National Capital Commission

Gamelin Street Defragmentation and Naturalization – Phase 2

Project no. : DC3085-09

Specifications

Issued For Tender

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SEALS PAGE

This document has been reviewed and approved in the following disciplines:

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END OF SECTION

SPECIFICATIONS

DRAWINGS

DIVISION 01

TENDER FORM

Item	*Description*	*Units*	*Qty*	*Units Price*	*Amount*
	Mobilization, Removals and Excavation				
1	Mobilization and General Requirements including Removals	lump sum	1	-	$
2	Asphalt Removal	m2	2800		$
3	Excavation, Trenching and Backfilling	lump sum	1	-	$
4	Management for excavated contaminated soils	m3	1000		$
	Pathways and Curbs				
5	Geotextile (under pathway and shouder)	lump sum	1	-	$
6.1	Granular MG-112	lump sum	1	-	$
6.2	Granular MG-20 (including shoulder)	lump sum	1	-	$
7	Pedestrian Pathway (Crushed Granite Particles)	m2	82		$
8	Asphalt Surfaces, type EC-10	m2	1540		$
9	Pavement Marking	m	385		$
10	Concrete Curbs	m.	47		$
	Rip-rap and Natural Stones				
11	Relocation of Natural Stones On-site	each	40		$
12.1	Granite Boulders	each	18		$
12.2	Rip-rap	lump sum	1	-	$
	Signage				
13.1	Relocation of Pathway Signs On-site	each	7		$
13.2	Relocation of NCC Signs On-site	each	4		$
13.3	Relocation of Special NCC Signs On-site	each	2		$
14.1	Pathway Signs	each	10		$
14.2	Pathway Signs on Traffic Lighting Lampost	each	2		

14.3	Flexible Delineators, type "Cyclo-Zone"	each	2		
15	Traffic Lighting Lampost	lump sum	1	-	$

Hydro Seeding

16	Imported Topsoil (for seeding areas)	m3	1000		$
17.1	Hydro Seeding - type 1	lump sum	1	-	$
17.2	Hydro Seeding - type 2	lump sum	1	-	$
17.3	Hydro Seeding - type 3	lump sum	1	-	$
17.4	Hydro Seeding - type 4	lump sum	1	-	$

Planting - Tall Shrubs

18.1	AMELANCHIER SANGUINEA /	each	9		$
18.2	ACER PENNSYLVANICUM/	each	8		$
18.3	CORNUS ALTERNIFOLIA /	each	7		$
18.4	CORNUS RUGOSA /	each	5		$
18.5	HAMAMELIS VIRGINIANA /	each	9		$
18.6	VIBURNUM ACERIFOLIUM /	each	14		$

Planting - Deciduous Shrubs

18.7	DIERVILLA LONICERA /	each	42		$
18.8	LONICERA CANADENSIS /	each	24		$
18.9	RIBES HIRTELLUM /	each	33		$
18.10	ROSA BLANDA /	each	34		$
18.11	RUBUS ODORATUS /	each	23		$
18.12	SAMBUCUS PUBENS /	each	32		$
18.13	SPIREA ALBA /	each	44		$
18.14	VIBURNUM EDULE /	each	33		$

Planting - Grasses

18.15	CALAMAGROSTIS CANADENSIS /	each	56		$
19	Plant Maintenance / Warranty (2 years)	lump sum	1	-	$

Sub-Total	$
GST 5 %	$
TOTAL	**$**

Basis of Payments

.1 Payment at the price per item and/or lump sum price, as indicated in the Tender Form, shall be full compensation for all labour, services, equipment and machinery as well as the supply, delivery and installation of all materials required for the proper execution of this contract, and the management and removal of all non reusable or surplus material from the site including excavated contaminated soils (excavated granular material and/or others, when required).

ITEM NO. 1 - MOBILIZATION AND GENERAL REQUIREMENTS (INCLUDING REMOVALS)

.1 This item includes all general requirements to complete the project including general instructions, shop drawings, safety measures, environmental protection, installation of temporary protective fencing, temporary facilities (including temporary access roads where required), traffic control (permits, signage, etc.), maintenance of access roads where required including water for dust control as directed, cleaning, removals and reinstatement at completion of the project.

.2 Included in this lump sum price are all the general requirements identified on the drawings and specifications and all those required to complete the work of this contract not covered under specific items, including the removal from the site of all objects (curbs, steel gates, signs, bollards, etc.) and materials required to undertake the work of this contract and indicated on the drawings.

.3 Included in this lump sum price are the completion of record drawings at the end of the Contract for provision to the NCC Representative.

.4 This item will not be measured but will be paid on a lump sum basis upon the following schedule.
- .1 70% for substantial completion of this item
- .2 30% for completion and supply of Contract record drawings

ITEM NO. 2 – ASPHALT REMOVAL

.1 This item consists of the removal of the complete asphalt layer inside limit of work, as indicated or specified otherwise on the drawings and details.

.2 This item also includes the management and removal of asphalt material from the site.

.3 This item will be measured for payment in square metres of asphalt removed from the site.

ITEM NO. 3 – EXCAVATION, TRENCHING AND BACKFILLING

.1 This item consists of the common excavation including trenching, backfilling and rough grading allowing for finished ground elevations and specified surface treatments.

.2 This item includes the hauling, handling and placing, shaping, compacting and trimming of earth and excess material and the management of excess material.

.3 This item includes the proof rolling of the exposed surface, and the sub-excavation as required of any soft areas encountered during proof rolling.

.4 This item includes the stripping and reuse of approved earth fill material including compaction.

.5 This item includes the stripping, stockpiling and reuse of acceptable and reusable topsoil material, as required (for seeding areas).

.6 This item also includes the removal of all excavated non reusable or surplus material from the site, excluding contaminated soils.

.7 This item will not be measured but will be paid on a lump sum basis.

ITEM NO. 4 – MANAGEMENT FOR EXCAVATED CONTAMINATED SOILS

.1 This item includes the management and sampling of excavated and piled soil as per method indicated in table 3 (refer to Section 01 61 10), and following NCC Representative instructions. Laboratory tests will be paid by NCC.

.2 This item also includes the removal from the site of all excavated non reusable and contaminated soils (granular material and/or others, when required).

.3 This item will be measured for payment in cubic metres of excavated contaminated soils removed from the site.

ITEM NO. 5 - GEOTEXTILE (UNDER PATHWAY AND SHOULDER)

.1 This item consists of the supply and installation of the geotextile required for the pathways construction, to the extent indicated and specified in the Contract documents.

.2 This item will not be measured but will be paid on a lump sum basis.

ITEM NO. 6.1 - GRANULAR MG-112

.1 This item consists of the supply, placement and compaction of MG-112 required for the construction of the sub base course for the recreational pathway where required on the drawings and details, to the extent indicated and specified in the Contract documents.

.2 This item also includes the supply and application of water for compaction.

.3 This item will not be measured but will be paid on a lump sum basis.

ITEM NO. 6.2 - GRANULAR MG-20 INCLUDING SHOULDER

.1 This item consists of the supply, placement and compaction of MG-20 required for the construction of the base course for the recreational pathway including his shoulder where indicated on the drawings and details, to the extent indicated and specified in the Contract documents.

.2 This item also includes the supply and application of water for compaction.

.3 This item will not be measured but will be paid on a lump sum basis.

ITEM NO. 7 - PEDESTRIAN PATHWAY (Crushed Granite Particles)

.1 This item consists of the supply, placement and compaction of the crushed granite particles surface required for the construction of the pedestrian pathway including the granular base course where indicated on the drawings and details, to the extent indicated and specified in the Contract documents.

.2 This item will be measured for payment in square metres (supplied and installed).

ITEM NO. 8 - ASPHALT SURFACES (TYPE EC-10)

.1 This item consists of the supply, placement and compaction of the surface of bituminous concrete (asphalt) required for the construction of the recreational pathway to the extent indicated and specified in the contract documents.

.2 This item will be measured for payment in square metres (supplied and installed).

ITEM NO. 9 – PAVEMENT MARKING

.1 This item consists of supply and placement of the pathway marking including stop lines, to the extent indicated and specified in the Contract documents.

.2 This item will be measured for payment in metres (supplied and installed).

ITEM NO. 10 – CONCRETE CURBS

.1 This item consists of the supply and installation of concrete curbs where indicated on the drawings, including all joints and related works such as the pavement rehabilitation along the new curb.

.2 This item will be measured for payment in metres (supplied and installed).

ITEM NO. 11 – RELOCATION OF NATURAL STONES ON-SITE

.1 This item consists of the relocation of existing natural stones on-site where indicated on the drawings, including all related works, to the extent indicated and specified in the Contract documents.

.2 This item will be paid per natural stone relocated.

ITEM NO. 12.1 – GRANITE BOULDERS

.1 This item consists of the supply and installation of granite boulders where indicated on the drawings, including all related works, to the extent indicated and specified in the Contract documents.

.2 This item will be paid per boulder (supplied and installed).

ITEM NO. 12.2 – RIP-RAP

.1 This item consists of the supply and installation of rip-rap where indicated on the drawings, including geotextile and all related works, to the extent indicated and specified in the Contract documents.

.2 This item will not be measured but will be paid on a lump sum basis.

ITEM NO. 13.1 – RELOCATION OF PATHWAY SIGNS ON-SITE

.1 This item consists of the relocation of existing pathway signs on-site including new posts and concrete footing where indicated on the drawings, including all related works, to the extent indicated and specified in the Contract documents.

.2 This item will be paid per pathway sign relocated, including the new posts and concrete footing.

ITEM NO. 13.2 – RELOCATION OF NCC SIGNS ON-SITE

.1 This item consists of the relocation of existing NCC signs on-site including posts and new concrete footing where indicated on the drawings, including all related works, to the extent indicated and specified in the Contract documents.

.2 This item will be paid per NCC sign relocated, including the posts and new concrete footing.

ITEM NO. 13.3 – RELOCATION OF "SPECIAL" NCC SIGNS ON-SITE

.1 This item consists of the relocation of existing NCC signs on-site (i.e. Gatineau Park signage and Map), including posts and new concrete footing where indicated on the drawings, including all related works, to the extent indicated and specified in the Contract documents.

.2 This item will be paid per NCC sign relocated, including the posts and new concrete footing.

ITEM NO. 14.1 - PATHWAY SIGNS

.1 This item consists of the supply and installation of pathway signs including posts and concrete footing where indicated on the drawings, including all related works, to the extent indicated and specified in the Contract documents.

.2 This item will be paid per pathway sign supplied and installed, including the posts and concrete footing.

ITEM NO. 14.2 - PATHWAY SIGNS ON TRAFFIC LIGHTING LAMP POST

.1 This item consists of the supply and installation of pathway signs on traffic lighting lamp post where indicated on the drawings, including all related works, to the extent indicated and specified in the Contract documents.

.2 This item will be paid per pathway sign supplied and installed.

ITEM NO. 14.3 – FLEXIBLE DELINEATORS, TYPE "CYCLO-ZONE"

.1 This item consists of the supply and installation of flexible delineators type "Cyclo-Zone" or approved equal, including anchors where indicated on the drawings, including all related works, to the extent indicated and specified in the Contract documents.

.2 This item will be paid per flexible delineator supplied and installed (including anchors).

ITEM NO. 15 – TRAFFIC LIGHTING LAMP POST

.1 This item consists of the supply and installation by the Electrical Contractor of a lamppost with arm holding flashing traffic lights c/w a flashing panel in compliance with the standards of the Quebec Ministry of Transport, including a concrete footing and all related works, as indicated and specified in the Contract documents.

.2 This item also includes the underground connection of the traffic lighting lamp post to the NCC's panel.

.3 The Contractor must submit shop drawings for the supply and installation of the concrete footing and the arm mast designed accordingly to the physical constraints of their installation. The shop drawing shall be signed and sealed by a certified engineer in the province of Quebec.

.4 This item will not be measured but will be paid on a lump sum basis.

ITEM NO. 16 – IMPORTED TOPSOIL (FOR SEEDING AREAS)

.1 This item consists of the supply, installation, compaction and fine grading of imported topsoil for seeding areas (as required) to the extent indicated and specified in the Contract documents.

.2 This item will be measured for payment in cubic metres (supplied and installed).

ITEM NO. 17 – HYDRO SEEDING

.1 Those items consist of the supply and installation of seed to reinstate all surface areas around the new pathway as well as for naturalization as indicated on the drawings, including the shoulders disturbed or damaged as part of the work of this Contract. Unless otherwise indicated, reinstatement shall be by hydro seeding.

.2 Hydro seeding includes, but is not limited to, the supply and installation of seed mixtures, hydro mulch and fertilizers as well as maintenance during establishment and warranty period.

.3 Those items will not be measured but will be paid on a lump sum basis based on types of mixture and upon the following schedule:
- .1 60% for supply and installation
- .2 40% for satisfactory maintenance and establishment of seeded areas.

ITEM NO. 18 – TALL SHRUBS, DECIDUOUS SHRUBS AND GRASSES PLANTING

.1 Those items consist of the supply and installation of plant materials, including the supply and installation of imported topsoil and fertilizers, as well as stakes, mulch and all related works, to the extent indicated and specified in the Contract documents.

.2 Those items will be paid per plant type and species (supplied and planted).

ITEM NO. 19 – PLANT MAINTENANCE AND WARRANTY (2 years)

.1 This item consists of the plant maintenance during maintenance and warranty period including watering, pruning, winter protection, replacement of plan material (when required) as well as all related works, to the extent indicated and specified in the Contract documents.

.2 Plant maintenance shall begin immediately after each portion of planting is completed and is conditional to the final acceptance of the vegetation.

.3 This item will not be measured but will be paid on a lump sum basis upon the following schedule:

- .1 50% for satisfactory maintenance and establishment of plant materials after the 1st year.
- .2 50% for satisfactory maintenance and establishment of plant materials after the 2nd year.

END OF SECTION

1.1 TIME OF COMPLETION

.1 Work must begin immediately following contract award and be substantially completed by end of November 30, 2014.

.2 On-site work shall be limited from Monday to Friday, unless approved by the NCC Representative.

1.2 SCOPE OF WORK

.1 Work under this contract covers the work involved in the construction of a 385 metre long and 4.0 metre wide recreational pathway within Gamelin street limits in the city of Gatineau (Hull sector), between St-Raymond blvd and Promenade de la Gatineau. The work under this contract also covers the naturalization of the recreational pathway between St-Raymond blvd and des Fées street, and includes, but is not limited to, the following:

.1 Erosion and sediment control
.2 Vegetation and environmental protection
.3 Excavation, backfilling and site grading including removal of contaminated material (i.e. excavated granular material and/or others, when required)
.4 Stockpiling and reuse of acceptable topsoil material, as required
.5 Supply and installation of a new bituminous concrete recreational pathway including his granular shoulder
.6 Supply and installation of a new pedestrian pathway (in crushed granite particles)
.7 Supply and installation of concrete curbs
.8 Relocation of existing pathway signs on site
.9 Supply and installation of signs and pavement markings
.10 Supply and installation of a traffic lighting lamppost
.11 Relocation of existing boulders on site
.12 Supply and installation of new granite boulders
.13 Supply and installation of imported topsoil (when required), as well as seed mixture, fertilizers and hydro mulch
.14 Supply and installation of plant material, including maintenance during maintenance and warranty period (2 years)
.15 Rehabilitation of disturbed areas

1.3 SPECIAL CONSTRUCTION REQUIREMENTS

.1 Contractor to stake out the proposed center line. NCC Representative to approve the proposed center line of the new pathway.

.2 Contractor will be responsible to maintain a pedestrian and cyclist traffic lane at all time. Work on the old emergency road (between St-Raymond blvd and Promenade de la Gatineau) must be completed before the removal of the existing pathway, as well as work between Promenade de la Gatineau and des Fées street. Refer to item 1.18 – Traffic Control.

.3 The Contractor will be responsible to protect the subgrade at all times during construction and in particular following moderate to heavy rainfall. Construction traffic on exposed subgrade should be prohibited or limited to equipment which will not damage subgrade.

.4 The Contractor will be responsible to ensure that the equipment utilized in the site preparation, excavation and removal of granular material (where required) as well as pathway construction does not cause any damage or disturbance to the subgrade.

.5 Any damaged subgrade areas caused as a result of construction traffic or construction techniques must be repaired by the Contractor as part of this contract and at no additional cost to the National Capital Commission.

.6 The Contractor shall be responsible as part of the tender price for the stockpiling and reuse of approved fill material, or the removal from the site of all excavated non reusable or excess material as well as the supply and placement of all required imported fill material required to execute the work of this contract.

.7 The Contractor shall not excavate more than the depth indicated on the drawings and details for the pathway construction, without the prior authorization and approval of the NCC Representative. The Contractor will not be compensated for any additional earth or granular backfill materials required as a result of over-excavations not approved and authorized by the NCC Representative prior to undertaking work.

1.4 CODES, PERMITS AND STANDARDS

.1 Standards referred to in this Specification (CGSB, CSA, ASTM, OPSD, CHBDC etc.) may be examined at the following location:

Public Works and Government Services Canada
Standards and Specifications Branch
Place du Portage - Phase 3, 11 Laurier Street
Gatineau, Quebec
K1A OS5

.2 Perform work in accordance with the National Building Code of Canada 2010 and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.3 Work to meet or exceed requirements of:
- .1 contract documents
- .2 specified standards, codes and referenced documents

.4 Obtain and pay for permits, inspector approvals, and other licenses required for this project and also pay any charges incidental to such permits. Provide copy of permits to the NCC Representative.

.5 Contractor is to obtain an entry permit from the National Capital Commission, Catherine Verreault (819)827-6012.

1.5 DEFINITIONS

.1 Wherever the term "NCC Representative" appears throughout this specification, it shall be construed to mean an Inspector representing the National Capital Commission and including a duly named consultant on their behalf.

.2 Wherever the terms "or equal", "or approved equal" appear after specific types of materials and items throughout this specification, they shall be construed to mean as being equal in

the opinion of the NCC Representative, in material content, workmanship and quality to that designated as being the minimum acceptable standard, and that the NCC Representative's written approval must be obtained prior to submitting an alternative, 7 days before close of tender.

1.6 TAXES

.1 Include in the tender amount, all sales and other taxes levied by the Federal, Provincial and Municipal government or other authority. There will be no refunds made by the National Capital Commission to the Contractor for taxes paid by the Contractor.

1.7 PROTECTION

.1 Provide and maintain guardrails, fences, barricades, lights and other devices required for protection of workmen and public in accordance with the requirements of Provincial and Local by-laws and the Canadian Construction Safety Code.

.2 Protect existing structures against damage until completion of work.

.3 Take all precautions to protect vegetated areas and specimen trees from any damage.

1.8 DAMAGES

.1 Damages caused to existing plant material, landscaping, lawns, roadways, pathways, structures, finishes and public utilities due to work of this contract, will be restored to their original condition, replaced or adequate compensation made to affected parties by the Contractor.

.2 It is understood that restored or replaced work includes, labour, equipment and material costs.

.3 The restored or replaced work shall be completed within 7 days of notification by the NCC Representative.

1.9 CUTTING, FITTING AND PATCHING

.1 Execute cutting, fitting and patching of work that may be a requirement to make work fit properly together, to receive or be received by other work.

.2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

.3 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

1.10 SITE VISIT

.1 Parties intending to submit tenders on the work must visit the site and obtain for themselves all information pertaining to existing conditions affecting the proper execution and completion of the work. The submission of a tender shall be deemed as proof that the tenderer and his sub-trades have complied with this requirement. After claims for additional compensation will not be entertained for any items of labour, equipment or materials required to complete the work that could have been reasonably ascertained by a Site Examination.

1.11 WORKMANSHIP

.1 It is a requirement of this contract that qualified tradesmen execute each type of work specified.

.2 Example: Landscape contractor for landscape work, mason for stonework, carpenter for carpentry work, etc.

.3 Work unsatisfactorily completed by unqualified tradesmen will be redone and paid for by the Contractor.

1.12 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each of following:
- .1 Contract drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change orders.
- .5 Other modifications to Contract.
- .6 Field test reports.
- .7 Manufacturer's installation and application instructions.
- .8 Copy of current and approved work schedule.

1.13 WORK SCHEDULE

.1 Provide within 5 working days after Contract award, in form acceptable to NCC Representative, detailed schedule showing anticipated progress stages and final completion of work within time period specified in Contract documents.

.2 Interim reviews of work progress based on work schedule will be conducted as decided by NCC Representative and schedule updated by Contractor in conjunction with and to approval of NCC Representative.

1.14 CONTRACTOR'S USE OF SITE

.1 Limited to area immediately surrounding work and areas designated by the NCC Representative for material stockpiling and work equipment parking.

.2 Do not unreasonably encumber site with materials or equipment during construction.

.3 Move stored products or equipment interfering with operations of N.C.C., other contractors or agencies and the general public.

.4 Obtain and pay for use of additional storage or work areas needed for operations.

.5 Where security is reduced by work, provide temporary means to maintain security of area at all times.

1.15 SETTING-OUT OF WORK

.1 The Commission shall furnish the Contractor with the reference co-ordinates necessary for laying out the work of this contract. **The Contractor shall employ survey personnel with experience in the use of coordinates to physically lay out work utilizing a total station survey system.**

.2 Contractor shall assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated on the drawings.

.3 Provide devices needed to lay out and construct work. Supply such devices as required to facilitate NCC Representative's inspection of work.

.4 Supply stakes and other survey markers required for laying out work.

.5 Contractor must obtain NCC Representative's approval of pathway centre-line prior to commencing work.

1.16 PROJECT MEETINGS

.1 NCC Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

1.17 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of work and notify NCC Representative of findings.

.2 Where unknown services are encountered, immediately advise NCC Representative and confirm findings in writing.
.3 Where work involves adjusting of existing services, carry out work as directed by the NCC Representative.
.4 Make good and pay for damage to existing utility lines resulting from work.

1.18 TRAFFIC CONTROL

.1 Do not infringe on adjacent roads, sidewalks, ramps, loading zones or interfere with normal traffic flow in carrying out the work. If it is necessary to disrupt traffic or occupy those thoroughfares for purposes of unloading materials, etc., obtain permission from the NCC Representative and abide by his instructions regarding the manner, time and delays necessary to carry out these operations. Incidental costs (e.g. for permits, signage, public notification of lane closures, etc) conforming to these requirements will be paid by Contractor.
.2 Provide a suitable system of protective barricades, lane markings, signs, lights and other such devices to warn and channel traffic and wherever necessary, the services of a flagman to direct and control traffic. Carry out protection in accordance with the requirements of the Provincial and Local by-laws having jurisdiction over this type of work.
.3 Where appropriate, provide pathway closed signage.
.4 Printed signage must be provided in both English and French
.5 The proposed methods and systems of traffic control and maintenance provisions together with supporting sketches must be submitted to the NCC Representative upon request following tender closing.

1.19 ADDENDA

.1 Answers to questions directed to the NCC Representative, and any amendments to the drawings and specifications during the tender period will be communicated in the form of addenda to all general contractors tendering. Such addenda to be considered as and read as part of the specifications and thereby included in the contract documents.

1.20 ADDITIONAL DRAWINGS

.1 The Commission may furnish additional drawings to the Contractor to assist in the proper execution of the work. These additional drawings will be issued for clarification purposes only. Such drawings shall have the same meaning and intent as if they were included with the plans referred to in Contract Documents.

1.21 CONTRACT DOCUMENTS

.1 Drawings and specifications are complementary. Items shown or mentioned in one and not in the other are deemed to be included in the contract work.
.2 If the drawings and specifications differ, the NCC Representative shall give preference to the Contract document thereof, that best insures the attainment of this contract's objectives.

1.22 PAYMENT

.1 This is a unit price contract. Any minor or miscellaneous items indicated on the drawings as being part of the work of this contract must be included by the Contractor in his overhead and indirect charges and incorporated into the unit price bid.
.2 No separate payment will be made for work performed in respect to any of the special provisions where there is no specific pay item on the schedule of prices. The cost of these works must be appropriated among, and included in the overhead and indirect charges of the Contractor.

1.23 ADVERTISING

.1 No advertising will be permitted on this project.

1.24 COMPACTION OF MATERIALS

.1 The thickness of granular and crushed stone materials shown on the drawings shall be the real thickness after the materials have been compacted as specified.

1.25 RECORD DRAWINGS

.1 As work progress, maintain, accurate record to show deviations from contract documents.

.2 Just prior to NCC Representative's inspection for issuance of final certificate of completion, supply one (1) set of drawing in AUTOCAD format with all major and minor deviations neatly inked in. The NCC Representative will provide AUTOCAD files.

1.26 GUARANTEES AND WARRANTIES

.1 Before completion of work, collect all manufacturer's guarantees and warranties, and deposit to NCC Representative.

.2 All work shall be warranted for a period of one year (except for plant material - 2 years warranty) from the date of written preliminary acceptance by the NCC Representative. A warranty inspection will be carried out at the end of the warranty period.

.3 Refer to Sections 32 93 10 and 32 93 50 for maintenance and warranty period of plant materials.

END OF SECTION

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 Submit to NCC Representative for review, shop drawings, product data and samples specified.

1.2 Until submission is reviewed, work involving relevant product may not proceed.

1.3 Shop Drawings
- .1 Drawings to be originals supplied by contractor, subcontractor, supplier or distributor, illustrating appropriate portion of work:
  - .1 Showing fabrication, layout, setting or erection details as specified in appropriate sections.
  - .2 Identify details by reference to sheet or detail number shown on contract documents.
  - .3 Maximum sheet size 610 x 915 mm.
  - .4 Reproductions for submissions opaque diazo prints.

1.4 Product Data
- .1 Manufacturer's standard schematic drawings, catalogue sheets, diagrams schedules, performance charts, illustrations and other standard descriptive data may be accepted in lieu of shop drawings.
- .2 Above will only be accepted if they conform to following:
  - .1 Delete information not applicable to project;
  - .2 Supplement standard information to provide additional information applicable to project;
  - .3 Show dimensions and clearances required;
  - .4 Show performances characteristics and capacities.

1.5 Samples and Mock-ups
- .1 Submit samples in sizes and quantities specified.
- .2 Where colour, pattern or texture is criterion, submit full range of samples.
- .3 Reviewed samples will become standards of workmanship and material against which installed work will be checked on project.

1.6 Co-ordination of Submissions
- .1 Review shop drawings, product data and samples prior to submission.
- .2 Verify:
  - .1 Field measurements;
  - .2 Field construction;
  - .3 Catalogue numbers and similar data.
  - .4 Co-ordinate each submission with requirements of work and contract documents. Individual shop drawings will not be reviewed until all related drawings are available.
  - .5 Contractor's responsibility for errors and omissions in submission is not relieved by NCC Representative’s review of submittals.
  - .6 Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by NCC Representative’s review of submission, unless NCC Representative gives written acceptance of specified deviations.
  - .7 Notify NCC Representative in writing at time of submission, of deviations from requirements of Contract documents.
  - .8 After NCC Representative's review, distribute copies.

1.7 Submission Requirements
- .1 Schedule submissions at least 10 days before dates reviewed submissions will be needed.
- .2 Submit number of paper or electronic copies of shop drawings and product data Contractor

requires for distribution, plus 2 copies to be retained by NCC Representative.

.3 Accompany submissions with transmittal letter, in duplicate, containing:
- .1 Date;
- .2 Project title and number;
- .3 Contractor's name and address;
- .4 Number of each shop drawings, product data and sample submitted;
- .5 Other pertinent data.

1.8 Submissions shall include:
- .1 Date and revisions dates;
- .2 Project title and number;
- .3 Name of:
  - .1 Contractor;
  - .2 Subcontractor;
  - .3 Supplier;
  - .4 Manufacturer;
  - .5 Separate detailer when pertinent.
- .4 Identification of product or material;
- .5 Relation to adjacent structure or materials;
- .6 Field dimensions, clearly identified as such;
- .7 Specification Section number;
- .8 Applicable standards, such as CSA or CGSB numbers;
- .9 Contractor's stamp, initialed or signed, verifying review of sub-mission, verification of field measurements and compliance with Contract documents.

END OF SECTION

PART 1 - GENERAL

1.1 References

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

.2 Province of Quebec

.1 Occupational Health and Safety Act, R.S.Q, c.S-2.1 (current edition).
.2 *Code de sécurité pour l'industrie de la construction*, R.R.Q. 1981, c. S-2.1, r.6 (current edition).

1.2 Submittals

.1 Submit site-specific Health and Safety Plan prior to award of contract. Health and Safety Plan must include:
.1 Results of site specific safety hazard assessment.
.2 Results of safety and health risk or hazard analysis for site tasks and operation found in the scope of work.

.2 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.3 Submit copies of incident and accident reports.

.4 Submit Material Safety Data Sheets (MSDS) to NCC Representative.

.5 Submit names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.

1.3 Safety Assessment

.1 Perform site specific safety hazard assessment related to project.

1.4 General Requirements

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

.2 NCC Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.5 Responsibility

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

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.6 Compliance Requirements

.1 Comply with Health and safety at work law of the *Commission de la santé et la sécurité au travail* (CSST).

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.7 Unforeseen Hazards

.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province of Quebec having jurisdiction. Advise NCC Representative verbally and in writing.

1.8 Posting of Documents

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Quebec having jurisdiction, and in consultation with NCC Representative.

1.9 Correction of Non-Compliance

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by NCC Representative.

.2 Provide NCC Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 NCC Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.10 Work Stoppage

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

PART 1 - GENERAL

1.1 Related Work

.1	Section 01 50 00	Temporary Facilities
.2	Section 01 61 10	Management and disposal of excess material
.3	Section 32 01 91	Shrub and Tree Preservation

1.2 Fires

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

1.3 Disposal of Wastes

.1 Burying of rubbish and waste materials on site not permitted.

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

.3 Waste will be managed in accordance with Quebec standards.

1.4 Plant Protection

.1 Protect trees and plants on site and adjacent properties where indicated.

.2 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.

.3 Minimize stripping of soil and vegetation clearing.

.4 Where heavy equipment is used around trees, protect trees with temporary fencing.

.5 Wetlands located at the edge of the work areas will have to be protected with fences prior to work initiation.

.6 Once work is completed remove all equipment used to protect the wetlands.

1.5 Protection of Bird Nesting Sites

.1 No clearing or close cut clearing shall take place during the avoidance time period for nesting habitat removal from May 1 to August 15.

.2 In the event such clearing is unavoidable during this time period, vegetation to be removed shall be inspected by an avian biologist to determine whether there are any active nesting sites. If clearance is received from the avian biologist, clearing may proceed.

.3 The NCC will be responsible for retaining the avian biologist. The Contractor shall provide at least 1 week advanced notice of the need for such an inspection.

1.6 Shrub and Tree Preservation

.1 Shrub and tree preservation per Section 32 01 91.

.2 Use existing roads, paths or cleared areas to avoid impacting on terrestrial vegetation.

.3 Install a protective mat around the threes which are at risk of being damaged.

.4 Vegetation clearing must be limited to the strict minimum that is to the vegetation that could be a nuisance to the movement of machinery and to the realization of the work. No residues should be allowed to fall into streams or wetlands and if it happens the debris should be removed rapidly while causing minimum perturbations.

.5 No trees with a diameter (Breast height diameter (BHD)) greater than 10 cm can be cut. If it is necessary to do so, an authorization must be obtained from the Land and Natural Resources Management Section of the Gatineau Park. The trees will have to be replaced, in the area of the work site, in a ratio of 2 to 1, with non invasive indigenous species approved by Gatineau Park biologists. Contractor shall submit his planting plan to NCC for approval before beginning the work. Any tree with a BHD greater than 10 cm cut in a wetland must be replaced in a ratio of 2 to 1, preferably in the same wetland, by species that will favor the wetland.

.6 Identify and mark the trees and shrubs that need to be cut (BHD inferior to 10 cm) or preserved (BHD greater than 10 cm).
.7 If a plantation or a tree must be cut, do it in 1m sections and disperse the residues in the adjoining forest.
.8 All trees and other damaged flora must be replaced.

1.7 Drainage
.1 Provide temporary drainage and pumping as necessary to keep excavation and site free from water.
.2 Do not pump water containing suspended materials into adjacent waterway.
.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with the requirements of applicable authorities.

1.8 Work Adjacent to Waterways
.1 Limit vehicles and machinery movements to the work areas and to existing temporary access roads. Circulation outside the work areas, in water streams, ditches or wetland will not be tolerated.
.2 Do not dump excavated fill, waste material or debris in or within 30 m from a watercourse.
.3 Do not skid logs or construction materials across watercourses.

1.9 Pollution Control
.1 Maintain temporary erosion and pollution control features installed under this contract.
.2 Control emissions from equipment and plant to local authorities emission requirements.
.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
.4 Install on the piles of material, during work activities or following daily shut down of the work site, covers that are in good condition to limit the washing of material.
.5 Install all material and equipment storage areas on impervious areas, either in the right-of-way of Gamelin Street or on adjacent paved areas. No storage will be allowed in natural areas.
.6 An emergency plan covering the actions to be realized in case of accidental spills of contaminants will have to be prepared and implemented. The responsible authorities and persons will be adequately identified, as will be the procedure to be followed in case of an environmental emergency.
.7 In the case of an accidental spill, the contractor must immediately apply the authorized emergency plan, which must include procedures to rapidly confine the spilled product, ensure its recuperation and elimination and propose a site restoration approach. The contractor must render available at all time on site and emergency spill response kit.
.8 Ensure the presence on the work site of all the equipment required (chemical toilet, waste containers, etc.) to prevent the emission and dispersion of wastes in the environment.
.9 The machinery use on site must be kept clean and free of leaks from the moment they arrive on the work site and throughout the duration of the work activities. Regular inspection should be made. Any maintenance or repair work required on the machinery must be done at a distance of at least 60 m from any water body (meaning wetlands, streams, lakes, rivers and their affluent or a reservoir).
.10 Manipulation, including decanting, of fuel, oil, other petroleum product or contaminants will be made under constant supervision to avoid any accidental spills. In case of spill, ensure the presence of container to allow the recuperation of petroleum products and wastes as well as the presence of absorbent.
.11 Fuelling of machinery will only be allowed in the storage areas and an impervious tarpaulin must be

placed under the equipment during the fuelling operation or any other operation implicating oil or other potential contaminant.

.12 All excavated soils will have to be excavated in compliance with the "Management table for excavated contaminated soils" from the Soil protection and contaminated sites rehabilitation Policy. If new soil is required, their environmental quality must meet the MDDEP's criteria of the "Management table for excavated contaminated soils". The same applies to the storage and transportation of these soils.

.13 Hazardous wastes, if generated on site, will be stored on an impervious site and protected against weather conditions with a tarpaulin before they are loaded and transported off site. These wastes will be eliminated through a facility authorized by the MDDEP.

.14 Dust abatement products, authorized by the MDDEP, will be applied, as required, to limit dust generation.

.15 Limit the machinery's movements on exposed soils.

1.10 Watercourse Protection

.1 The Contractor shall ensure that no contamination, waste or other substances which may be detrimental to marine life or quality of water shall enter the watercourse as either direct or indirect result of construction and the Contractor shall meet all requirements of Government authorities or agencies with respect to environmental protection.

.2 No storage of hydrocarbons and hazardous materials will be allowed within 60 meters of watercourses.

.3 The filling of transportation vehicles and machinery within 60 meters of watercourses is prohibited.

.4 The Contractor shall be prepared to immediately clean up any spills of contamination, waste or other substances which may be either detrimental to marine life or quality of water. In the event of a spill, the Contractor shall immediately commence a clean-up operation. The Contractor shall be liable for all damages and/or charges laid which result, either directly or indirectly, from the spill, or contamination of any kind which results from their construction operations.

.5 The Contractor shall not make any claim for extra compensation for the cost of fulfilling the obligations set out herein.

.6 Avoid parking machinery within 30 meters of watercourses on worksite.

.7 Before beginning work, the following prevention measures will be set up to avoid directing suspended matter into surface waters: geotextile on catch basins, filtering berm, sediment barriers through ditches and along the watercourse and wetlands.

.8 Any debris introduced accidentally into a watercourse, a stream or a wetland must be removed as soon as possible.

1.11 Erosion and Sediment Control Plan

.1 Within 2 weeks of award of Contract, the Contractor shall submit an Erosion and Sediment Control Plan. The plan shall indicate how the Contractor intends to provide for securing the site against erosion and siltation problems for the full duration of the construction period, i.e. from start of construction to final completion. The Contractor shall not proceed with excavation in or near waterways, drainage channels or wetland areas until approval of the erosion and sediment control plan is received from the NCC Representative.

.2 A copy of the Erosion and Sediment Control Plan shall be present on-site at all times. The Contractor shall ensure that all workers, including sub-contractors, are aware of the importance of the erosion and sediment control measures and are informed of the consequences of the failure to comply with the requirements of all Regulatory Agencies.

.3 The Contractor shall exercise reasonable care to ensure that sediment run-off does not enter the

watercourse. Berms, silt fences and other best management practices, as determined by the Contractors site work methods, shall be constructed at appropriate locations to ensure that turbidity shall be kept to a minimum as determined by the Government authorities and agencies.

.4 The minimum erosion and sediment controls shall be:
- .1 Limit the extent of exposed soils at any given time.
- .2 Revegetate exposed areas as soon as possible.
- .3 Provide temporary protection of exposed slopes 3H:1V or steeper and more than 3 meters height with plastic or mulch material approved by NCC Representative.
- .4 Install filter cloth between frame and cover on all catchbasins and manholes that will be affected by run-off from the site.
- .5 Install sediments barriers along streams, ditches and wetlands present within the worksite.
- .6 Install adequate support to ensure ground stability and avoid risks of collapse.
- .7 Avoid work on soils sensitive to erosion, fragile, sloping or with a low bearing capacity.
- .8 A silt fence shall be installed around the perimeter of all stockpiles of any soil to be used or removed from the site. Stockpiles shall be located outside of the floodplain and in locations approved by NCC Representative.
- .9 Erosion and sediment control measures shall be inspected, maintained and repaired weekly and after every rainfall event.
- .10 All water from trench excavations shall be pumped into an approved sedimentation pond for settlement prior to discharge into the river.

.5 Once work is completed, the contractor has the responsibility to restore the work site.

.6 Circulations and storage of equipment, vehicles, machinery, wastes or any other material outside the work site limits, even for a brief period, will be strictly forbidden without a specific authorization from the NCC.

.7 Erosion and sediment control will be reviewed as an item during the weekly site meeting. The status of the work will be recorded by the NCC Representative in the meeting minutes.

1.12 Circulation management

.1 During construction of the recreational pathway, information signs will be installed at strategic point.

.2 Work areas must be clearly delineated.

.3 Once work is completed, all signs, fences and any other equipment and material must be removed from the site.

1.13 Noise Control

.1 All contract requirements regarding noise control will be respected. Reduction at the point of origin must be favored to limit the effects of noise. Articles 7, 11 and 12 of the municipal by-law 44-2003 of the city of Gatineau related to noise will be respected. They require the following:

1. Because of the irritating nature of noise (alarms, chock waves, repetitive impacts, etc.), work on a construction, renovation or demolition site, located at less than 150 m from a building used for lodging, must be restricted to the period of Monday to Saturday between 7h00AM to 9h00PM, except for emergency work on public infrastructures or for work that were specifically authorized by the executive comity.
2. The operation of an electric generator or any other type of pump, compressor, motor or machinery generating noise with a level greater than 60 dBA during the day and 55 dBA during the night, as perceived by a resident in a building used for lodging, will be forbidden. For motors or compressors that are not continuously in operation, the acceptable noise levels will be 65 dBA during the day and 60 dBA during the night.
3. The use of engine brake is forbidden within the Gatineau city limits.

.2 If required, use acoustic screens or other types of temporary noise screens (tarpaulin, earth mounds, etc.).

1.14 Heritage and Archaeology

.1 Any fortuitous discovery of archaeological remains during construction will force the immediate interruption of work in the discovery area until a complete evaluation of the site is completed by a qualified archaeologist. The archaeologist from the NCC Heritage Program (613-239-5751) shall be contacted.

.2 The fortuitous discovery of human remains during construction will imply the immediate interruption of work on this site. The contractor will immediately contact the project manager and the NCC's archaeologist (Ian Badgley, 613-239-5751).

1.15 Review Agencies

.1 Various concerned Government agencies may be on site during construction and the Contractor shall provide easy access and meet the requirements of those agencies without delay.

END OF SECTION

PART 1 - GENERAL

1.1 Related Work
- .1 Section 01 10 00 – General Instructions
- .2 Section 01 35 43 – Environmental Protection

1.2 Access
- .1 With NCC Representative present, prepare photographic inventory of the original condition of all locations where temporary facilities are to be built by the Contractor. Submit a bound record copy of the photographic inventory with locations, labels and descriptions of existing features to the NCC Representative prior to commencing any work on the temporary facilities.
- .2 Provide and maintain adequate access to the project site.
- .3 Build and maintain temporary roads where required or indicated. This work is subject to approval by the NCC Representative. Remove temporary access roads and reinstate site following completion of work.
- .4 If authorized to use existing roads or pathways for access to project site, maintain such roads for duration of contract and make good damages resulting from the Contractor's use of roads or pathways.

1.3 Control and Protection Measures
- .1 Install control and protection measures as per Sections 0110 00 and 01 35 43.

1.4 Sanitary Facilities
- .1 Provide sanitary facilities for work force in accordance with governing regulations and by-laws.
- .2 Post notices and takes such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.5 Water Supply
- .1 Arrange, pay for and maintain temporary water supply in accordance with governing regulations and ordinances.

1.6 Removal of Temporary Facilities
- .1 Remove temporary facilities from site as directed by NCC Representative.
- .2 All areas disturbed shall be reinstated by the Contractor to its original condition at the contractor's expense and to the NCC Representative's satisfaction.

END OF SECTION

PART 1 - GENERAL

1.1 General Conditions

.1 The requirements of this specification take precedence over the requirements of any other specification for the management and disposal of excess material.

1.2 Related Work

.1 Section 31 23 33.01 - Excavating, Trenching and Backfilling

.2 Section 01 35 43 - Environmental Protection

.3 Section 02 41 13 – Implementation Works, Demolition and Items to be removed

1.3 Definitions

.1 Bituminous pavement: any combination of asphaltic material and aggregate, excluding asbestos modified asphaltic material.

.2 Concrete: concrete mixtures produced with Portland cement, which may include blended hydraulic cement, supplementary cement materials, spent debris and silica sand abrasive blasting media from abrasive cleaning of concrete and reinforcing steel, concrete brick, block and associated mortar. Can include embedded steel, and excludes asbestos modified Portland cement concrete mixtures.

.3 Disposable fill: excess material, other than that disposed of at a certified disposal site, that is managed in berms and mounds, and as fill, other than in road embankments.

.4 Earth: all soils except those defined as rock, and excludes stone masonry, concrete and other manufactured materials.

.5 Excess material: Material removed as a result of Work outlined in the Contract, for which management is not specified. Includes surplus and unsuitable materials.

.6 Fabricated metal and plastic products: metal and plastic products such as culverts, fence materials, and guide rails. Does not include containers, other packing materials, storage tanks, septic tanks, and ancillary equipment associated with sanitary sewage systems, septic systems, and fuel/lubricant dispensing and storage systems.

.7 Groundwater: subsurface water and water that

occurs beneath the water table in soils and rock formations that are fully saturated.

.8 Masonry: clay brick, stone and associated mortar.

.9 Natural wood: stumps, trunks, branches, and debris, from tree and shrub removal, and wood products that are not treated, coated or glued.

.10 Re-use: utilization, processing, re-processing or recycling of excess material into a construction material or other useful product, and management by these means for the Contract and other work.

.11 Rock: natural beds or massive fragments, of the hard, stable, cemented part of the earth's crust, igneous, metamorphic, or sedimentary in origin, which may or may not be weathered, and includes boulders having a volume of 1 m or greater.

.12 Swamp material: materials within the swamp excavation limits, except those defined as rock, and excludes stone masonry, natural wood and manufactured materials.

.13 Waste: excess material managed by re-use or as disposable fill.

.14 Waterbody: any body of water or watercourse or wetland, or a portion thereof, and excludes ditches other than those functioning as natural watercourses.

PART 2 - PRODUCTS Not applicable.

PART 3 - EXECUTION

3.1 Construction

.1 Management of excess material shall be as described below:

.1 Earth, aggregate, swamp material, rock and natural wood: Manage by re-use or disposal off-site.

.2 Bituminous pavement: Manage by disposal off-site.

.3 Concrete, masonry, fabricated metal and plastic products: Manage by disposal off site.

.4 Where excess materials are suspected of being contaminated, refer to Section 01

35 43 item 1.9.12 for the management of material, as well as item 3.1.4 below. If types of materials are encountered which are not addressed in this specification, direction on management shall be obtained from NCC Representative.

.5 Excess material that is a mixture of materials shall be disposed of according to most stringent conditions associated with any one of individual constituents.

.6 Excess materials shall be managed using methods which prevent their entry into waterbodies and other sensitive areas. These may be identified in Contract. Exceptions may be made when materials are re-used in accordance with requirements specified elsewhere in Contract.

.7 Notification requirements shall be complied with and approvals, releases, and agreements shall be obtained that are necessary for management of excess material.

.2 Management of disposable fill, within Commission's property and on other property designated in Contract, shall be as specified in the Contract.

.3 Management by open burning is not permitted.

.4 For the excavated and piled soil sampling, it is recommended to take composite samples. The minimum number of samples required per volume of excavated soil is defined in Table 3.

Table 3: Number of samples required per volume of soil

Excavated volume of soil (m3)	Number of sections in piles
Less than 30	1
30 – 60	2
60 – 100	3
100 – 200	4

200 – 1,000	4 + 1/100 m^3 over 200
1 000 – 2,000	12 + 1/250 m^3 over 1 000
More than 2,000	16 + 1/500 m^3 over 2 000

Reference : « Guides d'échantillonnage à des fins d'analyses environnementales - Cahier 1, Généralités » (MDDEP 1994) et Cahier 5, Échantillonnage des sols (CEAEQ, 2001).

This sampling density indicates that the stockpile shall be considered by section of 30 m3 (or more), in accordance with Table 3. The measure of soil volumes may need the use of more specific tools, like surveying equipment. Each section shall be sampled with a compound of five subsamples (the required number of subsamples is indicated in the next part). However, if a section of the pile shows indications of heterogeneity regarding contamination or composition (which corresponds to different populations from a statistical point of view), a composite sample shall be taken for each of those populations. The presence of different populations within a single section results in a higher number of samples to take.

END OF SECTION

PART 1 - GENERAL

1.1 General

.1 Use new material and equipment unless otherwise specified.

.2 Within 7 days of written request by NCC Representative, submit following information for materials and equipment proposed for supply:

- .1 Name and address of manufacturer.
- .2 Trade name, model and catalogue number.
- .3 Performance, descriptive and test data.
- .4 Manufacturer's installation or application instructions.
- .5 Evidence of arrangements to procure.

.3 Use products of one manufacturer for material and equipment of same type or classification unless otherwise specified.

1.2 Manufacturers Instructions

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.2 Notify NCC Representative in writing of any conflict between these specifications and manufacturers instructions. NCC Representative will designate which document is to be followed.

1.3 Delivery and Storage

.1 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.

.2 Prevent damage, adulteration and soiling of material and equipment during delivery, handling and storage. Immediately remove rejected material and equipment from site.

.3 Store material and equipment in accordance with suppliers instructions.

.4 Touch-up damaged factory finished surfaces to NCC Representative's satisfaction. Use primer or enamel to match original. Do not paint over name plates.

1.4 Contractor's Options for Selection of Materials for Tendering

.1 When materials are specified by referenced standard, select any material that meets or exceeds the specified standard.

.2 Where materials are required to be listed on the "Canadian General Standards Board, Qualified Products List", select any manufacturer so listed.

.3 When materials are specified by "Prescriptive" or "Performance" specification, select any material meeting or exceeding specification.

.4 When materials are specified by naming one or more materials, select any material named. For the purpose of these specifications, the term "Acceptable Material" is deemed to be a complete and working commodity as described by a manufacturer's name, catalogue number, trade name or any combination thereof.

.5 When materials are specified by a Standard, Prescriptive or Performance specification, upon request of the NCC Representative, obtain from manufacturer an independent testing laboratory report, showing that the material or equipment meets or exceeds the specified requirements.

1.5 Substitution

.1 No substitutions will be permitted without prior written approval of NCC Representative.

.2 Proposals for substitutions to be made in accordance with Instructions to Bidders. Such requests must include statements of respective costs of items originally specified and the proposed substitution.

.3 Proposals will be considered by NCC Representative if:

.1 Materials selected by tenderer from those specified, are not available.

.2 Delivery date of materials selected from those materials specified would unduly delay completion of contract, or

.3 Alternative material to those specified, which are brought to the attention of and considered by NCC Representative as equivalent to the material specified and will result in a credit to the Contract amount.

.4 Should proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on project. Pay for design or drawing changes required as result of substitution.

.5 Amounts of all credits arising from approval of substitutions will be determined by NCC Representative and Contract Price will be reduced accordingly.

END OF SECTON

PART 1 - GENERAL

1.1 Conduct cleaning and disposal operations to comply with local ordinances and anti pollution laws.

1.2 Disposal of mineral spirits, oil or paint and varnish solvents in storm or sanitary drainage systems is prohibited.

1.3 Prevent accumulation of wastes which create hazardous conditions.

1.4 Cleaning During Construction

.1 Maintain project grounds and public properties free from accumulations of waste materials and rubbish on a daily basis.

.2 Remove waste materials and rubbish from site and haul to an approved dump site.

.3 Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not interfere with operation of roads and pathways.

1.5 Final Cleaning

.1 Remove grease, dirt, dust, stains and other foreign materials from finished surfaces.

.2 Broom clean paved surfaces; rake clean other surfaces of grounds, to satisfaction of the NCC Representative.

.3 Clean project site in preparation for substantial completion inspection and final inspection.

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 Where requested, provide documents and all delivery slips confirming type, source, quantity, size and quality of materials provided, including all plants and imported topsoil.

.3 Provide instruction manuals in French and English.

1.2 PRESENTATION

.1 Organize data as an instructional manual.

.2 Use vinyl, hard-covered, three D-ring, loose-leaf (219 mm x 279 mm) binders with spine and face pockets.

.3 Where multiple binders are used, correlate data into related consistent groupings.

.1 Identify the contents of each binder on the spine.

.4 Cover: identify each binder with typed or printed title “Project Record Documents”, project title and table of contents.

.5 Arrange content by operations, under specification section numbers and in the order in which they appear in the table of contents.

.6 Text must be typed.

.7 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text and fold larger drawings to size of text pages.

1.3 RECORD DOCUMENTS

.1 Table of Contents for each volume: provide title of project.

.1 Date of submission of documents.

.2 Names, addresses and telephone numbers of the NCC Representative and Contractor, and names of their representatives.

.3 List of products, indexed to the content of the volume.

.2 For each product:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product data: Mark each sheet to identify specific products and parts clearly and data applicable to installation; delete all inapplicable information.

.4 Drawings: drawings are used to supplement product data and/or illustrate specific elements or changes made in a given area.

.5 Typewritten text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.4 PROJECT RECORD DOCUMENTS AND SAMPLES

.1 Maintain on site, in addition to requirements set forth in the General Conditions, one record copy of the following for the NCC Representative:

.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 project record documents and samples in the field office apart from construction documents.

.3 Label project record documents and file them in accordance with section numbers shown in the specification table of contents.

.1 Clearly label each document "PROJECT RECORD" in large printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by the NCC Representative.

1.5 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on a set of black line opaque drawings and in the copy of the Specification Manual provided by the NCC Representative.

.2 Use felt tip markers for recording information, maintaining separate colours for each major system.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and Shop Drawings: mark each item to record actual construction, including:

.1 Dimension and detail field changes.

.2 Changes made by change orders.

.3 Details not on original Contract Drawings.

.4 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: keep manufacturers' certificates, inspection certificates, and field test records as requested in each section of the technical specifications.

.7 Provide digital photos, if requested, for site records.

1.6 WARRANTIES AND BONDS

.1 Submit warranty information obtained during construction phase to the NCC Representative for approval prior to each monthly pay estimate.

.2 Assemble approved information in a binder, submit upon acceptance of work, and organize binder as follows:

.1 Separate each warranty and bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractors, suppliers and manufacturers with names, addresses and telephone numbers of their designated contacts.

.3 Obtain warranties and bonds signed in duplicate by subcontractors, suppliers and manufacturers within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain all necessary information and are notarized.

.5 Countersign submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.3 Except for items put into use with permission of the NCC Representative, do not change effective date of warranty until Date of Substantial Performance is determined.

.4 Four months and 12 months after date of preliminary acceptance of work, conduct a warranty inspection with the NCC Representative.

.5 The warranty management plan must contain the following information:

.1 Roles and responsibilities of personnel associated with the various warranties, including points of contact and telephone numbers of responsible persons within the organizations of the Contractor, subcontractors, manufacturers or suppliers involved in the work.

.2 Contractor's plans for attendance at the four and 12 month post-construction warranty inspections.

.6 Respond in timely manner to oral or written notification of required warranty repair work.

.7 Written instructions are to follow all oral instructions.

.1 Failure to fulfil obligations will be caused for the NCC Representative to take action against the Contractor.

END OF SECTION

DIVISION 02

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 35 43 – Environmental Procedures

.2 Section 01 61 10 – Management and Disposal of Excess Material

.3 Section 31 23 33.01 – Excavating, Trenching and Backfilling

1.2 PROTECTION OF EXISTING ELEMENTS

.1 Protect existing elements to be maintained and materials to be reused. In event of damage, immediately make repair as directed by NCC Representative and without any additional cost for NCC.

1.3 SITE CONDITIONS

.1 Prior to beginning work, Contractor to verify and establish location of aerial and buried services on and adjacent to site. Inform NCC Representative of any divergence.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.1 SITE PREPARATION

.1 Inspect site conditions and verify with NCC Representative the elements to be removed and the items to be maintained.

.2 Confirm locations of buried utilities. Maintain and protect from damage all buried utilities and structures encountered.

.3 Arrange with appropriate authorities prior to relocation works, demolition and removals.

3.2 REMOVALS

.1 Remove all elements as indicated on drawings.

.2 It is prohibited to damage any adjacent elements or surfaces which are to be maintained.

3.3 ASPHALT REMOVAL

.1 Delineate areas that must remain in place by cutting them with a saw or using any other approved method.

.2 Unless otherwise indicated, preserve the granular materials which are under existing pavement or designated elements.

3.4 MATERIALS RECOVERY AND RELOCATION

.1 Carefully remove elements containing materials that are intended to be recovered or relocated. Store recovered materials in location indicated by NCC Representative.

3.5 DISPOSAL OF DEMOLITION WASTE

.1 Dispose all unnecessary materials that cannot be recovered or reused. Proceed to the disposal off the construction site.

3.6 RESTORATION

.1 Once completed, remove debris, restore surfaces and leave the site in a clean condition.

.2 The surfaces and elements that are outside of the demolition work zone must be restored to the conditions of the undisturbed adjacent surfaces.

END OF SECTION

DIVISIONS 03

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 10 00 – General Instructions

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 74 11 – Cleaning

.4 Section 03 30 00 – Cast-in-Place Concrete

1.2 REFERENCES

.1 ASTM International

.1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.2 ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.3 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.4 ASTM A775/A775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.2 CSA International

.1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.

.3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

.4 CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

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

.6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.3 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Prepare reinforcement drawings in accordance with RSIC-2004 and SP-66.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by Professional Engineer registered or licensed in Province of Quebec.

.1 Indicate placing of reinforcement and:

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by NCC Representative, with identifying code marks to permit correct placement without reference to structural drawings.

.5 Indicate sizes, spacings and locations of chairs.

.2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3.

.4 When Chromate solution is used as replacement for galvanizing non-prestressed reinforcement, provide product description for review by the NCC Representative prior to its use.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.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 the NCC Representative.

.2 Reinforcing steel: billet steel, grade 300, deformed bars to CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.4 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.

.5 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.

.6 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.

.7 Galvanizing of non-prestressed reinforcement: to CAN/CSA-G164, minimum zinc coating 610 g/m³.

.1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.

.2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.

.8 Chairs and spacers: to CSA-A23.1/A23.2.

.9 Mechanical splices: subject to approval of the NCC Representative.

.10 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

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

.3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment to be 1 hour per 25 mm of bar diameter.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 FIELD BENDING

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

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

.3 Replace bars, which develop cracks or splits.

3.3 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 the NCC Representative's approval of reinforcing material and placement.

.3 Ensure cover to reinforcement is maintained during concrete pour.

.4 Protect epoxy and coated portions of bars with covering during transportation and handling.

3.4 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 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 reuse and recycling in accordance with Section 01 10 00 – General Instructions.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 10 00 – General Instructions
.2 Section 01 33 00 – Submittal Procedures
.3 Section 01 35 29.06 – Health and Safety Requirements
.4 Section 01 74 11 – Cleaning
.5 Section 03 20 00 – Concrete Reinforcing

1.2 REFERENCES

.1 Abbreviations and Acronyms:
  .1 Portland cement: hydraulic cement, blended hydraulic cement (where the suffixe * b + denotes blended) and Portland-limestone cement.
    .1 Type GU, GUb - General use cement.
    .2 Type MS and MSb - Moderate sulphate-resistant cement.
    .3 Type MH, MHb - Moderate heat of hydration cement.
    .4 Type HE, HEb - High early-strength cement.
    .5 Type LH, LHb - Low heat of hydration cement.
    .6 Type HS and HSb - High sulphate-resistant cement.
  .2 Fly ash:
    .1 Type F - with CaO content less than 15%
    .2 Type CI - with CaO content ranging from 15 to 20%.
    .3 Type CH - with CaO greater than 20%.
  .3 GGBFS - Ground, granulated blast-furnace slag.
.2 Reference Standards:
  .1 ASTM International
    .1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
    .2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
    .3 ASTM C494/C494M-11, Standard Specification for Chemical Admixtures for Concrete.
    .4 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  .2 CSA International
    .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
    .2 CSA A283-06, Qualification Code for Concrete Testing Laboratories.

.3 CSA A3000-08, Cementitious Materials Compendium

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: convene pre-installation meeting one (1) week prior to beginning concrete works.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide testing results and reports for review by the NCC Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.3 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken.

.4 Concrete hauling time: provide for review by the NCC Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

.5 Provide two (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

.2 Do not modify maximum time limit without receipt of prior written agreement from the NCC Representative and concrete producer as described in CSA A23.1/A23.2.

.3 Deviations to be submitted for review by the NCC Representative.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in mixes.

2.2 PERFORMANCE CRITERIA

.1 Blended hydraulic cement: Type GUb to CSA A3001.

.2 Water: to CSA A23.1.

.3 Aggregates: to CSA A23.1/A23.2.

.4 Admixtures:

.1 Air entraining admixture: to ASTM C260.

.2 Chemical admixture: to ASTM C494. NCC Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.5 Curing compound: to CSA A23.1/A23.2 white.

.6 Premoulded joint fillers:

.1 Bituminous impregnated fiber board: to ASTM D1751.

2.3 MIXES

.1 Alternative 1 - Performance Method for specifying concrete: to meet the performance criteria as defined by the NCC Representative, in accordance with CSA A23.1/A23.2.

.2 Provide concrete mix to meet following hard state requirements:

.1 Durability and class of exposure: C-1.

.2 Compressive strength at 28 days: 35 MPa minimum unless otherwise indicated.

.3 Intended application: Culvert footing, concrete curb and sign posts foundation.

.4 Aggregate size 20 mm maximum.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Obtain the NCC Representative's written approval before placing concrete.

.2 Provide 48 hours minimum notice prior to placing of concrete.

.3 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.4 During concreting operations:

.1 Development of cold joints not allowed.

.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

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

.6 Protect previous Work from staining.

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

.8 Do not place load upon new concrete until authorized by the NCC Representative.

3.2 INSTALLATION/APPLICATION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Anchor bolts:

.1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.

.2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from the NCC Representative.

.1 Drilled holes: to manufacturers' recommendations.

.3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.4 Set bolts and fill holes with epoxy grout.

.3 Finishing and curing:

.1 Finish concrete to CSA A23.1/A23.2.

.1 Levelled and polished with steel trowel unless otherwise indicated.

.2 Provide 20 mm chamfer for exposed sharp edges unless otherwise indicated.

.4 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 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 reuse and recycling in accordance with Section 01 10 00 – General Instructions.

END OF SECTION

DIVISION 10

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 Materials and application of traffic signs and delineators.

1.2 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 32 17 23 - Pavement markings

1.3 REFERENCES

.1 Cahier des charges et devis généraux (CCDG) du Ministère des Transports du Québec

.1 Infrastructures routières – Construction et réparation (current edition).

.2 Ministère des Transports du Québec

.1 Normes provinciales « Ouvrages routiers » - Tomes I to VIII (current edition).

.3 ASTM International

.1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A276-10, Standard Specification for Stainless Steel Bars and Shapes.

.3 ASTM B209M-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.

.4 ASTM B210M-05, Standard Specification for Aluminum-Alloy Drawn Seamless Tubes Metric.

.5 ASTM B211M-03, Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire Metric.

.4 Canadian General Standards Board (CGSB)

.1 CGSB 62-GP-11M-78, Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing and Amendment.

.5 CSA International

.1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.

.6 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for traffic signage, including product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

.2 Indicate items as follows:

.1 Dimensions of the signs

.2 Dimensions of the posts

.3 Materials

.4 Finish of the signs

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location 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 DESIGN CRITERIA

.1 Signboards: form, colour, border, size and lettering shall be in accordance with requirements of Chapter 1 - Tome V of *« Normes provinciales « Ouvrages routiers ».*

2.2 MATERIALS

.1 Flexible delineator: type “Cyclo-Zone™” for bicycle path by Develotech or approved equal.

.1 Size: 1.22 m height, 10 cm width.

.2 Color: Black with yellow horizontal stripes (4X).

.2 Traffic Sign Supports:

.1 Steel posts: to CSA G40.21, 4 m long, flanged "U" shaped in cross section, measuring 65 mm wide x 30 mm deep. Metal thickness: 4.5 mm. Hot dipped galvanized: to ASTM A123/A123M, with zinc coating.

.2 Standard tubular supports for small signs: to ASTM B210M.

.3 Vertical tubular supports and connecting diagonal members: to ASTM B210M.

.4 Aluminum tubular members: belt ground satin finish.

.5 Anchor and connecting bolts, 'U' clamps and miscellaneous hardware for overhead sign installations: fabricate from 304 stainless steel as specified in ASTM A276.

.6 Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.

.3 Signboards:

.1 Aluminum sheet: to ASTM B209M, precut to required dimensions.

.1 Thickness for signboards up to 750 mm wide: 1.6 mm minimum.

.2 Thickness for signboards 750-1200 mm wide: 2.1 mm minimum.

.3 Thickness for refurbishing existing sign panels: 1.0 mm minimum.

.2 Aluminum extrusions: to ASTM B211M, 150 mm or 300 mm panels suitable for bolting together.

.3 T-shape stiffeners for signboards: to ASTM B210M.

.4 Connecting straps and brackets: to ASTM B209M.

.5 Aluminum materials: to ASTM B209M.

.6 Reflective sheeting and tape : as per Standard 14101 - Tome VII of « Normes provinciales « Ouvrages routiers ». Adhesive, class of reflectivity and colour as indicated. Type of signboard shall be at least equal to type of sheeting specified in table 1 below:

Table 1 – Type of sheeting / signboard

Type of signboard	**Type of sheeting**
Work Signage	IX
Stop	IX
Other signboard	IV

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Delineator to be installed per manufacturer recommendations in location shown on the drawings and/or as indicated by the NCC Representative.

.2 Signboards and supports to be installed in location shown on the drawings and/or as indicated by the NCC Representative.

.3 Traffic Sign Support:

.1 Erect supports as indicated. Permissible tolerance: 50 mm maximum departure from vertical for direct buried supports. Where separate concrete footings have been placed, erect posts with base plates resting on levelling nuts and restrained with nuts and washers. Permissible tolerance: 12 mm maximum departure from vertical.

.2 Coat underside of base plate with corrosion protective paint before installation. Connect shoe base to shaft with inside and outside fillet welds.

.3 Close open aluminum tubes and posts with aluminum cap. Cut oblong holes in shoe bases to drain condensation. Install aluminum bolt cover on each base plate restraining nut.

.4 Erect posts plumb and square to details as indicated.

.5 Single channel steel posts:

.1 Drive to required depth without damage to posts.

.2 If rock or concrete is encountered, drill hole to required depth and set post in sand.

.3 In finished concrete surfaces, backfill with concrete or grout. Protect from adverse conditions until cured.

.4 Signboard:

.1 Fasten signboards to supporting posts and brackets as indicated.

.2 Fasten lane markers to signboard.

.3 Use strapping with crimped or bolted connections where signs fastened to utility poles. Use T-shape aluminum stiffeners to join portions of sign panel on site. Cover face of T-stiffener with material identical to face of sign panel.

3.2 CORRECTING DEFECTS

.1 Correct defects, identified by the NCC Representative, in sign message, consistency of reflectivity, colour or illumination. Correct angle of signboard aiming angle for optimum performance during night conditions to approval of the NCC Representative.

3.3 CLEANING

.1 Progress Cleaning: clean.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by traffic signage installation and salvage operations.

END OF SECTION

DIVISION 26

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 01 61 20 – Material and Equipment

.3 Section 01 74 11 - Cleaning

.4 Section 01 78 00 - Closeout Submittals

1.2 REFERENCES

.1 Definitions:

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

.2 Reference Standards:

.1 CSA Group

.1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations with Quebec modifications.

.2 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

.3 Ministry of Transports of Québec

.1 Cahier des charges et devis généraux – infrastructure routières – services de nature techniques – édition 2014

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for review and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, controll panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 Submit copies of drawings and product data to authority having jurisdiction and inspection authorities.

.6 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Certificates:

.1 Provide CSA certified equipment.

.2 Where CSA certified equipment is not available, submit such equipment to authority having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.

.6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.5 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for review for incorporation into manual.

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Language operating requirements: provide identification nameplates, labels for control items in English and French.

.3 Use one nameplate, label for each language.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 20 – Material and Equipment.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of authority having jurisdiction.

.2 Porcelain enamel decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.5 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates, labels as follows:

.1 Nameplates: lamicoid 3 mm thick plastic engraving sheet melamine, black face, white core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate or label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. [_____]" as directed by Departmental Representative.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.6 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.7 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for 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 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.4 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install as per Québec Ministry of Transport standards.

3.5 FIELD QUALITY CONTROL

.1 Conduct following tests.

.1 Power distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.2 Conduct tests in presence of Departmental Representative.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.4 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.6 SYSTEM STARTUP

.1 Instruct Departmental Representative in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples.

1.2 REFERENCES

.1 CSA International

.1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.

.2 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper or aluminum sized to fit copper or aluminum conductors as required.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 NEMA to consist of:

.1 Clamp for stranded aluminum.

.2 Stud clamp bolts.

.3 Bolts for copper conductors.

.4 Bolts for aluminum conductors.

.5 Sized for conductors as indicated.

.4 Clamps or connectors as required to: CAN/CSA-C22.2 No.18.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors 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 INSTALLATION

.1 Remove insulation carefully from ends of conductors cables and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

.3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

.4 Install bushing stud connectors in accordance with EEMAC 1Y-2 NEMA.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 26 05 00 - Common Work Results for Electrical.

.3 Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

1.2 PRODUCT DATA

.1 Provide product data in accordance with Section Shop Drawings, Product Data and Samples Products.

PART 2 - PRODUCT

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

.2 Install conductors into conduits.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples.

1.2 REFERENCES

.1 CSA Group

.1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

.3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for connectors and terminations and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 - PRODUCTS

2.1 CONNECTORS AND TERMINATIONS

.1 Copper long barrel compression connectors to CSA C22.2 No.65 as required sized for conductors.

.2 Contact aid for aluminum cables where applicable.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for connectors and terminations 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 INSTALLATION

.1 Install terminations and splices in accordance with manufacturer's instructions.

.2 Bond and ground as required to CSA C22.2No.41.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE 837-02, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 CSA International

.1 CSA Z32-09, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into O&M manual.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, soft annealed, size as indicated or as required.

.2 Rod electrodes: copper clad steel 19 mm diameter by minimum 3 m long.

.3 Grounding conductors: bare stranded copper, soft annealed size as indicated or as required.

.4 Insulated grounding conductors: green, copper conductors, size as indicated.

.5 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.

.6 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Thermit welded type conductor connectors.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment 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 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process.

.5 Use mechanical connectors for grounding connections to equipment provided with lugs.

.6 Soldered joints not permitted.

.7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.9 Install separate ground conductor to outdoor lighting standards.

.10 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end and load end.

3.3 MAINTENANCE HOLES

.1 Install conveniently located grounding stud, electrode, size as indicated stranded copper conductor in each maintenance hole.

.2 Install ground rod in each maintenance hole so that top projects through bottom of maintenance hole. Provide with lug to which grounding connection can be made. Confirm ground resistance meets or exceeds Canadian Electrical Code minimum requirements.

3.4 ELECTRODES

.1 Install concrete encased electrodes in building foundation footings, with terminal connected to grounding network.

.2 Install rod, plate electrodes and make grounding connections as indicated.

.3 Bond separate, multiple electrodes together.

.4 Use size 2/0 AWG copper conductors for connections to electrodes.

.5 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.5 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, control panels, building steel work, distribution panels, outdoor lighting.

3.6 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings: in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

PART 2 - PRODUCTS

2.1 SPLITTERS

.1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Terminations: main and branch lugs connection blocks to match required size and number of incoming and outgoing conductors as indicated.

2.2 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on turned edge covers.

2.3 CABINETS

.1 Construction: to Quebec Ministry of Transport standards.

PART 3 - EXECUTION

3.1 SPLITTER INSTALLATION

.1 Mount plumb, true and square to building lines.

.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Install terminal block as indicated in cabinets.

.4 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.3 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating system name, voltage and phase or as indicated.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.

.3 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

.1 Submit cable manufacturing data.

.3 Quality assurance submittals:

.1 Test reports: submit certified test reports.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, aluminum threaded.

.2 Rigid PVC conduit: to CSA C22.2 No. 211.2.

2.2 CONDUIT FASTENINGS

.1 Two holes steel straps to secure surface conduits.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Surface mounts conduits.

.2 Use rigid aluminum threaded conduit on surface and PVC underground except specified otherwise.

.3 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.4 Mechanically bend steel conduit.

.5 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.6 Install fish cord in empty conduits.

.7 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.8 Dry conduits out before installing wire.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 20 - Material and Equipment.

.3 Section 01 74 11 - Cleaning.

.4 Section 26 05 00 - Common Work Results for Electrical.

.5 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 Insulated Cable Engineers Association, Inc. (ICEA)

.2 Sustainable Forestry Initiative (SFI)

.1 SFI-2010-2014 Standard.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for cables and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 20 - Material and Equipment, and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

PART 2 - PRODUCTS

2.1 CABLE PROTECTION

.1 38 x 200 mm planks pressure treated with coloured copper naphthenate or 5% pentachlorophenol solution, water repellent preservative.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for cable 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 CABLE INSTALLATION IN DUCTS

.1 Install cables as indicated in ducts.

.2 Do not pull spliced cables inside ducts.

.3 Install multiple cables in duct simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.7 After installation of cables, seal duct ends with duct sealing compound.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using qualified personnel.

.1 Include necessary instruments and equipment.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short circuits and grounds.

.1 Ensure resistance to ground of circuits is not less than 50 megohms.

.5 Pre-acceptance tests:

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.6 Remove and replace entire length of cable if cable fails to meet any of test criteria.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse or recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Repair damage to adjacent materials caused by cables installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.

.3 Section 26 05 28 - Grounding - Secondary.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for service equipment and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Cabinet for utility revenue metering Junction box, Pull box, Splitter box: in accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets, size as indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for service equipment 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 INSTALLATION

.1 Install service equipment.

.2 Connect to incoming service.

.3 Connect to outgoing load circuits.

.4 Install ground fault equipment.

.5 Make grounding connections in accordance with Section 26 05 28 - Grounding - Secondary.

.6 Make provision for power supply authority's metering.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Section 01 61 20 – Material and Equipment.

1.2 REFERENCES

.1 CSA International

.1 CSA C22.2 No. 5-09, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 20 – Material and Equipment, and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store circuit breakers in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect circuit breakers from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 BREAKERS GENERAL

.1 Moulded-case circuit breakers: to CSA C22.2 No. 5

.2 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.3 Circuit breakers to have minimum 14 Ka symmetrical rms interrupting capacity rating.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for 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 INSTALLATION

.1 Install circuit breakers as indicated.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 CSA Group

.1 CSA C22.2 No.206-13, Lighting Poles.

.2 Ministère des Transports du Québec

.1 Cahier des charges et devis généraux – infrastructure routières – services de nature technique – édition 2014.

.1 This present section is a supplement to the general specification – "Infrastructures Routières - Construction et réparations'', 2011 (CCDG 2011). It is to complete some articles and to describe some work that is not mentioned in the CCDG 2011).

.2 The CCDG 2011 is entirely applicable. It is possible to order it from the following address:

Les Publications du Québec
C.P. 1005
Québec (Québec G1K 7B5
Téléphone : (418-643-5150

.3 This present section, which is also a supplement to specifications – "Ouvrages Routiers"-Part I to Part VII, most recent update, is to clarify certain articles and to clarify the work that is mentioned.

.4 Parts I to VII are entirely applicable. They are sold at the same location as the CCDG 2011.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for roadway lighting and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 - PRODUCTS

2.1 POLES

.1 Steel or aluminum poles: to Quebec Ministry of Transport standards.

2.2 LUMINAIRIES

.1 Standard weatherproof housing red flashing traffic light for stop:

.1 Lamp type: LED

.2 Ballast: 240 V, two (2) lamps.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for roadway lighting 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 INSTALLATION

.1 Install poles true and plumb, complete with brackets in accordance with manufacturer's instructions.

.2 Install luminaires on pole davits and install lamps and signage.

.3 Check luminaire orientation, level and tilt.

.4 Connect luminaire to lighting circuit.

.5 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

3.3 MAST WITH ARM AND CONCRETE BASE FOR TRAFFIC LIGHT

.1 The Contractor has the responsibility to provide a mast with arm for traffic light design taking into account its span and dimensions. The Contractor shall provide shop drawings signed and sealed by a certified structural engineer that confirms that the model of mast and arm provided is designed for the required installation.

.2 Provide and install a concrete base with bolting circle. Prior to installation provide a shop drawing of the concrete base to the Departmental Representative for approval, signed and sealed by a certified structural engineer. Install on a bed of crushed stones 0-19mm compacted, 300mm deep by 1,500mm diameter.

END OF SECTION

DIVISION 31

Part 1 General

1.1 SECTION INCLUDES

.1 Movement and placement of natural stones found on the site as well as new granite boulders;

.2 Rip-rap.

1.2 RELATED SECTIONS

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

.2 Section 31 05 16 – Aggregate Materials.

.3 Section 31 32 19.01 – Geotextiles.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Sort and recycle waste for re-use or recycling.

.2 Store natural stones salvaged from the site where and as indicated by the NCC Representative.

1.4 DOCUMENTS/SAMPLES TO SUBMIT

.1 Provide submittals in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.2 Advise NCC Representative of sources of proposed granite boulders supply.

.3 Submit a sample (full size) of granite boulders for approval ten (10) days prior to delivery.

Part 2 Products

2.1 MATERIALS

.1 Natural stones salvaged from the site to be relocated: granite and/or limestone.

.2 New Boulders: natural granite boulders, sizes:

.1 1,8m X 0,75m X 0,6m
.2 1,5m X 0,75m X 0,6m
.3 1,2m X 0,75m X 0,6m
.4 1,0m X 0,75m X 0,6m

.3 Rip-rap: crushed stone, 100mm diameter (refer to Section 31 05 16 – Aggregate Materials).

.4 Geotextile: refer to Section 31 32 19.01 – Geotextiles.

Part 3 Execution

3.1 PLACING – NATURAL STONES

.1 Moved and placed natural stones salvaged from the site and new granite boulders as shown on the drawings and as indicated by the NCC Representative.

.2 Install the pieces of boulders at ground level, embedding them deeply enough in the soil to be level and stable.

3.2 RIP-RAP

.1 Install the geotextile as indicated in Section 31 32 19.01.

.2 Installer crushed stone as indicated on drawings and as indicated by the NCC Representative.

3.3 CLEANING

.1 When work is substantially performed, remove surplus materials, waste materials, tools and safety barriers.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 74 11 – Cleaning

.3 Section 32 11 16.01 – Granular Sub-Base

.4 Section 32 11 23 – Aggregate Base Courses

.5 Section 32 15 40 – Crushed Stone Surfacing

1.2 REFERENCES

.1 Bureau de normalisation du Québec

.1 Standard NQ 2560-114 M2 (2007-02-19) - Travaux de génie civil - Granulats.

.2 Cahier des charges et devis généraux du Québec (CCDG) - Infrastructures routières, Construction et réparation (édition 2012).

.3 Ministère des Transports du Québec

.1 Cahier des Normes, Ouvrages Routiers, Vol. VII - Matériaux, Standard 2101 - Granulats.

1.3 SAMPLES

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

.2 Provide the NCC Representative with access to source and processed material for sampling.

.3 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

Part 2 Products

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Flat and elongated particles of coarse aggregate: to NQ 2560-114.

.1 Greatest dimension to exceed five times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

.1 Natural sand.

.2 Manufactured sand.

.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.4 Mixture of granite dust: Granite dust 0-15mm from Bristol in accordance with the sieve requirements of Section 32 15 40 - Crushed Stone Surfacing.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

.1 Crushed rock.

.2 Gravel and crushed gravel composed of naturally formed particles of stone.

.3 Light weight aggregate, including slag and expanded shale.

2.2 SOURCE QUALITY CONTROL

.1 Inform the NCC Representative of proposed source of aggregates and provide access for sampling at least two (2) weeks prior to commencing production.

.2 If, in opinion of the NCC Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.3 Advise the NCC Representative two (2) weeks in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 PREPARATION

.1 Topsoil stripping (when required)

.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

.2 Begin topsoil stripping of areas as directed by the NCC Representative after area has been cleared of brush weeds and grasses and removed from site.

.3 Strip topsoil to depths as directed by the NCC Representative. Avoid mixing topsoil with subsoil.

.4 Stockpile in locations as directed by the NCC Representative. Stockpile height not to exceed 2 m.

.5 Dispose of topsoil as directed by the NCC Representative.

.2 Aggregate source preparation

.1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by the NCC Representative.

.2 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

.3 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.

.4 Trim off and dress slopes of waste material piles and leave site in neat condition.

.3 Processing

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by the NCC Representative.

.4 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.5 Stockpiling

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by the NCC Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet Project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by the NCC Representative within 48 hours of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Max 1.5 m for coarse aggregate and base course materials.

.2 Max 1.5 m for fine aggregate and sub-base materials.

.3 Max 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 35 29.06 – Health and Safety

.3 Section 01 35 43 – Environmental Procedures

.4 Section 01 74 11 – Cleaning

.5 Section 31 05 16 – Aggregate Materials

.6 Section 31 32 19.01 – Geotextiles

.7 Section 32 11 16.01 – Granular Sub-base

.8 Section 32 11 23 – Aggregate Base Courses.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³;) (600 kN-m/m³).

.5 ASTM D1557-09, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³;) (2,700 kN-m/m³).

.6 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Bureau de normalisation du Québec

.1 *Standard NQ 2560-114 (2014) - Travaux de génie civil - Granulats*.

.4 Cahier des charges et devis généraux du Québec (CCDG) - Infrastructures routières, Construction et réparation (édition 2014).

.5 *Ministère des Transports du Québec*

.1 *Cahier des Normes, Ouvrages Routiers, Vol. VII - Matériaux, Standard 2101 – Granulats.*

1.3 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

.1 Rock : solid material in excess of 1.00 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 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 Topsoil:

.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.6 Unsuitable materials:

.1 Weak, chemically unstable, and compressible materials.

.2 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136 : Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.

.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

.3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.7 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Quality Control:

.1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.

.2 Submit for review by the NCC Representative proposed dewatering and heave prevention methods as described in PART 3 of this Section.

.3 Submit to the NCC Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.

.4 Submit to the NCC Representative written notice when bottom of excavation is reached.

.5 Submit to the NCC Representative testing and inspection results and report as described in PART 3 of this Section.

.3 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: location plan of existing utilities as found in field clearance record from utility authority location plan of relocated and abandoned services, as required.

.4 Samples:

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

.2 Inform the NCC Representative at least two (2) weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

.3 Submit 70 kg samples of type of fill specified including representative samples of excavated material.

.4 Ship samples prepaid to the NCC Representative, in tightly closed containers to prevent contamination and exposure to elements.

1.5 EXISTING CONDITIONS

.1 Examine soil report available at the time of tendering.

.2 Buried services:

.1 Before commencing work verify and establish location of buried services on and adjacent to site. Provide copies of all locate sheets to the NCC Representative from all utility companies before any excavation work.

.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.

.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, notify the NCC Representative and applicable authorities having jurisdiction to establish state of use of buried utilities and structures, and clearly mark the locations to prevent disturbance during Work.

.6 Confirm locations of buried utilities by careful test excavations or soil hydrovac methods.

.7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.8 Where utility lines or structures exist in area of excavation, obtain direction of the NCC Representative before removing or re-routing. Costs for such Work to be paid by the NCC Representative.

.9 Record location of maintained, re-routed and abandoned underground lines.

.10 Confirm locations of recent excavations adjacent to area of excavation.

.3 Existing buildings and surface features:

.1 Conduct, with the NCC Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, 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 the NCC Representative.

.3 Where required for excavation, cut roots or branches as directed by the NCC Representative.

Part 2 Products

2.1 MATERIALS

.1 Fill material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified as per NQ 2560-114.

.2 Type 3 fill: selected material from excavation or other sources, approved by the NCC Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

.3 Geotextiles: refer to Section 31 32 19.01 - Geotextiles.

.4 Granular material: refer to Section 31 05 16 - Aggregate Materials, Section 32 11 16.01 - Granular Sub-base and Section 32 11 23 - Aggregate Base Courses.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures according to requirements of Section 01 35 43 – Environmental Procedures.

3.2 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/PROTECTION

.1 Keep excavations clean, free of standing water, and loose soil.

.2 Where soil is subject to significant volume change due to change in moisture content, cover and protect to the approval of the NCC Representative.

.3 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.

.4 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as directed by the NCC Representative after area has been cleared of brush, weeds and grasses and removed from site.

.2 Strip topsoil to depths as indicated on drawings.

.1 Do not mix topsoil with subsoil.

.3 Stockpile in locations as directed by the NCC Representative.

.1 Stockpile height not to exceed 2 m and should be protected from erosion.

.4 Dispose of unused topsoil as directed by the NCC Representative.

3.5 STOCKPILING

.1 Stockpile fill materials in areas designated by the NCC Representative.

.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety.

.1 Where conditions are unstable, NCC Representative to verify and advise methods.

.2 Obtain permit from authority having jurisdiction for temporary diversion of water course.

.3 Construct temporary Works to depths, heights and locations as indicated or directed by the NCC Representative.

.4 During backfill operation:

.1 Unless otherwise indicated or directed by the NCC Representative, remove sheeting and shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.5 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.6 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

.2 Remove excess materials from site and restore watercourses as directed by the NCC Representative.

3.7 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide for the NCC 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.

.1 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 in accordance with Section 01 35 43 - Environmental Procedures to approved runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

3.8 EXCAVATION

.1 Excavate to lines, grades, elevations and dimensions as indicated.

.2 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation.

.3 Excavation must not interfere with bearing capacity of adjacent foundations.

.4 Do not disturb soil within branch spread of trees or shrubs that are to remain.

.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.5 For trench excavation, unless otherwise authorized by the NCC Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.6 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by the NCC Representative.

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 Dispose of surplus and unsuitable excavated material off site.

.9 Do not obstruct flow of surface drainage or natural watercourses.

.10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.11 Notify the NCC Representative when the bottom of the excavation is reached.

.12 Obtain the NCC Representative’s approval of completed excavation.

.13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by the NCC Representative.

.14 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 the NCC Representative.

.15 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

3.9 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated. Compaction densities are percentages of maximum densities obtained from ASTM D698.

3.10 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 The NCC Representative has inspected and approved installations.

.2 The NCC 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; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:

.1 Place bedding and surround material as specified elsewhere.

.6 Place unshrinkable recycled fill in areas as indicated.

.7 Consolidate and level unshrinkable fill with internal vibrators.

3.11 RESTORATION

.1 Cleaning the site as per the requirement of Section 01 74 11 – Cleaning.

.2 Replace topsoil as directed by the NCC Representative.

.3 Reinstate lawns to elevation which existed before excavation.

.4 Clean and reinstate areas affected by Work as directed by the NCC Representative.

.5 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.6 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.3 Section 32 11 16.01 – Granular Sub-Base

.4 Section 32 11 23 – Aggregate Base Courses

1.2 REFERENCES

.1 Ministère des Transports du Québec:

.1 Cahier des Normes, Ouvrages Routiers, Vol. VII - Matériaux, Standard 13101 - Géotextiles.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Test and Evaluation Reports:

.1 Submit copies of mill test data and certificate at least four (4) weeks prior to start of Work.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect geotextiles from direct sunlight and UV rays.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIAL

.1 For asphalted recreational pathway:

.1 Geotextile: Class II non-woven synthetic fibre fabric as per « *Ministère des Transports du Québec's standard 13101 – Géotextiles ».*

Part 3 Execution

3.1 INSTALLATION

.1 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.2 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.3 Overlap each successive strip of geotextile 600 mm over previously laid strip.

.4 Pin successive strips of geotextile with securing pins at 500 mm interval at mid point of lap.

.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.6 Replace damaged or deteriorated geotextile to the NCC Representative's approval.

.7 Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.2 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

DIVISION 32

Part 1 General

1.1 WORK INCLUDES

.1 Materials and installation for fertilizing and preserving root systems of plants affected by changing grades or excavation.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 01 35 29.06 – Health and Safety

.3 Section 01 35 43 – Environmental Protection

.4 Section 01 50 00 – Temporary Facilities

.5 Section 01 74 11 – Cleaning

.6 Section 31 23 33.01 - Excavating, Trenching and Backfilling

.7 Section 32 93 45 – Tree Pruning.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CSA G30.5-M1983(R1998), Welded Steel Wire Fabric for Concrete Reinforcement.

.2 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
.2 Fertilizers Act (R.S. 1985, c. F-10).
.3 Fertilizers Regulations (C.R.C., c. 666).
.4 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.3 Health Canada - Pest Management Regulatory Agency (PMRA).

.1 National Standard for Pesticide Education, Training and Certification in Canada (1995).

1.4 DEFINITION

.1 Mycorrhiza : association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.

1.5 DOCUMENTS / SAMPLES TO BE SUBMITTED

.1 Make submittals in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

1.6 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety.

1.7 TRANSPORTATION, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Separate wastes for reuse and recycling in accordance Section 01 74 11 – Cleaning.

.3 Do not dispose of unused fertilizer material into sewer system, into streams, lakes, onto ground or in any other location where they will pose health or environmental hazard.

.4 Ensure emptied containers are sealed and stored safely.

1.8 SCHEDULING

.1 Submit work schedule to NCC Representative for inspection. Schedule must state beginning date of Work.

Part 2 Products

2.1 MATERIALS

.1 Fill:

.1 Type (B): excavated soil, free from roots, rocks larger than 75 mm, building debris, and toxic ingredients (salt, oil, etc).

.2 Topsoil:

.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Native soil from stripping of topsoil on site. Refer to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.3 Anti-desiccant: commercial, wax-like emulsion.

.4 Filter Cloth:

.1 Type 1: 100 % non-woven needle punched polyester, 2.75 mm thick, 240 g/m^2 mass.

.2 Type 2: biodegradable burlap.

.5 Wood posts: 38 x 89 x 600 mm length.

.6 Welded wire fabric (WWF): 100 x 100 mm, to CSA G30.5.

Part 3 Execution

3.1 IDENTIFICATION AND PROTECTION

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety.

.2 Identify plants and limits of root systems to be preserved as approved by NCC Representative.

.3 Protect plant and root systems from damage, compaction and contamination resulting from construction as approved by NCC Representative.

.4 Ensure no pruning is done inside drip line. If pruning inside drip line is required consult an aborist or Canadian Certified Horticultural Technician (CCHT).

3.2 ROOT CURTAIN SYSTEM

.1 Identify limits for required construction excavation.

.2 Prior to construction excavation, hand dig trench minimum 500 mm wide x 1500 mm deep, along perimeter of excavation limits.

.3 Prune exposed roots cleanly at side of trench nearest plants to be preserved. Pruned ends to point obliquely downwards.

.4 Protect with a layer of native soil and a filter cloth all exposed roots. Install a few wood post to maintain the filter cloth in place during the excavation work.

.5 Maintain moisture level in root zones by watering as needed.

3.3 PRUNING

.1 Prune in accordance with Section 32 93 45 - Tree Pruning.

.2 Prune crown to compensate for root loss while maintaining general form and character of plant. Dispose of debris through alternative disposal.

3.4 ANTI-DESICCANT

.1 Apply anti-desiccant to foliage where applicable.

3.5 CLEANING

.1 Remove debris, sweep surfaces and leave worksite clean after completion of Work.

.2 Use solutions and cleaning methods that are not harmful for human health nor for vegetation and that do not endanger fauna, adjacent watercourses or water table.

END OF SECTION

Part 1 General

1.1 WORK INCLUDES

.1 The Contractor will supply, in accordance with the plans and other documents, all materials, tools, equipment and labour required for construction of:

.1 Crushed granite pathways.

1.2 RELATED SECTIONS

.1	Section 01 33 00	Shop Drawings, Product Data and Samples
.2	Section 31 05 16	Aggregate Materials
.3	Section 31 23 33.01	Excavating, Trenching and Backfilling
.4	Section 32 11 16.01	Granular Sub-base.

1.3 REFERENCES

.1 ASTM International

.1 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM D4318-05, Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-88, Sieves, Testing, Woven Wire, Metric.

1.4 ADMINISTRATIVE

.1 N/A

1.5 SUBMITTALS

.1 Submit product data, granulometry and samples in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

1.6 TRANSPORTATION, STORAGE AND HANDLING

.1 Transport, store and handle materials and equipment in compliance with the general specifications and standards.

.2 Store crushed stone where and as instructed by the NCC Representative.

Part 2 Products

2.1 MATERIALS

.1 Granular sub-base: in accordance with Section 31 05 16 - Aggregate Materials and the requirements set out below.

.1 Stone, gravel or pit-run sand, screened or crushed, composed of hard, durable particles free from clay lumps and binding materials, organic or frozen material and other deleterious materials.

.2 When tested in accordance with ASTM C136 and ASTM C117, particle size must be within specified limits. Sieve mesh sizes must comply with CAN/CGSB-8.1 and CAN/CGSB-8.2.

.2 Granular base layer

.1 Crushed granite particles: composed of hard, durable particles free from clay lumps and binding materials, organic or frozen material and other deleterious materials.

.2 When tested in accordance with ASTM C136 and ASTM C117, particle size must be within specified limits.

Sieve Designation	% Passing
9.5 mm	100
4.75 mm	50-100
2.00 mm	30-65
0.425 mm	10-30
0.075 mm	5-10

Part 3 Execution

3.1 SUBGRADE

.1 Ensure subgrade preparation conforms to levels and compaction required for installation of granular sub-base.

3.2 GRANULAR SUB-BASE

.1 Place sub-base to minimum thickness as indicated in the plans.

.2 Place materials in uniform layers not to exceed 150 mm compacted thickness.

.1 Compact each layer to 92% Standard Density in accordance with ASTM D698.

3.3 GRANULAR TOPPING

.1 Place granular topping to minimum compacted thickness as indicated.

3.4 FIELD QUALITY CONTROL

.1 Inspection and testing of crushed stone surfacing will be conducted by the designated laboratory.

3.5 CLEANING

.1 Progress cleaning: in accordance with the general specifications and standards.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion, remove surplus materials, rubbish, tools and equipment in accordance with the general specifications and standards.

3.6 PROTECTION

.1 Take all necessary measures to prevent damage to landscaping, edging, sidewalks, trees, fences, paved surfaces and adjacent properties.

.1 Where required, repair damage.

.2 Coordinate installation of surfacing so as to interfere as little as possible with the normal use of the site.

END OF SECTION

Part 1 General

1.1 SECTION CONTENT

.1 Contractor to supply the necessary materials, equipment and labour in accordance with plans and other documents to:

- .1 excavate and stockpile existing topsoil that can be reused;
- .2 place recovered topsoil;
- .3 supply and place new topsoil;
- .4 carry out finish grading.

1.2 RELATED REQUIREMENTS

.1 Section 32 92 21 – Hydroseeding

.2 Section 32 93 10 - Trees, Shrubs and Ground Cover Planting

1.3 REFERENCES

.1 Agriculture and Agri-Food Canada

- .1 The Canadian System of Soil Classification, third edition, 1998.

.2 Canadian Council of Ministers of the Environment

- .1 PN1340-2005, Guidelines for Compost Quality.

1.4 DEFINITIONS

.1 Compost

- .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
- .2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
- .3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth-inhibiting contaminates.
- .4 Composted bio-solids to: CCME Guidelines for Compost Quality, Categories A and B as set out in a document published by the Canadian Council of Ministers of the Environment (CCME).

.2 Type of soil to be used as basic materials in topsoil mixtures

- .1 Light sandy loam: loose soil (brown), not overly rich in clay or overly poor in sand, with an organic content of between 4% and 5% for sandy loam soils and between 2% and 3% for clayey soils, with a maximum allowable humus level of 20%. Such soil to have a pH between 5.5 and 7.0. Soil must also be free of subsoil contamination, roots, vegetation, debris, toxic materials and stones over 50 mm in diameter.

.2 Muck soil (humus): consisting of decomposed plant material, fairly elastic and homogenous, free of colloidal residue, wood, sulphur and iron, containing a minimum of 60% organic matter by weight, with moisture content not exceeding 15%. Shredded particle maximum size: 6 mm in diameter.

1.5 WORK SCHEDULE

.1 Spreading of topsoil and finish grading must be done at a time that is appropriate to enable seeding and planting under best possible conditions and within ten (10) days following the end of the initial spreading.

Part 2 Products

2.1 TOPSOIL

.1 Topsoil for seeded and sodded areas, planting trenches and flower beds/planting areas: mixture of particulates, micro organisms and organic matter producing a favourable growing medium for the required plants;

.1 **Type 1**: for tree pits and areas to be sodded or seeded:

- two parts light sandy loam;
- one part muck soil;
- one part coarse sand;
- 3% to 7% organic matter.

.2 **Type 2**: for planting trenches for shrubs, perennials and grasses:

- two parts light sandy loam;
- three parts muck soil;
- one part compost;
- one part coarse sand;
- 10% to 15% organic matter.

.3 **Type 3:** for planting trenches for shrubs, perennials and grasses, as well as surfaces in wooded areas to be seeded:

- Savaria “Super Mix” (no.3275), rich in organic material or approved equivalent.

2.2 CHARACTERISTICS OF TOPSOIL MIX

.1 The cation exchange capacity (CEC) must be between 10 and 20.

.2 Chemical testing of the soil will be done using the Walkey Black oxidation method.

.3 The acidity level (pH) must be 6.5.

.4 Include the following chemical elements in the proportions indicated:

Chemical Elements	Proportion
Phosphorous (P)	100 ppm
Potassium (K)	125 ppm
Magnesium (Mg)	200 ppm
Calcium (Ca)	2,000 ppm

.1 Must be properly sieved and fall within the following grading range:

Screen	Acceptable %
10 mm	100
5 mm	98 to 100
1.25 mm	90 to 97
630 µm	65 to 90
315 µm	25 to 65
160 µm	15 to 25
80 µm	5 to 15

.2 Water retention capacity: maximum of 20%.

2.3 SOIL AMENDMENTS

.1 Granular synthetic commercial fertilizer with a fast-acting phosphorous source containing a maximum of 35% soluble nitrogen. Industry-accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

.1 For sodding: 10-25-10 fertilizer;

.2 For trees and shrubs to be planted: 10-52-16 fertilizer;

.3 Calcium, magnesium, sulphur and trace elements present in balanced proportions in order to boost germination and/or the establishment of desired vegetation.

.4 pH value: between 6.5 and 8.0.

.2 Peat moss

.1 Derived from partially decomposed species of Sphagnum Mosses;

.2 Elastic and homogeneous, brown in colour;

.3 Free of wood and deleterious material which could prohibit growth;

.4 Shredded particle minimum size: 5 mm in diameter.

.3 Sand: washed coarse silica sand, medium to course textured.

.4 Organic matter: compost Category A, as per CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, as per the organic matter, stability and contaminant requirements.

.5 Limestone

.1 Ground agricultural limestone;

.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.6 Bone meal: finely ground, raw or dried, containing a minimum of 3% nitrogen and 20% phosphoric acid.

2.4 SOURCE QUALITY CONTROL

.1 Advise Professional of sources of proposed topsoil supply.

.2 Topsoil must be free of any roots, rocks, sub-soil material, debris, weeds and foreign matter.

.3 Analysis of supplier's topsoil to be carried out by a recognized test laboratory; test to analyze pH and levels of phosphorous, potassium and organic matter.

Part 3 Execution

3.1 PREPARATION OF EXISTING GRADE

.1 Verify that existing grade is correct.

.1 If discrepancies occur, inform designated professional and do not commence work until instructed by professional to do so.

.2 Grade soil, eliminating uneven areas and low spots to ensure positive drainage.

.3 Remove debris, roots, branches, stones over 50 mm in diameter and other deleterious substances.

3.2 TOPSOIL PLACEMENT AND SPREADING

.1 Have the designated professional inspect and approve the subgrade before beginning to spread the topsoil.

.2 Spread topsoil over the approved, frost-free subgrade in uniform layers with sufficient water.

.3 Spread topsoil in uniform layers not to exceed 150 mm thick.

.4 For sodded areas keep topsoil 15 mm below finished grade.

.5 Spread topsoil in layers of minimum thicknesses after settlement, as per plans.

.6 Manually spread topsoil and planting soil around trees, shrubs and obstacles and in areas where motorized equipment cannot be used.

3.3 SOIL AMENDMENTS

.1 For planting beds/ areas and seeding areas, apply and thoroughly mix soil amendments into full specified depth of topsoil layer.

3.4 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.

.1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by the designated professional.

.1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.5 ACCEPTANCE

.1 The professional will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.6 SURPLUS MATERIAL

.1 Dispose of materials off site.

3.7 CLEAN-UP

.1 Clean up.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 SECTION CONTENTS

.1 The Contractor shall supply all materials, equipment and labour required to perform hydraulic seeding in accordance with the drawings and other documents.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 32 91 19.13 – Topsoil Placement and Finish Grading

1.3 SUBMITTALS

.1 Submit product data and samples in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.2 Product Data

- .1 Submit product data as required.
- .2 Submit product data for:
  - .1 Seed.
  - .2 Mulch.
  - .3 Tackifier.
  - .4 Fertilizer.
- .3 Submit in writing to the NCC Representative 10 days prior to commencing work:
  - .1 Volume capacity of hydraulic seeder in litres.
  - .2 Amount of material to be used per tank based on volume.
  - .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.5 SCHEDULING

.1 Schedule hydraulic seeding to coincide with preparation of soil surface.

.2 Schedule hydraulic seeding using grass mixtures between August 20 and September 30 or before June 10 the following year, after the ground is thawed.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Divert unused fertilizer from landfill to official hazardous material collections site approved by the NCC Representative.

.3 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

1.7 WARRANTY

.1 The Contractor hereby guarantees that it will completely and uniformly re-seed the mixtures at the site, such guarantee to cover one (1) full year starting on the date of preliminary acceptance, provided that adequate maintenance is performed. It shall replace at its expense all seeded surfaces that are not deemed in perfect condition by the NCC Representative.

.2 The NCC Representative will inspect the plants at the end of the warranty period.

.3 The NCC Representative reserves the right to extend the Contractor's liability for an additional year if at the end of the initial warranty period leafing and development are not considered sufficient to ensure future survival of the plants.

Part 2 Products

2.1 MATERIALS

.1 Seed: Canada pedigreed grade in accordance with Government of Canada *Seeds Act* and *Seeds Regulations*.

.1 Type 1 mixture: Native grass seed (100%) for pathway verges, average height 40 cm.

.1 Mixture composition
For pathway verges and surfaces:
40% Poa compressa
35% Poa trivialis
10% Agrostis alba
8% Trifolium repens
7% Lotus corniculatus

.2 Type 2 mixture: Native grass and perennial seeds for beds adjacent to shrub beds or woods fringe (limits of rights-of-way), average height 100 cm. Seasonal attraction for visitors and attraction for insect pollinators.

.1 Composition of "*Ultra-pollination*" mixture supplied by Horticulture Indigo or approved equivalent

.1 Perennials:

0.7% Achillea millefolium
6.0% Asclepias incarnata
0.6% Chamerion angustifolium (Epilobium angustifolium)
3.5% Eutrochium maculatum (Eupatorium maculatum)
2.8% Helenium autumnale
0.5% Lobelia cardinalis
3.8% Monarda fistulosa
3.0% Oenothera biennis
2.2% Solidago canadensis
3.4% Symphyotrichum novae-angliae
3.0% Verbena hastata

.2 Grasses:

19.5% Elymus canadensis
21.0% Elymus virginicus
15.0% Panicum virgatum
15.0% Sorghastrum nutans

.3 Type 3 mixture: Native grass, perennial and shrub seeds (100%) for naturalizing the former pathway between Gatineau Parkway and Saint-Raymond Boulevard (meadow area), average height 200 cm.

.1 Mixture composition

.1 Perennials:

1.1% Achillea millefolium
0.5% Anaphalis margaritacea
1.1% Chamerion angustifolium
(Epilobium angustifolium)
2.6% Doellingeria umbellate
6.0% Oenothera biennis
1.5% Solidago Canadensis
2.3% Solidago nemoralis
1.5% Symphyotrichum novae-angliae

.2 Grasses:

17.3% Elymus trachycaulus
30.1% Festuca rubra
11.3% Elymus virginicus

.3 Trees and shrubs:

2.5% Alnus incana ssp. rugosa (A. rugosa)
0.8% Betula populifolia

3.0% Cornus stolonifera
9.0% Prunus virginiana
7.5% Rhus typhina
0.9% Spiraea tomentosa
1.0% Spiraea alba var. latifolia

.4 Type 4 mixture: Native grasses and perennials (100%) for naturalizing the former pathway between Gatineau Parkway and Saint-Raymond Boulevard (underbrush and partly shaded areas).

.1 Mixture composition

4.8% Anemone virginiana
4.0% Aquilegia canadensis
0.6% Clematis virginiana
10.0% Desmodium canadense
59.4% Elymus virginicus
3.5% Eurybia macrophylla (Aster macrophyllus)
6.0% Festuca rubra
2.0% Maianthemum racemosum (Smilacina racemosa)
2.0% Osmorhiza claytonii
1.2% Solidago flexicaulis
1.5% Symphyotrichum cordifolium (Aster cordifolius)
5.0% Thalictrum pubescens

.2 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:

.1 Type I mulch:

.1 Made from wood cellulose fibre.
.2 Organic matter content: 95% plus or minus 0.5%.
.3 Value of pH: 6.0.
.4 Potential water absorption: 900%.

.3 Tackifier: water soluble vegetable carbohydrate powder.

.4 Water: free of impurities that would inhibit germination and growth.

.5 Fertilizer

.1 To conform to Government of Canada *Fertilizers Act* and *Fertilizers Regulations*.
.2 Complete synthetic, slow release with 35% of nitrogen content in water insoluble form.

.6 Inoculants: inoculant containers to be tagged with expiry date.

Part 3 Execution

3.1 WORKMANSHIP

.1 Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.

.2 Clean up immediately any material sprayed where not intended, to satisfaction of the NCC Representative.

.3 Do not perform work under adverse field conditions such as wind speeds over 20 km/h, frozen ground or ground covered with snow, ice or standing water.

.4 Protect seeded areas from trespass until plants are established.

3.2 PREPARATION OF SURFACES

.1 Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.

.2 Cultivate areas identified as requiring cultivation to depth of 50 mm.

.3 Ensure areas to be seeded are moist to depth of 50 mm before seeding.

.4 Obtain the NCC Representative's approval of grade and topsoil depth before starting to seed.

3.3 PREPARATION OF SLURRY

.1 Measure quantities of materials by weight or weight calibrated volume measurement satisfactory to the NCC Representative. Supply equipment required for this work.

.2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.

.3 After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.4 SLURRY APPLICATION

.1 Hydraulic seeding equipment:

.1 Slurry tank.

.2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.

.3 Capable of seeding by 50 m hand-operated hoses and appropriate nozzles.

.4 Tank volume to be certified by certifying authority and identified by authority's Volume Certification Plate.

.2 Slurry mixture applied per hectare.

.1 Seed: Grass mixture, 300 kg.
.2 Mulch: Type I, 2000 kg.
.3 Tackifier: 120% of manufacturer's recommendation.
.4 Water: Minimum 30,000 L.
.5 Fertilizer: 500 kg, ratio 1-3-1.

.3 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.

.1 Using correct nozzle for application.
.2 Using hoses for surfaces difficult to reach and to control application.

.4 Blend application 100 mm into previous applications to form uniform surfaces.

.5 Re-apply where application is not uniform.

.6 Remove slurry from items and areas not designated to be sprayed.

.7 Protect seeded areas from trespass satisfactory to NCC Representative.

.8 Remove protection devices as directed by NCC Representative.

3.5 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of seed application until preliminary written acceptance by NCC Representative.

.2 For all types of seed mixture:

.1 Repair and re-seed dead or bare spots to allow establishment of seed prior to preliminary acceptance.
.2 Control weeds by mechanical means utilizing acceptable integrated pest management practices.
.3 Water seeded area for 15 days from date of seeding to maintain optimum soil moisture level for germination and continued growth of plants. Control watering to prevent washouts.

3.6 PRELIMINARY ACCEPTANCE

.1 Seeded areas will be accepted by the NCC Representative provided that:

.1 Plants are uniformly established;
.2 Seeded areas are free of rutted, eroded, bare or dead spots;
.3 Areas have been fertilized;
.4 For Type 1 mixture, areas have been mown at least twice.

.2 Areas seeded in fall will achieve preliminary acceptance in following spring, one month after start of growing season, provided acceptance conditions are fulfilled.

3.7 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of preliminary acceptance until the end of warranty period.

.1 Water seeded areas to maintain optimum soil moisture level for continued growth. Control watering to prevent washouts.

.2 Repair and reseed bare spots to satisfaction of NCC Representative.

.3 For Type 1 mixture, mow areas seeded to a height of 50 mm when plant height reaches 75 mm, and remove clippings to the satisfaction of the NCC Representative.

.4 Fertilize seeded areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

.5 Control weeds by chemical means in accordance with existing regulations.

.2 Areas seeded will achieve final acceptance at the end of the warranty period by NCC Representative if provided acceptance conditions are fulfilled (refer to item 3.6).

3.8 CLEANING

.1 Upon completion of work, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Partie 1 General

1.1 SCOPE OF WORK

.1 The Contractor will ensure, in compliance with plans and other documents, the supply of materials, equipment and labour required to carry out the following work:

- .1 Planting of bushes (tall shrubs)
- .2 Planting of shrubs
- .3 Planting of grasses

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 32 91 19.13 Topsoil Placement and Finish Grading.

.3 Section 32 93 50 Plant Maintenance and Warranty.

1.3 REFERENCES

.1 Agriculture and Agri-Food Canada (AAFC).

- .1 Plant Hardiness Zones in Canada-2000.

.2 Canadian Nursery Landscape Association (CNLA).

- .1 Canadian Standards for Nursery Stock-2001.

.3 Department of Justice Canada (Jus).

- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .2 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.4 Bureau de normalisation du Québec

- .1 NQ 0605-100-2001 *Aménagement paysager à l'aide de végétaux* [landscaping with plant material].
- .2 NQ 0605-400-2001 *Produits de pépinières et de gazon* [nursery stock and grass products].
- .3 NQ 0605-400-2001 *Produits de serres* [greenhouse products].

1.4 DEFINITIONS

.1 Mycorrhiza: association between fungus and roots of plants. This symbiosis enhances plant establishment in newly imported and landscaped soils.

1.5 SUBMITTALS

.1 Submit product data and samples in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.1 Submit a sample of mulch ten (10) days prior to delivery.

.2 Submit all delivery slips for topsoil and plant material to NCC Representative.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

1.7 STORAGE AND PROTECTION

.1 Protect plant material from frost, excessive heat, wind and sun during delivery.

.2 Immediately store and protect plant material that will not be installed within one (1) hour after arrival at site in storage location approved by NCC Representative.

.3 Protect plant material from damage during transportation.

.1 When 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 When 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.

.4 Protect stored plant material from frost, wind and sun and as follows.

.1 For bare root plant material, preserve moisture around roots by heeling in or burying roots in sand or topsoil and watering to full depth of root zone.

.2 For pots and containers, maintain moisture level in containers.

.3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

.5 Waste management and disposal

.1 Separate waste materials for recycling.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Divert unused metal materials from landfill to metal recycling facility.

.4 Fold up metal banding, flatten and place in designated area for recycling.

.5 Divert discarded plastic plant containers materials from landfill to plastic recycling facility.

.6 Dispose of unused fertilizer at official hazardous material collection site approved.

.7 Dispose of unused anti-desiccant at official hazardous material collections site

.8 Divert unused wood and mulch materials from landfill to recycling composting facility.

1.8 SUBSTITUTION

.1 No substitution of the plant types, varieties and sizes specified in the planting plans will be permitted without the written approval of the NCC Representative. Plants larger than specified may be used where approved by the NCC Representative, however there will be no resulting increase in the contract price. If larger plants are used, the root ball must be increased in proportion to the plant size.

1.9 REPLACEMENT PLANTS

.1 During the warranty period, remove from the site any dead plant or plants that have not developed to the NCC Representative's satisfaction.

.2 Replace plant material that is found unacceptable at the start of the next planting season.

.3 The warranty period for replacement plants must be the same as the warranty period for original plants.

.4 Continue replacing plants whenever they are found to be unacceptable.

1.10 SCHEDULING

.1 Submit the work schedule to the NCC Representative for approval seven (7) days prior to delivery of the plant material.

.2 Work schedule to include the following information:

.1 Type and number of plants;
.2 Dates of delivery;
.3 Dates of arrival on site;
.4 Dates of planting.

1.11 WARRANTY

.1 See Section 32 93 50 Plant Maintenance and Warranty.

Partie 2 Products

2.1 PLANT MATERIAL

.1 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.

.1 Source of plant material: in accordance with Plant Hardiness Zones in Canada.
.2 Plant material must be planted in zone indicated as appropriate for its species.
.3 Plant material in location appropriate for its species.

.2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.3 Native plant material: maximum 40 mm in caliper, with well developed crowns and characteristically branched; no more than 40% of overall height may be free of branches.

2.2 WATER

.1 Free of impurities that would inhibit plant growth.

2.3 TRUNK PROTECTION

.1 Perforated spiralled strip.

2.4 FERTILIZER

.1 Synthetic commercial type as recommended by soil test report.

2.5 ANTI-DESICCANT

.1 Wax-like emulsion.

2.6 FLAGGING TAPE

.1 Fluorescent, pink colour.

2.7 SOURCE QUALITY CONTROL

.1 Advise NCC Representative of sources of proposed plant material supply immediately after Contract Award.

.2 Obtain approval of plant material from NCC Representative prior to planting.

.3 Imported plant material must be accompanied with necessary permits and import licenses. Conform to Federal, Provincial or Territorial regulations.

2.8 MYCORRHIZA

.1 “Myke Pro-Landscape G” by Premier Tech Biotechnologies or approved equivalent.

2.9 STAKE

.1 Untreated wood stakes, 38mm X 89mm, 1,5m height.

2.10 MULCH

.1 Ramial chipped wood (RCW) (3316) by Matériaux paysagers Savaria ltée or approved equivalent meeting the specifications of Savaria's product data.

.2 Taken from live woody parts of trees and shrubs with a diameter before chipping of 70 mm or less.

.3 The chipped mass of woody material may not contain more than 10% softwood. pH between 6.5 and 7.5 (water pH: 1:1 ratio and buffer pH: SMP buffer method).

.4 Soil organic matter content: 25% to 40% (modified Walkley-Black or loss-on-ignition method).

.5 Granulometric analysis requirements for RCW mulch:

Sieve (mm)	Total mass passing through sieve (%)
31.5	100
20.0	90-100
14.0	80-93
10.0	65-85
5.0	44-65
2.5	35-48
1.25	25-35
0.630 (630 microns)	15-30
0.315 (315 microns)	8-25
0.160 (160 microns)	3-10
0.080 (80 microns)	0.5-3

Partie 3 Execution

3.1 PRE-PLANTING PREPARATION

.1 Ensure plant material acceptable to NCC Representative.

.2 Remove damaged roots and branches from plant material.

.3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

3.2 PLANTING SEASON

.1 Plant deciduous trees and shrubs in the fall, from mid-August to mid-October.

.2 Plants native to warmer climates cannot be planted earlier than the spring.

.3 If special permission has been given for planting after budding, spray an anti-desiccant on the trees and shrubs to slow the process of transpiration prior to planting.

.4 Plant conifers in the spring, prior to budding. Planting of balled and burlapped conifers may start after mid-August. Spray an anti-desiccant on the conifers prior to removing them from the soil.

.5 With permission, planting of trees, shrubs, perennials and ground cover grown in pots may take place during the growing season.

.6 Plant only when conditions are favorable for good plant growth.

.7 Provide a schedule of planting work. No extension in the work will be authorized due to labour shortage.

3.3 EXCAVATION AND PREPARATION OF PLANTING BEDS

.1 Establish sub-grade for planting beds.

.2 Prepare planting zones.

.3 Planting holes.

.1 Stake out location and submit layout to NCC Representative for review prior to planting.

.2 Excavate to depth and width as indicated.

.1 Flats of shrubs: excavate to depth of at least 450 mm.

.2 Individual shrubs: excavate wells to depth of at least 500 mm and width of at least 500 mm.

.3 Tall shrubs and small trees (3 m high or less): excavate wells to depth of 600 mm and diameter of 300 mm greater than the root ball.

.4 Flats of perennials and grasses: excavate wells to depth of at least 350 mm.

.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 Remove water which enters excavations prior to planting. Notify NCC Representative if water source is groundwater.

3.4 PLANTING

.1 For bare root stock, place 50 mm backfill soil in bottom of hole. Plant trees and shrubs with roots placed straight out in hole.

.2 For jute burlapped root balls, cut away top third of wrapping and wire basket without damaging root ball. Do not pull burlap or rope from under root ball.

.3 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.4 Plant vertically in locations as indicated. Orient plant material to give best appearance in relation to structure, roads and walks.

.5 For trees and shrubs:

.1 Backfill soil in 150 mm lifts. Tamp each lift to eliminate air pockets. When two thirds of depth of planting well has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade.

.2 Follow instructions on planting details.

.6 For ground cover, backfill soil evenly to finish grade and tamp to eliminate air pockets.

.7 Water plant material thoroughly.

.8 After soil settlement has occurred, fill with soil to finish grade.

.9 Dispose of burlap, wire and container material off site.

3.5 TRUNK PROTECTION

.1 Install trunk protection material around deciduous trees to a height of 300 mm.

.2 Install trunk protection material prior to staking, where applicable.

3.6 MULCHING

.1 Obtain approval for planting prior to mulching. Break up the soil in the beds and wells and remove debris and weeds.

.2 Spread a layer of mulch – approved in advance by the NCC Representative – to a thickness of 100 mm. If mulch is susceptible to blow way in the wind, moisten and mix with a little topsoil prior to spreading. In the fall, mulching must be done immediately after planting; in the spring, wait until the soil warms.

3.7 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 See Section 32 93 50 Plant Maintenance and Warranty.

3.8 MAINTENANCE DURING WARRANTY PERIOD

.1 See Section 32 93 50 Plant Maintenance and Warranty.

3.9 WINTER PROTECTION

.1 Deciduous trees of all grades: Wrap tree trunks in jute burlap or waxed cardboard for winter protection.

.2 Wrap burlap or tar paper around the tree from bottom to top to the second branch and remove at the start of spring.

.3 Trees planted along high-traffic routes: Cover crown with a Texel Arbotex-type membrane or other product approved to protect against salt spray.

.4 Conifers less than 1.2 m high: Protect with lightweight wind screens made up of snow fencing covered in 213-gram jute. Wind the fencing around the conifers and secure to stakes.

.5 Conifers greater than 1.2 m high: High-resistance windbreaks must be used. Anchor them in the ground and guy them tightly to resist winter wind gusts. Wooden frames 1.2 m wide and up to 5 m high may be used, and must be 30 cm higher than the height of the tree. Place in 50-mm x 50-mm A-frames, partitioned every 60 cm and covered in stapled burlap.

.6 Shrubs with long branches: Attach shrubs with long and fragile branches as well as shrubs that can easily be damaged by snow clearing or snow accumulation with jute twine.

.7 Hedges: Protect hedges with lightweight wooden sheltering structures throughout the winter.

.8 Perennials and grasses: Cover planting beds with pine branches or other material approved by the NCC Representative and meeting the same conditions.

END OF SECTION

Part 1 General

1.1 WORK INCLUDES

.1 Pruning of trees during the plant maintenance and warranty period.

1.2 RELATED SECTIONS

.1 Section 01 35 29.06 Health and Safety.

.2 Section 01 74 11 Cleaning.

.3 Section 32 01 91 Tree and Shrub Preservation.

.4 Section 32 93 50 Plant Maintenance and Warranty.

1.3 REFERENCES

.1 American National Standard Institute (ANSI)

.1 ANSI A300 (Part 1)-[2001], Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (revision and re-designation of ANSI A300-1995) (includes supplements).

.2 ANSI A300 (Part 2)-[1998], Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices - Part 2 - Fertilization.

.3 ANSI A300 (Part 3)-[2000], Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance: Standard Practices - Part 3 - Tree Support Systems (a. Cabling, Bracing, and Guying) (supplement to ANSI A300-1995).

.2 Canadian Nursery Landscape Association (CNLA)

.3 International Society of Arboriculture (ISA)

.4 Ontario Department of Agriculture, Food and Rural Affairs

.1 Document number 483-[2004], Pruning Ornamentals.

1.4 DEFINITIONS

.1 Crown Cleaning/Pruning: consists of selective removal of one or more of following items: deformed, dead, dying or diseased branches, weak branches and sprouts.

.2 Crown Thinning: consists of selective removal of branches to increase light penetration, air movement and reduce weight.

.3 Crown Raising: consists of removal of lower tree branches to elevate the tree's crown, create a trunk as high as possible to provide clearance for the crossing of pedestrians and vehicles.

.4 Crown Reduction or Crown Shaping: decreases tree height and/or spread.

.5 Vista Pruning: selective thinning of framework limbs or specific crown areas to improve views.

.6 Crown Restoration: removal of damaged branches to improve its form and appearance.

1.5 QUALITY ASSURANCE

.1 Certification: International Society of Arboriculture and/or Canadian Nursery Landscape Association.

.2 Regulatory Requirements: safety certificate, approved by the local power company.

.3 Field Samples: do sample pruning in a manner that meets the requirements of the NCC Representative and enables the NCC Representative to identify:

.1 Knowledge of target areas including branch bark ridge and branch collars;

.2 Technique for selection process and pruning used to establish desired form and shape for each species.

.4 Field sample will be used as reference standard for Acceptance of Work by the NCC Representative.

.5 Health and Safety: implement construction health and safety measures required in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Place materials defined as hazardous or toxic in designated containers.

.2 Dispose of unused disinfectant at a hazardous material collections site authorized by the NCC Representative.

.3 Ensure emptied containers are sealed and stored safely.

.4 Divert wood materials from landfill to facility for recycling or composting as directed by the NCC Representative.

1.7 TOOL MAINTENANCE

.1 Ensure that tools are clean and sharp throughout pruning operations: do not use tools that crush or tear bark.

.2 Disinfect tools before each tree is pruned.

.3 On diseased plant material disinfect tools before each cut.

Part 2 Products

2.1 DISINFECTANT

.1 20% solution of sodium hypochlorite or 70% solution of ethyl alcohol.

Part 3 Execution

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Prune in accordance with the requirements in the document entitled Pruning Ornamentals in ANSI A300, and as directed by the NCC Representative. Where discrepancies occur between standards and specifications, specifications govern.

.2 Immediately notify the NCC Representative of conditions detrimental to the health of plant material or pruning operations.

.3 Prune during plant dormant period or after leaves have matured. Avoid pruning during leaf formation, at time of leaf fall, or when seasonal temperature drops below minus 10 degrees C.

.4 Prune each species when in full leaf.

.5 Retain natural form and shape of plant species.

.6 Do not:

.1 Flush cut branches;
.2 Crush or tear bark;
.3 Cut beyond the branch bark ridge;
.4 Damage branch collars;
.5 Damage branches to remain.

3.3 PRUNING

.1 While cleaning (pruning) the crown, remove dead, dying, diseased and weak growth as designated by the NCC Representative in order to promote healthy growth.

.2 Remove live branches that:

.1 Interfere with healthy development and structural strength including branches crossed or rubbing more important branches;
.2 Are of weak structure including narrow crotches;

.3 Obstruct development of more important branches;

.4 Are broken.

.3 Remove live branches to re-establish natural species form including:

.1 One or more developing leaders;

.2 Multiple growth due to previous topping;

.3 Branches extending outward from natural form;

.4 Undesirable sucker growth.

.4 Remove loose branches, twigs and other debris lodged in tree.

.5 Remove vines.

.6 For branches under 50 mm in diameter:

.1 Locate branch bark ridge and make cuts smooth and flush with outer edge of branch collar to ensure retention of branch collar. Cut target area to bottom of branch collar at angle equal to that formed by line opposite to branch bark ridge.

.2 Make cuts on dead branches smooth and flush with swollen callus collar. Do not injure or remove callus collar.

.3 Do not cut lead branches unless directed by the NCC Representative.

.7 For branches greater than 50 mm in diameter:

.1 Make first cut on lower side of branch 300 mm from trunk, one third diameter of branch.

.2 Make second cut on upper side of branch 500 mm from trunk until branch falls off.

.3 Make final cut adjacent to and outside branch collar.

.8 Ensure that trunk bark and branch collar are not damaged or torn during limb removal.

.1 Repair areas which are damaged, or remove damaged area back to next branch collar.

.9 Remove additional growth designated by the NCC Representative.

3.4 ROOT GIRDLING

.1 For girdling roots one-quarter size of trunk diameter or larger, V-cut girdling root one-half way through at point where root is crossing.

.2 Remove exposed portion of girdling root as directed by the NCC Representative after cleanly cutting root flush with grade on each side of parent root. Do not injure bark or parent root.

3.5 CARE OF WOUNDS

.1 Shape bark around wound to oblong configuration ensuring minimal increase in wound size. Retain peninsulas of existing live bark.

3.6 CLEAN-UP

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Collect pruned material and remove from site.

.3 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 Work

.1 Section 01 35 43 - Environmental Protection
.2 Section 32 93 10 - Trees, Shrubs & Ground Cover Planting
.3 Section 32 93 45 – Tree Pruning

1.2 Warranty

.1 All plant material shall be warranted for a period of two (2) years from the date of preliminary written acceptance.

.2 The warranty shall cover any defects in materials and workmanship.

.3 A warranty inspection will be carried out four times during the term of the maintenance and warranty period:
.1 May 1, 2015
.2 October 1, 2015
.3 May 1, 2016
.4 October 15, 2016

.4 Extend warranty on replacement plant material.

1.3 Duration

.1 Plant material maintenance shall begin immediately after each portion of planting has been completed and shall continue throughout the maintenance and warranty period to the satisfaction of the NCC Representative.

PART 2 - PRODUCTS

2.1 Materials

.1 Water: shall be free from any contaminants which could adversely affect plant growth.

.2 Mulch: shall be in conformance with Section 32 93 10.

.3 Pruning Tools: shall be designed specifically for horticultural purposes and shall be clean, sharp and in proper, safe, working order. Pruning equipment shall be capable of producing clean, flush cuts without tearing or fraying the bark, as specified in Section 32 93 45.

.4 Pumps and Hoses: used for watering plant material shall be capable of reaching the limits of the planting areas. The outlet end of the hose shall be 25 mm in diameter and equipped with an adjustable nozzle.

PART 3 - EXECUTION

3.1 Operational Constraints

.1 Do each maintenance operation continuously and completely within a reasonable time period.

.2 No maintenance equipment, materials or other miscellaneous items may be stored on site unless approved by the NCC Representative.

.3 All debris, waste and other extraneous material resulting from the maintenance operation shall be removed from the site daily upon completion of maintenance, unless otherwise directed or approved by the NCC Representative.

.4 The Contractor shall be fully acquainted with all relevant provincial and municipal by-laws and regulatory codes relating to the work of this contract, and will be required to comply with such by-laws and codes without extra compensation.

.5 Notify the NCC Representative immediately of damage incurred by pest, disease, mechanical causes or vandalism.

3.2 Interim Replacement of Plant Material

.1 Throughout the maintenance and warranty period, units of plant material that are found to be unacceptable will be replaced by the Contractor.

.2 At the discretion of the NCC Representative, plant material that is identified as dead or in a poor or diseased condition shall be immediately removed from the site.

3.3 Watering

.1 The Contractor is responsible for watering of all plant material. The Contractor shall notify the NCC Representative by fax of the completion of all watering operations.

.2 Water all plant material immediately after planting and on a weekly basis for the next 4 weeks. Ensure the root zone is thoroughly saturated. Repair any damage caused by watering operations.

.3 During the growth period covered under warranty, whenever natural precipitation falls below 20 mm per week (Sunday to Saturday), thoroughly water plants for 2 consecutive weeks.

Water to maintain soil moisture for optimum establishment, growth and health of plant material without causing erosion. Precipitation data shall be as per Environment Canada from the Macdonald-Cartier Airport weather station.

.4 Water thoroughly in late fall prior to freeze-up to saturate the soil around root systems.

3.4 Erosion Control

.1 In the spring following the completion of work, before June 1st, the Contractor must ensure that the erosion control blankets are in place, well staked and functioning to control erosion and sedimentation. If problems are detected, the Contractor shall proceed with appropriate measures to remedy the situation, such as re-staking or other measures indicated in Section 01 35 43.

3.5 Weeding

.1 All weeds, dead plants, leaves, branches, paper and other refuse within planting beds shall be removed by hand once the work is complete and disposed of off the Contract site.

.2 Weeding shall be done once a month during the warranty period.

.3 The use of herbicides and mechanical weed removers is prohibited.

3.6 Pruning

.1 Prune off dead and injured branches in accordance with Section 32 93 45.

3.7 Pest Management

.1 Monitor plant material throughout the warranty period for any sign of disease or insect problems. If required, use appropriate control methods in accordance with federal, provincial and municipal regulations. Obtain product approval from the NCC Representative prior to application. Practice Integrated Pest Management (IPM).

.2 The use of pesticides shall not be permitted.

3.8 Staking

.1 In the spring of the first warranty year, the Contractor shall ensure that all stakes are in place to support tall shrubs.

3.9 Incidental Maintenance

.1 As a rule, the Contractor shall be responsible for any incidental maintenance to ensure healthy plant growth and a satisfactory appearance of plant material.

.2 Replace or re-spread disturbed mulch.

.3 For non-mulched areas, cultivate once a month to keep the top layer of soil friable.

.4 Apply fertilizer in the early spring according to soil test results.

.5 Submit a written report to the NCC Representative each month containing the following information:
- .1 maintenance work performed;
- .2 development and condition of the plants;

Maintenance schedule

Tasks	**Date**
Remove snow fences, stakes, geotextile	April 1 to 10
Untie shrubs and bushes	April 1 to 10
Clean site(s)	April 17 to May 15
Cut back dead or damaged wood	April 17 to May 15
1st weeding and cleaning	May 23 to 27
2nd weeding and cleaning	June 19 to 23
3rd weeding and cleaning	July 17 to 21
4th weeding and cleaning	August 14 to 18
5th weeding and cleaning	September 11 to 15
Winterization	October 5 to November 13

3.10 Restoration

.1 Any vegetation, hard surfaces, structures or services damaged as a result of the Contractor's work methods and practices for plant material maintenance shall be restored or repaired to the satisfaction of the NCC Representative. The cost of such restoration or repair shall be solely at the Contractor's expense.

3.11 Final Warranty Inspection

.1 A final inspection of all plant material shall be carried out by the NCC Representative at the end of the two-year maintenance and warranty period.

Plant material shall be **acceptable** when it is undamaged, shows adequate growth and formation of buds, and is free from blight of any description. All planting beds and tree pits shall be free of litter and in good order, including the removal of all tree supports.

Plant material shall be **unacceptable** when it does not meet this quality standard.

Units of plant material that are found to be unacceptable will be replaced by the Contractor at the earliest opportunity. The NCC Representative reserves the right to extend the Contractor's maintenance and warranty responsibilities for one additional year for replacement plant material.

In the event that this inspection is satisfactory to the NCC Representative, and that there are no outstanding commitments to the contracted works, the Contractor will be given final approval of the maintenance and warranty work.

.2 Where, in the opinion of the NCC Representative the Contractor has failed to fulfil all obligations as detailed in this Specification; and further, fails to rectify said deficiency within two days of written notification from the NCC Representative, the NCC Representative reserves the right to retain the services of others to complete the work and to deduct incurred expenses from monies owing to the Contractor.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and application of granular sub-base for recreational pathway and/or access road.

1.2 RELATED SECTIONS

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

.2 Section 31 05 16 - Aggregate Materials

.3 Section 31 23 33.01 – Excavating, Trenching and Backfilling

.4 Section 32 11 23 - Aggregate Base Courses

.5 Section 32 12 16 – Asphalt Paving

1.3 REFERENCES

.1 ASTM International

.1 ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3;) (600kN-m/m^3;).

.5 ASTM D1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3;) (2,700kN-m/m^3;).

.6 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Bureau de normalisation du Québec

.1 *Standard NQ 2560-114 (2014) - Travaux de génie civil - Granulats*.

.4 *Cahier des charges et devis généraux du Québec (CCDG) - Infrastructures routières, Construction et réparation (édition 2014).*

.5 *Ministère des Transports du Québec*

.1 *Cahier des Normes, Ouvrages Routiers, Vol. VII - Matériaux, Standard 2101 - Granulats.*

1.4 SAMPLES

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

.2 Provide the NCC Representative with access to source and processed material for sampling.

.3 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

Part 2 Products

2.1 MATERIALS

.1 Granular sub-base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified as per NQ 2560-114.

.3 Granular sub-base:

.1 Asphalted recreational pathway: MG-20, 200 mm thick.

.2 Pedestrian pathway: MG-20, 100 mm thick.

Part 3 Execution

3.1 PLACING

.1 Place granular sub-base after subgrade is inspected and approved by the NCC Representative.

.2 Construct granular sub-base to depth and grade in areas indicated.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, free from snow or ice.

.5 Begin spreading sub-base material on crown line or high side of one-way slope.

.6 Place granular sub-base materials using methods which do not lead to segregation or degradation.

.7 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.

.8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

.1 The NCC Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.10 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from the NCC Representative before use.

.3 Equipped with device that records hours of actual work, not motor running hours.

.4 Compact to 98% density as per CCDG 2014.

.5 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.6 Apply water as necessary during compaction to obtain specified density.

.7 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the NCC Representative.

.8 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 PROOF ROLLING

.1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm maximum.

.2 Obtain written approval from the NCC Representative to use non standard proof rolling equipment.

.3 Proof roll at level in sub-base as indicated.

.1 If non standard proof rolling equipment is approved, the NCC Representative will determine level of proof rolling.

.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.5 Where proof rolling reveals areas of defective subgrade:

.1 Remove sub-base and subgrade material to depth and extent as directed by the NCC Representative.

.2 Backfill excavated subgrade with sub-base material and compact in accordance with this section.

.3 Replace sub-base material and compact.

.6 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

3.4 SITE TOLERANCES

.1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.5 PROTECTION

.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by the NCC Representative.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and application of granular base for recreational pathway and/or access road.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 31 05 16 – Aggregate Materials

.3 Section 31 23 33.01 – Excavating, trenching, and backfilling

.4 Section 31 32 19.01 – Geotextiles

.5 Section 32 11 16.01 – Granular Sub-base

1.3 REFERENCES

.1 ASTM International

.1 ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3;) (600kN-m/m^3;).

.5 ASTM D1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3;) (2,700kN-m/m^3;).

.6 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Bureau de normalisation du Québec

.1 *Standard NQ 2560-114 M2 (2014) - Travaux de génie civil - Granulats*.

.4 Cahier des charges et devis généraux du Québec (CCDG) - Infrastructures routières, Construction et réparation (édition 2014).

.5 Ministère des Transports du Québec

.1 Cahier des Normes, Ouvrages Routiers, Vol. VII - Matériaux, Standard 2101 - Granulats,

1.4 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.2 Provide the NCC Representative with access to source and processed material for sampling.

.3 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

Part 2 Products

2.1 MATERIALS

.1 Granular base: material in accordance with Section 31 05 16 – Aggregate Materials and following requirements:

.1 Crushed stone or gravel.

.2 Gradations to be within limits specified as per NQ 2560-114.

.3 Granular base:

.1 Asphalted recreational pathway: MG-112, 400 mm thick.

Part 3 Execution

3.1 PLACEMENT AND INSTALLATION

.1 Place granular base after sub-base surface is inspected and approved by the NCC Representative.

.2 Placing:

.1 Construct granular base to depth and grade in areas indicated.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen surface, free from snow and ice.

.4 Begin spreading base material on crown line or on high side of one-way slope.

.5 Place material using methods which do not lead to segregation or degradation of aggregate.

.6 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.

.7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

.1 The NCC Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.9 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 Compaction Equipment:

.1 Ensure compaction equipment is capable of obtaining required material densities.

.2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from the NCC Representative before use.

.4 Compacting:

.1 Compact to 98% Proctor density as per CCDG 2014.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.3 Apply water as necessary during compacting to obtain specified density.

.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the NCC Representative.

.5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

.5 Proof rolling:

.1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.

.2 Obtain approval from the NCC Representative to use non standard proof rolling equipment.

.3 Proof roll at level in granular base as indicated.

.1 If use of non standard proof rolling equipment is approved, NCC Representative to determine level of proof rolling.

.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.5 Where proof rolling reveals areas of defective subgrade:

.1 Remove base, sub-base and subgrade material to depth and extent as directed by the NCC Representative.

.2 Backfill excavated subgrade with sub-base material and compact in accordance with Section 32 11 16.01 – Granular Sub-Base.

.3 Replace sub-base material and compact in accordance with Section 32 11 16.01 – Granular Sub-base.

.4 Replace base material and compact in accordance with this Section.

.6 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by NCC Representative and replace with new materials in accordance with Section 32 11 16.01 – Granular Sub-base and this section at no extra cost.

3.2 SITE TOLERANCES

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 PROTECTION

.1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by the NCC Representative.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and application of asphalt tack coat to an existing asphalt or concrete surface prior to asphalt paving.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 32 12 16 – Asphalt Paving

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM D140/D140M-09, Standard Practice for Sampling Bituminous Materials.

.2 Cahier des charges et devis généraux du Québec (CCDG) - Infrastructures routières, Construction et réparation (édition 2014).

.3 Ministère des Transports du Québec

.1 Cahier des Normes, Ouvrages Routiers, Vol. VII - Matériaux, Standards: 4101 - Bitumes, 4105 - Émulsion de bitumes, 4201 - Enrobés à chaud formulés selon le principe de la méthode Marshall, 4202 - Enrobés à chaud formulés selon la méthode de formulation du Laboratoire de chaussées.

1.4 SUBMITTALS

.1 Submit samples in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.2 Submit two - 1 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth jars or bottles made with plastic or plastic lined cans to the NCC Representative, at least 2 weeks prior to beginning Work.

.3 Sample asphalt tack coat material to: CCDG 2014.

.4 Provide access on tank truck for the NCC Representative to sample asphalt material to be incorporated into Work, in accordance with CCDG 2014.

1.5 QUALITY ASSURANCE

.1 Upon request by the NCC Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this section.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with CCDG 2014.

.2 Provide, maintain and restore asphalt storage area.

Part 2 Products

2.1 MATERIALS

.1 Anionic emulsified asphalt: to MTQ Standard 4105, grade: RS-1.

.2 Water: clean, potable, free from foreign matter.

2.2 EQUIPMENT

.1 Pressure distributor to be designed, equipped, maintained and operated so that asphalt material can be:

- .1 Maintained at even temperature.
- .2 Applied uniformly on variable widths of surface up to 5 m.
- .3 Applied at readily determined and controlled rates from 0.2 to 5.4 L/m^2 with uniform pressure, and with an allowable variation from any specified rate not exceeding 0.1 L/m^2.
- .4 Distributed in uniform spray without atomization at temperature required.

.2 Equipped with meter, registering metres of travel per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.

.3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.

.4 Equipped with an easily read, accurate and sensitive device which registers temperature of liquid in reservoir.

.5 Equipped with accurate volume measuring device or calibrated tank.

.6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

.7 Equipped with nozzle spray bar, with operational height adjustment.

.8 Cleaned if previously used with incompatible asphalt material.

Part 3 Execution

3.1 APPLICATION

.1 Obtain the NCC Representative's approval of surface before applying asphalt tack coat.

.2 Apply asphalt tack coat only on clean and dry surface.

.3 Dilute asphalt emulsion with water at 1:1 ratio for application.

.1 Mix thoroughly by pumping or other method approved by the NCC Representative.

.4 Apply asphalt tack coat evenly to pavement surface at rate as directed by the NCC Representative, but not to exceed 0.7 L/m^2.

.5 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.

.6 Do not apply asphalt tack coat when air temperature is less than 10 degrees Celcius or when rain is forecast within 2 hours of application.

.7 Apply asphalt tack coat only on unfrozen surface.

.8 Evenly distribute localized excessive deposits of tack coat by brooming as directed by the NCC Representative.

.9 Where traffic is to be maintained, treat no more than one half of width of surface in one application.

.10 Keep traffic off tacked areas until asphalt tack coat has set.

.11 Re-tack contaminated or disturbed areas as directed by the NCC Representative.

.12 Permit asphalt tack coat to set before placing asphalt pavement.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and application of asphalt paving for recreational pathway.

1.2 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 01 35 43 – Environmental Protection

.3 Section 31 05 16 – Aggregate Materials

.4 Section 32 11 16.01 – Granular Sub-Base

.5 Section 32 11 23 – Aggregate Base Courses

.6 Section 32 12 13.16 – Asphalt Tack Coat

1.3 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)

.1 AASHTO M320-10, Standard Specification for Performance Graded Asphalt Binder.

.2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.

.3 AASHTO T245-97(2004), Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

.2 Asphalt Institute (AI)

.1 AI MS-2-1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.ASTM International

.3 American Society for Testing and Materials International, (ASTM)

.1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C123/C123M-11, Standard Test Method for Lightweight Particles in Aggregate.

.4 ASTM C127-07, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.

.5 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.

.6 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.7 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.8 ASTM C207-06, Standard Specification for Hydrated Lime for Masonry Purposes.

.9 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

.10 ASTM D2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.11 ASTM D3203/D3203M-11, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

.12 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.4 Bureau de normalisation du Québec

.1 Standard NQ 2560-114 M2 (2014) - Travaux de génie civil - Granulats.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.

.6 Cahier des charges et devis généraux du Québec (CCDG) - Infrastructures routières, Construction et réparation (édition 2014).

.7 Ministère des Transports du Québec

.1 Cahier des Normes, Ouvrages Routiers, Vol. VII - Matériaux, Standards: 2011 - Granulats, 4101 - Bitumes, 4105 - Émulsion de bitumes, 4201 - Enrobés à chaud formulés selon le principe de la méthode Marshall, 4202 - Enrobés à chaud formulés selon la méthode de formulation du Laboratoire de chaussées.

1.4 PRODUCT DATA

.1 Submit in accordance with Section 01 33 00 - – Shop Drawings, Product Data and Samples.

.2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees Celsius at least two (2) weeks prior to beginning of Work.

.3 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.

.4 Submit asphalt concrete mix design and trial mix test results to the NCC Representative for approval and review at least two (2) weeks prior to beginning work.

.5 Submit manufacturer's certification that hydrated lime meets requirements of this section.

.6 Submit printed record of mix temperatures at end of each day.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials. Stockpile minimum 50 % of total amount of aggregate required before beginning asphalt mixing operation.

.2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

.3 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.

.4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

.5 Submit to the NCC Representative copies of freight and waybills for asphalt cement as shipments are received.

.1 The NCC Representative reserves right to check weights as material is received.

Part 2 Products

2.1 MATERIALS

.1 Asphalt cement: EC-10, 40 mm thick as indicated on drawings.

.2 Performance graded asphalt cement: to AASHTO M320, grade PG58-34 when tested to AASHTO R29.

.3 Aggregates: in accordance with Section 31 05 16 and following requirements:

.1 Crushed stone or gravel.

.2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.

.3 Table:

Sieve Designation	% Passing		
	Lower Course	Surface Course	Sheet Asphalt
200 mm	-	-	-
75 mm	-	-	-
50 mm	-	-	-
38.1 mm	-	-	-
25 mm	100	-	-
19 mm	-	-	-
12.5 mm	70-85	100	-
9.5 mm	-	-	100
4.75 mm	40-65	55-75	85-100
2.00 mm	30-50	35-55	80-9
0.425 mm	15-30	15-30	40-70
0.180 mm	5-20	5-20	10-35
0.075 mm	3-8	3-8	4-14

.4 Coarse aggregate: aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C136.

.5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.

.6 Separate stockpiles for coarse and fine aggregates not required for sheet asphalt.

.7 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.8 Sand equivalent: ASTM D2419. Min: 50.

.9 Magnesium Sulphate soundness: to ASTM C88. Max % loss by mass:

.1 Coarse aggregate surface course: 12 %.

.2 Coarse aggregate lower course: 12 %.

.3 Fine aggregate, surface course: 16 %.

.4 Fine aggregate, lower course: 16 %.

.10 Los Angeles degradation: Grading B, to ASTM C131. Max % loss by mass:

.1 Coarse aggregate, surface course: 25 %.

.2 Coarse aggregate, lower course: 35 %.

.11 Absorption: to ASTM C127. Max % by mass:

.1 Coarse aggregate, surface course: 1.75 %.

.2 Coarse aggregate, lower course: 2.00 %.

.12 Loss by washing: to ASTM C117. Max % passing 0.075 mm sieve:

.1 Coarse aggregate, surface course: 1.5 %.

.2 Coarse aggregate, lower course: 2.0 %.

.13 Lightweight particles: to ASTM C123. Max % by mass less than 1.95 relative density:

.1 Surface course: 1.5 %.

.2 Lower course: 3.0 %.

.14 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5): Max % by mass:

.1 Coarse aggregate, surface course: 15 %.

.2 Coarse aggregate, lower course: 15 %.

.15 Crushed fragments: at least 60 % of particles by mass within each of following sieve designation ranges, to have 1 minimum freshly fractured face. Material to be divided into ranges, using methods of ASTM C136.

Passing		Retained on
25 mm	to	12.5 mm
12.5 mm	to	0 mm

.16 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.4 Mineral filler:

.1 Ensure finely ground particles of limestone, hydrated lime, Portland cement or non-plastic mineral matter approved by the NCC Representative.

.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by the NCC Representative.

.3 Ensure mineral filler is dry and free flowing when added to aggregate.

.5 Anti-stripping agent: hydrated lime to ASTM C207 type N.

.1 Add lime at rate of approximately 2-3% of dry weight of aggregate.

.6 Water: to the approval of the NCC Representative

2.2 EQUIPMENT

.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

.2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers:

.1 Drum diameter: 1200 mm minimum.

.2 Amplitude of vibration (machine setting): 0.5 mm maximum for lifts (layers) less than 40 mm thick.

.4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

.1 Boxes with tight metal bottoms.

.2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.

.3 In cool weather or for long hauls, insulate entire contact area of each truck box.

.4 Use only trucks which can be weighed in single operation on scales supplied.

.5 Hand tools:

.1 Lutes or rakes with covered teeth for spreading and finishing operations.

.2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm^2 for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by the NCC Representative, may be used instead of tamping irons.

.3 Straight edges, 4.5 m in length, to test finished surface.

2.3 MIX DESIGN

.1 Mix design to be approved by the NCC Representative.

.2 Design of mix: by Marshall method to requirements below.

.1 Compaction blows on each face of test specimens: 50.

.2 Mix physical requirements.

Property	Roads	Sheet Asphalt
Marshall Stability at 60 degrees C kN min	5.5 surface course/4.5 lower course	3.0
Flow Value mm	2-4	2-5
Air Voids in Mixture, %	3-5 surface course/2-6 lower course	3-5
Voids in Mineral Aggregate, % min	15 surface course/13 lower course	16
Index of Retained Stability % minimum	75	75

.3 Measure physical requirements as follows:

.1 Marshall load and flow value: to AASHTO T245.

.2 Air voids: to ASTM D3203.

.3 Voids in mineral aggregates: to AI MS2.

.4 Do not change job-mix without prior approval of the NCC Representative. When change in material source proposed, new job-mix formula will be reviewed by the NCC Representative.

.5 Return plant dust collected during processing to mix in quantities acceptable to the NCC Representative.

Part 3 Execution

3.1 PLANT AND MIXING REQUIREMENTS

.1 Batch and continuous mixing plants:

.1 To ASTM D995.

.2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.

.1 Do not load frozen materials into bins.

.3 Feed cold aggregates to plant in proportions to ensure continuous operations.

.4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.5 Before mixing, dry aggregates to moisture content not greater than 1 % by mass or to lesser moisture content if required to meet mix design requirements. Heat to temperature required to meet mixing temperature as directed by the NCC Representative after combining with RAP.

.6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.

.7 Store hot screened aggregates in manner to minimize segregation and temperature loss.

.8 Heat asphalt cement and aggregate to mixing temperature directed by the NCC Representative. Do not heat asphalt cement above maximum temperature indicated on temperature-viscosity chart.

.9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, the NCC Representative to review temperature of completed mix at plant and at paver after considering hauling and placing conditions.

.10 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.

.11 Mixing time:

.1 In batch plants, both dry and wet mixing times as directed by the NCC Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.

.2 In continuous mixing plants, mixing time as directed by the NCC Representative but not less than 45s.

.3 Mixing time as directed by the NCC Representative.

.12 Where RAP is to be incorporated into mix:

.1 Feed from separate cold feed bin specially designed to minimize consolidation of material.

.1 Provide 50 mm scalping screen on cold feed to remove oversized pieces of RAP.

.2 Ensure positive and accurate control of RAP cold feed by use of hydraulic motor or electric clutch and equip with anti rollback device to prevent material from sliding backward on feed belt.

.3 Combine RAP and new aggregates in proportions as directed by NCC Representative. Dry mix thoroughly, until uniform temperature within plus or minus 5 degrees C of mix temperature, as directed by NCC Representative, is achieved prior to adding new asphalt cement.

.1 Do not add new asphalt cement where temperature of dried mix material is above 160 degrees C.

.2 Dryer drum mixing plant:

.1 To ASTM D995.

.2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.

.3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

.4 Where RAP is to be incorporated into mix, dryer drum mixer is to be designed to prevent direct contact of RAP with burner flame or with exhaust gases hotter than 180 degrees C.

.5 Feed RAP from separate cold feed bin designed to minimize reconsolidation of material.

.6 Meter total flow of aggregate and RAP using electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump to ensure proportions of aggregate, RAP and asphalt entering mixer remain constant.

.7 Allow for easy calibration of weighing systems for aggregates and RAP without having material enter mixer.

.8 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.1 Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time.

.2 Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2 %.

.9 Make provision for conveniently sampling full flow of materials from cold feed.

.10 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate and RAP from cold feed prior to entering drum.

.11 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.

.12 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream.

.1 Control heating to prevent fracture of aggregate or excessive oxidation of asphalt.

.2 Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator.

.3 Submit printed record of mix temperatures at end of each day.

.13 Ensure mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer is 2 % maximum.

.3 Temporary storage of hot mix:

.1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.

.2 Do not store asphalt mix in storage bins in excess of 3 hour.

.4 While producing asphalt mix for this Project, do not produce mix for other users unless separate storage and pumping facilities are provided for materials supplied to this project.

.5 Mixing tolerances:

.1 Permissible variation in aggregate gradation from job mix (percent of total mass).

4.75 mm sieve and larger	2 %
2.00 mm sieve	2 %
0.425 mm sieve	2 %
0.180 mm sieve	2 %
0.075 mm sieve	2 %

.2 Permissible variation of asphalt cement from job mix: 0.25%.

.3 Permissible variation of mix temperature at discharge from plant: 5 degrees C.

.6 Addition of anti-stripping agent:

.1 Plant to be equipped with pug mill to thoroughly mix aggregates and lime prior to entering the plant.

.2 Plant to be equipped with suitable conveyor systems capable of supplying aggregates and lime at constant rate.

.3 Plant and equipment used for addition of lime to be equipped with covers to control loss of lime.

.4 Plant to be equipped to control rate of lime incorporation to within 1/4 %.

.5 Add water to aggregate prior to entering pug mill.

.6 Add water to lime sufficiently in advance to permit time to slake prior to entering pug mill.

3.2 PREPARATION

.1 Reshape granular roadbed.

.2 Apply prime coat and tack coat in accordance with Section 32 12 13.16 - Asphalt Tack Coats prior to paving.

.3 Prior to laying mix, clean surfaces of loose and foreign material.

3.3 TRANSPORTATION OF MIX

.1 Transport mix to job site in vehicles cleaned of foreign material.

.2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least daily or as required.

.1 Raise truck bed and thoroughly drain, and ensure no excess solution remains in truck bed.

.3 Schedule delivery of material for placing in daylight, unless the NCC Representative approves artificial light for night placing.

.4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.

.1 Do not dribble mix into trucks.

.5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

.6 Deliver loads continuously in covered vehicles and immediately spread and compact.

.1 Deliver and place mixes at temperature within range as directed by the NCC Representative, but not less than 135 degrees C.

3.4 PLACING

.1 Obtain the NCC Representative's approval of base and existing surface and tack coat and prime coat prior to placing asphalt.

.2 Place asphalt concrete to thicknesses, grades and lines as indicated on the drawings.

.3 Placing conditions:

.1 Place asphalt mixtures only when air temperature is 5 degrees C minimum.

.2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.

.3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.4 Place asphalt concrete in compacted lifts of thickness as indicated on the drawings.

.5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.

.6 Spread and strike off mixture with self propelled mechanical finisher.

.1 Construct longitudinal joints and edges true to line markings.

.1 NCC Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.

.2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver.

.1 Work pavers as close together as possible and in no case permit them to be more than 30 m apart.

.3 Maintain constant head of mix in auger chamber of paver during placing.

.4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.

.5 Correct irregularities in alignment left by paver by trimming directly behind machine.

.6 Correct irregularities in surface of pavement course directly behind paver.

.1 Remove excess material forming high spots using shovel or lute.

.1 Fill and smooth indented areas with hot mix.

.2 Do not broadcast material over such areas.

.7 Do not throw surplus material on freshly screeded surfaces.

.7 When hand spreading is used:

.1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section.

.1 Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

.2 Distribute material uniformly without broad casting material.

.3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes.

.1 Reject material that has formed into lumps and does not break down readily.

.4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.

.5 Provide heating equipment to keep hand tools free from asphalt.

.1 Control temperature to avoid burning material.

.2 Do not use tools at higher temperature than temperature of mix being placed.

3.5 COMPACTING

.1 Roll asphalt continuously to density not less than 98 % of blow Marshall density to AASHTO T245.

.2 General:

.1 Provide at least 2 rollers and as many additional rollers as necessary to achieve specified pavement density. When more than 2 rollers are required, 1 roller must be pneumatic tired type.

.2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.

.3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.

.4 Use static compaction for levelling coarse less than 25 mm thick.

.5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.

.6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.

.7 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.

.8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.

.9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.

.10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.

.1 Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.

.11 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.

.12 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

.3 Breakdown rolling:

.1 Begin breakdown rolling with static steel wheeled roller vibratory roller immediately following rolling of transverse and longitudinal joint and edges.

.2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.

.3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by the NCC Representative.

.4 Use only experienced roller operators.

.4 Intermediate rolling:

.1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.

.2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

.5 Finish rolling:

.1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks.

.1 If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by the NCC Representative.

.2 Conduct rolling operations in close sequence.

3.6 JOINTS

.1 General:

.1 Remove surplus material from surface of previously laid strip.

.1 Do not deposit on surface of freshly laid strip.

.2 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.2 Transverse joints:

.1 Offset transverse joint in succeeding lifts by at least 600 mm.

.2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.

.3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

.3 Longitudinal joints:

.1 Offset longitudinal joints in succeeding lifts by at least 150 mm.

.2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.

.1 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.

.3 Overlap previously laid strip with spreader by 25 to 50 mm.

.4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.

.5 Roll longitudinal joints directly behind paving operation.

.6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

.4 Construct butt joints as indicated.

3.7 FINISH TOLERANCES

.1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.

.2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

3.8 DEFECTIVE WORK

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.

.1 If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.

.2 Repair areas showing checking, rippling, or segregation.

.3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and application of pavement markings for recreational pathway.

1.2 RELATED REQUIREMENTS

.1 Section 01 33 00 – Shop Drawings, Product Data and Samples

.2 Section 01 35 43 – Environmental Procedures

.3 Section 01 74 11 – Cleaning

1.3 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.5-99, Low Flash Petroleum Spirits Thinner.

.2 CAN/CGSB 1.74-01, Alkyde Traffic Paint.

.2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures.

.3 Samples:

.1 Submit to the NCC Representative following material sample quantities at least two (2) weeks prior to commencing work.

.1 Two 1 L samples of each type of paint.

.2 One 1 kg sample of glass beads.

.3 Sampling to MPI Painting Manual.

.2 Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, MPI specification number and formulation number and batch number.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location 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 Paint:

.1 To MPI -EXT 2.1B, Alkyd zone/traffic marking.

.2 Paints: in accordance with MPI recommendation for surface conditions.

.1 Paints: maximum VOC limit 100 g/L to SCAQMD Rule 1113 to GS-11.

.3 Colour: to MPI listed, yellow for center line and white for stop line.

.4 Upon request, the NCC Representative will supply qualified product list of paints applicable to work. Qualified paints may be used but the NCC Representative reserves right to perform further tests.

.2 Thinner: to MPI listed manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings previously installed under other Sections or Contracts are acceptable for product installation in accordance with MPI instructions prior to pavement markings installation.

.1 Visually inspect substrate in presence of the NCC Representative.

.2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.

.3 Proceed with Work only after unacceptable conditions have been rectified.

3.2 EQUIPMENT REQUIREMENTS

.1 Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.

3.3 APPLICATION

.1 Pavement markings: laid out by the NCC Representative.

.2 Unless otherwise approved by the NCC Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast within next 4 hours.

.3 Apply traffic paint evenly at rate of 3 m^2/L.

.4 Do not thin paint unless approved by the NCC Representative.

.5 Symbols and letters to dimensions indicated.

.6 Paint lines: of uniform colour and density with sharp edges.

.7 Thoroughly clean distributor tank before refilling with paint of different colour.

3.4 TOLERANCE

.1 Paint markings: within plus or minus 12 mm of dimensions indicated.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.6 PROTECTION OF COMPLETED WORK

.1 Protect pavement markings until dry.

.2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION