment, materials (i.e., mortar) and labour. Costs to include the cleaning of surfaces as required, fabrication of samples and protection of the structures during the curing period and any incidental expense. This item also includes the supply and application, where indicated on the drawings, of a coat of water-repellent and oil-repellent agent to the manufacturers' instructions.
 - .4 Item 3d) includes the pre-cleaning of masonry in contact with soil, raking the masonry joints, jointing and finishing in stages; supply of equipment, materials (i.e., mortar) and labour. Costs also include the protection of the work during the curing period and any incidental expense.
- .4 Item 4 – Copings
 - .1 Item 4a) includes the removal of existing copings, disposal off site of waste materials, shop fabrication of new concrete coping elements, their installation and any incidental expense.
 - .2 Item 4b) includes preparing the substrate supporting the new membrane, laying the specified waterproofing materials, and sealing around the anchors.
- .5 Item 5 – New anchors in the concrete wall: this Item includes the drilling required for the placement of new anchors as indicated, supply and installation of new anchors, and any incidental expenses.
- .6 Item 6 – Miscellaneous construction work: includes the removal and reinstallation of all elements identified or found in the work zone (i.e., guard rails, lanterns and their base), fences, sidewalks, curbs and platforms, pavers and pavement, street furniture, signage and any elements that needs to be moved or dismantled to allow performance of work, and any incidental expense.
- .7 Item 7 – Scaffolding and false works: this Item includes the installation of scaffolding and protection assemblies required to perform the work; engineering design and installation of retaining structures and temporary shoring in accordance with Section 31 04 31 (Historic – Subgrade Shoring and Bracing), and any incidental expense.

1.6 Description of items in the schedule of included unit prices – Part D

- .1 Item 1 – Replacement of exposed veneer stones: this Item will be paid per square meter surface area of replaced veneer stone. Where stones have more than one exposed face, the surface area measured for payment purposes will be the largest among them all. The unit cost includes the removal of identified stones and of additional stones indicated on the drawings and which will be identified on site by the Departmental Representative; the

disposal off site of non-reusable materials, the measurement of the stones to be replaced, the preparation of shop drawings, the fabrication of samples, the supply and installation of new stones and mortar, their anchoring (where required), repointing the periphery of the replaced stones, and any other incidental expenses.

- .2 Item 2 – Dismantling and reconstruction of the full-thickness of the walls: this Item will be paid per square meter surface area of exposed veneer (outer side of the bastion) dismantled and reconstructed. Includes the stripping of mortar joints in the area to be dismantled, the marking of veneer stones (exposed veneer and backside facing of walls), and their removal and stowage as specified; dismantling the core of the wall to sound masonry, reconstruction of the core, veneer and gun holes, installation of the specified anchors, mortaring and repointing of the surfaces. The cost of work also includes the protection of the work during the curing period, as well as any other incidental expenditure.
- .3 Items 3 and 4 – Partial dismantling and reconstruction: items paid per square meter surface area of dismantled and reconstructed veneer. Includes the stripping of mortar joints in the area to be dismantled, marking the veneer stones (exposed veneer and backside facing of the walls), their removal and stowage as specified; dismantling the core of the wall to sound masonry or to depths as indicated; reconstruction of the core and veneer, installing the specified anchors, mortaring and repointing of the surfaces. The cost of work also includes protection of the work during the curing period, as well as any incidental expenditure.
- .4 Item 5 – New gargoyles: this article paid according to the number of new gargoyles installed. The unit price includes the removal and cutting of stones as requested, drilling through the wall to bedrock, the supply and installation of the new steel pipe, wire mesh and filter bag, the repair of anchoring holes left by the machinery, refitting of the modified veneer stones and any incidental expense.

1.7 Description of items in the schedule of included unit prices – Part E

- .1 Item 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 for temporary stockpiling for characterisation, transportation to and unloading at a landfill compatible with the contamination at hand (ref. Section 31 23 33.01), and any incidental expense.
- .2 Item 2 – Replacement of exposed veneer stones: this Item will be paid per square meter surface area of replaced veneer stone. Where stones have more than one exposed face, the surface area measured for payment purposes will be the largest among them all. The unit cost includes the removal of identified stones and of additional stones indicated on the drawings and which will be identified on site by the Departmental Representative; the disposal off site of non-reusable materials, measurement of the stones to be replaced, preparation of shop drawings, fabrication of samples, the supply and installation of new stones and mortar, their anchoring (where required), repointing the periphery of the replaced stones, and any other incidental expenses.
- .3 Item 3 – Dismantling and reconstruction of the full-thickness of the walls: this Item will be paid per square meter surface area of exposed veneer (outer side of the bastion) dismantled and reconstructed. Includes the stripping of mortar joints in the area to be dismantled, the marking of veneer stones (exposed veneer and backside facing of walls), and their removal and stowage as specified; dismantling the core of the wall to sound masonry, reconstruction of the core, veneer and gun holes, installation of the specified anchors, mortaring and repointing of the surfaces. The cost of work also includes protection of the work during the curing period, as well as any other incidental expense.

- .4 Items 4 and 5 – Partial dismantling and reconstruction: items paid per square meter surface area of dismantled and reconstructed veneer. Includes the stripping of mortar joints in the area to be dismantled, marking the veneer stones (exposed veneer and backside facing of the walls), their removal and stowage as specified; dismantling the core of the wall to sound masonry or to depths as indicated; reconstruction of the core and veneer, installing the specified anchors, mortaring and repointing of the surfaces. The cost of work also includes protection of the work during the curing period, as well as any incidental expenditure.
- .5 Item 6 – New gargoyles: this article paid according to the number of new gargoyles installed. The unit price includes drilling through the wall to bedrock where cavities or voids are found in the wall, the supply and installation of the new steel pipe, wire mesh and filter bag, the repair of anchoring holes left by the machinery, and any incidental expense.

1.8 Description of items in the schedule of included unit prices – Part F

- .1 Item 1 – Replacement of exposed veneer stones: this Item will be paid per square meter surface area of replaced veneer stone. Where stones have more than one exposed face, the surface area measured for payment purposes will be the largest among them all. The unit cost includes the removal of identified stones and of additional stones indicated on the drawings and which will be identified on site by the Departmental Representative; the disposal off site of non-reusable materials, measurement of the stones to be replaced, preparation of shop drawings, fabrication of samples, the supply and installation of new stones and mortar, their anchoring (where required), repointing the periphery of the replaced stones, and any other incidental expenses.
- .2 Item 2 – Dismantling and reconstruction of the full-thickness of the walls: this Item will be paid per square meter surface area of exposed veneer (outer side of the bastion) dismantled and reconstructed. Includes the stripping of mortar joints in the area to be dismantled, the marking of veneer stones (exposed veneer and backside facing of walls), and their removal and stowage as specified; dismantling the core of the wall to sound masonry, reconstruction of the core, veneer and gun holes, installation of the specified anchors, mortaring and repointing of the surfaces. The cost of work also includes protection of the work during the curing period, as well as any other incidental expense.
- .3 Items 3 and 4 – Partial dismantling and reconstruction: items paid per square meter surface area of dismantled and reconstructed veneer. Includes the stripping of mortar joints in the area to be dismantled, marking the veneer stones (exposed veneer and backside facing of the walls), their removal and stowage as specified; dismantling the core of the wall to sound masonry or to depths as indicated; reconstruction of the core and veneer, installing the specified anchors, mortaring and repointing of the surfaces. The cost of work also includes protection of the work during the curing period, as well as any incidental expense.

1.9 Substantial completion of work

- .1 At substantial completion of work, prepare and submit to Departmental Representative a comprehensive list of items to be completed or corrected and apply for a field review of Work by Departmental Representative to establish substantial completion. Failure to include items on list does not alter responsibility to complete Contract.
- .2 No later than ten (10) days after receipt of list and application, the Departmental Representative will review Work to verify validity of application, and no later than seven (7) days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.

- .3 Departmental Representative will state date of Substantial Performance of Work or designated portion of Work in certificate.
- .4 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Departmental Representative, establish reasonable date for finishing Work.

1.10 Final payment

- .1 Contractor to submit application for final payment when Work is completed.
- .2 Departmental Representative will, no later than ten (10) days after receipt of application for final payment, review Work to verify validity of application. Departmental Representative will give notification that application is valid or give reasons why it is not valid, no later than seven (7) days after reviewing Work.
- .3 Departmental Representative will issue final certificate for payment when application for final payment is found valid.

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): 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 Chart (GANTT) 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, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 Action and informational submittals

- .1 Submit to Departmental Representative, within 5 working days of notice of acceptance of bid, a Bar Chart (GANTT) 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; do so for each of the construction phases.
- .2 Establish schedule in view of timelines for completing the project indicated in Section 01 11 00 (Summary of Work), and the work restriction dates specified in Section 01 14 00 (Work Restrictions).
- .3 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows, and distinctly for the three structures, i.e., Montcalm bastion, Montcalm wall and de la Canoterie wall:
 - .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 minimum 4,5 m in width (or as indicated).
- .5 Follow Departmental Representative's instructions and provide gravelled detours or temporary roads to facilitate passage of traffic around restricted construction area.
- .6 Ensure at all times safe pedestrian traffic on existing or temporary sidewalks provided.

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 Work likely to release asbestos dust;
 - .5 Work in confined spaces;
 - .6 Lockout procedures;
 - .7 Wearing and fitting of individual protective gear;

- .8 forklift truck;
- .9 positioning platform;
- .10 Any other requirement of Regulations or the safety program.
- .8 Medical examinations : Wherever legislation, regulations, directives, specification or a safety program require medical examinations, Contractor must:
 - .1 Prior to start-up, submit to Departmental Representative certificates of medical examination for all concerned supervisory staff and employees who will be on duty when the site opens.
 - .2 Thereafter, submit without delay certificates of medical examination for any newly hired concerned personnel as and when they start work at the site.
- .9 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.
- .10 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.
- .11 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.
- .12 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 Departmental Representative.

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 Urban environment;
 - .2 Residential area.

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 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.
- .2 Provide this person with the authority, resources and tools needed to perform his/her duties.
- .3 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.

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 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 Fuel supply

- .1 Do not keep fuel tanks on the construction areas.

1.5 Temporary heating and ventilation

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 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.
- .3 Maintain temperatures of minimum 15 °C in areas where construction is in progress.
- .4 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.
- .5 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.
- .6 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.6 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.

1.7 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 Follow indications on the layout drawing provided and prepare a site plan showing the proposed location and surface areas to be enclosed and used by the Contractor during construction with the required number of construction trailers, entrance and exit lanes to the fenced areas, and fencing details.
- .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 Construction parking

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

1.5 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.

1.6 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.

1.7 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.
- .3 No storage of materials (such as excavated material, backfill or masonry) is allowed on the work site. It is the Contractor's responsibility to find a suitable space for the storage and handling of these materials throughout the construction period.

1.8 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.

1.9 Construction signage

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

1.10 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.

1.11 Temporary protection of the Work

- .1 Considering the timeframe allowed for completion of the work as well as the start and end of construction, the Contractor shall provide for the adequate protection of the structures under ambient conditions as indicated in the specifications.
- .2 This protection should allow performance of work until completion as well as curing under temperate and controlled ambient conditions.

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. Installation to withstand wind pressures and any other weather conditions.
- .2 Provide lockable access gates for trucks and pedestrian gates 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. The enclosures must be designed to withstand weather conditions as specified in the applicable codes.

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 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .8 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.
- .8 At work completion, submit original copy of all construction worksite documents to Departmental Representative, annotated as specified.

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 Related requirements

- .1 Section 03 20 00 – Concrete Reinforcing
- .2 Section 03 30 00 – Cast-in-place Concrete

1.2 References

- .1 Refer to the latest applicable editions of the following standards:
 - .1 Canadian Standards Association (CSA)/CSA International
 - .2 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .3 CAN/CSA-S269.3, Concrete Formwork, National Standard of Canada.

1.3 Delivery, storage and handling

- .1 Waste management and disposal
 - .1 Separate waste materials for recycling.
 - .2 Place materials defined as hazardous or toxic in designated containers.
 - .3 Divert wood materials from landfill to a recycling facility.
 - .4 Divert unused plastic materials from landfill to a recycling facility.
 - .5 Divert unused form release material from landfill to an official hazardous material collection site.

Part 2 - PRODUCTS

2.1 Materials

- .1 Formwork materials
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O121, CAN/CSA-O86 and CSA O153.
 - .2 For exposed concrete (course of the wall) Duraform is prohibited. Use high density overlay in Douglas Fir to CSA O121. Plywood shall be new (first use).
- .2 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .3 Form release agent: non-toxic, biodegradable, low VOC product.
- .4 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 à 24 mm² /s at 40 °C, flashpoint minimum 150 °C in open cup.
- .5 Falsework materials: to CSA-S269.1.

Part 3 - EXECUTION

3.1 Fabrication and erection

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Departmental Representative's approval for use of earth forms, or framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1.
- .5 Do not place shores and mud sills on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .8 Align form joints and make watertight. Keep form joints to minimum.
- .9 Incorporate anchors and other inserts required in specified Work.
- .10 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.
- .11 Tolerances:
 - .1 Comply with the following tolerances in the construction of formwork:
 - .2 General dimensional tolerances (D):

| Length in metre | Acceptable deviation in millimetre |
|-----------------|------------------------------------|
| 0<D<2,4 | ± 5 |
| 2,4<D<4,8 | ± 8 |
| 4,8<D<9,6 | ± 12 |
| 9,6<D<14,4 | ± 20 |
| 14,4<D<19,2 | ± 30 |
| 19,2<D | ± 50 |

3.2 Removal and reshoring

- .1 After placing concrete, leave formwork in place for minimum three (3) days. This period of time does not relieve the Contractor of his responsibility to take into account the complexity and type of work as well as climatic conditions, and to ascertain prior to stripping that the concrete has attained sufficient strength to support its own weight and other loads applied.

END OF SECTION

Part 1 - GENERAL

1.1 Related requirements

- .1 Section 03 10 00 – Concrete Forming and Accessories.
- .2 Section 03 30 00 – Cast-in-place Concrete.

1.2 References

- .1 Refer to latest applicable editions of following standards:
 - .1 American Concrete Institute (ACI)
 - .1 SP-66, ACI Detailing Manual 2004.
 - .2 ASTM International
 - .1 ASTM A 82/A 82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - .2 ASTM A 143/A 143M, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - .3 ASTM A 185/A 185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .4 ASTM A 775/A 775M, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
 - .3 CSA International
 - .1 CSA-A23.1-F09/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A23.3, Design of Concrete Structures.
 - .3 CSA-G30.18, Carbon Steel Bars for Concrete Reinforcement.
 - .4 CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .5 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .6 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
 - .4 Reinforcing Steel Institute of Canada (RSIC/IAAC)
 - .1 RSIC, Reinforcing Steel Manual of Standard Practice.

1.3 Delivery, storage and handling

- .1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .2 Storage and Handling Requirements
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

Part 2 - PRODUCTS

2.1 Materials

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 Reinforcing steel: billet steel, grade 400R, deformed bars to CSA-G30.18, unless indicated otherwise.
- .3 Fibre-reinforced-polymer (FRP V-ROD) reinforcing bars coated with a sand coating:
 - .1 Binding material: Binding material is composed of modified vinyl ester resin with a maximum volume fraction of 35%.
 - .2 Fibre Reinforcement : Continuous E-glass fibres with a minimum volume fraction of 65%.
- .4 Weldable reinforcing bars: high adherence and weldable low alloy steel bars in accordance with CSA-G30.18, grade 400W.
- .5 Steel wire ties: cold-drawn annealed steel wire ties to ASTM A 82/A 82M .
- .6 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .7 Galvanization of reinforcement: 610 g/m², to CAN/CSA-G164.

2.2 Fabrication

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and SP-66 standards and the Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada (RSIC).
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

Part 3 - EXECUTION

3.1 Field bending

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

3.2 Placing reinforcement

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.
- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.

3.3 Cover to reinforcement

- .1 Concrete poured in earth forms: 75 mm.
- .2 Concrete in contact with ground after stripping or exposed to weather conditions: 50 mm.

3.4 Tolerance in the placement of reinforcement

- .1 Cover thickness: minus 5 mm, plus 8 mm.
- .2 Position of bars according to concrete element thickness:
 - .1 Thickness 200 mm or less: plus or minus (\pm) 8 mm.
 - .2 Thickness greater than 200 mm but smaller than 600 mm: plus or minus (\pm) 12 mm.
- .3 Longitudinal position of bar extremities: plus or minus (\pm) 50 mm.
- .4 Longitudinal position of hooks and of bar extremities at discontinuities in the framework: plus or minus (\pm) 20 mm.
- .5 Distance between hangers, casings, collars, pins and hoops: plus or minus (\pm) 20 mm.

3.5 Splicing

- .1 Lap splices:
 - .1 The location of spliced bars not indicated on the drawings to be approved by the Departmental Representative. Such splices shall always be performed away from locations where tensile load is high in the bars. Unless otherwise indicated on the drawings, minimum splice lengths shall be as follows:

| Bars | f'c = 20 MPa | f'c = 25 MPa | f'c = 30 MPa | f'c = 35 MPa |
|------|--------------|--------------|--------------|--------------|
| 10 M | 550 | 490 | 450 | 420 |
| 15 M | 820 | 740 | 670 | 620 |
| 20 M | 1090 | 980 | 890 | 830 |
| 25 M | 1710 | 1530 | 1390 | 1290 |
| 30 M | 2050 | 1830 | 1670 | 1550 |
| 35 M | 2390 | 2130 | 1950 | 1800 |

3.6 Cleaning

- .1 Progress cleaning: leave work area clean at end of each day.
- .2 Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste management: separate waste materials for recycling.

END OF SECTION

Part 1 - GENERAL

1.1 Related requirements

- .1 Section 03 10 00 – Concrete Forming and Accessories
- .2 Section 03 20 00 – Concrete Reinforcing

1.2 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).

1.3 Quality control of concrete

- .1 The Departmental Representative will assign quality control of concrete to a laboratory specializing in this type of work and pay for all inspections and testing.
- .2 The Laboratory is the Departmental Representative's agent for all matters pertaining to concrete proportioning and placing. In this capacity, the laboratory is authorized to issue directives which the Contractor and concrete supplier are required to conform.
- .3 Submit the following to the Laboratory's approval:
 - .1 Samples of coarse and fine aggregates
 - .2 Concrete mix proportioning
 - .3 The type and make of admixtures
 - .4 The analyses of the alkali aggregate reactivity.
- .4 Provide laboratory minimum 24h notice prior to placing of concrete specifying date and time of every pour.

1.4 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.
- .4 Shrinkage-compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
 - .1 Compressive strength: 50 MPa at 28 days.
- .5 Curing product: white, to CSA A23.1/A23.2 and ASTM C 309.

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 |
|---------------|------------------------|---------------------------------------|---|------------------------|--------------------------------|----------------------------------|
| Wall Footing | C-2 | 32 | 0,45 | 20 | 5-8 | 80 |
| 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 Place concrete reinforcing in accordance with section 03 20 00 (Concrete Reinforcing).
- .3 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .4 Protect existing structures Work from staining.
- .5 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 Related requirements

- .1 Section 03 10 00 – Concrete Forming and Accessories
- .2 Section 03 20 00 – Concrete Reinforcing

1.2 REFERENCES

- .1 CSA International
 - .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CSA A23.4-09, Precast Concrete-Materials and Construction.
 - .3 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 Action and informational submittals

- .1 Product Data: Submit manufacturer's instructions, printed product literature and data sheets for concrete mixes and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Shop Drawings:
 - .1 Two (2) weeks prior to fabrication, submit copies of detailed calculations and design drawings of typical precast elements and connections to Departmental Representative for approval.
 - .2 Indicate on drawings:
 - .1 Finishing schedules;
 - .2 Methods of handling and erection;
 - .3 Openings, sleeves, inserts and related reinforcement, including embedded handling hardware.
- .3 Samples: fabricate a full-size precast concrete sample displaying specified details, colour and quality; deliver to work site and install where indicated by Departmental Representative for approval. Launch production of precast units after receipt of Departmental Representative's written authorisation.

1.4 Delivery, storage and handling

- .1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .2 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect precast elements from damage.
 - .3 Replace defective or damaged materials with new.

1.5 Warranty

- .1 For spalling and cracking of precast elements, the 12 months warranty period shall extend to 36 months.

Part 2 - PRODUCTS

2.1 Materials

- .1 Cement, aggregates, water, admixtures: to CSA A23.4 and CSA A23.1/A23.2.
- .2 Exposed aggregate: 20 mm "St-Raphael" type river stone to match existing.
- .3 Colour and composition: Use same brands and source of cement and aggregate throughout entire project to ensure uniformity of colouration and other mix characteristics.
- .4 Rebars: install reinforcing bars made of glass fibre reinforced polymers.
- .5 Forms: to CSA A23.4.
- .6 Anchors and threaded rods: in stainless steel to ASTM A276 (grade 316).
- .7 Liquid sealing product: water- and oil-repellent product, acrylic copolymer in aqueous phase.

2.2 Concrete mixtures

- .1 Cement: use Type "GU" Portland cement to CSA A3001.
- .2 Minimum compressive strength at 28 days: 35 MPa.
- .3 Class of exposure: C2.
- .4 Nominal size of coarse aggregate: 20 mm.
- .5 Water cement ratio: 0,45.
- .6 Air content: 5 à 8 %.
- .7 Slump at time and point of discharge: 60 à 100 mm.

2.3 Performance requirements

- .1 Tolerance of precast elements: to CSA A23.4 .
- .2 Length of precast elements not to vary from design length by more than plus or minus 5 mm.
- .3 Cross sectional dimensions of precast elements not to vary from design dimensions by more than plus or minus 5 mm.
- .4 Deviations from straight lines not to exceed 3 mm in 3 m.

2.4 Fabrication

- .1 Manufacture units to CSA A23.4.
- .2 Mark each precast unit to correspond to identification mark on shop drawings for location with date cast on part of unit which will not be exposed after installation.

2.5 Finishes

- .1 Finish and colour of precast units to match existing.

- .2 Exposed aggregate finish:
 - .1 Apply uniform coat of retardant to inside face of forms.
 - .2 Expose aggregate by washing and brushing away mortar from concrete surface.
 - .3 Exposed aggregate finish to match that of existing coping.
- .3 Protect exposed aggregate surfaces with two (2) coats of water- and oil-repellent sealer approved by Departmental Representative.

Part 3 - EXECUTION

3.1 General

- .1 Do precast concrete work to CSA A23.4 and CAN/CSA-A23.3.

3.2 Examination

- .1 Verification of Conditions: verify that conditions of surfaces and substrates previously installed under other Sections or Contracts are acceptable for precast concrete installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate and support in presence of Departmental Representative.
 - .2 Notify Departmental Representative of any unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.3 Erection

- .1 Erect precast elements within permissible tolerances as indicated.
- .2 Comply with non-cumulative erection tolerances specified in CSA A23.4.
- .3 Set elevations and alignment between units to within allowable tolerances before connecting units.
- .4 Bed units on Type N mortar in accordance with Section 04 03 08 (Historic - Mortaring). Point in accordance with Section 04 03 07 (Historic - Masonry Repointing) and finish joint with polyurethane-based friable mortar.

3.4 Cleaning

- .1 Obtain approval of cleaning methods from Departmental Representative before cleaning soiled precast concrete surfaces.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.5 Protection

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by precast concrete installation.

END OF SECTION

Part 1 - GENERAL

1.1 Work of this section

- .1 All stone wall surfaces are subject to thorough cleaning of the exposed 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 pre-set 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 preserved masonry elements and structures.
- .3 Remove wooden coping from top of walls before cleaning.

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.

3.6 Site cleaning

- .1 Clean up the site and remove all waste in accordance with Section 01 74 21 (Construction/ Demolition Waste Management and Disposal).

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 or as otherwise indicated on the drawings.
 - .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 10 and 25 °C for entire duration of work.
- .2 Ambient temperature lower than 10 °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.
- .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, 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 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.
 - .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.
 - .3 All layers to be applied in a single day.
- .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.

3.3 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 10 °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.

3.4 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.

3.5 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 42 – Historic: Replacement of stone
- .3 Section 04 03 43 – Historic: Dismantling and Reconstruction of 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 10 °C. When ambient temperature is below 10 °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 10 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 white Portland cement, 1 part lime, and 6 parts sand.
- .2 Type S joint and bedding mortar: based on proportion specifications, consisting of 2 parts white Portland cement, one (1) part lime, and nine (9) parts sand.

- .3 Repointing mortar for prefabricated concrete coping units: use gray polyurethane flexible mortar containing 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

2.3 Air content

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

Part 3 - EXECUTION

3.1 Lime mortar batching

- .1 Mix mortar in a clean mortar mixer. Use potable water in quantities recommended by the manufacturer and mix as indicated.

3.2 Polyurethane mortar batching

- .1 Mix mortar components to manufacturer's recommendations.

3.3 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 sections

- .1 Section 04 03 07 – Historic: Masonry Repointing
- .2 Section 04 03 08 – Historic: Mortaring
- .3 Section 04 03 43 – Historic: Dismantling and Reconstruction of 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 the following stone samples:
 - .1 Veneer stone: 300 mm x 300 mm x 300 mm.
 - .2 Rubble: 300 mm x 200 mm x 100 mm.
- .5 Choose samples from the currently mined bed in the quarry and provide a certificate issued by the quarry.

1.4 Data sheet

- .1 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.
- .2 Technical data sheets to indicate the origin of the stone, the name of the quarry and identify the operator.

1.5 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.
- .3 Provide the Departmental Representative with a 5-year warranty (material and labor) on the quality of the stone provided.

1.6 Supply

- .1 When submitting his bid, the Contractor shall provide a written statement asserting that the new stones required in the Contract will be provided to ensure that milestones and timelines are met.
- .2 Ten (10) days after notice of acceptance of bid, the Contractor shall submit the data sheet of the sandstone masonry material for approval.

1.7 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.

1.8 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 Stones to be perfectly squared to shape and dimensions indicated on the drawings or to existing dimensions.
 - .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 stones 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.
- .4 The Contractor shall control the quality of the stones delivered to the construction site and the Departmental Representative reserves the right to reject stones that do not meet the quality criteria set out for this project.

2.8 Mortar

- .1 Mortar (Type N): 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.

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 and Reconstruction of 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 10 °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
- .4 Section 31 04 31 – Historic: Subgrade Shoring and Bracing

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 Anchoring adhesive

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

Part 3 - EXECUTION

3.1 Examination

- .1 Examine masonry 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 Dismantling of masonry

- .1 Ten (10) days before the start of work, provide Departmental Representative with detail drawings showing work activities and steps of the dismantling and reconstruction process.
- .2 Drawings must be prepared and sealed by a professional engineer with experience in historic massive stone masonry structures and licensed to practice in the Province of Québec.

- .3 These plans must mention the supports and shoring required to stabilise the portions of preserved structures; they must take into account the forces, thrusts and constraints applied to the overall structure.
- .4 Where portions of the structures being preserved are held in place above dismantled areas, foresee work stages with consideration to maximum 5 m intervention widths separated from each other by a wall portion whose length shall be at least 10 m.
- .5 Before undertaking the subsequent dismantling stages, allow sufficient time for proper curing of the mortar to at least 70% of maximum strength.

3.5 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.

3.6 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.

3.7 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.

3.8 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.

3.9 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.

3.10 Consolidation of the masonry core

- .1 The masonry core behind the veneer stones is composed of mortar, limestone rubble and concrete. Where dismantling work is required, proceed to the removal of the masonry core to depths indicated.
- .2 Clean the sound masonry, remove any loose particles and wet before applying new mortar.
- .3 Drill new anchor holes as shown on the drawings and insert threaded rods.
- .4 Proceed to the reconstruction of the masonry core with new limestone rubble and type N mortar.
- .5 To enhance adhesion of the new masonry with remaining material, create surface notches and insert headers.

3.11 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 Use anchors described on the drawings to fasten veneer stones (where required), and seal with the specified 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.

3.12 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.
- .4 Dispose of waste in accordance with section 01 74 21 (Construction/ Demolition Waste Management and Disposal).

3.13 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 Work included

- .1 Provide all the labour, materials, equipment and services for the fabrication and erection of the wooden structure shown on the plans or described in this specification.

1.2 References

- .1 Refer to the latest applicable edition of the following standards:
 - .1 ASTM International
 - .1 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
 - .3 ASTM D 1761, Standard Test Methods for Mechanical Fasteners in Wood.
 - .2 CSA International
 - .1 CSA B111, Wire Nails, Spikes and Staples.
 - .2 CAN/CSA-Series O80, Wood Preservation.
 - .3 CSA O86, Consolidation - Engineering design in wood
 - .3 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
 - .4 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber.

1.3 Action and informational submittals

- .1 Product Data: submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories. Include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Shop drawings
 - .1 Submit erection diagrams and shop drawings of plant fabricated elements for verification. Drawings to show the dimensions and location of members and assembly details.
 - .2 The Engineer's DWG drawings will not be provided to the Contractor. Shop drawings to be produced from the information provided on hard copy documents issued for construction.
- .3 Samples: submit for review and acceptance two (2) 300 mm long samples, one for each wood species called for.
- .4 Certificates: submit documents signed by the manufacturer certifying that the products and materials comply with the requirements pertaining to the physical characteristics and performance criteria.

1.4 Quality assurance

- .1 Marking of timber: lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

1.5 Delivery, storage and handling

- .1 Delivery and acceptance: deliver materials and products to work site in original factory packaging, labelled with manufacturer's name and address.
- .2 Storage and handling
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wood from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 Dimensions

- .1 All dimensions related to other structures and existing features to be ascertained on site.

Part 2 - PRODUCTS

2.1 Timber used in the construction of the terrace

- .1 Softwood S4S finish (surfaced on 4 sides), with moisture content not exceeding 19%, jack pine grade No. 1, treated.
 - .1 In accordance with requirements of CSA O141.
 - .2 Compliant with NLGA *Standard Grading Rules for Canadian Lumber*.

2.2 Timber used in the construction of the coping

- .1 Ledger strips and edges: Western Cedar Class A, non-treated, surfaced on 4 sides, with moisture content not exceeding 19%.
 - .1 In accordance with requirements of CSA O141.
 - .2 Compliant with NLGA *Standard Grading Rules for Canadian Lumber* (article 200b).
- .2 Decking and fascia: Western Cedar clear grade, straight-grained and quarter-sawed, untreated, milled on 4 sides, with moisture content not exceeding 15%.
 - .1 In accordance with requirements of CSA O141.
 - .2 NLGA *Standard Grading Rules for Canadian Lumber* (article 200a).
- .3 Certified products: CAN/CSA-Z809 or FSC or SFI.
- .4 Board lengths: varying between 1,8 m and 6 m or longer, but in excess of 3 m in a proportion of at least 90%. The boards must be cut square.

2.3 Timber used in the construction of the protection wall

- .1 Softwood S4S finish (surfaced on 4 sides), with moisture content not exceeding 19%, jack pine grade No. 1, ACQ (Alkaline Copper Quaternary) treated.
 - .1 In accordance with requirements of CSA O141.
 - .2 Compliant with NLGA Standard Grading Rules for Canadian Lumber.
 - .3 The ACQ treatment must be in accordance with CSA 080, exposure classification CE-4.1.

2.4 Accessories

- .1 Nails, spikes and staples: to CSA B111.
- .2 Bolts: 16 mm diameter unless indicated otherwise, hot-dip galvanized, complete with nuts and washers.
- .3 Lag screws: hot-dip galvanized, to CSA-B34.
- .4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, as recommended for purpose by manufacturer.
- .5 Joist hangers: minimum 1 mm thick sheet steel, galvanized, ZF001 coating designation.
- .6 Fastener finishes (galvanized metal): to ASTM A123/A123M, ASTM A653, for exterior work.
- .7 Wood treatment products:
 - .1 Unless otherwise indicated, all the wood of the terrace will be jack pine, pressure treated with a CCA K33 preservative (chromated copper arsenate base) to obtain a retention of 9,6 kg/m³ of wood by vacuum impregnation process in a closed cylinder, to latest edition of CSA 080.
 - .2 Incise wood with micro slits before treatment. Ensure that the CCA K33 preservative forms a consistent and deep envelope.
 - .3 For field groves and cuts, use a penetrating water-repellent solution to help protect wood against decay and rot efficiently in compliance with the relevant CSA 080 series standard. Product to contain 2% zinc naphthenate. This solution is not intended to replace pressure impregnation of the wood.

Part 3 - EXECUTION

3.1 Examination

- .1 Verification of the conditions: prior to product installation, ensure that the condition of surfaces and substrates previously implemented under other Sections or Contracts are acceptable and allow to perform the work in accordance with manufacturer's written instructions.
 - .1 Proceed to visual inspection of surfaces and substrates in presence of the Departmental Representative.
 - .2 Immediately notify the Departmental Representative upon identifying any unacceptable condition.

- .3 Begin with installation only after correcting the unacceptable conditions and receiving written authorisation from the Departmental Representative.

3.2 Preparation

- .1 Before installing the elements, apply generously the wood preservative product with a brush over all surfaces exposed on site by cuts, dressing and drilling.

3.3 Installation

- .1 Install members true to line, levels and elevations, square and plumb.
- .2 Construct continuous elements using sections of longest practical length.
- .3 Select exposed decking elements for appearance. Install lumber materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
- .4 Install ledger strips as indicated.
- .5 Assemble, anchor, fasten, attach and brace members to provide required strength and rigidity.
- .6 Countersink where bolt or lag screw heads would interfere.
- .7 Decking:
 - .1 Install decks in accordance with the requirements of CSA O86 for continuous pan construction.
 - .2 Each board to rest on at least three (3) points of support.
 - .3 Apply a preservative product to the cut ends of the boards where the use of treated wood is specified.
- .8 Nailing and assemblies: unless otherwise indicated on the plans, comply with the requirements of Part 9 of the National Building Code (NBC).
- .9 Notches and drill holes: no framing member should be notched, drilled or otherwise damaged in any way without the Departmental Representative authorisation.
- .10 Rot protection:
 - .1 Pieces of wood that rest on concrete or masonry should be treated with a preservative in order to prevent rot when the bottom of the element is lower than the ground level where an 13 mm air gap must be provided at the end and on the sides of the element.
 - .2 Pieces of wood which are not treated with a pressure-applied preservative and rest on concrete in contact with the ground or on filling, shall be separated by a sheet of polyethylene of at least 0,2 mm thickness, or 45 lb tar paper or other approved moisture proof material. This precaution is however not required when the element is more than 152 mm above the ground.

3.4 Cleaning

- .1 Cleaning during construction: leave the premises clean at the end of each work day.
- .2 Final Cleaning: upon completion of work, remove surplus materials, waste, tools and equipment.

- .3 Waste Management: separate waste materials for recycling. Remove bins and recycling bins from site and dispose of materials at appropriate facilities.

3.5 Protection

- .1 Protect installed products and components against damage during construction.
- .2 Repair damage to adjacent materials and equipment caused during installation of rough carpentry elements.

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 Ensure that the work of this section are performed by personnel qualified in roofing watertightness.

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 Watertight membrane:
 - .1 Description: Roofing membrane composed of SBS modified bitumen and non-woven polyester reinforcement. The exposed surface is covered with inlaid coloured granules and the underside is covered with a thermofusible plastic film.

- .2 Components: non-woven polyester reinforcement of 180 g/m² mass unit per area, a mixture of bitumen and SB polymer, protected with 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.
- .2 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.
- .3 Sealing mastic: synthetic, bitumen plasticized jointing mastic (such as SOPRAMASTIC).

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 and Reconstruction of 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 technological document in DWG format will not 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.

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 requirements

- .1 Section 01 74 21 – Construction/Demolition Waste Management and Disposal

1.2 References

- .1 Bureau de normalisation du Québec - NQ 0605-200 - Entretien arboricole et horticole
- .2 Normes de bonne pratique de la Société internationale d'arboriculture Québec (SIAQ).

1.3 Definitions

- .1 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
- .2 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.
- .3 Grubbing consists of excavation and disposal of stumps and roots boulders and rock fragments of specified size to not less than specified depth below existing ground surface.

1.4 Quality assurance

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 (Health and Safety Requirements).
- .2 Safety Requirements: worker protection. Workers must wear gloves, respirators, dust masks, long sleeved clothing, eye protection, protective clothing when applying herbicide materials.

1.5 Storage and protection

- .1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, utility lines, site appurtenances, water courses, root systems of trees which are to remain.
 - .1 Repair damaged items to approval of Departmental Representative.
 - .2 If trees are damaged during work, the Contractor shall take full responsibility including financial compensation for the loss of value of the damaged trees based on the method used by the Société internationale d'arboriculture – Québec Inc. (resolution CE-86-1682). Repairs are at the Contractor's expenses. The Departmental Representative shall determine the cost without recourse.

1.6 Waste management and disposal

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 (Construction/Demolition Waste Management and Disposal).
- .2 Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuel wood can be produced as saleable timber.
 - .1 Trim limbs and tops, and saw into saleable lengths.

- .2 Stockpile these materials adjacent to the site in accordance to the directions provided by the Department representative.
- .3 Transport the unused materials off site.

Part 2 - PRODUCTS

2.1 Materials

- .1 Soil Material for Fill:
 - .1 Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.
 - .2 Remove and store soil material for reused.

Part 3 - EXECUTION

3.1 Temporary erosion and sedimentation control

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 Preparation

- .1 Inspect site and verify with Departmental Representative, items designated to remain.
- .2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.
 - .1 Notify Departmental Representative immediately of damage to or when unknown existing utility lines are encountered.
 - .2 When utility lines which are to be removed are encountered within area of operations, notify Departmental Representative in ample time to minimize interruption of service.
- .3 Notify utility authorities before starting clearing and grubbing.
- .4 Keep roads and walks free of dirt and debris.

3.3 Close cut clearing

- .1 Close cut clearing to within 100 mm of ground surface.

3.4 Isolated trees and grubbing

- .1 Clear trees as indicated by Departmental Representative and cut at maximum height of 300 mm above ground level.
- .2 Grub out stumps of trees and shrubs that have been cut.

3.5 Removal and disposal

- .1 Remove cleared and grubbed materials off site.
- .2 Dispose of cleared and grubbed materials.
- .3 The contractor may chip and mulch cleared vegetative material.
- .4 The Contractor may use wood chips to reduce compaction of roots or to control surface water. Wood chips must be removed once landscaping work is completed.

3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 (Cleaning).
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 - GENERAL

1.1 Related requirements

- .1 Section 03 10 00 – Concrete Forming and Accessories
- .2 Section 03 30 00 – Cast-in-place Concrete
- .3 Section 32 93 10 – Trees, Shrubs and Ground cover planting

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 Structural soil: plantation soil composed of crushed rock and clayey soil.

- .6 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of work.
- .7 Unsuitable material: weak, chemically unstable, and compressible materials..
- .8 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).
- .9 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.
 - .4 Structural soil: submittal information must be submitted 30 days prior to the start of the work for quality control purposes.
 - .1 Indicate the proposed acquire sources to the Department representative.
 - .2 Soil analysis: Submit the test reports certifying that the products and materials satisfy the physical characteristics and performance criteria that are required.
 - .3 Certificates: Submit the documents signed by the manufacturer, certifying that the products and materials satisfy the physical characteristics and performance criteria that are required.
 - .4 Provide a 0,2 m³ sample of structural soil for approval.

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 MDDELCC Policy (Policy of Soil Protection and Rehabilitation of Contaminated Land), by a specialised firm.

1.6 Existing conditions

- .1 Contaminated materials:
 - .1 Peruse the environmental report on the characterization of soils which is provided by the Departmental Representative.
 - .2 Any excavation material, whether contaminated or not, may be reused as backfill where indicated providing it is reused in its original excavation zone.
 - .3 Excess materials shall be characterised and managed to the requirements of MDDELCC policy.
 - .4 Soils along rue des Remparts, in the vicinity of the Montcalm wall, display A-B (PAH and metals) and B-C contamination levels (MAH and hydrocarbons).
- .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.
- .4 Archeology:
 - .1 The walls subject to the work of this project are part of the Fortifications of Québec which is considered a historic site of national significance as it contains numerous archaeological resources. Should an archaeological finding be made during construction, notify at once the Departmental Representative and await written instructions before resuming work at the site of the discovery.

- .2 During excavation Work, Departmental Representative 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 an 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).

1.7 Retaining Structures

- .1 Design, supply and build the temporary retaining structures required to carry out the work and prevent any movement of the ground adjacent to the excavations likely to cause damage to existing structures. Unless otherwise indicated on the drawings, execute retaining work/structures with Berlin walls held by walers fastened with tie rods. During construction, support utilities (waterworks, drainage, gas and electricity) unearthed during the excavation.
- .2 In designing this work, take into account any overloading caused by workforce, machinery and general traffic.
- .3 Engage the services of a professional engineer, or licensed to practice in Québec for the design and inspection of all shoring work (retaining walls, shoring, bracing and underpinning) required for this project.
- .4 Submit design documents and related technical information at least two (2) weeks prior to start of work.
- .5 Design documents and related technical data submitted must bear the seal and signature of a professional engineer registered or licensed in Québec.

- .6 The engineer responsible for the design of temporary facilities must provide proof of professional liability (insurance) unless employed by the Contractor, in which case the Contractor shall provide proof that the Work of his engineer is covered by his liability insurance.

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 the latest version of CCDG (Cahier des charges et devis généraux, ministère des Transports du Québec).
- .5 Type 2 fill may be replaced with MG-112 type fill as defined in the latest version of CCDG (Cahier des charges et devis généraux, ministère des Transports du Québec).
- .2 CG-14 type fill: sand as defined in the latest version of CCDG (Cahier des charges et devis généraux, ministère des Transports du Québec).
- .3 Type 3 fill: selected material from excavation or 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 Structural Soil:
 - .1 The mix consists of granitic crushed stone, clay soil, water and hydrogel.
 - .2 The crushed stone (non-calcareous) must be calibrated with precision (diameter between 19 and 38 mm), very clayey and exempt from fine particles. The clay loam must be in accordance with the classification of soil of the Department of Agriculture of the United States (USDA) (gravel < 5 %, sand 25 to 30%, lime 20 to 40%, clay 25 to 40%). Clay loam shall contain not less than 2% or more than 5% organic matter as determined by the loss on ignition of oven-dried samples. The hydrogel shall be coated potassium propenoate-propenamide copolymer and adjusted in small quantities.
 - .3 Chemical and Physical Properties:

| | |
|---|--------------------------|
| Water content (%) | 7,5 |
| Bulk Density | 1287,5 kg/m ³ |
| Tap Density | 1782,0 kg/m ³ |
| Maximum Density (Proctor) | 2000,0 kg/m ³ |
| California Bearing Ratio (CBR) | > 50 |
| Active Earth Pressure coefficient (Ka) | 0,33 |
| Passive Earth Pressure coefficient (Kp) | 3,0 |
| Coefficient of pressure for ground at rest (Ko) | 0,50 |
| pH | < 7,5 |

.4 Gradation

| Sieve (mm) | % Passing |
|------------|-----------|
| 56 | 100 |
| 40 | 80 - 100 |
| 31,5 | 60 - 85 |
| 20 | 20 - 35 |
| 14 | 10 - 25 |
| 10 | 10 - 25 |
| 5 | 10 - 20 |
| 2,5 | 8 - 20 |
| 1,25 | 8 - 20 |
| 0,630 | 7 - 20 |
| 0,315 | 5 - 18 |
| 0,160 | 5 - 15 |

- .8 Foundation drain perforated HDPE conduit, 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 Implementation of retaining structures

- .1 Perform retaining work and shoring as excavation work progresses in accordance with the drawings prepared by the Contractor's engineer. Have the latter verify the retaining and shoring structures.
- .2 Stop driving the sheet piles and steel piles when refusal is encountered on masonry structures.
- .3 Adjust the positioning of piles to the geometry of masonry walls and buried vestiges whose thicknesses vary and against which the retaining structures abut.
- .4 Adjust the retaining structures to the vestiges uncovered.

- .5 Insert the Berlin wall woodwork as the excavation progresses. As work progresses, fill with concrete the cavities created during excavation to prevent any sagging.
- .6 Do the following during backfilling:
 - .1 Unless otherwise indicated on the drawings or instructed by the Engineer, remove the retaining structures from the excavations.
 - .2 Do not cut the tie rods or remove the bracing before each layer of backfill layer has reached the required level.

3.4 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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.

3.9 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).

3.10 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.

3.11 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.

3.12 Backfilling

- .1 Whether contaminated or not, excavated materials may be reused to backfill the excavations as indicated on the drawings. Contaminated materials in excess shall be managed to the requirements of applicable policies.
- .2 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.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .6 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.
- .7 Place dimensionally stabilised fill in areas indicated.
- .8 Consolidate and level dimensionally stabilised fill with internal vibrators.

3.13 Installation of structural soil

- .1 Install 150 mm structural soil lifts and compact each lift.
- .2 Compact all materials to at least 95% Proctor Density from a standard compaction curve AASHTO T 99 (ASTM D 698). No compaction shall occur when moisture content exceeds maximum as listed herein. Delay compaction of 24 hours if moisture content exceeds maximum allowable and protect the structural soil during delays in compaction with plastic or plywood as directed by the Department representative.
- .3 Bring the structural soil to finished grades as shown on the drawings. Immediately protect the structural soil from contamination by toxic materials, trash, debris, water containing cement, clay, silt or materials that will alter the particle size distribution of the mix with plastic or plywood as directed by the Department representative.

3.14 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 project manager or his/her assistant 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 project manager. Contractor shall implement these field data from benchmarks provided by the project manager.

1.5 Retakes

- .1 Any element deemed unsuccessful by the Departmental Representative (joint, mix, placement, profile, etc.) shall be redone by the Contractor to project manager 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 Project manager reserves 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, latest 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 |
| | 3 | 2 |
| Single layer | 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.

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 3000 cycles (Deformation % max.) | — — | — — | 10 20 | 10 20 | — — | — — |
| Water resistance (% min.) | 70 | 70 | 70 | 70 | | |

- .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).

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 project manager. 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

Part 1 - GENERAL

1.1 Related requirements

- .1 Section 31 23 33.01 – Excavating, trenching and backfilling

1.2 References

- .1 Definitions: Mycorrhiza: association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.
- .2 Reference Standards:
 - .1 Agriculture and Agri-Food Canada (AAFC): Plant Hardiness Zones in Canada.
 - .2 Canadian Nursery Landscape Association (CNLA): Canadian Standards for Nursery Stock.
 - .3 Norme NQ 0605-100 “Aménagement paysager à l'aide de végétaux”: Work in this must be carried out in accordance with industry practices and most recent standards of the Bureau de Normalisation du Québec (BNQ).
 - .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS): Material Safety Data Sheets (MSDS).
 - .5 U.S. Environmental Protection Agency (EPA) / Office of Water: EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 Administrative requirements

- .1 Contractor must obtain approval from Departmental Representative before commencing work.
- .2 Submit detailed delivery and planting schedule, coordinated with supplier, to Departmental Representative for approval. Method and planting times must be submitted for approval and integrated into other site activities.
- .3 Schedule to include:
 - .1 Shipping dates.
 - .2 Planting dates.

1.4 Action and informational submittals

- .1 Submit in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Product Data: Submit manufacturer's instructions, printed product literature and data sheets for trees, shrubs, ground cover, fertilizer, mycorrhiza, anti-desiccant, anchoring equipment, and mulch and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples: Submit samples of mulch (1 litre bag), stake tie and type of rodent protection for approval.

1.5 Quality assurance

- .1 Qualifications:
 - .1 Landscape Contractor: to be a Member in Good Standing of the Horticultural Trades Association.
 - .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
 - .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Ornamental Maintenance designation.

1.6 Delivery, storage and handling

- .1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Protect plant material from frost, excessive heat, wind and sun during delivery.
 - .2 Protect plant material from damage during transportation:
 - .1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
 - .2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
 - .3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.
 - .3 Protect plant material from frost, excessive heat, wind, sun and sudden temperature changes during delivery and storage.
 - .4 The Contractor is responsible for unloading plants and for damage to plants.
 - .5 The Contractor must also coordinate all delivery and planting operations to minimize time between excavation and planting.
 - .6 Plants damaged due to transportation and handling may be rejected before, during and after planting.
- .2 Storage and Handling Requirements:
 - .1 Store plants in protected, shaded location until they can be planted. Root balls and containers must be covered in mulch (heeled in) and kept humid until planting.
 - .2 Protect stored plant material from frost, wind and sun and as follows:
 - .1 For pots and containers, maintain moisture level in containers.
 - .2 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.
 - .3 Keep roots moist at all times.
 - .3 Store and manage hazardous materials in accordance with manufacturer's written instructions.

1.7 Schedule

- .1 The Contractor must receive approval from the Departmental Representative before beginning Work outlined in this section.

- .2 Submit a detailed delivery and planting schedule coordinated with the supplier to the Departmental Representative. The method and planting time must be submitted for approval and integrated into the other site activities. Plant during periods favourable to plant health and growth.

1.8 Warranty

- .1 The Contractor guarantees all plants for a period of 12 months from date of provisional acceptance of the work.
- .2 The Contractor must replace dead, deteriorated or defective plants at own expense and according to drawing and plan specifications at his own cost. Replacement plants must be of the same species, size, quality and guarantee as the original plant.
- .3 The Contractor must remove dead plants within ten consecutive days of the notice from the Departmental Representative and replace them immediately or the following planting season.
- .4 The Contractor must have the Departmental Representative inspect the plants at the end of the warranty period.
- .5 The guarantee of the contractor includes materials, labor, equipment and tooling necessary to replace all plants that do not meet growth requirements in this section.
- .6 All materials and planting methods used for the replacement of plants must meet all the requirements of this specification.

Part 2 - PRODUCTS

2.1 Plant material

- .1 General:
 - .1 Plants will be nursery grown and typical of their species. Sizes and species are as shown on the planting list.
 - .2 The Departmental Representative must approve the plants at the nursery or on delivery to the site prior to planting. If the Contractor does not do so, the plants may be rejected prior to planting.
- .2 Supply of plants:
 - .1 The Contractor must provide all the plants indicated on the bid schedule.
 - .2 Substitutes must receive prior authorization from the Departmental Representative.
 - .3 One (1) month after the Notice of Acceptance of offer, the Contractor must inform the Departmental Representative of the source and provide proof of the plant order corresponding to the bid schedule.
 - .4 Planting materials must be first quality and correspond to BNQ, NQ 0605-300-2001, and the planting table provided in the planting plan.
 - .5 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.
 - .6 Source of plant material: grown in Zone 3 and 4 in accordance with Plant Hardiness Zones in Canada.
 - .7 Plants will be nursery grown.

- .3 Plant material: Must be exempt from diseases, insects, defects or bruises; demonstrate a healthy structure and robust and dense root system.

- .4 Trees:

- .1 Quality and supply source: Supply first quality nursery trees. Size and development of trees and roots must comply with BNQ standard 0605-300 du BNQ, Written approval is required for trees with root balls smaller than the Standards. Tree size must be measured 30 cm from the ground for trees 100 mm and more in diameter and 15 cm from the ground for trees under 100 mm in diameter. Measure trees when branches are in normal position. Sizes indicated for tree height and branch development are based on the dimension of the main part of the tree and not the distance between branch extremities.
 - .2 Plants will be nursery grown and typical of their species. Sizes and species are as shown on the planting list. Substitutes must receive prior authorization from the Departmental Representative. Container plants will be acceptable if cultivated for at least one season, two seasons at most in the same container. Containers must be large enough for development of the roots.

2.2 Water

- .1 Free of impurities that would inhibit plant growth.

2.3 Stakes

- .1 T-bar, steel, 40 x 40 x 5 x 2440 mm, galvanized and painted black.

2.4 Ties

- .1 For trees with caliper size of 70 mm or less, rubber "Pro-Tie" type tie, flexible and adjustable, as distributed by "Derco," Quebec or equivalent approved by Departmental Representative.
 - .2 Tie fastener: 5 mm round screw, for square screwdriver and galvanized steel bolts.

2.5 Trunk protection

- .1 Wire mesh: galvanized, electrically welded 1.4 mm wire with 25 x 25 mm mesh and fastener.

2.6 Mulch

- .1 Bark chip: varying in size from 25 to 50 mm in diameter, from bark of coniferous trees.

2.7 Fertilizer

- .1 Fertilizers must comply with federal fertilizer law and regulation.
 - .2 Synthetic commercial type as recommended by soil test report and manufacturer's recommendations according to period and season. Indicate formulas for planting and maintenance and have validated by Departmental Representative.
 - .3 Bonemeal, 100% natural, 2-11-0 ratio.
 - .4 Mycorise™ growing medium.
 - .1 Ensure new root growth is in contact with mycorrhiza (growing material).
 - .2 Use mycorrhiza as recommended by manufacturer's written recommendations.

2.8 Structural soil for planting

- .1 Refer to the specifications indicated in section 31 23 33.0 (Excavating, Trenching and Backfilling).

2.9 Anti-desiccant

- .1 Wax-like emulsion.

2.10 Source quality control

- .1 Obtain approval from Departmental Representative of plant material prior to planting.
- .2 Imported plant material must be accompanied with necessary permits and import licenses. Conform to Federal, Provincial or Territorial regulations.

Part 3 - EXECUTION

3.1 Examination

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for planting installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Pre-planting preparation

- .1 Proceed only after receipt of written acceptability of plant material from Departmental Representative.
- .2 Remove damaged roots and branches from plant material.
- .3 At Departmental Representative's request or if otherwise deemed necessary, apply antidesiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.
- .4 Locate and protect utility lines.
- .5 Notify and acquire written acknowledgment from utility authorities before beginning excavation of planting pits for trees and shrubs.

3.3 Planting season

- .1 The Contractor must follow the steps in the planting schedule coordinated with the General Contractor.
- .2 Do not plant unless conditions are suitable to plant health and growth.

3.4 Excavation and preparation of planting beds

- .1 Establishment of sub-grade for planting beds in accordance with Section 31 23 33.01 (Excavating, Trenching and Backfilling).

- .2 For individual planting holes:
 - .1 Stake out location and obtain approval from Departmental Representative prior to excavating.
 - .2 Excavate to depth and width as indicated.
 - .3 Remove subsoil, rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.
 - .4 Scarify sides of planting hole.
 - .5 Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.
 - .6 Protect all surrounding work during digging.

3.5 Planting trees

- .1 Backfill soil in 150 mm lifts.
- .2 Protect the trunk, top and root ball during transportation and handling. Use a three-point tree spade with clamp to keep trees in upright position during handling. Equipment must be approved by Departmental Representative prior to planting.
- .3 Remove soil from top of rootball and measure to make sure root collar is at the correct height. Make sure plants are straight in the hole; adjust position to blend well with surroundings.
- .4 Place rootball to ensure that collar level is at the same height as surrounding finish grade.
- .5 Orient plant material to give best appearance in relation to structure, roads and walks.
- .6 Loosen burlap and remove 1/3 of the top, taking care not to disturb the rootball. Do not remove the burlap and rope under rootball. In the case of container plants, remove containers without breaking up the rootball.
- .7 Do not leave wrapping materials in holes that are not biodegradable.
- .8 Add and compress by 150 mm, to eliminate air pockets. Do use frozen and water saturated soil. Fill in 2/3 of the hole with soil and the remainder with water. Let the water soak and fill in the hole up to the collar and finished soil level.

3.6 Pruning

- .1 Plantings require minimal trimming at planting time, if transported properly. Cut away dead, dry or damaged branches or parts of branches.

3.7 Fertilization

- .1 Trees: mix in the following with soil:
 - .1 200 grams 2-11-0 fertilizer (bonemeal)/tree.
 - .2 500 ml Mycorise Pro Végétalisation/tree.

3.8 Trunk protection

- .1 Install trunk protection on deciduous trees as indicated.
- .2 Install trunk protection before installation of tree supports.

3.9 Tree supports

- .1 Deciduous tree (45 mm and more in diameter):
 - .1 Fill in 2/3 of hole and drive in T-bar stakes, taking care not to damage main roots. Install stakes, two per tree, 150 mm from trunk on prevailing wind side. Attach trunk to stake with collars. Stakes must remain in place for a minimum of two (2) years. Equipment remains the owner's property.
 - .2 Do not alter collars, except in the case of a modified collar.
 - .3 Collar screws must not be longer than 5 mm past nuts once collar is attached.
 - .4 Collars and stakes must be compatible to ensure solid, safe installation.

3.10 Mulching

- .1 Ensure soil settlement has been corrected prior to mulching.
- .2 Spread mulch evenly 50 to 100 mm thick. If mulch is likely to blown away, wet and mix with a little soil. Thin at base of trunks.

3.11 Maintenance during establishment period

- .1 Perform following maintenance operations from time of planting to acceptance by Departmental Representative.
 - .1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.
 - .2 Remove weeds monthly.
 - .3 Replace or respread damaged, missing or disturbed mulch.
 - .4 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.
 - .5 Remove dead or broken branches from plant material.
 - .6 Keep trunk protection and guy wires in proper repair and adjustment.
 - .7 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

3.12 Maintenance during warranty period

- .1 From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.
 - .1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
 - .2 Remove weeds monthly.
 - .3 Replace or respread damaged, missing or disturbed mulch.
 - .4 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.
 - .5 Apply fertilizer in early spring as indicated by soil test.

- .6 Remove dead, broken or hazardous branches from plant material.
- .7 Keep trunk protection and tree supports in proper repair and adjustment.
- .8 Remove trunk protection, tree supports and level watering saucers at end of warranty period.
- .9 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.
- .10 Submit monthly written reports to Departmental Representative identifying:
 - .1 Maintenance work carried out.
 - .2 Development and condition of plant material.
 - .3 Preventative or corrective measures required which are outside Contractor's responsibility.

3.13 Cleaning

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.14 Provisional acceptance of planting work

- .1 Once planting work is completed, provisional acceptance is given after verified and approved by Departmental Representative.
- .2 Provisional acceptance of planting work will be given, provided that:
 - .1 All plant materials installed on the site are healthy and meet normal growth conditions.
 - .2 Comply with requirements of planting list regarding species and size.
 - .3 Planting materials are insect and disease free.
- .3 Labels identifying plants are removed after provisional acceptance.

3.15 Final acceptance of planting work

- .1 Final acceptance of work will be granted after the warranty period following provisional acceptance of the last step, provided all conditions are met.
- .2 Submit the tree maintenance rapports to the Department representative.

END OF SECTION