

SPECIFICATION DOCUMENTS

Retaining Wall Repair Km 19, Trans Canada Highway 1 Banff National Park

Project No. 201301b

Solicitation No. 5P420-13-5063/B

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Project No. 201301b
July 2013
Parks Canada

Retaining Wall Repair
Trans-Canada Highway 1
Banff National Park

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Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 29 01 – Site Occupancy.
- .2 Section 01 33 00 - Submittal Procedures.

1.2 PROJECT LOCATION

- .1 The project is located in Banff National Park, Alberta. The work is on the Trans-Canada Highway (TCH) at approximately km 19. The following are key locations relative to the project:
 - TCH km 0 - East Park Gate
 - TCH km 13 – Lake Minnewanka Interchange
 - TCH km 17.2 – Norquay Interchange
 - TCH km 46.95 –Castle Interchange
 - TCH km 49.9 – Access Road to Mannix Pit
 - TCH km 66.9 - Access Road to km 69 Pit
 - TCH km 72.3 - Lake Louise Interchange

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- .1 The project work consists of the repair of an existing retaining wall supporting the eastbound lanes of the Trans-Canada Highway. The existing structure is a 3± m high Reinforced Earth® wall that has been locally undermined by the failure of a CSP culvert that passes beneath the wall. The existing 900 mm diameter CSP culvert passing under the highway will be repaired. The 600 mm CSP culvert between the TCH and Vermilion Lakes Drive will be replaced.
- .2 Major scope items include: detours, traffic management, barrier removal and replacement, excavation, culvert supply and installation, sub-base course, base course, asphalt patching.
- .3 Without limiting the scope of work, the work of this Contract generally comprises the following:
 - .1 Installation and maintenance of temporary barriers and supply and installation of temporary traffic control and other temporary construction facilities required for completion of the Work of the Project.
 - .2 Removal and replacement of the existing culvert between TCH and Vermilion Lakes Drive.
 - .3 Placing of shoring and blocking, as required, to support the existing wall panels during construction.
 - .4 Flushing, cleaning and inspection of the 900 mm CSP culvert under TCH from outlet to inlet.
 - .5 Supply, place and finish concrete invert lining 900 mm CSP culvert.
 - .6 Remove and stockpile existing concrete roadside barrier.
 - .7 Removal of existing asphalt and stockpile material at Mannix Pit, as directed by the Departmental Representative.

- .8 Remove existing catch basin catch basin to allow for retaining repair and reinstall.
- .9 Excavating of the TCH eastbound shoulder to allow access to and backfill of the retaining with AT Designation 20mm base aggregate from stockpiles at Mannix Pit.
- .10 Load, haul and place sub-base course materials. 50 mm Sub-base Course available from stockpiles at km 69 Pit.
- .11 Load, haul and place base course materials. AT Designation 20 mm base aggregate available from stockpiles at Mannix Pit.
- .12 Supply and place AT H1 mix Asphalt Concrete Pavement as directed by the Departmental Representative. **RAP mix is not permitted.**
- .13 Dispose outside of Park existing CSP culverts as shown on the Drawings and as directed by the Departmental Representative.
- .14 Westbound ditch excavation and disposal of waste material at 69 Pit.
- .15 Supply and paint temporary roadway paint markings during construction as required. Permanent line markings at the completion of the work to be done by others.
- .16 Traffic signage and traffic control.
- .17 Site clean-up and removal of waste.
- .18 Miscellaneous Additional Work as directed by the Departmental Representative.
- .4 In preparation for and during construction of this project, an "Environmental Protection Plan" (EPP) is to be prepared by the Contractor to meet the requirements of Section 01 35 43 – Environmental Procedures to ensure the desired minimal adverse effects are achieved. The Contractor's EPP must be approved by Parks Canada Agency (PCA) prior to the commencement of construction. The Departmental Representative and Parks Canada's environmental surveillance officer (ESO) will refer to the approved EPP in determining compliance with the plan and contract specifications. The EPP will form part of the contract.

1.4 CONTRACT METHOD

- .1 Construct Work under combined price contract.

1.5 WORK BY OTHERS

- .1 The Contractor is advised that the following Work in the vicinity has been or will be contracted by Parks Canada:
- .2 The Contractor is advised that the following Work in the vicinity has been or will be contracted by Parks Canada:
 - .1 Line Painting at various locations. Contractor is AAA Striping and Seal Coating Service. Anticipated contract completion is 2013.
 - .2 Asphalt production in Mannix Pit, OAL. Anticipated completion is Fall 2013.
 - .3 Other projects and maintenance work may occur along the TCH in 2013.
- .3 Where it is necessary that work is to proceed in areas of this project common to both the Contractor and forces of others, the Contractor shall cooperate with the other Contractors

and the Owner in reviewing their construction schedules, sharing his work space, and shall coordinate his operations with the other Contractors, including traffic management and construction staging.

- .4 Km 69 and Mannix Gravel Pits are operational pits used by many contractors and Parks Canada Agency. The Contractor shall cooperate with the other users of the pits.

1.6 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of these specifications.

1.7 DEFINITIONS

- .1 Alberta Transportation is referred to as "AT"

1.8 WORK SEQUENCE

- .1 Schedule work progress to allow Owner/Departmental Representative unrestricted access to inspect all phases of the Work.
- .2 Maintain fire and emergency access on the Trans Canada Highway at all times.
- .3 Co-ordinate Work with other Contractors / Departmental Representatives doing maintenance, survey / testing work.
- .4 Interim Certificate (Substantial Completion) by September 18, 2013.
- .5 Complete all work by September 25, 2013 (Contract Completion Date).

1.9 CONTRACTOR USE OF PREMISES

- .1 Contractor has unrestricted use of site subject to Section 01 14 00 and Section 01 29 01 until Contract Completion date. However, the Contractor is not permitted to extract and process native material for the production of granular aggregate anywhere inside the Park.
- .2 Contractor shall limit use of premises for Work, for storage, and for access, to allow:
 - .1 Owner occupancy.
 - .2 Work by other Contractors.
- .3 Coordinate use of premises under direction of the Departmental Representative.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .5 The Contractor and any Subcontractors shall obtain a business license from Realty Services in the Banff Park Administration building in Banff townsite, prior to commencement of the contract.
- .6 All Contractor's business and private vehicles are required to display a vehicle work pass from Parks Canada. These permits may be obtained free of charge from PCA Environmental Surveillance Officer or as directed by the Departmental Representative.

1.10 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.11 OWNER FURNISHED ITEMS

- .1 Crushed granular materials available to the Contractor, at no cost, in stockpiles:
 - .1 20 mm base aggregate at Mannix Pit;
 - .2 50 mm granular sub-base aggregate, at Km 69 Pit;
 - .3 80 mm Select Granular Sub Base, at Km 69 Pit.

1.12 CONSTRUCTION SIGNAGE

- .1 No signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction shall be in both official languages. Signs shall be diamond grade and 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 the Departmental Representative.
- .4 All temporary traffic control signs that are used for longer than one day shall be mounted on wood posts.
- .5 Signage shall be coordinated with other Contractors.

1.13 SETTING OUT OF WORK

- .1 Departmental Representative will establish control points and provide:
 - .1 Detailed cross-section templates showing design centreline and shoulder grades.
 - .2 Complete set of construction Drawings.
 - .3 Alignment notes showing curve data and control point coordinates.
 - .4 List of control monuments, including coordinates and elevations.
 - .5 Measurements for Payment (Quantity Surveys) by the average end method.
- .2 Contractor to:
 - .1 Set additional control points as necessary.
 - .2 Set all work stakes necessary to complete work.
 - .3 Allow sufficient time for Departmental Representative to take measurements for payment.
 - .4 Not damage geodetic benchmarks or control monuments unless authorized by Departmental Representative.
- .3 No separate payment for setting out work, unless Departmental Representative adjusts alignment in field and additional survey costs are incurred. Payment for additional

survey required due to changes by Departmental Representative to be paid for as part of Prime Cost Sum.

Part 2 Products

.1 NOT USED.

Part 3 Execution

.1 NOT USED.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 32 18 – Construction Progress Schedules - Bar (Gantt) Chart.
- .2 Section 01 35 31 – Special Procedures for Traffic Control.
- .3 Section 01 35 43 – Environmental Procedures.

1.2 ACCESS AND EGRESS

- .1 Provide for pedestrian, railway and vehicular traffic for the duration of the construction.

1.3 USE OF THE SITE AND FACILITIES

- .1 The Work Site (limits shown on Drawings) will be specified by Parks Canada and shall only be used for the purposes of the Work. The Work Site will be made available by Parks Canada to the Contractor for its non-exclusive use for the duration of the Work, unless otherwise provided in the Contract Documents.
- .2 Office-tool trailer may be set up at Mannix Pit or at the rest stop located just east of the site. See Section 01 35 43 - Environmental Procedures.
- .3 The Contractor shall not store material or park equipment along the TCH Right-of-way outside the normal hours of work.
- .4 Contractor shall maintain adequate drainage at the Worksite.
- .5 The Contractor shall keep the Work Site clean and free from accumulation of waste materials and rubbish regardless of source. Snow shall be removed by the Contractor as necessary and at his cost for the performance and inspection of the Work.
- .6 The Contractor shall provide sanitary facilities for work force in accordance with governing regulations and the Environmental Procedures for this project. The Contractor shall post notices and take such precautions as required by local health authorities and keep area and premises in sanitary condition.
- .7 Any damage to the Work Site caused by the Contractor shall be repaired by the Contractor at its expense.
- .8 The Contractor may work 24 hours per day, seven days per week subject to the following restrictions:
 - .1 Restricted hours for blasting, if required.
 - .2 No hauling of material during inclement weather.
 - .3 No stoppage of traffic will be allowed for the period commencing at 07:00 a.m. on the day before a Statutory Holiday or long weekend to 7:00 a.m. on the day following a long weekend.

1.4 WORK CONDUCTED OVER OR ADJACENT TO WATERWAYS

- .1 All components of the Work shall be conducted in accordance with Section 01 35 43 - Environmental Procedures and the Environmental Protection Plan prepared for the project.

- .2 All components of the Work shall be conducted without equipment entering into wetlands, water bodies, streams and the Vermilion Lakes.
- .3 Refer to Section 01 35 43 - Environmental Procedures, for details.
- .4 All waste materials from the Work shall be contained and collected in a manner to prevent any contact with the river valleys and waterways. All collected waste materials shall be disposed of in accordance with Section 01 35 43 - Environmental Procedures and the Environmental Protection Plan prepared for the project. One "Bear Proof" garbage container will be provided by PCA.
- .5 The Contractor is responsible for the development and supply of construction access to the Work as approved by the Departmental Representative.

1.5 ACCESS TO ADJACENT PROPERTIES

- .1 Construction operations shall be conducted so as to cause minimal inconvenience to the public and to owners of adjoining property. Existing access to property shall be maintained as far as possible and if new access must be provided, every effort shall be taken to provide the new access before the existing access is removed.

1.6 UTILITIES

- .1 There are no active utilities within the Trans Canada Highway right-of-way.
- .2 The locations of utilities, if any, shown or not shown on the Drawings are subject to verification by the Contractor.
- .3 If it is determined by the Departmental Representative that Utilities affected by the permanent Work will be relocated by Other Contractors, the Contractor shall co-operate and coordinate as required with Other Contractors engaged in Utility relocation operations on the Work Site.
- .4 The Contractor shall establish and maintain direct and continuous contact with the owners or operators of any Utilities which may interfere with the Work. The Contractor shall co-operate with them at all times and in all places of Work. The Contractor shall keep the Departmental Representative informed of all communications with the Utility companies and authorities.
- .5 The Contractor shall notify the Departmental Representative and the Utility companies at least seven days in advance of any activities which may interfere with the operation of such Utilities.
- .6 Whenever working in the vicinity of Utilities, the Contractor shall locate such Utilities and expose those that may be affected by the Work, using hand labour as required.
- .7 The Contractor shall assess the possible impact of its operations on all Utilities that may be affected by its operations, and shall, in consultation with Utility owner(s), protect, divert, temporarily support or relocate, or otherwise appropriately treat such Utilities to ensure that they are preserved.
- .8 The Contractor shall immediately report any damage to Utilities to the Departmental Representative and to the Utility company or authority affected, and shall promptly undertake such remedial measures as are necessary at no additional cost to the Owner.

1.7 SURVEY OF EXISTING PROPERTY CONDITIONS

- .1** Submission of tender is deemed to be confirmation that the Contractor has inspected the site and is conversant with all conditions affecting execution and completion of work.
- .2** The Contractor shall regularly monitor the condition of the Work Site and of property on and adjoining the Work Site throughout the construction period, and shall immediately notify the Owner if any deterioration in condition is detected. Such monitoring shall cover all pertinent features and property including, but not limited to, buildings, structures, roads, walls, fences, slopes, sewers, culverts and landscaped areas.
- .3** The Departmental Representative may, but shall not be obligated to, survey and record the condition of the Work Site and of property on or adjoining the Work Site prior to the commencement of construction by the Contractor. If requested, the Departmental Representative will provide a copy of the survey records to the Contractor for reference.
- .4** Whenever supplied with survey records, the Contractor shall satisfy itself as to the accuracy and completeness of the survey records provided by the Departmental Representative for any area before commencing construction in that area.
- .5** Commencement of construction in any area shall be interpreted to signify that the Contractor has accepted such survey records as being a true record of the existing conditions prior to construction.
- .6** The provision of the records of a survey of existing conditions by the Departmental Representative shall in no way limit or restrict the Contractor's responsibility to exercise proper care to prevent damage to all property within or adjacent to the Work Site, whether all such property is covered by the survey or not.

1.8 PROTECTION OF PERSONS AND PROPERTY

- .1** The Contractor shall comply with all applicable safety regulations of the Workers' Compensation Board of Alberta (WCB) including, but not limited to, WCB's Industrial Health and Safety Regulations, Industrial First Aid Regulations, and Workplace Hazardous Materials Information System Regulations.
- .2** The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site.
- .3** The Contractor shall promptly take such measures as are required to repair, replace or compensate for any loss or damage caused by the Contractor to any property or, if Parks Canada so directs, shall promptly reimburse to Parks Canada the costs resulting from such loss or damage.
- .4** If required, blasting shall take place between 11:00 a.m. and 3:00 p.m. The Contractor shall:
 - .1** Notify the Departmental Representative at least 24 hours in advance of each scheduled blasting.
 - .2** A list of other parties to be notified in advance of each scheduled blast will be provided by the Departmental Representative. Contractor to notify these parties at least 24 hours in advance of each scheduled blast.
 - .3** Provide traffic management in accordance with Section 01 35 31 - Special Procedures for Traffic Control.

1.9 USE OF PUBLIC AREAS

- .1** Off-road construction equipment will not be allowed on the existing Trans-Canada Highway except at designated crossing points and loading areas. Steel tracked equipment with cleats will not be allowed on pavement designated for future use. Asphalt, granular, embankment and excavation materials may be hauled on existing highway but this shall be by standard highway trucks not exceeding legal highway load limits.
- .2** Flag persons shall be provided when vehicles are entering or exiting Worksite access points and when vehicles are entering or exiting gravel pits in the park.
- .3** The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas. All vehicles and equipment leaving the Work Site and entering public roadways shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle. All vehicles arriving at or leaving the Work Site and transporting materials shall be loaded in a manner which will prevent dropping of materials or debris on the roadways, and where contents may otherwise be blown off during transit such loads shall be covered by tarpaulins or other suitable covers. Spills of materials in public areas shall be removed or cleaned immediately by the Contractor at no cost to the Owner. All activities shall be in accordance with Section 01 35 43 - Environmental Procedures and the Environmental Protection Plan prepared for the project.
- .4** Construction areas and construction crossings shall be flood-lit for night operations.

1.10 SUPERVISORY PERSONNEL

- .1** Within five Days after award notification, the Contractor shall submit to the Departmental Representative confirmation of the names of the supervisory personnel and other key staff designated for assignment on the Contract.
 - .** The following personnel shall be included in the list:
 - .1** Project Superintendent;
 - .2** Safety Representative.
- .2** The above personnel shall perform the following duties:
 - .1** The Project Superintendent shall be employed full time and shall be present on the Work Site each and every workday that Work is being performed, from the commencement of Work to Total Performance of the Work;
 - .2** The Project Superintendent shall nominate a Deputy Project Superintendent who shall have the authority of the Project Superintendent during the latter's absence;
 - .3** The Safety Representative shall possess safety experience in general construction. Duties shall encompass all matters of safety activities from commencement of Work until the Total Performance of the Work.

1.11 MEETINGS

- .1** The Work includes attending meetings between the Contractor and the Departmental Representative. The meetings will be called and chaired by the Departmental Representative as required. The Contractor shall be represented at such meetings to the satisfaction of the Departmental Representative.

- .2 The Departmental Representative will schedule an initial meeting to be held on site after award notification. Senior representatives of the Owner, Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors are to be in attendance.
- .3 The Contractor will be requested to assemble his site staff and sub-contractors for an environmental briefing to be conducted by Parks Canada. The briefing shall be of approximately 2 hours in duration and held at initial project start-up. The Contractor shall ensure that all his current project staff is in attendance. The Departmental Representative and the Contractor will co-operate in setting the most appropriate time and place for the briefing. Subsequent to the initial environmental briefing, briefings will be arranged for new staff and sub-contractors showing up on the project.
- .4 Cost of attending the above meetings shall be considered incidental to the Unit Price items and no additional payment will be made.

1.12 WASTE DISPOSAL

- .1 All surplus, unsuitable and waste materials shall be removed from the job site to approved sites outside Banff National Park. Refer to Section 01 35 43 - Environmental Procedures and Environmental Protection Plan.
- .2 Deposit of any construction debris into any waterway is strictly forbidden.
- .3 Cost for Waste Disposal described above shall be considered incidental to the Unit Price items and no additional payment will be made.
- .4 Waste Disposal shall be completed in accordance with Section 01 35 43 - Environmental Procedures.

1.13 WORK STOPPAGE

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

Part 2 Products

- .1 NOT USED.

Part 3 Execution

- .1 NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Prime Cost Sum.
- .2 Measurement procedures.

1.2 REFERENCES

- .1 General Conditions.

1.3 PRIME COST SUM

- .1 Include in Contract Price a total Prime Cost Sum of \$40,400
- .2 Do not include in the Contract Price, additional contingency allowances for products, installation, overhead or profit.
- .3 Prime Cost Sum provided for in the unit price table is not a sum due the Contractor. Rather, payment will be made against it for miscellaneous work not included in the unit price table under the General Conditions of the Contract.
- .4 Such work may include, but not be limited to:
 - .1 Supply and installation of permanent signs (not construction signs) and relocation of existing signs.
 - .2 Stripping, common excavation and disposal of waste materials.
 - .3 Supply and install Rip Rap
 - .4 Sub-drainage not specified in the tender documents.
 - .5 Remediation or removal and replacement of unsuitable or contaminated soils not described in the contract documents.
 - .6 Additional survey resulting from changes made by the Departmental Representative.
- .5 The Contract Price, and not Prime Cost Sum, includes Contractor's overhead and profit in connection with the Work.

1.4 MEASUREMENT PROCEDURES

- .1 Payment for Work under the **“Lump Sum Price Item 3 – Prime Cost Sum** will be made using negotiated rates or by material, labour and equipment rates as per the following:
- .2 Rental rates will be in accordance with current Alberta Roadbuilders rate schedule, and will be all inclusive and fully operated.
- .3 Hourly rental of equipment will be measured in actual working time and necessary travel time within project limits.
- .4 Transportation time to and from site will be reimbursed only for equipment used exclusively for additional work.

Part 2 Products
 .1 NOT USED.

Part 3 Execution
 .1 NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Mobilization and Demobilization.

1.2 RELATED SECTIONS

- .1 Section 01 11 00 – Summary of Work

1.3 DESCRIPTION

- .1 Mobilization and Demobilization consists of preparatory work and operations including but not limited to, those necessary for the movement of personnel, equipment, camp, buildings, shops, offices, supplies and incidentals to and from the project sites.
- .2 Any protective measures or movement of Contractor trailers necessitated by animal interactions and required by Parks Canada will be paid by the Departmental Representative, and are not to be anticipated in the Lump Sum Contract Price for Mobilization and Demobilization.

1.4 MEASUREMENT PROCEDURES

- .1 Mobilization and Demobilization:
 - .1 Payment will be made under “Lump Sum Price Item 1 Mobilization / Demobilization”.
 - .2 50% of Lump Sum Contract Price for Mobilization and Demobilization to be paid when mobilization to site is complete.
 - .3 The remainder of the Lump Sum Price for Mobilization and Demobilization to be paid when work is complete and all materials, equipment, camp, buildings, shops, offices, and other facilities have been removed from site and site cleaned and left in condition to the satisfaction of the Departmental Representative and all other Agencies having Jurisdiction.
 - .4 Payment of only 10% of the total price tendered will be scheduled as outlined above. If the amount bid for mobilization and demobilization is greater than 10% of the total price tendered, payment of the remainder of the amount will be authorized when the contract has been completed.

Part 2 Products

- .1 NOT USED.

Part 3 Execution

- .1 NOT USED.

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 these specifications.

1.2 RELATED SECTIONS

- .1 SACC R2850D GC 5.10
- .2 Section 01 11 00 – Summary of Work Clause 1.8 - Work Sequence

1.3 DEFINITION OF OCCUPANCY

- .1 Occupancy
 - .1 Notwithstanding SACC R2850D - GC 5.10, the Contractor shall be permitted to lease and occupy sites where he will be working in Banff National Park, free of charge from the date of award of the contract up to and including the completion date of September 25, 2013 (Section 01 11 00 – Summary of Work Clause 1.8 - Work Sequence). The sites to be leased by the Contractor include all the roads and areas specified in this contract and as directed by the Departmental Representative.
 - .2 If the Contractor has not completed the work identified in the Summary of Work by September 25, 2013 (Section 01 11 00 – Summary of Work Clause 1.8 - Work Sequence) to the satisfaction of the Departmental Representative, a site lease fee of \$1,000.00 per calendar day shall be payable by the Contractor to Parks Canada. The site lease fee shall be payable for each and every calendar day, commencing September 26, 2013, and continuing until the Contractor has completed the work and is no longer occupying the site to a maximum of 10 days or \$10,000.00. No allowances shall be made for days of inclement weather, equipment breakdown or any reasons outside of the Contractor's control.
 - .3 If the Contractor has completed the work identified in the Summary of Work prior to September 25th, 2013 (Section 01 11 00 – Summary of Work Clause 1.8 - Work Sequence), to the satisfaction of the Departmental Representative, Parks Canada will pay the Contractor an amount equal to site lease fee of \$1,000.00 per calendar day times the number of days the Contractor has completed work and is no longer occupying the sites prior to the specified completion date September 25th, 2013. The maximum amount payable by Parks Canada to the Contractor shall be \$10,000.00.
 - .4 The Contractor's occupancy of the site will be deemed to have ended, when both of the following conditions are met to the satisfaction of Parks Canada:
 - All the work identified under this contract, has been completed.
 - All sites clean up and any outstanding deficiencies have been addressed to the satisfaction of the Departmental Representative.

Part 2 Products

- .1 NOT USED.

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SITE OCCUPANCY
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Part 3 Execution

.1 NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Coordination.
- .2** Progress meetings.
- .3** Construction organization and start-up.
- .4** Submittal schedule.
- .5** Construction progress meetings.
- .6** On-site documents.
- .7** Schedules.
- .8** Submittals.
- .9** Closeout procedures.

1.2 RELATED SECTIONS

- .1** Section 01 11 00 – Summary of Work.
- .2** Section 01 14 00 – Work Restrictions.
- .3** Section 01 32 18 – Construction Progress Schedules – Bar (Gantt) Chart.
- .4** Section 01 33 00 - Submittal Procedures.
- .5** Section 01 35 43 – Environmental Procedures.
- .6** Section 01 45 00 – Quality Control.
- .7** Section 01 52 00 – Construction Facilities.
- .8** Section 01 77 00 – Closeout Procedures.
- .9** Section 01 78 00 – Closeout Submittals.

1.3 MEASUREMENT PROCEDURES

- .1** This Work shall be incidental to the contract and will not be measured for payment.

1.4 COORDINATION

- .1** Perform coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction Work, with progress of Work of other Contractors, and Work by Owner, under instructions of the Departmental Representative.

1.5 PROJECT MEETINGS

- .1** Attend weekly project meetings throughout progress of Work and provide information as determined by the Departmental Representative. Meetings shall be chaired by the Departmental representative who will prepare the minutes of the meetings.

- .2 Attend pre-installation meetings, when specified in specifications and when required to coordinate related or affected Work and provide information, as determined by the Departmental Representative.
- .3 Provide physical space and make arrangements for meetings.

1.6 CONSTRUCTION ORGANIZATION AND START-UP

- .1 Within seven (7) days after award of Contract, request a meeting of Contract Representatives to discuss and resolve administrative procedures and responsibilities. Meeting shall be chaired by the Departmental representative who will prepare the minutes of the meeting.
- .2 Senior representatives of the Owner, Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors are to be in attendance.
- .3 Agenda to include following:
 - .1 Appointment of official representative of participants in Work.
 - .2 Schedule of Work, progress scheduling in accordance with Section 01 32 18.
 - .3 Schedule of submittals in accordance with Section 01 33 00.
 - .4 Requirements for temporary facilities, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.
 - .5 Site safety and security in accordance with Sections 01 14 00, 01 52 00 and 01 35 43.
 - .6 Quality Control in accordance with Section 01 45 00.
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
 - .8 Owner-furnished materials.
 - .9 Monthly progress claims, administrative procedures, photographs, and holdbacks.
 - .10 Closeout procedures and submittals in accordance with Sections 01 77 00 and 01 78 00.
 - .11 Insurances and transcript of policies.
 - .12 Other business.
- .4 Comply with Departmental Representative's allocation of mobilization areas of site; for field offices and sheds, for access, traffic, and parking facilities.
- .5 During construction, coordinate use of site and facilities through Departmental Representative's procedures for intra-project communications: Submittals, reports and records, schedules, coordination of Drawings, recommendations, and resolution of ambiguities and conflicts.
- .6 Comply with instructions of the Departmental Representative for use of temporary utilities and construction facilities.
- .7 Coordinate field engineering and layout work with the Departmental Representative.

1.7 ON-SITE DOCUMENTS

- .1** Maintain at job site, one copy each of the following:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings and mix designs.
 - .5 Change Orders.
 - .6 Other modifications to Contract.
 - .7 Traffic Management Plan.
 - .8 Safety Plan.
 - .9 WHMIS.
 - .10 Environmental Protection Plan.
 - .11 Field test reports.
 - .12 Copy of approved Work schedule and most recent updated schedule.
 - .13 Labour conditions and wage schedules.
 - .14 Applicable current editions of municipal regulations and by-laws.

1.8 SUBMITTAL SCHEDULE

- .1** Prepare a schedule of the required submissions and the date the submissions will be made. Include columns for Actual Date of Submission, Review Comments Received, Final Submission and Final Acceptance Received.
- .2** The Owner will not be responsible for any construction delays resulting from delays in submission acceptance if the submittal dates shown in the Submittal Schedule are not achieved.

1.9 PROJECT SCHEDULES

- .1** Submit preliminary construction progress schedule in accordance with Section 01 32 18 to Departmental Representative coordinated with Owner's project schedule.
- .2** After review, revise and resubmit schedule to comply with revised project schedule.
- .3** During progress of Work revise and resubmit as directed by the Departmental Representative.
- .4** In addition to the project schedule, submit weekly schedules to the Departmental Representative showing Work planned for the following week on a day by day basis.

1.10 CONSTRUCTION PROGRESS MEETINGS

- .1** During course of Work prior to project completion, schedule progress meetings weekly.

- .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance. Meetings shall be chaired by the Departmental representative who will prepare the minutes of the meetings.
- .3 Agenda to include following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review environmental issues.
 - .3 Review Traffic Control and Emergency response Protocol issues.
 - .4 Review site safety and security issues.
 - .5 Review issues with Prime Contractor and co-ordination with other contractors.
 - .6 Review of Work progress since previous meeting.
 - .7 Discuss field observations, problems, and conflicts.
 - .8 Review off-site fabrication delivery schedules.
 - .9 Review submittal schedules: expedite as required.
 - .10 Corrective measures and procedures to regain projected schedule.
 - .11 Revisions to construction schedule.
 - .12 Review Weekly Progress schedule, during succeeding work period.
 - .13 Review of quality reports since previous meeting.
 - .14 Review construction budget: Progress payments, variances from contract.
 - .15 Other business.

1.11 SUBMITTALS

- .1 Submit product data to Section 01 33 00 for review for compliance with Contract Documents.
- .2 Submit requests for payment for review, and for transmittal to Departmental Representative. Payment request on last day of the month.
- .3 Submit requests for interpretation of Contract Documents, and obtain instructions through Departmental Representative.
- .4 Process substitutions through Departmental Representative.
- .5 Process change orders through Departmental Representative.
- .6 Deliver closeout submittals for review and preliminary inspections, for transmittal to Departmental Representative.

1.12 CLOSEOUT PROCEDURES

- .1 Notify Departmental Representative when Work is considered ready for Substantial Performance.
- .2 Accompany Departmental Representative on preliminary inspection to determine items listed for completion or correction.

- .3** Comply with Departmental Representative's instructions for correction of items of Work listed in executed certificate of Substantial Performance.
- .4** Notify Departmental Representative of instructions for completion of items of Work determined in Departmental Representative's final inspection.

Part 2 Products

- .1** NOT USED.

Part 3 Execution

- .1** NOT USED.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 01 11 00 – Summary of Work
- .2 Section 01 14 00 – Work Restrictions
- .3 Section 01 21 00 – Allowances

1.2 MEASUREMENT PROCEDURES

- .1 This Work shall be incidental to contract and will not be measured for payment.

1.3 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of these specifications.

1.4 DEFINITIONS

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

- .9 Project Planning, Monitoring and Control System: Overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.5 REQUIREMENTS

- .1 Ensure the Project Schedule is practical and remains within specified Contract duration.
- .2 Ensure all the Work required for the Contract is identified in the Project Schedule. Refer to Section 01 11 00 – Summary of Work for a potential list of activities.
- .3 Include an allowance in the schedule for Work performed and paid for as Prime Cost Sum. Refer to Section 01 21 00 – Allowances for a list of activities.
- .4 Plan to complete Work in accordance with prescribed Project Schedule.
- .5 Limit activity durations to maximum of approximately 14 working days, to allow for progress reporting.
- .6 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.
- .7 Include the requirements of Section 01 14 00 - Work Restrictions and Section 01 35 43 – Environmental procedures.

1.6 SUBMITTALS

- .1 Submit to Departmental Representative within 10 working days of Award of Contract, Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .2 Submit Project Schedule to Departmental Representative within 10 working days of receipt of acceptance of Master Plan.

1.7 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule. Completion of each Stage of Construction:
- .2 Interim Certificate (Substantial Completion) September 18, 2013.
- .3 Contract Completion Date September 25, 2013.

1.8 MASTER PLAN

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

1.9 PROJECT SCHEDULE

- .1** Develop detailed Project Schedule derived from Master Plan.
- .2** Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1** Award.
 - .2** Permits.
 - .3** Submittals:
 - Project Schedule
 - List of subcontractors, suppliers and Departmental Representative
 - Contractor Chain of Command including Sub-Contractors and Departmental Representatives
 - Prime Contractor / co-ordination with other Contractors Plan
 - Work Plan
 - Environmental Protection Plan
 - Traffic Management Plan
 - Site access / Detour Plan
 - Emergency Response Protocol
 - Site Specific Health and Safety Plan, incl. MSDS sheets
 - On Site Contingency and Emergency Response Plan
 - Management of Owner supplied material Plan
 - Survey Plan
 - Quality Control Plan
 - Shop Drawings
 - Concrete / asphalt mix Designs
 - Mobilization
 - Work Activities by road segments / locations:
 - .1** Detours / Site Access
 - .2** Excavation
 - .3** Culvert installation
 - .4** Concrete placement
 - .5** Wall repairs
 - .6** Sub-base material placement
 - .7** Base material placement
 - .8** Asphalt Concrete Pavement placement

- .9 Concrete barrier installation
- .10 Temporary line painting
- .11 Additional Work as and when requested
 - Quality Control
 - Interim Inspection
 - Site Clean-up / De-mobilization

1.10 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress. Provide weekly Progress Reports.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.11 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

Part 2 Products

- .1 NOT USED.

Part 3 Execution

- .1 NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Administrative.
- .2** Shop drawings and product data.
- .3** Certificates and transcripts.
- .4** Required Contractor Submittals.
 - .1** Pre-mobilization Submittals
 - .2** Construction Phase Submittals
 - .3** Project Completion Submittals

1.2 RELATED SECTIONS

- .1** Section 01 14 00 – Work Restrictions.
- .2** Section 01 32 18 – Construction Progress Schedules - Bar (Gantt) Chart.
- .3** Section 01 35 29.06 – Health and Safety Requirements.
- .4** Section 01 35 31 – Special Procedures for Traffic Control.
- .5** Section 01 35 43 – Environmental Procedures.
- .6** Section 01 45 00 – Quality Control.
- .7** Section 01 78 00 – Closeout Submittals.

1.3 MEASUREMENT PROCEDURES

- .1** This work shall be incidental to contract and will not be measured for payment.

1.4 REFERENCES

- .1** NOT USED.

1.5 ADMINISTRATIVE

- .1** Submit to Departmental Representative submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2** Do not proceed with Work affected by submittal until review is complete.
- .3** Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4** Where items or information is not produced in SI Metric units converted values are acceptable.
- .5** Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and

Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.

- .6 Notify Departmental Representative in writing at time of submission, identifying any deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work is consistent.
- .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 review.
- .10 Keep one reviewed copy of each submission on site.

1.6 "DESIGN AND BUILD", SHOP DRAWINGS, PRODUCT DATA AND MIX DESIGNS

- .1 "Design and Build": The term "Design" refers to all detailed design activities (survey, investigation, drawings, specifications) based on general requirements contained in these specifications and shown on the drawings. "Build" refers to construction of Contractor's detailed design after design has been reviewed by the Departmental Representative. Contractor's responsibility for error and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .2 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by the Contractor to illustrate details of a portion of Work.
- .3 The term "mix design" means engineered design for proportioning materials in concrete or asphalt concrete pavement including all supporting test results, materials properties and Departmental Representative's letter of recommendation.
- .4 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.
- .5 Allow fourteen (14) calendar days for Departmental Representative's review of each submission.
- .6 Adjustments made on shop drawings by the Departmental Representative are not intended to change the Contract Price. If adjustments affect the value of Work, state such in writing to the Departmental Representative prior to proceeding with the Work.
- .7 Make changes in shop drawings as the Departmental Representative may require, consistent with the Contract Documents. When resubmitting, notify the Departmental Representative in writing of any revisions other than those requested.
- .8 Submit letter(s) of certification with all mix designs.
- .9 Accompany submissions with a transmittal letter containing:
 - .1 Date.
 - .2 Project title and number.

- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, mix design, product and sample.
- .5 Other pertinent data.
- .10** Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - Subcontractor,
 - Supplier,
 - Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with the Contract Documents.
 - .5 Details of appropriate portions of the Work as applicable:
 - Fabrication,
 - Performance characteristics,
 - Standards.
- .11** After the Departmental Representative's review, distribute copies.
- .12** Submit one (1) electronic copy of the shop drawings or mix design for each requirement requested in the Specification Sections and as requested by the Departmental Representative.
- .13** Submit one (1) electronic copy of the product data sheets or brochures for requirements requested in the Specification Sections and as requested by the Departmental Representative where shop drawings will not be prepared due to standardized manufacture of the product.
- .14** Delete information not applicable to project.
- .15** Supplement standard information to provide details applicable to project.
- .16** If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .17** The review of shop drawings and mix designs by Departmental Representative is for the sole purpose of ascertaining conformance with general concept. 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 all requirements of construction and Contract Documents. 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 co-ordination of Work of all sub-trades.

1.7 SAMPLES

- .1 NOT USED.

1.8 MOCK-UPS

- .1 NOT USED.

1.9 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
.2 Submit transcription of insurance immediately after award of Contract.

1.10 REQUIRED CONTRACTOR SUBMITTALS

.1 General

- .1 This Clause identifies the plans, programs, and documentation required prior to mobilization on site and during the construction phase.

.2 Pre-Mobilization Submittals

The Contractor shall not begin any site Work until the Departmental Representative has authorized acceptance of submittals in writing. Submit the following plans and programs to the Departmental Representative for review a minimum of twenty (20) days prior to mobilization to the project site:

- .1 Project schedule, detailing the schedule of the workdays required from Contractor, subcontractors, suppliers and consultants to complete each activity of the project by road segment or location in order to meet stages specified in Section 01 11 00. In addition, for each activity critical elements that could impact on the schedule are to be identified. Submission shall include both a paper copy of the schedule and an electronic copy in Microsoft Projects format.
- .2 List of subcontractors, suppliers and consultants, their role and their key personnel, including names and positions, addresses, telephone, cellular telephone and/or pager numbers.
- .3 Plan describing methods the Contractor will have to meet his responsibilities as the Prime Contractor for Traffic Control along the TCH at km 19, and to co-ordinate Work, traffic control, site access, safety, with other Contractors working in this Work zone.
- .4 Contractor Chain of Command, listing key Contractor personnel, including for each name, position, qualification, experience, telephone, cellular telephone and/or pager numbers. The list shall include the names and telephone/cellular telephone/pager numbers for contact persons who are available on a 24-hour basis in the event of emergencies.
- .5 Work Plan, describing in detail for each activity by road segment and location, the Contractor's intended methods of construction, and materials, equipment and manpower he will use to meet stages specified in Section 01 11 00. The Work Plan has to be linked to the Project Schedule.

- .6 Quality Control Plan in accordance with Section 01 45 00 – Quality Control.
- .7 Traffic Management Plan, in accordance with the requirements of Section 01 35 31 - Special Procedures for Traffic Control.
- .8 Campsite Plan, showing layout of the site and how it will be administered in accordance with Section 01 35 43 – Environmental Procedures.
- .9 Environmental Protection Plans (EPP) and Environmental Construction Operations Plans (ECO Plans) which shall meet the requirements of Section 01 35 43 - Environmental Procedures.
- .10 Site Access and Detour Plans. It shall include but not be limited to, engineered Drawings and procedures for accessing all areas of the Work or for proposed detours.
- .11 Management of Owner supplied materials Plan describing the Contractor's intended methods of reporting to him regularly on quantities used and for what purpose, and on managing materials supplied by the Owner to avoid waste or shortfalls.
- .12 Survey Plan describing the Contractor's intended methods of surveying during this project.
- .13 Contractor shall develop an "Emergency Procedures Protocol" in consultation with Parks Canada. Parks Canada will supply the Contractor with a template with contact names and numbers to be used for this purpose.
- .14 Health And Safety Plan – The Contractor shall have a Certificate of Recognition (COR) or Registered Safety Plan (RSP) including a site specific Health and Safety Plan acceptable to the Departmental Representative. The Contractor shall implement and maintain the Health and Safety Plan during the Work.
- .15 Health and Safety Plan must include:
 - Contractor's safety policy.
 - Identification of applicable compliance obligations.
 - Definition of responsibilities for project safety/organization chart for project.
 - Site specific hazard assessment.
 - General safety rules for project.
 - Job specific safe work procedures.
 - Inspection policy and procedures.
 - Incident reporting and investigation policy and procedures.
 - Occupational Health and Safety meetings.
 - Occupational Health and Safety communications and record keeping procedures.
 - Results of safety and health risk or hazard analysis for site tasks and operation.
 - Submit copies of Material Safety Data Sheets (MSDS).
 - Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to

commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

- On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

- .16 The Contractor shall not begin any site Work until the Departmental Representative has authorized acceptance of the submittals in writing.
- .17 Submit a copy of the filed Notice of Project with Provincial authorities.

.3 Construction Phase Submittals

- .1 Monthly Progress Reports in accordance with Section 01 32 18.
- .2 Weekly Progress Reports that outline the detailed Work (Contractor, subcontractors, suppliers, consultants) completed to date as well as the anticipated Work to be performed for the following week on a day-by-day basis. Work to be linked to activities by road segment or location identified in project schedule and to provide information on materials, equipment and manpower. Also, alternate Work to be identified if Work or a portion of, proposed cannot be done due to weather, equipment breakdown, delays in delivery, etc.
- .3 Quality Control Inspection Reports - The Contractor shall maintain a daily inspection report that itemizes the results of all Quality Control inspections conducted by the Contractor. The reports shall be made available for review by the Departmental Representative upon request. A summary of all Quality Control inspections conducted to date shall be submitted by the Contractor with each request for payment.
- .4 "Design and Build" documents, Shop Drawings and Mix Designs - The Contractor shall submit all design drawings, shop drawings and mix designs required to fabricate and / or conduct the work a minimum 30 days prior to fabrication / production.
- .5 Progress Photographs:
 1. Formats:
 - Electronic: .jpg files, minimum three (3) mega pixels.
 2. Submission requirements: one (1) set of electronic files.
 3. Identification: name and number of project, description of photograph and date.
 4. Viewpoints: viewpoints determined by Construction Manager or Departmental Representative.
 5. Submission Frequency: prior to commencement of Work and weekly thereafter with progress statement, or as directed by Construction Manager or Departmental Representative.
 6. Submit CD with all electronic pictures as part of closeout package.
- .6 Submit an electronic copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative and authority having jurisdiction, weekly.
- .7 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.8 Submit copies of incident and accident reports.

.4 Project Completion Submittals

.1 Record Drawings -The Contractor shall submit copies of all Contractor's Drawings revised as necessary to record all as-built changes to the Work and the Contractor shall submit a set of Contract Drawings clearly marked to record as-built changes to the Work.

.2 Quality Control Records – The Contractor shall submit a bound and itemized set of project quality control documentation.

.5 The Contractor shall not construe the Departmental Representative's authorization of the submittals to imply approval of any particular method or sequence for conducting the Work, or for addressing health and safety concerns. Authorization of the programs shall not relieve the Contractor from the responsibility to conduct the Work in strict accordance with the requirements of Federal or Provincial regulations, this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor shall remain solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

Part 2 Products

.1 NOT USED.

Part 3 Execution

.1 NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Submittals.
- .2** Filing of notice.
- .3** Safety assessment.
- .4** Meetings.
- .5** Regulatory requirements.
- .6** Project/site conditions.
- .7** General requirements.
- .8** Responsibility.
- .9** Compliance requirements.
- .10** Unforeseen hazards.
- .11** Health and safety coordinator.
- .12** Posting of documents.
- .13** Correction of non-compliance.
- .14** Blasting.
- .15** Powder actuated devices.
- .16** Work stoppage.

1.1 RELATED SECTIONS

- .1** Section 01 14 00 – Work Restrictions
- .2** Section 01 33 00 – Submittal Procedures
- .3** Section 01 35 43 – Environmental Procedures
- .4** Section 02 81 01 – Hazardous Materials: Submission Requirements for WHMIS MSDS.

1.2 MEASUREMENT PROCEDURES

- .1** This work shall be incidental to contract and will not be measured for payment.

1.3 REFERENCES

- .1** Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2** Health Canada/Workplace Hazardous Materials Information System.
 - .1** (WHMIS).Material Safety Data Sheets (MSDS).
- .3** Province of Alberta.
 - .1** Occupational Health and Safety Act, R.S.A. 2000.

1.4 SUBMITTALS

- .1** Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2** Submit site-specific Health and Safety Plan: Within seven (7) days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1** Contractor's safety policy.
 - .2** Identification of applicable compliance obligations.
 - .3** Definition of responsibilities for project safety/organization chart for project.
 - .4** General safety rules for project.
 - .5** Job specific safe work procedures.
 - .6** Inspection policy and procedures.
 - .7** Incident reporting and investigation policy and procedures.
 - .8** Occupational Health and Safety meetings.
 - .9** Occupational Health and Safety communications and record keeping procedures.
 - .10** Results of site specific safety hazard assessment.
 - .11** Results of safety and health risk or hazard analysis for site tasks and operation.
 - .12** Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative and authority having jurisdiction, weekly.
 - .13** Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.
 - .14** Submit copies of incident and accident reports.
 - .15** Submit copies of Material Safety Data Sheets (MSDS) to Departmental Representative.
 - .16** Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within ten (10) days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within five (5) days after receipt of comments from Departmental Representative.
 - .17** Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
 - .18** Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
 - .19** On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.5 FILING OF NOTICE

- .1** File Notice of Project with Provincial authorities prior to beginning of Work.

- .2 Provide Departmental Representative with copy of filing.

1.6 SAFETY ASSESSMENT

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

1.7 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.
- .2 Parks Canada recognizes that federal Occupational Health and Safety legislation places specific responsibilities upon Parks Canada as owner of the work place. In order to meet those requirements, Parks Canada has implemented a contractor safety regime to ensure roles and responsibilities assigned under Part II of the Canada Labour Code and the Canada Occupational Health and Safety Regulations are implemented and observed when involving contractor(s) to undertake work in Parks Canada work places, including on Parks Canada property.

After contract award and prior to commencement of any work under the contract, the Project Manager will hold a health and safety meeting with the Contractor. At this meeting, the Contractor is required to complete and sign an Attestation to certify the Contractor will comply with the requirements set out in the Attestation and the terms and conditions of the contract.

A copy of the "Attestation and Proof of Compliance with Occupational Health and Safety (OHS)" form is attached as Appendix A.

1.8 REGULATORY REQUIREMENTS

- .1 Do Work in accordance with National Parks Act.

1.9 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with Alberta Occupational Health and Safety Act.

1.10 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.11 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.12 COMPLIANCE REQUIREMENTS

- .1** Comply with Occupational Health and Safety Act, General Safety Regulation, Alberta.
- .2** Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.13 UNFORESEEN HAZARDS

- .1** When unforeseen or peculiar safety-related factor, hazard, or conditions 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.

1.14 HEALTH AND SAFETY COORDINATOR

- .1** Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Co-ordinator must:
 - .1** Have minimum 2 years site-related working experience specific to activities associated with roadway construction.
 - .2** Have working knowledge of occupational safety and health regulations.
 - .3** Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 - .4** Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .5** Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.15 POSTING OF DOCUMENTS

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

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

1.17 BLASTING

- .1** Blasting or other use of explosives is not permitted without prior receipt of written instructions by the Departmental Representative.

- .2 Production of blasting powder must be done in accordance with Section 01 35 43 - Environmental Procedures.
- .3 Do blasting operations in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfill.

1.18 POWDER ACTUATED DEVICES

- .1 Use powder actuated devices only after receipt of written permission from the Departmental Representative.

1.19 WORK STOPPAGE

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

Part 2 Products

- .1 NOT USED.

Part 3 Execution

- .1 NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Measurement Procedures for Traffic Management.
- .2** Informational and Warning Devices.
- .3** Protection and Control of Public Traffic.
- .4** Operational Requirements.

1.2 PRECEDENCE

- .1** For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of these specifications.

1.3 RELATED SECTIONS

- .1** All Division 01, 02 and 03 Sections.

1.4 MEASUREMENT PROCEDURES

- .1** Cost of Traffic Control, including placing and removing temporary concrete barrier and temporary pavement marking, described in this Section 01 35 00.06, shall be considered incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”**, and no additional payment will be made for the duration of the Contract. The Contractor shall receive payment for traffic management on a monthly basis prorated by the number of months working on site divided by the number of months on site identified on Contractor schedule, not to exceed the total lump sum bid price for Traffic Management.

1.5 REFERENCES

- .1** The Contractor shall provide traffic control in accordance with current edition of:
- .2** Alberta Transportation Standard – Traffic Accommodation in Work Zones latest edition.
- .3** Manual of Uniform Traffic Control Devices for Canada, (MUTCD) distributed by Transportation Association of Canada.

1.6 QUALITY CONTROL

- .1** All Quality Control by the Contractor.

1.7 GENERAL

- .1** The Contractor shall develop and implement a Traffic Management Plan in accordance with the requirements of the current edition of the Alberta Transportation Standard – Traffic Accommodation in Work Zones, except where specified otherwise. The Traffic Management Plan will include plans specific to each detour and access point required for this project.

- .2 The Contractor shall design, supply, erect, move and maintain all traffic control devices, signs, temporary pavement marking, other safety measures and provide staff to ensure safe passage of all traffic from commencement of site work to date of acceptance by the Departmental Representative.
- .3 All temporary signs that are used for longer than one day shall be mounted on wood posts.
- .4 All traffic and warning signs shall be either bilingual or of a symbolic or pictorial type. If bilingual signs are used, the English and French message shall be of equal letter size and at same elevation, with English on left and French on right. Assistance in translation of construction and warning signs to French may be obtained from Parks Canada.
- .5 All speed limits, traffic control and warning signs shall have an "NPC" adhesive sticker added to bottom right-hand corner. These stickers will be supplied by Parks Canada following the acceptance by the Departmental Representative of the Contractor's traffic management plan.
- .6 Concrete barriers for temporary traffic control are available to the Contractor at Mannix Pit. Barriers to be returned to Mannix Pit. Installation and removal of temporary barrier for traffic control shall be considered incidental to Traffic Control.
- .7 Temporary pavement marking shall be in accordance with Section 32 17 23 – Pavement Marking
- .8 Contractor shall have appropriate traffic control measures in place so that two lanes of highway traffic are maintained through the work zone at all times throughout the construction.
- .9 The Contractor shall coordinate traffic management procedures with other Contractors working in the area.

1.8 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 existing travelled way:
 - .1 Place equipment in a position presenting a minimum of interference and hazard to traveling public.
 - .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
 - .3 Do not leave equipment on travelled way overnight.
 - .4 Do not close any lanes of road without approval of Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with the requirements of the current edition of the Alberta Transportation Standard – Traffic Accommodation in Work Zones, except where specified otherwise.
 - .5 Keep travelled way clean, free of pot holes and of sufficient width to accommodate two 3.7 m wide lanes for traffic, one in each direction.

- .6 The Contractor shall also provide competent supervision and/or contract personnel as required during non-working hours to ensure that safety flares, flashing beacons, signs, lights, etc. are in proper working order.
- .7 The traffic control measures will be monitored by the Departmental Representative, who may require modifications of these measures from time to time to achieve satisfactory traffic flow, safety of traveling public and coordination with adjacent contracts.
- .3 At paved detours and at access points, Contractor shall:
 - .1 Have posted speed limit at 50 km/hr. with appropriate signage, temporary pavement marking and other safety features necessary.
 - .2 Keep areas clean, free of pot holes, failures, and rutting.
 - .3 Provide and maintain temporary markings.
 - .4 Provide competent supervision and/or contract personnel as required during non-working hours to ensure that safety flares, flashing beacons, signs, lights, etc. are in proper working order.
 - .5 Traffic control measures will be monitored by the Departmental Representative, who may require modifications of these measures from time to time to achieve satisfactory traffic flow, safety of traveling public and coordination with adjacent contracts

1.9 INFORMATIONAL AND WARNING DEVICES

- .1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
- .2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in the Traffic Management Plan submitted by the Contractor and approved by the Departmental Representative. **All temporary signs that are used for longer than one day shall be mounted on wood posts.**
- .3 At the west end of the Work site, supply, install and maintain a portable electronic sign with a minimum of three (3) lines with 8 characters for the duration of the project.
- .4 Place signs and other devices to standards and in locations recommended in Alberta Infrastructure and Transportation's Standard Traffic Accommodation in Work Zones. Provide intermittent signage if work zones exceed 2.0 km in length.
- .5 Signs shall be wind resistant.
- .6 As situation on site changes, Contractor to update his Traffic Management Plan outlining signs and other devices required for the project and submit for the approval of the Departmental Representative.
- .7 Continually inspect and maintain traffic control devices in use by:
 - .1 Checking signs daily for legibility, damage, suitability and location.
 - .2 Cleaning, repairing or replacing signs as required ensuring clarity and reflectance.

- .3 Removing or covering signs which do not apply to conditions existing from day to day or time to time.

1.10 CONTROL OF PUBLIC TRAFFIC

- .1 Provide competent flag persons, trained in accordance with, and properly dressed and equipped as specified in, Alberta Infrastructure and Transportation's Standard Traffic Accommodation in Work Zones:
 - .1 When public traffic is required to pass working vehicles or equipment, which block all or part of travelled roadway.
 - .2 When vehicles are entering or exiting Worksite access points.
 - .3 When vehicles are entering or exiting gravel pits in the park.
 - .4 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.
 - .5 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
 - .6 Where temporary protection is required while other traffic control devices are being erected or taken down.
 - .7 For emergency protection when other traffic control devices are not readily available.
 - .8 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
 - .9 At each end of restricted sections where pilot cars are required.
- .2 Delays to public traffic due to Contractor's operators: maximum 20 minutes, except during blasting operation at which time the Contractor may delay public traffic up to 45 minutes between the hours of 11:00 a.m. and 3:00 p.m.
- .3 No stoppage of traffic will be allowed for the period commencing at 07:00 a.m. on the day before a Statutory Holiday or long weekend to 7:00 a.m. on the day following a long weekend.
- .4 During hours of darkness, Contractor shall determine requirements but as a minimum, flagpersons shall be additionally equipped with a red signal hand-light of sufficient brightness to be clearly visible to approaching traffic and flagging stations shall be illuminated by overhead lighting. Signs indicating hazardous conditions and signs requiring increased attention shall be marked with flashers.

1.11 OPERATIONAL REQUIREMENTS

- .1 Maintain existing conditions for traffic throughout 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 to be restricted as follows:
 - .1 Speed limit reduced to 70 km/h in work zones in non-work periods.

- .2 Speed limit reduced to 50 km/h in work zones in work periods.
- .3 Speed limit reduced to 50 km/h on detours at all times.
- .2** Maintain existing conditions for traffic crossing right-of-way.
- .3** No stoppage of traffic shall be allowed during inclement weather conditions.

Part 2 Products

- .1** NOT USED.

Part 3 Execution

- .1** NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Precedence.
- .2** Measurement procedures.
- .3** National Park regulations.
- .4** Canadian Environmental Assessment Act (CEAA).
- .5** Start-up and environmental briefing.
- .6** Site access and parking.
- .7** Protection of work limits.
- .8** Erosion control.
- .9** Pollution control.
- .10** Equipment maintenance, fuelling and operation.
- .11** Operation of equipment.
- .12** Fire prevention and control.
- .13** Wildlife.
- .14** Relics and antiquities.
- .15** Waste materials storage and removal.
- .16** Miscellaneous site management contingencies.
- .17** Clearing and grubbing.
- .18** Stripping.
- .19** Blasting.
- .20** Material loading, hauling, placement and grade building.
- .21** Excavating and placement.
- .22** Culvert installation.
- .23** Asphalt plant operation and paving.
- .24** Concrete management.
- .25** Crushing.
- .26** Fine grading, topsoil placement and seeding.
- .27** Pavement marking and guardrail placement.
- .28** Specific concerns.

1.2 RELATED SECTIONS

- .1** All Divisions 01, 02, 03, 05, 10, 31, 32, 33 and 34 Sections

1.3 MEASUREMENT PROCEDURES

- .1 Preparation and implementation of an Environmental Protection Plan in accordance with this Section 01 35 43 – Environmental Procedures will not be measured separately for payment and will be considered incidental to the Work.

1.4 SUBMITTALS

- .1 The Contractor is required to prepare an Environmental Protection Plan in accordance with this Section 01 35 43 – Environmental Procedures.

1.5 NATIONAL PARK REGULATIONS

- .1 The Contractor shall ensure that all work is performed in accordance with the ordinances, laws, rules and regulations set out in the Canada National Parks Act and Regulations.
- .2 The Contractor and any sub-Contractors shall obtain a business license from the Parks Canada Administration Office in Banff, prior to commencement of the contract.
- .3 All Contractor's vehicles are required to display a vehicle work pass from Parks Canada. These permits may be obtained free of charge from the Departmental Representative, PCA Environmental Officer or at the Park Gate.

1.6 CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)

- .1 Execution of the work is subject to the provisions within the *Canadian Environmental Assessment Act* (CEAA) Guidelines Order of 2003 and subsequent amendments. This large twinning project, and its components, has been subject to an environmental assessment – “*Screening Report for the TransCanada Highway Twinning Project Phase IIIB Banff National Park*” 2004 Golder Associates, pursuant to the expectations of C.E.A.A. Environmental Protection Plans are the next step to achieve the desired end results of minimal adverse environmental effect, as the project is constructed.
- .2 Failure to comply with or observe environmental protection measures as identified in these specifications may result in the work being suspended pending rectification of the problems.

1.7 START-UP AND ENVIRONMENTAL BRIEFING

- .1 All staff employed at the construction site will be subject to an approximately two hour briefing regarding their individual and collective responsibilities to ensure avoidable adverse environmental impact does not arise from their activities and personal choices. Employees must attend this briefing before beginning their work at the site. Each employee, having received the briefing, will be issued a certification sticker to be displayed on their helmet. It is recognized new employees may join the Contractors' work force after the initial round of “environmental briefing”. In that case and as required, subsequent “environmental briefings” can be presented as numbers warrant, by arrangement with the ESO through the Departmental Representative. Also, some sub-trades may be present at the site for a short time, to perform once-only duties. In these cases, the “environmental briefing” will be replaced by the Contractor explaining the environmental sensitivity of the work location to the sub-trade worker(s), and reviewing highlights of personal conduct expected, with reference to a one-page briefing summary

to be provided to the Contractor by the ESO. A copy of this summary will be provided to each sub-trade worker joining the work force at the site.

- .2 Parks Canada will have an ESO attending the site to monitor the construction activity for conformance with the EPP. The ESO or alternate designated Parks Canada staff member will present the “environmental briefing”. The ESO’s main duties are to monitor the progress of the construction on an on-going basis to ensure compliance with environmental protection measures, and to provide guidance through the Departmental Representative, in the event of unanticipated environmental problems. Although the ESO has authority to enforce National Parks Act violations, direction to the Contractor will be the duty of the Departmental Representative.

1.8 CONSTRUCTION SITE ACCESS AND PARKING

- .1 Points of access from the existing TCH to the various construction sites will be required. The Contractor shall review both short and long term construction access requirements with the Departmental Representative, both at start-up and on an ongoing basis. In consultation with the Departmental Representative, the Contractor shall formulate an agreement for worker transportation to and from the work sites and where workers shall park their private vehicles. Generally, personal vehicles shall be parked at least 10 metres distance from any watercourse.
- .2 The Contractor shall ensure that the environment beyond the work limits is not negatively impacted or damaged by workers’ vehicles or construction machinery and shall instruct workers so that the “footprint” of the project is kept within defined boundaries.

1.9 PROTECTION OF WORK LIMITS

- .1 The Contractor is to prepare an EPP which details how the work limits shall be marked and what procedures will be employed to ensure trespass outside these limits does not occur, to the satisfaction of the Departmental Representative and the ESO.

1.10 EROSION CONTROL

- .1 Erosion control measures that prevent sediment from entering any waterway, water body or wetland in the vicinity of the construction site are a critical element of the project and shall be implemented by the Contractor.
- .2 If necessary, on-site sediment control measures shall be constructed and functional prior to initiating activities associated with the asphalt plant and the paving. The Contractor shall prepare an Erosion Control Plan to the satisfaction of the Departmental Representative and the ESO.
- .3 The regular monitoring and maintenance of all erosion control measures shall be the responsibility of the Contractor. If the design of the control measures is not functioning effectively they are to be repaired. The Departmental Representative and ESO also will monitor erosion control performance.
- .4 The site will be secured against erosion during any periods of construction inactivity or shutdown.

1.11 POLLUTION CONTROL

- .1** The Contractor shall prevent any deleterious and objectionable materials from entering streams, rivers, wetlands, water bodies or watercourses that would result in damage to aquatic and riparian habitat. Hazardous or toxic products shall be stored no closer than 100 metres from the Vermilion Lakes.
- .2** A Spill Response Plan will be prepared as part of the EPP and shall detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative and the E.S.O. and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
- .3** The containment, storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the use of any hazardous or toxic products shall be in accordance with all applicable federal and provincial legislation. Hazardous products shall be stored no closer than 100 metres from the Vermilion Lakes.
- .4** An impervious berm shall be constructed around fuel tanks and any other potential spill area. The berms shall be capable of holding 110% of tank storage volumes and shall be to the satisfaction of the Departmental Representative and the ESO before start-up. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double-lined fuel tanks can prevent spills into the environment.
- .5** The Contractor shall prevent blowing dust and debris by covering and/or providing dust control for temporary roads and on-site work by methods that are approved by the Departmental Representative or ESO.
- .6** The Contractor shall provide spill kits at re-fuelling, lubrication, and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The ESO and Departmental Representative prior to project start-up must approve these spill kits. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
- .7** Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The Departmental Representative and the ESO shall be notified immediately of any spill. If not available, Banff Dispatch will be contacted at (403) 762 – 4506. Spill response cards will be distributed during the initial Environmental Briefing with basic instructions and phone numbers.
- .8** In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
- .9** The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill conditions), shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the expected standard and to the satisfaction of the Departmental Representative and ESO.

1.12 EQUIPMENT MAINTENANCE, FUELLING AND OPERATION

- .1 The Contractor shall ensure that all soil, seeds and any debris attached to construction equipment to be used on the project site shall be removed (e.g. power washing) outside the Banff National Park before delivery to the work site.
- .2 Equipment fuelling sites will be identified by the Contractor and approved by the Departmental Representative and the ESO. Except for chain saws, any fuelling closer than 100 metres to the Vermilion Lakes or any other streams, wetlands, water bodies or waterways shall require the authorization and oversight of the Departmental Representative.
- .3 Diesel and gasoline delivery vehicles, including bulk tankers shall be parked more than 100 metres from the Vermilion Lakes or any other streams, wetlands, water bodies or watercourses. Gravity fed fuel systems are not allowed. Manual or electric pump delivery systems shall be used. Fuelling personnel shall maintain presence at and immediate attention to the fuelling operation.
- .4 Mobile fuel containers (e.g. slip tanks, small fuel carboys) shall remain in the service vehicle at all times. Protection and containment of approved fuel storage sites is addressed in # 4 of Pollution Control above.
- .5 Equipment used on the project shall be fuelled with E10, and low sulfur diesel fuels and shall conform to local emission requirements. The Contractor is to ensure that unnecessary idling of vehicles is avoided.
- .6 Oil changes, lubricant changes, greasing and machinery repairs shall be performed at locations approved by the ESO or the Departmental Representative. Waste lubrication products (e.g. oil filters, used containers, used oil, etc.) shall be secured in spill-proof containers and properly recycled or disposed of at an approved facility. No waste petroleum, lubricant products or related materials are to be discarded, buried or disposed of in borrow pits, turnouts, picnic areas, viewpoints, etc anywhere within Banff National Park.
- .7 The Contractor shall ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working order.
- .8 Fuel containers and lubricant products shall be stored only in secure locations specified by the Departmental Representative. Fuel tanks or other potentially deleterious substance containers shall be secured to ensure they are tamperproof and cannot be drained by vandals when left overnight in Banff National Park. Alternatively, the Contractor may hire a security person employed to prevent vandalism. The access gate to km 69 and Mannix Gravel Pits shall be locked at the end of each working day and during extended periods when the pit is not being used. The Contractor is to ensure that workers are briefed on proper 'daisy-chain' use of locks to ensure no other contractor or Parks Canada Highways are locked out.

1.13 OPERATION OF EQUIPMENT

- .1 Equipment movements shall be restricted to the 'footprint' of the construction area. The work limits shall be identified by stake and ribbon or other methods approved by the Departmental Representative. Unless authorized by the Departmental Representative, activities beyond the work limits are not permitted. No machinery will enter, work in or cross over streams, rivers, wetlands, water bodies or watercourses, nor damage aquatic and riparian habitat or trees and plant communities. Some of the construction shall

require working close to the Vermilion Lakes and other watercourses or water bodies. In these instances, the Contractor is to describe measures to be employed to ensure fugitive materials (e.g. rocks, soil, branches) and especially deleterious substances (e.g. chemicals) do not enter any watercourses, to the satisfaction of the Departmental Representative and ESO.

- .2 The Contractor shall instruct workers to prevent pushing, placement, raveling, storage or stockpiling of any materials (e.g. slash, rock, fill or topsoil) in the trees bordering the right-of-way or into watercourses or water bodies.
- .3 When, in the opinion of Parks Canada, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the designated work area, the Contractor shall be responsible, at his or her expense, for complete restoration including the replacement of trees, shrubs, topsoil, grass, etc. to the satisfaction of the Departmental Representative and ESO.
- .4 Restrict vehicle movements to work limits.
- .5 Workers private vehicles are to remain within the construction footprint.

1.14 FIRE PREVENTION AND CONTROL

- .1 A fire extinguisher shall be carried and available for use on each machine and at locations within the plant in the event of fire. Basic fire fighting equipment recommended (e.g. a water truck; minimum 500 Imperial gallons with 500 feet of fire hose and a pump capable of producing 45 psi water pressure at the nozzle, three shovels, two pulaskis, and two five gallon backpack pumps) shall be maintained at the construction site at a location known and easily accessible to all the Contractors' staff. Contractor's staff shall receive basic training in early response to wildfire events during the "environmental briefing".
- .2 Water can be obtained from Mannix Pit. An excavation to the water table will be required to access groundwater for use by the Contractor. The Departmental Representative will identify a suitable location for this excavation. The contractor will be responsible to make the excavation, and extend it to greater depths in the event that the water table drops.
- .3 A water truck may be necessary and will depend on the timing of the contract (e.g. – not required during winter or snow covered conditions).
- .4 Construction equipment shall be operated in a manner and with all original manufacturer's safety devices to prevent ignition of flammable materials in the area.
- .5 Care shall be taken while smoking on the construction site to ensure that the accidental ignition of any flammable material is prevented. Fires or burning of waste materials is not permitted.
- .6 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The ESO and the Departmental Representative shall be notified of any fire immediately. If not available, Banff Dispatch shall be contacted at (403) 762 – 4506.
- .7 Fires or burning of waste materials is not permitted.

1.15 WILDLIFE

- .1 During the Environmental Briefing all personnel shall be instructed by the ESO on procedures to follow in the event of wildlife appearance near or within the work site and any other wildlife concerns.
- .2 If necessary, the construction activity may be scheduled around important wildlife windows (e.g. Harlequin duck breeding and bird nesting). Any work prior to May 1 and after September 30 has little effect on Harlequins in the Bow Valley. Critical times are during flightless movements of Harlequin broods during the months of July and August (See Specific Concerns in the Harlequin Duck section below). Fisheries windows for avoidance of stream disturbance work will apply – see Fish and Fish Habitat Considerations section below.
- .3 Avoid or terminate activities on site that attract or disturb wildlife and vacate the area and stay away from the immediate location if bears, cougars, wolves, elk or moose display aggressive behaviour or persistent intrusion. Extra care to control materials that might attract wildlife (e.g. lunches and food scraps) must be exercised at all times.
- .4 Notify the ESO and Departmental Representative immediately about dens, litters, nests, carcasses (road kills), bear activity or encounters on or around the site or crew accommodation. Other wildlife-related encounters are to be reported within 24 hours. If the ESO or Departmental Representative are not available, Banff Dispatch will be contacted at (403) 762 – 4506.

1.16 RELICS AND ANTIQUITIES

- .1 Artifacts, relics, antiquities and items of historical interest such as cornerstones, commemorative plaques, inscribed tablets and similar objects found on the work site shall be reported to the ESO or the Departmental Representative immediately. The Contractor and workers shall wait for instructions before proceeding with their work.
- .2 All historical or archaeological objects found in Banff National Park are protected under the National Parks Act and Regulations and are the property of Parks Canada. The Contractor and workers shall protect any articles found and request direction from the ESO or the Departmental Representative.

1.17 WASTE MATERIALS STORAGE AND REMOVAL

- .1 The Contractor and workers shall dispose of hazardous wastes in conformance with the Environmental Contaminants Act and applicable provincial regulations while observing the Code of Good Practice for Management of Hazardous and Toxic Wastes at Federal Establishments.
- .2 All wastes originating from construction, trade, hazardous and domestic sources shall not be mixed, but will be kept separate.
- .3 Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site or elsewhere in Banff National Park. These wastes shall be contained and removed in a timely and approved manner by the Contractor and workers, and disposed of at an appropriate waste landfill site located outside the park. Construction waste storage containers, provided by the Contractor, shall be emptied by the Contractor when 90% full. Waste containers will have lids, and waste loads shall be covered while being transported.

- .4 A concerted effort shall be made by the Contractor and workers to reduce, reuse and recycle materials.
- .5 All efforts to prevent wildlife from obtaining food, garbage or other domestic wastes shall be made by the Contractor and contract staff while undertaking their work in Banff National Park. Such wildlife attractants shall not be stored at the work site overnight. Lunches, coolers and food products, including waste food products, shall be securely stored away from access by animals. Daily removal of food scraps, food wrappers, pop cans or other attractive products to bear proof containers, such as the Overflow Campground, is mandatory. It is incumbent on the Contractor to notify Parks Canada and make specific arrangements to have garbage collected by Parks Canada when using existing Parks Canada receptacles.
- .6 The Contractor and workers shall immediately report any circumstances related to food/garbage (e.g. overflowing container or strong smell) and wildlife to the ESO or the Departmental Representative. If neither can be reached, the Contractor/worker shall immediately contact Banff Dispatch at (403) 762 – 4506 and report the details.
- .7 Sanitary facilities, such as a portable container toilet, shall be provided by the Contractor and maintained in a clean condition.

1.18 MISCELLANEOUS SITE MANAGEMENT CONTINGENCIES

- .1 The Contractor shall prepare an EPP which details how the work limits will be marked and what procedures will be employed to ensure trespass outside these limits does not occur, to the satisfaction of the Departmental Representative and the E.S.O.
- .2 A Contractor's office and work headquarters material laydown, equipment parking and storage area will be permitted at the Overflow Campground at km 66.9, or Mannix Pit.
- .3 The Contractor shall prepare a Workers Accommodation Camp Plan regarding structures, layout, vehicles, operations, etc. required at this location, to the satisfaction of the Departmental Representative. Particular attention shall be given to management of foods and waste products attractive to wild animals. An electric surround fence may be required in the event of bear attraction problems. The site will be shared with other Contractors. Also, part of this Overflow Campground will continue to operate for public camping. All ordinances, laws, rules and regulations set out in the Canada National Parks Act and Regulations shall apply (e.g. no excessive noise, quiet times, no fires, etc.).
- .4 The Contractor shall provide toilets and maintain them in a clean and sanitary condition at the camp. These facilities shall not be used for the disposal of anything but human body wastes.
- .5 The National Park Act regulations prohibit anyone working within Banff National Park from using public campground facilities.
- .6 Removal and storage of snow shall be arranged with the ESO and the Departmental Representative.
- .7 The Contractor shall control blowing dust and debris generated from the construction site by means such as covering or wetting down dry materials and rubbish. Dust control measures for temporary access roads may also have to be initiated.
- .8 Security services at the construction site may be desirable or necessary during the contract, especially during quiet times. Fuel tanks or other potentially deleterious

substance containers must be secured by the Contractor to ensure they are tamperproof and cannot be drained by vandals at his own cost.

- .9 Pets shall not be brought to or maintained at the construction site or workers' camp.
- .10 Should the Contractor require/request a water source other than Mannix Pit, the Departmental Representative, in consultation with the ESO may give direction as to an alternative location to be used. Specific intake measures are required when water is approved to be withdrawn from open watercourses.

Part 2 Products

- .1 NOT USED.

Part 3 Execution

3.1 CLEARING AND GRUBBING

- .1 The Contractor shall ensure that the substrate or riparian area of streams, rivers or watercourses, whether open water or frozen over shall not be disturbed by tracked, wheeled or self-propelled equipment, (e.g. a skidder or truck). The ESO or Departmental Representative will provide direction in the case of work occurring near any wetland area or watercourses.
- .2 The Contractor shall take all measures to ensure that trees do not fall into streams, rivers, wetlands or water bodies or outside the clearing limits as marked by colored flagging. Generally, work within a 30 metre buffer of watercourses, water bodies or wetlands requires the close oversight of the ESO or the Departmental Representative.
- .3 Trees inadvertently felled into streams, rivers, watercourses or outside the clearing limits shall be removed by means (e.g. winch) so as not to damage the substrate or any standing trees left outside the clearing limits. Machinery shall not go outside the clearing limits, or into streams, rivers, watercourses or water bodies to remove felled trees.
- .4 Logs and other salvage materials are to be conveyed to and placed at the storage site without spread of debris or damage to other standing trees or landscape resources outside the marked clearing or storage limits. They shall not be skidded through wetlands, waterways or water bodies.
- .5 During the grubbing component, stumps, roots, imbedded logs and other non-soil debris shall be pulled and shaken free of loose soil and rocks before transport to Mannix Pit
- .6 No slash clearing, pickup or grubbing shall occur outside of the designated area or within 1 metre of the drip line of existing forest.
- .7 Existing areas of vegetation disturbed as a result of this contract shall be rehabilitated using approved topsoil from the park and a native grass seed mix as specified in Section 32 92 22 – Seeding.

3.2 STRIPPING

- .1 A contingency plan for control of dust generated from the construction site shall be prepared, with materials availability arranged in the event of their need. In the event of a work program shutdown during inclement weather (e.g. winter conditions unfavourable for construction) erosion control of bared soils or excavated materials stockpiles will be

required. The Contractor's EPP will describe measures to be implemented in such a circumstance.

- .2 Stripping close to the any watercourse, water body or wetland shall employ methods to ensure materials are not pushed, fall or are eroded into the water or wetlands. Generally, work within a 30 metre buffer of waterways or wetlands requires the close oversight of the ESO and the Departmental Representative.
- .3 No stripping shall occur outside of the designated area or within 1 metre of the drip line of existing forest.
- .4 Stripped soil (including fine forest litter) materials shall be placed and stored at locations and in amounts and form as instructed by the Departmental Representative, for later reclamation use on graded slopes. Stripping piles may require erosion control, sedimentation protection or stabilization, depending on the location and anticipated duration of storage. At the Departmental Representatives direction, the Contractor shall prepare a plan for management of each stripping pile.

3.3 **BLASTING**

- .1 The Departmental Representative will identify a magazine location for explosives should a factory site or "ready-to-use" explosives storage site be required.
- .2 The sweep of the blast area shall include looking for wildlife that may be in the area. If any are found, they shall be hazed out of the area by the ESO or a Park Warden.
- .3 The Contractor shall ensure that all work activities meet or exceed the standards outlined in DFO's "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters"; Canadian Technical Report of Fisheries and Aquatic Sciences 2107, 1998.
- .4 The Contractor shall, whenever explosives are used, use the Provincial and Workers' Compensation Laws and Regulations, and all respective agencies having jurisdiction over them, such as DFO.
- .5 Steps shall be taken to minimize fly-rock and dust. Vegetation outside of the designated area shall not be damaged or destroyed.
- .6 In order to stabilize slopes of the cut, these shall be scaled of all loose material. Ditches shall be formed and cleaned upon the completion of the blasting, and the natural drainage shall be restored as specified by the contract or as directed by the Departmental Representative.
- .7 The Contractor shall describe the proposed type and quantities of explosives to be used on the project, to the satisfaction of the Departmental Representative and the E.S.O. Some blasting products – such as those very high in nitrogen, may have some limitations imposed for environmental protection purposes.

3.4 **MATERIAL LOADING, HAULING, PLACEMENT AND GRADE BUILDING**

- .1 During grade construction conducted close to any watercourse, water body or wetland methods shall be employed to ensure materials are not pushed, fall or are eroded into the water or wetlands. Generally, work within a 30 metre buffer of waterways or wetlands requires the close oversight of the ESO and the Departmental Representative.
- .2 No grade building shall occur outside of the designated area or within 1 metre of the drip line of existing forest. Any material inadvertently falling outside the work limits is to be

removed promptly in a manner that does not damage trees or vegetation at that location. Materials shall be placed at storage sites or on the grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation at that location.

3.5 EXCAVATING AND PLACEMENT

- .1** Excavation will be undertaken according to the approved Grading Plan for the ROW, and approved Development Plans for Mannix Pit.
- .2** Materials shall be placed at storage sites or on the grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation at that location.
- .3** All sediment control measures shall be implemented by the Contractor prior to the commencement of the work in the vicinity of the Vermilion Lakes, water bodies, watercourses, and wetlands.
- .4** Special precautions may have to be taken during excavation in the vicinity of intermittent or active drainage channels. See “Specific Concerns”.
- .5** If sediments enter the Vermilion Lakes during any excavation nearby or at its banks, the Contractor shall ensure that sediment levels in the waters of the river or creeks do not exceed specified limits and meet the “desired end result” limits outlined. See “Specific Concerns”.
- .6** Placement of rip rap and backfill at creeks of the Vermilion Lakes shall be undertaken without contacting the watercourse or wetted margins of the stream, unless approved by the Departmental Representative.
- .7** Fisheries protection windows shall be observed for the Vermilion Lakes, and any other watercourse in this contract and will guide the timing of the work so that stream disturbance is prevented. See “Specific Concerns”.
- .8** If a pump-out sump to dewater excavation sites will be required, the Contractor is to prepare an EPP which details how the dewatering shall be undertaken, to the satisfaction of the Departmental Representative and the E.S.O. Special attention is to be given to the environmental sensitivity of the discharge area, freezing conditions operation, overflow avoidance, decanting and settlement pond reclamation. Water containing suspended materials shall not be pumped into watercourses, drainage systems or on to land, except with the permission of the Departmental Representative and the E.S.O.

3.6 CULVERT INSTALLATION

- .1** All culverts shall be installed using best management practices for working in or near water that will result in a minimum amount of sedimentation and damage to the riparian area of the watercourse. The Contractor shall prepare a plan for the installation of each culvert, a minimum one (1) week prior to doing the work for approval by the Departmental Representative and ESO.
- .2** The culverts shall be installed using best management practices for placement, including consideration of aquatic ecology.
- .3** It is preferable to install the culvert during periods of low discharge (e.g. during the fall). The use of sediment control measures may be necessary to ensure that excessive amounts of sediments do not enter the Vermilion Lakes.

- .4 It may be necessary to exclude fish from the immediate construction site while the culvert is being installed. If this practice is necessary, fish shall be salvaged from within the exclusion area, and construction should be carried out expediently to minimize the time spent working in the drainage.

3.7 ASPHALT PLANT OPERATION AND PAVING

- .1 Trucks for hauling asphalt mixture shall have tight, clean, smooth metal beds that have been sprayed with a minimum amount of thin fuel oil to prevent the mixture from adhering and causing waste asphalt. The vehicle covers shall be securely fastened. Excess truck box lubricants such as light oil, detergent or lime solutions shall not be allowed to contaminate the mix and shall be disposed of in an environmentally acceptable manner. Truck box lubricant application shall be carried out in a containment berm.
- .2 The asphalt plant must be equipped with pollution control devices in addition to, or in replacement of standard cyclone dust collectors, to effectively eliminate the emission of dust and smoke pollutants into the atmosphere. Use of secondary dust collection systems which require discharge of dust polluted water into natural drainage system will not be allowed. Regardless of requirements stated in above, asphalt plant operation must comply with all environmental pollution control regulations applicable in the plant area. NOTE: Alberta Environment may test dust collector's efficiency.
- .3 The Contractor shall be responsible for the purchase and the safe delivery/storage/handling of asphalt cement and emulsions to the asphalt plant site. Excess hot mix or reject asphalt shall be temporarily stored as directed by the Departmental Representative, and removed from Banff National Park for proper recycling or disposal.
- .4 Asphalt material shall be removed and stored at Mannix Pit at a location specified by the Departmental Representative.
- .5 The Contractor shall ensure that there is enough room between the stockpiles and the asphalt plant for a loader in the event of a spill at the asphalt plant. A containment berm with an associated liner made of occlusive material (e.g. plastic of a thickness approved by the Departmental Representative) and covered with absorbent sand or clay shall be installed under the asphalt storage tank to ensure containment of 110% of the tank's capacity.
- .6 The Contractor may wish to protect containment / catchment areas and drip trays at the asphalt plant from rainfall since, if contaminated, all of the collected water will have to be disposed of at the expense of the Contractor at an approved disposal facility.
- .7 Sites from which materials have been removed shall be restored to a neat and presentable condition upon the completion of the work.

3.8 CONCRETE MANAGEMENT

- .1 Wet and uncured concrete is an acutely toxic substance for an aquatic environment. Extra care not to introduce these materials into the environment is required. The Contractor is to prepare an EPP which addresses concrete plant location, operation, and reclamation where required, to the satisfaction of the Departmental Representative and the E.S.O. This plan shall include the following concrete management elements:
- .2 Concrete mixer truck washout must be contained in an approved facility with wash products moved back to the concrete batching yard for disposal.

- .3 Rolling concrete mixers with surplus concrete in amounts less than one cubic metre of wet concrete may waste this concrete in the grade right-of-way as directed by the Departmental Representative and well away from and in areas that drain well away from watercourses. Surplus amounts in excess of one cubic metre are to be returned to the batching yard.
- .4 Water contaminated in the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.
- .5 The concrete batching plant must be operated pursuant to applicable dust, air emission, and water quality control regulations.
- .6 Waste, solidified concrete from rolling concrete mixers in amounts less than 1 cubic meter and waste solidified concrete from construction pour, shall be buried in the grade within 48 hours of the pour, subject to approval and direction from the Departmental Representative.

3.9 CRUSHING

- .1 The substrate in the area between km 69 and Mannix Gravel Pits and the Vermilion Lakes is permeable. The Contractor shall be prepared for potential spills of fuels, lubricants or hydraulic fluid from the crusher using containment berms with associated occlusive liner of adequate thickness to ensure that these materials do not penetrate underlying soil materials down to the water table and into the Vermilion Lakes. In the event of a spill, the Contractor shall ensure timely and effective spill response.
- .2 The Contractor shall provide drip and spill containment for the crusher, cone, generators and other components where spills may occur (e.g. plastic lined dirt berms, collection/drip trays, double-walled fuel tanks). Spill response in a timely and effective manner in the event of a spill is mandatory. The measure chosen by the Contractor shall ensure containment of 110% of the capacity of the fuel tank, crankcase, etc.
- .3 Excavation, hauling and placing materials associated with a crushing operation shall be conducted within the approved footprint of the total crushing operation. Crushed materials shall be placed at the designated storage site located within Mannix Pit as identified by the Departmental Representative without spillage or ravelling outside the limits of this location. Any material inadvertently falling outside the work limits is to be moved promptly to within the storage limits. Repair of damage outside the work limits will be at the complete expense of the Contractor.
- .4 Access to km 69 and Mannix Gravel Pits work areas is via a locked gate. There is minimal space for parking of workers' private vehicles in the vicinity of the crushing operation. If other Contractors are using the pit at the time of this contract, the Departmental Representative shall address any circulation or parking conflicts, should they arise.

3.10 FINE GRADING, TOPSOIL PLACEMENT, AND SEEDING

- .1 This contract involves the final shaping of cut slopes, fills and landscapes disturbed in the construction of the Works. These slopes will be covered by stripped soil and chip compost materials and seeded. Environmental concerns related to these activities largely focus on erosion prevention and sediment control. The Contractor is to present a plan for placement, spreading, and stabilization of reclamation materials that controls erosion and prevents sedimentation, to the satisfaction of the Departmental Representative and E.S.O.

3.11 PAVEMENT MARKING AND GUARDRAIL PLACEMENT

- .1 Pavement marking shall be undertaken pursuant to standard methods applied in Banff National Park for control of paint products, both in transport and handling. The Contractor will present a description of methods to be employed for transporting and controlling paint and hazardous products, application of paint, cleaning of equipment, containment and disposal of waste paint and cleaning products, etc. the satisfaction of the Departmental Representative.

3.12 SPECIAL NOTES FOR ACCESS AND OPERATIONS AT THE WILDLIFE UNDERPASS AND OVERPASS SITES

- .1 The approaches to and from wildlife crossings are important for the future successful functioning of these structures. Ensure minimal tree removal and vegetation disturbance occur at this location during construction activity. The Contractor is to explain the method of establishing work access to the construction sites on both sides of the TCH, methods of operation to avoid incremental damage arising from the access trails, and methods of restoration of the access trails to pre-construction conditions, to the satisfaction of the Departmental Representative and E.S.O. In consultation with the Departmental Representative the Contractor shall formulate an agreement for worker transportation to and from the work site and where workers will park their private vehicles.
- .2 The landscapes and forest cover at both ends of the wildlife crossing structures are important to the proper functioning of structures for wildlife passage. The Contractor is alerted that disturbance or damage to terrain or vegetation outside of the defined construction footprint at this location is unacceptable.

3.13 SPECIFIC CONCERNS RELATIVE TO EROSION CONTROL AND SEDIMENTATION

- .1 The Contractor shall prepare an Erosion and Sedimentation Management Plan for the components of this contract that are undertaken in proximity to watercourses, wetlands or riparian environments. This plan shall be to the satisfaction of the Departmental Representative and ESO. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger. The ponds shall also be designed to handle 1:5 year storm events, with overflow spill capacity for 1:10 year storm events and emergency spillway capacity for 1:100 year storm events.
- .2 An important desired end result is to allow no release into watercourses of sediments in levels that are deleterious to fish or that would harmfully alter, disrupt, or destroy fish habitat. Similarly there is to be no sediment release into areas of vegetation growth or sensitive areas of sediments in levels that would adversely alter growing or hydraulic conditions. The target is 0 mg/L of TSS over background levels. The threshold is a maximum instantaneous increase of 25 mg/L over background levels when background levels are <250 mg/L, or a maximum instantaneous increase of 10% over background levels when background levels are >250 mg/L. This threshold shall not be exceeded.

3.14 SPECIFIC CONCERNS RELATIVE TO SENSITIVE SITES AND ACTIVITIES

- .1 Grade construction and paving activity near streams, rivers, wetlands, water bodies or watercourses must be undertaken with care to prevent damage to aquatic and riparian habitat or associated tree and plant communities. A large and mobile spill kit shall be

kept at hand during construction at these sensitive sites in proximity to the Vermilion
Lakes and its tributaries.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Measurement procedures.
- .2 Testing by the Contractor.
- .3 Contractor's Quality Control Program.
- .4 Inspection.
- .5 Independent Inspection Agencies.
- .6 Access to Work.
- .7 Reports.
- .8 Tests and mix designs.
- .9 Mill tests.

1.2 RELATED SECTIONS

- .1 All Division 01, 02 and 03 Sections

1.3 MEASUREMENT PROCEDURES

- .1 This work shall be incidental to contract and will not be measured for payment.

1.4 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.2-04, Methods of Test and Standard Practices for Concrete

1.5 TESTING BY THE CONTRACTOR

- .1 Testing required to provide quality control to assure that the Work strictly complies with the Contract requirements shall include, but not be limited to:
 - .1 testing all structural concrete, grout, reinforcing steel, asphalt concrete pavement, structural backfill, corrugated steel culverts, misc metals, concrete barriers, and all source acceptance testing ; and
 - .2 all testing specified in the Contract Documents; and
 - .3 any other testing required as a condition for deviation from the specified Contract procedures.
- .2 Testing proposed shall be based on testing requirements in the 2010 Alberta Transportation Standard Specifications for Highway Construction and subsequent updates.
- .3 The Contractor shall be fully responsible and bear all costs for all quality control testing and shall conduct such testing in the following manner:

- .1 provide testing facilities and personnel for the tests and inform the Departmental Representative in advance to enable the Departmental Representative to witness the tests if it so desired;
 - .2 notify the Departmental Representative when sampling will be conducted;
 - .3 within one Day after completion of testing, submit test results to the Departmental Representative; and
 - .4 identify test reports with the name and address of the organization performing all tests, and the date of the tests.
- .4** Approval of tested samples will be for characteristics or use named in such approval and shall not change or modify any Contract requirements.
- .5** Testing agencies, their inspectors, and their representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of the Contract Documents, nor to approve or accept any part of the Work
- .6** The minimum frequency for Quality Control testing during embankment construction will be as follows:

CONSTRUCTION TYPE	TEST TYPE	MINIMUM FREQUENCY OF TESTS
Embankment construction with fine grained or granular soil	Standard Proctor by: ASTM D698	1 per change in material or 1 per week, whichever is more frequent
Embankment construction with fine grained or granular soil	Field density by: ASTM D1556 – Sand Cone ASTM D2167 – Balloon ASTM D2922 - Nuclear	1 per 1000 m ² per lift, spaced randomly across full width of embankment
Embankment construction with blasted rock or oversize granular	Field observation with daily field report; and a summary report signed and stamped by Professional Departmental Representative	Full time during blasted rock placement
Culvert Installation	Field Density	Minimum two per 300 mm lift per culvert, spaced through the length and depth of the culvert backfill

1.6 CONTRACTOR'S QUALITY CONTROL PROGRAM

- .1** The Contractor shall prepare a Quality Control Program. The purpose of the program shall be to ensure the performance of the Work in accordance with Contract requirements.
- .2** The Quality Control Program shall be described in a Quality Control Manual. The Contractor shall submit the Manual to the Departmental Representative for review in accordance with Section 01 33 00, Submittal Procedures. The Manual shall develop a logical system for tracking and documenting the Quality Control of the Work. A systematic format and a set of procedures patterned on a recognized Quality Control Standard will be acceptable, subject to review by the Departmental Representative.
- .3** The Quality Control Manual shall include the following information:
 - .1 Distribution list, providing a list of names to whom the Manual shall be distributed;
 - .2 Title page, identifying the Contract, Contractor and copy number;

- .3 Revision page, identifying the revision number and date of the Manual;
 - .4 Table of contents;
 - .5 Revision control, tabulating the revision number, date of revision, description of revisions and authorized signature;
 - .6 Details of measuring and testing equipment including methods and frequency of calibration;
 - .7 Purchasing details of all materials and equipment including procurement documents and vendor's Quality Control Program standards;
 - .8 Procedures for inspection of incoming items, in-process inspection and final inspection and tagging of all supply items;
 - .9 Details of special processes as identified by the Departmental Representative, including qualifications of personnel and certification;
 - .10 Procedures for shipping, packaging and storage of materials;
 - .11 Procedures for maintaining quality records and Statements of Compliance, including filing and storage of documents for a period of one year after Completion of the Works;
 - .12 Details of any non-conformance, including identification and recording of deficiencies, tagging procedures for "HOLD" or "REJECT" items, and final disposition of non-conformance forms by the Quality Control Manager;
 - .13 Inspection and test checklists, including tabulated checklists describing all manufacturing and delivery activities such as Inspection or Test, frequency of tests, description of tests, acceptance criteria of tests, such as verification, witnessing or holding tests and sign-off by the Quality Control Manager and the Departmental Representative, if the Departmental Representative witnesses the tests; and
 - .14 Forms used to ensure the application of the inspection and test checklist requirements. These forms shall be identified in the checklists and describe all testing requirements for Specification compliance.
- .4** The Contractor shall appoint a full time qualified and experienced Quality Control Manager, 100% of his time dedicated to quality matters and who will report regularly to the Contractor's management at a level which shall ensure that Quality Control requirements are not subordinated to manufacturing, construction or delivery. The Quality Control Manager shall be empowered by the Contractor to resolve quality matters.
- .5** The Quality Control Manual shall include samples of all forms to be filled in by the Quality Control Inspectors. All forms shall be signed by the Quality Control Manager and submitted promptly to the Departmental Representative who will add its review signature.
- .6** An independent check of all Work shall be performed by the Contractor. The Contractor shall appoint Quality Control Inspectors to ensure compliance of products and workmanship with Contract requirements. The same personnel may not be used to perform a given task and to check the quality and accuracy of the task.
- .7** At completion of the Work a bound and itemized copy of all Quality Control documents and reports shall be prepared by the Contractor's Quality Manager and submitted to the Departmental Representative.

1.7 INSPECTION

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

1.8 INDEPENDENT INSPECTION AGENCIES

- .1** Independent Inspection / Testing Agencies will be engaged by the Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2** Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .3** If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by the Departmental Representative at no cost to the Departmental Representative.

1.9 ACCESS TO WORK

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

1.10 PROCEDURES

- .1** Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2** Provide labour and facilities to obtain and handle samples and materials on site.

1.11 REJECTED WORK

- .1** Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2** Make good other Contractor's work damaged by such removals or replacements promptly.

- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.12 REPORTS

- .1 Submit one (1) electronic copy of all inspection and test reports to Departmental Representative in accordance with Section 01 33 00 Submittals Procedures.

1.13 TESTS AND MIX DESIGNS

- .1 Furnish test results and designs as may be requested.

1.14 MILL TESTS

- .1 Submit mill test certificates as required of specification sections.

Part 2 Products

- .1 NOT USED.

Part 3 Execution

- .1 NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Installation and removal.
- .2 Site storage / loading.
- .3 Construction parking.
- .4 Security.
- .5 Offices.
- .6 Equipment, tools and material storage.
- .7 Sanitary facilities.
- .8 Construction signage.

1.2 RELATED SECTIONS

- .1 Section 01 35 31 – Special Procedures for Traffic Control.

1.3 MEASUREMENT PROCEDURES

- .1 This work shall be incidental to contract and will not be measured for payment.

1.4 INSTALLATION AND REMOVAL

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.5 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.

1.6 CONSTRUCTION PARKING

- .1 Provide and maintain adequate access and parking at the project site in areas approved by the Departmental Representative.
- .2 Build and maintain temporary roads 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.

1.7 SECURITY

- .1 If required by the Contractor, provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays. For extended shut-downs, the Contractor shall provide the level of security as required to protect the Work.

The Contractor is advised that some random acts of vandalism to equipment have occurred within the Park.

1.8 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.

1.9 SANITARY FACILITIES

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

1.10 CONSTRUCTION SIGNAGE

- .1** No other signs or advertisements, other than warning and traffic control 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.

Part 2 Products

- .1** NOT USED.

Part 3 Execution

- .1** NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Installation and removal.
- .2** Fencing.
- .3** Guardrails and barricades.
- .4** Access to site.
- .5** Public traffic flow.
- .6** Fire Routes.
- .7** Protection for off-site and public property.

1.2 PRECEDENCE

- .1** For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of these specifications.

1.3 MEASUREMENT PROCEDURES

- .1** This work shall be incidental to contract and will not be measured for payment.

1.4 RELATED SECTIONS

- .1** Section 01 35 31 – Special Procedures for Traffic Control.
- .2** Section 01 52 00 - Construction Facilities.

1.5 INSTALLATION AND REMOVAL

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

1.6 HOARDING

- .1** Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.7 GUARD RAILS AND BARRICADES

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

1.8 WEATHER ENCLOSURES

- .1** NOT USED.

1.9 DUST TIGHT SCREENS

- .1** NOT USED.

1.10 ACCESS TO SITE

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

1.11 PUBLIC TRAFFIC FLOW

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

1.12 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

Part 2 Products

- .1** NOT USED.

Part 3 Execution

- .1** .NOT USED

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Quality.
- .2** Availability.
- .3** Storage, handling and protection.
- .4** Transportation.
- .5** Manufacturer's instructions.
- .6** Quality of work.
- .7** Coordination.
- .8** Concealment.
- .9** Remedial work.
- .10** Fastenings.
- .11** Protection of work in progress.

1.2 RELATED SECTIONS

- .1** Section 01 45 00 – Quality Control.

1.3 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 borne 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.

1.4 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 manufacture for any particular or like item throughout building.

1.5 AVAILABILITY

- .1 Immediately after 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 the 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.

1.6 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 and misc metals 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.

1.7 TRANSPORTATION

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

1.8 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.

1.9 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.

1.10 CO-ORDINATION

- .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.

1.11 CONCEALMENT

- .1 The Departmental Representative will inspect all work prior to any concrete pours. The Contractor shall notify the Departmental Representative 24 hours before any pour for inspection.

1.12 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.

1.13 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.14 PROTECTION OF WORK IN PROGRESS

- .1 Do not cut, drill or sleeve any load bearing structural member without written approval of Departmental Representative, unless specifically indicated.

Part 2 Products

- .1 NOT USED.

Part 3 Execution

- .1 NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Qualifications of Surveyor.
- .2** Survey reference points.
- .3** Survey / layout requirements.
- .4** Survey accuracy.
- .5** Notification.
- .6** Records Submittals.

1.2 MEASUREMENT PROCEDURES

- .1** This work shall be incidental to contract and will not be measured for payment.

1.3 RELATED SECTIONS

- .1** Section 01 32 18 - Construction Progress Schedules - Bar (GANTT) Chart.

1.4 REFERENCES

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

1.5 QUALIFICATIONS OF SURVEYOR

- .1** Qualified registered land surveyor, licensed to practise in Place of Work, acceptable to Departmental Representative.

1.6 SURVEY / LAYOUT REQUIREMENTS

- .1** The Departmental Representative will indicate the beginning and end of the project and sufficient reference points and other information for horizontal and vertical control, to be used by the Contractor for his detailed layout. This information will include, if available, radii and lengths of curves, design superelevations, pavement widths, and centreline deflection points. The Contractor shall protect and shall not remove or destroy, or permit to be removed or destroyed, the stakes or marks set as reference points by the Departmental Representative. Subsequent to the initial reference points staking performed by the Departmental Representative, the Contractor shall perform all layout, survey and construction staking necessary to meet specified requirements for any type of construction.

The Contractor's detailed survey layout for construction shall include a complete base-line displaying project stationing at 20 m intervals suitable for referencing test locations and for purposes of measurement for payment. For Asphalt Concrete Pavement overlay projects, the base-line shall display project stationing at 20 m intervals.

Layout for interim lane markings, including those for intersection treatments, shall be performed by the Contractor at his own cost.

The Contractor shall provide, at his own cost, any survey activities as required and including, but not limited to, the following:

- .1 Layout for interim lane markings, including those for intersection treatments
- .2 Re-establishing the start and finish of "No Passing Zones", or at new limits as directed by the Departmental Representative
- .3 String line or other markings for the alignment or grade control of construction equipment

1.7 SURVEY REFERENCE POINTS

- .1 Existing base horizontal and vertical control points will be provided by the Departmental Representative.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Departmental Representative.
- .4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.8 SURVEY REQUIREMENTS

- .1 Contractor will be responsible for all staking and layout including but not limited to:
 - .1 Establish lines and levels, locate and lay out, by instrumentation.
 - .2 Stake for grading, cut and fill.
 - .3 Stake slopes and top of embankment, sub-base course, base course and centreline for paving.
 - .4 Establish culverts, catch basin structures, invert elevations and locations.
 - .5 Accuracy:
 - All survey work shall be tied into the existing Control Monument Network with 3TM coordinates in NAD 27. Departmental Representative will provide information on control points.
 - All traverses will be closed and balanced. All level loops and traverses will be tied into the PWGSC Control Monument Network.
 - Secondary Control Points will be tied into and relative to PWGSC Control Monument Network. Accuracy for Control Points surveys shall be to second order:
 - Horizontal shall be less than $r = 5(d+0.2)$ where "r" is in cm and "d" is in km
 - Vertical shall be less than $0.008 \times \sqrt{k}$ where k is distance in kilometres.
 - .6 Staking accuracy shall be:
 - In bush areas, all elevations shall be within 0.1m of correct elevation.

- In open ground, all elevations shall be within 0.05 m of correct elevation.
- On highway surface, all elevations shall be within 0.01 m of correct elevation.

.7 Reference Survey Control Points that are in danger of being damaged or destroyed.

.2 Departmental Representative will complete all measurement surveys.

1.9 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 Record locations of maintained, re-routed and abandoned service lines.

1.10 SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative.

.2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying those elevations and locations of completed Work that conform with Contract Documents.

Part 2 Products

.1 NOT USED.

Part 3 Execution

.1 NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Progressive cleaning.
- .2 Final cleaning.

1.2 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of these specifications.

1.3 MEASUREMENT PROCEDURES

- .1 This work shall be incidental to contract and will not be measured for payment.

1.4 RELATED SECTION

- .1 Section 01 35 31 – Special Procedures for Traffic Control.
- .2 Section 01 35 43 – Environmental Procedures.
- .3 Section 01 77 00 - Closeout Procedures.

1.5 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 Clear snow and ice from access to work areas during active construction periods and when access to environmental protection facilities required outside active construction times.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 One bear proof containers will be provided by Parks Canada. Contractor to provide any additional on-site bear proof containers he requires for collection of waste materials and debris.
- .6 Remove waste material and debris from site at end of each working day.
- .7 Dispose of waste materials and debris off site.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances.
- .10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.6 FINAL CLEANING

- .1** When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2** Prior to final review, remove surplus products, tools, construction machinery and equipment.
- .3** Remove waste products and debris including that caused by Owner or other Contractors.
- .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** Inspect finishes, and ensure specified workmanship and operation.
- .7** Remove dirt and other disfiguration from exterior surfaces.
- .8** Sweep and wash clean paved areas.
- .9** Clean drainage systems.

Part 2 Products

- .1** NOT USED.

Part 3 Execution

- .1** NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Inspection and declaration.

1.2 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of these specifications.

1.3 MEASUREMENT PROCEDURES

- .1 This work shall be incidental to contract and will not be measured for payment.

1.4 RELATED SECTIONS

- .1 Section 01 74 11 – Cleaning.
- .2 Section 01 78 00 – Closeout Submittals.

1.5 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 is complete and ready for Final Inspection.
- .4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative, and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

Part 2 Products

- .1 NOT USED.

Part 3 Execution

- .1 NOT USED.

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END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 As-built, samples, and specifications.
- .2 Warranties and bonds.
- .3 Final site survey.

1.2 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of these specifications.

1.3 MEASUREMENT PROCEDURES

- .1 This work shall be incidental to contract and will not be measured for payment.

1.4 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 01 71 00 - Examination and Preparation.
- .4 Section 01 77 00 - Closeout Procedures.

1.5 AS-BUILTS AND SAMPLES

- .1 In addition to requirements in General Conditions, 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.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of these specifications. 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.

1.6 RECORDING ACTUAL SITE CONDITIONS

- .1** Record information on set of black line opaque Drawings.
- .2** Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .3** Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1** Field changes of dimension and detail.
 - .2** Changes made by change orders.
 - .3** Details not on original Contract Drawings.
 - .4** References to related shop drawings and modifications.
- .4** Specifications: legibly mark each item to record actual construction, including:
 - .1** Changes made by Addenda and change orders.

1.7 FINAL SURVEY

- .1** Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.8 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 Owner'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.

Part 2 Products

- .1** NOT USED.

Part 3 Execution

- .1** NOT USED.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Measurement procedures.
- .2** Waste management and disposal.
- .3** Equipment.
- .4** Preparation.
- .5** Protection.
- .6** Removal.
- .7** Stockpiling of material.
- .8** Finish tolerances.
- .9** Sweeping.

1.2 RELATED SECTIONS

- .1** Section 01 35 31 – Special Procedures for Traffic Control
- .2** Section 01 35 43 – Environmental Procedures

1.3 MEASUREMENT PROCEDURES

- .1** Payment under this Unit Price Item - Asphalt Pavement Removal will include operations involved in removal, hauling and stockpiling at 69 Pit, designated asphalt pavement and cleaning of remaining pavement surface. Payment will be made as follow:
 - .1** **“Unit Price Item 1a) – Sawcutting”** will be measured for payment in linear metres of cut according to these specifications, and shall include all labour, equipment and material to complete the Work.
 - .2** **“Unit Price Item 1b) – Full Depth Asphalt Pavement Removal”** will be measured for payment in square metres of asphalt pavement structure removed according to these specifications, and shall include all labour, equipment and material to satisfactorily complete this item of work. Asphalt pavement structure has an average thickness of 230 mm but may vary from one location to the next.
 - .3** Concrete gutter may be encountered while sawcutting. No separate or additional payment shall be made to cut concrete.
 - .4** No overhaul will be paid for Asphalt Pavement Removal
- .2** Traffic Control required for this Work shall be incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”** and no separate payment will be made to the Contractor.
- .3** Mobilization and demobilization required for this Work shall be incidental to **“Lump Sum Price Item 1 – Mobilization / De-mobilization”**, and no additional payment will be made.

- .4 Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment will be made to the Contractor.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Place asphalt material in stockpile in 69 Pit, at location designated by the Departmental Representative.

Part 2 Products

2.1 EQUIPMENT

- .1 The Contractor may use any method to cut the pavement provided that the methods and equipment result in a clean and straight vertical cut. Jagged or rough edges will not be acceptable.

Part 3 Execution

3.1 PREPARATION

- .1 Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt pavement to be removed.
- .2 Have appropriate Traffic Control measures in place for this work.

3.2 PROTECTION

- .1 Protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

3.3 REMOVAL

- .1 Remove existing asphalt pavement by milling to lines and grades established by Departmental Representative in field.
- .2 Use equipment and methods of removal and hauling which do not damage or disturb underlying roadway structure.
- .3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.
- .4 Provide for suppression of dust generated by removal process.

3.4 FINISH TOLERANCES

- .1 Finished surfaces in areas where asphalt pavement has been removed to be within +/-5 mm of grade specified but not uniformly high or low.

3.5 SWEEPING

- .1** Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Definitions.
- .2** Submittals.
- .3** Storage and handling.
- .4** Transportation.
- .5** Materials.
- .6** Disposal.

1.2 PRECEDENCE

- .1** For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of these specifications.

1.3 MEASUREMENT PROCEDURES

- .1** This work shall be incidental to contract and will not be measured for payment.

1.4 RELATED SECTIONS

- .1** Section 01 33 00 - Submittal Procedures.
- .2** Section 01 35 43 – Environmental Procedures.

1.5 REFERENCES

- .1** Export and Import of Hazardous Waste Regulations (EIHWR Regulations), SOR/92-637.
- .2** National Fire Code of Canada 1995.
- .3** Transportation of Dangerous Goods Act, 1992 (TDG Act) [1992], (c. 34).
- .4** Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).

1.6 DEFINITIONS

- .1** Dangerous Goods: Product, substance, or organism that is specifically listed or meets the hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2** Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3** Hazardous Waste: Any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .4** Workplace Hazardous Materials Information System (WHMIS): A Canada-wide system designed to give employers and workers information about hazardous materials used in the workplace. Under WHMIS, information on hazardous materials is to be provided on

container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by a combination of federal and provincial laws.

1.7 SUBMITTALS

- .1** Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2** Submit to Departmental Representative current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.
- .3** Submit hazardous materials management plan to Departmental Representative that identifies all hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.

1.8 DELIVERY, STORAGE AND HANDLING

- .1** Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2** Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3** Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- .4** Storage and Handling Requirements:
 - .1** Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.
 - .2** Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
 - .3** Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.
 - .4** All explosives must be mixed outside of the Park and delivered to the site. No storage of explosives shall be allowed within the National Parks.
 - .5** Keep no more than [45] litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
 - .6** Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
 - .7** Storage of quantities of flammable and combustible liquids exceeding [45] litres for work purposes requires the written approval of the [Departmental Representative] [DCC Representative] [Consultant].
 - .8** Transfer of flammable and combustible liquids is prohibited within buildings.
 - .9** Transfer flammable and combustible liquids away from open flames or heat-producing devices.
 - .10** Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

- .11 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
- .12 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
- .13 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
- .14 Store hazardous materials and wastes in closed and sealed containers.
- .15 Label containers of hazardous materials and wastes in accordance with WHMIS.
- .16 Store hazardous materials and wastes in containers compatible with that material or waste.
- .17 Segregate incompatible materials and wastes.
- .18 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
- .19 Store hazardous materials and wastes in secure storage area with controlled access.
- .20 Maintain clear egress from storage area.
- .21 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
- .22 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
- .23 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

Part 2 Products

2.1 MATERIALS

- .1 Only bring on site the quantity of hazardous materials required to perform Work.
- .2 Maintain MSDSs in proximity to where the materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

Part 3 Execution

3.1 DISPOSAL

- .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
- .2 Recycle hazardous wastes for which there is an approved, cost effective recycling process available.
- .3 Send hazardous wastes only to authorized hazardous waste disposal or treatment facilities.
- .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

- .5** Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited. Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
- .6** Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
- .7** Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1** Hazardous wastes recycled in manner constituting disposal.
 - .2** Hazardous waste burned for energy recovery.
 - .3** Lead-acid battery recycling.
 - .4** Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Measurement procedures.
- .2** Shop drawings.
- .3** Waste management and disposal.
- .4** Materials.
- .5** Fabrication and erection.
- .6** Removal and reshoring.

1.2 RELATED SECTIONS

- .1** Section 01 33 00 – Submittal Procedures.
- .2** Section 01 35 43 – Environmental Procedures.
- .3** Section 03 30 00 – Cast-in-Place Concrete.

1.3 MEASUREMENT PROCEDURES

- .1** This work will not be measured for payment. Include costs in Unit Price Items for which concrete formwork and falsework is required.

1.4 REFERENCES

- .1** Canadian Standards Association (CSA)
 - .1** CSA-A23.1-[04]/A23.2-[04], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2** CSA-O86S1-[05], Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
 - .3** CSA O121-[M1978(R2003)], Douglas Fir Plywood.
 - .4** CSA O151-[04], Canadian Softwood Plywood.
 - .5** CSA O153-[M1980(R2003)], Poplar Plywood.
 - .6** CSA O437 Series-[93(R2006)], Standards for OSB and Waferboard.
 - .7** CSA S269.1-[1975(R2003)], Falsework for Construction Purposes.
 - .8** CAN/CSA-S269.3-[M92(R2003)], Concrete Formwork, National Standard of Canada
- .2** Council of Forest Industries of British Columbia (COFI)
 - .1** COFI Exterior Plywood for Concrete Formwork.

1.5 SHOP DRAWINGS

- .1** Submit shop drawings for formwork and falsework in accordance with Section 01 33 00 - Submittal Procedures.
 - .1** Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
- .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, for falsework Drawings. Comply with CAN/CSA-S269.3 for 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.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1** Separate and recycle waste materials in accordance with Section 01 35 43, Environmental Procedures.
- .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 volatile organic compounds (VOC's).
- .5** Dispose concrete waste in the roadway embankment as approved by the Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1** Formwork **materials:**
 - .1** Forms for exposed surfaces including the cast in place concrete shall be new material, made of "Coated Formply", consisting of Douglas Fir substrate with resin-impregnated paper overlay and factory treated chemically active release agent,
 - .2** Acceptable products:
 - "ULTRAFORM",
 - "POURFORM 107",
 - Or equal.
 - .3** All form material for exposed surfaces shall be full-sized sheets, as practical. The re-use of any forms must have the acceptance of the Departmental Representative.

- .2 The minimum acceptable forming for all exposed concrete where the pour height is 1.5 m or less shall have 18 mm approved plywood, supported at 300 mm maximum on centres. Where the pour height is greater than 1.5 m the minimum acceptable forming for all exposed concrete shall have 18 mm approved plywood, supported at 200 mm maximum on centres. Strong-backs or walers placed perpendicularly to the supports shall be employed to ensure straightness of the form.
- .3 Metal bolts or anchorages within the forms shall be so constructed as to permit their removal to a depth of at least 20 mm from the concrete surface.
- .4 Break-back type form ties shall have all spacing washers removed and the tie shall be broken back a distance of at least 20 mm from the concrete surface.
- .5 All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left will be of the smallest possible size. Torch cutting of steel hangers and ties will not be permitted. Formwork hangers for exterior surfaces of decks and curbs shall be an acceptable break-back type with surface cone, or removable threaded type.
- .6 Cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in color.
- .7 Form release agent shall be non-toxic, biodegradable, low VOC.
- .8 Falsework materials to CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with Drawings.
- .2 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.
- .3 Do not place shores and mud sills on frozen ground.
- .4 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .6 Align form joints and make watertight. Keep form joints to minimum.
- .7 Use 20 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
- .8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

3.2 REMOVAL AND RESHORING

- .1** Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .2** 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.
- .3** Reuse formwork and falsework subject to requirements of CAN/CSA-A23.1.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Measurement procedures.
- .2** Certificates.
- .3** Quality assurance.
- .4** Waste management and disposal.
- .5** Materials.
- .6** Mixes.
- .7** Aggregate tests.
- .8** Preparation.
- .9** Construction.
- .10** Protection.
- .11** Field quality control.

1.2 RELATED SECTIONS

- .1** Section 01 35 43 – Environmental Procedures.
- .2** Section 03 10 00 – Concrete Forming and Accessories.
- .3** Section 03 20 00 – Concrete Reinforcing.

1.3 MEASUREMENT PROCEDURES

- .1** Measure cast-in-place concrete in cubic metres calculated to neat dimensions as indicated on the drawings. Payment will be made under **“Unit Price Item 2 – Cast-in-Place Concrete”** and will include cost to flush and clean surface; and supply, place, finish and protect the concrete.
- .2** Concrete placed beyond dimensions indicated will not be measured.
- .3** Heating of water and aggregates and providing cold weather protection will not be measured but considered incidental to work. Include costs in Unit Price for cast-in-place concrete.
- .4** Cooling of concrete and providing hot weather protection will not be measured but considered incidental to work. Include costs in Unit Price items for cast-in-place concrete.
- .5** Supply and installation of anchor bolts, nuts and washers, bolt grouting, will not be measured but considered incidental to the work. Include costs in Unit Price items for cast-in-place concrete.
- .6** Supply and installation of temporary drainage diversions pipes will not be measured but considered incidental to work. Include costs in Unit Price for cast-in-place concrete.

1.4 REFERENCES

- .1** American Society for Testing and Materials (ASTM). In all cases the latest edition of the specified code shall apply.
 - .1 ASTM C109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars using 50-mm Cube Specimens.
 - .2 ASTM C260, Specification for Air-Entraining Admixtures for Concrete.
 - .3 ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .4 ASTM C494, Specification for Chemical Admixtures for Concrete.
 - .5 ASTM C827 Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
 - .6 ASTM D1751, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
- .2** Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3** Canadian Standards Association (CSA)
 - .1 CAN/CSA-A3000, Cementitious Materials Compendium.
 - .2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
 - .3 CAN/CSA-A23.2, Methods of Test for Concrete.
 - .4 CAN/CSA-A23.5-M86(R1992), Supplementary Cementing Materials.
 - .5 CAN/CSA A363-M88(R1996), Cementitious Hydraulic Slag.

1.5 CERTIFICATES

- .1** Submit certificates in accordance with Section 01 33 00 - Submittal Procedures.
- .2** Minimum 4 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 Supplementary cementing materials.
 - .3 Admixtures.
 - .4 Aggregates.
 - .5 Water.
- .3** Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .4** Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

- .5 Provide certification that the alkali-aggregate reactivity and iron content of the materials has been examined and meets the requirements.

1.6 QUALITY CONTROL

- .1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures in accordance with Section 01 45 00 - Quality Control for Departmental Representative's approval for following items:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 35 43, Environmental Procedures.
- .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, non-combustible 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.

Part 2 Products

2.1 MATERIALS

- .1 Normal Portland cement, Type GU with maximum 15% fly ash replacement: to CAN/CSA-A5.
- .2 Supplementary cementing materials: to CAN/CSA-A23.5.
- .3 Cementitious hydraulic slag: to CAN/CSA-A363.
- .4 Water: to CAN/CSA-A23.1.
- .5 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
- .6 Air entraining admixture: to ASTM C260.
- .7 Chemical admixtures: to ASTM C494. Calcium Chloride, Accelerators and Air-reducing agents shall not be used.

- .8 Concrete retarders: to ASTM C494 water based. Do not allow moisture of any kind to come in contact with the retarder film. Departmental Representative to approve set retarding admixtures.
- .9 Silica fume to Can/CSA-A23.5, Type U, with a SiO₂ content of at least 85%, maximum 6% ignition loss and no more than 1% SiO₃ content.
- .10 Weep hole tubes: PVC plastic.

2.2 MIXES

- .1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1
- .2 Use Type GU Portland Cement for all mixes, unless otherwise noted.
- .3 Proportion all concrete mixes in accordance with the following Table:

USE	28 Day Max Compressive Strength (MPa) *see below	Nominal Aggregate (mm)	Entrained Air Content (%)	Supplementary Materials	Slump Range (mm)	Max W/C Ratio
Culvert Invert treatment	35	28	5+/- 2	Max 15% Fly Ash	50±20	0.45
Wall Coping, Leveling pad	35	28	5+/- 2	Max 15% Fly Ash	50±20	0.45

* Before adding superplasticizer. Slump to not exceed 150 mm with superplasticizer.

- .4 Gradation limit for the 28 mm aggregate shall conform to CSA A23.1 except that 100% shall pass the 40 mm screen and a maximum 5% shall be retained on the 28 mm screen.
- .5 Gradation limit for the fine aggregate shall conform to CSA A23.1 except that the amount of material passing the 160 µm shall not exceed 5%.
- .6 Gradation limits for the 20 mm aggregate shall conform to CSA A23.1 and the maximum combination of flat and elongated particles (3:1 ratio), as determined by CSA A23.2-13A, shall not exceed 10% of the mass of coarse aggregate.
- .7 Rapid chloride permeability shall be determined in accordance with ASTM C1202 on laboratory moist cured samples at 28 days. Rapid chloride permeability shall be less than 1000 coulombs.
- .8 An air-void spacing factor shall be determined in accordance with ASTM C457, modified point-count method at 100 times magnification. The average of all tests shall not exceed 230 µm with no single test greater than 260 µm.
- .9 The temperature of the centre of the in-situ concrete shall not fall below 10°C or exceed 60°C and the temperature difference between the centre and the surface shall not exceed 20°C.
- .10 Concrete mixes that will be placed by concrete pump shall be designed for pumping.
- .11 For initial mixing operations or changes in source of water or aggregates, the mix adopted shall be designed for an excess compressive strength of 10% above the specified 28 day nominal compressive strength. After the mix has been adequately proven as to strength and performance, adjustment may be undertaken, but only with the acceptance of the Departmental Representative. If, during the progress of the work, the mix design is

found to be unsatisfactory for any reason including poor workability, the Contractor shall make the necessary adjustments. Notwithstanding the Departmental Representative's review of the design mix, it remains the Contractor's responsibility that the concrete meets all the requirements of this Specification.

2.3 AGGREGATE TESTS

- .1** For each mix design the following aggregate analysis shall be provided:
 - .1** "Fine and Coarse Aggregate Sieve" (CSA A23.2-2A)
 - .2** Amount of material finer than 80 µm in aggregate (CSA A23.2-5A)
 - .3** "Organic Impurities in Sands for Concrete" (CSA A23.2-7A)
 - .4** "Results of deleterious substances and physical properties of aggregates included in Table 12, CSA A23.1-04"
 - .5** "Assessment of Potential for Deleterious Alkali-Aggregate Reactivity (AAR)" (CSA A23.2-27A)
 - .6** "Petrographic Examination of Coarse Aggregate for Concrete" shall be required for mixes containing silica fume
 - .7** "Sources of proposed aggregate"
- .2** The analysis of the aggregates shall be current and fully represent the material to be used in production. Sampling and testing shall have been done no more than 90 days prior to concrete production. Additional analyses of more recent sampling shall be provided as required to confirm that the aggregates continue to meet requirements. A break in production of a particular class of concrete shall not constitute the need for additional testing when the Contractor provides conclusive evidence that the material initially tested, is still representative.
- .3** If the fine aggregate consists of a blend from more than one source, the "Fine Aggregate Sieve" analysis shall show the gradation of the blended fine aggregates. Similarly in the case of blended coarse aggregates, the "Coarse Aggregate Sieve" analysis shall indicate the gradation of the blended coarse aggregates.
- .4** Fine aggregate, tested in accordance with CSA Test Method A23.2-7A, "Organic Impurities in Sands for Concrete", shall produce a colour not darker than the Standard colour (Organic Plate Number 3). Aggregate producing a colour darker than the Standard colour will be rejected in the absence of a satisfactory record of performance of a similar class of concrete (minimum 30 tests over the last 12 months); provisions 4.2.3.3.2 (a) & (b) of CSA Standard CAN3-A23.1-04 shall not apply.
- .5** The potential for deleterious alkali-aggregate reactivity shall be assessed in accordance with CSA A23.2-27A. This assessment shall include the risk level associated with structure size and environment, the level of prevention related to service life requirements and the determination of the appropriate preventative measures. Current (less than 18 months old) test data evaluating the potential alkali-silica reactivity of aggregates tested in accordance with CSA A23.2-14A or CSA A23.2-25A is required. In the absence of current test data and outside of areas of known highly reactive aggregate, the aggregate shall be presumed to be moderately reactive.
- .6** Petrographic analysis shall be performed by an experienced qualified petrographer of a CSA certified laboratory in accordance with CSA A 23.2-15A. The (weighted)

petrographic number shall not exceed 130, and the ironstone content shall not exceed 0.8%. The results shall be certified by a Professional Geologist, or Geological Engineer, and indicate that the aggregate is suitable for the intended use.

Part 3 Execution

3.1 PREPARATION

- .1** Obtain Departmental Representative's acceptance before placing concrete. Provide 48 hours notice prior to placing of concrete.
- .2** Pumping of concrete is permitted only after acceptance of equipment and mix.
- .3** Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4** Prior to placing of concrete obtain Departmental Representative's acceptance of proposed method for protection of concrete during placing and curing.
- .5** Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .6** Do not place load upon new concrete until authorized by Departmental Representative.

3.2 CONSTRUCTION

- .1** Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
- .2** Sleeves and inserts.
 - .1** Where accepted by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
 - .2** Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain acceptance of modifications from Departmental Representative before placing of concrete.
 - .3** Check locations and sizes of sleeves and openings shown on Drawings.
 - .4** SPEC NOTE: Co-ordinate the following paragraph with Section 04 05 10 - Common Work Results for Masonry.
- .3** Delivery.
 - .1** Concrete shall be delivered and discharged within 90 minutes from the time of batching.
 - .2** Truck mixers may be used to batch concrete on site provided they are of the revolving drum type, watertight, and so constructed that uniform distribution of the materials is ensured.
- .4** Temperature of concrete at discharge shall be between 10o C and 22o C.
- .5** Finishing.
 - .1** Finish concrete in accordance with CAN/CSA-A23.1 and as per the Drawings.
 - .1** Exposed faces barriers, except top, to receive a Rubbed Finish.
 - .2** All other surfaces to receive an Ordinary Finish.

.2 Use procedures acceptable to Departmental Representative to remove excess bleed water. Ensure surface is not damaged.

.3 Use curing compounds compatible with applied finish on concrete surfaces.

.6 Perforated Pipe

.1 PVC pipe and fittings to ASTM Specification D3034 and CSA Standard B182M, Perforated nominal inside diameter 150 mm.

.2 Geotextile filter sock or pipe wrap: see Section 31 32 19.01 – Geotextiles and the following requirements.

.3 MATERIAL

.4 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.

.5 Width: 3 m minimum.

.6 Length: 30 m minimum.

.7 Composed of: minimum 85% by mass of polyester with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.

.8 Physical properties:

.9 Thickness: to CAN/CGSB-148.1, No.3, minimum 1 mm.

.10 Tensile strength and elongation (in any principal direction): to ASTM D4595.

.11 Tensile strength: minimum 500 N, wet condition.

.12 Elongation at break: maximum 50%.

.13 Seam strength: equal to or greater than tensile strength of fabric.

.14 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.

.15 Breaking force: minimum 300 N, wet condition.

.16 Elongation at future maximum 50%.

.17 Bursting strength: to CAN/CGSB-148.1, No.6.1 minimum 1000 KPa, wet condition.

.18 Hydraulic properties:

.19 Apparent opening size (AOS): to ASTM D4751, 0.2 mm.

.20 Filtration opening size (FOS): to CAN/CGSB-148.1 No.10 OPSS 1860.

.21 Permittivity: to ASTM D4491, 2.1 sec-1.

.7 Sealers

.1 An approved sealer shall be applied to all exposed concrete surfaces to 600 mm below grade.

.2 Acceptable commercially available products are as follows:

.3 Dry-Trete 1000L by DRE Industries Inc. (application rate 193 ml/m²)

.4 Dynasylan BH-0 by Degussa Corporation (application rate 156 ml/m²)

.5 Hydrozo 100 by ChemRex Inc./Hydrozo (application rate 272 ml/m²)

- .6 Sikagard SN-100 by Cappar Ltd. (application rate 209 ml/m²)
- .7 Silane 100 by ChemRex Inc./Hydrozo (application rate 221 ml/m²)
- .8 Or Equal
- .9 Install as per the manufacturer's recommendations and at the minimum application rates shown above.
- .10 Allow minimum 3 days of continuous drying since last heavy rain.
- .11 Allow 28 days continuous drying after burlap is removed from new concrete.
- .12 Flood coat top surfaces and repeat the process on high spots and areas that dry quickly.
- .13 Depending upon drying conditions, drying time may have to be extended.
- .8 Control Joint Caulking Compound**
 - .14 Acceptable commercially available products are as follows:
 - Sikaflex 1a joint compound
 - Or Equal
 - .15 Install as per the manufacturer's recommendations, including bond breaker as required.

3.3 PROTECTION

- .1** Protection and curing for concrete placed between September 30 and March 1 shall comply with following requirements in addition to the cold weather requirements of CAN/CSA-A23.1.
 - .1 Protect concrete with windproof shelter of canvas or other material to allow free circulation of inside air around fresh concrete. At no point let walls of shelter touch formwork. Provide sufficient space for removal of formwork for finishing. Use heating equipment accepted by Departmental Representative. Vent the products of combustion outside protective shelter. Equipment to be capable of keeping inside air at constant temperature sufficiently high to maintain concrete at following curing temperatures:
 - .2 For initial 3 days: minimum temperature of 15 deg C, maximum of 27 deg C at concrete surfaces.
 - .3 For concrete walls and copings: cure at 10 deg C for additional 4 days.
 - .4 Keep concrete surfaces continually moist while protected.
 - .2** Unformed surfaces: cure with burlap, water and polythene. Carefully place two layers of damp burlap on surface of concrete. Overlap each strip by minimum 75 mm and secure against displacement by wind. Maintain burlap in place and keep thoroughly wet for seven days after placement. Place polythene sheeting on wetted burlap to maintain moisture.
 - .3** Formed surfaces: No additional curing will be required if formwork is left in place for seven days or more. If formwork removed in less than seven days, cure in manner specified for unformed surfaces for remainder of seven day period.

- .4 During curing period, only uncover areas needed for finish treatment. Re-cover and continue curing.

3.4 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials shall be carried out by a Testing Laboratory in accordance with CAN/CSA-A23.1 and Section 01 45 00 - Quality Control.
- .2 Contractor shall pay for costs of QC testing.
- .3 Contractor shall take additional sets of test cylinders during cold weather concreting. 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 CAN/CSA-A23.2.
- .5 Inspection or testing by the Departmental Representative will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1** Summary.
- .2** Definitions.

1.2 SUMMARY

- .1** This Section defines correction to maximum dry density to take into account aggregate particles larger than 19 mm.

1.3 REFERENCES

- .1** American Society for Testing and Materials (ASTM)
 - .1** ASTM C127-[04], Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - .2** ASTM D698-[00ae1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .3** ASTM D1557-[02e1], Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - .4** ASTM D4253-[00], Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.4 DEFINITIONS

- .1** Corrected maximum dry density is defined as:
 - .1** $D = D1 \times D2 / (F1 \times D2) + (F2 \times D1)$
 - .2** $D = (F1 \times D1) + (0.9 \times D2 \times F2)$
 - .3** Where: D = corrected maximum dry density kg/m³
 - .4** F1 = fraction (decimal) of total field sample passing 19 mm sieve
 - .5** F2 = fraction (decimal) of total field sample retained on 19 mm sieve (equal to 1.00 - F1)
 - .6** D1 = maximum dry density, kg/m³ of material passing 19 mm sieve determined in accordance with Method A of ASTM D1557
 - .7** D2 = bulk density, kg/m³, of material retained on 19 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127
 - .8** For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253 wet method when directed by Departmental Representative.

Part 2 Products

- .1** NOT USED.

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Parks Canada

Retaining Wall Repair
Trans-Canada Highway 1
Banff National Park

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CORRECTED DRY DENSITY
FOR FILL
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Part 3 Execution
 .1 NOT USED.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1** Section 01 35 31 – Special Procedures for Traffic Control.
- .2** Section 01 35 43 – Environmental Procedures.
- .3** Section 01 56 00 – Temporary Barriers and Enclosures.
- .4** Section 32 11 19 – 50 mm Granular Sub-base Course.
- .5** Section 33 42 13 – Pipe Culverts.

1.2 DESCRIPTION

- .1** This item consists of the excavation and disposal of all materials in conformity with the lines, grades and dimension indicated on the drawings and as directed by the Departmental Representative, and includes:
 - .1** Roadway, culvert, wall foundation and borrow excavation.
 - .2** Construction of roadway ditches, embankments, permanent access and connecting roads, approaches, entrances, berms, approved haul roads and other earthworks necessary for the construction of the works.
 - .3** Removal and disposal of waste materials from excavation, ditches, embankments and borrow areas.
 - .4** Transportation of excavated materials.
 - .5** Finishing of top surfaces and slopes.
 - .6** Maintenance of the work set forth under this section in a finished condition until any portion thereof has been accepted as completed by the Departmental Representative.

1.3 MEASUREMENT PROCEDURES

- .1** Excavated materials will be measured in cubic metres in their original location.
 - .1** Common excavation quantities measured will be actual volume removed within following limits:
 - .1** Width for trench or ditch excavation as indicated on the drawings.
 - .2** Width for excavation for structures as indicated on the drawings.
 - .2** Rock quantities measured will be actual volume removed within following limits:
 - .1** Width for excavation as indicated.
 - .2** Width for excavation for structures to be bounded by vertical planes up to 500 mm outside of and parallel to neat lines of footings as indicated.
 - .3** Depth from rock surface elevations immediately prior to excavation, to elevation as indicated.
 - .4** Where design elevation is less than 300 mm below original rock surface, depth will be considered to be 300 mm below original rock surface.

- .5 Volume of individual boulders and rock fragments will be determined by measuring three maximum mutually perpendicular dimensions.
- .3 The Quantity of Excavation Common for which payment will be made shall be the volume in cubic metres measured in its original position from cross sections taken by Departmental Representative in areas of excavation. Payment will be made under **“Unit Price Item 3 – Common”** and shall include cost of excavating, hauling, placing and compacting material.
- .4 Payment for disposal of material deemed by the Departmental Representative as waste will be made under **“Unit Price Item 3 – Common”** and shall include cost of excavation, haul, and disposal by the Contractor as directed by the Departmental Representative.
- .2 Shoring, bracing, underpinning and de-watering of excavation will not be measured separately for payment.
- .3 Departmental Representative will take initial cross sections immediately prior to excavation of material.
- .4 No overhaul will be paid.
- .5 Trench or structure backfill using select or processed native material will not be measured separately for payment.
- .6 Traffic Control required for this Work shall be incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”** and no separate payment will be made to the Contractor.
- .7 Mobilization and demobilization required for this Work shall be incidental to **“Lump Sum Price Item 1 – Mobilization / De-mobilization”**, and no additional payment will be made.
- .8 Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment will be made to the Contractor
- .9 No measurement payment will be made for:
 - .1 Excavating unnecessarily beyond lines established by Departmental Representative, with exception of unavoidable slide material. Do not measure slide material, when such slides are attributable to negligence.
 - .2 Scarifying or benching existing slopes or existing road surfaces.
 - .3 Removing and disposing of roots, stumps and other materials excavated during waste operation.
 - .4 Removing and disposal of unsuitable material from embankment attributable to negligence.
 - .5 Watering, drying or compacting.
 - .6 Proof rolling.
 - .7 Compaction of material (150 mm) below subgrade horizon in areas of cut.
 - .8 Finishing.

1.4 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM D698-00a, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft³) (600 kN-m/m³).

1.5 DEFINITIONS

- .1 Common Excavation: excavation of materials that are not Rock Excavation including material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work
- .2 Rock Excavation: excavation of:
 - .1 Material from solid masses of igneous, sedimentary or metamorphic rock that, prior to removal, was integral with parent mass. Material that cannot be removed by means of heavy duty mechanical excavation equipment with 0.95m³ bucket or equivalent to be considered integral with parent mass.
 - .2 Boulder or rock fragments measuring 1.5 cubic metres or more in volume.
- .3 Embankment: material derived from usable excavation and placed above original ground or stripped surface.
- .4 Backfill: Native or imported material meeting the requirements for structure or trench backfill. The processing of native material from trench or foundation excavations for use a structure or trench backfill will be permitted provided it meets the applicable specifications for backfill.
- .5 Waste Material: material unsuitable for backfill, trench foundation or material surplus to requirements.

1.6 QUALITY CONTROL

- .1 Regulatory Requirements:
 - .1 Adhere to regulations of authority having jurisdiction when blasting is required.
 - .2 Adhere to Provincial and National Environmental requirements when potentially toxic materials are involved.
- .2 All Quality Control testing by the Contractor.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Dispose of waste off-site at location provided by Contractor.

Part 2 Products

2.1 MATERIALS

- .1 Retaining wall backfill shall be in accordance with manufactures requirements.
- .2 Backfill materials require acceptance by Departmental Representative.

- .3 Material used for backfill not to contain organic matter, frozen lumps, or other unsuitable material.

Part 3 Execution

3.1 WATER DISTRIBUTORS

- .1 Apply water with equipment capable of uniform distribution.

3.2 EXCAVATING

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as indicated on the drawings.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .5 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 50 m of trench in advance of installation operations and do not leave open more than 15m at end of day's operation.
- .6 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .7 Restrict vehicle operations directly adjacent to open trenches.
- .8 Dispose of surplus and unsuitable excavated material off site.
- .9 Do not obstruct flow of surface drainage or natural watercourses.
- .10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .11 Notify Departmental Representative when bottom of excavation is reached.
- .12 Obtain Departmental Representative approval of completed excavation.
- .13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .14 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with 20mm WGB compacted to not less than 100% of corrected Standard Proctor maximum dry density.
 - .2 Fill under other areas with select embankment compacted to not less than 95 % of corrected Standard Proctor maximum dry density [in accordance with Section 31 05 10 - Corrected Maximum Dry density for Fill.
- .15 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

- .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.
- .16 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

3.3 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
 - .1 Departmental Representative has inspected and approved installations.
 - .2 Departmental Representative has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.
 - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Place bedding and surround material as specified on Drawings.
 - .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 500 mm.
 - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative or:
 - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
- .6 Install drainage system in backfill as indicated on Drawings.

3.4 EMBANKMENTS

- .1 This item consists of the construction of the subgrade in embankments and cuts to the lines, grades, cross-sections and dimensions shown on the drawings.
- .2 Scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces. Method used to be subject to prior approval of the Departmental Representative.

- .3 Do not place material which is frozen nor place material on frozen surfaces except in areas authorized.
- .4 Maintain crowned surface during construction to ensure ready run-off of surface water.
- .5 Drain low areas before placing materials.
 - .1 Place and compact to full width in layers not exceeding 200 mm loose thickness. The Departmental Representative may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.
- .6 Rock Embankments:
 - .1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 0.6 m.
 - .2 Distribute rock material to fill voids with smaller fragments to form compact mass.
 - .3 Fill surface voids at design elevation with rock spalls or selected material to form earth-tight surface.
 - .4 The Contractor may place rock embankments during freezing conditions provided compaction equipment of sufficient size to break large rock particles is used and all snow and ice is removed from fill surface.
 - .5 The Departmental Representative has no preference for which embankments are constructed with rock fill.
- .7 Deductions from excavation will be made for overbuild of embankments.

3.5 SUBGRADE COMPACTION

- .1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.
- .2 Embankment material shall be placed in successive uniform layers over the entire area as follows:
 - .1 Material containing less than 25 percent by volume of stones larger than 100 mm shall be placed in 200mm compacted layers.
 - .2 Material containing 25 percent or more by volume of stones larger than 100 mm shall be placed in layers not exceeding the maximum size of the stones. Stones larger than 100 mm shall not be placed within 150 mm of the subgrade elevation.
 - .3 In embankments composed principally of material obtained from rock cuts, the larger stones shall be carefully distributed and the interstices filled with smaller stones and other material to form a compact mass. Such embankments shall be constructed in layers not exceeding 1 metre. The placing of individual rocks and boulder exceeding 1.0metres in least dimension will be permitted provided they are carefully distributed and the interstices filled with finer material to form a dense and compact mass. Each layer, before starting the next, shall be levelled and smoothed with suitable equipment. Hauling and spreading equipment shall be operated over the full width of each layer.
- .3 Each layer shall be brought to its required degree of compaction throughout its entire width before successive layers are placed.

- .4 Compact each layer to minimum 95% maximum dry density, ASTM D698 (AASHTO T99). Top 300 mm of subgrade to be compacted to 98% maximum dry density, ASTM D698 (AASHTO T99).
- .5 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.
- .6 For rock placed as fill, compact with large steel wheeled or tracked equipment of sufficient size to break larger particles. Compact until rock fill is stable under compaction equipment and all voids are filled.

3.6 PROOF ROLLING

- .1 Proof roll using a loaded tandem truck with tires inflated to normal operation pressures.
- .2 Proof roll subgrade.
- .3 Make sufficient passes with proof roller to subject surface to three separate passes of loaded tire. Departmental Representative to determine level of proof rolling.
- .4 Where proof rolling reveals areas of defective subgrade:
 - .1 Remove subgrade material to depth and extent as directed by the Departmental Representative.
 - .2 Backfill excavated subgrade with common material and compact in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfill.
- .5 Where proof rolling reveals areas of defective subgrade, remove and replace in accordance with the appropriate sections. Removal of defective subgrade material shall be the Contractor's responsibility.

3.7 FINISHING

- .1 Shape entire roadbed to within 100 mm of design elevations.
- .2 Round top of back slope as shown on the Drawings.
- .3 Remove rocks over 150 mm in dimension from slopes and ditch bottoms.
- .4 Trim between constructed slopes and edge of clearing to provide drainage.

3.8 PROTECTION

- .1 Maintain finished surfaces in condition conforming to this section until acceptance by the Departmental Representative.

END OF SECTION

Part 1 General

3.1 SECTION INCLUDES

- .1** Materials and installation of polymeric geotextiles used in, retaining wall structures, filtration, drainage structures, and roadbeds beds purpose of which is to:
 - .1** Act as hydraulic filters permitting passage of water while retaining soil strength of granular structure.

3.2 RELATED SECTIONS

- .1** Section 01 33 00 – Submittal Procedures.
- .2** Section 01 35 43 – Environmental Procedures.
- .3** Section 31 37 00 – Riprap.

3.3 MEASUREMENT PROCEDURES

- .1** No measurement will be made for geotextiles, include in other items of work.
- .2** No measurement will be made for Silt fences, include in other items of work.
- .3** No measurement will be made for Geosynthetic berms, include in other items of work.

3.4 REFERENCES

- .1** American Society for Testing and Materials International, (ASTM)
 - .1** ASTM D4491-99a, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - .2** ASTM D4595-86(2001), Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - .3** ASTM D4716-01, Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
 - .4** ASTM D4751-99a, 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(April 1997), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2** CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
 - .3** No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
 - .4** No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
 - .5** No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.

- .6 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
- .7 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1860-March 1998, Material Specification for Geotextiles.

3.5 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 for each type of geotextile used on the project.
 - .1 Minimum length of 2 m of roll width of geotextile.
 - .2 Minimum of 1 m seam with at least 300 mm of geotextile on both sides of seam.
- .3 Submit to Departmental Representative 4 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.

3.6 DELIVERY, STORAGE AND HANDLING

- .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

3.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 35 43, Environmental Procedures.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with the EPP.
- .4 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 MATERIAL

- .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
- .2 Width: 3 m minimum.
- .3 Length: 30 m minimum.

- .1 Composed of: minimum 85% by mass of polyester with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days. Polypropylene is acceptable alternative material.
 - .2 Physical properties:
 - .3 Thickness: to CAN/CGSB-148.1, No.3, minimum 2.5 mm.
 - .4 Mass per unit area: to CAN/CGSB-148.1, No.2, minimum 400 g/m².
 - .5 Tensile strength and elongation (in any principal direction): to ASTM D4595.
 - .6 Tensile strength: minimum 1000 N, wet condition.
 - .7 Elongation at break: maximum 50%.
 - .8 Seam strength: equal to or greater than tensile strength of fabric.
 - .9 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
 - .10 Breaking force: minimum 665 N, wet condition.
 - .11 Elongation at future maximum 50%.
 - .12 Bursting strength: to CAN/CGSB-148.1, No.6.1 minimum 2100 kPa, wet condition.
 - .13 Hydraulic properties:
 - .14 Apparent opening range (AOS): to ASTM D4751, 0.15mm to 0.20mm.
 - .15 Filtration opening size (FOS): to CAN/CGSB-148.1 No.10 OPSS 1860.
 - .16 Permittivity: to ASTM D4491, 1.7 sec-1.
 - .17 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.
 - .18 Factory seams: sewn in accordance with manufacturer's recommendations.
 - .19 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.
 - .20 Values listed, with the exception of AOS, are minimum average values.
- .4 Silt Fence.**
- .1 Silt fences may be composed of woven or non-woven synthetic fabrics, approved commercially available products are as follows:
 - .2 Amoco: "1198 Siltfence"
 - .3 Terrafix: "Terrafence"
 - .4 Belton Industries Inc: "Beltech Silt Fence"
 - .5 Or approved equal.
- .5 Geosynthetic Permeable Berms.**
- .1 Geosynthetic permeable berms are unibody permeable berms used to reduce water velocity over soil, with the intent of preventing transport of fine soil particles. They are sediment trapping devices using composed materials or equal, in a fabric sock, applied with a pneumatic blower device or equivalent.
 - .2 Acceptable commercially available products are as follows:

- Filtrexx: "Siltsoxx"
- Terrafix: "Sediment Log"
- Bonterra: "Biolog"
- Or approved equal.

Part 3 Execution

3.1 INSTALLATION

.1 Riprap Filter Fabric Requirements:

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with Pins.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .5 Join successive strips of geotextile by sewing.
- .6 Pin successive strips of geotextile with securing pins at 3m intervals.
- .7 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .8 After installation, cover with overlying layer within 8h of placement.
- .9 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .10 Place and compact Riprap in accordance with Section 31 37 00.

.2 Silt Fence / Geosynthetic Berms:

- .1 Install as per the manufacturers instructions and recommendations.

3.2 CLEANING

- .1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner and in accordance with Section 01 35 43 - Environmental Procedures.

3.3 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1** Section 01 35 14 – Special Procedures for Traffic Control.
- .2** Section 01 35 43 – Environmental Procedures.
- .3** Section 31 23 33.01 – Excavation, Trenching and Backfill.
- .4** Section 31 32 19.01 – Geotextiles.

1.2 MEASUREMENT PROCEDURES

- .1** The quantity of Hand placed Rip Rap measured for payment, shall be the number of cubic metres supplied as measured in place and accepted in the completed work, and shall include all labour, equipment and material to satisfactorily complete this item as specified. Payment will be in accordance with Section 01 21 00 – Allowances, Clause 1.4. No overhaul will be paid for this Work.
- .2** Geotextile supplied and placed shall be incidental to the Work.
- .3** Excavation, preparation of Rip Rap base, hauling and any other related materials will be considered incidental to the work.
- .4** Traffic Control required for this Work shall be incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”** and no separate payment will be made to the Contractor.
- .5** Mobilization and demobilization shall be incidental to the work, and no additional payment will be made.
- .6** Environmental mitigations required in accordance with Section 01 35 43 Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment will be made to the Contractor.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1** Separate and recycle waste materials in accordance with Section 01 35 43, Environmental Procedures.
- .2** Place materials defined as hazardous or toxic in designated containers.
- .3** Divert leftover geotextiles to recycling facility as approved by Departmental Representative.

Part 2 Products

2.1 STONE

- .1** Hard, dense with relative density not less than 2.65, free from seams, cracks or other structural defects, to meet following size distribution for use intended:
- .2** Stone Rip Rap shall be supplied by the Contractor.
- .3** Rip Rap for Culverts inlet / outlet

- .1 BC MoT Class 25 Rip Rap
- .2 BC MoT Class 50 Rip Rap
- .4 Hand placed Rip Rap for spillways and barrier drains:
 - .1 BC MoT Class 10 Rip Rap
- .5 Supply rock spalls or cobbles to fill open joints.

2.2 GEOTEXTILE FILTER

- .1 Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

Part 3 Execution

3.1 PLACING

- .1 Contractor shall do the layout for placement of Rip Rap.
- .2 Where Rip Rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
- .3 Fine grade area where Rip Rap is to be placed, to a uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .4 Place non-woven geotextile on prepared surface in accordance with Section 31 32 19.01 - Geotextiles and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .5 Place Rip Rap (by machine or by hand) to thickness and details as indicated or as agreed to by the Departmental Representative.
- .6 Place stones in manner accepted by Departmental Representative to secure surface and create a stable mass or to match existing Streambed. On slopes, place larger stones at bottom of slopes.
- .7 Hand placing Rip Rap:
- .8 Use larger stones for lower courses and as headers for subsequent courses.
- .9 Stagger vertical joints and fill voids with rock spalls or cobbles.
- .10 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION

Part 1 General

1.1 SUPPLIED PRODUCTS UNDER THIS SECTION

- .1** 50 mm Granular Sub-base material supplied by the Owner is available at 69 Pit.

1.2 RELATED SECTIONS

- .1** Section 01 35 31 – Special Procedures for Traffic Control,
- .2** Section 01 35 43 – Environmental Procedures.
- .3** Section 31 23 33.01 – Excavation, Trenching and Backfill.
- .4** Section 32 11 24 – Granular Base Course.

1.3 MEASUREMENT PROCEDURES

- .1** Quantity of 50 mm Granular Sub-base course for which payment will be made shall be the number of tonnes incorporated into Work and accepted by Departmental Representative, and shall include all labour, equipment and material required to satisfactorily complete this item of work. Payment shall be under **“Unit Price Item 4 – 50 mm Granular Sub-Base Course”**.
- .2** Loading, hauling, placing, compacting, water for compaction and drying will be incidental to the Work.
- .3** No overhaul will be paid for this Work.
- .4** Supply, installation and maintenance and calibration of weight scales and a scale house by the Contractor shall be considered incidental to the contract and no additional payment will be measured for payment.
- .5** Traffic Control required for this Work shall be incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”** and no separate payment will be made to the Contractor.
- .6** Mobilization and demobilization required for this Work shall be incidental to **“Lump Sum Price Item 1 – Mobilization / De-mobilization”**, and no additional payment will be made.
- .7** Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment will be made to the Contractor.

1.4 REFERENCES

- .1** American Society for Testing and Materials (ASTM)
 - .1** ASTM C117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2** ASTM C131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

- .3 ASTM C136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D422-63(1998), Standard Test Method for Particle-Size Analysis of Soils.
- .5 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
- .6 ASTM D1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).
- .7 ASTM D1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .8 ASTM D4318-00, 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.

1.5 QUALITY CONTROL

- .1 All Quality Control testing by the Contractor.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Divert unused granular material to Mannix Pit as approved by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Crushed 50 mm minus granular subbase materials are available to the Contractor from stockpile at 69 Pit.

Part 3 Execution

3.1 PLACING

- .1 Load, haul and place granular subbase after subgrade is inspected and accepted by Departmental Representative.
- .2 Construct granular subbase 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. For each lift, material shall be placed on crown line using a Tonne / metre Spread Sheet. Contractor shall have a checker to indicate spread distance when material is being placed.

- .5 Begin spreading subbase material on crown line or high side of one-way slope.
- .6 Place granular subbase materials using methods which do not lead to segregation or degradation.
- .7 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .10 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 98% maximum dry density in accordance with ASTM D1557.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted subbase.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 Dry as necessary to obtain specified density.
- .6 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .7 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 SITE TOLERANCES

- .1 Finished subbase surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.4 PROTECTION

- .1 Maintain finished subbase in condition conforming to this section until succeeding base is constructed, or until granular subbase is accepted by Departmental Representative.

END OF SECTION

Part 1 General

1.1 SUPPLIED PRODUCTS UNDER THIS SECTION

- .1** Base course material supplied by the Owner is available at Mannix Pit.

1.2 RELATED SECTIONS

- .1** Section 01 35 31 – Special Procedures for Traffic Control.
- .2** Section 01 35 43 – Environmental Procedures.
- .3** Section 31 23 33.01 – Excavation, Trenching and Backfill.
- .4** Section 32 11 19 – 50 mm Granular Sub-base Course.

1.3 MEASUREMENT PROCEDURES

- .1** Quantity of 20 mm Granular Base course for which payment will be made shall be the number of tonnes incorporated into Work and accepted by Departmental Representative, and shall include all labour, equipment and material required to satisfactorily complete this item of work. **Payment shall be under “Unit Price Item 5 – 20 mm Granular Base Course”.**
- .2** Loading, hauling, placing, compacting, water for compaction and drying will be incidental to the Work.
- .3** No overhaul will be paid for this Work.
- .4** Supply, installation and maintenance and calibration of weight scales and a scale house by the Contractor shall be considered incidental to the contract and no additional payment will be measured for payment.
- .5** Traffic Control required for this Work shall be incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”** and no separate payment will be made to the Contractor.
- .6** Mobilization and demobilization required for this Work shall be incidental to **“Lump Sum Price Item 1 – Mobilization / De-mobilization”**, and no additional payment will be made.
- .7** Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment will be made to the Contractor.

1.4 REFERENCES

- .1** American Society for Testing and Materials (ASTM)
 - .1** ASTM C117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2** ASTM C131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

- .3 ASTM C136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
- .5 ASTM D1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).
- .6 ASTM D1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .7 ASTM D4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .1 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.

1.5 QUALITY CONTROL

- .1 All Quality Control testing by the Contractor.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Divert unused granular material to Mannix Pit as accepted by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 AT Designation 2 Class 20 base aggregate is available to the Contractor from stockpile at Mannix Pit.

Part 3 Execution

3.1 SEQUENCE OF OPERATION

- .1 Load, haul and Place granular base after subbase surface is inspected and accepted by Departmental Representative.
- .2 Placing
 - .1 Construct granular base to depth and grade in areas indicated.
 - .2 Ensure no frozen material is placed.
 - .3 Place material only on clean unfrozen surface, free from snow and ice. For each lift, material shall be placed on crown line using a Tonne / metre Spread Sheet. Contractor shall have a checker to indicate spread distance when material is being placed.

- .4 Begin spreading base material on crown line or on high side of one-way slope.
- .5 Place material using methods which do not lead to segregation or degradation of aggregate.
- .6 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .9 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.2 COMPACTION EQUIPMENT

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density not less than 98% maximum dry density in accordance with ASTM D1557.
- .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 Dry as necessary to obtain specified compaction.
- .6 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .7 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .8 Proof rolling
 - .1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.
 - .2 Obtain acceptance from Departmental Representative to use non standard proof rolling equipment.
 - .3 Proof roll granular base. If use of non standard proof rolling equipment is approved, Departmental Representative to accept level of proof rolling.
 - .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
 - .5 Where proof rolling reveals areas of defective subgrade:
 - .6 Remove base, subbase and subgrade material to depth and extent as directed by Departmental Representative.
 - .7 Backfill excavated subgrade with common material and compact in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfill, subbase material and compact in accordance with Section 32 11 19 - Granular Subbase.

- .8 Replace subbase material and compact in accordance with Section 32 11 19 - Granular Subbase.
- .9 Replace base material and compact in accordance with this Section.
- .10 Where proof rolling reveals defective base, subbase or subgrade, remove defective materials to depth and extent as directed by Departmental Representative and replace with new materials in accordance with the appropriate sections at no extra cost.

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.

3.4 PROTECTION

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Materials and application of asphalt tack coat to an existing asphalt or concrete surface prior to asphalt paving.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 43 – Environmental Procedures.
- .3 Section 32 12 16 – Asphalt Concrete Pavement

1.3 MEASUREMENT PROCEDURES

- .1 Supply, Delivery and Application of tack coat will be will not be measured separately and will be considered to “**Unit Price Item 6 –Asphalt Concrete Pavement**”.

1.4 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D140-01, Standard Practice for Sampling Bituminous Materials.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.5 SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two - 1 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth bottles made with plastic to Departmental Representative, at least 2 weeks prior to beginning Work.
- .3 Sample asphalt tack coat material to: ASTM D140.
- .4 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work, in accordance with ASTM D140.

1.6 QUALITY ASSURANCE

- .1 Upon request by Departmental Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this Section.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with ASTM D140.
- .2 Provide, maintain and restore asphalt storage area.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1** Separate waste materials for reuse and recycling in accordance with Section 01 35 43 - Environmental Procedures and with the Waste Reduction Work Plan.
- .2** Divert unused asphalt materials to facility capable of recycling materials.

Part 2 Products

2.1 MATERIALS

- .1** Anionic emulsified asphalt: to CAN/CGSB-16.2, grade: SS-1.
- .2** Water: clean, potable, free from foreign matter.

2.2 EQUIPMENT

- .1** Pressure distributor to be:
 - .1** Designed, equipped, maintained and operated so that asphalt material can be:
 - .2** Maintained at even temperature.
 - .3** Applied uniformly on variable widths of surface up to 5 m.
 - .4** Applied at readily determined and controlled rates from 0.2 to 5.4 L/m² with uniform pressure, and with an allowable variation from any specified rate not exceeding 0.1 L/m².
 - .5** Distributed in uniform spray without atomization at temperature required.
 - .6** Equipped with meter, registering metres of travel per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
 - .7** Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
 - .8** Equipped with an easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
 - .9** Equipped with accurate volume measuring device or calibrated tank.
 - .10** Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
 - .11** Equipped with nozzle spray bar, with operational height adjustment.
 - .12** Cleaned if previously used with incompatible asphalt material.

Part 3 Execution

3.1 APPLICATION

- .1** Obtain Departmental Representative's approval of surface before applying asphalt tack coat.
- .2** Apply asphalt tack coat only on clean and dry surface.

- .3 Dilute asphalt emulsion with water at 1:1 ratio for application.
 - .1 Mix thoroughly by pumping or other method accepted by Departmental Representative.
- .4 Apply asphalt tack coat evenly to pavement surface at rate as directed by Departmental Representative, of 0.5 L/m² plus or minus 0.2 L/m².
- .5 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.
- .6 Do not apply asphalt tack coat when air temperature is less than 10 degrees C or when rain is forecast within 2 hours of application.
- .7 Apply asphalt tack coat only on unfrozen surface.
- .8 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
- .9 Where traffic is to be maintained, treat no more than one half of width of surface in one application.
- .10 Keep traffic off tacked areas until asphalt tack coat has set.
- .11 Re-tack contaminated or disturbed areas as directed by Departmental Representative.
- .12 Permit asphalt tack coat to set before placing asphalt pavement.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Asphalt prime is not required unless otherwise directed by Departmental Representative.
- .2 Materials and application of asphalt prime to granular base surface prior to asphalt paving where approved by the Departmental Representative.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 43 – Environmental Procedures.
- .3 Section 32 12 16 – Asphalt Concrete Pavement

1.3 MEASUREMENT PROCEDURES

- .1 Supply, Delivery and Application of asphalt prime will be measured separately. Payment will be made under **“Lump Sum Price Item 3 – Prime Cost Sum”**.

1.4 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D140-01, Standard Practice for Sampling Bituminous Materials.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-16.1-M89, Cutback Asphalts for Road Purposes.
 - .2 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.5 SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two - 1 L samples of asphalt prime proposed for use in new, clean, air tight sealed, wide mouth, bottles made with plastic, to Departmental Representative, at least 2 weeks prior to commencing work.
- .3 Sample asphalt prime coat materials in accordance with ASTM D140.
- .4 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work, in accordance with ASTM D140.

1.6 QUALITY ASSURANCE

- .1 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials to ASTM D140.
- .2 Provide, maintain and restore asphalt storage area.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1** Separate waste materials for reuse and recycling in accordance with Section 01 35 43 - Environmental Procedures and with the Waste Reduction Workplan.
- .2** Divert unused asphalt materials to facility capable of recycling materials.

Part 2 Products

2.1 MATERIAL

- .1** Asphalt material: to CAN/CGSB-16.1 grade: RM-20, MC-30, MC-250. CAN/CGSB-16.2 grade: SS-1.
- .2** Sand blotter: clean granular material passing 4.75 mm sieve and free from organic matter or other deleterious materials.
- .3** Water: clean, potable, free from foreign matter.

2.2 EQUIPMENT

- .1** Pressure distributor to be:
 - .1** Designed, equipped, maintained and operated so that asphalt material can be:
 - .2** Maintained at even temperature.
 - .3** Applied uniformly on variable widths of surface up to 5 m.
 - .4** Applied at controlled rates from 0.2 to 5.4 L/m² with uniform pressure, and allowable variation from any specified rate not exceeding 0.1 L/m².
 - .5** Distributed in uniform spray without atomization at temperature required.
- .2** Equipped with meter registering metres of travel per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
- .3** Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
- .4** Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
- .5** Equipped with accurate volume measuring device or calibrated tank.
- .6** Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
- .7** Equipped with nozzle spray bar, with operational height adjustment.
- .8** Cleaned if previously used with incompatible asphalt material.

Part 3 Execution

3.1 APPLICATION

- .1** Obtain Departmental Representative's acceptance of granular base surface and authorization to apply before applying asphalt prime.

- .2** Cutback asphalt:
 - .1 Heat asphalt prime to a temperature for pumping and spraying as recommended by the supplier.
 - .2 Apply asphalt prime to granular base at rate recommended by the supplier and accepted by the Departmental Representative.
 - .3 Apply on dry surface unless otherwise directed by Departmental Representative.
- .3** Anionic emulsified asphalt:
 - .1 Dilute asphalt emulsion with clean water at 1:1 ratio for application.
 - .2 Mix thoroughly by pumping or other method approved by Departmental Representative.
 - .3 Apply diluted asphalt emulsion at rate recommended by the supplier and approved by the Departmental Representative.
 - .4 Apply diluted asphalt emulsion on damp surface unless otherwise directed by Departmental Representative.
- .4** Apply asphalt prime only on unfrozen surface.
- .5** Do not apply prime when air temperature is less than 10 degrees C or when rain is forecast within 2 hours.
- .6** Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt prime material.
- .7** Where traffic is to be maintained, treat no more than one-half width of surface in one application.
- .8** Prevent overlap at junction of applications.
- .9** Do not prime surfaces that will be visible when paving is complete.
- .10** Apply additional material to areas not sufficiently covered as directed by Departmental Representative.
- .11** Keep traffic off primed areas until asphalt prime has set.
- .12** Permit prime to set before placing asphalt paving.

3.2 USE OF SAND BLOTTER

- .1** If asphalt prime fails to penetrate within 24 hours, spread sand blotter material in amounts required to absorb excess material.
- .2** Allow sufficient time for excess prime to be absorbed.
- .3** Apply second application of sand blotter as required.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 35 00.06 – Special Procedures for Traffic Control.
- .3 Section 01 35 43 – Environmental Procedures.
- .4 Section 32 12 13.16 – Asphalt Tack Coat.
- .5 Section 32 12 13.23 – Asphalt Prime.

1.2 WORK DESCRIPTION

- .6 Work shall consist of supply and placement of AT Hot Mix Asphalt Concrete Pavement Type “H1”.
- .1 Asphalt Concrete Pavement Class 16 Type “H1” shall consist of crushed aggregates, or a combination of crushed aggregates, blend sand material as required and 150 – 200(A) asphalt cement, combined in a hot mix plant as hereinafter specified, placed and compacted to the specified density on a prepared surface in conformity to the lines, grades, dimensions and cross-sections as directed by the Departmental Representative.
- .2 The addition of recycled asphalt pavement (RAP) is not permitted.

1.3 MEASUREMENT PROCEDURES AND UNIT PRICE ADJUSTMENTS

- .1 Accepted asphalt concrete pavement will be measured in tonnes and will be paid for at the unit price for “Asphalt Concrete Pavement” for the type placed subject to unit price adjustment for density and asphalt content only. Payment shall be compensation in full for supply of asphalt concrete mix including all materials, supply and application of prime/tack coat, processing, plant mixing, loading, hauling, paver laying, compacting, finishing surface, raking, interim lane marking, quality control testing, safety, and maintenance.
 - .1 Payment for Type H1 Asphalt Concrete Pavement will be under **“Unit Price Item 6 – Asphalt Concrete Pavement”**.
- .2 Supply, installation and maintenance and calibration of weight scales and a scale house at the Plant by the Contractor shall be considered incidental to **“Unit Price Item 6 – Asphalt Concrete Pavement”** for the asphalt placed and no additional payment will be made.
- .3 Preparation of an asphalt mix designs acceptable to the Departmental Representative (including anti-stripping test) shall be considered incidental to **“Unit Price Item 6 – Asphalt Concrete Pavement”** for the type of asphalt placed and no additional payment will be made.
- .4 There is no Overhaul payment under this contract.
- .5 Supply of anti-stripping agents if required and accepted by the Departmental Representative shall be considered incidental to **“Unit Price Item 6 – Asphalt Concrete Pavement”** for the type of asphalt placed and no additional payment will be made.

- .6 Mobilization and demobilization required for this Work shall be incidental to “**Lump Sum Price Item 1 – Mobilization / De-mobilization**” and no additional payment will be made.
- .7 Traffic Control required for this Work shall be incidental to “**Lump Sum Item 2 – Traffic Accommodation**” and no separate payment will be made to the Contractor.
- .8 The following end product properties of the HMA CP will be measured for acceptance in accordance with Section 2.3 - Acceptance Sampling and Testing.
 - .1 Density.
 - .2 Actual Asphalt Content.
 - .3 Gradation.
- .9 Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment will be made to the Contractor

Part 2 Products

2.1 MATERIALS

- .1 Materials used shall be in accordance with AT Standard Specifications for Highway Construction, Edition 14, December 2010 Section 3.50 – Asphalt Concrete Pavement (EPS).
- .2 The addition of recycled asphalt pavement (RAP) is not permitted.

Part 3 Execution

3.1 EQUIPMENT, PLANT AND MIXING REQUIREMENTS

- .1 Execution of the Work shall be in accordance with AT Standard Specifications for Highway Construction – 2010 Section 3.50 – Asphalt Concrete Pavement (EPS).

END OF SECTION

Part 1 General

1.1 RELATED WORK

- .1** Section 01 35 31 – Special Procedures for Traffic Control.
- .2** Section 01 35 43 – Environmental Procedures.
- .3** Section 02 81 01 – Hazardous Materials.
- .4** Section 32 12 16 – Asphalt Concrete Pavement (End Product Specifications).

1.2 REFERENCES

- .1** CAN/CGSB-1.5-M99, Low Flash Petroleum Spirits Thinner.
- .2** CGSB1-GP-12C-83, Standard Paint Colours.
- .3** CGSB1-GP-71-83, Method, of Testing Paints and Pigments.
- .4** CAN/CGSB 1.74-01, Alkyd Traffic Paint.
- .5** U.S. FED-STD-595B, 1989 - Colours Used in Government Procurement.
- .6** Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1** Material Safety Data Sheets (MSDS).

1.3 SAMPLES

- .1** Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2** Submit to Departmental Representative following material sample quantities at least 4 weeks prior to commencing work.
 - .1** Two samples of each type of paint.
 - .2** One sample of glass beads.
 - .3** Sampling to CGSB1-GP-71.
- .3** Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, CGSB specification number and formulation number and batch number.

1.4 MEASUREMENT FOR PAYMENT

- .1** Temporary Pavement Marking including supply of paint and reflective glass beads in accordance with Section 01 35 31 - Special Procedures for Traffic Control shall be considered incidental to the contract and will not be measured for payment.
- .2** Payment for final pavement markings will be made in accordance with Section 01 21 00 - Allowances, Clause 1.4.2.

Part 2 Products

2.1 MATERIALS

- .1** Paint:
 - .1** To CGSB 1.74-2001-CAN/CGSB, alkyd traffic paint.
 - .2** Colour: to FED-STD-595B, yellow 33538 and white 37925.
 - .3** Upon request, Departmental Representative will supply a qualified product list of paints applicable to work. Qualified paints may be used but Departmental Representative reserves right to perform further tests.
- .2** Thinner: to CAN/CGSB-1.4-2000.
- .3** Glass beads:
 - .1** Overlay type: to CGSB1-GP-74M.

2.2 SUPPLY, STORAGE AND HANDLING

- .1** Storage and handling shall meet the requirements of Section 01 35 43 - Environmental Procedures and Section 02 81 01 - Hazardous Materials.
- .2** The Contractor shall make all arrangements for the supply and delivery of paint and glass beads and shall provide the Departmental Representative with records of all materials received and/or returned, on a daily basis.
- .3** The Contractor shall provide, maintain and reclaim all material storage sites.
- .4** No paint formulation shall be diluted or mixed with a different formulation or with any other material, without the specific approval of the Departmental Representative.
- .5** The Contractor shall take all necessary steps to prevent contamination of the materials. Paint shall be protected from freezing.
- .6** The Contractor shall be responsible for the proper clean up of waste or spilled material, and the proper disposition of containers.

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.
- .2** Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint.

3.2 CONDITION OF SURFACES

- .1** Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

3.3 TRAFFIC CONTROL

- .1 In accordance with Section 01 35 31 and Contractor's Traffic Management Plan.

3.4 APPLICATION

- .1 Pavement markings to be laid out by Contractor.
- .2 Apply paint only when air temperature is above 10°C, wind speed is less than 60 km/h and no rain is forecast within next 4 h.
- .3 Apply traffic paint evenly at rate of 3 m²/L.
- .4 Do not thin paint.
- .5 Paint lines to be of uniform colour and density with sharp edges.
- .6 Thoroughly clean distributor tank before refilling with paint of different colour.
- .7 Apply glass beads at rate of 200 g/m² of painted area immediately after application of paint.

3.5 TOLERANCE

- .1 Paint markings to be within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings as directed by the Departmental Representative

3.6 QUALITY CONTROL INSPECTION PLAN

- .1 The Contractor is responsible for quality control inspection throughout every stage of the work to ensure that materials and workmanship comply with the requirements of this specification.
- .2 The Contractor shall develop and submit a Quality Control Inspection Program (QCIP) that addresses all the elements that affect the quality of the line painting including, but not limited to:
 - .1 Paint Application Rates,
 - .2 Glass Bead Application Rates,
 - .3 Pavement Surface and Atmospheric Conditions, and
 - .4 Line Widths, Line Lengths and Space Lengths.
- .3 The Contractor shall maintain records of QCIP data, complaints from the public, and other details relevant to the Work and shall provide these records to the Departmental Representative daily.

3.7 HIGHWAY OPERATION

- .1 Highway operation shall be in accordance with the Contractor's Traffic Management Plan and shall meet the following requirements:
 - .1 General
 - .1 Painting shall be carried out during hours of daylight between ½ hour after sunrise and ½ hour before sunset. Generally, the Contractor may paint lines during any day of the week but is cautioned that traffic volumes are usually higher on all highways on Friday, Saturday and Sunday.

- .2 Operation of the painting truck against the flow of traffic will not be permitted.
- .3 Loading glass beads or paint onto the painting truck is not permitted on a roadway surface.

.2 Operation of Companion Vehicles

- .1 When the roadway to be painted is open to public traffic, the Contractor shall operate a crash attenuator vehicle and a pilot vehicle in conjunction with the painting truck during the painting of all longitudinal lines. Companion vehicle operators shall not attempt to control traffic from inside the vehicle.
- .2 The actual operating parameters of the companion vehicles will be determined by the Contractor to safely accommodate traffic and will be based on site specific conditions such as sight distances, highway geometrics and traffic patterns and volumes. Typical operating parameters are as follows:
 - .1 The crash attenuator vehicle shall be equipped with a crash attenuator which meets National Cooperative Highway Research Program, Report 350 Test Criterion. Test Level 3 for 100 km/hr. The vehicle shall follow behind the painting truck at a distance of 50 to 400 m.
 - .2 The pilot vehicle shall be driven in the same travel lane as the paint machine, following it at a constant distance of approximately two kilometres.
 - .3 The crash attenuator vehicle, pilot truck and the painting truck are to display the same message at all times. The painting truck and the companion vehicles shall be equipped with a two-way radio for communication and overhead revolving beacon with an amber lens of a minimum 180 mm high and 180 mm wide.

3.8 PROTECTION OF COMPLETED WORK

- .1 Protect pavement markings until dry.

END OF SECTION

Part 1 General

1.1 PRODUCTS SUPPLIED UNDER THIS SECTION

- .1** 20 mm Granular material supplied by the Owner is available to the Contractor from stockpiles at Mannix Pit.

1.2 SECTION INCLUDES

- .1** Materials and installation for constructing new outfall structures, precast and cast-in-place manholes and catch basins.

1.3 RELATED SECTIONS

- .1** All Division 1 Specifications.
- .2** Section 02 41 13.14 – Asphalt Pavement Removal.
- .3** Section 02 81 01 – Hazardous Materials.
- .4** Section 03 10 00 – Concrete Forming and Accessories.
- .5** Section 03 20 00 – Concrete Reinforcing.
- .6** Section 03 30 00 - Cast-in-Place Concrete.
- .7** Section 10 14 53 – Traffic Signage.
- .8** Section 31 05 10 – Corrected Dry Density for Fill.
- .9** Section 31 23 33.01 – Excavation, Trenching and Backfill.
- .10** Section 31 37 00 – Rip Rap.
- .11** Section 32 11 19 – 50 mm Granular Sub-Base Course.
- .12** Section 32 11 24 – 20 mm Granular Base Course.
- .13** Section 32 12 13.16 – Asphalt Tack Coat.
- .14** Section 32 12 16 – Asphalt Concrete Pavement.
- .15** Section 33 42 13 – Pipe Culverts.

1.4 MEASUREMENT PROCEDURES

- .1** Removal of Catch Basin structures:
 - .1** The quantity of Catch Basin structures which will be measured for payment shall be the number of Catch Basin structures removed and stockpiled at the site of installation, in accordance with the plans and specifications, this Section and Section 33 42 13 - Pipe Culverts. Payment will be made under **“Unit Price Item 7 – Manholes and Catch Basin Structures”**.
- .2** Installation of Catch Basin structures
 - .1** The quantity of Catch Basin structures which will be measured for payment shall be the number of Catch Basin structures assembled and accepted by the Departmental Representative, and shall be inclusive of all costs of labour,

materials, equipment to satisfactorily complete this item as specified and in accordance with the plans and specifications, this Section, and Section 33 42 13 - Pipe Culverts. Payment will be made under **“Unit Price Item 7 – Manholes and Catch Basin Structures”**.

- .3 Supply and Installation of pre-cast concrete manhole
 - .1 The quantity of manhole structures which will be measured for payment shall be the number of complete manhole structures supplied, installed and accepted by the Departmental Representative, and shall be inclusive of all costs of labour, materials, equipment to satisfactorily complete this item as specified and in accordance with the plans and specifications, this Section, and Section 33 42 13 - Pipe Culverts. Payment will be made under **“Unit Price Item 7 – Manholes and Catch Basin Structures”**.
- .4 Work required as part of the installation of Catch Basin structures, to be paid under the following items:
 - .1 Excavation Common / embankment will be paid under **“Unit Price Item 3 – Excavation Trenching and Backfill”**, in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfill.
 - .2 Asphalt removal will be paid under **“Unit Price Item 1b) – Asphalt Pavement Removal”** in accordance with Section 02 41 13.14 – Asphalt Pavement Removal.
 - .3 Placing Sub-base course will be paid under **“Unit Price Item 4 – 50 mm Granular Sub-base Course”** in accordance with Section 32 11 19 - 50 mm Granular Sub-base Course.
 - .4 Placing Base course will be paid under **“Unit Price Item 5 – 20 mm Granular Base Course”** in accordance with Section 32 11 24 – 20mm Granular Base Course.
 - .5 Placing asphalt will be paid under **“Unit Price Item 6 –Asphalt Concrete Pavement”** in accordance with Section 32 12 16 – Asphalt Concrete Pavement (End Product Specifications).
 - .6 Placing Rip Rap will be paid under **“Lump Sum Price Item 3b) - Prime Cost Sum: Items other than Bituminous Materials”**, in accordance with Section 31 37 00 – Rip Rap.
 - .7 Removal and stockpile of existing Precast Concrete Barriers will be paid under **“Unit Price Item 9a) – Remove and Stockpile”** in accordance with Section 34 71 13.01 – Precast Concrete Barrier.
 - .8 Placing of Precast Concrete Barriers will be paid under **“Unit Price Item 9b) – Install”** in accordance with Section 34 71 13.01 – Precast Concrete Barrier.
 - .9 Supply and installation of cast iron manhole frame and cover will be paid under **“Unit Price Item 7 – Manholes and Catch Basin Structures”** Removal of existing catch basin frame and cover is incidental to the work.
- .5 Traffic Control during the survey, layout, Construction of the Catch Basin structures shall be incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”** and no separate payment will be made to the Contractor.

- .6 Mobilization and demobilization required for this Work shall be incidental to “**Lump Sum Price Item 1 – Mobilization / De-mobilization**”, and no additional payment will be made.
- .7 Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment will be made to the Contractor.

1.5 REFERENCES

- .1 American Society for Testing and Materials (ASTM International)
 - .1 ASTM A48/A48M-00, Standard Specification for Gray Iron Castings.
 - .2 ASTM C139-99, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
 - .3 ASTM C478M-97, Specification for Precast Reinforced Concrete Manhole Sections Metric.
 - .4 ASTM C618-00, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - .5 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-98 (April 2001), Cementitious Materials Compendium. Includes:
 - .1 CAN/CSA-A5-98, Portland Cement.
 - .2 CAN/CSA-A8-98, Masonry Cement.
 - .3 CAN/CSA-A23.5-98, Supplementary Cementing Materials.
 - .2 CSA-A23.1/A23.2-00(June 2001), Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .3 CSA-A165 Series-94(R2000), CSA Standards on Concrete Masonry Units.
 - .4 CAN/CSA-G30.18-M92(R1998), Billet Steel Bars for Concrete Reinforcement.
 - .5 CAN/CSA-G164-M92R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.6 SUBMITTALS

- .1 Submittals in accordance with Section 013300 - Submittal Procedures.
- .2 Submit manufacturer's test data and certification at least 4 weeks prior to beginning Work. Include manufacturer's Drawings, information and shop drawings where pertinent.

1.7 STAGED CONSTRUCTION

- .1** Provisions for staged construction shall be shown in the shop drawings, including any temporary support required, until catch basin structure is complete.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1** Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Protection.
- .2** Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.
- .3** Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .4** Place unused concrete materials in the roadway embankment as approved by Departmental Representative.
- .5** Place unused aggregate materials in stockpile in Mannix Pit as approved by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1** Granular bedding and backfill: 20 mm and 50 mm crushed aggregate is available to the Contractor from Mannix Pit. See Section 01 11 00 - Summary of Work, for maximum quantities available to Contractor.
- .2** Supply precast manhole in accordance with Alberta Transportation standard 2.10.M31 using 1350 mm diameter precast rings.
- .3** Supply manhole frames and covers in accordance with Alberta Transportation standard drawing 2.10.M27

Part 3 Execution

3.1 EXCAVATION AND BACKFILL

- .1** Excavate and backfill in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfill.
- .2** Obtain approval of Departmental Representative before installing manholes or catch basins.

3.2 CONCRETE WORK

- .1** Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .2** Position metal inserts in accordance with dimensions and details as indicated.

3.3 INSTALLATION

- .1** Construct units in accordance with details indicated, plumb and true to alignment and grade.
- .2** Complete units as pipe laying progresses. Maximum of units behind point of pipe laying will be allowed.
- .3** Dewater excavation to approval of Departmental Representative and remove soft and foreign material before placing concrete base.
- .4** Precast units:
 - .1** Set precast concrete unit on 150 mm minimum of granular bedding compacted to 95% maximum density to ASTM D698 with the top of units at correct elevation.
 - .2** Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
 - .3** Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.
- .5** Grout around pipes that lead to and from the precast units and trim the pipes flush with the inside surface of the precast unit.
- .6** Place concrete for bottom and bending, as shown on the Drawings.
- .7** Compact granular backfill to 95% maximum density to ASTM D698 no sooner than 7 days after concrete placement.
- .8** Place frame and cover on top section to elevation as indicated. If adjustment required use concrete ring.
- .9** Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.

END OF SECTION

Part 1 General

1.1 PRODUCTS SUPPLIED UNDER THIS SECTION

- .1 50 mm crushed bedding and backfill aggregate for Structural culverts is available to the Contractor from stockpile in Mannix Pit.
- .2 20mm crushed bedding and backfill aggregate for CSP is available to the Contractor from stockpile from Mannix Pit.

1.2 SECTION INCLUDES

- .1 Materials and installation for CSP (Corrugated Steel Pipe).

1.3 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 43 – Environmental Procedures.
- .3 Section 31 23 33.01 – Excavation, Trenching and Backfill.
- .4 Section 31 37 00 – Riprap.
- .5 Section 33 05 14 – Manholes and Catch Basin Structures.

1.4 MEASUREMENT

- .1 Supply and installation of Culverts:
 - .1 The quantity of culverts which will be measured for payment shall be the number of linear metres assembled and accepted by the Departmental Representative, and shall be inclusive of all costs of labour, materials, equipment to satisfactorily complete this item as specified and in accordance with Section 33 42 13 - Pipe Culverts. Payment will be made under **“Unit Price Item 8a) – 600mm HDPE Boss 2000 Pipe”**.
 - .2 The quantity of pipe slope anchors which will be measured for payment shall be the number assembled and accepted by the Departmental Representative, and shall be inclusive of all costs of labour, materials, equipment to satisfactorily complete this item as shown on the Drawings. Payment will be made under **“Unit Price Item 8b) – Pipe Slope Anchors”**.
 - .3 The survey and layout of the Culverts as per requirements identified in this Section and Section 33 42 13 – Pipe Culverts, will not be measured directly for payment but shall be considered incidental to **“Unit Price Item 8a) – 600mm HDPE Boss 2000 Pipe”**.
 - .4 At locations of extensions to existing culverts, thoroughly cleaning and flushing the existing culvert, excavating 1 metre back from present exposed end, cutting off damaged sections of exposed end and painting remaining end with a high zinc dust oxide paint and supplying and placing a joint sealant shall be considered incidental **“Unit Price Item 8a) – 600mm HDPE Boss 2000 Pipe”**.
- .2 Work required as part of the installation of CSP Culverts, to be paid under the following items:

- .1 Excavation will be paid under **“Unit Price Item 3 – Excavation Trenching and Backfill”**, in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfill.
- .2 Asphalt removal will be paid under **“Unit Price Item 1b – Asphalt Pavement Removal”** in accordance with Section 02 41 13.14 – Asphalt Pavement Removal.
- .3 Placing supplied granular backfill around the culvert will be paid under **“Unit Price Item 5 – 20 mm Granular Base Course”** in accordance with Section 32 11 24 - 20 mm Granular Base Course and Section 33 42 13 - Pipe Culverts
- .4 Placing Sub-base course will be paid under **“Unit Price Item 4 – 50 mm Granular Sub-base Course”** in accordance with Section 32 11 19 - 50 mm Granular Sub-Base Course.
- .5 Placing Base course will be paid under **“Unit Price Item 5 – 20 mm Granular Base Course”** in accordance with Section 32 11 24 – 20mm Granular Base Course.
- .6 Placing asphalt will be paid under **“Unit Price Item 6 – Asphalt Concrete Pavement”** in accordance with Section 32 12 16 – Asphalt Concrete Pavement (End Product Specifications).
- .7 Placing Rip Rap if required will be paid under **“Lump Sum Price Item 3 – Prime Cost Sum”**, in accordance with Section 31 37 00 – Rip Rap.
- .3 Traffic Control during the survey, layout and Construction of the culverts shall be incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”** and no separate payment will be made to the Contractor.
- .4 Mobilization and demobilization required for this Work shall be incidental to **“Lump Sum Price Item 1 – Mobilization / De-mobilization”**, and no additional payment will be made.
- .5 Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment will be made to the Contractor. For measurement associated with the supply and install of Manholes and Catch Basin Structures refer to Section 35-05-14 “Manholes and Catch Basin Structures”.
- .6 No separate measurement will be made for couplings, fittings or end sections for CSP, SPSCP or HDPE.
- .7 Measure removal of or plugging of existing culverts under Prime Cost Sum in metres of invert length for each size, type and class of pipe removed and disposed.
- .8 Culvert excavation shall be measured in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfill.
- .9 Culvert installation must be coordinated with embankment construction. No payment will be made for re-excavation of embankment material required to install culverts.

1.5 REFERENCES

- .1 CSA-G401-01, Corrugated Steel Pipe Products.
- .2 CSA-B182.8-02, Profile Polyethylene Storm Sewer and Drainage Pipe and Fittings.

1.6 SUBMITTALS

- .1** Submit manufacturer's test data and certification at least one week prior to beginning Work.
- .2** Certification to be marked on pipe.

1.7 STORAGE AND HANDLING

- .1** Handle and store pipe products in a manner to avoid damage, alteration, deterioration and soiling.
- .2** Store pipes on a clean and flat surface in Mannix Pit
- .3** Where the material supplied is damaged, the Contractor shall immediately separate nested sections of the plate or pipe to facilitate more detailed inspection. Culvert material designated by the Departmental Representative as unacceptable, due to damage or failure to meet specified requirements, shall be immediately repaired or replaced by the Contractor.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1** Separate waste materials for reuse and recycling in accordance with Section 01 35 43 - Environmental Procedures.
- .2** Remove from site and dispose of 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 Section 01 35 43 - Environmental Procedures.
- .4** Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5** Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 CORRUGATED STEEL PIPE

- .1** Corrugated steel pipe: to CSA-G401.
- .2** Culverts to be annular or spiral with annular ends. Coupling bands to be two piece annular bolted with minimum width of nine corrugations.
- .3** Minimum wall thickness to be 2.0 mm.
- .4** Corrugations to be 68 mm x 13 mm.
- .5** For all exposed culvert ends, 2:1 mitred end sections will be required.
- .6** Design Code CHBDC S6-06.
- .7** Design Live Load CL-800.

2.2 CORRUGATED HDPE PIPE

- .1** Pipe to be Armtec BOSS 2000 or approved equal.

- .2 Pipe stiffness in accordance with Alberta Transportation Specification for Highway Construction - Edition 13 -2007, Section 5.24.
- .3 Pipe joint shall be bell and spigot in accordance with Alberta Transportation Specification for Highway Construction - Edition 13 -2007, Section 5.24.

2.3 GRANULAR BEDDING AND BACKFILL

- .1 20 mm and 50 mm crushed aggregates are available from Mannix Pit for use as culvert bedding and backfill material. See Section 01 11 00 - Summary of Work, for maximum quantities available to the Contractor.

2.4 RIPRAP

- .1 Riprap shall be installed in accordance with Section 31 37 00 - Riprap. The type of riprap shall be hand placed riprap.

Part 3 Execution

3.1 CUT ENDS

- .1 All exposed ends of CSP culverts to have sloped end sections conforming to roadside slope, by cutting culvert with mechanical saw.
- .2 All cut edges shall be made smooth by grinding so that all the burrs are removed. Any damaged galvanizing shall be restored by zinc metallizing in accordance with CSA G401.
- .3 Where an existing culvert is extended, up to 3 m of the existing culvert end shall be removed as directed by the Departmental Representative.

3.2 BEDDING

- .1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.
- .2 Place minimum thickness of 300 mm of approved granular material on bottom of excavation and compact to minimum 95% maximum density to ASTM D698.
- .3 Shape bedding to fit lower segment of pipe exterior so that width of at least 50% 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.

3.3 LAYING CORRUGATED STEEL PIPE CULVERTS

- .1 Begin pipe placing at downstream end.
- .2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.
- .3 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.

3.4 JOINTS: CORRUGATED STEEL CULVERTS

- .1 Match corrugations of coupler with pipe sections before tightening.

- .2 Insert and tighten bolts.
- .3 Tap couplers firmly with a rubber mallet or similar non-marring tool as they are being tightened, to take up slack and ensure snug fit.
- .4 Repair spots where damage has occurred to coating in the field by applying two coats of zinc rich paint approved by the CSP supplier. Allow each coat to dry before placing second coat, bedding or backfill.

3.5 BACKFILLING

- .1 Backfill around and over culverts as indicated or as directed by Departmental Representative.
- .2 Place granular backfill material, in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.
- .3 Compact each layer to 98% maximum density to ASTM D698 taking special care to obtain required density under haunches. Hand tamp where necessary to obtain compaction.
- .4 Protect installed culvert with minimum 900 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 2H:1V.
- .5 Place backfill in unfrozen condition.
- .6 Place riprap.

3.6 TRENCHING EXISTING PAVEMENT STRUCTURES

- .1 Where trenches are cut into existing pavement structures, backfill will match the existing materials and thickness, payment for backfill and paving will be made at the unit price for the type of material used.

3.7 CULVERT EXTENSIONS

- .1 Extensions to existing culverts shall be as noted on drawings. Payment for installation shall include all hardware and necessary features to attach new sections. Backfill and bedding shall be as per drawings and paid as per the appropriate unit price item.

3.8 CULVERT / STRUCTURE REMOVAL

- .1 Culvert removal shall be as indicated on drawings and shall include disposal of sections to an approved site as directed by owner.
- .2 Bedding and backfill for culvert removal shall be paid as per the appropriate unit price item.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1** Section 01 33 00 - Submittal Procedures.
- .2** Section 01 35 00.06 – Special Procedures for Traffic Control.
- .3** Section 01 35 43 - Environmental Procedures.

1.2 DESCRIPTION

- .1** Work includes the removal, stockpiling and reinstallation of precast concrete barriers in accordance to this section and as directed by the Departmental Representative.

1.3 MEASUREMENT PROCEDURES

- .1** Remove and stockpile Precast Concrete Barriers:
 - .1** The quantity of Precast Concrete Barriers which will be measured for payment shall be the number of linear metres removed regardless of the type of barrier, hauled and stockpiled, in accordance with these specifications. Payment will be made under **“Unit Price Item 9a) –Remove and Stockpile”**.
- .2** Installation of Precast Concrete Barriers
 - .1** The quantity of Precast Concrete Barriers which will be measured for payment shall be the number of linear metres assembled, regardless of the type of barrier, and accepted by the Departmental Representative, and shall be inclusive of all costs of labour, materials, equipment to satisfactorily complete this item as specified and in accordance with this Section. Payment will be made under **“Unit Price Item 9b) - Install”**.
 - .2** Hauling Precast Concrete Barriers to and from stockpiles to the barrier installation sites will not be measured directly for payment but shall be considered incidental to the installation of Precast Concrete Barriers.
- .3** Mobilization and demobilization required for this Work shall be incidental to **“Lump Sum Price Item 1 Mobilization / De-mobilization”** and no additional payment will be made.
- .4** Traffic Control during the survey, layout for the installation or re-installation of Precast Concrete Barriers shall be incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”** and no separate payment will be made to the Contractor.
- .5** Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment will be made to the Contractor

1.4 REFERENCES

- .1** CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .2** CAN/CSA-A23.4, Precast Concrete – Materials and Construction.
- .3** CAN/CSA-G40.21-98, Structural Quality Steel.

- .4 CAN/CGSB-1-GP-181M, Coating, Zinc-Rich,

1.5 DEFINITIONS

- .1 Compressive Strength Test Result: Average of strengths of three 28 day compressive test cylinder breaks with standard cylinders of 150 mm diameter and 300 mm high size.
- .2 Curing Period: 28 days if test cylinders reach specified 28 day compressive strength not later than 28 days after casting.
- .3 Laitance: soupy mixture of cement, fine sand and water that accumulates on concrete surface when wet concrete mixes that bleed excessively are used.

1.6 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Manufacturer's Instructions: submit manufacturer's, storage and installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.7 QUALITY CONTROL

- .1 Concrete test for every pour shall be performed by the contractor. Concrete testing procedures shall
 - .1 Provide certification by Engineer licensed to practice in the province of the contractor, that precast concrete barrier meets specifications prior to delivery of materials. Certification to include results of concrete testing performed by independent laboratory retained by the Contractor

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Protection:

- .1 Store materials in accordance with manufacturer's recommendations
- .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials in accordance with Section 01 35 43 – Environmental Procedures.

Part 2 Products

2.1 MATERIAL:

- .1 Precast Concrete barrier as per British Columbia 2009 Standard Specifications for Highway Construction, Section 941 – Precast Reinforced Concrete Barriers. All end faces to have 25 mm chamfered edges.

2.2 PRECAST CONCRETE BARRIER

- .1 Concrete Quality:
 - .1 To CAN/CSA-A23.1 except where amended below.
 - .2 Compressive Strength: Compressive strength test result is equal to or exceeds 30 MPa and no individual cylinder strength is less than 27 MPa.
 - .3 Calcium chloride or admixtures containing calcium chloride are not to be used in concrete.
 - .4 Cement Content: minimum of 320 kg/m³.
 - .5 Water / Cement Ratio: maximum of 0.45.
 - .6 Coarse Aggregate: nominal maximum size not exceeding 28 mm.
 - .7 Slump: 50 mm plus or minus 20 mm.
 - .8 Entrained Air: 5 to 8%.
 - .9 Reinforcement: 50 mm fibrillated polypropylene fibres to be added at the rate of 0.9 kg/m³
- .2 Concrete Placing and Consolidation:
 - .1 To CAN/CSA-A23.4, Clause 19.
- .3 Concrete Curing and Protection:
 - .1 Strictly to CAN/CSA-A23.4, Clause 21.
 - .2 During curing period temperature differential between concrete surface and ambient air not to exceed 20°C.
- .4 Exposed Concrete Surfaces:
 - .1 Uniform in texture and colour as produced from well-maintained steel form surfaces and proper vibration methods without excessive surface fines or laitance.

- .2 Surface defects will normally be cause for rejection of any unit except where such are within the following permissible limits or are subject to making good within the following permissible limits:
- .3 Unobtrusive defects of any kind where their total area is not in excess of 2% of exposed surface area of unit.
- .4 Air holes not greater than 3 mm in diameter and not more than 20 in any isolated 300 mm x 300 mm area.
- .5 Sharp ridges at edges of exposed concrete surfaces softened where necessary by careful rubbing or grinding.
- .6 Patching of isolated small holes, cavities and similar self-confining defects may be permitted when authorized by Departmental Representative.
- .5** Patching, if authorized, to be completed as follows:
 - .1 Defective area saturated with water and defect prepared with cement paste and filled with mortar.
 - .2 Mortar to be properly proportioned to same sand and cement as original concrete and reasonably colour-matched to cured dry unit with addition of white cement where necessary, to be pre-shrunk for about one hour before retempering and use.
 - .3 Patching mortar to be well tooled in, finished flush and smooth and area covered to cure adequately.
- .6** Surface tolerance to be ± 3 mm unless otherwise directed by Departmental Representative.
- .7** Finished Product:
 - .1 Contractor to notify Departmental Representative in advance of manufacturing of schedule so that inspection can be carried out. All processes are subject to inspection by Departmental Representative. Inspection or release of units by Departmental Representative is required prior to shipping.
 - .2 Identification indicated by embedding manufacturer's name or trademark, year of manufacture, and form number on end of each unit in manner, size and depth that will be permanently legible.
 - .3 Authorized patching or making good to be inspected by Departmental Representative before shipment or upon delivery and rejected units replaced at no cost.
- .8** Welded Steel Wire Mesh Reinforcement:
 - .1 Welded wire mesh reinforcement not to be used. Fibrillated fibre strand reinforced concrete to be used for production of barriers.
- .9** Reinforcing Steel for Bent and Hooked Connections:
 - .1 To CAN/CSA-G40.21-M, Grade 260W.
 - .2 Bending:
 - .3 Carefully bend reinforcing steel to radii detailed and install as shown on drawings.
 - .4 Inspect reinforcing steel after bending for evidence of fracture. Fractured pieces to be replaced.

- .5 Surface Treatment: Treatment of exposed surfaces not required.
- .10 Pick-up Points:
 - .1 Form with accurately placed rigid P.V.C. pipe recessed 15 mm from both finished surfaces as shown on drawings.
- .11 Drainage Slots: Cast-in as shown on drawings.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 STORAGE

- .1 Storage of Precast Concrete Barriers on site to be in single layer, for first seven days.
- .2 Stacking of three layers high, with wood blocking between lifts, permitted with Departmental Representative approval, after seven days.
- .3 Barriers to be stacked three layers high, with wood blocking between lifts, at delivery location. Cost of supply and installation of wood blocking shall be incidental to the contract and no separate payment will be made.
- .4 Haul removed barrier to Mannix Pit and place in stockpile as directed by Departmental Representative.

3.3 PREPARATION

- .1 Do grading in accordance with Section 31 23 33.01 – Excavation, Trenching and Backfill and as indicated.
- .2 Install granular base in accordance with Section 32 05 16 - Aggregate Materials and as indicated.
- .3 Asphalt paving in accordance with Section 32 12 16 and as indicated.

3.4 INSTALLATION

- .1 Precast Concrete Barriers shall be installed permanently on asphalt concrete pavement in accordance with Drawings and these Specifications.
- .2 Precast Concrete Barriers will also be installed temporarily for traffic protection as verified by the Departmental Representative. When no longer needed the barriers will be re-installed elsewhere or stored in nearest PCA Pit(s).
- .3 Contractor shall do the layout of the barriers.

3.5 FIELD QUALITY CONTROL

- .1 Contractor shall carry out all the necessary quality control to ensure barrier are supplied and installed as per these specifications.

3.6 CLEANING

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

END OF SECTION