SPECIFICATIONS

FOR

TRANS CANADA HIGHWAY SAFETY AND STANDARDS REHABILITATION
2019-2020
PARKS CANADA AGENCY
TERRA NOVA NATIONAL PARK, NL

ISSUED FOR TENDER

PCA Project No.: 636
Date: May 2, 2019

Specifications
Issued for Tender

PARKS CANADA
Trans Canada Highway - Safety and Standards Rehabilitation, 2018-2019
TERRA NOVA NATIONAL PARK

Standing Offer Agreement: 5P301-14-0001/004
PCA Project No.: 636

Julien Babin, P. Eng.
Director - Civil Engineering
Crandall Engineering Ltd.

PARKS CANADA
TRANS CANADA HIGHWAY SAFETY AND STANDARDS REHABILITATION 2019-2020
TERRA NOVA NATIONAL PARK

Crandall Engineering Ltd. Issued for Tender - Technical Specifications						
	Prepared by	**Init**	**Date**	**Checked by**	**Init**	**Date**
Civil	Julien Babin	JFB	April 10/19	Peter Allaby	PEA	April 10/19
Project Manager	Peter Allaby	PEA	April 10/19	Julien Babin	JFB	April 10/19

SECTION TITLE PAGES

SECTION TITLE PAGES

List of Drawings

END OF TABLE

PART 1 – GENERAL

1.1 Description of Work .1 The work will be carried out along the Trans Canada Highway, within the boundaries of Terra Nova National Park.

.2 The work of this contract includes the provision of all materials, labour, equipment, and ancillaries, all as necessary for the completion of the work as indicated on the drawings and as described in the specifications and notes. Work on this project consists generally of, but is not limited to, the following:

.1 Completion and submission of submittals listed for review and acceptance by the Departmental Representative prior to

.2 Supply and install all environmental protection measures required such as site erosion and sediment control measures, check dams, silt fencing, straw bales, vegetative stabilization and other measures, to be maintained for the duration of the project and removed following completion.

.3 Supply and operation of traffic control and signage for the duration of the project.

.4 Excavation, and replacement of existing CSP culverts indicated for replacement.

.5 Ditching in locations on the TCH as indicated or as directed by the Departmental Representative.

.6 Clearing in locations on the TCH as indicated or as directed by the Departmental Representative.

.7 Supply and installation of new aluminized CSP culverts, concrete culverts, and HDPE culverts, complete with backfill, fish baffles, and rip rap aprons as indicated.

.9 Installation of HDPE pipe liner.

.10 Cutting and removal of existing asphalt, excavation of roadway structure.

.11 Placement and compaction of rock fill aggregates and granular materials for bedding and surround, roadway structure, and rock-lined ditches.

.13 Hauling, placement, and compaction of granular sub-base, base, and shoulder materials as shown on the drawings.

.14 Supply, installation and compaction of new hot mix asphalt pavement, including keyed joints at existing pavement.

.15 Installation of slope erosion protection materials at the Bread Cove, Saltons Brook, and Southwest Brook culverts.

.16 Application of hydroseed and fibre reinforced matrix.

.17 Supply and installation of a wildlife walkway ramp.

.18 Improvements to asphalt gutter and off-takes at selected locations, including installation of catch basins.

.19 Supply and installation of new permanent traffic signage.

.20 Supply and installation of temporary and permanent pavement markings at culvert renewals.

.22 All other labour, materials and work not listed that are necessary to complete the project to the Departmental Representative's full satisfaction.

.3 All work to be carried out in accordance with applicable federal and provincial regulations for those agencies having jurisdiction for the work. The work is subject to the National Park Act and Regulations, Canadian Environmental Protection Act, Canada Labour Code and the NL Occupational Health and Safety Act and Regulations.

.4 The Contractor is advised that other construction projects may be ongoing in Terra Nova National Park at various locations during the time frame of this contract. Contractor is to cooperate with other contractors within the project limits. No compensation will be made for delays resulting from overlapping activity or hauling through other highway work zones.

1.2 Work Restrictions

.1 Design, construct and maintain temporary "access to" and "egress from" work areas in accordance with relevant municipal, provincial, and other regulations.

.2 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.3 Provide for personnel and vehicle access.

.4 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.5 Provide for personnel, pedestrian, and vehicular traffic. Ensure two-lanes of free flowing two-way traffic is maintained at construction site at all times.

.6 Maintain two (2) lanes of uninterrupted flow during all times.

.7 Construct barriers in accordance with 01 56 00 – Temporary Barriers and Enclosures.

.8 For approval of work outside of normal working hours, the Contractor shall provide 48 hours notice to the Departmental Representative. There are no restrictions on working on nights, weekends, or statutory holidays.

.9 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic, and security regulations.

.10 Keep within limits of work and avenues of ingress and egress.

1.3 Familiarization With Site

.1 Before submitting a bid, it is recommended that bidders visit the site to review and verify the form, nature and extent of the work, materials needed, the means of access and the temporary facilities required to perform the Work.

.2 The chainage referred to for this contract is located along the centre line of the Trans Canada Highway, with Station 0+000 being located near the East boundary of TNNP, just east of Salmon Brook Bridge, with coordinate:
Lat: 48.3907905
Long: -54.2074438

.3 Obtain prior permission from the Parks Canada before carrying out such site inspection.
Contact:
Mr. Bill Brake
Field Unit Superintendent
Terra Nova National Park
709-533-3161

.4 Contractors, bidders or those they invite to site are to review specification Section 01 35 29 – Health and Safety Requirements before visiting site. Take all appropriate safety measures for any visit to site, both before and after acceptance of bid.

1.4 Interpretation of Documents

.1 Supplementary to the Order of Precedence article of the General Conditions of the Contract, the Division 01 sections take precedence over the technical specification sections in other Divisions of the Specification Manual.

1.5 Term Engineer

.1 Unless specifically stated otherwise, the term Engineer where used in the Specifications and on the Drawings shall mean the Departmental Representative as defined in the General Conditions of the Contract.

1.6 Setting Out Work

.1 The Departmental Representative will provide

control points and initial layout of offset stakes.

.2 Contractor is to locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Contractor shall make no changes or relocations without prior written notice to Departmental Representative.

.4 Contractor is to report to Departmental Representative when reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.

.5 If survey control points or layout stakes are lost due to neglect of the Contractor, the points or stakes shall be replaced at the Contractor's expense and shall not be cause for work delay claims.

.6 Contractor is responsible to provide any layout required after the initial layout is completed by Departmental Representative. Layout information can be provided to Contractor upon request.

1.7 Measurement For Payment

.1 Notify Departmental Representative sufficiently in advance of operations to permit required measurements for payment.

1.8 Maintenance of Work During Construction

.1 Maintain work during construction. Undertake continuous and effective maintenance work day by day, with adequate equipment and forces so that the roadway or structures are continuously kept in a condition satisfactory to Departmental Representative.

1.9 Codes and Standards

.1 Perform work in accordance with National Parks Act, Code of Practice of the Department of Labour, as it pertains to the Traffic Control Manual (Department of Transportation & Works) and any other code of federal, provincial or local application provided that in any case of conflict or discrepancy, the more stringent

requirements shall apply.

.2 Materials and workmanship must conform to or exceed applicable standards of Canadian General Standards Board (CGSB), Canadian Standards Association (CSA), American Society for Testing and Materials (ASTM) and other standards organizations.

.3 Conform to latest revision of any referenced standard as re-affirmed or revised to date of specification. Standards or codes not dated shall be deemed editions in force on date of tender advertisement.

1.10 Work Within Park Boundaries

.1 The project is within a national park and it is essential that lands remain as undisturbed as possible. The Contractor will be expected to use standards and methods beyond those for normal construction in order to protect the environment and ensure the aesthetics of the work. Contract limits shall be strictly adhered to and every precaution shall be taken to minimize environmental damage and disruption to vegetation, wildlife habitat, and structures or existing services, both on construction and storage sites.

.2 If any damage occurs during construction, the Contractor is responsible to bear the expense to immediately restore such damaged areas to the satisfaction of the Departmental Representative.

.3 If Contractor fails to repair damage to the satisfaction of the Departmental Representative, the Departmental Representative may have repairs completed by others at the Contractor's expense.

.4 The Contractor shall ensure that contracted work meets the standards outlined in the contract specification and drawings.

.5 The Contractor shall ensure that no damage will be done to any existing underground telephone cables or utilities.

.6 All sources of aggregate and asphalt cement

must be submitted to the Departmental Representative for approval at least two weeks prior to the start of any work. Aggregate sources must be free of invasive species and capable of producing clean material to the satisfaction of the Departmental Representative.

.6 The Contractor is responsible to follow the Provincial requirements regarding the following:

.1 Pit and Quarry Guidelines

.2 Environmental Construction Practice specifications

.7 The Contractor will make arrangements with authorities or owners of private properties for quarrying and transporting materials and machinery over their properties and be responsible for obtaining and paying of fees.

1.11 Documents Required

.1 Maintain at job site, one copy each of following:

.1 Contract drawings.

.2 Specifications.

.3 Addenda.

.4 Reviewed drawings.

.5 Change orders.

.6 Other modifications to Contract.

.7 Copy of approved work schedule.

.8 Field test reports.

.9 Manufacturer’s installation and application instructions.

.10 Site specific Health and Safety Plan and other safety related documents.

.11 Other documents as stipulated elsewhere in the Contract Documents.

1.12 Site Conditions	.1	The Contractor will be responsible to visit the roadway and review existing site conditions.
1.13 Departmental Representative	.1	Departmental Representative will be assigned after contract award.
1.14 Work Schedule	.1	Provide to the Departmental Representative in writing and within 5 working days after Contract award, a detailed construction schedule and traffic control plan. The schedule shall show proposed work to be undertaken and anticipated completion dates for each category of work.
1.15 Sanitary Services	.1	The Contractor shall provide and maintain sanitary facilities for the use of workers at locations specified by the Departmental Representative. Provision of sanitary facilities shall meet requirements of provincial government and municipal statutes and authorities.
1.16 Contractor's Use of Site	.1	Use of site: for execution of work within roadway right of way and those areas specified by the Departmental Representative.
	.2	The Departmental Representative will specify the areas for work and storage.
1.17 Project Meetings	.1	The Departmental Representative will arrange project meetings, which are to occur every two (2) weeks, and assume responsibility for setting times and recording and distributing minutes.
	.2	After receiving the Contractor's schedule, traffic control plan, health and safety hazard assessment, and environmental protection plan, and prior to start of construction, a meeting involving Contractor, Departmental Representative and Parks Canada will be held at a place and time to be determined by the Departmental Representative. This meeting will review implications of the

contract, design, schedule of work health and safety, methods of construction, environment protection methods and traffic control.

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

.4 No work will begin until the pre-construction meeting is held, and all submittals have been approved.

.5 Following the pre-construction meeting and approval of submittals, the work will be carried out to meet the time restraints and have the project completed on time.

1.18 Cutting & Patching

.1 Cut and patch as required to make work fit.

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

1.19 Existing Services

.1 Carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to pedestrian and vehicular traffic.

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

.3 Submit schedule to and obtain approval from Departmental Representative for any shut down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.

.4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.5 Record locations of maintained, re-routed and

abandoned service lines.

.6 Ensure pedestrian and other traffic is not unduly impeded, interrupted or endangered by execution or existence of work or plant.

.7 Maintain existing signs at all times. When it is necessary to temporarily remove a sign, it shall be dismantled and re-established on a temporary post or stand set back from construction area. The work is considered to be incidental and no separate payment will be made for maintaining or moving signs.

.8 Verify locations of any underground utilities.

1.20 Additional Drawings

.1 Departmental Representative may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in Contract documents.

1.21 Relics, Antiquities and Wildlife Habitat

.1 Protect relics, antiquities, wildlife habitat, items of historical or scientific interest such as cornerstones and contents, animal nesting sites, commemorative plaques, inscribed tablets, and similar objects found during course of work.

.2 Give immediate notice to Departmental Representative and await Departmental Representative's written instructions before proceeding with work in this area.

.3 Relics, antiquities and items of historical or scientific interest remain the property of Canada.

1.22 National Park Act

.1 For projects within boundaries of National Park, perform work in accordance with Canada National Parks Act and Regulations.

1.23 Measurement of Quantities

.1 Linear: Items which are measured by metre or kilometre are to be measured along centreline of installation unless otherwise shown on plans.

.2 Area:
.1 Longitudinal and transverse measurements for areas to be measured horizontally.

.3 Mass:
.1 Term "tonne" shall mean 1000 kg.
.2 Materials which are specified for measurement by mass shall be weighed on scales approved by and at locations designated by Departmental Representative. Units used to haul material being paid for by mass shall bear legible identification numbers plainly visible to scale person as it approaches and leaves scale-house.

.4 Time:
.1 Unless otherwise provided for elsewhere or by written authority of Departmental Representative, hourly rental of equipment will be measured in actual working time and necessary travelling time of equipment within limits of project at an all-inclusive rate. Equip each unit of mobile equipment with an approved device to register hours of operation. Devices which only measure hours of running of motor will not be accepted.

1.24 Permits/ Authorities

.1 The Contractor shall obtain, and pay for, permits from authorities as required for all operations and construction. The Contractor shall also comply with all pertinent regulations of all authorities having jurisdiction over the work. The Contractor shall provide copies of all permits to the Departmental Representative prior to starting the work. The Contractor shall be responsible for obtaining all applicable permits, inspections and approvals required and shall pay all charges in connection therewith.

1.25 Equipment Rental Rates

.1 Upon written request, the Contractor will supply the Departmental Representative with a list of the rental equipment to be used on work beyond the scope of bid items. Equipment rental rates will be in accordance with current rates published by the Newfoundland and Labrador Department of Transportation and Works.

1.26 Existing Survey

.1 Topographic survey used in the preparation of these Contract Documents was completed by Crandall Engineering Ltd. in December 2018.

1.27 Protection

.1 Store all materials and equipment to be incorporated into work to prevent damage by any means.

.2 Repair and replace all materials or equipment damaged in transit or storage to the satisfaction of the Departmental Representative and at no cost to Canada.

.3 Contractor will take adequate precautions to protect existing structures when operating tracked equipment.

.4 Exercise care so as not to obstruct or damage public or private property in the area.

.5 At completion of work, restore area to its original condition. Damage to ground and property will be repaired by Contractor. Remove all construction materials, residue, excess, etc., and leave site in a condition acceptable to Departmental Representative.

END OF SECTION

PART 1 – GENERAL

1.1 Submittals

.1 Upon acceptance of bid and prior to commencement of work, submit to Departmental Representative the following work management documents:

.1 Work Schedule as specified herein.

.2 Health and Safety Plan as specified in Section 01 35 29 – Health and Safety Requirements.

.3 Environmental Protection Plan as specified in Section 01 35 43 – Environmental Procedures.

.4 Traffic Control Plan as specified in Section 01 55 26 – Traffic Regulation.

1.2 Work Schedule

.1 Upon acceptance of bid, submit:

.1 Preliminary work schedule within five (5) calendar days of contract award.

.2 Schedule to indicate all calendar dates from commencement to completion of all work within the time stated in the accepted bid.

.3 Provide sufficient details in schedule to clearly illustrate entire implementation plan, depicting efficient coordination of tasks and resources, to achieve completion of work on time and permit effective monitoring of work progress in relation to established milestones.

.4 Work schedule content to include as a minimum the following:

.5 Bar (GANTT) Charts, indicating all work activities, tasks and other project elements, their anticipated durations, planned dates for achieving key activities and major project milestones supported with;

.1 Written narrative on key elements of work illustrated in bar chart, providing sufficient details to demonstrate a

reasonable implementation plan for completion of project within designated time.

.2 Generally Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.

.5 Work schedule must take into consideration and reflect the work phasing.

.6 Schedule work in cooperation with the Departmental Representative.

.7 Completed schedule shall be approved by Departmental Representative. When approved, take necessary measures to complete work within scheduled time. Do not change schedule without Departmental Representative's approval.

.8 Ensure that all subtrades and subcontractors are made aware of the work restraints and operational restrictions specified.

.9 Schedule Updates:
.1 Submit when requested by Departmental Representative.
.2 Provide information and pertinent details explaining reasons for necessary changes to implementation plan.
.3 Identify problem areas, anticipated delays, impact on schedule and proposed corrective measures to be taken.

.10 Departmental Representative will make interim reviews and evaluate progress of work based on approved schedule. Frequency of such reviews will be as decided by Departmental Representative. Address and take corrective measures on items identified by reviews and as directed by Departmental Representative. Update schedule accordingly.

.11 In every instance, any change or deviation from the Work Schedule, no matter how minimal the risk or impact on safety or inconvenience to tenant or public might appear, will be subject to prior review and approval by the

Departmental Representative.

1.3 Project Meetings

.1 Departmental Representative will schedule and administer project meetings every two (2) weeks for entire duration of work.

.2 Departmental Representative will prepare agenda for meetings.

.3 Meetings will be held at Terra Nova National Park Administration Building.

1.4 Coordination with Other Activities

.1 The Contractor is advised that other construction projects may be ongoing in Terra Nova National Park. The Contractor is to account for this in the scheduling of work.

.2 The Contractor may contact Terra Nova National Park for further details on these activities.

END OF SECTION

END

PART 1 - GENERAL

1.1 General Requirements

.1 The Form of Tender includes lump sum priced items and unit priced items.

.2 The total tendered price shall be the sum of the lump sum items plus the amounts calculated from the unit priced items based on the approximate quantities identified for each of the unit priced items.

.3 The Contractor in submitting their Tender for the project understand that they will only be entitled to payment under the unit priced items when prior written authorization has been received from the Departmental Representative for utilization and then only to the extent of the work authorized by the Departmental Representative.

.4 Additional instructions for measurement and/or payment for items of the work may be contained in specific sections of the Technical Specifications. In the case of a conflict between the instructions for measurement and payment contained in this section with that of any other section, the requirement of this section shall apply.

.5 The submitted tender prices will be inclusive of all costs for the complete supply and installation of all materials, labour and equipment required to complete the work. No separate payment will be made for any testing, inspections and approvals required by Contractor.

.6 All measurement shall be along a horizontal plane unless otherwise indicated.

1.2 Lump Sum Item

.1 No separate measurement for payment shall be made for any work completed under this item.

.2 The work of the lump sum item shall include all other works which are required for completion of the project exclusive of those covered by the unit priced items.

.3 All and any items not specifically included in the unit price items are considered incidental

to the work and are to be included in the lump sum portion of the work.

1.3 Unit Price Items

.1 Clearing

.1 Unit of measurement: hectare (ha).

.2 Method of Measurement: horizontal area.

.3 This item includes: clearing and disposal of all roadside vegetation, including trees (standing and felled), shrub vegetation and underbrush, to the limits indicated or as required by the Departmental Representative.

.2 Selective Tree Clearing

.1 Unit of measurement: Each

.2 This item includes: cutting and disposal of selected trees or deadfall, as indicated or as required by the Departmental Representative.

.3 Ditching

.1 Unit of Measurements: Linear metre (m)

.2 Method of Measurement: Along the centerline of the new ditch bottom.

.3 This Item Includes excavation of material to the dimensions shown on the Drawings, including the ditch at Southwest Brook, reuse of suitable material, removal of unusable material off-site, and shaping of final ditch contours.

.4 Rock Excavation

.1 Unit of Measurement: Cubic metre (m^3), in place measurement.

.2 Method of Measurement: Rock will be measured in its original position, by the cross-section method. Cross sections will be measured at five (5) metre intervals. Boulders greater than 1 cubic metre in volume shall be measured individually for payment.

.3 This item includes: The unit price will be full compensation for material, equipment, and work required for rock removal excavation to achieve the finish grades required, removal of rock as required to construct backslopes and ditches as indicated on the Drawings or as directed by Departmental Representative, hauling, placing, shaping and compacting of approved rock fill materials to construct the embankment along the proposed roadway realignment to lines and levels indicated on

the Drawings, traffic control, dust control, proof rolling, and loading and disposal of surplus rock material at an approved location outside the park. This item also includes removal of rock 300mm below the invert of culverts.

.5 Rock Borrow Materials

.1 Unit of Measurement: Metric Tonnes (1000 kg).

.2 Method of Measurement: Scale tickets signed by Departmental Representative and incorporated into work.

.3 This item includes: supply, hauling, placement, and compaction of rock borrow materials. This item also includes grading, placing and compaction of the materials to provide required grades.

.4 There shall be no payment for extra thickness rock borrow materials placed outside of specified limits. Whenever in the opinion of the Departmental Representative there is extra thickness, the appropriate weight will be deducted.

.5 Rock Borrow used at the culvert replacement sites including trench backfilling, traffic diversions, road reconstruction will **not** be measured for payment and shall be incidental to the Work.

.6 Granular "A" Base and Granular "B" Sub-base Materials:

.1 Unit of Measurement: Metric Tonnes (1000 kg).

.2 Method of Measurement: Scale tickets signed by Departmental Representative, except as provided below.

.3 This item includes: supply, hauling, placement, and compaction of granular base and sub-base materials for road reconstruction at the culvert replacements and traffic diversion or detour construction, ditching and shoulder reconstruction, as shown on drawings, including dust control and traffic control. This item includes grading and compaction of existing sub-grade below granular materials prior to their installation to provide required sub-grades.

.4 There shall be no payment for extra thickness of subbase and base materials placed

outside of specified limits. Whenever in the opinion of the Departmental Representative there is extra thickness, the appropriate weight will be deducted.

.5 There shall be no measurement and payment for the granular material used as bedding for the culverts. Culvert bedding used to 1 m above the pipes shall be incidental to the culvert installation items.

.7 Asphalt Cold Milling

.1 Unit of Measurements: square metre (m^2)

.2 Method of Measurement: measured in square metres of horizontal surface area to the required depth in millimetres, rounded to one decimal place.

.3 This item includes: labour, materials and equipment to carry out the cold milling to the required depth, removal and disposal of material, shaping, grading, compaction, protection of existing structures, signage, traffic control, dust control, sweeping the milled surface, safety, clean-up and all work incidental thereto, all as specified or as shown on the Drawings or as directed by the Departmental Representative.

.8 Asphalt Tack Coat

.1 Unit of measurement: square metre (m^2)

.2 Method of Measurement: horizontal surface area, rounded to one decimal place.

.3 This item includes: labour, materials, and equipment used to clean the existing milled surface and supply and apply tack coat on milled surfaces, including tack coat application on any vertical joints at limits of surface areas.

.9 Hot-Mix Asphalt Concrete Paving (Base Course and Surface Course)

.1 Unit of Measurement: Metric Tonnes (1000 kg).

.2 Method of Measurement: Scale tickets signed by Departmental Representative, except as provided below.

.3 This item includes: supply, placement and compaction of base course and surface course asphaltic concrete. All key joints are to be included in this unit item.

.4 There shall be no payment for extra

thickness or extra width of asphalt placed. Wherever in the opinion of the Departmental Representative there is extra thickness, the appropriate weight will be deducted.

.10 Asphalt Cement
.1 Unit of measurement: Metric Tonnes (1000 kg)
.2 Method of measurement will be based on the lab's liquid extraction. Ignition ovens will not be accepted.

Increases or decreases will be made to progress estimates to compensate for changes in Liquid Asphalt prices from the time of tender to the prices in effect during construction based upon changes in the local market price.

A Benchmark Unit Price per tonne for Liquid Asphalt will be established equal to the quotation price provided to the Contractor by the Liquid Asphalt supplier at the time of tender closing. The Contractor shall provide to Parks Canada written proof as required of the quoted price.

The Contractor's unit price per tonne for Liquid Asphalt will be increased or decreased in accordance with the difference between the Benchmark Unit Price and the invoiced unit Price made to the contractor for Liquid Asphalt by the supplier. The Contractor is required to provide documentation by way of invoices and weigh slips from his/her liquid asphalt supplier.

Contractors are advised that due to the unavailability of quoted prices for Liquid Asphalt in the spring, the Benchmark Unit Price for Liquid Asphalt will be established at $810 per tonne and this will remain effective until the date at which the suppliers provide quotations.

The Departmental Representative shall calculate the adjustment (payment or credit) for Liquid Asphalt on the Monthly Progress Estimates.

The Liquid Asphalt cost adjustment shall be calculated using the quantity of the item added

to the progress estimate since the last estimate. In cases where Liquid Asphalt is included in the price of Asphalt Concrete, the liquid asphalt quantity will be determined using the percentage (%) of asphalt cement required in the Design Mix Formula approved by the Departmental Representative.

The onus is on the Contractor to provide the required documentation. Parks Canada will not make payment for Liquid Asphalt until such time that the required documentation is provided.

No price adjustments will be made due to an increase in the price on liquid asphalt used after the identified contract completion date or approved contract extension date but adjustments due to a decrease in the price of liquid asphalt will be made for liquid asphalt used after the identified contract completion date or approved contract extension date.

.11 Pipe-Culverts

.1 Unit of Measurement: linear metre (m) for each size and type of culvert.

.2 Method of Measurement: along centreline of new culvert pipe invert, from end to end of new culvert installed, or in the case of culvert extensions, along the centerline of the new culvert pipe invert, from the end of the culvert extension installed to the flush end of the existing culvert, as laid and as accepted by the Departmental Representative.

.3 Supply and installation of culverts will be measured and paid separately.

.4 Supply item includes: supply of new culvert pipe including couplers, bolts, or other connections, energy dissipation rings, tension bar assemblies as indicated, and delivery to site.

.5 Payment for Culvert Installation item includes:

.1 Dewatering of site and temporary water control works.

.2 Excavation and removal of existing CSP culverts, and disposal of any unsuitable material.

.3 Common excavation.

.4 Cutting and removal of existing asphalt.

.5 Construction of detours, including excavation and embankment construction, shoring systems, and temporary roadside barriers.
.6 Supply and placement of backfill material (granular "A" or "B" bedding and rock borrow) as detailed on drawings.
.7 Culvert tension bar assemblies as indicated on the drawings.
.8 Culvert energy dissipation rings as indicated on drawings.
.9 Installation of new culvert.
.11 Removal and reinstallation of existing guide rail.
.12 Restoration of permanent painted traffic lines.
.13 All other cost not included with other units in this contract.
.14 Supply and placement of Granular "B" sub-base, Granular "A" base, and new asphalt for the detour construction and highway restoration, as detailed on drawings, to be paid for separately under the respective unit item.
.15 Supply and placement of rip rap to be paid for separately.
.16 Supply and placement of concrete headwall to be paid for separately.

.12 Pipe Slip Lining:
.1 Unit of measure: linear metre (m) for each size and type of culvert liner.
.2 Method of measurement: along centreline of new culvert pipe liner invert, from end to end of new liner installed.
.3 This item includes supply of HDPE liner material, liner assembly, transport of liner to the site and staging area, construction of staging areas and access roads, excavation as require at both ends of the pipe, liner installation, construction of bulkheads, grouting of annular void, and all other tools, materials, and labour required for a complete installation.

.13 Concrete Headwalls:
.1 Unit of measure: cubic metres, in place measurement.
.2 Method of measurement: Based on dimensions indicated on drawings for

consolidated concrete in place within the completed structure. Precast concrete is also acceptable. No payment will be made for surplus concrete used outside the dimensions indicated.

.3 This item includes excavation, furnishing of all materials, aggregates, cement, supplementary cementing materials, concrete mixes, admixtures, reinforcing steel, tools, equipment, falsework, forms, bracing, chairs, bolsters, ties, labour, curing, surface finishing, and all other items required to complete the work. Supply, installation and securing of Reinforcing Steel is incidental to this work and is included in this item.

.4 This item also includes excavation required for headwall installation, backfilling with suitable excavated material, shoring, temporary retaining wall or structures, dewatering, temporary control of stream water flow as required, protection of the stream from the demolition of existing or construction of the new structure.

.14 Rip Rap

.1 Unit of Measurement: Metric Tonne (1000 kg) of each size of rip rap.

.2 Method of Measurement: Scale tickets signed by Departmental Representative, except as provided below.

.3 This item includes: Supply, hauling, placement, excavation, and compaction for use at culvert inlets, outlets pool and channel and as the culvert embedment material.

.4 This item also includes the mixing of the rip rap material with onsite excavated streambed material or granular “A” or “B” as indicated on the drawing, prior to and during its placement, for use in the wetted portion of the watercourses.

.15 Outlet Pool Improvements

.1 Unit of Measurement: Each (Cobblers Brook, Square Pond Brook, and Arnolds Pond Brook).

.2 This item includes: Common excavation, placement of common fill, supply and installation of log weirs, construction of access to the pools, and all other labour, tools, and environmental controls, required to

complete the outlet pool improvements as indicated on the Drawings.
.3 Supply and hauling of rock borrow, large rocks, rip-rap and granular materials to be paid for separately under the respective unit item.

.16 Large Rock Placement
.1 Unit of Measurement: Metric Tonne (1000 kg) of individually placed large rocks in stream pools, cross rock vane , and log weirs.
.2 Method of Measurement: Scale tickets signed by Departmental Representative
.3 This item includes: Supply, hauling, placement, and compaction for use at culvert outlets pool and channel and includes excavation, placing the large rock, leveling the rocks as required.

.17 Removal of asphalt concrete in Cobblers Brook
.1 Unit of Measurement: Metric Tonne (1000 kg) of Asphalt removed.
.2 Method of Measurement: Scale tickets signed by Departmental Representative, except as provided below.
.3 This item includes: Excavation, hauling, and disposal outside the park at an approved location.

.18 Wildlife Crossing Ramp
.1 Unit of Measurement: Each
.2 This item includes: Supply and installation of wildlife crossing ramp as specified on the Drawings, and all other labour, tools, and environmental controls, required to complete the wildlife crossing ramp as indicated on the Drawings.

.19 Pine Hill Pond Asphalt Gutter Offtake Improvement
.1 Unit of Measurement: Each
.2 This item includes: Supply and installation of a new double square grate catch basin, modification to the existing asphalt gutter, new catch basin, new 600mm storm pipe to ditch, new asphalt gutter including asphalt, asphalt gutter and gutter outlet, removal and disposal of concrete offtake, removal and reinstallation of guide rail and all other labour, tools, and environmental controls,

required to complete the improvements to Pine Hill Pond Asphalt Gutter as indicated on the Drawings.

.20 Asphalt Gutters
.1 Unit of Measurement: Linear meter (m)
.2 This item includes: Supply and installation of a new asphalt gutter, gutter blocks, asphalt pavement and all other labour, tools, and environmental controls, required to complete the asphalt gutter as indicated on the Drawings.
.3 Asphalt gutter rip rap outfalls / offtakes shall be paid under the Rip Rap quantity.

.21 Ochre Hill Slope Shaping
.1 Unit of Measurement: Square metre (m^2)
.2 This item includes: Redressing the existing slope with sloughed material in the ditch and reshaping the existing ditch all other labour, excavation, tools, and environmental controls, required to complete the shape Ochre Hill Slope as indicated on the Drawings.
.3 This item does not include: payment for hydroseeding and hydroseeding with fibre reinforced matrix. This item will be paid for under its contract unit price.

.22 Geogrid Slope Stabilization System
.1 Unit of Measurement: Square metre (m^2)
.2 This item includes: Supply and installation of new surficial slope stabilization system consisting of TBX 3000 Geogrid and Terrafirm S4 Anchors or approved equal as shown on the drawings, including all common excavation, installation, transportation, stockpiling and reuse of salvaged excavated soil from slope stabilization and all other labour, tools, and environmental controls, required to properly install the system as per manufacturer recommendations.
.3 This item does not include: payment for sod. This item will be paid for under its contract unit prices.

.23 Sodding
.1 Unit of measurement: square metre (m^2).

.2 Method of Measurement: The area of sodding will be measured in square metres, rounded to the nearest whole number. The surface area shall be measured jointly with the Departmental Representative using a measuring wheel or approved alternative method.
.3 This item includes: wood stakes placed 300mm deep through the sodding and through the geogrid every 450mm both directions.

.24 Hydroseeding
.1 Unit of measurement: square metre (m^2).
.2 Method of Measurement: The slope area actually seeded and mulched, from within the limits as staked by the Departmental Representative, will be measured in square metres, rounded to the nearest whole number. The surface area shall be measured jointly with the Departmental Representative using a measuring wheel or approved alternative method.
.3 This item includes: all labour, materials and equipment for the preparation of the ground to be treated with hydroseeding and the supply and placement of hydroseed mix, together with such watering and maintenance as may be required over a one-year establishment period from date of initial acceptance.
.4 Seeded areas will be accepted by the Departmental Representative provided evidence of growth and plants are uniformly established.
.5 An additional application of fertilizer is required the following Spring after initial application. No additional payment will be made for maintenance over the establishment period or the extra application of fertilizer.
.6 A holdback of 25% of the cost for hydroseeding will be released for each seeded area upon fulfilment of the following conditions:
.1 An additional application of fertilizer has been provided the following Spring after initial application.
.2 Growth is sustained throughout the establishment period to the satisfaction of the Departmental Representative.

.25 Hydroseeding with Fibre Reinforced Matrix
.1 Unit of measurement: square metre (m^2).
.2 Method of Measurement: The slope area on

which the seeding and matrix is applied, from within the limits as staked by the Departmental Representative, will be measured in square metres, rounded to the nearest whole number. The surface area shall be measured jointly with the Departmental Representative using a measuring wheel or approved alternative method.

.26 Traffic Sign Replacements
.1 Unit of Measurement: Each
.2 This item includes: Supply and installation of new sign panels and treated 150x150mm wooden posts, including washers, bolts, and all necessary appurtenances, augering of post holes, setting posts, installing signs, backfilling, compaction, disposal of surplus material and reinstatement of disturbed surfaces.
. 3 This item also includes removal and disposal of existing signs and posts.

.27 All and any items not specifically included in the Measurement for Payment and Pay Item List are considered incidental to the Work and are to be included in the lump sum portion of the work.

END

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 35 29 - Health and Safety Requirements.

.2 Section 01 35 43 - Environmental Procedures.

.3 Section 10 14 53 – Traffic Signage.

.4 Section 31 05 17 - Aggregates: General

.5 Section 31 23 10 - Excavating, Trenching & Backfilling.

.6 Section 31 24 13 - Roadway Embankments.

.7 Section 31 32 19.01 – Geotextiles and Geogrids.

.8 Section 31 37 00 - Rip-Rap.

.9 Section 32 11 19 - Granular Sub-Base.

.10 Section 32 11 23 - Granular Base

.11 Section 32 12 16 – Hot-Mix Asphalt Concrete Paving.

.12 Section 32 15 60 - Roadway Dust Control.

.13 Section 32 17 23 - Painted Traffic Lines & Markings

.14 Section 32 92 21 - Hydroseeding.

.15 Section 32 92 23 - Sodding.

.16 Section 32 92 21 - Hydroseeding.

.17 Section 34 71 13 - Steel W-Beam Guide Rail.

.18 Section 33 42 13 - Pipe Culverts.

1.2 Administrative

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in

Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is completed by Departmental Representative.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify that field measurements and affected adjacent Work are coordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative’s review.

.10 Keep one (1) reviewed copy of each submission on site.

1.3 Shop Drawings .1 The term "shop drawings" means drawings,

And Product Data

diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow five (5) days for Departmental Representative to review each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

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

.8 Submissions include:
- .1 Date and revision dates.
- .2 Project title and number.

.3 Name and address of:
.1 Subcontractor.
.2 Supplier.
.3 Manufacturer.
.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
.5 Details of appropriate portions of Work as applicable:
.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions, and clearances.
.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight.
.8 Wiring diagrams.
.9 Single line and schematic diagrams.
.10 Relationship to adjacent work.

.9 After Departmental Representative's review, distribute copies.

.10 Submit one (1) electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accordance with specified requirements.
.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.17 Delete information not applicable to project.

.18 Supplement standard information to provide details applicable to project.

.19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, transparency copies will be returned and fabrication and installation of Work may proceed. If shop

drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.20 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of Work of sub-trades.

1.4 Samples

.1 Submit for review samples in triplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative business address.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 Certificates and Transcripts

.1 Immediately after award of Contract, submit Workplace NL status.

.2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

END

PART 1 – GENERAL

1.1 Section Includes

.1 Fire Safety Requirements.

.2 Hot Work Permit.

.3 Existing Fire Protection and Alarm Systems.

1.2 Related Sections

.1 Section 01 35 29: Health and Safety Requirements.

1.3 References

.1 National Fire Code 2010

.2 National Building Code 2010

1.4 Definitions

.1 Hot Work defined as:
- .1 Welding work.
- .2 Cutting of materials by use of torch or other open flame devices.
- .3 Grinding with equipment which produces sparks.
- .4 Use of open flame torches such as for roofing work.

1.5 Submittals

.1 Submit copy of Hot Work Procedures and sample of Hot Work permit to Departmental Representative for review, within fourteen (14) calendar days of acceptance of bid.

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

1.6 Fire Safety Requirements

.1 Implement and follow fire safety measures during Work. Comply with following:
- .1 National Fire Code 2010.
- .2 National Building Code 2010.
- .3 Federal and Provincial Occupational Health and Safety Acts and Regulations.

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

1.7 Hot Work Authorization

.1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot Work on site.

.2 To obtain authorization submit to Departmental Representative:
- .1 Contractor's typewritten Hot Work Procedures to be followed on site as specified below.
- .2 Description of the type and frequency of Hot Work required.
- .3 Sample Hot Work Permit to be used.

.3 Upon review and confirmation that effective fire safety measures will be implemented and followed during performance of hot work, Departmental Representative will give authorization to proceed as follows:
- .1 Issue one (1) written "Authorization to Proceed" covering the entire project for duration of work or;
- .2 Subdivide the work into pre-determined, individual activities, each activity requiring a separately written authorization to proceed.

.4 Requirement for individual authorization will be based on:
- .1 Nature or phasing of work;
- .2 Risk to Facility operations;
- .3 Quantity of various trades needing to perform hot work on project or;
- .4 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.

.5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.

.6 In tenant occupied Facility, coordinate performance of Hot Work with Facility Manager through the Departmental Representative. When directed, perform Hot Work only during non-operative hours of the Facility. Follow Departmental Representative's directives in this regard.

1.8 Hot Work Procedures

.1 Develop and implement safety procedures and

work practices to be followed during the performance of Hot Work.

.2 Hot Work Procedures to include:
- .1 Requirement to perform hazard assessment of site and immediate work area beforehand for each hot work event in accordance with Safety Plan specified in Section 01 35 29 - Health and Safety Requirements.
- .2 Use of a Hot Work Permit system with individually issued permit by Contractor's Superintendent to worker or subcontractor granting permission to proceed with Hot Work.
- .3 Permit required for each Hot Work event.
- .4 Designation of a person on site as a Fire Safety Watcher responsible to conduct a fire safety watch for a minimum duration of sixty (60) minutes immediately following the completion of the Hot Work.
- .5 Compliance with fire safety codes, standards and occupational health and safety regulations specified.
- .6 Site specific rules and procedures in force at the site as provided by the Facility Manager.

.3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Label document as being the Hot Work Procedures for this contract.

.4 Procedures shall clearly establish responsibilities of:
- .1 Worker performing hot work,
- .2 Person issuing the Hot Work Permit,
- .3 Fire Safety Watcher,
- .4 Subcontractor(s) and Contractor.

.5 Brief all workers and subcontractors on Hot Work Procedures and of Permit system. Stringently enforce compliance.

1.9 Hot Work Permit

.1 Hot Work Permit to include the following:
- .1 Project name and project number;
- .2 Building name and specific room or area where hot work will be performed;
- .3 Date of issue;

.4 Description of hot work type needed;
.5 Special precautions to be followed, including type of fire extinguisher needed;
.6 Name and signature of permit issuer.
.7 Name of worker to which the permit is issued.
.8 Permit validity period not to exceed eight (8) hours. Indicate start time/date and termination time/date.
.9 Worker's signature with time/date of hot work completion.
.10 Stipulated time period of safety watch.
.11 Fire Safety Watcher’s signature with time/date.

.2 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.

.3 Each Hot Work Permit to be completed in full, signed and returned to Contractor's Superintendent for safe keeping on site.

1.10 Fire Protection And Alarm Systems

.1 Fire protection and alarm systems shall not be:
.1 Obstructed.
.2 Shut-off, unless approved by Departmental Representative.
.3 Left inactive at the end of a working day or shift.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.

.3 Costs incurred, from the fire department and Facility owner, resulting from negligently setting off false alarms will be charged to the Contractor in the form of financial progress payment reductions and holdback assessments against the Contract.

1.11 Documents on Site

.1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.

.2 Upon request, make available to Departmental Representative or to authorized safety Representative for inspection.

END

PART 1 - GENERAL

1.1 Definitions

.1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

.2 Competent Person: means a person who is:
.1 Qualified by virtue of personal knowledge, training and experience to perform assigned work in a manner that will ensure the health and safety of persons in the workplace, and;
.2 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work and;
.3 Knowledgeable about potential or actual danger to health or safety associated with the Work.

.3 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

.4 PPE: personal protective equipment

.5 Work Site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.

1.2 Submittals

.1 Make submittals in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan prior to commencement of Work.
.1 Submit within ten (10) working days of notification of Bid Acceptance. Provide three (3) copies.
.2 Departmental Representative will review Health and Safety Plan and provide comments.
.3 Revise the Plan as appropriate and resubmit within ten (10) working days after receipt of comments.
.4 Departmental Representative's review and comments made of the Plan shall not be

construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.

.5 Submit revisions and updates made to the Plan during the course of Work.

.3 Submit name of designated Health & Safety Site Representative and support documentation specified in the Safety Plan.

.4 Submit building permit, compliance certificates and other permits obtained.

.5 Submit copy of Letter in Good Standing from Provincial Workers Compensation or other department of labour organization.

.1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.

.6 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.7 Submit copies of incident reports.

.8 Submit WHMIS MSDS - Material Safety Data Sheets.

1.3 Compliance Requirements

.1 Comply with Occupational Health and Safety Act for Province of Newfoundland and Labrador, and Occupational Health & Safety Regulations made pursuant to the Act.

.2 Comply with Canada Labour Code - Part II (entitled Occupational Health and Safety) and the Canada Occupational Health and Safety Regulations (COSH) as well as any other regulations made pursuant to the Act.

.1 The Canada Labour Code can be viewed at: www.http://laws.justice.gc.ca/en/L-2/

.2 COSH can be viewed at: www.http://laws.justice.gc.ca/eng/SOR-86-304/index.html

.3 A copy may be obtained at: Canadian Government Publishing Public Works & Government Services Canada Ottawa, Ontario,

K1A 0S9 Tel: (819) 956-4800 (1-800-635-7943) Publication No. L31-85/2000 E or F)

.3 Observe construction safety measures of:
.1 Part 8 of National Building Code
.2 Provincial Worker's Compensation Board.
.3 Municipal by-laws and ordinances.

.4 Comply with Government of Newfoundland and Labrador Department of Transportation and works, Highway Design Division.
.1 Traffic Control Manual (TCM), latest edition.

.5 In case of conflict or discrepancy between above specified requirements, the more stringent shall apply.

.6 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing.

.7 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

1.4 Responsibility

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

.2 Comply with and enforce compliance by all workers, sub-contractors and other persons granted access to Work Site with safety requirements of Contract Documents, applicable federal, provincial, and local by-laws, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.5 Site Access and Control

.1 Control the Work and entry points to Work Site. Approve and grant access only to workers and authorized persons. Immediately stop and remove non-authorized persons.
.1 Departmental Representative will provide names of those persons authorized by Departmental Representative to enter onto

Work Site and will ensure that such authorized persons have the required knowledge and training on Health and Safety pertinent to their reason for being at the site, however, Contractor remains responsible for the health and safety of authorized persons while at the Work Site.

.2 Isolate Work Site from other areas of the premises by use of appropriate means.
- .1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate the Work Site, stop non-authorized entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment. See Section 01 56 00 – Temporary Barriers and Enclosures for minimum acceptable requirements.
- .2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.
- .3 Use professionally made signs with bilingual message in the 2 official languages or international known graphic symbols.

.3 Provide safety orientation session to persons granted access to Work Site. Advise of hazards and safety rules to be observed while on site.

.4 Ensure persons granted site access wear appropriate PPE. Supply PPE to inspection authorities who require access to conduct tests or perform inspections.

.5 Secure Work Site against entry when inactive or unoccupied and to protect persons against harm. Provide security guard where adequate protection cannot be achieved by other means.

1.6 Protection

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

.2 Should unforeseen or peculiar safety related hazard or condition become evident during performance of Work, immediately take measures to rectify situation and prevent damage or

harm. Advise Departmental Representative verbally and in writing.

1.7 Filing of Notice

.1 File Notice of Project with pertinent provincial health and safety authorities prior to beginning of Work.
.1 Departmental Representative will assist in locating address if needed.

1.8 Permits

.1 Post permits, licenses and compliance certificates, specified in section 01 11 00 – General Instructions, at Work Site.

.2 Where a particular permit or compliance certificate cannot be obtained, notify Departmental Representative in writing and obtain approval to proceed before carrying out applicable portion of work.

1.9 Hazard Assessments

.1 Perform site specific health and safety hazard assessment of the Work and its site.

.2 Carryout initial assessment prior to commencement of Work with further assessments as needed during progress of work, including when new trades and subcontractors arrive on site.

.3 Record results and address in Health and Safety Plan.

.4 Keep documentation on site for entire duration of the Work.

1.10 Project/Site Conditions

.1 Following are potential health, environmental and safety hazards at the site for which Work may involve contact with:
.1 Known latent site and environmental conditions:
.1 Steep slopes and rock faces.
.2 Streams, brooks and other water bodies.
.3 Wildlife.
.4 Overhead and buried power lines.
.2 Facility on-going operations:
.1 Highway traffic.

.2 Above items shall not be construed as being complete and inclusive of potential health and safety hazards encountered during Work.

.3 Include above items in the hazard assessment of the Work.

1.11 Meetings

.1 Attend pre-construction health and safety meeting, convened and chaired by Departmental Representative, prior to commencement of Work, at time, date and location determined by Departmental Representative. Ensure attendance of:
.1 Superintendent of Work
.2 Designated Health & Safety Site Representative
.3 Subcontractors

.2 Conduct regularly scheduled tool box and safety meetings during the Work in conformance with Occupational Health and Safety regulations.

.3 Keep documents on site.

1.12 Health and Safety Plan

.1 Prior to commencement of Work, develop written Health and Safety Plan and Safety Control Plan specific to the Work. Implement, maintain, and enforce Plan for entire duration of Work and until final demobilization from site.

.2 Health and Safety Plan shall include the following components:
.1 List of health risks and safety hazards identified by hazard assessment.
.2 Control measures used to mitigate risks and hazards identified.
.3 On-site Contingency and Emergency Response Plan as specified below.
.4 On-site Communication Plan as specified below.
.5 Name of Contractor's designated Health & Safety Site Representative and information showing proof of his/her competence and reporting relationship in Contractor's company.
.6 Names, competence and reporting relationship of other supervisory personnel

used in the Work for occupational health and safety purposes.

.3 On-site Contingency and Emergency Response Plan shall include:
- .1 Operational procedures, evacuation measures and communication process to be implemented in the event of an emergency.
- .2 Evacuation Plan: site and floor plan layouts showing escape routes, marshalling areas. Details on alarm notification methods, fire drills, location of fire fighting equipment and other related data.
- .3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.
- .4 Emergency Contacts: name and telephone number of officials from:
  - .1 General Contractor and subcontractors.
  - .2 Pertinent Federal and Provincial Departments and Authorities having jurisdiction.
  - .3 Local emergency resource organizations.
- .5 Harmonize Plan with Facility's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data including name of PCA and Facility Management contacts.

.4 On-site Communication Plan:
- .1 Procedures for sharing of work related safety information to workers and subcontractors, including emergency and evacuation measures.
- .2 List of critical work activities to be communicated with Facility Manager which have a risk of endangering health and safety of Facility users.

.5 Address all activities of the Work including those of subcontractors.

.6 Review Health and Safety Plan regularly during the Work. Update as conditions warrant to address emerging risks and hazards, such as whenever new trade or subcontractor arrive at Work Site.

.7 Departmental Representative will respond in writing, where deficiencies or concerns are

noted and may request re-submission of the Plan with correction of deficiencies or concerns.

.8 Post copy of the Plan, and updates, prominently on Work Site.

1.13 Safety Supervision

.1 Employ Health & Safety Site Representative responsible for daily supervision of health and safety of the Work. Representative to be trained in occupational health and safety procedures and practices.

.2 Health & Safety Site Representative may be the Superintendent of the Work or other person designated by Contractor and shall be assigned the responsibility and authority to:
.1 Implement, monitor and enforce daily compliance with health and safety requirements of the Work.
.2 Monitor and enforce Contractor's site-specific Health and Safety Plan.
.3 Conduct site safety orientation session to persons granted access to Work Site.
.4 Ensure that persons allowed site access are knowledgeable and trained in health and safety pertinent to their activities at the site or are escorted by a competent person while on the Work Site.
.5 Stop the Work as deemed necessary for reasons of health and safety.

.3 Health & Safety Site Representative must:
.1 Be qualified and competent person in occupational health and safety.
.2 Have site-related working experience specific to activities of the Work.
.3 Be on Work Site at all times during execution of the Work.

.4 All supervisory personnel assigned to the Work shall also be competent persons.

.5 Inspections:
.1 Conduct regularly scheduled safety inspections of the Work on a minimum bi-weekly basis. Record deficiencies and remedial action taken.
.2 Conduct Formal Inspections on a minimum

monthly basis. Use standardized safety inspection forms. Distribute to subcontractors.

.3 Follow-up and ensure corrective measures are taken.

.6 Cooperate with Facility's Occupational Health and Safety representative should one be designated by Departmental Representative.

.7 Keep inspection reports and supervision related documentation on site.

.4 Employ Contractor Safety Officer (CSO).

.1 The Contractor shall be responsible to have a full time Contractor’s Safety Officer (CSO) on site for the duration of the project. This person shall be responsible for implementing the project’s safety plan and ensuring all work zones reflect that on the Newfoundland and Labrador’s Traffic Control Manual (TCM).

.2 As a minimum, the CSO shall have a complete understanding of the Newfoundland and Labrador’s Occupational and Safety Act, the project’ safety plan and the TCM. This person shall demonstrate their knowledge by monitoring the project site and correcting any and all safety deficiencies during the project’s duration.

.3 The CSO shall have as a minimum:

1. Certified in Standard First Aid;
2. Completed a certificate program in hazard recognition, evaluation and control which includes accident investigation;
3. The experience to develop, implement and monitor safe work practices and Procedures;
4. Certified Flagperson within the province of Newfoundland and Labrador;
5. Certified in Power Line Hazards within the province of Newfoundland and Labrador;
6. Training and experience in the use, care and maintenance of PPE to be used on site.

.4 The Contractor shall provide a resume of the CSO’s credentials at the preconstruction meeting.

.5 If the CSO is required to leave site, the CSO shall appoint an interim CSO during his/her period of absence. The CSO shall inform the Department's Representative of their replacement until return.

1.14 Training

.1 Use only skilled workers on Work Site who are effectively trained in occupational health and safety procedures and practices pertinent to their assigned task.

.2 Maintain employee records and evidence of training received. Make data available to Departmental Representative upon request.

.3 When unforeseen or peculiar safety-related hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.15 Minimum Site Safety Rules

.1 Notwithstanding requirement to abide by federal and provincial health and safety regulations; ensure the following minimum safety rules are obeyed by persons granted access to Work Site:

.1 Wear appropriate PPE pertinent to the Work or assigned task; minimum being hard hat, safety footwear, safety glasses, hearing protection and high-visibility workwear.
.2 Immediately report unsafe condition at site, near-miss accident, injury and damage.
.3 Maintain site and storage areas in a tidy condition free of hazards causing injury.
.4 Obey warning signs and safety tags.

.2 Brief persons of disciplinary protocols to be taken for non-compliance. Post rules on site.

1.16 Correction of Non-Compliance

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

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

.3 Departmental Representative will stop Work if non-compliance of health and safety regulations is not corrected in a timely manner.

1.17 Incident Reporting

.1 Investigate and report the following incidents to Departmental Representative:
- .1 Incidents requiring notification to Provincial Department of Occupational Safety and Health, Workers Compensation Board or to other regulatory Agency.
- .2 Medical aid injuries.
- .3 Property damage in excess of $10,000.00,
- .4 Interruptions to Facility operations resulting in an operational lost to a Federal department in excess of $5000.00.

.2 Submit report in writing.

1.18 Hazardous Products

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).

.2 Keep MSDS data sheets for all products delivered to site.
- .1 Post on site.
- .2 Submit copy to Departmental Representative.
- .3 For interior work in an occupied Facility, post additional copy in one or more publically accessible locations.

1.19 Blasting

.1 Blasting or other use of explosives is not permitted on site without prior receipt of written permission and instructions from Departmental Representative. A Permit for Explosives will also be required from the Park Superintendent prior to initiating any blasting activities.

1.20 Powder Actuated Devices

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

Departmental Representative.

1.21 Confined Spaces

.1 Abide by occupational health and safety regulations regarding work in confined spaces.

.2 Obtain an Entry Permit in accordance with Part XI of the Canada Occupational Health and Safety Regulations for entry into an existing identified confined space located at the Facility or premises of Work.
.1 Obtain permit from Facility Manager
.2 Keep copy of permit issued.

.3 Safety for Inspectors:
.1 Provide PPE and training to Departmental Representative and other persons who require entry into confined space to perform inspections.
.2 Be responsible for efficacy of equipment and safety of persons during their entry and occupancy in the confined space.

1.22 Site Records

.1 Maintain on Work Site copy of safety related documentation and reports stipulated to be produced in compliance with Acts and Regulations of authorities having jurisdiction and of those documents specified herein.

.2 Upon request, make available to Departmental Representative or authorized Safety Officer for inspection.

1.23 Posting of Documents

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Work Site in accordance with Acts and Regulations of Province having jurisdiction.

.2 Post other documents as specified herein, including:
.1 Site specific Health and Safety Plan
.2 WHMIS data sheets
.3 Incident reports
.4 Tool box and safety meeting minutes

1.24 Scalehouse

.1 Ensure Scalehouse is a sufficient distance away from scales to prevent roll-over

accidents.

.2 Ensure scalehouse is equipped with washroom facilities and air conditioning/heat.

END OF SECTION

PART 1 - GENERAL

1.1 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 Related Sections

.1 Section 01 35 45 – Environmental Protection Refueling Vehicles.

.2 Section 01 74 21 – Constructional Demolition Management and Disposal.

.3 Section 35 42 19 - Preservation of Watercourses and Wetlands

1.3 Fires

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

1.4 Disposal of Wastes

.1 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.

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

.3 Dispose of uncontaminated construction/demolition material which cannot be recycled or reused, at an approved construction and debris disposal site.

1.5 Drainage

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

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

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 Site Clearing and 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 topsoil and vegetation.

.4 Restrict vegetation removal to areas indicated or designated by Departmental Representative.

.5 Vegetation and topsoil should not be removed to obtain fill for road construction purposes.

.6 Whenever possible, organic debris removed during grading operations should be stored for use during site restoration. Such stockpiles should be located well away from any stream or water body and should be covered with coarse material or tarps to minimize wind and water erosion.

1.7 Work Adjacent to Waterways

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material without Departmental Representative's approval.

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

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

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

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

.7 Do not blast under water or within 100 m of indicated spawning beds.

.8 Temporary diversion ditches, approved by the Departmental Representative, are to be plastic

lined.

.9 Temporary storage sites for debris generated from clearing operations should be deposited away from watercourses and should be surrounded by a natural vegetative buffer.

.10 Do not pump or drain water containing suspended materials into waterways. Water containing suspended materials shall be pumped into vegetation a minimum of 30 m away from watercourses.

.11 All in-stream work is to be carried out under low flow conditions

.12 Do not operate construction equipment in waterways. Fording of watercourses is not permitted.

1.8 Pollution Control

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

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

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads. Chemicals used in dust control must have prior approval of the Departmental Representative.

1.9 General Requirements

.1 Work under this contract is to be carried out in a National Park, and environmental protection must be given a high priority by all staff involved with the work. Perform work in accordance with Canada National Parks Act and Regulations.

.2 An Environmental Briefing will be held prior to work commencing at the site, which will outline environmental factors to be considered during the work. It is mandatory that all

current staff of the Contractor attend this meeting with the Departmental Representative and Environmental Protection Officer (EPO).

.3 The Contractor shall meet all requirements as detailed in Appendix A – Basic Impact Analysis (BIA) Trans Canada Highway Safety and Standards Rehabilitation 2019-20, Terra Nova National Park. This document is not all-inclusive, and site adjustment of the mitigation methods for the work may be required. The Departmental Representative will advise the Contractor of any additional requirements as they arise.

1.10 Site Set-up and Use

.1 All site activities related to construction are to be confined within the defined project boundaries.

.2 Work sites will be equipped with appropriate and properly maintained sanitary facilities.

.3 Garbage must be collected and removed daily from the work site. All material must be removed, transported and disposed of in accordance with existing provincial – municipal and Park solid waste disposal guidelines and/or regulations.

.4 Littering is prohibited.

.5 Temporary storage, parking areas, and turn-a-round facilities for contractor-related equipment and vehicles will be limited to those areas agreed to and designated by the Departmental Representative.

1.11 Environmental Protection Plan

.1 The Contractor is required to submit a plan showing all pollution control measures that will be used to fulfill the requirements of the Environmental Protection Section. This plan will be reviewed by the Departmental Representative and the Environmental Protection Officer prior to commencement of any work. Any deviation from this plan will require further approval by the Departmental Representative. The protection plan shall be submitted prior to the pre-construction

meeting.

.2 The Environmental Plan will outline how the Contractor will address the environmental protection requirements, including removal and installation of culverts, and ensure pollution created by the construction is controlled. It will show sufficient detail on products to be used and physical placement on site to determine effectiveness of these items.

.3 The plan must cover all activities within the limits of all construction, laydown and traffic diversion areas.

1.12 Environmental Performance

.1 The Contractor is required to follow the Canadian Environmental Protection Act and Canadian National Parks Act.

.2 The Contractor is held responsible to ensure that all necessary permits related to Environmental Protection have been obtained and that necessary documentation is available on-site.

1.13 Vehicular Movements

.1 Restrict movement of vehicles and equipment to existing disturbed areas (access roads, borrow pits, disposal areas and rights-of-way).

1.14 Storage and Handling of Fuels and Dangerous Fluids

.1 Locate fuel storage facility outside the Park and a minimum of 100 m from any water body in an area approved by Departmental Representative and construct impermeable dykes so that any spillage is contained. Fueling of vehicles or equipment will not be permitted within 100 m of any water body. Maintenance of vehicles and equipment will be permitted only in designated areas as directed by the Departmental Representative.

.2 Exercise care in handling of fuels or dangerous materials to minimize potential for spills. Report immediately any spills to Departmental Representative. Contractor is responsible for responding immediately to any spill to minimize environmental damage and for clean-up, repair or rehabilitation resulting

from any spills to the satisfaction of the Departmental Representative.

.3 Supply and maintain on site emergency response material to contain spills and minimize environmental damage, i.e. absorbent material, to the approval of Departmental Representative. Disposal of all contaminated material shall be off-site at an approved facility.

.4 Dangerous goods, whose release into the environment could cause adverse effect, should be stored and handled in a manner which gives due regard for workers and public safety, and for the protection of the environment.

.5 No material toxic to fish or any aquatic life shall be permitted to enter any stream, river, or lake. This shall include, but not be limited to lubricants, fuels, testing fluids, insecticides, detergents, herbicides, cement, lime or concrete.

.6 The management of fuels, lubricants and chemicals must meet with the requirements of the Newfoundland & Labrador Department of Environment & Conservation and all other appropriate provincial and federal regulations.

.7 Fuel storage containers must be accompanied by impermeable structures that would provide containment of 125% of the container capacity in the event of a leak or spill.

.8 All refueling and lubricating operations should employ protection measures such as drip pans, to reduce the potential for escape of petroleum products to the environment.

.9 The Departmental Representative and the Park’s Environmental Protection Officer (EPO) must be immediately contacted after a spill of fuel or lubricant, and after any amount of other chemical products has escaped.

.10 Storage of any fuel has to occur only in previously approved locations, and with Park consent. The Contractor must submit plans for

fuel management and a Spill Contingency Plan seven days prior to the start of the Work. The Contractor is expected to be prepared to effect the containment and cleanup of all spills related to the Work.

.11 Storage of hazardous material, including explosives, shall not be permitted, except for quantities which shall normally be expected to be utilized in a day of Work, and which are not permitted to stockpile.

.12 Emulsion storage tanker and transfer of emulsion from tanker to spray vehicle are not permitted.

1.15 Erosion and Sediment Control

.1 Appropriate preventative controls should be in place at all times during construction to prevent undue erosion and sedimentation. The Contractor is required to provide to the Departmental Representative for review and acceptance ten (10) working days before start-up an erosion and sedimentation control plan, as part of the Environmental Protection Plan. The plan shall incorporate all necessary silt fences, silt traps, plastic lined trenches and ditches as approved by the Departmental Representative.

.2 The Contractor shall install and maintain all sedimentation and erosion control features for the duration of the project in accordance with the approved plan. The Contractor shall remove all sedimentation and erosion control upon completion of the work and when requested by the Departmental Representative.

.3 Sediment fences and erosion control structures shall be constructed in roadside ditches or at culvert inlets prior to any excavation as directed by Departmental Representative.

.4 To minimize run-off, work on slopes which may affect water body will be curtained during periods of heavy rainfall, as directed by the Departmental Representative.

.5 Prior to carrying out work, check long range weather forecast to ensure that there is adequate time before forecast of heavy rain

storms to stabilize the work. Provide details of stabilization plan to Departmental Representative for review.

.6 Maintain a stockpile of appropriate erosion and environmental protection materials (e.g. silt fences, straw bales, wood chips, clean rock fill and aggregate base course) on site at all times.

.7 Install additional erosion control measures as required by site conditions to prevent sediment from entering drainage courses.

.8 Inspect erosion and sediment control measures on a daily basis and maintain as necessary.

1.16 Fisheries Regulations

.1 The Contractor must adhere to the Federal Fisheries Act. All in-water work must be completed in accordance with this specification, Basic Impact Analysis, and Fisheries Act or associated regulations.

.2 Work in or adjacent to fish bearing waterbodies must be completed during the allowable in-water window of June 1 – September 30. Work outside of this window is not permitted unless otherwise approved by the Departmental Representative and in consultation with the Parks Canada Environmental Protection Officer.

1.17 Relics and Antiquities

.1 Relics and antiquities and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found on site or in structures to be demolished, shall remain property of Canada. Protect such articles and request direction from Departmental Representative.

.2 Give immediate notice to Departmental Representative if evidence of archaeological finds are encountered during construction and await his written instructions before proceeding with work in this area.

1.18 Treated Wood

.1 Workers shall be made aware of the possible

health risks associated with exposure to CCA or creosote treated timber as well as the recommended safe practices for handling such materials.

.2 Disposal of treated wood wastes including saw-dust must be outside of the site, and in accordance with all applicable Provincial and Municipal regulations. Similar attention must be given to disposal of any replaced guiderail posts which have been treated with creosote, which must also be removed from the park for disposal.

1.19 Environmental Incident or Emergency

.1 In the event of an environmental incident or emergency such as:
- .1 Chemical spill or petroleum spill;
- .2 Poisonous or caustic gas emission;
- .3 Hazardous material spill;
- .4 Sewage spill;
- .5 Contaminated water into waterways.
- .6 The Contractor or his employees shall immediately:
  - .1 Notify the Contractor's job superintendent.
  - .2 Call the local emergency services and give type of emergency.
  - .3 Notify the Departmental Representative and the Park's Environmental Protection Officer (EPO).

.2 The Contractor is to submit to Departmental Representative a copy of its Environmental/Spill Response Plan for approval.

1.20 Site Decommissioning

.1 Unless prior permission from the Departmental Representative is obtained, all contractor equipment, facilities and materials must be removed from the Park at the finish of each work phase, or if work is suspended due to weather or other circumstances, upon the suspension of work activities.

.2 All work sites must be returned to a neat and tidy condition upon site abandonment.

1.21 Site Clearing

.1 Timber and vegetation shall not be cleared unless approved by Departmental

Representative.

.2 Vegetation and topsoil shall not be removed to obtain fill for road construction purposes.

.3 All cleared trees, shrub vegetation, underbrush and timber shall become the property of the Contractor, and are to be disposed of outside the Park boundaries.

.4 No burning of any vegetation or debris will be permitted in the park boundaries.

.5 No roadside vegetation clearing will be permitted during the annual songbird nesting period of May 1 to August 15.

PART 1 - GENERAL

1.1 Refueling

.1 Refueling of equipment to be performed in locations as directed by Departmental Representative.

.2 Do not refuel equipment within 100 metres of any watercourse or storm water catch basin unless protection against spills is in place and location is approved by Departmental Representative.

.3 Use petroleum containers approved for products with no spill fill spouts for dispensing fuels. The sure pour nozzle to have self closing valve, prevent any flow of fuel until the nozzle is inserted into the receiving container. On removal from the receiving container the slide valve closes to eliminate any fuel spill. Nozzle to be equipped with its own automatic vent eliminating the need for the user to open or close air inlets on the pouring container.

.4 Nozzle to support the weight of the pouring container. Nozzles to automatically stop the flow when the receiving container becomes full. The nozzle to be such that it reduces evaporative losses of volatile organic compounds during the fuel transfer.

.5 All spills of hydrocarbon based products such as gasoline, kerosene, naphtha, lubricating oils, engine oils, greases and de-icing fluids or antifreeze no matter how large or small to be reported to Departmental Representative and the Park’s Environmental Protection Officer (EPO).

.6 Oil changes or equipment repairs in the field or on Parks Canada land are not permitted.

.7 Refueling to be performed on level surfaces, PCC Portland cement concrete or HMAC surfaces when approved by the Departmental Representative unless otherwise directed.

.8 Contractor to have drip pans sized for amounts of product to be recovered and customized to fit under pieces of equipment to perform

routine maintenance to equipment while maintaining equipment on property. Drip Pans to be used whenever leaving equipment on site or parking overnight when not in use.

.9 Parking of equipment on site to be on level ground in locations away from watercourses and as approved by Departmental Representative. Equipment with leaks or poor mechanical repair to be removed from site when so ordered by Departmental Representative.

1.2 Spill Control Kit

.1 Contractor to have at the work site a spill control kit consisting of the following minimum types of equipment:

.1 a spaded shovel;
.2 a stable broom;
.3 a broad nosed shovel;
.4 a container(s) suitable, compatible to and of sufficient size to contain petroleum products being used with equipment;
.5 Absorbents;
.6 rags;
.7 metal container for soiled rags;
.8 Booms when working next to a watercourse that will traverse the width of the watercourse by two times; and
.9 Spill control kit to be inspected and approved by both the Newfoundland and Labrador Department of Environment & Conservation and the Departmental Representative prior to Work commencing. Spill control kits to be available to Contractor employees at all areas where Work of the Contract is being performed and at all times during the course of the Contract.
.10 Contractor employees to be trained in the use of the spill control kit and the equipment they contain.

1.3 Spills

.1 Disposal of spilled materials to be off Parks Canada property and at approved locations for materials to be disposed of.

.2 When parking of equipment on site, the equipment is to be secured from entry, inspected for leaks and the ground protected

from leaks.

.3 Contractor to protect all wells, catch basins, drywells, drains and watercourses from contamination in event of a spill.

.4 All equipment to be used for the Work of the Contract to be inspected by the Departmental Representative for leaks. Equipment not in good repair to be removed/repaired when directed by Departmental Representative.

.5 Spills to be reported immediately to Departmental Representative, the Park’s Environmental Protection Officer (EPO) and the Newfoundland and Labrador Department of Environment and Conservation.

.6 Contractor to immediately remove as much or all of the contaminated soils as possible, from any spills created from Work of the Contractor.

.7 Contaminated soils/materials to be placed in containers compatible to the contaminants.

.8 Any remaining clean-up to be performed at no extra cost to Parks Canada. Clean-up to be to the Departmental Representative's satisfaction.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures

1.2 Inspection

.1 Give minimum 24-hours' notice requesting inspection of Work designated for special tests, inspections or approvals by Departmental Representative or by inspection authorities having jurisdiction.

.2 In accordance with the General Conditions, Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents.

.3 If Contractor covers or permits to be covered Work designated for special tests, inspections or approvals before such is made, uncover Work until particular inspections or tests have been fully and satisfactorily completed and until such time as Departmental Representative gives permission to proceed.

.4 Pay costs to uncover and make good work disturbed by inspections and tests.

1.3 Testing

.1 Tests on materials, as specified in various sections of the Specifications are the responsibility of the Department except where stipulated otherwise.

.2 Departmental Representative will engage and pay for service of Independent Inspection and Testing Agencies for purpose of inspecting and testing portions of Work except for the following which remain part of Contractor's responsibilities:

.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Mill tests and certificates of compliance.

.4 Tests as specified within various sections designated to be carried out by Contractor under the supervision of Departmental Representative.

.5 Additional tests specified in Clause 1.3.2.

1.4 Access to Work

.1 Facilitate Departmental Representative's access to Work. If part of Work is being fabricated at locations other than construction site, make preparations to allow access to such Work whenever it is in progress.

.2 Furnish labour and facility to provide access to the work being inspected and tested.

.3 Co-operate to facilitate such inspections and tests.

1.5 Rejected Work

.1 Remove and replace defective Work, whether result of poor workmanship, use of defective or damaged products and whether incorporated in Work or not, which has been identified by Departmental Representative as failing to conform to Contract Documents.

.2 Make good damages to new construction and finishes resulting from removal or replacement of defective work.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 01 52 00 - Construction Facilities.

.2 Section 01 56 00 - Temporary Barriers and Enclosures.

1.2 Installation and Removal

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use or as directed by Departmental Representative.

1.3 Dewatering

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

.2 Ensure discharge is not contaminated with sediment, oil, etc.

1.4 Temporary Heating and Pumping

.1 Pay for costs of temporary heat, and pumping used during construction, including costs of installation, fuel, operation, maintenance and removal of equipment, if applicable.

.2 Maintain strict supervision of operation of temporary heating and pumping equipment:
- .1 Conform with applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.

1.5 Temporary Power and Light

.1 Departmental Representative will not provide and pay for temporary power during construction for temporary lighting and operating of power tools.

.2 Arrange for connection with appropriate utility company. Pay all costs for installation, maintenance and removal.

.3 Provide and maintain temporary lighting throughout project.

.4 Coordinate with all Parks Canada Staff and Departmental Representative.

.5 Install temporary facilities for power to approval of local power supply authorities.

.6 Provide and pay for temporary power and lights

for use of Departmental Representative site office.

1.6 Temporary Communication Facilities

.1 Provide and pay for temporary telephone, fax and data hook up, line(s) and equipment as necessary for own use and use of Departmental Representative.

1.7 Fire Protection

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

1.8 Sanitary Facilities

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

.3 All surface modifications are restricted to the identified corridors. Accurate delineation of these corridors by field survey is required prior to commencement of construction.

1.09 Storage Sheds

.1 Provide adequate weathertight sheds with raised floors, for storage of materials, tools and equipment which are subject to damage by weather.

1.10 Access

.1 Provide and maintain adequate access to project site.

.2 Build and maintain temporary roads where approved and provide snow removal during period of work.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

.4 All surface modifications are restricted to the identified construction corridors. Accurate delineation of these corridors by field survey prior to commencement of

construction is required.

.5 All vehicle traffic is restricted to existing roadways or as indicated in project plans. A field visit will be scheduled with the Contractor for locational confirmation and all areas of proposed construction will be marked in the field with orange flagging tape prior to commencement of work.

1.11 Temporary Water Crossing

.1 Construct culverts in the dry. Contractor shall maintain culvert excavations, including the culvert bedding construction free of any standing or flowing water.

.2 Design and erect a temporary watercourse crossing at the general location indicated and in reasonable conformity to the lines and levels shown on the Drawings to divert traffic during the construction of the proposed culverts.

.3 Temporary roadway and watercourse crossing shall be capable of handling two lane, two-way traffic.

.4 Detailed design of temporary crossing is the responsibility of the Contractor. Roadway widths, shoulder widths or other geometrical requirements not specified in the Contract Documents, shall comply with the TAC Geometric Design Guide for Canadian Roads (50km/hr design speed). Submit detailed design to the Departmental Representative for review at least 14 days prior to the scheduled installation of the temporary crossing.

.5 Detailed design of the temporary crossing must be completed by a professional engineer eligible to practice within the Province of Newfoundland and Labrador and the design must bare his/her seal.

.6 Hydraulic Design, structural design, and placement of the temporary crossing shall be the responsibility of the Contractor and the risk for selection of an appropriate design flow shall be borne by the Contractor.

.7 The Contractor shall provide, in writing, a detailed installation procedure to the Departmental Representative for review at least 14 days days prior to the scheduled installation of the temporary crossing. Installation shall not commence without the Departmental Representative's approval of the installation procedure.

.8 The following items shall be addressed in the procedure, but not limited to as a minimum:
- .1 Construction scheduling
- .2 Temporary flow control schedule, procedure and methodology.
- .3 Description, sizes, shapes, materials and configuration of the proposed temporary crossing structure(s).

PART 2 – PRODUCTS

2.1 Not Used .1 Not Used

PART 3 – EXECUTION

3.1 Not Used .1 Not Used

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Project identification.

1.2 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 Related Sections

.1 Section 01 56 00 - Temporary Barriers and Enclosures.

1.4 References

.1 Canadian General Standards Board (CGSB)
- .1 CGSB 1-GP-189M-84, Primer, Alkyd, Wood, Exterior.
- .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
- .1 CAN3-A23.1-/A23.2-94, Concrete Materials and Methods for Concrete Construction/Method of Test for Concrete.
- .2 CSA-0121-M1978, Douglas Fir Plywood.
- .3 CAN/CSA-Z321-96, Signs and Symbols for the Occupational Environment.

1.5 Installation and Removal

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.6 Scaffolding

.1 Provide and maintain scaffolding, ladders and temporary stairs.

1.7 Hoisting

.1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.2 Hoists cranes shall be operated by qualified operator.

1.8 Site Storage/Loading

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.9 Construction Parking

.1 Parking will be limited to Contractor vehicles and equipment required to carry out work only, provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.3 Build and maintain temporary roads where indicated or directed by Departmental Representative and provide snow removal during period of Work.

.4 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.10 Security

.1 Contractor shall provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays (24 hours per day, 7 days per week).

1.11 Departmental Representative's Site Offices

.1 Contractor to provide Departmental Representative's office trailer/space. Minimum office trailer/space size is 40 m^2.

.2 Contractor to arrange and pay for phone, fax machine, internet connection and photocopier in Departmental Representative's office for its exclusive use. Long distance calls placed on this phone and fax to be paid for by Departmental Representative. Replacement cartridges for printer and photocopier to be

supplied by contractor.

.3 Contractor to equip office with washroom, kitchen and one (1) separate office, two (2) 1 m x 2 m tables, one (1) 1 m x 2 m drafting table, four (4) chairs, 6 m of shelving 300 mm wide, one (1) three-drawer filing cabinet, one (1) plan rack and one (1) coat rack and shelf.

.4 Upon completion of the Contract; all equipment and furniture provided by the Contractor shall be returned to contractor.

.5 Supply of the Departmental Representative's office, supplies and services will be incidental to the work. Payment to be included in the lump sum portion of the work.

.6 Contractor to ensure site office is supplied and operational within fourteen (14) days after contract award.

.7 Provide garbage and cleaning services bi-weekly.

.8 Maintain inside air temperature at 20 degrees.

1.12 Testing Labratory

.1 Provide testing laboratory at aggregate production site and at asphalt concrete plant for exclusive use of Departmental Representative.

.1 Testing laboratory shall be to a standard not less than that shown in the NL DTW Standard Specification, Division 12, Drawing 1203: Field Laboratory, with the following exception: Remove references to Asphalt Ignition Oven and Exhaust system. Testing laboratory shall include in this place equipment and exhaust system to facilitate chemical extraction testing to the requirements of ASTM D2172, Method 'A'. The testing laboratory may not differ from these plans without prior written approval from the Departmental.

.2 Supply all equipment and supplies, including consumables such as cooking spray, paper towel, hand soap, tetrachloroethylene, and anything else required by the Department Representative

to facilitate testing. The Contractor shall also be responsible for proper disposal of all consumables.

.3 Provide water, electrical power and propane to testing laboratory at aggregate production site, and at asphalt concrete plant.

.4 Notify Departmental Representative sufficiently in advance of operations to allow for assignment of Laboratory personnel and scheduling of tests.

.5 No separate payment to be made for Testing Laboratory. Cost shall be deemed incidental to Contract, and deemed to be included in the lump sum portion of the work.

.6 If testing laboratory at aggregate production site is required at the same time as testing laboratory at asphalt concrete production site, provide additional laboratory as required.

.7 Maintain inside air temperature at 20 degrees.

.8 Provide ventilation to meet the Occupational Health and Safety Act and Regulations.

.9 Refer to the DTW Specifications Book, standard drawing 1203, for minimum size and equipment requirements.

1.13 Equipment, Tool and Materials Storage

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.14 Sanitary Facilities

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.15 Construction

.1 No other signs or advertisements, other than

Signage

warning signs, are permitted on site.

.2 Signs and notices for safety and instruction shall be in both official languages Graphic symbols shall conform to CAN3-Z321.

.3 Maintain approved signs and notices in good condition for duration of project and dispose of off-site on completion of project or earlier if directed by Departmental Representative.

1.16 Weigh Scale and Scale House

.1 The scales shall be of such capacity to accurately weigh any single loaded truck arriving on the site. The contractor is advised that split weighing will not be permitted under any circumstances. The vehicle being weighed must be fully supported by the scale platform. Split or axle weighing is a method to be used only for highway weight restriction control.

.2 The scale shall be equipped with a portable scale house complete with furniture and adequate provision for heat, air conditioning and light.

.3 The Contractor shall periodically clean the scale house and maintain all lights, air conditioning, and heating in good working condition at all times when the scales are in use.

.4 The scale platform and mechanism shall at all times be maintained clean and free from encumbrances such as gravel, asphalt, snow, and ice.

.5 Scale houses must be equipped with suitable washroom facilities that meet the OHS Act and Regulations under Sections 13 and 14 of the Regulations. These facilities must be located within 100m of the scale house.

.6 These facilities must be provided for use of the Departmental Representative employees only for the duration of the project while scales are being used. These facilities must be cleaned twice weekly and in the case of a

portable toilet, emptied of sewage as well. Contractor must also supply toiletries for the facility.

.7 Ensure scale house is sufficient distance away from scales to prevent roll-over accidents.

END

PART 1 - GENERAL

1.1 Description

.1 This section is to provide traffic control as stipulated in the Department of Transportation and Works Traffic Control Manual (TCM), latest edition.

.2 Given the nature of the highway, its critical transportation link, effect on motorists, etc. it is imperative that Park personnel be kept notified as to the number of construction areas, their locations, duration of work, etc. This information must be provided by the contractor to the Park Communications staff on an ongoing basis.

.3 Preparation of the Traffic Control Plan is responsibility of the Contractor. A Traffic Control Plan must be reviewed and accepted by the Departmental Representative prior to commencing any work. Traffic Control Plan to be submitted prior to the pre-construction meeting.

.4 The Departmental Representative reserves the right to direct the contractor to reduce either the number or length of traffic control work areas during peak traffic volumes or when delays exceed the specified maximum in Article 1.10 of this Section.

1.2 Related Work

.1 Section 01 11 00 - General Instructions

.2 Section 01 35 29 - Health and Safety Requirements.

.3 Section 01 56 00 - Temporary Barriers and Enclosures.

1.3 Reference Standard

.1 Government of Newfoundland and Labrador Department of Transportation and works, Highway Design Division.
.1 Traffic Control Manual (TCM), latest edition.

1.4 Protection of Public Traffic

.1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is

necessary to carry out work or haul materials or equipment.

.2 When working on travelled way:
- .1 Place equipment in position to present minimum of interference and hazard to travelling public.
- .2 Keep equipment units as close together as working conditions will permit and preferably on same side of travelled way.
- .3 Do not leave equipment on travelled way overnight.

.3 Do not close any lanes of roadway without approval of Departmental Representative. Before re-routing traffic, erect suitable signs and devices in accordance with instructions contained in the TCM. Provide sufficient granular base material to ensure a smooth riding surface during work. (see Section 32 11 23 - Granular Base)

.4 Keep travelled way well graded, free of pot holes and of sufficient width that required number of lanes of traffic may pass.

.5 Ensure two (2) lanes of free flowing two-way traffic is maintained at construction site at all times.

.6 When directed by Departmental Representative, provide well graded, detours or temporary roads to facilitate passage of traffic around restricted construction area. Provide and maintain signs and lights and maintain roadway.

.7 Provide and maintain reasonable road access and egress to property fronting along or in vicinity of work under Contract unless approved otherwise by Departmental Representative.

.8 All flag persons and traffic control personnel shall have successfully completed a traffic control training course approved by the Workplace Health, Safety and Compensation Commission of Newfoundland and Labrador. Proof of training for all persons shall be available on site at all times.

1.5 Road Diversion

.1 Where the work requires a road diversion from the existing highway alignment in order to maintain traffic flow, the Contractor shall be responsible for the design, construction, maintenance and removal of such diversion. In providing the diversion, the Contractor shall comply with the requirements of the Traffic Control Manual for Roadway Work Operations in the province of Newfoundland. Diversions shall be approved prior to their installation. The specified minimum width of the top of a two (2) lane diversion shall be 9.0 metres.

.2 Where the road diversion requires a stream crossing, Contractor shall be responsible for sizing, designing, supplying, and installing such crossing to the requirements of all regulatory agencies and the park. Proposed diversion arrangement to be provided to the Departmental Representative for approval, along with copies of all approvals received from regulatory authorities, prior to starting any work on the diversion.

1.6 Informational and Warning Devices

.1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from project work which may require road user response.

.2 All traffic signs are to be bilingual or symbolic and shall be Level 1 reflectivity.

.3 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in TCM.

.4 Place signs and other devices in locations recommended in the TCM.

.5 The Contractor shall be responsible to have a full time Contractor’s Safety Officer (CSO) on site for the duration of the project. The CSO will be responsible to supervise the placement and dismantling of all temporary condition signs and devices that indicate to the road user that highway construction activity exist and also to ensure that proper traffic control procedures are carried out in accordance with

the TCM. The CSO is considered part of the Contractor's supervision and administration staff and compensation for the provision this individual is considered incidental to the work.

.6 Continually maintain traffic control devices in use by:
- .1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance
- .2 Removing or covering signs which do not apply to conditions existing from day to day.
- .3 Check reflectivity and suitability of signs under nighttime conditions and during daytime conditions.

.7 Provide automatic traffic lights at both ends of any road diversion for the duration of the work, and maintain them in good working condition at all times.

1.7 Portable Variable Message Signs

.1 It is a requirement that electronic signage (trailer mounted) be employed at both ends of the work area, notifying the general public that construction will be occurring over the next 3 km, along with anticipated delay times, etc. Notification signage is critical for this project, given the traffic volumes and potential for accidents to occur. Messages shall be bi-lingual.

.2 The Portable Variable Message Signs (PVMS)shall exhibit the following operating characteristics while in use:
- .1 Light emitting diode (LED) technology or hybrid LED/Flip Disk Technology.
- .2 Antiglare polycarbonate sheeting.
- .3 Solar powered.
- .4 Capable of operating for 7 consecutive days on battery power supply with solar panels disconnected.
- .5 Shall include all hardware and software necessary to facilitate reliable local and remote sign control.
- .6 Programmable (25 message sequence for one week duration).

.7 Capable of displaying a multiphase message with variable dwell times for each phase.
.8 Text of message shall not scroll or travel horizontally or vertically across the face of the sign.
.9 Capable of displaying 3 lines of 8 characters, each character being approximately 457 mm high.
.10 Each character matrix comprised of 35 pixels, 5 wide by 7 high.
.11 Message visible from 500 metres away in all ambient light conditions.
.12 Message legible from 50 m to 300 m away in all ambient light conditions.
.13 Ability to raise the bottom of the display board a minimum of 1.5 metres above ground level.
.14 Flat black background on the display area when the pixels are in the off position.
.15 Trailer painted orange or yellow.
.16 Capability to accurately level the sign and aim it towards oncoming traffic.
.17 Photo sensor array to enable the luminance of the sign to be controlled both automatically and manually in relation to ambient light levels.
.18 Locking device to prevent rotation of the sign in winds up to 10-km/hour, while the sign is in display mode.

.3 The maximum dimensions of the Portable Variable Message Sign and trailer assembly while in display mode shall be as follows:
.1 Maximum overall height = 4.5 metres.
.2 Maximum overall width = 3.75 metres.
.3 Maximum overall length = 5.5 metres.
.4 Maximum gross unit weight = 2500 kilograms.

.4 For Conspicuity Markings, the PVMS trailer assemblies shall require high reflectivity micro-prismatic fluorescent sheeting tape (or equivalent) (e.g. diamond grade or Type VII) (meeting ATSM standard E991 and ASTM E1247 for fluorescent materials). The reflectorized tape shall be of alternating, uniform white and orange or white and yellow sections. Sections of reflectorized tape shall be placed around the trailer frame, tongue or other outermost

dimension, at uniform height and width such to reflect the light from the headlights of a vehicle approaching from any direction.

.1 PVMS sign assemblies shall require high reflectivity micro-prismatic fluorescent sheeting tape (or equivalent) (e.g. diamond grade or Type VII) ((meeting ATSM standard E991 and ASTM E1247 for fluorescent materials). The reflectorized tape shall be construction orange in colour, and 13 mm in width. The tape shall surround the outside of the sign assembly on all sides and be uniform distance from the outmost pixels.

1.8 Control of Public Traffic

.1 Provide traffic control personnel who have valid provincial certification and are trained in accordance with and property equipped as specified in the Traffic Control Manual, in following situations:

.1 When public traffic is required to pass working vehicles or equipment which may block all or part of travelled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

.3 When workers or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 Where temporary protection is required while other traffic control devices are being erected or taken down.

.5 For emergency protection when other traffic control devices are not readily available.

.6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.2 All Traffic Control Personnel shall be equipped with portable radios only, not cellular devices. Any flagperson using cellular devices, except for emergency use only, shall be deemed incompetent and shall be removed from

the work site immediately. The Department shall not be held responsible for any lost time incurred due to the removal of such an individual.

.3 All construction vehicles shall operate in accordance with and are subject to traffic control restrictions and operations in place on the project.

.4 In addition to traffic control during the normal hours of work, the Contractor shall have a responsible person on site at all times to monitor that the traffic signage is working properly (including nights, weekends, and holidays).

1.9 Traffic Management Plan Requirement

.1 Contractor to provide a Traffic Control Plan prior to construction for review and acceptance by the Departmental Representative.

1.10 Operational Requirements

.1 Maintain existing conditions for traffic throughout the period of contract except that, when required for construction under contract and when measures have been taken as specified herein and approved by Departmental Representative to protect and control public traffic, existing conditions for traffic may be restricted as follows:

.1 In accordance with the TCM.

.2 The maximum cumulative traffic delay for work carried out under this contract shall not exceed ten (10) minutes per vehicle for one-way travel on the Trans Canada Highway.

.2 Maintain existing conditions for traffic crossing right-of-way containing work except that, when required for construction under this Contract and when measures have been taken as specified herein and approved by Departmental Representative, to protect and control public traffic.

END OF SECTION

PART 1 - GENERAL

1.1 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 Related Sections

.1 Section 01 52 00 - Construction Facilities.

.2 Section 01 55 26 – Traffic Regulation.

1.3 References

.1 Canadian General Standards Board (CGSB)
- .1 CGSB 1.189M-84, Primer, Alkyd, Wood, Exterior.
- .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
- .1 CSA-O121-M1978, Douglas Fir Plywood.

.3 Government of Newfoundland and Labrador, Department of Transportation and works, Highway Design Division.
- .1 Traffic Control Manual (TCM), latest edition.

1.4 Installation and Removal

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.5 Guard Rails and Barricades

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

.2 Provide as required by governing authorities.

.3 Provide Traffic Control guide rails, barricades and delineators in accordance with Section 01 55 26 – Traffic Regulation.

1.6 Access to Site

.1 Provide and maintain access roads, as may be required for access to Work.

1.7 Public Traffic Flow	.1	Provide Traffic Control in accordance with Section 01 55 26 – Traffic Regulation.
1.8 Fire Routes	.1	Maintain access to properties for use by emergency response vehicles.
1.9 Protection for Off-Site and Public Property	.1	Protect surrounding private and public property from damage during performance of Work.
	.2	Be responsible for damage incurred.

END OF SECTION

PART 1 - GENERAL

1.1 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 Reference Standards

.1 Within text of each specifications section, reference may be made to reference standards.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

.5 Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date or issue is specifically noted.

1.3 Quality

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of fabrication or manufacture for any particular or like item throughout construction.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 Availability

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 Storage, Handling and Protection

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber, fencing on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 Transportation

.1 Pay costs of transportation of products required in performance of Work.

1.7 Manufacturer’s Instructions

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 Quality of Work

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.9 Coordination

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.10 Remedial Work

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 Existing Utilities

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 78 00 - Closeout Submittals.

1.2 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 References

.1 Owner's identification of existing survey control points and property limits.

1.4 Survey Reference Points

.1 The Departmental Representative will provide control points and initial layout of survey stakes.

.2 Contractor is to locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Contractor is to make no changes or relocations without prior written notice to Departmental Representative.

.4 Contractor is to report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 The Contractor is responsible to hire surveyor to replace control points in accordance with original survey control, if disturbed unnecessarily during construction activities. This shall not be cause for work delay claims.

1.5 Survey Requirements

.1 Departmental Representative shall establish permanent bench marks on site, as required, referenced to established bench marks by survey control points. Contractor shall record locations, with horizontal and vertical data in Project Record Documents.

.2 Departmental Representative shall establish lines and levels, locate and lay out, by instrumentation only once during construction.

Contractor shall protect layout and provide their own layout if original layout is disturbed or removed.

.3 Departmental Representative shall stake for grading, fill and topsoil placement and stake slopes once during construction. Contractor shall protect layout and provide their own layout if original layout is disturbed or removed

.5 Departmental Representative shall establish pipe invert elevations and location of any exposed pipe not being removed under this contract.

.6 Contractor shall record elevation and location of all existing and installed end caps of abandoned underground services.

.7 Contractor shall provide coordinates, elevations and dimensions in the field, as required by the Departmental Representative.

1.6 Existing Services

.1 Before commencing work, the Contractor is to establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Contractor is to complete locates of all underground utility services and facilities prior to commencing work.

1.7 Records

.1 Contractor shall maintain a complete, accurate log of control and survey work as it progresses.

.2 Contractor shall, on completion of site works, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Contractor shall record locations of maintained, re-routed and abandoned service lines.

END OF SECTION

PART 1 - GENERAL

1.1 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 Related Section

.1 Section 01 77 00 - Closeout Procedures.

1.3 Project Cleanliness

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use clearly marked separate bins for recycling.

.6 Remove waste material and debris from site and deposit in waste container at end of each working day.

.7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.8 Dispose of waste materials, and debris off site at approved facilities.

1.4 Final Cleaning

.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than

that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.

.4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.6 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.7 Remove dirt and other disfiguration from exterior surfaces.

.8 Sweep and wash clean paved areas.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

1.2 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 Definitions

.1 Materials Source Separation Program (MSSP): Consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.2 Recyclable: Ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.

.3 Recycle: Process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.4 Recycling: Process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.5 Reuse: Repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.6 Salvage: Removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.7 Separate Condition: Refers to waste sorted into individual types.

.8 Source Separation: Acts of keeping different types of waste materials separate beginning from first time they became waste.

1.4 Documents

.1 Maintain at job site, one copy of following documents:
.1 Material Source Separation Plan.

1.5 Submittals

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

.2 Prepare and submit following prior to project start-up:
.1 Submit two (2) copies of Materials Source Separation Program (MSSP) description.

1.6 Waste Reduction Workplan (WRW)

.1 Prepare, Waste Reduction Workplan.

.2 Structure WRW to prioritize actions and follow as first priority Reuse, then followed by Recycle.

.3 Describe management of waste.

.4 Post workplan or summary where workers at site are able to review its content.

1.7 Materials Source Separation Program (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up. The Demolition Waste Audit (DWA), with related weight bills and/or receipt must be submitted on a monthly basis with the Contractor's monthly Progress claim.

.2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.4 Provide containers to deposit reusable and recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.6 Locate separated materials in areas which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separated condition.
.1 Transport to approved and authorized recycling facility.

1.8 Storage, Handling and Protection

.1 Store, materials to be reused, recycled and salvaged in locations as specified in MSSP.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed for demolition from movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.

.7 Protect surface drainage, mechanical and electrical from damage and blockage.

.8 Separate and store materials produced during dismantling of structures in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
.1 On-site source separation is recommended.
.2 Remove co-mingled materials to off-site

processing facility for separation.
.3 Provide waybills for separated materials.

1.9 Disposal of Wastes

.1 Do not bury rubbish or waste materials.

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

.3 Keep records of construction waste including:
.1 Number and size of bins.
.2 Waste type of each bin.
.3 Total tonnage generated.
.4 Tonnage reused or recycled.
.5 Reused or recycled waste destination.

.4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

.5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

1.10 Use of Site and Facilities

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Maintain security measures established by PCA.

1.11 Scheduling

.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

.1 Not Applicable

PART 3 - EXECUTION

3.1 Application

.1 Do Work in compliance with WRW.

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

3.2 Cleaning

.1 Remove tools and waste materials on completion of Work and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION

PART 1 - GENERAL

1.1 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 Related Sections

.1 Section 01 78 00 - Closeout Submittals.

.2 Section 01 74 11 - Cleaning.

1.3 Inspection and Declaration

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

- .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
- .2 Request Departmental Representative's Inspection.

.2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:

- .1 Work has been completed and inspected for compliance with Contract Documents.
- .2 Defects have been corrected and deficiencies have been completed.
- .3 Work has been completed and in compliance with Workplace Health, Safety and Compliance Commission of Newfoundland and Labrador (WHSCC).
- .4 Operation of systems have been demonstrated to Departmental Representative's personnel.
- .5 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative, in conjunction

with Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

END OF SECTION

PART 1 - GENERAL

1.1 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 – Testing and Quality Control.

.3 Section 01 71 00 - Examination and Preparation.

.4 Section 01 77 00 - Closeout Procedures.

1.3 Submission

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Departmental Representative's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two (2) weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four (4) final copies of operating and maintenance manuals in English.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged, free of defects, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.8 Pay costs of transportation.

1.4 Format

.1 Organize data in the form of an instructional

manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dxf or dwg format on diskettes or CD.

1.5 Contents - Each Volume

.1 Table of Contents: provide title of project;
- .1 date of submission; names,
- .2 addresses, and telephone numbers of Consultant and Contractor with name of responsible parties;
- .3 schedule of products and systems, indexed to content of volume.

.2 For each product or system:
- .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 clearly identify specific products and component

parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 – Testing and Quality Control.

1.6 As-Builts and Samples

.1 Maintain at the site for Departmental Representative one record copy of:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to the Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

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

1.7 Recording Actual Site

.1 Record information on set of opaque drawings, provided by Departmental Representative.

Conditions

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
- .1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
- .2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
- .3 Field changes of dimension and detail.
- .4 Changes made by change orders.
- .5 Details not on original Contract Drawings.
- .6 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
- .2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.8 Final Survey

.1 Contractor is to submit final site survey certificate, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.9 Warranties and Bonds

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

.2 List subcontractor, supplier, and

manufacturer, with name, address, and telephone number of responsible principal.

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

.4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

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

1.10 Materials and Finishes

.1 Building Products, Applied Materials, and Finishes: include produce data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 03 20 00 - Concrete Reinforcing.

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

1.2 References

.1 American Concrete Institute (ACI)
  .1 ACI 301-10, Specifications for Structural Concrete.

.2 Canadian Standards Association (CSA International)
  .1 CAN/CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.
  .2 CAN/CSA-O86-14, Engineering Design in Wood (Limit States Design).
  .3 CSA O121-08(R2013), Douglas Fir Plywood.
  .4 CSA O151-09(R2014), Canadian Softwood Plywood.
  .5 CSA O153-13, Poplar Plywood.
  .6 CSA S269.1-16, Falsework and Formwork.

1.3 Shop Drawings

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

.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1-16, for falsework and formwork drawings.

.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.

.4 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

1.4 Responsibility

.1 Design for method and schedule of construction, shoring, stripping and re-

shoring procedures, materials, arrangement of joints, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA-S269.1-16 for formwork drawings.

1.5 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and the Waste Reduction Workplan.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

.4 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

1.6 Delivery, Storage And Handling

.1 Deliver, handle and store formwork materials to prevent weathering, warping or damage detrimental to the strength of the materials or to the surface to be formed.

.2 Ensure that formwork surfaces which will be in contact with concrete are not contaminated by foreign matter. Handle and erect the fabricated formwork so as to prevent damage.

PART 2 - PRODUCTS

2.1 Materials

.1 Formwork materials:
- .1 Use formwork materials to CAN/CSA-A23.1 and CAN/CSA S269.1.

.2 Form ties:
- .1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface. Holes are to be filled with non-shrink grout.
- .2 Adjustable in lengths to permit tightening and alignment of forms.
- .3 Form tie colour shall be grey.

.3 Form release agent: compatible with repair

materials, non-toxic, biodegradable, low VOC, chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.

.4 Falsework materials: to CSA-S269.1.
.1 Materials required to bear grade marks, or be accompanied with certificates, test reports or other proof of conformity.

.5 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 and 24 mm^2/sat 40°C, flashpoint minimum 150°C, open cup.

PART 3 - EXECUTION

3.1 Fabrication and Erection

.1 Precast concrete for headwalls, cutoff walls and pads will also be accepted.

.2 Verify lines, levels and centers before proceeding with formwork/falsework and ensure dimensions agree with drawings. Review all drawings and check dimensions prior to construction for proper fit and report any discrepancies before proceeding with the work

.3 Assemble formwork so that concrete is not damaged during its removal.

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

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

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

.7 Fabricate and erect formwork in accordance with CAN/CSA-S269.1 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.8 Align form joints and make watertight. Keep

form joints to minimum.

.9 Make the form mortar tight by sealing with building tape or sealants along all joints.

.10 Where concrete is to remain exposed, use 25 mm chamfer strips on external corners and 25 mm fillets at interior corners, joints, unless specified otherwise.

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

.12 Prior to placing concrete, the elevations of forms shall be checked to verify conformance to required shapes.

.13 Provide 48 hour notice to Departmental Representative for inspection prior to concrete placement.

.14 Clean formwork to remove foreign matter. Remove cuttings, shavings and debris from within forms. Flush completely with water to remove remaining foreign matters. Ensure that water and debris drain to exterior through clean-out ports.

.15 During cold weather, remove ice and snow from within forms, do not use de-icing salts. Do not use water to clean out completed forms, unless formwork and concrete construction proceed within a heated enclosure.

.16 Repair concrete will be placed within the working time of bonding coats.

.17 Patch all form tie holes and finish surface to remove all evidence of tie holes and/or patching.

.18 Construction Joints:
.1 Form construction joints where required and as approved.

.19 Build in anchors, sleeves, and other inserts required to accommodate work specified in other sections.

.20 Clean formwork in accordance with CSA

A23.1/A23.2 before placing concrete.

3.2 Remove and Reshoring

.1 Notify Departmental Representative prior to form removal.

.2 Form removal times are dependent on proper curing in accordance with CAN/CSA-A23.1 and CSA S269.1. Provide written evidence of concrete strength to the Departmental Representative 24 hours prior to form removal to show that suitable strength has been achieved. Contractor shall pay for the concrete cylinder strength tests to demonstrate concrete strength prior to form removal.

.3 Remove formwork progressively and in accordance with the reference code requirements, and so that no shock loads or imbalanced loads are imposed on the structure.

.4 Leave formwork in place for following minimum periods of time after placing concrete.

.1 3 days or at achievement of 80% of 28-day design strength for walls and vertical surfaces.

.2 28 days for upper culvert, 'slab', section or seven (7) days when replaced immediately with adequate shoring and concrete has achieved at least 70% of its 28 day design strength.

.5 Remove forms not directly supporting the weight of concrete as soon as stripping operations will not damage concrete.

.6 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

.7 Loosen forms carefully. Do not wedge pry bars, hammers or tools against concrete surfaces.

.8 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.9 Remove all forms. Do not leave any forms in

place after completion of project.

3.3 Finishes

.1 Form finishes: to CSA A23.1 and ACI 301 as follows:

.1 Exposed interior culvert surface "Smooth Form Finish".

.2 Sides of footings, walls and formed surfaces buried below earth: Rough form finish.

.3 Surfaces of culvert walls, wing walls and formed surfaces exposed to view: Rubbed finish as per ACI 301.

.2 Upper culvert surfaces: smooth troweled finish.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 03 10 00 - Concrete Forming and Accessories.

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

1.2 References

.1 American Concrete Institute (ACI)
- .1 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .2 ACI 315-99, Details and Detailing of Concrete Reinforcement.

.2 American Society for Testing and Materials International (ASTM)
- .1 ASTM A108-13, Standard Specification for Steel Bar, Carbon and Alloy, Cold finished.

.3 Canadian Standards Association (CSA)
- .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.
- .2 CSA-A23.3-14, Design of Concrete Structures.
- .3 CSA G30.3-M1983(R1998), Cold Drawn Steel Wire for Concrete Reinforcement.
- .4 CSA-G30.18-09 (R2014), Carbon Steel Bars for Concrete Reinforcement.
- .5 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)
- .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 Shop Drawings

.1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate

sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada. ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.3 Detail lap lengths and bar development lengths to CSA-A23.3, unless otherwise indicated. Provide Class B tension lap splices unless otherwise indicated.

.4 Each shop drawing submitted to bear the stamp and signature of a qualified Professional Engineer registered in the Province of Newfoundland and Labrador

1.4 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and the Waste Reduction Workplan.

PART 2 - PRODUCTS

2.1 Materials

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

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

.3 Cold-drawn annealed steel wire ties: minimum 1.5 mm diameter to CAN/CSA G30.3.

.4 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2, adequate for strength and support of reinforcing during construction conditions, all of which to be non-staining. Do not use metal chairs. Colour to be grey where all or portions of the chair may remain exposed.

.5 Fabricate to the following tolerances:
.1 Sheared length + 25 mm.
.2 Stirrups + 10 mm.
.3 Other bends + 25 mm.

.6 Mechanical splices: subject to approval of

Departmental Representative.

2.2 Fabrication

.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada. ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures unless indicated otherwise.

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

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

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

2.3 Source Quality Control

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum two (2) weeks prior to beginning reinforcing work. Mill certificates shall be in accordance with CAN/CSA G30.18.

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

PART 3 - EXECUTION

3.1 Examination

.1 Examine work related to this section and report discrepancies to Departmental Representative.

.2 Commencement of work shall imply acceptance of conditions.

3.2 Field Bending

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

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

.3 Replace bars which develop cracks or splits.

3.3 Placing Reinforcement

.1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.

.2 Provide all chairs, braces, lateral support, headers, ties, etc. to secure reinforcing in place during construction.

.3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

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

.5 Under no circumstances will any traffic or vehicles of any kind, including concrete trucks be permitted to travel over the reinforcing prior to concrete being placed and acceptably cured.

.6 After reinforcing is placed and prior to closing of forms, notify the Departmental Representative for inspection of the Work.

.7 Reinforcement shall be adequately supported by chairs, spacers or hangers and secured against displacement within the tolerance permitted and in accordance with the latest ACI Standard 315.

3.4 Cleaning

.1 Clean reinforcing before placing concrete to CAN/CSA-A23.1.

3.5 Storage

.1 Store reinforcing steel to prevent deterioration, contamination or disfigurement.

.2 Store reinforcing steel off the ground.

END OF SECTION

PART 1 - GENERAL

1.1 Description

.1 This section specifies requirements for supply, placing, finishing, protecting and curing cast-in-place concrete for concrete headwalls.

1.2 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 35 29 – Health and Safety Requirements.

.3 Section 01 45 00 – Quality Control.

.4 Section 03 10 00 - Concrete Forming and Accessories.

.5 Section 03 20 00 - Concrete Reinforcing.

.6 Section 31 23 10 – Excavating, Trenching and Backfilling.

1.3 References

.1 American Concrete Institute (ACI)
- .1 ACI 117-10, Standard Tolerances for Concrete Construction and Materials.

.2 American Society for Testing and Materials International (ASTM)
- .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-13, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM C881/C881M-10, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- .5 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.3 Canadian Standards Association (CSA)
- .1 CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test

Methods and Standard Practices for Concrete.

.2 CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.

.3 CSA-A3000-08, Cementitious Materials Compendium.

.4 Government of Newfoundland and Labrador, Department of Transportation and Works, Highway Design Division, Specifications Book, latest version.

1.4 Certificates

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

.2 Provide certification indicating the concrete supplier is certified in accordance with the Atlantic Provinces Ready Mix Concrete Association Program or equivalent.

.1 Only concrete supplied from such certified plants shall be acceptable to the Departmental Representative.

.2 Plant certification shall be maintained for the duration of the fabrication and erection until the warranty period expires.

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

.4 Provide mix design in compliance with CSA-A23.1 to provide concrete of quality, yield and strength as specified under 2.2 Mix Design. Mix design to be prepared by and stamped by an engineer licensed to practice in the Province of Newfoundland and Labrador.

.5 Minimum two (2) weeks prior to starting concrete work, submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:

.1 Portland cement.

.2 Blended hydraulic cement.

.3 Supplementary cementing materials.

.4 Admixtures.

.5 Aggregates.
.6 Water.

1.5 Quality Assurance

.1 Quality Assurance: in accordance with Section 01 45 00 – Quality Control.

.2 Submit to Departmental Representative, minimum four (4) weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
.1 When plant does not hold valid certification, provide test data and certification by qualified independent inspection and testing laboratory that materials used in concrete mixture will meet specified requirements.

.3 Minimum four (4) weeks prior to starting concrete work, submit proposed quality assurance procedures for review by Departmental Representative on following items:
.1 Falsework erection.
.2 Hot weather concrete.
.3 Cold weather concrete.
.4 Curing.
.5 Finishes.
.6 Formwork removal.
.7 Joints.

.4 Quality Control Plan: submit written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

.5 Health and Safety Requirements: perform construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.6 Waste Management and Disposal

.1 Designate a cleaning area for concrete trucks off site, at a company owned site for such a purpose meeting all federal and provincial requirements.

.2 Use trigger operated spray nozzles for water hoses.

.3 Designate a cleaning area for tools to limit water use and runoff.

.4 Carefully coordinate the specified concrete work with weather conditions.

.5 Ensure emptied containers are sealed and stored safely for disposal away from children.

.6 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.

.7 Choose least harmful, appropriate cleaning method which will perform adequately.

1.7 Delivery, Storage And Handling

.1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
- .1 Modifications to maximum time limit must be agreed to by Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
- .2 Deviations to be submitted for review by Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

PART 2 - PRODUCTS

2.1 Materials

.1 All materials for concrete structure to be in accordance with the Newfoundland and Labrador Department of Transportation and Works Specifications Book, 2011 edition, Section 904 – Concrete Structures, article 904.02 – Materials.

2.2 Mixes

.1 The contractor shall be responsible for the concrete mix design.

.2 It shall be the responsibility of the Contractor to ensure that the mixture proportions shall be properly batched, mixed, placed and cured such that the concrete conforms to the specifications.

.3 Mix designs to be in accordance with the Newfoundland and Labrador Department of Transportation and Works Specifications Book, 2011 edition. Mix designs to produce the specified properties and meet the parameters listed in the table given in article 904.04.02 - Concrete Quality as follows:

.1 For concrete in culvert headwalls and footings: meet parameters listed for substructure, 40 MPa concrete.

.4 Where admixtures are used, do not allow end-of-truck slump with admixtures to exceed 150mm.

.5 In sufficient time before placement, submit all concrete mix designs to Departmental Representative for approval. No concrete shall be placed before mix designs are approved.

.6 Obtain authorization from Departmental Representative for use of super plasticizing admixture, water reducer and all other admixtures. Add plasticizer, water reducer and/or other admixtures as approved by Departmental Representative to achieve desired concrete properties. Pay for all admixtures required.

.7 Provide quality management plan to ensure verification of concrete quality to specified performance.

.8 Use of Calcium Chloride not permitted.

PART 3 - EXECUTION

3.1 Preparation

.1 Obtain Departmental Representative’s approval before placing concrete. Provide 24 hours’ notice prior to placing of concrete.

.2 Place, consolidate, finish, cure and protect concrete to CAN/CSA-A23.1 except where specified otherwise.

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

.4 Secure in position reinforcing steel, embedded parts, anchor bolts and dowels etc. prior to placing concrete and ensure these are not disturbed during concrete placement in accordance with CAN/CSA A23.1.

.5 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.

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

.7 Do not place load upon new concrete until authorized by Departmental Representative.

.8 During concreting operations:
.1 Development of cold joints not allowed.
.2 Ensure concrete delivery and handling facilities placing with minimum of rehandling, and without damage to existing structure or work.

.9 Ensure that reinforcement and formwork are thoroughly clean before placing.

.10 Place concrete in dry conditions.

.11 Ensure that foundation bearing materials are free from water and frost. Remove previously frozen bearing materials.

.12 Keep excavation dry while placing concrete.

.13 All dowels shall be placed before concrete footings are poured.

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

.15 Maintain adequate frost protection to all soils under footings for entire duration of work.

.16 Protect previous work from staining.

.17 Bond fresh concrete to hardened concrete to CAN/CSA A23.1.

.18 Do not permit vertical free fall of concrete mix to exceed 1500 mm.

3.2 Construction

.1 Perform cast-in-place concrete work in accordance with CSA-A23.1/A23.2.

.2 Construction Joints
- .1 Construction joint locations shall be approved by Departmental Representative wherever they are not specifically designated on drawings.
- .2 Surface of concrete construction joints shall be cleaned and laitance removed.
- .3 Locate construction joints in wall and footings so as to least impair the strength of the structure and to Departmental Representative's approval. Construction joints shall be as detailed on design drawings.
- .4 Immediately before concrete is placed, all construction joints shall be wetted and standing water removed.

.3 Joint fillers.
- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative. When more than one (1) piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
- .2 Locate and form isolation, construction, expansion joints as indicated and as per CAN/CSA A23.1. Supply and install joint filler in strict accordance with manufacturer’s written instructions.

.4 Concrete shall not be placed on or against any surface (including rebar) that is at a temperature below 5°C (40°F).

.5 Concrete at time of deposit shall be between 10°C (50°F) and 30°C (85°F).

.6 Pour concrete continuously between predetermined construction and control joints.

.7 Carry out winter concreting in strict accordance with. CSA-A23.1/A23.2.

.8 Carry out hot weather concreting in accordance with CAN/CSA A23.1.

.9 Top surface of vertically formed lifts shall be generally level.

.10 Fill all construction joints in the completed concrete work minimum 28 days after casting employing an epoxy injection technique approved by Departmental Representative to completely seal cracks.

3.3 Formwork

.1 Install and strip formwork to CAN/CSA-A23.1 and Section 03 10 00 - Concrete Forming and Accessories.

3.4 Strike Off and Consolidation

.1 High speed internal poker vibrators shall be used to consolidate the concrete during placing. Final compaction of the surfaces shall be done by beam-type vibratory air screed as approved by Departmental Representative. A surcharge of approximately 65 mm of concrete will be maintained at the screed face during consolidation.

.2 Strikeoff and consolidation must be completed before excess water bleeds to the surface.

3.5 Finishing

.1 Only ACI certified or other pre-approved concrete finishers are to be utilized in finishing all concrete works. All work is to be finished to CAN/CSA-A23.1, and as specified below.

.2 The surface will be brought to the specified level by means of darbying or bull floating

which will be carried out immediately following screeding and must be completed before any bleed water is present on the surface. Surface tolerance to be 8 mm under a 3 metre straight edge.

.3 Finish slabs to elevations indicated on drawings.

.4 Strike off the surface with a straight edge.

.5 Hand tamp low slump concrete with jitterbug.

.6 Darby or bull float the surface to smooth and level the concrete.

.7 Allow bleed water or sheen to disappear.

.8 Float the surface by means of power and/or hand float where the concrete has hardened enough for a man to leave only slight footprints on the surface.

.9 Do not bring water and fines to the surface by over floating. Where extra floating is required the floating operation shall be repeated after the time interval necessary for any sheen to disappear and for concrete to set further.

.10 Steel trowel the concrete surfaces by means of power and/or hand trowel. Do not leave any hard, smooth, polished or burnished surface area.

.11 Do not bring water and fines to the surface by over troweling.

.12 Where required by the Departmental Representative, lightly broom surface with a soft bristle broom obtaining a fine and even textured finish with a non-slip finish. All brush strokes to be parallel across paving.

.13 The surface shall be true and accurate to a maximum tolerance of 1 mm in 500 mm.

3.6 Protection and Curing

.1 Cure to CAN/CSA-A23.1.

.2 Cure concrete by protecting it against loss of moisture, rapid temperature change and mechanical injury for at least 7 days after placement. After finishing operations have been completed, the entire surface of the newly placed concrete shall be covered by whatever curing medium is applicable to local conditions and approved by the Departmental Representative. The edges of concrete slabs exposed by removal of forms shall be protected with continuous curing treatment equal to the method selected for curing the slab and curb surfaces. Cure to CAN/CSA-A23.1. Have the equipment needed for adequate curing at hand and ready to install before actual concrete placement begins.

.3 When air temperature is at or below 5°C or when there is a probability of its falling to that limit within 24 hours of placing (as forecast by the nearest official meteorological office) cold weather protection as per CAN/CSA-A23.1 will be provided and the following:

.1 Housing - Protect concrete by a windproof shelter of canvas or other material to allow free circulation of inside air around fresh touch formwork and provide sufficient space for removal of formwork for finishing. Supply approved heating equipment capable of keeping inside air at a constant temperature sufficiently high to maintain concrete at following curing temperatures.

.1 For initial 3 days at a temperature of not less than 15°C nor more than 27°C at surface.

.2 Maintain concrete at 10°C for an extra 4 days plus the initial 3 days.

.3 In addition to the protective housing, the concrete must be cured as outlined in Clause 3.9.2 above.

3.7 Testing

.1 Quality Control Inspection and testing of concrete and concrete materials will be carried out by an independent testing agency in accordance with CAN/CSA A23.1/A23.2.

.2 For compressive strength testing of concrete a minimum of three (3) cylinders and two (2) field cured cylinders (for total of five (5) cylinders) are required for:
- .1 Each day's pour.
- .2 Each type of grade of concrete.
- .3 Each change of supplier.
- .4 Each 40 cubic meters or fraction thereof.
- .5 Test cylinders are required for testing at 7, 14 and 28 days as per requirements of CAN/CSA A23.1.
- .6 Test cylinders are required for testing at 56 days, in addition to requirements of CAN/CSA A23.1.
- .7 Conduct at least one (1) slump and one (1) air entrainment test with each compressive strength test.
- .8 In addition, each truck to be tested for air and slump.
- .9 Additional test specimen shall be taken whenever requested by Departmental Representative to verify concrete quality.
- .10 Additional test specimen shall be taken during cold weather concreting.

.3 Cure cylinders on job site under same conditions as concrete which they represent.

.4 Non-destructive Methods for Testing Concrete shall be in accordance with CSA-A23.1/A23.2.

.5 Inspection and testing by testing laboratory will not augment or replace contractor quality assurance nor relieve contractor of contractor responsibility.

3.8 Defective Work

.1 Repairs and classification of unacceptable concrete to be in accordance with CSA-A23.1/A23.2.

.2 Remove defective concrete and embedded debris and repair as directed by Departmental Representative.

.3 A cold joint, honeycombing or embedded debris in any concrete shall deem it defective. Remove and replace defective concrete as

directed by Departmental Representative.

.4 Remove to bare concrete curing compounds detrimental to application of specified finishes.

.5 Concrete to be supplied at the minimum strength requirement at 28 days. Tests indicating strengths lower than specified will necessitate further testing as required by Departmental Representative. Cost for such testing to be at the Contractor's expense. Should further tests confirm low values, Departmental Representative has the right to require strengthening of the affected area or removal and replacement of weak concrete all to the Contractor's expense.

.6 Repair all shrinkage cracks in the completed concrete work minimum 28 days after casting employing an epoxy injection technique acceptable to Departmental Representative to completely seal all such cracks.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

1.2 References

.1 Transportation Association of Canada:
.1 Manual of Uniform Traffic Control Devices for Canada, latest edition.

.2 American Association of State Highway and Transportation Officials (AASHTO)
.1 Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, (5th Edition).

.3 Newfoundland and Labrador Highway Traffic Act: Highway Sign Regulations, 1999

1.3 Samples

.1 At least four (4) weeks prior to commencing work, inform Departmental Representative of proposed sources of signage and components, and provide access for sampling. Provide shop drawings of sign product data and mock-ups to the Departmental Representative for review and acceptance.

1.4 Delivery, Storage and Handling

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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.

1.5 Design Requirements

.1 Sign supports to be capable of withstanding the summation of the following loads:

.1 Wind load in any direction of 0.60 kPa on signboards and 0.60 kPa on sign supports and appurtenances.

.2 Dead load of signboards, sign supports and appurtenances.

.3 Ice load of 0.25 kPa on one (1) face of signboards and around surface of all structural members and appurtenances.

.2 Structural deflections and vibration in accordance with American Association of State Highway and Transportation Officials (AASHTO), "Specifications for the Design and Construction of Structural Supports for Highway Signs".

PART 2 - PRODUCTS

2.1 Traffic Sign Posts .1 Wood:

.1 Lumber for posts shall be sound, well-seasoned, structural grade lumber, pressure treated eastern hemlock, western hemlock or BC fir and free from cracks and warp.

.2 Posts shall be sound and rot-free and shall conform with the requirements for No. 1 Structural Posts and Timbers, graded in accordance with the National Lumber Grading authority (NLGA) Standard Grading Rules for Canadian lumber.

.3 For field cut surfaces, preservative shall be 2% copper napthenate wood preservative, applied in two (2)coats.

.4 Treatment shall be completed in accordance with requirements of CSA-080.

.5 Minimum required depth of penetration of wood preservative shall be 13mm. To determine penetration, a borer core shall be taken from 20 pieces in each charge. If 80% of the borings meet the penetration requirements, the charge shall be accepted. The Departmental Representative may verify the penetration and retention of the preservative by the assay method.

.6 Incising will normally be required. However, this requirement will be waived if specifications for both penetration and

retention are satisfied. If it is determined that incising is required prior to pressure-treating, posts and blocks shall be incised on all four (4) sides and dried to their fibre saturation point of 25 to 30% at 25 mm depth.

.2 Fasteners:

.1 Bolts , nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.

.2 All steel bolts, nuts and washers shall conform to ASTM A 307 and shall be hot dip galvanized conforming to CSA-G164-M.

.3 Nails to secure reflectors shall be 30 mm galvanized flat head nails.

.3 Flat Aluminum Sign Panels:

.1 Aluminum sign panels must conform to ASTM B209M ASTM B209, alloy-temper 6061-T6 or 5052-H38. The blanks must be free from laminations, blisters, open seams, pits, holes, other defects that may affect their appearance or use. The thickness must be uniform and the blank commercially flat.

.4 Traffic Sign Retroreflective Sheeting and Lettering:

.1 All background sheeting applied to flat sheet and extruded panel signs must be in accordance with ASTM D4956, Type III, IV, VII, VIII, IX or XI retroreflective sheeting and must have Class 1, 3, or 4 adhesive backing. Retroreflective sheeting must be high intensity that is an unmetallized micro prismatic reflective material.

.2 Retroreflective sheeting must have sufficient adhesion, strength and flexibility such that the sheeting can be handled, processed and applied according to the manufacturer's recommendations without appreciable stretching, tearing, cracking or other damage.

.3 Non-reflective Lettering and Symbols:

.1 Non-reflective lettering and symbols: cut from vinyl film as specified in CGSB 62-GP-9M, or paint using required colour of finish paint or silk screen transparent ink.

.4 Sign identification:

.1 Apply sign number and date of installation with 25mm high stencil painted black letters on lower left back face of each signboard.

3.1 Sign Posts

.1 Wood:

.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 Drill holes in the post as indicated.

3.2 Location and Position of Signs

.1 Locate and erect all signs in accordance with the Drawings and MUTCD.

.2 Signs should be vertically mounted at right angles to the direction of, and facing, the traffic that they are intended to serve.

.3 Where mirror reflection from the sign face is encountered to such a degree as to reduce legibility, turn the sign slightly away from the road.

.4 Turn signs that are placed 9 m or more from the pavement edge toward the road.

.5 On curved alignments, determine the angle of placement by the direction of approaching traffic rather than by the roadway edge at the point where the sign is located.

.6 Mounted signs must present a smooth flat surface varying no more than 10 mm from a 1.2 m straightedge placed in any position on the face of the sign after erection.

.7 Mount signs on traffic signal posts with strap or clamp type sign supports.

.8 Each installed sign will be inspected by the Departmental Representative prior to acceptance.

.9 Correct defects, identified by Departmental Representative, in sign message, consistency of reflectivity, colour or illumination. Correct

angle of signboard and adjust luminaire aiming angle for optimum performance during night conditions to approval of Departmental Representative.

3.3 Installation

.1 Excavate holes for footings and sign posts such that when installed the installation is at least the required minimum depth in the ground.

.2 Footings shall be backfilled with selected fill which meets the Departmental Representative's approval. Backfill material shall not contain stones larger than 150 mm in any one dimension.

.3 Backfill materials shall be placed in layers of thickness not greater than 150 mm. Each layer shall be thoroughly compacted before the successive layer is placed.

.4 Backfill material around the sign post installations shall be brought up level with the surrounding ground and surplus excavated materials together with surplus backfill material shall be disposed of on the sides of fill, or as directed by the Departmental Representative.

3.4 Protection

.1 Place temporary covering on signboards where indicated. Covering to be capable of withstanding rain, snow and wind and be non-injurious to signboard. Replace deteriorated covering and remove covers as directed by Departmental Representative.

3.5 Cleaning

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END

PART 1 - GENERAL

1.1 Related Work

.1 Section 31 23 10 - Excavating, Trenching and Backfilling.

.2 Section 32 11 23 - Granular Base.

.3 Section 32 11 19 - Granular Subbase.

1.2 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D 4791-10, Standard Test Method for Flat Particles, Elongated Particles or Flat and Elongated Particles in Coarse Aggregate.

1.3 Source Approval

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling two (2) weeks minimum before starting production. The Contractor or his representative is to be present during sampling.

.2 Aggregate sources must be free of invasive species and capable of producing clean material to the satisfaction of the Departmental Representative.

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

.4 Should a change of aggregate source be proposed during work, advise Departmental Representative one (1) week in advance of proposed change to allow sampling and testing.

.5 Acceptance of an aggregate at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory.

1.4 Sampling

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

.2 Allow continual sampling by Departmental Representative during production.

.3 Provide Departmental Representative with access to source and processed material for sampling.

.4 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.

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

.6 Provide area for Departmental Representative lab trailer in accordance with Section 01 52 00 – Construction Facilities.

PART 2 - PRODUCTS

2.1 Materials

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

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
.1 Greatest dimension to exceed three (3) times least dimension.

.3 Fine aggregate satisfying requirements of applicable section to be one, or a blend of following:
.1 Natural sand.
.2 Manufactured sand.
.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.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.

PART 3 - EXECUTION

3.1 Development of Aggregate Source

.1 Contractors are advised, that should the Contractor wish to carry out his pit or quarry operations on lands for which the mineral and quarry rights are vested in the Crown, then the Department of Natural Resources requires that prior approval be obtained before pit or quarry operations may begin. It is the responsibility of the Contractor to obtain the quarry permit from the Department of Natural Resources.

.2 The Contractor is responsible for ensuring that his pit or quarry operations are carried out in conformity with all land-use or zoning regulations which may apply.

.3 Contractors wishing to set up an aggregate washing operation at a site must first obtain environmental approval before proceeding. Contractors must apply in writing to the Department of the Environment and conservation for a Ministerial Approval as required in Section 24 of the Department of the Environment Act, 1981.

.4 The Contractor is responsible for obtaining all necessary approvals from the Department of Mines and Energy.

.5 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 Departmental Representative.

.6 Where clearing is required, leave a screen of trees between cleared area and roadways.

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

.8 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.

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

3.2 Stripping of Topsoil

.1 Commence topsoil stripping of areas as directed by the Departmental Representative.

.2 Avoid mixing topsoil with subsoil.

.3 Stockpile in locations as indicated by the Guidelines. Stockpile height not to exceed 2.0m.

3.3 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 Departmental Representative.

.3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.

.4 When operating in stratified deposits use excavation equipment and methods that will produce uniform, homogeneous aggregate.

3.4 Handling

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

3.5 Stockpiling

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental 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 Departmental Representative within 48 hours of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:
- .1 Maximum 1.5 m for coarse aggregate and base coarse aggregate.
- .2 Maximum 1.5 m for fine aggregate and sub-base aggregate.
- .3 Maximum 1.5 m for other aggregate.

.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.

3.6 Aggregate Stockpile Cleanup

.1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.2 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

3.7 Source Abandonment

.1 For temporary or permanent abandonment of aggregate source, rehabilitate source to condition meeting requirements of the Guidelines.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 01 35 43 - Environmental Procedures.

.2 Section 31 23 10 - Excavating, Trenching & Backfilling.

1.2 Definitions

.1 Clearing consists of cutting off trees and brush vegetative growth to not more than a specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.

.2 Grubbing consists of removing all stumps, grass, sod, and organic growth to a depth of 300 mm below the existing grade, or as otherwise required to prevent regrowth of vegetative organisms through the new asphalt, and disposing of the material. Grubbing will be paid for under Common Excavation Section 01 29 00 – Project Particulars and Measurement.

1.3 Storage & Protection

.1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, utility lines, site appurtenances, water courses, root systems of trees which are to remain.

.2 Repair any damaged items to approval of Departmental Representative. Replace any trees designated to remain, if damaged, as directed by Departmental Representative.

PART 2 – PRODUCTS

.1 Not Applicable

PART 3 - EXECUTION

3.1 Preparation

.1 Inspect site and verify with Departmental Representative, items designated to remain.

.2 Locate and protect above ground and underground utility lines. Preserve in operating condition active utilities traversing site.

.3 Notify utility authorities before starting clearing.

3.2 Clearing

.1 Clear all trees and underbrush by saw cutting from areas indicated to within 100 mm of original ground surface. Mechanical brushers are not permitted. Trees and underbrush as well as all other materials disturbed during this clearing operation are to be removed from the site and disposed of outside the park boundaries in a manner and location approved by the Departmental Representative or it can be placed outside clearing limit in a manner satisfactory to Departmental Representative.

.2 Cut off branches and cut down trees overhanging area cleared as directed by Departmental Representative.

.3 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.

.4 All cleared trees and timber shall become the property of the Contractor and are to be disposed of outside the park boundaries.

.5 No roadside vegetation clearing will be permitted during the annual songbird nesting period of May 1 to August 15. Contractor to ensure no songbird nests are present in areas of selective clearing. Contractor must receive written approval from Departmental Representative prior proceeding with any clearing or cutting during the nesting period.

3.3 Grubbing

.1 Remove all stumps, grass, sod, and organic growth to a depth of 300 mm below the existing grade, or as directed by the Departmental Representative, and dispose at a location outside of the Park boundary.

.2 Remove all clearing slash, including cut trees, brush, and logs, and dispose at a location outside of the Park boundary.

.3 Where grubbing operations are required near a

watercourse or water body, the Contractor shall ensure that a minimum 15 m "no grub" zone is left between the watercourse or water body and adjacent work area. This "no grub" buffer shall be clearly marked in the field by the Departmental Representative prior to any grubbing so that the area is visible to heavy equipment operators.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 35 43 - Environmental Procedures.

.2 Section 31 05 17 – Aggregates: General.

.3 Section 31 23 16 – Rock Excavation.

.4 Section 31 24 13 – Roadway Embankments.

.5 Section 33 42 13 – Pipe Culverts.

.6 Section 33 46 19 – Sub Drains

1.2 References

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM C117-04, Standard Test Method forMaterial 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 D698-07, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbs/ft^3) (600 kN-m/m^3).
- .5 ASTM D4318-05, 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.

1.3 Definitions

.1 Common excavation: excavation of materials of whatever nature, shall include all earth, sand, gravel, cemented gravel, clay, hardpan and boulders less than one cubic metres in measurement and all excavated materials not classed as Solid Rock other than rock excavation, including those unsuitable for

use in Work or surplus to requirements..

.2 Unsuitable materials:
.1 Weak and compressible materials under excavated areas.
.2 Frost susceptible materials under excavated areas.

.3 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.

.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.

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

.5 Unshrinkable fill: very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

.6 Rock fill or rock borrow : Material to be used as rock fill or rock borrow, shall only consist of quarry material which before it was excavated consisted entirely of Solid Rock as defined in Section 205 "Classification of Excavated Materials" of the NL DEPARTMENT OF TRANSPORTATION AND WORKS SPECIFICATIONS BOOK. The rock fill or rock borrow shall be thoroughly fragmented and well graded with fragments of greatest dimension not more than 500 mm. The rock fragments shall consist of hard durable material. The rock fill or rock borrow

material shall not contain frozen lumps, weeds, sods, roots, logs, stumps or any other objectional matter. Material that is proposed to be used as rock fill material shall be subject to test by the Departmental Representative to determine its suitability for the portions of the work in which it is proposed that it be placed. Only rock fill or rock borrow material approved by the Engineer shall be placed in the work.

1.4 Quality Assurance

.1 For design of any temporary structures submit design and supporting data at least two (2) weeks prior to installation or construction.

.2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.

.3 Keep design and supporting data on site.

.4 Engage services of qualified professional Engineer who is registered or licensed in Province of Newfoundland and Labrador, Canada in which Work is to be carried out to design and inspect shoring, bracing and underpinning required for Work.

1.5 Shoring, Bracing, and Underpinning

.1 Shoring, Bracing or underpinning may be required to prevent undermining of adjacent structures, underground utilities and/or traffic areas.

.2 Comply with safety requirements and applicable local legislation to protect existing features.

.3 Engage services of qualified Professional Engineer who is registered in the Province of Newfoundland and Labrador to design and inspect cofferdams, shoring, bracing and underpinning required for work.

.4 At least two (2) weeks prior to commencing work, submit design and supporting data.

.5 Design and supporting data submitted to bear the stamp and signature of qualified Professional Engineer licensed in the Province of Newfoundland and Labrador.

PART 3 – EXECUTION

3.1 Site Preparation

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Sawcut pavement neatly along limits of proposed removal in order that surface may break evenly and cleanly.

.3 Prior to excavating for culvert installation, design temporary detour and submit to Departmental Representative for approval as per 01 33 00 – Submittal Procedures.

.4 Install temporary traffic detour. Temporary Detour Minimum Design Requirements:

.1 Design speed: 50Km/h

.2 Detours shall have two lanes with two way traffic and wide enough for two opposing WB-20 trucks, and minimum 3.5m travel lanes with 1.0m shoulders.

.3 Detour fill slopes shall not be steeper than 1h:1v and constructed with Rock fill.

.4 Detour cut slopes shall not be steeper than 1.5h:1v.

.4 Detour with slopes steeper than 2h:1v shall be protected with temporary concrete traffic barriers.

.5 Detour with 2h:1v slopes, greater than 3m in height, shall be protected with temporary concrete traffic barriers.

.6 Maximum grade of temporary detour shall be 10%.

.7 Provide temporary shoring as required to provide stable embankments or slopes.

3.2 Dewatering

.1 Keep excavations free of water while Work is in progress.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 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, existing facilities, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.4 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.3 Excavation

.1 During excavation, keep waste asphalt materials separate from excavated soil materials, and dispose of them in accordance with applicable permits.

.2 Excavate to lines, grades, elevations and dimensions as indicated.

.3 Excavation must not interfere with bearing capacity of adjacent foundations.

.4 Dispose of surplus and unsuitable excavated material in approved location off site.

.5 Do not obstruct flow of surface drainage.

.6 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.7 Notify Departmental Representative when bottom of excavation is reached.

.8 Obtain Departmental Representative's approval of completed excavation.

.9 If encountered, remove unsuitable material from excavation bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.10 Naturally occurring boulders, after being measured by the Departmental Representative, shall be placed as directed by the Departmental Representative.

3.4 Fill Types & Compaction

.1 Use types of fill as indicated, and compacted in accordance with the requirements stated elsewhere in this specification.

.2 Minimum roller size: 9t

3.5 Backfilling

.1 Do not proceed with backfilling operation until Departmental Representative has inspected and approved installations.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations.
- .1 Place bedding and surround material as specified elsewhere.
- .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
- .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1.0 m.

3.6 Restoration

.1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental

Representative.

.2 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.3 Restore site to its normal state prior to excavation.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedure.

.2 Section 01 56 00 - Temporary Barriers and Enclosures.

.3 Section 01 35 29.06 - Health and Safety Requirements.

.4 Section 01 35 43 - Environmental Procedures.

.5 Section 31 05 17 – Aggregates: General.

.6 Section 31 24 13 – Roadway Embankments.

.7 Section 33 42 13 – Pipe Culverts.

.8 Section 33 46 19 – Sub Drains

1.2 References

.1 Government of Newfoundland and Labrador, Department of Transportation and Works, Highway Design Division, Specifications Book, latest version.

1.3 Definitions

.1 Rock excavation: excavation of solid rock materials, including naturally occurring boulders that are one (1) cubic metre or larger in volume, from the project area to provide required road grades which cannot be removed by conventional mechanical excavating equipment having 0.95 to 1.15m3 bucket. Frozen material not classified as rock.

.2 Rock Overbreak: the portion of rock which is excavated, displaced or loosened outside and beyond the back slopes of the ditches as shown on the Drawings and as established by the Departmental Representative, with the exception of such material which occurs as slides, regardless of whether any such overbreak is due to blasting, to the inherent character of any formation encountered, or to any other cause.

1.3 Submittals

.1 Copy of Contractor's Insurance Policy as it relates to blasting and any pre-blast survey requirements.

.2 Valid Blaster's Journey Person Certificate and Certificates of Qualification identifying the Level of Qualification for the project requirements. An acceptable letter of extension of blasters certificate from the Industrial Training Division of the Provincial Department of Education is required when certificate expires (5 years max.). Certificate numbers and names are required for all blasters proposed for the project.

.3 Temporary Magazine License, when required

.4 Explosives Vehicle Certificate, when required, issued by Transport Canada for transport of explosives regulated under the Transportation of Dangerous Goods Act.

.5 Contractor to submit a detailed Blasting Plan for review by the Departmental Representative prior to blasting work. The Blasting Plan is to include a letter signed by the certified blaster or a Professional Engineer, stating that the drill pattern and blasting sequences and charges have been designed in accordance with appropriate codes. Details regarding construction of rock benches will also be shown. The Blasting Plan will include a schedule of when blasting will take place.

1.4 Quality Assurance

.1 For design of any temporary structures submit design and supporting data at least two (2) weeks prior to installation or construction.

.2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.

.3 Keep design and supporting data on site.

PART 2 – MATERIAL

.1 Not used.

PART 3 – EXECUTION

3.1 Blasting

.1 Blasting shall be carried out in accordance with the Government of Newfoundland and Labrador, Department of Transportation and Works, Highway Design Division, Specifications Book, latest version.

.2 Blasting or other use of explosives is not permitted on site without prior receipt of written permission and instructions from Departmental Representative. A Permit for Explosives will be required from the Park Superintendent prior to initiating any blasting activities.

.3 Ensure blasting operations are carried out under the direct visual supervision of a qualified Blaster registered with the Provincial Department of Government Services. Comply with the requirements of:
.1 Explosives Act.
.2 Explosives Regulations.
.3 Newfoundland Regulation 70/09,

.4 Government of Newfoundland and Labrador, Department of Transportation and Works, Highway Design Division, Specifications Book, latest version.

.5 Ensure that workers required to transport explosives have a valid Transportation of Dangerous Goods Training Certification in accordance with the "Act to Promote Public Safety in the Transportation of Dangerous Goods, and the "Explosives Act (Canada)".

.6 Advise the public by suitable public notices, and advertisements, for blasting operations in close proximity to areas occupied by the public. Advise of the warning device to be sounded and the procedure to be used before detonation of individual blasts.

.7 Prior to detonation of a blast, give sufficient warning in every direction and ensure that all persons have reached a place of safety before the blast is fired.

.8 File an Emergency Response Assistance Plan with the Explosives Branch, Natural Resources Canada.

.9 Blaster shall:
- .1 Be solely responsible for implementation of the Explosives Management Program
- .2 Have a valid blaster's safety certificate from the Department of Education Division of Institutions and Industrial Education, and have a valid temporary Magazine License, when required, issued by Natural Resources Canada, for storage and explosives.
- .3 Possess a thorough working knowledge of the Federal Explosives Act and Provincial Regulations.
- .4 Possess specialized training in handling storage and detonation of explosives

3.2 Excavation

.1 During excavation, keep waste asphalt materials separate from excavated soil materials, and dispose of them in accordance with applicable permits.

.2 Excavate to lines, grades, elevations and dimensions as indicated.

.3 Where the height of the new rock face exceeds 10m, construct a 5m wide bench at the top of the face.

.4 Do not obstruct flow of surface drainage.

.5 Notify Departmental Representative when bottom of excavation is reached.

.6 Obtain Departmental Representative's approval of completed excavation.

.7 Use suitable rock excavation to construct the roadway embankment in accordance with Section 31 24 13 - Roadway Embankments and as directed by the Departmental Representative.

.8 Dispose of surplus and unsuitable excavated material in approved location off site. If

encountered, remove unsuitable material from excavation bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.9 Naturally occurring boulders, after being measured by the Departmental Representative, shall be placed as directed by the Departmental Representative.

.10 All rock cuts shall be excavated and mucked out fully to 300 mm below sub-grade.

.11 In rock cuts where pockets which will not drain are formed below the sub-grade by blasting, the Contractor shall, at his own expense, provide drainage by ditching to a free outlet, as ordered, and then backfill and compact to 95% of Proctor Density both the pockets and the trench to an elevation 300 mm below sub-grade. Backfill material shall be broken rock or coarse gravel.

.12 Back slopes shall be carefully scaled down and all rocks and fragments, liable to slide or roll down the slopes, removed to the satisfaction of the Departmental Representative.

3.3 Dewatering

.1 Keep excavations free of water while Work is in progress.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 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, existing facilities, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.4 Provide flocculation tanks, settling basins, or other treatment facilities to remove

suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.4 Restoration

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

.2 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.3 Restore site to its normal state prior to excavation.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 31 23 10 – Excavating, Trenching and Backfill.

.2 Section 31 37 00 – Rip Rap.

1.2 Definitions

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

.2 Waste material: material unsuitable for use in embankment or surplus to requirements.

.3 Borrow material: Rock Borrow material obtained from areas off site required for construction of embankments or for other portions of work.

.4 Embankment: Material derived from usable excavation and placed above original ground or stripped surface up to subgrade.

.5 Rock Excavation: Material derived from solid rock excavation within the limits of work suitable for use as rock fill embankment material.

.6 Pavement structure: combination of layers of unbound or stabilized granular sub-base, base, and asphalt or concrete surfacing.

.7 Subgrade elevation: elevation immediately below pavement structure.

1.3 Traffic Provisions

.1 Provide and maintain roadways, walkways and detours, for vehicular and pedestrian traffic and access to fire hydrants, alarms and emergency telephones.

PART 2 - PRODUCTS

2.1 Materials

.1 Embankment materials to approval of Departmental Representative.

.2 Material used for embankment not to contain organic matter, frozen lumps, weeds, sod, roots, logs, stumps, boulders larger than 150 mm or any other unsuitable material.

.3 Embankment Material:

.1 Suitable rock excavation: in accordance with Section 31 23 16 – Rock Excavation.

.4 Topsoil material shall be obtained from excavation by method to the acceptance of the Departmental Representative.

PART 3 - EXECUTION

3.1 Compaction Equipment

.1 Compaction equipment must be capable of obtaining required densities in materials on project.
- .1 Demonstrate compaction equipment effectiveness on specified material and lift thickness by documented performance of test-strip before start of Work.
- .2 Replace or supplement equipment that does not achieve specified densities.

.2 Operate compaction equipment continuously in each embankment when placing material.

.3 Minimum roller size: 9t

3.2 Water Distributors

.1 Apply water with equipment capable of uniform distribution.

3.3 Embankments

.1 Remove topsoil and rootmat and stockpile topsoil for re-use. Avoid mixing topsoil with subsoil.

.2 Do not place material which is frozen nor place material on frozen surfaces.

.3 Maintain a crowned surface during construction to ensure ready runoff of surface water. Do not place material in free standing water.

.4 Use specialized compaction equipment supplemented by routing, hauling, and leveling equipment over each layer of fill.

.5 Compaction:
- .1 Place and compact to full width in uniform layers not exceeding 200 mm loose thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .2 Compact to a density of not less than 95% corrected maximum dry density in

accordance with ASTM D698.

.3 Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required.

.4 Compact each layer of embankment until compaction equipment achieves no further significant consolidation.

.5 Ensure required compaction for each layer before placing any material for next layer.

3.4 Excavations

.1 Excavate fill or bedrock to subgrade level in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling and Section 31 23 16 – Rock Excavation.

3.5 Construction of Fill Adjacent to Steep Slopes

.1 Where fill is to be placed against an existing embankment steeper than 3:1, the slopes of the existing embankment shall be cut (benched) to the dimensions shown on the Drawings, or as may be directed by the Departmental Representative. The fill shall then be placed in layers. After successive layers have brought the fill up to the level of the top of the bench, another horizontal cut of a similar nature shall be made into the existing embankment, so that proper bonding of new work to old may be obtained.

.2 This procedure shall be followed throughout the entire construction of the fill. All material thus cut out shall be re-compacted along with the new fill material.

.3 Slopes requiring this treatment to have steepness greater than 3:1 and heights exceeding 3.5m, or as directed by the Departmental Representative.

.4 Construction of benching is incidental to embankment construction and no separate payment will be made for excavation, backfilling and compaction of suitable insitu material. If insitu material is deemed unsuitable by the Departmental Representative, excavation and removal of the unsuitable material will be paid for as common excavation.

3.6 Subgrade

.1 After grading has been completed, scarify and

Compaction

mix subgrade surface to required depth of subgrade compaction.

.2 Remove unsuitable materials found during work. Replace with material approved by Departmental Representative

.3 Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required.

3.7 Finishing and Tolerances

.1 Shape and compact surfaces to within 30 mm of design elevations but not uniformly high or low.

.2 Do scarifying, grading, compacting or other methods of work as necessary to provide thoroughly compacted roadbed shaped to grades and cross sections as indicated or as directed by Departmental Representative.

.3 Finish edges and slopes of common material to neat condition, true to line and grade.
.1 Remove isolated boulders exposed in cut slopes and fill resulting cavities.
.2 Hand finish slopes that cannot be finished satisfactorily by machine.

3.8 Maintenance

.1 Maintain finished surfaces in condition conforming to this section until acceptance.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures

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

.3 Section 31 24 13 - Temporary Roadway Embankments.

1.2 References

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM D 4491-99a (2011), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- .2 ASTM D 4595-09, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
- .3 ASTM D 4716-08(2013), Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- .4 ASTM D 4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-4.2 No. 11.2-M89(2004), Textile Test Methods – Bursting Strength - Ball Burst Test (Reaffirmation of September 1989).
- .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
  - .1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
  - .2 Field surveys for layout of the construction work items and for collection of as-built condition information.
  - .3 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
  - .4 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
  - .5 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab

Tensile Test for Geotextiles.
.6 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

.3 Canadian Standards Association (CSA International)
.1 CAN/CSA-G40.20/G40.21-04 (R2009, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.4 Newfoundland and Labrador Department of Transportation and Works
.1 Specifications Book (latest edition).

1.3 Submittals

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

.2 Submit to Departmental Representative following samples at least 4 weeks prior to beginning Work.
.1 Minimum length of 2 m of roll width of geotextile.

.3 Submit to Departmental Representative copies of mill test data and certificate at least 4 weeks prior to start of Work, and in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Delivery, Storage and Handling

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.5 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management

Plan.

.4 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 – PRODUCTS

2.1 Material

.1 Geo Grid for slope stabilization: Terrafix TBX3000 or approved equal. Biaxial geogrid shall be a drawn and extruded finished single layer sheet made from virgin polypropylene, free of striation, roughness, pinholes, blisters, undispersed raw material or any other sign of contamination by foreign matter with the following minimum requirements:

- .1 Minimum Aperture Size: Measured, MD: 39mm XMD: 39mm
- .2 Ultimate Tensile Strength: to ASTM D6637, Md: 30.0kN/m XMD:30.0kN/m
- .3 Tensile Strength @ 5% Strain: to ASTM D6637, MD: 21.6kN/m XMD: 22.0kN/m
- .4 Flexural Rigidity: to ASTM D7748, MD: 4806 g-cm, XMD: 2619 g-cm
- .5 Junction Strength: to GRI-GG2, MD: 27.9kN/m XMD: 27.9kN/m
- .6 Aperture Stability: to A.C.E, 5.7kg-cm/deg
- .7 Multi-Axial Tensile Test: to ASTM D5617, Vessel Pressure at Rupture: 15.6psi Break Resistance Strain: 7.3%
- .8 Minimum Carbon Content: to ASTM D4218, 2%

.2 Slope stabilization system shall be complete Terrafix Terrafirm system or approved equal.

.3 Anchors for Slope stabilization shall be Terrafix Terrafirm type S4 or approved equal.

PART 3 – EXECUTION

3.1 Installation

.1 Geogrids:

- .1 Place geogrid smooth and free of tension stress, folds, wrinkles and creases.
- .2 Install in the longest continuous practical lengths as to minimize the number of joints required.
- .3 Overlap joints a minimum of 1200mm.
- .4 Tie adjacent rolls together with joint

fasteners in accordance with the manufacturer's recommendations.

.5 Construction vehicles are not to be permitted directly on geogrid.

.6 Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling and Section 31 24 13 - Temporary Roadway Embankments.

.7 Remove or replace geogrid improperly installed or damaged as directed by the Departmental Representative.

.8 Trim all exposed geogrid after completion of backfilling.

.2 Slope stabilization system shall be install as per manufacturer instructions.

3.2 Cleaning

.1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner in accordance with applicable federal, municipal and provincial regulations.

3.3 Protection

.1 Vehicular traffic not permitted directly on geotextile or geogrid.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections .1 Section 33 42 13 – Pipe Culverts

.2 Section 31 23 16 – Rock Excavation

PART 2 - PRODUCTS

2.1 Rock .1 Hard, with relative density (formally specific gravity) not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects

.2 To meet following size distribution per sizes shown on drawings and graded as follows:

.1 Nominal 300mm diameter or 40 kg mass:
100% smaller than 450mm or 130 kg
At least 20% larger than 350 mm or 70 kg
At least 50% larger than 300mm or 40 kg
At least 80% larger than 200mm or 10 kg

.2 Nominal 500mm diameter or 200 kg mass:
100% smaller than 800mm or 700 kg
At least 20% larger than 600 mm or 300 kg
At least 50% larger than 500mm or 200 kg
At least 80% larger than 300mm or 40 kg

.3 Nominal 800mm diameter or 700 kg mass:
100% smaller than 1200mm or 2300 kg
At least 20% larger than 900 mm or 1100 kg
At least 50% larger than 800mm or 700 kg
At least 80% larger than 500mm or 200 kg

.3 Rip rap to be clean, inorganic, non ore-bearing, non-toxic material from a non-watercourse source. It shall be hard, resistant to weathering and angular in shape.

.4 Suitable rock excavation shall be used for rip-rap.

.5 Riprap Mixed
.1 Riprap mixed shall be noted in the Contract Documents as ## kg Rip Rap Mixed and shall consist of a riprap material of the designated size (##kg) thoroughly mixed with a salvaged stream bed material or gravel. Finely shattered rock may be substituted

for gravel, subject to the approval of the Departmental Representative.
.2 The Contractor shall produce a consistent mixed homogeneous blended supply of the specified mixture mixed at the proportion of approximately 20% by weight to the random riprap material indicated, to form a very dense material.

PART 3 - EXECUTION

3.1 Placing

.1 Where rip rap is to be placed on slopes, excavate trench at toe of slope.

.2 Fine grade area to be to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

.3 Place rip rap to thickness and details as indicated.

.4 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

.5 Hand or Machine placing:
.1 Use larger stones for lower courses and as headers for subsequent courses.
.2 Stagger vertical joints and fill voids with rock spalls or cobbles.
.3 Finish surface evenly, free of large openings and neat in appearance.

END

PART 1 – GENERAL

1.1 Section Includes

.1 Cold milling of existing asphalt to remove a specified volume of material.

.3 Saw cutting of existing asphalt.

.4 Removal of remaining asphalt by excavator or other means for storage/disposal at an approved disposal site.

PART 2 – PRODUCTS

.1 Not Applicable.

PART 3 - EXECUTION

3.1 Preparation

.1 Prior to commencing removal operation, inspect and verify with Department Representative areas, depths and lines of asphalt concrete pavement to be removed.

3.2 Equipment

.1 Cold milling where required, shall be accomplished using a cold-milling machine. The cold-milling machine shall be a self-driven rotating drum type, capable of removing asphalt 50 mm thick and at least 1200 mm wide in a single pass. Cutting depth shall be adjustable from 0 mm to 50 mm over the length of the drum. The machine shall have automatic grade control and be able to load milled material directly into trucks, or be able to windrow the material for subsequent pick-up by other equipment.

3.3 Removal

.1 Remove existing asphalt pavement to lines and grades as indicated.

.2 Prior to paving operations commencing, a transverse butt joint must be constructed. If a transverse vertical cut is milled in the existing pavement at the limit of the work area the Contractor shall immediately construct with hot mix asphalt concrete a temporary smooth 1.5 meter long taper. The temporary taper must be removed prior to paving of the milled area.

.3 Where plans show the asphalt removal to the edge of an existing lane, the removal shall extend to 50mm beyond any existing cold joints in the asphalt located in reasonable proximity

to the edge of lane or as directed in the field by the Departmental Representative.

.4 Full depth asphalt removal can be accomplished by either cold milling or by full depth saw cut at the limit of excavation and removing the asphalt with an excavator.

.5 All cutting of asphalt shall be done in uniform straight lines with a saw and not with a cutting wheel.

.6 Asphalt removed shall become the property of the Contractor and shall be loaded, hauled and disposed of outside the National Park, and in accordance with all applicable regulations.

.7 Transport all removed material for storage or disposal at an approved disposal site located outside the park boundaries. Contractor to obtain approvals for disposal or storage at the site selected from all applicable regulatory authorities (including the Department of Environment & Conservation) and provide a copy of such approvals to the Departmental Representative prior to project start-up.

.8 All residue left by the cold milling process shall be removed immediately from the road. Mechanical sweeping shall be performed at the end of each day’s operations. Low points in the asphalt as a result of cold milling operations, where water ponding may occur, shall have the shoulder milled for draining rainfall. Any guide sweeping operations shall be cleaned to the satisfaction of the Departmental Representative. Any milled material that is lost over the shoulder shall be immediately retrieved and disposed of in an approved manner.

.9 Use equipment and methods of removal and hauling which do not tear, gouge, break or otherwise damage or disturb underlying pavement.

.10 Prevent contamination of removed asphalt concrete pavement and granular base by topsoil, underlying gravel or other materials.

.11 Provide for suppression of dust generated by removal process.

.12 In areas where localized pavement removal is carried out within the traffic lane ensure traffic is restricted from area until the surface is restored.

.13 Grade existing road being uncovered by asphalt removal operations on a regular basis.

3.4 Traffic Control

.1 Maintain at least one lane of alternating two-way traffic at construction sites at all times as specified in Section 01 55 26 – Traffic Regulations.

END OF SECTION

PART 1 - GENERAL

1.1 Related Work

.1 Section 31 24 13 – Roadway Embankments.

.2 Section 31 05 17 - Aggregates: General.

.3 Section 31 23 10 – Excavating Trenching and Backfilling.

1.2 References

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM C 117-13, Standard Test Methods for Material Finer Than 75-micro m (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM D6928-10, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
- .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D 422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.
- .5 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ftn) (600kN-m/mn).
- .6 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .7 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

PART 2 - PRODUCTS

2.1 Materials

.1 Granular “B” Sub-base Material: in accordance with Section 31 05 17 – Aggregates: General and following requirements:
- .1 Crushed rock.
- .2 Gravel and crushed gravel composed of naturally formed particles of stone.
- .3 Gradations to be within limits specified when tested To ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 AND CAN/CGSB-8.2.
- .4 Table:

Sieve Designation	% Passing
50.8 mm	100
25.4 mm	50 – 100
4.76 mm	20 – 55
1.20 mm	10 – 35
0.300 mm	5 – 20
0.075 mm	2 – 6 (Pit Source)
	2 – 8 (Rock Source)

.5 Other Properties as follows:
.1 Liquid Limit: to ASTM D 4318, Maximum 25.
.2 Plasticity Index: to ASTM D 4318 Maximum 0.
.3 Los Angeles degradation: to ASTM C131. Max % loss by mass: 35.
.4 Crushed Particles: at least 50% of particles by mass retained on the 4.75 mm sieve to have at least two (2) fractured faces.
.5 Particles smaller than 0.02 mm: to ASTM D 422, Maximum 3%.
.7 Flat and elongated particles: maximum percent by mass: 15.
.8 Granular Subbase shall not consist of sandstone.

.2 Shouldering material, composed of crushed rock and gravel to the gradations listed above.

PART 3 - EXECUTION

3.1 Inspection of Underlying Sub-Base

.1 Place granular sub-base after surface is inspected and approved by Departmental Representative.

.2 Underlying material to be compacted to 100% of Standard Proctor Density to ASTM D698

3.2 Placing

.1 Place granular sub-base after subgrade is to the satisfaction of the Departmental 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 Place granular sub-base materials using methods which do not lead to segregation or degradation.

.6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace portion of layer in which material has become segregated during spreading.

.9 Place and compact shouldering to 2% cross slope in reconstruction areas. In overlay sections, feather new shoulder material from top of new asphalt to rounding of shoulder slope.

.10 Compacted shouldering to be flush with asphalt concrete surface.

.11 Hand work will be required to form base for asphalt concrete gutters/offtakes.

.12 Place, hand rake and compact new shoulder material under and behind guiderail.

3.3 Compaction

.1 Compaction equipment to be vibratory-type and capable of obtaining required material densities.

.2 Compact to density of not less than 100% of Maximum Dry Density in accordance with ASTM D 698.

.3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.4 Apply water as necessary during compaction to obtain specified density.

.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers to the satisfaction of the Departmental Representative.

.6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

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 Departmental Representative.

.2 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

.3 Shouldering cross slope is to be 2% or match the cross slope of the roadway surface, whichever is steeper.

END OF SECTION

PART 1 - GENERAL

1.1 Related Work

.1 Section 31 05 17 - Aggregates: General.

.2 Section 31 23 10 – Excavating, Trenching and Backfilling.

1.2 References

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM C 117-13, Standard Test Methods for Materials Finer Than 75-mirco m Sieve in Mineral Aggregates by Washing.
- .2 ASTM D 6928-10, Standard Test Method for Resistance of coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
- .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ftn) (600kN-m/mn).
- .5 ASTM D 1883-07e1, Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils.
- .6 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
- .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

PART 2 – PRODUCTS

2.1 Materials

.1 Granular "A" Base: material in accordance with Section 31 05 17 – Aggregates: General and following requirements.

.1 Crushed rock.

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

.3 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.

.1 Gradation to:

Sieve Designation	% Passing
19 mm	100
9.51 mm	50-80
4.76 mm	35-60
1.20 mm	15-35
0.300 mm	5-20
0.075 mm	2-6 (pit source) 2-8 (pit source)

.2 Liquid limit: to ASTM D 4318, maximum 25

.3 Plasticity index: to ASTM D 4318, maximum 0.

.4 Los Angeles degradation: to ASTM C 131.

.5 Maximum % loss by mass: 35.

.6 Crushed particles: at least 60% of particles by mass within each of following sieve designation ranges to have at least two (2) freshly fractured faces. Material to be divided into ranges using methods of ASTM C 136.

.7 Flat and elongated particles: maximum by mass: 15%.

PART 3 - EXECUTION

3.1 Placing

.1 Place granular base after sub-base surface is inspected and approved by the Departmental Representative.

.2 Construct granular 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 and ice.

.5 Place material using methods which do not lead to segregation or degradation of aggregate.

.6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.2 Compaction

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Compact to density not less than 100% of standard proctor Maximum Dry Density in accordance with ASTM D 698.

.3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.4 Apply water as necessary during compacting to obtain specified density.

.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers to the satisfaction of the. Departmental Representative.

.6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 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.

.2 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 Protection

.1 Maintain finished base in condition conforming

to this Section until succeeding material is applied or until acceptance by the Departmental Representative.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections
.1 Section 32 12 16 – Hot-Mix Asphalt Concrete Paving

1.2 References
.1 American Society for Testing and Materials International, (ASTM)
.1 ASTM D 140-2009, Standard Practice for Sampling Bituminous Materials.
.2 ASTM D 244-09, Standard Test Methods and Practices for Emulsified Asphalts.
.3 ASTM D 997-13, Standard Specification for Emulsified Asphalt.

1.3 Environmental Provisions
.1 Tack coat spills larger than 70 L shall be immediately reported to the Newfoundland and Labrador Department of Environment & Conservation and the Departmental Representative.

.2 The Contractor shall take such steps as are necessary to abate the discharge, clean up the area affected, dispose of waste materials in an approved waste disposal site, and restore the environment to the satisfaction of the Newfoundland and Labrador Department of Environment & Conservation and the Departmental Representative, all at the Contractor’s expense.

PART 2 – PRODUCTS

2.1 Materials
.1 Emulsified Asphalt: Type SS-1 or Type SS-1h emulsified asphalt, to ASTM D 997 as the tack coat material.
.1 The Departmental Representative shall be notified in advance as to which type the Contractor intends to use and the tack coat shall meet the following standards.

.2 Water: Water for forming the solution shall be clean water free from impurities.

PART 3 – EXECUTION

3.1 Equipment
.1 Tack coat shall be applied by means of an approved pressure distributor equipped with thermometer, pressure gauge, fifth wheel tachometer and suitable spray nozzles which shall all be of the same orifice and manufacturer and capable of producing a fog-

type spray. The slot of each nozzle shall be set at 30 degrees to the axis of the spray bar and the spray bar shall be set at a height above the existing pavement that will permit the fan from each nozzle to overlap its neighbouring fan by exactly half.

3.2 Application

.1 Obtain Departmental Representative's approval of existing surface before applying asphalt tack coat. Clean surface as required.

.2 Tack coat shall only be placed on surfaces that are clean and dry and then only when the atmospheric temperature is at least 10°C and when rain is not forecast within two (2) hours of application.

.3 Should the surface to be treated be dirty, then the Contractor shall thoroughly clean the surface by means of a power broom, or equivalent.

.4 The Contractor shall plan his work so that no more tack coat than is necessary for the day's paving operation is applied at one time.

.5 Paint contact surfaces of existing abutting asphalt surface with thin, uniform coat of asphalt tack coat material.

.6 To avoid nuisance and possible property damage to the travelling public, the Contractor shall install portable traffic lights or other means of directing one-way traffic while working on the adjacent part of the road.

.7 Type SS-1 or Type SS-1h emulsion shall be diluted with an equal volume of water prior to the application. The diluted SS-1 or SS-1h emulsion shall be applied at a rate of 0.3 to 0.5 l/m^2 of diluted emulsion on old pavement. Both the mixing temperature and the application temperature shall be between 20°C and 50°C. Care must be exercised not to exceed the recommended application rate.

.8 Tack coat application shall be visually uniform. Areas of insufficient or non-

uniform tack coat coverage shall be corrected by the contractor at no cost to Canada.

.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 Departmental Representative.

.12 Permit asphalt tack coat to set before placing asphalt pavement.

3.3 Curing

.1 No hot mix shall be placed upon the tack coat until it has dried to a proper condition of tackiness, as determined by the Departmental Representative. The Contractor is advised that the period required for such drying will depend upon weather conditions.

END OF SECTION

PART 1 – GENERAL

1.1 Related Work

.1 Section 01 35 43 - Environmental Procedures.

.2 Section 31 05 17 - Aggregates: General.

.3 Section 32 11 23 - Granular Base.

.4 Section 32 17 23 - Painted Traffic Lines & Markings.

.5 Section 32 12 13.16 – Asphalt Tack Coat.

1.2 References

.1 ASTM International

.1 ASTM C 88-13, Standard Test Method for Soundness of Aggregates by Use of Sodium sdssd Sulphate or Magnesium Sulphate.

.2 ASTM C 117-17, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C 123-14, Standard Test Method for Lightweight Particles in Aggregate.

.4 ASTM C 127-15, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.

.5 ASTM C 128-15, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.

.6 ASTM C 131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.7 ASTM C 136-14, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.8 ASTM C 207-06(2011), Standard Specification for Hydrated Lime for Masonry Purposes.

.9 ASTM D 995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

.10 ASTM D 2419-14, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.11 ASTM D 3203-11, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

.12 ASTM D 4791-10, Standard Test Method for Flat Particles, Elongated Particles, or

Flat and Elongated Particles in Coarse Aggregate.

.13 ASTM D 6373-16, Standard Specification for Performance Graded Asphalt Binder

.14 ASTM D 6927-15, Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures

.15 ASTM D 6928-17, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

.16 ASTM C 1252-17, Standard Test Methods for Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading)

.17 ASTM D 4867-09 (2014), Standard Test for Effect of Moisture on Asphalt Concrete Paving Mixtures (Lottman Test)

.2 Government of Newfoundland and Labrador, Department of Transportation and works, Highway Design Division.

.1 The Department of Transportation and Works (DTW) specifications Book, latest edition.

1.3 Supply of Materials

.1 Notify Departmental Representative of proposed date for use of materials; order and schedule shipments to coincide with construction schedule.

1.4 Source Sampling

.1 At least four (4) weeks prior to commencing work inform Departmental Representative of proposed source of aggregates and provide access for sampling.

.1 A copy of the location letter shall be forwarded to the Superintendent, Terra Nova National Park.

.2 At least four (4) weeks prior to commencing work submit samples of following materials proposed for use as requested by the Departmental Representative:

.1 One 5 L container of asphalt cement.

1.5 Material Certification

.1 Submit manufacturer's test data and certification that asphalt cement meets requirements of this section.

1.6 Submission of Mix Design

.1 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for review at least four (4) weeks prior to commencing work.

.2 All asphalt concrete mix supplied for the work shall conform to the requirements of the 'surface course' and 'base course' designations.

1.7 Delivery and Storage

.1 Deliver and stockpile aggregates in accordance with Section 31 05 17 - Aggregates: General. Stockpile minimum 50% of total amount of aggregate required before commencing 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.

.4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

.5 Furnish copies of freight and weigh bills for asphalt cement as shipments are received. Departmental Representative reserves right to check weights as material is received.

PART 2 – PRODUCTS

2.1 Materials

.1 Asphalt cement: PG 58-28 in accordance with ASTM D6373.

.2 Aggregate material to following requirements:
.1 Crushed rock consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, and other deleterious materials.
.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117 and to have a smooth curve without sharp breaks when plotted on semi-log grading chart.

Sieve Designation	Surface Course % Passing	Base Course % Passing
19.0 mm	100	90 - 100
12.5 mm	93 – 100	75 – 90
9.5 mm	75 – 92	63 - 84
4.75 mm	55 – 75	35 - 55
2.00 mm	32 – 55	20 - 42
0.425 mm	12 – 25	10 – 25
0.150 mm	5 – 12	5 – 12
0.075 mm	2 - 5	2 - 6

.3 Coarse aggregate is aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm when tested to ASTM C136.

.4 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.

.5 Coarse aggregate stockpile shall contain no more than 15% passing 4.75 mm sieve.

.6 Fine aggregate stockpile shall contain no more than 15% retained on 4.75 mm sieve.

.7 Petrographic Number: CSA A23.2 – 15A, Max: 135.

.8 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.9 Sand equivalent: ASTM D2419 Min: 50

.10 Magnesium Sulphate Soundness: ASTM C88. Max.% loss by mass: Coarse aggregate, surface course: 12%. Fine aggregate, surface course: 16%.

.11 Los Angeles abrasion; Gradation B. to ASTM C131. Max. % loss by mass: Coarse aggregate, surface course: 35%

.12 Absorption: ASTM C127, max. % by mass: Coarse aggregate, surface course: 1.75%

.13 Loss by washing: to ASTM C117. Max. % passing 0.075 mm sieve: Coarse aggregate, surface course: 1.75%

.14 Flat and elongated particles with length to thickness ratio greater than 3:1: Max. % by mass: Coarse aggregate, surface course: 15%

.15 Crushed fragments at least 100% of particles by mass within each of following sieve designation ranges to have at least 2 freshly fractured faces. Material to be

divided into ranges using methods of ASTM C136.

Passing		Retained on
19.0 mm	to	12.5 mm
12.5 mm	to	4.75 mm

.16 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.
.17 Micro – Deval abrasion, to ASTM D6928, Coarse aggregate: Max. 20%.
.18 Micro – Deval abrasion, to CSA A23.2 – 23A, Fine aggregate: Max 20%.
.19 Fine aggregate angularity, to ASTM C1252, Min. 45%.

.3 Mineral filler:
.1 Finely ground particles of limestone, hydrated lime, Portland cement or other approved non- plastic mineral matter, thoroughly dry and free from lumps.
.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed to improve mix properties.
.3 Mineral filler to be dry and free flowing when added to aggregate.

2.2 Mix Design

.1 Job mix formula to be provided by Contractor and designed and certified by a Professional Engineer licensed to practice in the Place of Work. Job mix formula to be reviewed by Departmental Representative.

.2 Design of mix: by Marshall method to requirements below and as directed by Departmental Representative.
.1 Compaction blows on each face of test specimens: 75.
.2 Mix physical requirements:
Marshall Stability at 60°C: 10000 N(minimum)
Flow Value (mm): 2 to 4.25
Air Voids in Mixture, %: 3-5
Voids in Mineral Aggregate, % min: 15
Index of Retained Stability % Minimum: 75
.3 Measure physical requirements as follows:
Marshall load and flow value: to ASTM D6927
Air voids: to ASTM D3203

Do not change job-mix without prior approval of Departmental Representative. Should change in material source be proposed, new job-mix formula to be reviewed by Departmental Representative.

.5 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.

.6 Asphalt content: 5.5-6.25% based on total weight.

.7 The quality of the final pavement mixture shall meet all requirements set forth in this specification.

.9 Use liquid type anti-stripping agent. Ensure compatibility with cement being used. Tensile Strength Ration (TSR) required is 80% minimum.

PART 3 – EXECUTION

3.1 Plant and Mixing Requirements

.1 Batch and continuous mixing plants:

.1 To ASTM D995.

.2 Heat asphalt cement and aggregate to mixing temperature directed by Departmental Representative. Do not heat asphalt cement above 160°C.

.3 Before mixing, dry aggregates to a moisture content not greater than 0.5% by mass or to a lesser moisture content if required to meet mix design requirements.

.4 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Departmental Representative will direct temperature of completed mix at plant and at paver after considering hauling and placing conditions.

.5 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.

.6 Feed cold aggregates to plant in proportions that will ensure continuous operations.

.7 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.

.8 Store hot screened aggregates in a manner to minimize segregation and temperature loss.

.9 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.10 Maintain temperature of materials within plus or minus 5°C of specified mix temperature during mixing.

.11 Mixing time:

.1 In batch plants, both dry and wet times as directed by Departmental Representative. Continue wet mixing as long as necessary to obtain a thoroughly blended mix but not less than 30 s or more than 75 s.

.2 In continuous mixing plants, mixing time as directed by Departmental Representative but not less than 45 s.

.3 Do not alter mixing time unless directed by Departmental Representative.

.2 Dryer drum mixing plant:

.1 Feed aggregates to burner end of dryer drum by means of a multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

.2 Meter total flow of aggregate by an electronic weigh belt system with an indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate and asphalt entering mixer remain constant.

.3 Provide for easy calibration of weighing systems for aggregates without having material enter mixer.

.4 Calibrate individual feed bin conveyors to ensure mix proportions are achieved.

.5 Make provision for conveniently sampling the full flow of materials from the cold feed.

.6 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.

.7 Provide a system interlock which will stop all feed components if either asphalt or aggregate from any bin stops flowing.

.8 Accomplish heating and mixing of asphalt mix in an approved parallel flow dryer-mixer in which aggregate and asphalt enter drum at burner end and travel parallel to

flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with a printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each day.

.9 Mixing period and temperature to produce a uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 1%.

.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 h.

.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	5.0
2.00 mm sieve	4.0
0.425 mm sieve	2.5
0.075 mm sieve	1.0

.2 Permissible variation of asphalt cement from job mix, 0.30%

.3 Permissible variation of mix temperature at discharge from plant, 10°C.

3.2 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, general: sufficient number of rollers of type and weight to obtain specified density of compacted mix.

.3 Haul trucks: 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 Trucks which cannot be weighed in a single operation on scales supplied will not be accepted.

.4 Material Transfer Device: device to transfer all asphalt mixture from the haul trucks to the paver(s). The Material Transfer Device shall be utilized in conjunction with a hopper insert in the asphalt paver. The hopper insert on the asphalt paver shall be kept full at all times. Cycling the hopper wings of the asphalt paver shall be kept to a minimum. The Material Transfer Device shall be used at no extra cost.

.5 Hand tools:
- .1 Lutes or rakes with covered teeth for spreading operations.
- .2 Provide tamping irons having mass not less than 12 kg and a bearing area not exceeding 310 cm2 for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used instead of tamping irons.
- .3 Straight edges, 4.5 m in length, to test finished surface.

3.3 Preparation

.1 Reshape granular roadbed to Departmental Representative's approval.

.2 Prior to laying mix, clean surfaces of loose and foreign material.

.3 Saw cut adjacent asphalt surfaces and prior to placing new asphaltic pavement.

.4 Tack coat existing asphalt surfaces and edges prior to placing new asphalt mix in accordance with Section 32 12 13.06 – Asphalt Tack Coat.

.5 Construct key joint at locations where the new top lift of asphalt will meet existing asphalt as indicated on the drawings.

3.4 Transportation of Mix

.1 Transport mix to job site in vehicles cleaned of foreign material in good mechanical working order, tight gates and with tarps.

.2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product at least once a day or as required. Elevate truck bed and thoroughly drain. No excess solution will be permitted.

.3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light.

.4 Deposit mix from surge or storage silo into trucks in multiple drops and use methods necessary to prevent segregation.

.5 Deliver materials to paver at a 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. Deliver and place mixes at a temperature within range directed, but not less than 130°C.

3.5 Placing

.1 Obtain Departmental Representative's approval of base prior to placing asphalt.

.2 Place asphalt concrete to thicknesses, grades and lines indicated or directed by Departmental Representative.

.3 Placing conditions:

.1 For base course asphalt, place asphalt mixtures only when air temperature at the road surface is 7°C and rising.

.2 For surface course asphalt, place asphalt mixtures only when air temperature at the road surface is 10°C and rising.

.3 When temperature of surface on which material is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.

.4 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.5 A material transfer device shall be used for the placement of all asphalt mix on the project. Prior to use, the material transfer device shall be approved by the Departmental Representative.

.4 No course shall be placed upon a previously laid course less than 12 hours after final compaction of the latter, except with the permission of the Departmental Representative in circumstances where in his opinion this requirement would be impractical

.5 Place asphalt concrete in compacted lifts of thickness as noted on the plans.

.6 To ensure continuous operation of the pavers, they shall operate at whatever speed necessary to match the output of the plant provided that a consistent and satisfactory mat is being laid. However, in no case shall the speed of the paver exceed 0.7 km/h. Place asphalt concrete in compacted lifts of thickness as noted on the plans.

.7 Spread and strike off mixture with self-propelled mechanical finisher:

.1 Construct longitudinal joints and edges true to line markings. Lines for paver to follow will be established by Departmental Representative 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. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.

.3 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.

.4 Correct irregularities in alignment left by paver by trimming directly behind machine.

.5 Correct irregularities in surface of pavement course directly behind paver.

Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.

.6 Do not throw surplus material on freshly screeded surfaces.

.8 When hand spreading is used:

.1 Approved wood or steel forms, rigidly supported to assure correct grade and cross section, may be used. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

.2 Distribute material uniformly. Do not broadcast material.

.3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. 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. Avoid high temperatures which may burn material. Do not use tools at a higher temperature than temperature of mix being placed.

3.6 Compacting

.1 Roll asphalt continuously to a density not less than 93% of the mix maximum theoretical density.

.2 General:

.1 Provide minimum three (3) rollers and as many additional rollers as necessary to achieve specified pavement density. One roller must be pneumatic-tired type.

.2 Start rolling operations as soon as placed mix can bear weight of roller without undue displacement of material or cracking of surface.

.3 Operate rollers slowly initially to avoid displacement of material. For subsequent rolling do not exceed 5 km/h for static steel- wheeled rollers and 8 km/h for pneumatic-tired rollers.

.4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 20 impacts per metre of travel.

.5 Overlap successive passes of roller by at least one half width of roller and vary pass lengths.
.6 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
.7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism.
.8 Do to permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
.9 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.
.10 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.
.11 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 Commence breakdown rolling 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. Exceptions may be made when working on steep slopes or super-elevated sections.
.4 Use only experienced roller operators for this work.

.4 Second 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 shall 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 wheel rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, Departmental Representative shall specify use of pneumatic-tired rollers.
.2 Conduct rolling operations in close sequence.

3.7 Joints

.1 General:
.1 Trim vertical face by sawcutting to provide true surface and cross section against which new pavement may be laid. Remove loose particles.
.2 Paint joint face with thin coat of hot asphalt cement or cutback asphalt or preheat joint face with approved heater, prior to placing of fresh mix.
.3 Overlap previously laid strip with spreader by 100 mm.
.4 Remove surplus material from surface of previously laid strip. Do not dispose on surface of freshly laid strip.
.5 Construct joints between asphalt concrete pavement and portland cement concrete pavement as directed by Departmental Representative.
.6 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.2 Transverse joints:
.1 Construct and thoroughly compact transverse joints to provide a smooth riding surface.
.2 Stagger joint locations 2 m.
.3 Offset transverse joint in succeeding lifts by at least 600 mm.

.3 Longitudinal Joints:
.1 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with a lute or rake.
.2 Roll longitudinal joints directly behind paving operation.
.3 When rolling with static roller, shift roller over onto previously placed lane in order that 100 to 150 mm of drum width rides on newly laid lane, then operate roller to pinch and press fines gradually

across joint. Continue rolling until thoroughly compacted neat joint is obtained.

.4 When rolling with static or vibratory roller, have most of drum width ride on newly placed lane with remaining 100 to 150 mm extending onto previously placed and compacted lane.

.5 Offset longitudinal joints in succeeding lifts by at least 150 mm.

3.8 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 5mm when checked with a 4.5 m straight edge place in any direction.

3.9 Defective Work

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form a 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.

3.10 Hours of Work

.1 Unless specifically authorized otherwise by the Departmental Representative, all spreading of asphalt mix shall stop at least 1/2 hour before sunset and the paver shall be off the road by sunset.

3.11 Pollution Control/Site Clean-up

.1 Control emissions from equipment and plant to Site Clean-up Provincial emission requirements.

.2 Copies of the Contractor's current Provincial Asphalt Plant Approval Permit must be provided to PCA and the EPO.

.3 Excess asphaltic concrete material must be disposed of at approved locations. No material will be deposited outside the lines and grades

indicated for asphalt paving, except as approved by the Departmental Representative.

.4 The Departmental Representative will be monitoring the Contractor's operation, including site cleanup.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 31 24 13 – Roadway Embankments.

.2 Section 32 11 19 – Granular Subbase.

.3 Section 32 11 23 – Granular Base.

1.2 Definitions

.1 Flake equivalent Tonne: method used to convert aqueous Calcium Chloride to its equivalent mass of Type 1 Regular flake Calcium chloride, is as follows:

$$FE = \frac{M \times C}{77{,}000}$$

Where FE = Number of flake equivalent tonnes
M = Mass of solution in kilograms
C = Percentage of Calcium Chloride in solution.

1.3 Delivery, Storage and Handling

.1 Provide Departmental Representative with name of product, name of manufacturer, net weight or mass, and percentage of Calcium Chloride guaranteed by manufacturer.

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

PART 2 – PRODUCTS

2.1 Calcium Chloride Flakes

.1 To CGSB Specification 15-GP-1M Calcium Chloride Type 1 Regular (77%).

2.2 Aqueous Calcium Chlorides

.1 To CGSP 15-GP-1M Calcium Chloride – 35% concentration by weight of anhydrous produce.

PART 3 – EXECUTION

3.1 Preparation of Surfaces

.1 Apply Calcium Chloride after fine grading of surface.

3.2 Application

.1 Apply Calcium Chloride uniformly over centre 7 m of roadway at rate of 5 Flake Equivalent tonnes/km unless otherwise directed by Departmental Representative.

.2 Immediately after applying Calcium Chloride flakes, apply water at rate of 15 tonnes/km or until Calcium Chloride spreads to edge of roadway.

END

PART 1 – GENERAL

1.1 Description

.1 The Contractor is responsible for permanent pavement markings, including dashed and solid white lane edge lanes, temporary markings, and removal of existing markings that conflict with new permanent markings.

.2 This standard applies to low temperature, water-borne, acrylic, fast drying traffic paints suitable for spray application with specialized equipment, to asphalt surfaces.

.3 This specification includes a compound to be used as an additive in conjunction with water-borne traffic paint and glass spheres to provide a drying agent which accelerates the no-tack time of the water-borne traffic paint. No-tack time is to be increased by approximately 40% over the same paint without the compound.

.4 All pavement markings to be in accordance with the Manual of Uniform Traffic Devices for Canada, latest edition.

1.2 References

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM D 711, Test Method for No-Pick-Up Time of Traffic Paint.
- .2 ASTM D 868, Test Method for Evaluating Degree of Bleeding of Traffic Paint
- .3 ASTM D 869, Test Method for Evaluating Degree of Settling of Paint
- .4 ASTM D 969, Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint
- .5 ASTM D 1155, Test Method for Roundness of Glass Spheres
- .6 ASTM D 1210, Test Method for Fineness of Dispersion of Pigment-Vehicle Systems
- .7 ASTM D 1214, Test Method for Sieve Analysis of Glass Spheres
- .8 ASTM D 1309, Test Methods for Settling Properties of Traffic Paints During Accelerated Storage
- .9 ASTM D 2205, Guide for Selection of Tests for Traffic Paints
- .10 ASTM D 2243, Test Method for Freeze-Thaw Resistance of Water-Borne Coatings

.11 ASTM D 3960, Standard Practice for Determining Volatile Organic Compound (VOC)Content of Paints and Related Coatings

.12 ASTM E 97, Test Method for Directional Reflectance Factor of Opaque Specimens by Broad-Band Filter Reflectometry

.3 Transportation Association of Canada (TAC), Manual of Uniform Traffic Control Devices For Canada.

1.3 Samples

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

.2 Mark samples with name of project, location, paint manufacturer's name and address, name of paint, CGSB specification number and formulation number and batch number.

.3 The Departmental Representative reserves the right to test samples of paint at the point of delivery, from any or all batches of paint to be used. The samples will be tested and all paint from any batch tested that does not meet specifications, will not be permitted to be used on this project.

1.4 Temporary Line Striping

.1 The Contractor shall ensure that the roadway is properly marked as the work progresses and all cold milled sections and/or newly surfaced road is pre-marked at the completion of the day’s operation, as described herein. Temporary pavement marking shall be clearly visible both day and night.

.2 Should the pre-marking tape not adhere to the cold milled and/or newly treated surface, the Contractor shall use other means to adequately mark the roadway, such as painting the markings on the road.

.3 The Contractor is responsible for the removal of the Temporary Overlay Markers between successive pavement courses as the work progresses and from the finish course of pavement after painting.

.4 Temporary Pavement Marking sign to be erected 250 m in advance of the beginning of a temporarily marked section of highway. End

Temporary Pavement Marking is placed at the end of a temporarily marked section. These signs must be used to indicate a section of highway that has been recently resurfaced and that does not have permanent centreline markings. The signs must remain in place until the permanent centreline has been painted.

.5 Typical temporary pavement markings consist of temporary marking tape, raised pavement markers and standard traffic paint with glass beads. Yellow markings shall be used where two-way traffic occurs and to delineate opposing traffic. White markings should be used for shoulder edge lines or multiple lanes where traffic flows in the same direction.

1.5 Scheduling

.1 Application of permanent pavement markings shall be completed no more than three (3) weeks after placement of surface lift of asphalt. Temporary pavement markings are to be maintained until permanent markings are completed.

PART 2 – PRODUCTS

2.1 Materials

.1 General Requirements:

.1 The low temperature, water-borne (acrylic), lead free, fast drying traffic paints shall be designed to be applied in environmental conditions such that operational temperatures shall be in the range of 2 degrees Celsius and rising.

.2 Paint shall be well ground to a uniform smooth consistency and shall be free from skin, dirt and other foreign particles. The paint shall be capable of being sprayed at the temperature intended for the paint. It shall flow evenly and smoothly and cover solidly when applied to pavement. The paint shall be supplied ready-mixed for use without any addition of water.

.3 The paint mixture shall include the glass bead intermix system.

.4 The paint mixture is to be able to be applied under pneumatic pressure by a standard truck mounted dispensing machine moving at speeds of 8 to 24km/hr.

2.2 Paint .1 Paint to this standard shall comply with the following detail requirements when tested in accordance with the specified test methods:

Property	Specification		Test Method (1)
General:	Min.	Max.	
Density	-	-	Method 2.1
Consistency, KU (2)	85	95	Method 4.5
Skinning Properties (3)	0	0	Method 10.1
Contrast Ratio (5)	0.992		
VOC (6)		150g/L	ASTM D3960
Volatile Matter % (mass)(including water)		24	Method 17.1
Freeze-thaw resistance	Pass		ASTM D2243
Pigment Content, % (mass)	56	62	Method 21.2
Binder solid,% of mass (7)	16.75		Method 19.1
100% Acrylic Polymer, % (mass)	15	-	Method 57.1
No-pick-up time, min. (4)	1	5	ASTM D711
Non-tracking time, sec. (9)		60	
Fineness of grind, HU	3	-	ASTM D1210
Coarse Particles:			
#60 Sieve – 250um	nil	nil	ASTM D185 & ASTM
#100 Sieve – 150 mm	-	0.01	D2205
Bleeding	4	-	ASTM D868 & ASTM D2205
Settling Rate	6	-	ASTM D1309
	8	-	ASTM D869
White Paint:			
Titanium Dioxide, g/L	150	-	Method 2.1, 21.1, 50.14
Titanium Dioxide Pigment (8)			
Reflectance	80	-	ASTM E97
Colour	-	-	1-GP-12C 513-301
Yellow Paint:			
Reflectance	60	-	ASTM E97
Colour	-	-	505-308 (approx)

(1) All tests to be performed by methods as per Canadian General Standards Board (CGSB), 1-GP-71 or American Society of Testing and Materials (ASTM) or as noted herein.
(2) Kreb units at 25°C

(3) Paint shall be non-skinning. (See General Requirements, 2.1.1.2).
(4) Perform field tests on a 15 mil wet film thickness of hot spray (maximum 50°C). Wait one minute, drive a passenger vehicle over the film and ensure no visible (from 15m) deposition of paint is deposited onto the adjacent pavement.
(5) Contrast Ratio: apply a wet film thickness of 381 microns on Laneta Penopac form (1B) Drying Time: Minimum 24 hours at 23°C. (plus or minus 2°C)
(6) Volatile organic compounds (VOC) (excluding water): max. 150g/L; method ASTM D3960.
(7) Binder shall be FASTRACK Resin XSR or equivalent.
(8) Titanium dioxide pigment shall be Rutile type and have a minimum TiO_2 content of 93%.
(9) Non-tracking time based upon 375um (15 mils) wet film thickness applied when pavement temperature is greater than 10° C and humidity conditions of 80% or less on dry pavement.

2.3 Glass Bead Intermix System

.1 The compound shall be a mixture of glass beads and drying agent materials.

.2 The compound shall meet the following gradation when tested according to ASTM D1214:

Sieve Size	% Passing
1.180mm (#16)	100%
0.850mm (#20)	90 – 100%
0.600mm (#30)	65 – 95%
0.300mm (#50)	10 – 35%
0.150mm (#100)	0 – 5%

.3 The glass bead component of the compound shall be colourless, clean, transparent, and free from milkiness and excessive air bubbles. They shall be spherical in shape, containing no more than 30% irregularly shaped particles and be the equivalent of an AASHTO Type I glass bead. The silica content of the glass spheres shall not be less than 60% as per ASTM C169 testing. The component shall be manufactured of glass of a composition designed to be highly resistant to traffic wear, decomposition, etching under atmospheric conditions, dilute acids, alkalis, paint film constitutes, and to the effect of weathering, and should be composed of recycled glass (to the maximum extent possible).

.4 The drying agent component shall be smooth and spherically shaped, amber to white in colour, and of a type that promotes accelerated coalescence of the latex polymer and as such reduces water-borne paint dry to touch time by approximately 40% (minimum).

.5 The compound shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. It shall flow freely from dispensing equipment at any time when applying with pavement marking.

PART 3 – EXECUTION

3.1 Equipment Requirements

.1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.

3.2 Removal of Existing Markings

.1 Equipment shall be made available for removal of existing pavement markings as determined by the Departmental Representative or as required to correct markings applied in error or non-conformance. The Equipment shall be capable of removing markings with minimal damage to the Pavement surface.

3.3 Condition of Surfaces

.1 Surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

3.4 Traffic Control

.1 Traffic control to be in accordance with Section 01 55 26 – Traffic Regulation.

3.5 Application

.1 Unless otherwise approved by Departmental Representative, apply paint only when air Temperature is above 10°C, wind speed is less than 60km/h and no rain is forecast within next 4h.

.2 Apply traffic paint evenly at rate of 3m/L.

.3 Do not thin paint unless approved by Departmental Representative.

.4 Symbols and letters to conform to dimensions indicated.

.5 Paint lines to be of uniform colour and density with sharp edges.

.6 Thoroughly clean distributor tanks before refilling with paint of different colour.

3.6 Tolerance

.1 Paint markings to be within plus or minus 12mm of dimensions indicated.

.2 Remove incorrect markings to approval of Departmental Representative.

3.7 Protection of Completed Work

.1 Protect pavement markings until dry.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 31 24 13 - Roadway, Excavation, Embankment and Compaction.

1.2 Submittals

.1 Product Data.
- .1 Submit product data in accordance with 01 33 00 - Submittal Procedures.
- .2 Provide product data for:
  - .1 Seed.
  - .2 Mulch.
  - .3 Tackifier.
  - .4 Fertilizer.
  - .5 Fibre Reinforced Matrix

.3 Submit in writing to Departmental Representative fourteen (14) 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.

1.3 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.

1.4 Scheduling

.1 Schedule hydraulic seeding to coincide with preparation of soil surface.

.2 Hydroseeding shall be carried out as soon as possible after completion of the surface preparation in order to prevent erosion by wind and water. Hydroseeding shall take place no more than two (2) weeks after excavation and embankment construction is complete.

PART 2 – PRODUCTS

2.1 Materials

.1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.

.1 Grass mixture: "Certified", "Canada No.1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
.2 Mixture composition:
.1 60% Certified Annual Rye Grass.
.2 40% Creeping Red Fescue

.2 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, with an environmentally acceptable dye, 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 dilutable, liquid dispersion water soluble vegetable carbohydrate powder.

.4 Water: free of impurities that would inhibit germination and growth.

.5 Fertilizer:
.1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
.2 The fertilizer is to have a plant food ratio of 10 nitrogen, 20 phosphorus, and 20 potash plus 2% Fritted Trace Elements.
.3 The fertilizer to be spread the following spring during the maintenance period shall have a plant food ratio of 19 nitrogen, 19 phosphorus, and 19 potash.

.6 Inoculants: inoculant containers to be tagged with expiry date.

.7 Fibre Reinforced Matrix (FRM)
.1 FRM shall consist of thermally refined wood fibers and 10% by weight cross-linked hydro-colloidal tackifiers, and 5% by weight crimped man-made fibers. FRM shall be 100% biodegradable. FRM shall not have a curing period.
.2 FRM shall be hydraulically applied and after application be capable of adhering

to the soil. In a dry state, FRM shall be comprised of not less than 70% by weight of long stranded wood fibres held together by organic or mineral bonding agents or both. The hydrated FRM shall form a viscous mat. The bonding agent shall not dissolve or disperse up re-wetting. FRM shall not inhibit the germination or growth of plant material.

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 Departmental Representative.

.3 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice, standing water or immediately before a heavy rain event.

.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 Ensure areas to be seeded are moist to depth of 150 mm before seeding.

.3 In areas of hard earth, spread suitable excavated material at a minimum depth of 150mm to promote growth.

.4 Obtain Departmental Representative's approval of grade before starting to seed.

3.3 Preparation of Slurry

.1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental 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.

.2 Slurry mixture applied per hectare.
- .1 Seed: Grass mixture 175kg.
- .2 Mulch: Type I 1350kg.
- .3 Tackifier: 300kg.
- .4 Water: Minimum 30,000 L.
- .5 Fertilizer: 400 kg.

.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 300 mm into adjacent grass areas or sodded areas and 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 Departmental Representative.

.8 Remove protection devices as directed by Departmental Representative.

3.5 Application of Fibre Reinforced Matrix

.1 FRM slurry shall be applied at locations as identified on the Drawings or as directed by the Departmental Representative.

.2 FRM shall be thoroughly mixed with water in a hydraulic.1 FRM shall be applied at a minimum rate of 3,700 kg of dry product per hectare. FRM shall be thoroughly mixed with water in a hydraulic seeder and mulcher at a rate of 20-30 kg of dry product to 500-600 litres of water to form a homogeneous slurry.

.3 The FRM slurry may be applied in a 1-step application with seed or a two-step application on already seeded earth. FRM shall be applied by nozzle sprayer or extension hose. The FRM slurry shall be evenly dispersed in successive applications from different directions to form a uniform, cohesive mat. The spray shall not dislodge soil or cause erosion.

.4 FRM shall be installed by personnel certified and trained by the manufacturer in the proper mixing and installation of the product.

3.6 Maintenance During Establishment Period

.1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.

.2 The Contractor shall be responsible for maintaining hydroseeded areas to ensure proper and adequate growth of the vegetation during the warranty period. The Contractor shall also be responsible for an additional application of fertilizer the following spring after initial application. This application shall be by a method approved by the Department. The fertilizer shall be 5-10-30 and shall be applied at a rate of 300 kg/ha. No additional payment will be made for maintenance or the extra application of fertilizer.

3.7 Acceptance

.1 Seeded areas will be accepted by the Departmental Representative provided evidence of growth and that plants are uniformly established.

3.8 Warranty Period

.1 All areas hydroseeded under this contract shall have a warranty period of one (1) year starting from the date of initial acceptance. This warranty shall cover any defects in materials

and workmanship, and damages caused by the elements of weather. During this period, any defect brought to the attention of the Contractor by the Departmental Representative shall be fixed, repaired or made good to the satisfaction of the Departmental Representative and at no additional cost to the Department.

3.9 Cleaning .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 31 24 13 - Roadway, Excavation, Embankment and Compaction.

1.2 References

.1 Canadian Food Inspection Agency (CFIA); Plant Production Division, Fertilizer Section:
- .1 Canadian Fertilizer Act and Regulations
- .2 Canadian Fertilizer Quality Assurance Program
- .3 Canadian Fertilizer Act and Regulations

.2 Canadian Nursery Landscape Association (CNLA):
- .1 Canadian Standards for Nursery Stock, Nursery Sod

1.3 Submittals

.1 Product Data.
- .1 Submit manufacturer's instructions, printed product literature and data sheets for sod, geotextile and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 11 10 – General Requirements: Health and Safety Requirements.

.3 Samples:
- .1 Submit:
  - .1 Sod for each type specified. Install approved samples in 1 m^2 mock-ups and maintain in accordance with maintenance requirements during establishment period.
  - .2 Bio-degradable geotextile fabric.
  - .3 0.5 kg container of each type of fertilizer used.
- .2 Obtain approval of samples by Departmental Representative.

.4 Test Reports: Submit certified test reports of seed analyses showing compliance with specified performance characteristics and physical properties.

.5 Certificates: Submit product certificates signed by manufacturer certifying that materials supplied to the project comply with

specified performance characteristics and criteria and physical requirements.

1.4 Quality Assurance

.1 Regulatory Requirements: Use only fertilizers, pesticides, micro-nutrients and supplements that are registered by the Canadian Food Inspection Agency and that meet requirements of referenced acts and regulations.

1.5 Scheduling

.1 Schedule sod laying to coincide with preparation of soil surface.

.2 Schedule sod installation when frost is not present in ground.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.6 Delivery, Storage and Handling

.1 Deliver, store and handle materials in accordance with Section 01 11 10 - General Requirements: Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:
.1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.

.3 Storage and Handling Requirements
.1 Store fertilizer off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 Materials

.1 Number One Grade Turf Grass: Provide sod that is sown and cultivated in local nursery fields as turf grass crop from certified seed as approved by the Departmental Representative, and that has matured under environmental conditions similar to that of the project and as follows:
.1 Turf Grade Sod: Mow sod to a height of 50 mm within 36 hours prior to lifting with

clippings removed.

.2 Turf Grass Nursery Sod quality:
- .1 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm
- .2 Mowing height limit: 35 to 65 mm.
- .3 Soil portion of sod: 6 to 15 mm in thickness.

2.2 Accessories

.1 Sod Establishment Support: Provide biodegradable geotextile fabric and pegs as required to prevent washouts and to establish strong root growth.

.2 Water: Provide water from local source or from trucked source as required during maintenance period and until vigorous growth has been established.

.3 Fertilizer: Provide slow release fertilizer that contains a minimum of 65% water insoluble nitrogen, and other nutrients required to establish vigorous growth in proportions necessary to amend topsoil as determined by analysis.

2.3 Source Quality Control

.1 Obtain written approval from Departmental Representative of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

.3 Obtain sod only from CNLA listed grower that can provide certification of seed source with growing location in close proximity to project site; provincial associations belonging to CNLA are acceptable for this requirement.

.4 Provide a nutrient analysis of topsoil and provide test data and recommended fertilizer application constituents and rates to Departmental Representative before delivering materials to the project site.

PART 3 - EXECUTION

3.1 Examination

.1 Verify that grades are correct and prepared ready for placement of sodding materials
- .1 Do not perform work under adverse conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- .2 Starting work of this Section indicates acceptance of conditions.

3.2 Preparation

.1 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated to tolerance of ±8 mm and to allow surface to drain naturally.

.2 Remove and dispose of weeds, debris, stones larger than 50 mm diameter, soil contaminated by oil, gasoline and other deleterious materials off site and in accordance with requirements of local authority having jurisdiction.

3.3 Installation

.1 Sod Placement:
- .1 Lay sod within 24-hours of being lifted if air temperature exceeds 20°C.
- .2 Lay sod sections in rows with joints staggered and ends butted closely without overlapping or leaving gaps between sections; cut out irregular or thin sections with sharp implements.
- .3 Roll sod as required to obtain close contact between sod and soil using light rolling; use of heavy rolling to correct irregularities in grade is not permitted.

.2 Sod Placement on Slopes:
- .1 Install and secure geotextile fabric in areas having a slope greater than 3:1 to prevent soil erosion in accordance with manufacturer's instructions.
- .2 Lay sod starting from bottom of slopes.
- .3 Peg sod on slopes steeper than 3:1, within 1 metre of catch basins and within 1 metre of drainage channels and ditches to following pattern:
  - .1 First sod sections along contours of slopes: 100 mm below top edge at 200 mm on centre.
  - .2 Areas above first sod sections: Not less than 3 to 6 pegs/m2.
  - .3 Areas at drainage structures Not

less than 6 to 9 pegs/m2.

.4 Adjust pattern as required to obtain firm contact with topsoil and to prevent movement.

.2 Drive pegs to 20 mm above soil surface of sod sections.

.3 Fertilizing Program: Fertilize during establishment and warranty periods at a rate and frequency established by source quality control testing and until vigorous growth is established.

.4 Maintenance during Establishment Period: Perform following operations from time of installation until vigorous growth is established:

.1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.

.2 Cut grass to 50 mm when or prior to it reaching height of 75 mm; remove clippings that have potential to smother grassed areas.

.3 Fertilize areas in accordance with fertilizing program listed above; spread half of required amount of fertilizer in one direction and remainder at right angles and water in well where rainfall is not expected within 2 to 3 hours of fertilizing.

.5 Acceptance: Departmental Representative will accept installation provided that:

.1 Sodded areas are properly established and free of bare and dead spots with no surface soil from a height of 1500 mm when grass has been cut to height of 50 mm; when sodded areas are cut a minimum of 2 times prior to acceptance; and that fertilizing in accordance with fertilizer program has been carried out at least once.

.6 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.4 Maintenance During Warranty Period

.1 Maintenance during Warranty Period: Perform following operations from time of acceptance until end of warranty period:

.1 Water Turf Grade Sod at weekly intervals to obtain optimum soil moisture conditions listed above.

.2 Repair and reapply sod to dead or bare spots before expiration of warranty period.

.3 Cut grass and remove clippings that have potential to smother grass to heights listed above.

.4 Cut grass at 2-week intervals or as otherwise required to maintain grass at correct growing height at intervals so that approximately one third of growth is removed in single cut.

.5 Eliminate weeds by mechanical means to extent acceptable listed above.

3.5 Acceptance

.1 Sodded areas will be accepted by the Departmental Representative provided evidence of growth and that plants are uniformly established.

3.6 Warranty Period

.1 For seeding, 12 months' warranty period is extended to 1 full growing season.

.2 End-of-warranty inspection will be conducted by Departmental Representative.

3.7 Cleaning

.1 Remove surplus materials, rubbish, tools and equipment barriers after completion of work of this Section.

END OF SECTION

PART 1 - GENERAL

1.1 Related Secti15ons

.1 Section 01 33 00 – Submittal Procedures

.2 Section 31 23 10 – Excavating, Trenching and Backfilling.

.3 Section 31 23 16 – Rock Excavation.

.4 Section 31 24 13 - Roadway Embankments.

.5 Section 31 37 00 – Rip-rap.

.6 Section 32 11 19 - Granular Sub-base.

.7 Section 32 11 23 - Granular Base.

.8 Section 32 12 16 - Hot Mix Asphalt Paving.

.9 Section 35 42 19 – Preservation of Watercourses and Wetlands

1.2 References

.1 ASTM International / AASHTO

.1 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ftn (600 kN-m/mn)).

.2 ASTM A929/A929M-17, Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe.

.3 ASTM A760/A760M-15, Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.

.4 AASHTO M274, Standard Specification for Steel Sheet, Aluminum-Coated (Type 2), for Corrugated Steel Pipe.

.5 AASHTO M326-08, Standard Specification for Polyethylene (PE) Liner Pipe, 300- to 1600-mm Diameter, Based on Controlled Outside Diameter.

.6 ASTM B209, B221, Material Standards for Aluminum Structural Plate Pipe.

.7 ASTM B746/B746M, B789/B789M, ASTM

B790/B790M, Fabrication Standards for Aluminum Structural Plate pipes

.8 ASTM F714, Standard specification for (PE) plastic Pipe (DR) based on outside diameter.

.2 CSA International.

.1 CSA A23.1/A23.3-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA G401-14, Corrugated Steel Pipe Products.

.3 CSA S6-14, Canadian Highway Bridge Design Code.

.4 CSA A257, Standards for Concrete Pipe and Manhole Sections.

.5 CAN/CSA B182.8, Profile Polyethylene (PE)storm sewer pipe and Fittings

.3 Government of Newfoundland and Labrador, Municipal Water, Sewer and Roads Master Construction Specification, latest edition.

1.3 Samples

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

.2 Inform Departmental Representative at least four (4) weeks prior to commencing work, of proposed source of bedding materials and provide access for sampling.

1.4 Material Certification

.1 Contractor to submit stamped shop drawings from the pipe manufacturers for review and acceptance by the Departmental Representative at least four (4) weeks prior to commencing work.

.2 Submit manufacturer's test data and certification at least four (4) weeks prior to commencing work.

.3 Certification to be marked on pipe.

1.5 Delivery, Storage and Handling

.1 Contractor to deliver, store and handle materials in accordance with Product

Requirements and manufacturer's instructions.

1.6 Waste Management and Disposal

.1 Separate and recycle waste materials as indicated by Departmental Representative.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.7 Environmental Permits and Authorizations

.1 The Contractor is required to follow the Canadian Environmental Protection Act, Canadian Environment Assessment Act, Species at Risk Act, Fisheries Act, and Migratory Birds Convention Act.

.2 The Contractor is held responsible to ensure that all necessary permits related to Environmental Protection have been obtained and that necessary documentation is available on-site.

.3 Where shown on the Drawings or as identified by the Departmental Representative, a downstream pool shall be provided at the culvert outlet.

.4 Where dewatering is required, the Contractor shall carry out this work in accordance with all applicable environmental and DFO approvals and requirements.

.5 The contractor shall submit detailed shop drawings for all culverts, baffles, headwalls, concrete collars, footings.

.6 The contractor shall design, supply and maintain temporary water works and flow control sufficient to to maintain and isolate the respective flow of water from the incomplete culvert or baffle construction. Culvert will be considered incomplete until properly backfilled to a minimum of 1.0m above the top of pipe in accordance with manufacturers backfill requirements. This system shall be in accordance with Section 01 51 00 – Temporary Utilities and Section 01 35 43 – Environmental Procedures.

.1 The contractor shall submit design information stamped by a professional engineer licensed to practice in Newfoundland. Installation procedure including dewatering techniques, temporary flow control, sedimentation control, etc. shall be included to the attention of the Departmental Representative for approval prior to proceeding.

PART 2 - PRODUCTS

2.0 General

.1 All products listed within this section or referenced to including corrugated metal pipe, Aluminum structural plate pipe, concrete pipe, HDPE pipe, couplers, wyes, tees, bends, adapters, nuts, bolts and all other related material for construction shall conform to the requirements of the most recent revisions of the applicable relevant CSA, ASTM, AASHTO and other specifications.

2.1 Culverts:
Steel Reinforced Polyethylene (SRPE)

.1 1350mm SRPE pipe shall be DuroMaxx pipe or approved equal.

.2 All corrugated SRPE pipe shall be smooth-lined.

.3 SRPE pipe and appurtenances shall conform to CAN/CSA B182.14

.4 Joints shall be welded together using electrofusion couplers or extrusion welded couplers.

.5 Joints shall be welded connections providing a true in-field watertight system assured by pressure testable welded sleeves at each weld connection.

.6 The field installed welded joints shall remain watertight up to a test pressure of 30 psi.

.7 Plastic pipe and appurtenances shall be and shall conform to CAN/CSA B182.14-12 and ASTM F2562 / F2562M - 15.

2.2 Culverts: Corrugated HDPE Pipe

.1 All corrugated HDPE culvert pipes shall have water tight joints.

.3 All corrugated HDPE pipe shall be a smooth-lined interior along the entire length of the pipe.

.4 Corrugated HDPE pipe and appurtenances shall conform to CAN/CSA B182.8.

.5 Culvert Design shall be in accordance with the latest editions of CAN/CSA B182.8 for the worst case loading of either 0.7m of earth fill or finished grade plus 1.0m of earth fill. The live loading shall conform to CAN/CSA – S6-06.

.6 Earth fill material shall have a design density of 21.1kN/m3 and a soil structure interaction factor of 1.15.

2.3 Culverts: Pre-Cast Concrete Pipes

.1 Minimum size of culvert pipes: 450 mm, unless otherwise noted on the drawings.

.2 Reinforced concrete pipe: to CSA A257 diameter as indicated.

.3 Strength classification: Class 65-D unless otherwise noted on the drawings.

.4 Joints: bell and spigot type with rubber gasket. This is a push-on joint and must be watertight.

.1 Rubber gaskets for joints: to CSA A257.

.5 Cement mortar filler when required as approved by the Engineer - Architect:

.1 Portland cement: to CSA A3000, Type 10.

.2 Sand: to ASTM C144.

.3 Mortar: one part by volume of cement to two parts of clean, sharp sand mixed dry. Add sufficient water after mixing to give optimum consistency for hand application.

.6 Precast concrete culverts specified for shall arrive on site with fish weirs already

installed and as indicated on the drawings.

2. Culvert Liner

.1 The liner pipe shall be Weholite or approved equal, pipes shall comply with standard ASTM F894-06, made of high density polyethylene resins that complies with properties classification PE 334433C in accordance with the requirements of ASTM D3350. The liner pipe shall have a smooth non-corrugated interior and exterior surface. The liner pipe shall be capable of being joined into a continuous length by either but fusion, screwable connection or an interlocking method. The liner pipe joints shall not create an increase in the outside diameter of the liner pipe. The joints must be water-tight and gasketed as required.

.2 The annular void between the host pipe and new culvert liner will be completely filled with an approved engineered low density cellular fill;

.1 Minimum 28-day compressive strength: 2.0MPa.

.2 Wet Density Tolerance: 1000 to 1500 kg/m^3.

.3 Contractor to submit Mix Design for approval 4 weeks prior to anticipated placement date.

2. Energy dissipation rings

.1 All concrete work for any energy dissipation rings under this Contract shall be in accordance with the sections of Division 03 included as part of this specification.

.2 Precast concrete culverts shall arrive on site with energy dissipation rings already installed and as indicated on the drawings.

2. End Treatments

.1 Rip rap: to Section 31 37 00 – Rip Rap and as indicated on the drawings

.2 Concrete collar / headwall: to Section 03 30 00 – Cast-in-Place Concrete, constructed and

installed in accordance with CSA A23.1 and as indicated on the drawings.

2. Granular Bedding and Backfill

.1 Supply and Placement of granular bedding and placement of embankment material shall be incidental to culvert pipe installation and in accordance with the contract drawing and details, in accordance with pipe manufacturer's written instructions and with:

.1 Section 31 23 10 – Excavating Trenching and Backfill.

.2 Section 31 23 16 – Rock Excavation.

.3 Section 32 11 19 – Granular Sub-base.

PART 3 - EXECUTION

3.1 Traffic Access

.1 During replacement of culverts crossing the highway, maintain two (2) lane of traffic.

3.2 Road Diversion

.1 Where the work requires a road diversion from the existing highway alignment in order to maintain traffic flow, the Contractor shall be responsible for the design, construction, maintenance and removal of such diversion. In providing the diversion, the Contractor shall comply with the requirements of the Traffic Control Manual for Roadway Work Operations. Diversions shall be approved prior to their installation. The specified minimum width of the top of a two (2) lane diversion shall be 9.0 meters.

.3 Where the road diversion requires a stream crossing, Contractor shall be responsible for sizing, designing, supplying, and installing such crossing to the requirements of all regulatory agencies and the park. Proposed diversion arrangement to be provided to the Departmental Representative for approval, along with copies of all approvals received from regulatory authorities, prior to starting any work on the diversion.

.4 At the end of the working season, the roadway and roadside environment must be returned to suitable condition for uninterrupted two-way traffic flow and for safe public travel and snow plowing.

3.3 Trenching

.1 Do trenching work and excavation in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling.

.2 Obtain Departmental Representative's approval of trench line and depth prior to placing bedding material or pipe.

3.4 Bedding

.1 Dewater excavation, as necessary, to allow placement of culvert bedding in the dry.

.2 Place minimum thickness of 300 mm of approved granular material on bottom of excavation and compact to minimum 100% maximum density to ASTM D 698. Loosen bedding in the center of the pipe in accordance with manufacturers recommendations.

.3 Shape bedding to fit lower segment of pipe exterior so that width of at least 25% of pipe diameter is in close contact with bedding and to camber as indicated or as directed by Departmental Representative, free from sags or high points.

.4 Place bedding in unfrozen condition.

3.5 General Execution

.1 Shoring, bracing, sheeting, pumps, temporary traffic diversion/detours, temporary water crossings that are necessary to the Work shall be employed, maintained and removed by the contractor.

.2 Utilize laser beam instrumentation and techniques to determine intermediate line and grade for all culvert pipes except where and when the Departmental Representative may allow other methods to be used.

.3 Install new culvert pipes according to the sizes, locations, and grades indicated on the drawings.

.4 Pipe shall be assembled and/or erected as shown on the manufacturers drawings.

.5 Lay culvert pipes in the trench so after the culvert is completed the interior surface will conform accurately to the grades and the alignment of the ditch or other location. All adjustments of line and grade of pipes laid directly upon the bottom must be done by scraping away or filling in the backfill under the body of the pipe and not by blocking or wedging up.

.6 Any pipes which have a bell end of larger diameter than the pipe shall have the bed of the trench dug out at the bell to conform to this shape and avoid any point loadings of the pipe on the trench.

.7 Where an existing culvert pipe is being extended, the new pipe shall be installed as described herein, including preparation of the existing pipe as required for the connection, connection to the existing pipe, re-bedding under the existing pipe at the point of connection, and removal of debris.

.8 Construct new headwalls of the materials and to the dimensions shown on the Drawings. Connect to the culvert pipe to make a tight connection that will not permit soil or debris to wash into the pipe behind the headwall.

.9 Install culvert pipes to manufacturer’s recommendations and in accordance with recognized good practice. Provide and use proper implements, tools and facilities for safe and efficient execution of the work.

.10 Inspect culvert pipes in the field before and after laying. Remove any defective or damaged culvert pipe and replace with new sound material at the Contractor's expense.

.11 Lay culvert pipes true to line and grade with uniform bearing under the full length of the barrel of the culvert pipe. Remove and re-lay any culvert pipe which is not in true alignment or shows any undue settlement after laying.

3.6 Laying Corrugated Metal Pipe Culverts

.1 Commence pipe placing at downstream end.

.2 Ensure bottom of pipe is in contact with shaped bed of compacted fill throughout its length.

.3 Lay pipe with outside circumferential laps facing upstream and longitudinal laps or seams at side or quarter points.

.4 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.

.5 Take special care and take all necessary precautions while handling installing aluminum culvert pipe to avoid damage.

.6 Pipe manufacturer representative shall be on-site at critical stages of the assembly, erection and backfilling of the corrugated aluminum structural plate pipe.

3.7 Joints: Corrugated Metal Culverts

.1 Match corrugations or indentations of coupler with pipe sections before tightening.

.2 Tap couplers firmly as they are being tightened, to take up slack and ensure snug fit.

.3 Insert and tighten bolts.

3.8 Laying HDPE Pipe Culverts

.1 Commence pipe placing at downstream end.

.2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.

.3 Lay pipe with outside circumferential laps facing upstream and longitudinal laps or seams at side or quarter points.

.4 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.

3.9 Joints: HDPE pipe culvert

.1 Joints shall be made with rubber gaskets.

.1 Rubber gasket joints:

.1 Install in accordance with manufacturer's written recommendations.

3.10 Laying of Concrete Pipe

.1 Begin at downstream end of culvert with flanged end of first pipe section facing upstream.

.2 Ensure barrel of each pipe is in contact with shaped bed throughout its length.

.3 Allow water to flow through pipes during construction only as permitted by Departmental Representative.

3.11 Joints: Concrete Pipe Culverts

.1 Joints shall be made with rubber gaskets.

.1 Rubber gasket joints:

.1 Install in accordance with manufacturer's written recommendations.

.2 Ensure that tapered ends are fully entered into flanged ends.

3.12 HDPE Culvert Liner

.1 Before inserting the liner pipe, the host pipe must be cleaned of all debris or other foreign materials.

.2 Complete pipe liner system shall be installed in accordance with the manufacturers complete written recommendations.

.3 Pipe manufacturers representatives shall be on-site at critical stages of the liner installation and grouting application.

.4 The contractor shall be responsible to position and maintain the liner pipe at the host pipe invert elevation and grade prior and as directed by the Departmental Representative prior to placement of the flowable fill.

.5 After the liner is in place, bulkheads shall be placed at each end of the annular void then the annular void between the host culvert and the liner pipe shall be completely filled with

engineered low density cellular flowable fill. Bulkheads shall be designed to resist the hydraulic pressure during the grouting of the annular space.

.1 Placement of flowable fill shall be via pump injection from one end of the pipe run allowing fill to flow toward the other end.

.2 Venting of the annular void shall be performed to assure uniform filling of the void space during the grouting process. An open ended high point tap or equivalent vent must be provided opposite to the point of grout injection. The vent shall be monitored throughout the grouting process.

.3 Penetrations of the existing corrugated metal pipe will be permitted to facilitate grouting of the annular void. Multiple fill pipes will be required.

.4 Allowable deflection of liner caused by grout placement shall be less than 1.5%.

.5 Multiple lifts of grout may be required to avoid flotation of liner and/or failure of bulkhead.

3.13 Backfilling

.1 Backfill around and over culverts as indicated on manufacturers drawings or instructions or as directed by Departmental Representative.

.2 Place backfill material in 300 mm layers to full width, alternately on each side of culvert, so as not to deform or displace it laterally or vertically.

.3 Compact each layer to 100% maximum density to ASTM D 698 taking special care to obtain required density under haunches.

.4 Protect installed culvert with minimum 1000 mm cover of compacted fill before heavy equipment is permitted to cross. During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 1:2.

.5 Place backfill in unfrozen condition.

3.14 Typical End Treatments: Pipe Culverts

.1 Install concrete headwalls and rip-rap as indicated or as directed by Departmental Representative.

.2 Obtain approval of Departmental Representative of culvert installation prior to installation of any end treatments.

3.15 Energy dissipation rings

.1 Pipe sections with weirs or baffles shall be installed with the weir or baffle tops horizontal in the transverse direction, with a maximum installed tolerance of 2% vertically over the full horizontal length of the weir.

3.16 Road Diversion

.1 Shall be in accordance with Section 01 55 26 – Traffic Regulations.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 32 11 19 – Granular Sub-base.

1.2 References

.1 American Association of State Highway and Transportation Officials (AASHTO)
- .1 AASHTO M180-2011, Corrugated Sheet Steel Beams for Highway Guardrails.

.2 American Society for Testing and Materials (ASTM International)
- .1 ASTM A 307-12, Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.4 Canadian Standards Association (CSA International)
- .1 CAN/CSA-O80 Series-08(R2012), Wood Preservation.
- .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 Samples

.1 At least four (4) weeks prior to commencing work, inform Departmental Representative of proposed sources of guide rail and components, and provide access for sampling.

PART 2 - PRODUCTS

2.1 Materials

.1 Steel W-beam guide rail:
- .1 Steel rail and terminal sections: to AASHTO M180, Class B (3.5 mm thick), Type 2 zinc coated.
- .2 Bolts, nuts and washers: to ASTM A307, hot dip galvanized to CSA G164.

.2 Timber post and offset block:
- .1 Well seasoned, straight and sound, free from loose knots or other defects, dressed four sides.
- .2 Acceptable species of wood: Jack Pine or Eastern Hemlock.

.3 Treat posts and blocks to CSA O80 commodity standard O80.14-M, pressure preserved wood for highway construction. Standard minimum retention of CCA preservative 6.4 kg/m^3.

.4 Posts located in protected water supply areas shall only be chromated copper arsenate (CCA) treated type.

.5 Reflector strips shall be 75 mm x 70 mm on metal backing. Nails for securing signal reflectors shall consist of 300mm galvanized flat head nails.

PART 3 - EXECUTION

3.1 Erection

.1 Install posts plumb at locations and to depths indicated or directed by Departmental Representative.

.2 When excavation is required, auger post holes and compact bottom to provide firm foundation. Set post plumb and square in hole, backfill in 150 mm layers and compact each layer before placing succeeding layer.

.3 Cut off tops of posts to elevations indicated.

.4 Treat post and block end cuts with two coats of same type of wood preservative used to pressure treat posts.

.5 Erect steel W-beam components to details indicated. Lap joints in direction of traffic. Tighten nuts to 100 N.m torque. Maximum protrusion of bolt 6 mm beyond nut.

.6 Flare and bury guide rail end sections as indicated on the Drawings.

.7 Once the W-beam rail is properly installed, new reflective strips shall be placed immediately on every third post on curves and on each end post, and every fifth post on tangent or straight run.

.1 Silver reflector shall be placed facing the approaching traffic in the immediately adjacent driving lane and yellow reflector on the opposite side of the same post facing traffic in the other direction.

3.2 Touch-up .1 Clean damaged surfaces with brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas in accordance with manufacturer's instructions.

END

PART 1 - GENERAL

1.1 Related Section

.1 Section 01 35 43 – Environmental Procedures

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

.3 Section 31 23 10 – Excavating Trenching & Backfilling

.4 Section 31 23 16 – Rock Excavation

.5 Section 33 42 13 – Pipe Culverts

1.2 Environmental Requirements

.1 Operation of construction equipment in water is prohibited.

.2 Use borrow material from watercourse beds only after receipt of written approval from Departmental Representative.

.3 Design and construct temporary crossings to minimize environmental impact to watercourse.

.4 Fish passage must be maintained when constructing temporary crossings of waterways.

.5 Do not blast under water or within 100 m of fish bearing waterbodies.

.6 Dumping excavated fill, waste material, or debris in watercourse or wetland is prohibited.

PART 2 – EXECUTION

2.1 Existing Conditions

.1 Maintain existing flow pattern in natural watercourse systems.

.2 In natural systems maintain existing riffle pool and step pool patterns.

.3 In wetland systems, maintain existing hydrological conditions.

2.2 Site Clearing And Plant Protection

.1 Temporary Erosion and Sedimentation Control:
.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties according to Contractor's accepted sediment and erosion control plan.
.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Minimize disturbance to vegetated buffer zones and protect trees and plants on site and adjacent properties where indicated.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Remove only trees that may offer future blockage problems as instructed by Departmental Representative.

.5 Maintain temporary erosion and pollution control features installed under this contract.

2.3 Drainage

.1 Pumping water containing suspended materials into watercourse is prohibited.

2.4 Shaping and Preparation of Streambed

.1 All work in streambed to be done in the dry. De-watering to be carried out to the approval of the Departmental Representative prior to undertaking this work.

.2 The streambed shall be graded to each side in a manner that will cause water to flow in the channel at the center of the stream during low flow conditions.

.3 After streambed has been shaped to the satisfaction of the Departmental Representative, Contractor shall install approx. 400-600 mm rocks, or as otherwise designated by the Departmental Representative, at staggered intervals along the length of the streambed invert to create small pools behind them during low flow periods where fish may rest. These rocks to be installed at approximately one rock every 5 m along the stream invert, and be pushed partially down into the subgrade of the stream with an excavator bucket to secure them in position. Location of rocks to be as directed by Departmental Representative.

2.5 Site Restoration

.1 Establish vegetated buffer zones with suitable vegetation to minimum 3 m along edge of watercourse banks as determined by Departmental Representative.

.2 Control stream bank erosion in lower section of watercourse with irregular shaped rip rap.

.3 Control stream bank erosion in upper section of watercourse by planting suitable vegetation as directed by Departmental Representative.

2.6 Watercourse Flow Maintenance

.1 Watercourse flow maintenance shall be required for all culvert replacements and culvert repairs under this contract. Wherever possible, watercourses shall be maintained within the existing culvert.

.1 Contractor to submit construction methodology to Departmental Representative before proceeding. Methodology to include excavation dewatering techniques, maintenance of water course flow and isolation from construction areas for duration of construction. Methods to maintain and

isolate flow to be capable of accommodating the equivalent applicable full design capacity of the existing watercourse structure.

.2 All in-stream work is to be completed in dry and de-watered conditions.

.3 Dewatering any body of water or waterway is not permitted.

.4 Water containing suspended materials shall be pumped into vegetation a minimum of 30 m away from watercourses. Do not pump or drain water containing suspended materials into waterways.

END OF SECTION