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END OF DOCUMENT

Drawings Bound Separately.

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L-E100	EXISTING FEATURES AND REMOVALS
L-E101	LANDSCAPE PLAN
L-E400	LANDSCAPE DETAILS
L-E401	LANDSCAPE DETAILS
S-E100	STRUCTURAL NOTES
S-E101	STRUCTURAL DETAILS
Natural Bridge	
L-N100	EXISTING FEATURES AND REMOVALS PLAN 1
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L-N102	LANDSCAPE PLAN 1
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L-N402	LANDSCAPE DETAILS

END OF SECTION

1.0 GENERAL

.1 The Work covered by this Contract shall include, but shall not be limited to the furnishing of all materials, equipment, tools, machinery, supplies, temporary lighting, water, heating, transportation, labour and superintendence necessary for the construction of the work as herein specified and shown on the Drawings.

.2 The Contractor shall read and be governed by the Bid Form, Instructions to Bidders, Addenda, Consent of Surety, Bid Security, Agreement, Definitions, Supplementary General Conditions, General Conditions, General Requirements, and complete Specifications and Drawings of this Project.

.3 The complete Work under this Contract shall be governed by the dictates of good practice and shall be complete in all details of materials and methods even if not minutely specified. The Work shall be properly coordinated with the requirements of all work specified in other sections.

1.1 Scope of Work

.1 The work covered by this Contract shall include mobilization and demobilization, the furnishing of all materials, labour, equipment, tools, supplies, temporary lighting and heating, transportation, quality control, Division 1 requirements, labour and superintendence necessary for the construction of the work as herein specified and shown on the Drawings.

.2 Work under this Contract covers supply and installation of all materials and construction.

1.2 Site Scope of Work

.1 Mobilization and demobilization of all personnel, equipment, support facilities and materials, and acquiring all necessary permits and licenses required to complete the Work.

.2 Stripping and salvage topsoil material from within the project for placement on finished seeded areas.

.3 Excavating and disposing offsite of unsuitable materials.

.4 Excavating and grading all classes of materials for asphalt area expansion.

.5 Supply, load, haul, place and compact all classes of materials for construction of asphalt area.

.6 Supply, load, haul, place and compact all classes of materials for construction of granular area.

.7 Supply, load, haul, place and compact all classes of materials for construction of wooden stair.

.8 Supply and installation of site furnishings, concrete barrier, retaining wall, rails, fencing, signage and information kiosk.

.9 Construction of erosion protection.

.10 Disposal of all unusable materials, such as excess stripped topsoil and all stockpiled materials offsite or onsite pending client approval.

.11 Topsoil placement and seeding, planting at designated areas.

.12 Traffic accommodation during all construction activities.

.13 General site rehabilitation and clean-up.

1.3 Interpretation

.1 If a Contractor finds discrepancies in or omissions from the Drawings, Specifications or other documents or has any doubt as to the meaning or intent of any part thereof, the contractor shall at once inform Departmental Representative, who may send a written instruction or explanation. Every request for an interpretation shall be made in writing.

.2 Discussions at Bid briefings or other oral discussions shall not become part of the Bid Documents unless confirmed by Amendment.

1.4 Location of Work

.1 The Work is located in Yoho National Park, approximately 12 kilometres west of the Town of Field, British Columbia.

1.5 Material Supply

.1 The Contractor shall supply all new materials necessary for the construction of the work as herein specified or shown on the Drawings.

1.6 Contract Schedule and Completion

.1 Provide within five working days after Contract award, construction bar chart schedule in weekly increments showing anticipated progress stages, significant milestones, inspections by outside parties and final completion of Work within time period required by Contract and Bid documents.

.2 The Contractor shall commence the Work and proceed with diligence to perform the Work in accordance with the agreed upon schedule in sufficient time to complete the Work on or before the completion date specified in the Contract.

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

.4 Scheduling shall be in accordance with the General Conditions, Supplementary Conditions and General Requirements.

1.7 Documents Required

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

.1 Latest version of Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Reviewed shop Drawings.

.5 Change orders.

.6 Other modifications to Contract.

.7 Field test reports.

.8 Copy of latest approved Work Schedule.

.9 Manufacturers' installation and application instructions.

.10 Permits, licenses and land use regulations.

.11 Up-to-date As-Built Drawings.

1.8 Site Conditions

.1 The Contractor shall thoroughly examine the site of the work before submitting the Bid, to satisfy himself as to the local conditions and nature of work. The Contractor shall not seek nor receive any compensation for failing to thoroughly investigate the site conditions and their effect on the tendered unit rates.

.2 Prior to commencing actual construction, check field conditions to obtain actual dimensions required to ensure correct execution of the Work, and notify Departmental Representative, in writing, of all matters which could prejudice proper execution of the Work.

.3 Commencement of construction shall constitute acceptance of existing conditions and verification of dimensions.

.4 No extra charges will be allowed for Work resulting from conditions which would have been evident upon a thorough examination of the site.

1.9 Construction Layout

.1 All Work is to be laid out by the Contractor. This shall include, but not be limited to, batter boards, sight rails, stakes and marks, and bench marks as required.

1.10 Responsibility for Work

.1 Departmental Representative will not be responsible for the Contractor's means, methods, techniques, sequences or procedures of construction, or for the supervision of the Contractor's performance of this Contract, or for the Contractor's failure to perform the work in accordance with the Contract. However, if at any time Departmental Representative is of the opinion that the number of workers, pieces of equipment or quality of machinery, tools, plant and equipment or articles is insufficient to meet the schedule, he may so advise the Contractor in writing. The Contractor shall promptly make the necessary changes to ensure that the schedule is adhered to.

.2 Pursuant to the provisions of the General Conditions of the Contract, while it is intended that the Contractor shall be allowed in general to carry out the Contract in such manner that may appear to be the most desirable, Departmental Representative may with discretion direct the order in which and points at which the work shall be undertaken. This control shall be exercised in the interest of the Departmental Representative and it is intended that an agreement be reached between all parties prior to the commencement of the Contract. A schedule of work shall be drawn up for this purpose by the Contractor.

.3 Whenever in the Contract the terms "as ordered", "as directed", "as required", "as allowed" or terms of the like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper" or "satisfactory" or adjectives of the like effect or import are used to describe requirement, direction, review or judgement of Departmental Representative as to the work, it is intended that such requirement, direction, review or judgement will be solely to evaluate the work for compliance with the Contract unless there is a specific statement indicating otherwise. The use of any such term or adjective shall not be construed to indicate that Departmental Representative shall have authority to supervise or direct performance of the work.

1.11 Mobilization / Demobilization

.1 Mobilization shall include the necessary work and operation including, but not limited to, the movement of personnel, equipment, supplies and incidentals to the Work, the establishment of facilities necessary to undertake the Work and for expenses incurred for other work and operations which must be performed prior to the commencement of the Work.

.2 Demobilization shall include the dismantling and removal from the site of all of the Contractor's equipment and materials, clean-up of the site, and transportation of labour from the site.

1.12 Contractor's Use of Site

.1 Use of site: Contractor to be provided access for execution of work in accordance with General Conditions and Special Provisions, except as follows.

.1 The Contractor and stored materials shall not interfere with the Departmental Representative's access to the site for operation, maintenance and repair of existing facilities. Provide temporary access to existing facilities as may be required and move materials as requested by the Departmental Representative.

.2 At all times cooperate with the Departmental Representative.

.2 Contractor shall be responsible for site security for the duration of the Contract. Where security is reduced by work of Contract, provide temporary means to maintain security.

.3 Obtain and pay for use of additional storage or work areas as required.

1.13 Project Meetings

.1 Departmental Representative will arrange and set times for project meetings and will record and distribute minutes.

.2 The Contractor's site superintendent and representatives of the subcontractors shall attend the meetings at the request of Departmental Representative.

1.14 Permits, Licenses, Certificates and Fees

.1 Contractor shall pay for all permits, licenses, certificates and all fees required for performance of the Work in accordance with General Conditions and Supplementary Conditions.

1.15 Water Supply

.1 Supply all water necessary for the work and obtain written permission from the Departmental Representative prior to using any Park Facility.

.2 The Contractor shall be held responsible for any damage done to the Park Facility or surrounding area.

.3 Make an Agreement with the Departmental Representative for the payment of water used.

1.16 Contractor Submission Requirements

.1 A list of the documents and information to be submitted by the Contractor is presented in the table at the end of this Section. Please note that this list does not necessarily include all required submissions.

.2 Submit all information and documents by the dates indicated, unless otherwise directed by the Departmental Representative.

1.17 Haul Roads

.1 The Contractor shall be responsible for damage and/or spillage on all roads used for hauling materials and equipment to and from the site subject to Departmental Representative being satisfied such damage or spillage was a direct result of the actions of the Contractor or one of the Contractor's agents in the performance of the work required under this Contract.

.2 Upon notification by Departmental Representative that the remedial work is necessary, immediately clean and/or restore the affected areas designated by Departmental Representative.

.3 Obtain approval from the Departmental Representative prior to using any road as a haul road.

1.18 Construction Signage and Safety

.1 The Contractor shall supply and maintain, at their own expense, all barriers, fences, warning signs and other precautions to protect the workers and general public against accident or injury. All excavations or obstructions shall be clearly marked between sunset and sunrise with proper warning flares or lights. Local or Municipal bylaws governing warning flares or lights shall be strictly observed.

.2 Signage shall be erected indicating an open excavation and to adequately protect the general public against accident or injury. Signs and notices for safety and instruction shall be in both official languages.

.3 All signs, barricades, and warning devices shall meet local and/or Regional Transportation Advisory Committee (RTAC) requirements and satisfaction of Departmental Representative. The Contractor shall obtain any permits required by the Departmental Representative with respect to this work.

.4 Upon notification by Departmental Representative, the Contractor shall remove the construction sign to a location designated by Departmental Representative.

1.19 Working Hours, Night Work and Holidays

.1 The acceptable working hours for the Contractor shall be from dusk till dawn, seven (7) days a week. The Contractor is to work within daylight hours as flood lights will be prohibited.

.2 Holiday schedule: The Contractor must finish work and not impede traffic from 12 noon the Friday till after 12 noon the day after the holiday.

1.20 Remove and Dispose of Materials

.1 Materials to be removed and disposed shall be removed, hauled and disposed of at the Contractor's expense to an approved landfill outside of the National Park (and any National Park).

.2 All materials in excess of that needed for completion of the project shall be removed from site upon excavation.

.3 All the necessary approvals and/or permits shall be obtained from the Departmental Representative and any governing authority prior to dumping any material.

1.21 Emergency Situations

.1 In emergency situations, endangering life or public property, the Departmental Representative shall proceed with repairs and thereupon advise the Contractor of the failure, and resulting costs shall be paid by the Contractor.

1.22 Clearing of Site

.1 Complete all clearing of bush, levelling, etc., for the proper execution of the work under this Contract.

.2 All refuse, bush, etc., shall be disposed of in a manner satisfactory to Departmental Representative.

.3 The Contractor shall become fully aware of the conditions in the work area prior to submitting their Bid.

1.23 Traffic Accommodation

.1 Prior to construction, provide a Traffic Accommodation strategy and Work Safety Plan indicating all proposed detour routes and schedules. The plan must be approved by the governing authority and Departmental Representative prior to construction.

.2 Traffic control shall be in accordance with the provisions of the Manual of Uniform Traffic Control Devices.

.3 Supply and maintain all barriers, fences, warning signs and other precautions to protect the workers and general public against accident or injury.

.4 All excavations or obstructions shall be clearly marked between sunset and sunrise with proper warning flares or lights.

.5 Local or Municipal Bylaws governing warning flares or lights shall be strictly observed.

.6 Should any of the Contractor's work cause interference with any existing public roads or pedestrian accesses, the Contractor shall provide and maintain detour roads and shall post such signs, lights, barriers, etc., as may be required for public convenience in accordance with governing local or municipal standards.

.7 Where construction occurs within the right-of-way of Provincial Highways, provide and maintain warning and/or detour signs as required by the Departmental Representative.

.8 As construction proceeds, clean up all lanes and ditches and make them passable and useable.

1.24 Noise and Dust Control

.1 The Contractor shall be responsible for controlling objectionable dust conditions in areas of construction as a result of traffic, construction equipment, or wind.

.2 All equipment shall be equipped with suitable muffling systems.

.3 The Contractor shall be cognizant of and abide by Noise Bylaws which affect any work in the area.

1.25 Existing Fences, Trees and Buildings

.1 No trees whatsoever shall be cut down without the written permission of Departmental Representative.

.2 Trees, shrubbery, fences, poles and all other private property and surface structures shall be protected unless their removal is shown on the Drawings or authorized by Departmental Representative.

1.26 Relics and Antiquities

.1 Give immediate notice to the Departmental Representative if evidence of historical or archaeological finds are encountered during construction, and await the Departmental Representative's written instructions before proceeding with the Work in this area.

1.27 Easements

.1 This project is located in the National Park. There will be less temporary workspace due to trees immediately beyond the project site. The Contractor shall manage the construction with limited workspace.

1.28 Existing Utilities and Pipelines

.1 The Contractor shall assume full responsibility for safeguarding all existing and relocated utility installations during the progress of the Work. While the Departmental Representative has made every effort to collect and present details concerning utility installations, no responsibility will be assumed by Departmental Representative for the correctness and completeness of the information, and the

Contractor shall have no claim on that account. The existence, location, elevation, and condition of existing underground utilities or pipelines is not guaranteed, and notwithstanding any other provisions in the Contract, the Contractor shall be responsible for determining the location and elevation of all sewer, water and gas mains or lines, electric light, power or telephone conduits, or other structures or utilities or pipelines, by non-destructive means acceptable to the Departmental Representative.

.2 There will be no separate payment made for all incidental work related to utility or pipeline coordination or temporary protection or protection required during the course of the contract (including warranty period) or repair of existing services damaged in the course of the Works.

1.29 Dewatering and Drainage

.1 Keep all portions of the Work properly drained during the construction and until completion.

.2 The Contractor will be held responsible for all damage, directly resultant from their operations, which may be caused by or which may result from water backing up or overflowing through, from or along any part of the Work.

.3 The Contractor shall bear all costs related to the effective dewatering of excavations and all other pumping and drainage necessary for the proper construction of the Works, including keeping the pipes, structures and trenches free of undesirable accumulations of seepage, subsoil water, surface water or rainwater.

.4 Dispose of all water drained or pumped as above by discharging it to drainage ditches or natural water course approved by Departmental Representative, but in compliance with all Municipal, Provincial and Federal regulations, ordinances, bylaws, etc., and provide documentation indicating that authority has been granted to discharge effluent water into any drainage ditch, brook, creek or river.

.5 Keep all drainage channels and culverts free of silt, sand, debris and gravel and remove such deposits as required by Departmental Representative or any other Authority Having Jurisdiction.

.6 Accept responsibility for any actionable damage, inconvenience or interference caused by the dewatering operations to the roads, utilities, services or other improvements which may be affected by a lowering of the water table and bear all costs of repair, replacement, reinstatement or alteration of same.

1.30 Subsurface Investigation Data

.1 Geotechnical information documents is not available for the project.

1.31 As-Built Drawings

.1 The Departmental Representative will provide one (1) additional set of construction Drawings for As-Built drawing purposes after Award of Contract.

.2 Identify each Drawing as "Project As-Built Copy". Maintain Drawings in good condition and make available for inspection on site by Departmental Representative at all times.

.3 Maintain project As-Built Drawings and record accurately significant deviations from Contract documents caused by site conditions and change orders by Departmental Representative. The Contractor shall keep the "As-Built" Drawings current as the job progresses.

.4 Mark changes in red.

.5 Record following information:

.1 Field changes of dimension and detail.

.2 Changes made by Change Order or Field Instruction.

.3 Horizontal and vertical locations of all reconstructed drainage and structures.

.6 At completion of project and prior to Issuance of Completion Certificate, sign and date prints as Certification of Accuracy and submit As-Built Drawings.

1.32 Final Clean-Up

.1 At the completion of the construction work, all areas on which work has been done shall be left in a neat and presentable condition.

.2 All drainage ditches which have been blocked as a result of the work shall be repaired or restored to their original condition or better.

.3 The Contractor, at their own expense, shall dispose of all surplus excavated material, trees, brush, rock, boulders, including those less than 0.5 m^3 in volume, at a location approved by the Departmental Representative.

1.33 Backfill

.1 Backfilling of trenches or fill areas will not be permitted unless Departmental Representative is onsite. The Contractor will notify Departmental Representative 24 hours in advance of backfilling scheduled for weekends or holidays.

1.34 Surface Restoration

.1 All existing roadways, landscaping and other surface structures shall be restored. No separate payment will be made for any restoration and the costs are to be included in unit prices.

2.0 PRODUCTS

.1 Not applicable.

3.0 EXECUTION

.1 Contractor Submittal Schedule:

Specification Section	Description	Date Required
01 10 00	Copies of Permits/Licenses	Upon Departmental Representative's request
01 33 00	Material and Shop Drawing Schedule	15 days from Notice of Acceptance
01 33 00	Dust control plan	Prior to the start of construction
01 35 00.07	System of routing traffic during construction	Ten (10) days prior to undertaking any construction
01 35 30	Safety Meeting Minutes	Upon Departmental Representative's request
01 35 30	Accident Reports	Promptly after incident
01 35 30	WHMIS Data Sheets	Upon delivery of materials to site
01 35 43	Environmental Protection Plan and Parks Canada Permits	At least four (4) weeks prior to commencing work
01 77 00	Record Drawings (1 set)	At project completion/prior to final inspection
10 14 53	Signage structures indicating product data and design	At least two (2) weeks prior to commencing work
31 05 16	Submit Manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations	At least two (2) weeks prior to commencing work
32 00 02	Provide the Departmental Representative of proposed source of aggregates and provide materials certification of properties below	At least two (2) weeks prior to commencing work
32 00 03	Asphalt mix design	At least one (1) week prior to commencing work
32 12 13.16	Submit two - 1 L samples of asphalt tack coat	At least two (2) weeks prior to commencing work
32 12 13.16	Tack coat Submit summary report	Within 7 days minimum of date of application
32 17 23	Two 1 L samples of each type of paint One 1 kg sample of glass beads	At least two (2) weeks prior to commencing work
Drawing	Description	Date Required
Not used.	Not used.	Not used.

END OF SECTION

1.0 GENERAL

.1 Payments will be made on the basis of the unit prices and lump sum prices bid in the Tender. Additions and credit to the Work will be assessed based on the unit prices provided on the Bid Form.

.2 Each unit or lump sum price stated on the Bid Form shall constitute compensation as herein specified for each item of Work completed in accordance with the Drawings and Specifications.

.3 The prices bid for various items of work, unless specifically noted otherwise, shall include the supply of all labour, plant, products, material, and equipment necessary to construct the Work in accordance with the Contract Documents.

.4 The prices bid for supply and installation shall be full compensation for supplying, hauling, handling, storing, installing, cleaning, testing, and placing in service together with all other work subsidiary and incidental thereto for which separate payment is not provided elsewhere.

.5 The method of measurement of the quantities for payment and the basis for payment will be in accordance with the following items of this section. All measurement will be done using generally accepted field survey methods.

.6 Where the Tender shows separate items for supply and installation, the unit prices or lump sum prices bid for supply shall include supplying, delivering, loading, unloading and all allowances for handling, storage, breakage and waste. Payment will be made only for material actually installed in the Work. Progress Payment for supply-only items shall be made only for material and product on the worksite and in the Contractor's care, and shall then become the property of the Departmental Representative.

.7 Other materials on site, whether existing structures, vegetation, topsoil, gravel, sand or other excavated or piled materials, are the property of the Departmental Representative or of the owner of the land on which the Work is located. Only those materials specifically noted in the Contract Documents as belonging to the Contractor shall become the Contractor's property.

.8 Where there are excess excavated materials, unsuitable materials excavated or materials of any kind that are excavated but not used in the Work, such materials are not the property of the Contractor unless authorized in writing by the Departmental Representative or specified to be disposed of by the Contractor.

.9 With each progress payment claim, the Contractor and any pre-selected Supplier shall jointly certify a claim for payment for pre-ordered material used or incorporated into the Work or delivered to the site of the Work during that claim period.

.10 Upon complete performance of the Work, the Contractor shall credit the Departmental Representative for material paid for as supplied on the worksite,

but not incorporated in the Work, and remove the surplus material from the worksite.

1.2 Definitions:

.1 Unit price is price per unit of measurement for materials, equipment, services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 Applications for Progress Payment

.1 Submit to the Departmental Representative, at least 7 days before the first application for payment, a detailed cost breakdown for all parts of the Work aggregating the total amount of the Contract Price, as directed by the Departmental Representative. After approval by the Departmental Representative, the cost breakdown shall be used as the basis for progress payments.

.2 Support claims for products delivered to the place of Work, but not yet incorporated into the Work, by such evidence as the Departmental Representative may reasonably be required to establish value and delivery of products.

.3 Submit, with the application for progress payment, a letter of clearance or certificate from Workers' Compensation Board verifying that all assessments due by the Contractor have been fully paid.

.4 Submit, with the application for progress payment, a current Statutory Declaration verifying that all Subcontractors, Suppliers, labour and accounts for services, materials, machinery and equipment, and any other indebtedness, which may have been incurred by the Contractor, directly or indirectly, in the performance of the Work have been fully paid by the Contractor except of unpaid holdbacks on such subcontracts and that no lien has been filed against the Contractor, the Project, the premises or any materials supplied to or incorporated into the Work or in respect of anything done under or by virtue of the Contract.

.1 A Statutory Declaration shall be submitted for the second and all subsequent payment applications.

.2 If only one payment application is made for the Work, the Statutory Declaration is to be submitted with the first payment application.

1.4 Progress Payment

.1 The Departmental Representative will issue, no later than 10 days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as the Departmental Representative determines to be due. If the Departmental Representative amends the application, Departmental Representative will give notification in writing giving reasons for amendment.

1.5 Substantial Performance of Work

.1 Contractor shall prepare and submit to the Departmental Representative a comprehensive list of items to be completed or corrected and apply for a review by the Departmental Representative to establish Substantial Performance of Work (or Substantial Performance of designated portion of Work) when Work is substantially performed as permitted by lien legislation applicable to the Place of Work. Failure to include items on list does not alter responsibility to complete Contract.

.2 No later than 10 days after receipt of list and application, the Departmental Representative will review Work to verify validity of application and will notify Contractor if Work (or designated portion of Work) is substantially performed.

.3 When Work is determined to be Substantially Completed by the Departmental Representative, the Departmental Representative shall issue a certificate of Substantial Performance.

.4 Immediately following issuance of certificate of Substantial Performance of Work, Contractor shall establish a reasonable date for finishing Work, in consultation with Departmental Representative.

1.6 Payment of Holdback Upon Substantial Performance of Work

.1 Upon issuance of certificate of Substantial Performance of Work:

.1 Submit application for payment of holdback amount.

.2 Submit sworn statement that accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtness which may have been incurred in Substantial Performance of Work and for which Parks Canada might be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.

.2 After receipt of application for payment and sworn statement, the Departmental Representative will issue certificate for payment of holdback amount.

1.7 Final Payment

.1 Submit application for final payment when Work is completed.

.2 The Departmental Representative shall, no later than 10 days after receipt of application for final payment, review Work to verify validity of application. The Departmental Representative will give notification that application is valid or give reasons why it is not valid, no later than 7 days after reviewing Work.

.3 The Departmental Representative will issue final certificate for payment when application for final payment is found valid.

2.0 PAYMENT CLAUSES

2.1 Schedule

.1 Payments will be made on the basis of the unit prices and lump sum prices bid in the Tender on the Bid Form.

.1 Unit rates will be paid on a unit rate basis following the term in which the work is completed and as approved by the Departmental Representative.

.2 Lump sum items will be paid 100%, unless specifically noted otherwise, following the term in which the work was completed and as approved by the Departmental Representative.

2.2 Mobilization and Demobilization

.1 Mobilization and demobilization shall include the Contractor's costs of mobilization at the beginning of the project; and the costs of demobilization at the end of the project.

.2 Included in mobilization are such items as bonding, insurance, permits, moving personnel, safety, erosion and sediment control, materials and equipment to the site, setting up temporary facilities, project signage and all preparation for performing the Work.

.3 Included in demobilization are preparation and submission of operation and maintenance manuals, removal of all personnel, materials and equipment; and cleanup of the site and the Work.

.4 The lump sum price bid for this work shall be relative to the costs involved but shall not exceed ten percent of the Tender Price.

.5 Payment will be made as follows, as approved by the Departmental Representative:

.1 50% of the lump sum bid will be included in the first progress payment certificate;

.2 50% of the lump sum bid will be included in the final progress payment certificate.

2.3 Site Works

.1 Payments will be made on the basis of the unit prices and lump sum prices bid in the Tender on the Bid Form.

.2 Selective site demolition includes the supply of all labour, material, and equipment for demolition, removal or reinstallation of all materials within the areas identified on the Drawings or as required. Selective site demolition will be measured and paid for per item demolished and removed or reinstalled as per the Drawings and the Bid Form. Payment for selective site demolition is unit rates

or lump sum price per item. Payment shall be full compensation for all labour, material, equipment, and incidentals. All other miscellaneous items not stated the Drawings and the Bid Form, the cost for selective site demolition is to be included in Lump Sum for Mobilization and Demobilization.

.3 Asphalt paving removal includes the supply of all labour, material, and equipment for asphalt paving removal within the areas identified on the Drawings or as required. Asphalt paving removal will be measured in sq.m. Payment for asphalt paving removal is unit rate per sq.m.

.4 Concrete formwork and falsework will be considered incidental to site furniture, barriers and signage. No additional payment will be made for concrete formwork and falsework.

.5 Concrete reinforcing and falsework will be considered incidental to site furniture, barriers and signage. No additional payment will be made for concrete reinforcing.

.6 Concrete accessories will be considered incidental to site furniture, barriers and signage. No additional payment will be made for concrete accessories.

.7 Cast-in-place concrete will be considered incidental to site furniture, barriers and signage. No additional payment will be made for cast-in-place concrete.

.8 Metal fabrications will be considered incidental to site furniture, barriers and signage. No additional payment will be made for metal fabrications.

.9 Rough carpentry will be considered incidental to site furniture, stair, and signage. No additional payment will be made for rough carpentry.

.10 Wood decking will be considered incidental to site furniture, stair and signage. No additional payment will be made for wood decking.

.11 Joint sealants will be considered incidental to site furniture, stair and signage. No additional payment will be made for joint sealants.

.12 Painting will be considered incidental to site furniture, stair and signage. No additional payment will be made for painting. Painting of the privy will be measured in each unit completed in accordance with the Drawings and Specifications.

.13 Signage will be measured and paid for per sign supplied and installed as per the drawings and specifications. Payment shall be full compensation for all labour, material, equipment, and incidentals required for the supply and installation of all signage including sign panels (unless otherwise noted), posts, and mounting hardware.

.14 Aggregate materials will be considered incidental to surface works. No additional payment will be made for aggregate materials.

.15 Clearing and grubbing includes the supply of all labour, material, and equipment for clearing and grubbing all materials within the areas identified on the Drawings or as required. All clearing and grubbing shall be removed and disposed of outside of Yoho National Park (and any National Park). The cost for selective clearing and grubbing is incidental to the surface work as shown on the Drawings.

.16 Stripping of topsoil and subsoil to on-site stockpile as directed by Departmental Representative. The work includes supply of all labour, material and equipment to strip areas.

.1 Staking the areas to be stripped.

.2 Stripping of topsoil to a full depth to remove all organic materials. Striping of subsoil to a full depth.

.3 Stockpiling topsoil at on-site topsoil stockpile.

.4 Stockpiling subsoil at on-site subsoil stockpile.

.5 Loading, unloading, hauling, grading, levelling, dust control and cleanup.

.6 Maintaining the stockpiles.

Measurement and payment for soil stripping and stockpiling is incidental to the surface work.

.17 Site grading will be considered incidental to surface works. No additional payment will be made for site grading.

.18 Erosion and sedimentation control silt fence measurement and payment will be supply and erection of silt fence in metres erected. Other temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways will be incidental to mobilization and demobilization.

.19 Geotextile filter fabric is incidental to the larger work item for which they are performed.

.20 Subgrade preparation includes all labour, material, equipment, testing, proof rolling as requested, and incidentals required to complete the work. No payment will be made for additional preparation, conditioning or re-working as a result of weather conditions. Construction, maintenance and rehabilitation (including topsoil removal/replacement and any grubbing and clearing) of the Contractor's laydown area are incidental to the work. Measurement and payment for subgrade preparation is incidental to the surface work. Where excavated material is not specifically directed to be used as fill or for any other purpose, the Contractor will be required to haul the material from site to an approved disposal site. There is no separate payment for this work and is considered included in the surface work unit payment.

.21 Measurement and payment of granular base course is considered incidental to the surface work. The work will include processing, hauling, preparing the surface, placing the material, compaction, and testing. Separate payment will not be made for any material required to repair failures which occur in the granular base course.

.22 The unit prices for the asphalt will be full compensation for all labour, material, testing, tools and equipment and incidentals necessary to complete the Work in accordance with these specifications. Asphalt concrete pavement will be measured in square metres for the full length and width as constructed at the specified depth indicated. Payment shall be compensation in full for furnishing, mixing, transporting, placing and rolling, provision of a sieve analysis and asphalt concrete mix design and for all other labour and materials required to complete the work. Payment for asphalt pavement shall be subject to the penalties outlined in Section 3, Section 4 and Section 5 for deficient pavement.

.23 Asphalt tack coat will be considered incidental to asphalt costs. No additional payment will be made for asphalt tack.

.24 Asphalt prime will be considered incidental to asphalt costs. No additional payment will be made for asphalt prime.

.25 The unit price for the gravel surfacing shall constitute full compensation for the Work required, including but not limited to the required excavation, subgrade preparation, compaction, supply and installation of gravel, and disposal of excavated materials as indicated on the Drawings and in the Specifications. Payment shall be measured in square metres for the full length and width as constructed at the specified depth indicated.

.26 Post and rail fence measurement and payment will be supply and erection of post and rail fence in metres erected.

.27 The unit price for the site furnishings shall constitute full compensation for the Work required, including but not limited to the required excavation, subgrade preparation, compaction, concrete slab on grade construction, and installation of the site furniture as indicated on the Drawings and in the Specifications. Excavated materials to be removed from site and properly disposed of outside of Yoho National Park (and any National Park), unless otherwise directed by Departmental Representative.

.28 Topsoil placement includes supply of all labour, material and equipment required to place the subsoil and topsoil, in accordance with the requirements of the Specifications and Drawings. Work includes:

.1 Screening the topsoil and subsoil to remove roots, grass, weeds, and foreign objects.

.2 Loading, unloading, hauling, grading, levelling, dust control of subsoil and topsoil from onsite stockpile and clean-up.

.3 Placing topsoil. Re-spreading of existing topsoil to original thickness of topsoil removed and re-seeding.

Overhaul, over excavation and erosion and sediment control measures are considered incidental and no separate payment will be made. Measurement and payment for topsoil placement is incidental to the restoration, seeding and planting.

.29 Seeding includes supply of all labour, materials and products to install seed. Areas to be seeded shall include any disturbed or exposed earth surfaces within the limits of construction. Seeding will be measured in sq.m for all areas where topsoil has been placed. Payment for seeding shall be full compensation as per unit rate per sq.m for everything required to place the seed in accordance with the requirements of the Specifications and Drawings, and includes maintenance until Final Acceptance.

.30 Trees, shrubs and ground covers shall be considered full compensation for all materials, labour and equipment required for the supply and planting of shrubs, including: procurement, loading, hauling, handling, safeguarding, transporting, excavation, planting, backfilling, compacting, watering, staking, associated clean up and all items incidental to complete the work. Payment will be made for each shrub correctly planted.

.31 SEDIMAX-FR filtration rolls measurement and payment will be supply and installation of SEDIMAX-FR filtration rolls in metres installed.

.32 Measurement for the supply and installation of for concrete barriers will be per individual unit supplied and installed as per the drawings and specifications. Payment made will be full compensation for supply of all labour, materials and equipment necessary to supply and install all concrete barrier materials including end treatments, reflectors and guide post delineators, to the satisfaction of the Departmental Representative.

.33 The unit price for boulder placement shall constitute full compensation for the Work required. The boulders shall be provided on site but loaded, hauled and placed elsewhere on site as specified or directed by the Departmental Representative. Payment shall be made based on number of boulders placed. The boulders for the retaining wall shall be supplied and installed as directed by the Departmental Representative. Payment shall be made based on as a lump sum for the retaining wall boulders.

.34 The unit price for stair landing shall constitute full compensation for the Work required. Payment shall be made per landing installed.

.35 The maintenance and warranty period on landscaped areas shall constitute full compensation for the Work required, based on a period of one year commencing at the end of Work. The cost for selective site demolition is to be included in Lump Sum for Mobilization and Demobilization

END OF SECTION

1.0 GENERAL

1.1 Departmental Representative to Administer

.1 Departmental Representative will schedule and administer preconstruction meeting and progress meetings as required.

.2 Departmental Representative will:

.1 Prepare agenda for meetings.

.2 Make arrangements for meeting locations.

.3 Preside at meetings.

.4 Record meeting minutes, identifying significant proceedings and decisions, and noting action by the parties.

.5 Reproduce and distribute copies of the minutes to participants and affected parties not in attendance.

.3 Contractor's superintendent and senior representatives of major Subcontractors, to attend all meetings.

.4 Representatives of Contractor, Subcontractor and suppliers attending meetings shall be qualified and authorized to act on behalf of the party each represents.

1.2 Preconstruction Meeting

.1 Within 5 days after award of Contract, Departmental Representative will arrange a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Senior representatives of Departmental Representative and major Subcontractors will be in attendance.

.3 Agenda to include the following:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work and progress scheduling.

.3 Requirements for temporary facilities.

.4 Site security.

.5 Contemplated changes, change procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.

.6 Force account work procedures.

.7 Record drawings.

.8 Acceptance and warranties.

.9 Monthly progress claims, administrative procedures, photographs and holdbacks.

.10 Insurances.

.11 Safety Program.

1.3 Progress Meetings

.1 Progress meetings will be held at least once a month, up to and including start-up and commissioning.

.2 Contractor, major Subcontractors involved in Work, and Departmental Representative are to be in attendance.

.3 Agenda to include the following:

.1 Review and approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revisions to construction schedule.

.8 Progress, schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review of pending and proposed changes for effect on construction schedule and on completion date.

.12 Safety issues.

.13 Environmental Issues (including, but not limited to a summary of locations where temporary erosion and sedimentation control measures are in place and success of measures.

.14 Issues.

.15 Other business.

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTION

.1 Not used.

END OF SECTION

1.0 GENERAL

1.1 Requirements Included

.1 Construction schedule.

.2 Shop drawings and product data.

.3 Samples.

.4 As-Built drawings and all pertaining reports.

.5 Certificates.

1.2 Administrative

.1 Provide submittals to Departmental Representative for review with reasonable promptness and in an orderly sequence so as to not cause delay in the Work. Departmental Representative shall be provided with a minimum of 14 days to review submittals. 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 At Departmental Representative's request, prepare and submit schedule fixing dates for submission and return of shop drawings, product data or samples.

.3 Work affected by the submittal shall not proceed until review is complete.

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

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

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

.7 Keep one reviewed copy of each submission on Site.

.8 Contractor shall submit a dust control plan for the transport of materials to and from the construction site. The plan shall be submitted prior to the start of construction.

.9 If the Departmental Representative deems the dust control measures undertaken to be inadequate, he/she retains the right to instruct the Contractor to undertake appropriate dust control measures. The cost of such measures will be billed to the Contractor.

1.3 Construction Schedule

.1 Refer to Section 01 10 00 - General Instructions.

1.4 Samples

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples as to origin and intended use in the Work.

.2 Deliver samples prepaid to Departmental Representative's business address.

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

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

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

1.5 As-Built Drawings

.1 Submit record As-Built drawings to Departmental Representative, per Section 01 77 00, upon completion of Work and prior to final inspection.

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTION

.1 Not used.

END OF SECTION

1.0 GENERAL

1.1 Reference Standard

.1 Traffic regulations to be in accordance with Departmental Representative requirements.

1.2 Protection of Public Traffic

.1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out work or haul materials or equipment.

.2 When working on travelled way:

.1 Place equipment in position to present minimum interference and hazard to travelling public.

.2 Keep equipment units as close together as working conditions will permit and preferably on the same side of travelled way.

.3 Do not leave equipment on travelled way overnight.

.3 Do not close any lanes or any road without approval of Departmental Representative. Before re-routing traffic, erect suitable signs and devices in accordance with a manner acceptable to the Departmental Representative. Provide sufficient crushed gravel to ensure a smooth riding surface during work.

.4 Load trucks in a manner that will prevent spillage and tracking of soil or debris on roadways. Clean up immediately to the satisfaction of the Departmental Representative if spillage or tracking does occur. Clean haul routes as directed by the Departmental Representative. Failure to clean up haul routes may result in the Departmental Representative crews doing the cleaning without notice to the Contractor and the costs will be deducted from moneys due to the Contractor.

1.3 Informational and Warning Devices

.1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from project work which may require road user response. Signs and notices for safety and instruction shall be in both official languages.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in Part D, Temporary Conditions, of manual titled the Manual of Uniform Traffic Control Devices for Canada.

.3 Place signs and other devices in locations recommended in said manual.

.4 Meet with Departmental Representative prior to commencement of work to prepare list of signs and other devices required for project.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

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

1.4 Control of Public Traffic

.1 Ten (10) days prior to undertaking any construction, the Contractor shall submit in writing, the intended system of routing traffic during construction, to the Departmental Representative. The Contractor's system of routing traffic will be reviewed by the Departmental Representative with the Contractor and any modifications requested, at any time, by the Departmental Representative, shall be immediately implemented.

.1 Restricted Activity on Roads

.1 Lane closure in Yoho National Park is not permitted without Departmental Representative consent.

.2 Prior to closing any lanes the contractor is to provide an alternate access with approval of the Departmental Representative. For all closures the Contractor is to obtain lane closure permits prior to closing.

.3 The Contractor is to maintain one lane of traffic in a single direction at all times during underground utility construction. Contractor to use box trench construction method to minimize work zone area influence and to minimize traffic disruption.

.4 Traffic signs shall be erected and maintained to ensure safety of workers and public as required in Section 1.3.

.2 The desire for this project is to minimize disruption to traffic (both public and service vehicles) to the greatest extent possible. Lane closures should be limited to those sections being actively worked on and should re-open to public traffic as soon as possible.

.3 Provide competent flag persons, properly equipped as specified in the Manual of Uniform Traffic Control Devices for Canada, in following situations:

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

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

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

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

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

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

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTION

.1 Not used.

END OF SECTION

1.0 GENERAL

1.1 Occupational Health and Safety Act

.1 The Prime Contractor is responsible to ensure that all contractors working on the worksite comply with the Occupational Health & Safety Act and applicable regulations.

.2 The Contractor shall comply and ensure that all the Subcontractors comply with all applicable legislation. The Contractor shall enforce all the applicable safety rules and regulations to all individuals who will be on the site.

.3 The following is a list of safety information to assist the Contractor in familiarizing with the Occupational Health & Safety Requirements. The Contractor warrants that the Contractor shall comply with all requirements of the Occupational Health & Safety Act as well as the relevant legislation in conducting work under this Contract.

1.2 Supervision:

.1 The Contractor shall advise the Departmental Representative in writing of the person or persons who will ensure compliance with applicable safety legislation. This list should include the site superintendent plus as many representatives as the Contractor determines are required to ensure appropriate supervision and the subsequent safe performance of all jobs on the site. Provision should be made to include twenty-four (24) hour emergency telephone number(s) on this list.

1.3 Competent Workers:

.1 The Contractor shall ensure that workers on the site be adequately qualified and sufficiently experienced to perform work in a safe manner. Those workers who do not meet these criteria shall be supervised by someone who is competent. The Contractor shall provide or arrange for the necessary training to ensure sufficient workers on site are competent.

1.4 Audit/Inspections:

.1 The Contractor shall conduct frequent inspections to ensure compliance with legislation. Any unsafe conditions or work practice observed shall be corrected as soon as possible. In the event of an imminent danger situation, Section 27 of the Occupational Health and Safety Act shall be followed. All reports provided by outside agencies (i.e. British Columbia Government Health & Safety, etc.) shall be copied and a copy provided to the Departmental Representative within twenty-four (24) hours following the inspection.

1.5 Reporting Procedures:

.1 All serious or potentially serious accidents or incidents as specified in the current Designation of Serious Injury and Accident regulation shall be reported as prescribed by Section 13 of the Occupational Health & Safety Act. Following this, the Departmental Representative shall be notified and a copy of the investigation

report is to be provided as soon as practicable. Severe action including fines may be imposed by the provision authorities should a Contractor be found guilty of failure to report an accident or having disturbed the scene of an accident prior to an investigation.

1.6 First Aid and Emergency Planning:

.1 Each Contractor shall provide first aid services, equipment and supplies in accordance with the current First Aid Regulation. The Contractor shall establish an overall emergency plan (routes, equipment, emergency contracts, etc.) and inform all the workers on the worksite of the contents of the plan. If the worksite has an existing emergency plan, the Contractor shall familiarize all the workers under their control of the contents of the plan.

1.7 Codes of Practice:

.1 The Contractor shall post at all worksites, codes of practice for confined space entry, respiratory protective equipment, designated chemicals, and others as required under the Occupational Health & Safety Legislation. Each code of practice must reflect the specific operation conduct at that particular site.

1.8 Chemical Hazards:

.1 The Contractor shall ensure that all controlled products present at the worksite are stored, used and handled in accordance with Part 2 of the Chemical Hazards Regulations.

.1 Material Safety Data Sheets:

.1 The Contractor shall have all Material Safety Data Sheets accessible to all workers at the worksite for controlled products present at the worksite. The Contractor shall provide copies of the Material Safety Data Sheets to the Departmental Representative upon request.

.2 Labels:

.1 The Contractor shall ensure that all controlled products present at the worksite are identified with either supplier or worksite labels.

.3 Education:

.1 The Contractor shall ensure all workers are instructed in accordance with Sections 17 and 18, Part 1, of the Chemical Hazards Regulation.

1.9 Personal Protective Equipment:

.1 The Contractor shall ensure that workers use appropriate personal protective equipment and are trained in its use and care in order to control or minimize hazards that cannot be controlled by engineering or administrative practices.

1.10 Safety Meetings:

.1 A meeting shall be held prior to the commencement of work for the purpose of review and clarification of safety procedures.

1.11 Safety Committees:

.1 The Contractor may be required to establish worksite committees acceptable to the Departmental Representative for the purpose of discussing safety relates issues.

1.12 Worksite Classification/Procedure Development:

.1 The Contractor shall develop procedures for demolition, hot work, explosives; work over water, ground thawing, pesticide application, radioactive material, lasers, electrical or substance isolation (blanking, lockouts), carcinogenic material, and other hazards as required for the Work. These procedures shall be made available upon request. The Contractor shall ensure that these procedures outline safe work practices that will address health and safety concerns and the workers on the site and exposed or potentially exposed to these hazards shall be familiar with and follow the safe work practices prescribed.

1.13 Maintenance and Repair:

.1 The Contractor shall ensure that all equipment used on the worksite is maintained in such condition that it will not compromise the health and safety of workers.

1.14 Housekeeping:

.1 The Contractor shall ensure that the worksite is kept clean and free from hazards that may endanger workers or restrict safe access or egress.

1.15 Illumination:

.1 The Contractor shall ensure illumination at the worksite is sufficient to enable work to be done safely. Refer to the current CSA standard for guidance.

1.16 Powered Mobile Equipment:

.1 The Contractor shall ensure that powered mobile equipment meets the requirements of pertinent legislation. Personnel shall not be transported in a vehicle unless adequate seating is provided. Equipment fitted with roll over protective structures shall be equipped with seat belts and the seat belts shall be

worn when the equipment is operated. Equipment requiring back-up alarms shall have the alarms maintained in good working order.

1.17 Traffic Hazards:

.1 The Contractor shall ensure that appropriate measures are taken to protect workers from the hazards created by traffic including the provision and wearing of safety vests where required.

1.18 Hoisting and Rigging:

.1 The Contractor shall ensure that all aspects of hoisting and rigging comply with applicable legislation. Only competent workers shall operate hoists, act as signaller, or perform rigging. The Contractor shall designate workers who will operate hoisting equipment or act as signaller for hoisting work. Log books for cranes and hoist shall be provided and maintained as required. Approved rigging shall be of sufficient strength, inspected thoroughly at the beginning of each shift and used in a safe manner.

1.19 Movement of Equipment and Material:

.1 The Contractor shall ensure that loads and materials are secured against unintentional movement that could adversely affect the safety of workers. Chemical substances regulated by the Transportation of Dangerous Goods regulation shall be handled in accordance with that regulation. The Contractor shall ensure workers are aware of the hazards associated with working around moving equipment and that appropriate measures are taken to protect the workers from injury.

1.20 Fall Protection:

.1 The Contractor shall ensure that fall protection (i.e. guard rail, safety harnesses, fall arresting device) is provided and used when workers would fall greater than 3.0 metres from a temporary work area or 1.2 metres from a permanent work area.

.2 Openings that create a falling hazard must have a temporary cover with warning signs or guard rails and toes boards installed by the Contractor. Similarly, where open trench work is adjacent to a frequently used public thoroughfare, guard rails shall be erected and maintained.

1.21 Ladders and Scaffold:

.1 The Contractor shall ensure that ladders which meet the requirements of applicable legislation are provided when no other safe means of access or egress between levels is present. The Contractor shall ensure that a scaffold will be designed to support four (4) times the load it will carry and that the erection, maintenance, and dismantling is performed by a competent worker. Scaffolds shall be anchored at least every 4.6 metres vertically and 6.4 metres horizontally.

.2 Scaffold planks shall be at least grade one 51 millimetres x 254 millimetres lumber that is inspected and load tested before installation at which time they should be secured to prevent movements. Free standing or rolling scaffolds shall be erected with a minimum of 3 to 1 height to base ratio.

1.22 Excavations and Trenches:

.1 The Contractor shall ensure that workers are protected from cave-ins by cutting back the walls or by installing temporary protective structures in trenches and excavations depending upon the nature of soil and the depth. Cut-backs in hard and compact solid (requiring use of rippers and heavy machinery) must be cut-back to not less than 30°. Other soils to not less than 45°. Typical utility shall NOT be considered hard and compact in native material unless stipulated by the Departmental Representative. The temporary protective structures shall be installed as outlined in the applicable legislation or as specified in plan designed and certified by a Professional Engineer and made available at the job site. Any additional loads (equipment, buildings, etc.) that may be imposed on the trench or excavations walls shall be taken into account when protecting workers from cave-ins.

.2 Installation and removal of temporary protective structures shall be done in a safe manner. Workers shall install cross braces while on a ladder starting from the top and working down. Removal shall again be from a ladder starting from the bottom and working upward.

1.23 Underground and Overhead Utilities:

.1 The Contractor shall ensure that all underground utilities are located and procedures outlined in the Pipeline Act, Electrical Utilities Regulations, and other applicable legislation are followed. The Contractor shall ensure that workers are made aware of the location of overhead utilities, the dangers of contacting these utilities are communicated to all workers and the safe limits of approach as outlined in the legislation are maintained for workers and equipment.

1.24 Hand and Power Tools:

.1 The Contractor shall ensure that power and hand tools are properly maintained and that they are used in accordance with good industrial practices. Tools that are particularly hazardous, such as explosive actuated fastened tools, shall be operated only by workers who have received specific instruction on the safe use, limitations and maintenance of that tool.

1.25 Compressed Gases:

.1 The Contractor shall ensure that compressed gases are transported, used and stored in accordance with the manufacture's specifications. Cylinders shall have their contents clearly labelled (WHMIS) and the cylinders shall be secured to prevent being dislodged or damaged by equipment or moving materials.

1.26 Smoking:

.1 The Contractor shall inform their workers of any smoking restrictions that may be in place on the worksite and ensure these restrictions are followed.

1.27 Sanitary Facilities:

.1 The Contractor shall ensure that sanitary facilities shall be provided in accordance with applicable legislation. The provision of additional washing facilities (i.e. showers) may be required in accordance with the hazards associated with the materials on the worksite.

1.28 Hazardous Wastes:

.1 The Contractor shall ensure that all hazardous wastes generated at the worksite are removed, transported and disposed of in accordance with applicable legislation. A copy of the necessary documentation (i.e. Hazardous Waste Manifest) must be supplied to the Departmental Representative upon request.

1.29 Fire Protection:

.1 The Contractor shall ensure that an adequate number of the appropriate types and size of fire extinguishers are provided and maintained in accordance with applicable legislation. The fire extinguishers shall be clearly visible and readily accessible and the workers shall be trained in the use of the fire extinguishers provided.

1.30 Use and Storage of Flammable Substance:

.1 The Contractor shall ensure that the hazards associated with the use of any flammable substance are clearly evaluated and procedures put in place to ensure the safety of workers, materials and equipment at the worksite. Flammables shall be stored in approved containers and rags contaminated with flammable substance shall be stored in suitable metal containers with adequate covers.

1.31 Site Security/Public Safety:

.1 The Contractor shall ensure that access or movement at or adjacent to the worksite does not present hazards.

.2 This may involve the use of fencing, barricading, lighting, signing, hoarding, locked covers over openings, workers on watch, "authorized entry only" provision, or other means as appropriate. The Contractor shall ensure that authorized personnel have access to the site.

.3 The Departmental Representative may request the Contractor to institute a means of identifying authorized workers on the site to assist in site security. Adverse weather conditions may require an increased awareness of public security and safety.

1.32 Key Control:

.1 The Contractor shall adhere to any key control system established by the Departmental Representative to protect the worksite.

1.33 Worker's Compensations Board:

.1 The Contractor and the Subcontractors shall have accounts in good standing with the Workers' Compensation Board. Proof of current account status shall be provided upon request.

1.34 Demolition:

.1 The Contractor shall ensure that before demolition work commences, a meeting will be held on site with the Contractor, the Departmental Representative, and other interested parties to discuss the coordination, scheduling, safety, and all other aspects of the work.

1.35 Asbestos:

.1 The Contractor shall ensure that when work requires the removal of asbestos material, procedures shall be developed and are site specific. Work to be executed by certified abatement personnel only.

1.36 Manhole and Vault Covers:

.1 The Contractor shall ensure that when work requires the temporary removal of a manhole or vault lid, the manhole or vault lid is not left open while unattended. The manhole or vault shall be adequately protected and covered if it becomes necessary to leave it unattended without its lid in place.

END OF SECTION

1.0 GENERAL

1.1 Action and Informational Submittals

.1 The Contractor shall submit an Environmental Protection Plan (EPP) written by an approved Qualified Environmental Professional (QEP). Work can not start until Parks Canada has approved the EPP.

1.2 Fires

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

1.3 Disposal of Wastes

.1 Do not bury rubbish and waste materials on site.

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

.3 Remove from site wastes and materials specified or designated by the Departmental Representative to be disposed of. Arrange for disposal sites.

1.4 Drainage

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

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

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

.4 Maintain existing drainage facilities affected by the Work in good operating condition at all times during construction.

1.5 Site Clearing and Plant Protection

.1 Protect trees and plants on site.

.2 Wrap trees and shrubs adjacent to construction work, storage areas and trucking lanes in burlap, and encase with protective wood framework from grade level to height of 2 m.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

1.6 Pollution Control

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

.2 Control emissions from equipment to local authority's emission requirements.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.4 Provide dust control during all truck transport activities.

.5 Address releases of harmful and/or hazardous substances as required by the Environmental Act, Water Act or any other applicable legislation or municipal bylaw.

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTION

.1 Not used.

END OF SECTION

1.0 GENERAL

1.1 Requirements Included

.1 Not used.

1.2 Compliance with Regulations

.1 Ascertain requirements and regulations of local authorities (gas/power/telephone service providers, Federal authorities, British Columbia Environmental Protection, etc.).

.2 Comply with all such requirements and regulations as applicable to the Work.

.3 Requirements set out in this Section are for guidance and information and are not necessarily complete.

1.3 Permits

.1 Obtain all construction permits necessary for the Works.

END OF SECTION

1.0 GENERAL

1.1 Symbols on Drawings

.1 Refer to Drawings for explanation of symbols.

1.2 Abbreviations

.1 Symbol or Abbreviation

A	ampere
AB	anchor bolt
ABS	acrylonite butadiene styrene (plastics)
AC	alternating current
Ac	asbestos cement (pipe)
AFC	automatic frequency control
AF	audio frequency
A h	ampere hour
Al	aluminum
AM	amplitude modulation
AUX	auxiliary
AVG	average
AWG	American wire gauge
BBL	barrel
BLDG	building
BM	bench mark
BPD	barrels per day
BRKR	breaker
BSMT	basement
Btu	British thermal unit
BWV	backwater valve
CB	catch basin
cc	cubic centimetre
CCRED	concentric reducer
Cd	Cadmium
CDN	Canadian
CDT	conduit
CHC	continuous high chair
CI	cast iron
CIP	cast iron pipe
CJ	construction joint
℄	centreline
CL	clearance
cm	centimetre
CMP	corrugated metal pipe
Cr	chrome
CSG	casing
CSK	countersink
CTR	centre
Cu	copper
cu	cubic
CULV	culvert
CV	control valve
CW	cold water
dB	decibel
DBL	double
DC	direct current
DIA	diameter
DIM	dimension
DL	deadload
DWG	drawing
DWV	drain waste vent (plastics)
ECCRED	eccentric reducer
EHV	extra high voltage
EJCTR	ejector
ELB	elbow
EMT	electrical metallic tubing
EP	epoxy (plastics)
EPDM	ethylene propylene dienemonomer (plastics)
EQ	equal
ESP	external static pressure

FBM	board foot (foot, board measure)
F/C	flanged by compression
FDN	foundation
Fe	iron
FF	flat-face
FLTR	filter
FM	frequency modulation
FS	forged steel
FSD	flat side down
FSL	full surface level
FSU	flat side up
ft	foot
ft/min	foot per minute
ft/s	foot per second
g	gram
g/m^2	grams per square metre
GA	gauge
GALV	galvanized
GRD	electrical ground
ha	hectare
HC	high chair
HDW	hardware
HF	high frequency
HGR	hanger
HORIZ	horizontal
hp	horsepower
HP	high pressure
hr	hour
HV	high voltage
HW	hot water
HYD	hydrant
Hz	hertz
ID	inside diameter
ig	imperial gallons
igpm	imperial gallons per minute
ig/s	imperial gallons per second
imp	imperial
INV	invert
IP	iron pipe
kg	kilogram
km	kilometre
km/h	kilometres per hour
kN	kilonewtons
kPa	kilopascals
kV	kilovolt
kVA	kilovolt ampere
kW	kilowatt
kW/h	kilowatt per hour
L	litre
lb	pound
LIN	linear
LL	liveload
lm	lumen
LP	low pressure
Lpm	litres per minute
Lps	litres per second
LR	long radius
lx	illuminance
m	metre
mA	milliamperes
MAX	maximum
m^3/d	cubic metres per day
mg	milligram
mg/L	milligrams per litre
MH	manhole
migd	million imperial gallons per day
MIN	minimum
MJ	megajoules
mm	millimetre
MPa	megapascals
m/s	metres per second
MTG	mounting
MW	megawatt
N	newton
NIC	not-in-contract
NPT	National pipe thread
NTS	not-to-scale

oc	on-centre
OD	outside diameter
Pa	pascal
PE	polyethylene
pH	hydrogen-ion concentration
PI	point-of-intersection
ppb	parts per billion
ppm	parts per million
Pt	platinum
PVC	polyvinyl chloride (plastics)
R	radius
RED	reducer or reducing
RF	raised-face
REINF	reinforce(d)
REQ	required
RGE	range
RO	rough opening
rpm	revolutions per minute
RR	railroad
RW	raw water
R/W	right-of-way
RWL	rainwater leader
SAN	sanitary (sewer)
SCH	schedule
SPEC	specification
sq	square
sq.m.	square meter
SR	short radius
STA	station
STD	standard
SW	switch
t	tonnes
TDH	total differential head
TLLD	total load
TWP	township
TYP	typical
UGRD	underground
UHF	ultra high frequency
US	American
UV	ultraviolet
V	volt
VCT	vitrified clay tile
VERT	vertical
VHF	very high frequency
W	watt
WCB	water curb box
WOG	water, oil and gas
yd	yard
°C	degree Celsius
°F	degree Fahrenheit
Φm	micrometre

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTION

.1 Not used.

END OF SECTION

1.0 GENERAL

1.1 Latest Editions

.1 All references to specifications, standards, or methods of technical associations refer to the latest adopted revision, including all amendments, in effect on the date of submission of bids, except where a date or issue is specifically noted.

1.2 Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFBMA	Antifriction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AISC	American Institute of Steel Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ARI	Air-Conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWMAC	Architectural Woodworkers Manufacturers Association of Canada
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
CAN	Canadian National Standard
CBM	Certified Ballast Manufacturers
CBTIC	Clay Brick and Tile Institute of Canada
CEC	Canadian Electrical Code
CEMA	Canadian Electrical Manufacturers Association
CGA	Canadian Gas Association
CGRA	Canadian Good Roads Association
CGSB	Canadian General Standards Board
CISC	Canadian Institute of Steel Construction
CITC	Canadian Institute of Timber Construction
CLA	Canadian Lumbermen Association
CMAA	Crane Manufacturers Association of America
CMHC	Canada Mortgage and Housing Corporation
CPCA	Canadian Painting Contractors Association
CPCI	Canadian Prestressed Concrete Institute
CRCA	Canadian Roofing Contractors Association
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSSBI	Canadian Sheet Steel Building Institute
CUA	Canadian Underwriters Association
CWB	Canadian Welding Bureau
CWC	Canadian Wood Council

CSPI	Corrugated Steel Pipe Institute
DIN	Deutsches Institute Normung
EEI	Edison Electric Institute
EIB	Electrical Inspection Branch
EEMAC	Electrical and Electronic Manufacturers of Canada
FFPC	Federal Fire Prevention Committee
FMEC	Factory Manual Engineering Corporation
FM	Factory Mutual Engineering Corporation
IAO	Insurers' Advisory Organization
IBRM	Institute of Boiler and Radiator Manufacturers
IEC	International Electro technical Commission
IEE	Institution of Electrical Engineers (U.K.)
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IGMAC	Insulated Glass Manufacturers Association of Canada
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
ISO	International Standardization Organization
LEMA	Lighting Equipment Manufacturers Association
LTIC	Laminated Timber Institute of Canada
MMA	Millwork Manufacturers Association
NACE	National Association of Corrosion Engineers
NAAMM	National Association of Architectural Metal Manufacturers
NBC	National Building Code of Canada
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NESC	National Electric Safety Code
NFPA	National Fire Protection Association
NLGA	National Lumber Grade Authority
NWTI	National Wood Tank Institute of the USA
OECI	Overhead Electrical Crane Institute
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
RLM	RLM Standards Institute
RTAC	Road and Transportation Association of Canada
SAE	Society of Automotive Engineers
SBI	Steel Boilers Institute
SJI	Steel Joist Institute
SSPC	Steel Structures Painting Council
TTMAC	Terrazzo, Tile and Marble Association of Canada
ULC	Underwriters' Laboratories of Canada
USFG	United States Federal Government
WCB	Workers' Compensation Board

1.3 Conformance

.1 Conform to these standards, in whole or in part as specifically requested in Specifications.

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

.3 The cost for such testing will be born by Departmental Representative in the event of conformance with Contract Documents or by Contractor in the event of non-conformance.

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTION

.1 Not used.

END OF SECTION

1.0 GENERAL

1.1 Inspection

.1 All quality control testing required for this Contract is the Contractor's responsibility. The Contractor shall engage a certified materials testing firm to conduct quality control testing. All costs incurred related to quality control testing are at the Contractor's expense with no additional payment being made. The Departmental Representative may engage an independent testing firm to conduct random quality assurance testing. Costs for quality assurance testing will be incurred by the Departmental Representative.

.2 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.

.3 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.

.4 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.

.5 Departmental Representative may 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. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.2 Procedures

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site.

1.3 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.

1.4 Reports

.1 Submit four (4) copies of inspection and test reports to Departmental Representative.

.2 Provide copies to Subcontractor of work being inspected or tested.

2.0 PRODUCTS

.1 Not Used

3.0 EXECUTION

.1 Not Used

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Temporary utilities.

.2 Construction facilities.

.3 Temporary controls.

1.2 Access

.1 Prior to closing lanes, Contractor to provide alternate access. Contractor to obtain approval from the Departmental Representative prior to closing any lane.

.2 Maintain existing roads used for project site access for the duration of the Contract and make good any damage resulting from Contractor's use of these roads.

.3 Clean roadways used by Contractor's equipment.

.4 Do not obstruct hydrants, valve or control pit covers, valve boxes, curb stop boxes, fire or police call boxes, and all other utility controls, warning systems, and appurtenances.

.5 Prior to final inspection, obtain and submit to Departmental Representative written signed releases from owners of all roads used for Site access, verifying that roads have been adequately restored and left in a satisfactory condition.

.6 Trim loads of trucks hauling excavated material, cement, sand, stone, gravel, debris or other loose material before leaving the Site, and ensure that the bodies of such vehicles are tight so that no spillage of loads occurs.

1.3 Installation/Removal

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

.2 Make necessary applications to Authorities Having Jurisdiction, obtain required permits, and pay all fees and related charges.

.3 Remove from Site all such work after use.

.4 Restore Site to clean, sanitary condition.

1.4 Storage Sheds

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

.2 Maintain storage sheds in a neat, clean condition.

.3 All storage sheds to be located within designated work zone within fenced area.

1.5 Sanitary Facilities

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

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

.3 Disinfect facilities frequently.

.4 Remove contaminated soil and material and replace with fresh, clean material.

.5 Dispose of sanitary wastes, in accordance with the applicable regulations, and subject to approval of Departmental Representative.

.6 Provide all sanitary supplies required for use by the Contractor's work force and staff of Departmental Representative.

.7 Prohibit the committing of nuisance. Promptly discharge any employee violating such provision.

.8 All sanitary facilities to be located within designated work zone within fenced area.

1.6 Site Enclosures

.1 Hoarding

.1 Provide barricades and covered walkways required by governing authorities for public rights-of-way.

.2 Provide secure, rigid guard railings and barricades around deep excavations.

.3 All work areas shall be completely fenced off at all times using temporary fencing. Fencing shall be rigidly supported, steel grade with a minimum height of 1.8 metres. The Contractor shall maintain the fencing throughout the project duration.

1.7 Power

.1 Arrange, pay for and maintain temporary electrical power supply in accordance with governing regulations and ordinances.

.2 Locate temporary power at designated location, or at an acceptable location subject to approval of Departmental Representative.

1.8 Water Supply

.1 Arrange for connection with appropriate utility company, pay for and maintain temporary water supply in accordance with governing regulations and ordinances.

.2 Locate temporary water supply at a location acceptable to Departmental Representative.

1.9 Maintenance and Public Utilities

.1 Arrange work to avoid interruption of utilities serving the public. Pay for damage.

.2 Where interruption of public utilities is unavoidable, obtain prior approval for interruption from responsible authority.

.3 As required by utility authority, establish and pay for temporary relocation of utility during construction.

1.10 Materials to be Salvaged

.1 Remove, clean, deliver, unload and neatly stockpile at the Departmental Representative yard materials which are specified or designated by the Departmental Representative to be salvaged.

.2 Repair or replace at Contractor's expense salvaged materials damaged during removal, unloading or in transit.

1.11 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 Any equipment, tools, and materials must be stockpiled or situated within fenced work zone.

1.12 Security

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

1.13 Construction Cleaning

.1 Maintain the work in tidy condition, free from the accumulation of waste products and debris, other than that caused by the Departmental Representative or other Contractors.

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

.3 Promptly clean up any spillage that occurs on site roads, access roads or public roads, or other areas where construction vehicles are travelling.

.4 If the Contractor is negligent in maintaining cleanliness of roads, Departmental Representative will arrange for cleaning to be done at Contractor's expense.

.5 Contractor shall not dump waste products, either personal or construction related, into trenches and backfill.

.6 Contractor to supply, maintain and empty garbage bins along construction site.

.7 Contractor is encouraged to enforce that recyclable materials be separated and disposed of properly.

1.14 Open Excavations

.1 All open excavations to be fenced off and/ or covered with steel plates.

.2 Open excavations impeding on modified traffic flow must be backfilled immediately after utility repair or covered with a steel plate capable of supporting traffic loads, to ensure traffic flow is reinstated.

1.15 Site Signs and Notices

.1 Safety and Instruction Signs and Notices

.1 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN3-Z321-77.

.2 Maintenance and Disposal of Site Signs

.1 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.

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTIONS

.1 Not used.

END OF SECTION

1.0 GENERAL

1.1 Requirements Included

.1 Location, protection, removal, and replacement of existing structures and utility works.

.2 Existing structures and utility works being all existing pipes, ducts, ditches, or other works forming a part of sewerage, drainage, water, telephone, electrical, gas, or other utility systems as well as sidewalks, curbs, poles, fences, buildings, and other man-made things that may be encountered during construction.

2.0 COORDINATION

2.1 Coordination

.1 Coordinate the protection of all utilities.

3.0 WORKMANSHIP

3.1 Location of Structures and Utility Works

.1 Locate existing surface and underground structures that may affect the work or may be damaged during construction.

.2 The existence, location and elevation of utilities and structures are not guaranteed. Determine the existence, location and elevation of all sewer, water, and gas mains, services or lines, electric light, power, cable T.V. or telephone conduits, or other such structures or utilities. Notify the appropriate company, department or persons on intention to carry out operations in the vicinity of any structure or utility, at least one week in advance of any such operations being carried out.

.3 Provide the Departmental Representative with letters from the appropriate authority of the utility or utilities involved stating that the Contractor has made satisfactory arrangements with the utility organization for the location, protection and inspection of the utility involved.

.4 On request from the Departmental Representative, excavate and uncover underground structures and utilities for the purpose of establishing line or grade for proposed installation of piping or other works.

3.2 Protection of Structures and Utilities

.1 Protect from damage. In the event of damage resulting from the construction operation, repair to a condition which is at least the equivalent of that which existed prior to construction.

3.3 Emergency Situations

.1 In emergency situations resulting from the construction operation, where life or property are endangered, immediately take whatever action is possible to eliminate the danger and notify the appropriate authorities of the situation.

3.4 Access Maintained

.1 Maintain access for existing roadways, hydrants, valve or control pit covers, valve boxes, curb stop boxes, fire or police call boxes, and all other utility control, warning systems, and appurtenances thereof.

3.5 Support of Structures and Utility Works

.1 Protect existing structures and utilities against damage from settlement by means of supports or compaction of backfill as approved by the Departmental Representative. Where necessary, supports shall remain in place following backfill of excavations.

.2 Compact backfill which is placed under or adjacent to existing structures and utilities which have been undermined during excavation in a manner which will prevent damage of the structure or utility from settlement. Backfill with approved crushed granular material less than 50 mm in diameter.

3.6 Drainage Facilities

.1 Keep clear existing culverts, enclosed drains, flumes and ditches, and other drainage structures affected by the work. When it is necessary to temporarily remove an existing drainage structure, provide suitable temporary ditches or other approved means of handling the drainage during construction.

.2 Replace culverts and drain pipes at the time of backfilling to line and grade as directed by the Departmental Representative.

END OF SECTION

1.0 GENERAL

1.1 Requirements Included

.1 Product quality, availability, storage, handling, protection, transportation.

.2 Manufacturer's instructions.

.3 Workmanship, co-ordination, protection of work in progress.

.4 Quantities.

.5 Ownership.

1.2 Products and Materials

.1 Quality

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

.2 Availability

.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products are foreseeable, notify the 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 the Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Departmental Representative reserves the right to substitute more readily available products of similar character, at no increase in Contract Amount.

.3 Storage, Handling and Protection

.1 Handle and store Products in a 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 seals and labels intact. Do not remove from packaging or bundling until required in the Work.

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

.4 Remove and replace damaged Products at own expense and to the satisfaction of the Departmental Representative.

.5 Contractor to identify location for stockpiles. Stockpiles must be either located offsite in designated areas approved by Departmental Representative or stockpiled on site in a manner such that stockpile is fenced off from public traffic and while maintaining traffic flow under modified traffic restrictions as detailed in this contract.

.4 Transportation

.1 Pay costs of transportation of Products required in the performance of Work.

1.3 Manufacturer’s Instructions

.1 Unless otherwise indicated in the specifications, install or erect Products in accordance with manufacturer's instructions.

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

.3 Improperly installed or erected Products, shall be removed and re-installed at no increase in Contract Amount.

1.4 Workmanship

.1 General

.1 Execute work by workers experienced and skilled in the respective duties for which they are employed. Notify Departmental Representative immediately if required Work is such as to make it impractical to produce required results.

.2 Do not employ any unfit person or anyone unskilled in their required duties. The Departmental Representative reserves the right to require the dismissal from the site, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Departmental Representative, whose decision is final.

.2 Co-ordination

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for co-ordination and placement of openings, sleeves and accessories.

.3 Protection of Work in Progress

.1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by the Departmental Representative, at no increase in Contract Amount.

1.5 Ownership

.1 All materials provided by the Contractor for execution of the work will vest in and become the property of the Departmental Representative upon delivery to the Site, but will remain in the custody and at the risk of the Contractor until Final Completion.

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTION

.1 Not used.

END OF SECTION

1.0 GENERAL

1.1 Project Cleanliness

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from Authorities Having Jurisdiction for disposal of waste and debris.

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

.5 Dispose of waste materials and debris outside of Yoho National Park (and any National Park).

1.2 Final Cleaning

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

.2 Remove waste products and debris, and leave Work clean and suitable for occupancy.

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

.4 Broom clean and wash surfaces; rake clean other surfaces of grounds.

.5 Remove dirt and other disfiguration from exterior surfaces.

.6 Sweep and wash clean paved areas.

1.3 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.

2.0 PRODUCTS

.1 Not Used.

3.0 EXECUTION

.1 Not Used.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Cleaning.

.2 Project record documents.

.3 Spare parts and maintenance materials.

1.2 Related Sections

.1 General Conditions and Special Provisions.

.2 Individual Specifications Sections: Specific requirements for operation and maintenance data.

1.3 Progressive Cleaning

.1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Departmental Representative or other Contractors.

.2 Make arrangements with and obtain permits from Authorities Having Jurisdiction for off-site disposal of waste and debris.

.3 Remove waste material and debris from the site at the end of each working day.

1.4 Final Cleaning

.1 In accordance with the General Conditions and Special Provisions.

.2 At the completion of the construction work, all areas on which work has been done shall be left in a neat and presentable condition.

.3 All gutters and drainage ditches which have been blocked as a result of the work shall be repaired or restored to their original condition or better.

.4 Dispose of all surplus excavated material, trees, brush, rock, boulders and pieces of concrete or masonry.

.5 Rake clean surfaces of grounds.

1.5 As-Built Documents - Actual Site Conditions

.1 Departmental Representative will provide one set of prints for As-Built drawing purposes.

.2 Maintain project As-Built drawings current as work progresses and record neatly and accurately deviations from Contract Documents.

.3 Record the following information:

.1 Field changes of dimension and detail.

.2 Changes made by Change Order or Field Order.

.4 Identify each set of drawings as “Project As-Built Drawings” and date and sign each set.

.5 Record changes in red. Mark on one set of prints and at completion of project and prior to interim inspection, neatly transfer notations to second set and submit both sets to Departmental Representative.

1.6 Spare Parts and Maintenance Materials

.1 Spare parts and maintenance materials provided shall be new, not damaged or defective, and of the same quality and manufacture as Products provided in the Work. If requested, furnish evidence as to type, source and quality of Products provided.

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

.3 Store spare parts and maintenance materials in a manner to prevent damage, or deterioration.

.4 Provide spare parts, special tools, maintenance and extra materials in quantities specified in individual specification sections.

.5 Provide items of same manufacture and quality as items in the Work.

1.7 Inspection

.1 Refer to the General Instructions for contractual requirements.

.2 Accumulate all necessary data from sub trades and suppliers and present same in the specified format for the approval by the Departmental Representative.

.3 Once the items of this section are completed and the Contractor has verified that the requirements of the Contract have been performed give five days’ notice to the Departmental Representative, in writing, of satisfactory completion of the work and request an Interim Inspection.

.4 The Interim Inspection will be performed by the Departmental Representative. A list of deficiencies and defects will be tabulated. If in the opinion of the Departmental Representative, the list indicates the project is excessively incomplete, an Interim Certificate of Completion will not be issued. Corrections shall be done expeditiously by the Contractor.

.5 Once the Interim Certificate of Completion is issued and all deficiencies and defects have been corrected; request a Final Completion inspection, giving the Departmental Representative five days' notice.

.6 The Final Completion Inspection will be performed by the Departmental Representative. If the deficiencies and defects from the Interim inspection are completely corrected, a Final Certificate of Completion will be issued.

.7 If the Contractor requests either an Interim or Final Completion Inspection when an Interim or Final Completion Certificate cannot be issued, the Contractor will pay expenses for additional visits by the Departmental Representative to re-perform the inspection.

2.0 PRODUCTS

.1 Not used.

3.0 EXECUTION

.1 Not used.

END OF SECTION

1.0 GENERAL

.1 Not Used.

2.0 PRODUCTS

2.1 Equipment

.1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

3.0 EXECUTION

3.1 Preparation

.1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

3.2 Removal of Hazardous Wastes

.1 Remove contaminated or dangerous materials defined by Authorities Having Jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal. Remove and dispose of in an approved landfill outside of the National Park.

3.3 Removal Operations

.1 Remove items as indicated.

.2 Do not disturb items designated to remain in place.

.3 Removal of pavements, curbs and gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.

.2 Protect underlying and adjacent granular materials.

.4 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.

.5 Remove designated trees during demolition:

.1 Obtain written approval of Departmental Representative prior to removal of trees not designated.

.6 Stockpile topsoil for final grading and landscaping:

.1 Stockpile location to be approved by the Departmental Representative.

.2 Provide erosion control and seeding if not immediately used.

.7 Disposal of Material:

.1 Dispose of materials not designated for salvage to approved disposal facility outside of Yoho National Park (and any National Park) or reuse on site as instructed by Departmental Representative.

3.4 Stockpiling

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.5 Restoration

.1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.

.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.6 Cleaning

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

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

.2 Remove debris, trim surfaces and leave work site clean, upon completion of Work

.3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

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

3.7 Protection

.1 Repair damage to adjacent materials or property caused by selective site demolition.

END OF SECTION

1.0 GENERAL

.1 Not Used.

2.0 PRODUCTS

2.1 Equipment

.1 Use cold milling, planning or grinding equipment with automatic grade controls capable of operating from string line, and capable of removing part of pavement surface indicated on the Drawings.

3.0 EXECUTION

3.1 Preparation

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of Authorities Having Jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt pavement to be removed.

.3 Protection: protect existing pavement not designated for removal, and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

.4 Saw cutting in accordance with Section 02 41 13 - Selective Site Demolition

3.2 Removal

.1 Remove existing asphalt pavement to lines as indicated on the Drawings.

.1 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.

.2 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

.3 Suppress dust generated by removal process.

.4 All removed asphalt shall be removed to approved disposal facility outside of Yoho National Park or reuse on site as instructed by Departmental Representative.

3.3 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.

3.4 Cleaning

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

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

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

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Forms for all concrete and supporting falsework design.

.2 Wood and/or steel forms for all cast-in-place concrete.

.3 Shoring, bracing, and anchorage.

.4 Form openings for other trades.

.5 Supply and installation of concrete accessories.

.6 Set anchor rods, anchors, sleeves, dowels, frames and other items supplied by other trades.

.7 Clean erected formwork prior to concrete placement.

.8 Remove forms and supporting falsework.

1.2 Related Work

.1	Concrete Reinforcement	Section 03 20 00
.2	Concrete Accessories	Section 03 25 00
.3	Cast-In-Place Concrete	Section 03 30 00

1.3 References

.1 ACI 347, Guide to Formwork for Concrete.

.2 National Building Code of Canada 2010.

.3 Occupational Health and Safety Act of British Columbia.

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

.5 CSA-O86-09, Engineering Design in Wood.

.6 CSA-O121-08, Douglas Fir Plywood.

.7 CSA-O141-05, Softwood Lumber

.8 CSA-O151-09, Canadian Softwood Plywood.

.9 CSA-O325-07, Construction Sheathing.

.10 CSA-B111-74, Wire Nails, Spikes and Staples.

.11 CAN/CSA-S269.3-M92 (R2008), Concrete Formwork

1.4 Design Standards

.1 Design and detail formwork and supporting falsework in accordance with CSA-A23.1, CSA-S269.1, CAN/CSA-S269.3, ACI 347, and applicable construction safety regulations.

.2 Where there is a conflict between the above-noted codes and standards, the most stringent requirements shall apply. The Departmental Representative shall decide which requirement is the most stringent.

.3 Use load combinations in accordance with the National Building Code.

.4 Design formwork, falsework, and reshoring to carry all dead loads, lateral loads, concrete loads, and construction live loads, including placing equipment, until these loads can be supported by the structure.

.5 All design shall be done by a Professional Structural Engineer, registered in the Province of British Columbia.

1.5 Quality Assurance

.1 Construct and erect formwork and falsework in accordance with CSA-A23.1, CSA-S269.1, CAN/CSA-S269.3, ACI 347, and applicable construction safety regulations.

.2 Provide a system of quality control and quality assurance to ensure that the minimum standards specified herein are attained.

2.0 PRODUCTS

2.1 Materials

.1 For Exposed Surfaces: square-edged, smooth surfaced panels true in plane, free of holes, surface markings or defects.

.2 For Unexposed Surfaces: square-edged plywood or other material suitable to retain concrete without leakage or distortion.

.3 Wood Materials:

.1 Sheathing: CSA-O151 or CSA-O325, solid one side select sheathing - tight face grade. Sound, undamaged sheets with clean true edges.

.2 Lumber: conforming to CSA-O141.

.3 Nails, Spikes and Staples: galvanized or phosphatized.

2.2 Prefabricated Forms

.1 Steel Type: minimum 1.6 mm steel thickness; well matched, tight fitting and adequately stiffened to support the weight of concrete without deflection detrimental to structural tolerance and appearance of finished concrete surface.

2.3 Accessories

.1 Form Ties: Removable or snap-off metal type with metal form spacers, adjustable length; minimum working strength of 13 kN. When assembled, free of defects that will leave metal closer than 40 mm from concrete surface. Cones shall be approximately 20 mm diameter and not larger than 40 mm. Use plastic cone snap type or screw type on exposed surface. Wire ties are not permitted.

.2 Form Release Agent: colourless mineral oil which will not stain concrete or impair natural bonding or colour characteristics of coating intended for use on concrete. Form release agent shall be non-toxic.

.3 Corner or Chamfer Fillets: extruded plastic or mill finish pine, 20 mm width, maximum possible lengths, mitre ends.

.4 Sealing Tape: reinforced, self-adhesive polyvinyl-chloride.

3.0 EXECUTION

3.1 Examination

.1 Before starting this Work, examine work done by others which affects this Work.

.2 Rectify all conditions which would prejudice proper completion of this Work.

.3 Commencement of Work implies acceptance of existing conditions.

3.2 Erection

.1 Verify lines, levels and centers before proceeding with formwork. Ensure dimensions agree with the Drawings.

.2 Construct formwork and falsework to meet design and regulatory requirements and to produce finished concrete conforming to surfaces, shapes, lines and dimensions indicated on the Drawings. Ensure visible lines of the curbs, walls and walks follow a smooth profile both vertically and horizontally.

.3 Arrange and assemble formwork to permit removal without damage to concrete. Set shores supporting forms for beams, slabs and other horizontal members on wedges or other approved adjustable supports.

.4 Align joints and make watertight to prevent leakage of cement paste and disfiguration of concrete. Keep form joints to a minimum. Where joints are shown on Drawings, Contractor shall ensure that joint layout matches drawings. Tape form joints as necessary.

.5 Do not use earth surfaces to form concrete without written approval of Departmental Representative unless shown on Drawings.

.6 Arrange forms to allow removal without removal of principal shores where these are required to remain in place.

.7 Obtain the Departmental Representative's permission before framing openings in concrete slabs not shown on Drawings.

.8 Provide falsework to ensure stability of formwork. Prop or strengthen all previously constructed parts liable to be overstressed by construction loads.

.9 Position form joints to suit any expressed lines required in exposed concrete. Arrange form board panels in a regular symmetrical pattern to the approval of the Departmental Representative.

.10 Provide 25 mm chamfer on all internal and external corners and edges of exposed concrete.

.11 Form chases, slots, openings, drips and recesses as detailed on the Drawings.

.12 Set screeds with top edge level to required elevations.

.13 Check and re-adjust formwork to required lines and levels during placing of concrete.

.14 If form sheathing is to be re-used, remove nails and clean surfaces in contact with concrete before re-using.

.15 Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

.16 Close temporary ports or openings with tight fitting panels, flush with inside face of forms, neatly fitted so no leakage occurs and to provide uniform surface on exposed concrete.

3.3 Tolerances

.1 Construct formwork, falsework and all supporting or bracing members to provide concrete with dimensions, lines and levels within tolerances specified in CSA-A23.1.

.2 If tolerances are exceeded, remove, replace or modify placed concrete as directed by the Departmental Representative at no cost to the Departmental Representative.

.3 Provide for settlement, closure of joints and elastic shortening of forms and shoring. Camber slabs and beams as shown on the Drawings. Maintain beam depth and slab thickness from cambered surface.

3.4 Construction Joints

.1 Locate joints not indicated on the Drawings so as to least impair the strength of the structure. Obtain the Departmental Representative's approval before proceeding.

.2 Construct joints in accordance with CSA-A23.1 and details shown on drawings.

.3 Roughen surface of hardened concrete and thoroughly clean of any foreign matter and laitance. Wet surface with water and ensure forms are tight against face of hardened concrete. Epoxy bonding agent to be used where shown on Drawings or as indicated by the Departmental Representative.

3.5 Inserts / Embedded Items / Openings

.1 Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.

.2 Accurately locate and set in place items which are to be cast directly into concrete.

.3 Coordinate Work of other Sections and cooperate with other trades involved in forming openings, slots, recesses, chases, and setting sleeves, bolts, anchors and other inserts.

.4 Coordinate installation of concrete accessories specified in Section 03 25 00.

.5 Set anchor bolts, sleeves and inserts accurately at the positions designated. Secure in position by means of wooden templates and ties to prevent shifting and floating during concrete placement.

.6 Do not set anchor bolts, sleeves and inserts into placed concrete.

.7 Core holes and grout anchor bolts for bearings.

3.6 Form Ties

.1 Submit tie patterns and form tie specifications to the Departmental Representative for review prior to construction. Arrange ties in a uniform pattern; horizontally and vertically.

.2 For exposed concrete, fit ties with cones approximately 20 mm diameter and not longer than 40 mm. Coat ties with cup grease or other approved material if ties are to be removed. Loosen ties twenty four hours after concrete has been placed. Ensure sufficient numbers of ties remain to hold form in place. Cutting ties back from the face of the wall is not permitted.

.3 For all non-exposed concrete, fill all holes left by withdrawal of rods or holes left by removal of tie ends with solid mortar as outlined in the concrete section.

.4 Remove all cones from both interior and exterior concrete surfaces. If surface is to be sandblasted, leave cones in place until after sandblasting is complete. Fill cone holes with small amount of grey sealant to cover metal rod.

.5 The holes left by withdrawal of rods or the holes left by removal of ends of ties shall be filled solid with mortar after first being thoroughly wetted. For holes passing entirely through the wall a plunger-type pressure gun or other device shall be used to force the mortar through the wall starting at the back face. A piece of burlap or canvas shall be held over the hole on the outside and when the hole is completely filled, the excess mortar shall be struck off with the cloth flush with the surface. Holes not passing entirely through the wall shall be filled with a small tool that will permit packing the hole solid with mortar. Any excess mortar at the wall shall be struck off flush with the surface.

3.7 Quality Control

.1 Inspect and check complete formwork, falsework, shoring and bracing to ensure that the work is in accordance with formwork design and that supports, fastenings, wedges, ties and parts are secure.

.2 Inform Departmental Representative when formwork is complete and has been cleaned to allow for inspection. Departmental Representative's inspection will be for verification that forms are clean and free from debris.

.3 For all exposed concrete surfaces, do not patch formwork.

.4 Allow the Departmental Representative to inspect each section of formwork prior to reuse. Formwork may be re-used if approved by the Departmental Representative.

3.8 Cleaning

.1 Clean forms as erection proceeds to remove foreign matter. Remove cuttings, shavings and debris from within the forms. Flush completely with water to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

.2 During cold weather, remove ice and snow from within the forms. Do not use de-icing salts. Do not use water to clean out completed forms unless formwork and concrete construction proceed within a heated enclosure. Use compressed air or other means to remove foreign matter.

3.9 Preparation

.1 Apply form release agent in accordance with the manufacturer's recommendations prior to placing reinforcing steel, anchoring devices and embedded parts. Any embedded item to be cast in concrete, on which form release agent has been applied, shall be thoroughly cleaned prior to placing concrete.

.2 Do not apply form release agent where concrete surfaces are to receive special finishes or applied coverings which are affected by the agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces moist prior to placing the concrete.

.3 Do not apply form release agent where wood graining characteristics are required on finished concrete surfaces.

3.10 Form Removal

.1 Notify Departmental Representative prior to removing formwork.

.2 Remove falsework progressively in accordance with regulatory requirements and ensure that no shock loads or imbalanced loads are imposed on the structure.

.3 Loosen forms carefully. Do not apply tools to exposed concrete surfaces.

.4 Leave forms loosely in place for protection until complete removal is approved by the Departmental Representative.

.5 Removal of forms subject to approved on-going curing procedures.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete, complete with tie wire.

.2 Support chairs, bolsters, bar supports, and spacers for reinforcing.

.3 Special support chairs, spacers, bar supports, and bolsters for reinforcing where in-slab piping is specified.

.4 Special support chairs, spacers, bar supports, and bolsters for reinforcing where adjacent to architectural concrete surfaces.

.5 All labour, materials, and equipment to supply and place the reinforcing steel shown on the Drawings.

1.2 Related Work

.1 Section 03 10 00 – Concrete Formwork and Falsework.

.2 Section 03 25 00 – Concrete Accessories.

.3 Section 03 30 00 – Cast-In-Place Concrete.

1.3 References

.1 ACI Detailing Manual – 2004.

.2 ACI 439.3R-07, “Types of Mechanical Splices for Reinforcing Bars”.

.3 ASTM A123/A123M-12, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 ASTM A185/A185M–07, “Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete”.

.5 ASTM A497/A497M–07, “Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete”.

.6 CAN/CSA-A23.1-09, “Concrete Materials and Methods of Concrete Construction”.

.7 CAN/CSA-A23.3-09, “Design of Concrete Structures”.

.8 CAN/CSA-G30.18-M92 (R2007), “Billet-Steel Bars for Concrete Reinforcement”.

.9 CAN/CSA-W47.1-03, “Certification of Companies for Fusion Welding of Steel”.

.10 CAN/CSA-W186-M1990 (R2007), “Welding of Reinforcing Bars in Reinforced Concrete Construction”.

.11 Reinforcing Steel Institute of Canada, “Reinforcing Steel – Manual of Standard Practice, Fourth Canadian Edition 2004”.

1.4 Quality Assurance

.1 Perform concrete reinforcing work in accordance with CSA-A23.1.

.2 Provide a system of quality control and quality assurance to ensure that the minimum standards specified herein are attained.

.3 Perform welding in accordance with CSA-W186.

1.5 Inspection and Testing

.1 If requested by Departmental Representative, submit certified copies of mill test report of reinforcement supplied, indicating physical and chemical analysis.

1.6 Shop Drawings

.1 Submit bar lists and placing drawings in accordance with Division 01.

.2 Placing drawings and details shall conform to the ACI Detailing Manual and RSIC Manual of Standard Practice.

.3 Clearly indicate bar sizes, spacing, locations and quantities of reinforcing steel, mesh, chairs, spacers, and hangers.

.4 Detail placement of reinforcing where special conditions occur. Congested areas such as openings, depressions, intersections of columns and beams, and column splices to be drawn at a larger scale to fully illustrate placing sequence.

.5 Specify the placing sequences for reinforcement at the intersection of beams and slabs. Specify the placing sequence for reinforcement in flat and two-way slabs.

.6 Show minimum clearances between reinforcing bars and the minimum concrete protection for reinforcement.

.7 Locate bars relative to building grid lines which can be identified on the formwork.

.8 Specify the location and embedment of dowels.

.9 Design and detail lap lengths, bar development lengths, and splice lengths to CSA-A23.1 and CSA-A23.3, unless noted otherwise on the drawings.

.10 Fabrication shall commence only after shop drawings have been reviewed by the Departmental Representative, provided that the drawings require no resubmission.

1.7 Delivery and Storage

.1 Deliver, handle and store reinforcement in a manner to prevent damage and contamination.

.2 Deliver bars in bundles, clearly identified in relation to placing drawings.

1.8 Substitutions

.1 Different size bars will be permitted only upon written approval of the Departmental Representative.

1.9 Construction Review

.1 Notice for inspection must be given to the Departmental Representative 48 hours prior to actual concrete placing. Failure to give adequate notice may cause the Departmental Representative to classify the work as defective.

.2 Concrete shall not be cast until the reinforcement and its placement has been inspected by the Contractor's quality control representative.

.3 Correct defects and irregularities to the satisfaction of the Departmental Representative, at no cost to the Owner.

.4 The Departmental Representative's general review is undertaken to inform the Owner of the Contractor's performance, and in no way shall augment the Contractor's quality control procedure, or relieve the Contractor of contractual responsibility.

2.0 PRODUCTS

2.1 Reinforcing Materials

.1 Reinforcing Steel: 400 MPa yield grade; deformed billet steel bars conforming to CSA-G30.18; plain finish.

.2 Weldable Reinforcing Steel: weldable low alloy deformed steel bars, conforming to CSA G30.18, Grade 400W.

.3 Welded Steel Wire Fabric: plain type, conforming to ASTM A185/A185M or deformed type, conforming to ASTM A 497/A 497M.

.4 Tie Wire: minimum 1.6 mm annealed type, or patented system approved by Departmental Representative.

.5 Chairs, Bolsters, Bar Supports, Spacers: adequately sized for strength and support of reinforcing steel during construction.

.6 Concrete Bricks: acceptable for support of bottom layer of bars in slabs on fill. Broken concrete blocks and wood supports not acceptable.

.7 Special Chairs, Bolsters, Bar Supports, where in-slab pipe support required; as indicated on Drawings.

3.0 EXECUTION:

3.1 Examination

.1 Before starting this work, examine work done by others which affects this work.

.2 Notify the Departmental Representative of any conditions which would prejudice proper completion of this work.

.3 Commencement of work implies acceptance of existing conditions.

3.2 Fabrication

.1 Fabricate reinforcing steel in accordance with CSA-A23.1 and Drawings.

.2 Locate reinforcing splices not indicated on Drawings at points of minimum stress.

.3 Fabricate within the following tolerances:

.1 Sheared length: ±25 mm.

.2 Depth of truss bars: plus 0, minus 10 mm.

.3 Stirrups, ties and spirals: ±10 mm.

.4 Other bends: ±25 mm.

.4 Weld reinforcing bars in accordance with CSA W186.

.5 All bending shall be done cold with a suitable machine accurately producing all lengths, depths and radii shown on the bending details.

.6 Bars shall not be bent or straightened in a manner that will injure the material and any bars with kinks or bends not shown on the Drawings shall not be used.

.7 After initial fabrication, reinforcing steel shall not be re-bent or straightened unless so indicated on the Drawings.

.8 Heating of reinforcing steel will not be permitted.

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

3.3 Installation

.1 Place reinforcing steel in accordance with CSA-A23.1 and reviewed placing drawings. Chair slab reinforcing not further apart than 1.2 m in either direction.

.2 Locate mechanical splices, if acceptable, as detailed on shop drawings.

.3 When specifically requested, obtain Departmental Representative's approval of reinforcing steel and position before placing concrete.

.4 Reinforcement shall be free from loose rust, scale, grease, clay, or other coatings which will destroy or reduce concrete bond.

.5 Concrete cover shall be as specified on the Drawings, or if not specified, in accordance with CSA-A23.1.

.6 Reinforcement shall be adequately secured in position by approved chairs, support bars, and spacers.

.7 Reinforcement shall be tied with wire ties at bar intersections to ensure that displacement outside the allowable tolerances will not occur. Tack welding of bars is not permitted.

.8 Necessary splices shall be lapped not less than 24 bar diameters unless noted otherwise, and be in accordance with CSA-A23.3.

.9 Revise, reseat, and correct improperly positioned reinforcing prior to placing concrete to the satisfaction of the Departmental Representative.

.10 Provide horizontal "L" shaped corner bars of same cross-sectional area and spacing as horizontal bars around slab thickening corners, unless shown otherwise on Drawings.

.11 Provide 10M support bars in hooks and corners of beam stirrups unless shown otherwise on the Drawings.

.12 Provide 4 extra 15M diagonal corner bars around holes larger than 100 mm in floor slabs, unless shown otherwise on the Drawings. Corner bars to be 1.5 times the length of the shortest side of the hole or minimum of 750 mm long.

.13 Where toppings are placed on waterproof membranes or vapour barriers, prevent reinforcement or tie wire from contacting these items.

.14 Do not drive or force reinforcement into fresh concrete.

.15 Preassemble column cages as necessary. Do not "spring" or bend ties and stirrups to place longitudinal reinforcement.

.16 Prior to closing forms and placing concrete, obtain Departmental Representative's acceptance of completed installation of reinforcement. Review in-place and instructions resulting from such review will take precedence over previous instructions or reviews.

Item	Tolerances Plus or Minus
Slabs	5 mm
Other Structural Members	10 mm
Rebar Bends and Ends	50 mm

3.4 Field Bending

.1 Do not field bend reinforcement except where indicated or authorized in writing by the Departmental Representative.

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

.3 Replace bars which develop cracks or splits.

3.5 Welding Reinforcing Steel

.1 Welding of reinforcing steel to plates or to other reinforcing steel shall be in accordance with CSA-W186.

.2 The organization undertaking to weld under this section shall be certified by the Canadian Welding Bureau in accordance with CSA-W47.1.

3.6 Cleaning

.1 Ensure concrete reinforcing is clean and free from oil and deleterious matter.

.2 Remove all loose scale, loose rust and other deleterious matter from surfaces of reinforcing.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Premoulded joint fillers.

.2 Inserts.

.3 Joint sealants.

.4 Epoxy bonding agents.

.5 Vapour barrier.

1.2 Related Work

.1 Section 03 10 00 - Concrete Formwork and Falsework.

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

1.3 Quality Assurance

.1 Verification of Details: Contractor to notify the Departmental Representative immediately of any detail, note, or specification which does not comply with current manufacturer's installation requirements.

.2 Installation Instructions: Components and installation procedures shall be in accordance with current manufacturer's printed specifications and recommendations.

1.4 Shop Drawings

.1 Submit shop drawings for all products in accordance with Division 01.

1.5 Material Delivery, Handling and Storage

.1 Deliver materials as factory packaged, sealed and labeled. Handle and protect as necessary to prevent damage or deterioration during shipment and handling. Store materials in a location secure from construction operations. Remove damaged materials from the site and dispose of in accordance with applicable regulations.

2.0 PRODUCTS

2.1 Premoulded Joint Fillers

.1 Asphalt-impregnated vegetable or cane fibreboard, conforming to ASTM D1751. Approved products: W. R. Meadows Sealtight Fibre Expansion Joint, Sternson Flexcell.

2.2 Backer Rod for Joint Sealant

.1 Backer Rod: closed cell vinyl foam.

2.3 Inserts

.1 Dovetail Anchor Slots: minimum 0.8 mm thick galvanized steel, conforming to CSA A370-04 (R2009); foam filled; release tape sealed slots; stiffening lips minimum 3 mm wide, neck 13 mm, depth 25 mm; securable to formwork, manufactured by Superior Concrete Accessories Ltd.; Drew Brown Ltd.; Burke Industries or approved equal.

.2 Flashing Reglets: 0.032 mm extruded aluminum, longest possible lengths; complete with alignment splines for joints; securable to formwork; Superior or Fry Reglet or approved equal.

.3 Structural Inserts: stainless steel inserts for bolts, sizes and locations as indicated on the Drawings. All stainless steel inserts to conform AISI Type 316. Approved products: Hilti, Ramset or approved equal.

2.4 Sealants

.1 Polyurethane Sealant (Vertical Joint): to withstand a maximum of 25% joint movement. Sikaflex lA, PRC 270, Vulkem 116, or approved equal.

.2 Interior and Exterior Control Joint Sealant: two-component, epoxy-urethane, self-levelling sealant for load bearing joints. Sika Loadflex or approved equal.

.3 Primers: as supplied by sealant manufacturers.

3.0 EXECUTION

3.1 Examination

.1 Before starting this Work, examine work done by others which affects this Work.

.2 Review any conditions which would prejudice proper completion of this Work.

.3 Commencement of work implies acceptance of existing conditions.

3.2 Installation

.1 Coordinate work of this Section with other construction.

.2 Install all concrete accessories in accordance with Drawings and manufacturer's recommendations; straight, level, and plumb.

.3 Construction joints shall be placed in accordance with Drawings.

.4 Ensure embedded items are not disturbed during concrete placement.

.5 When installing sealants, clean contact surfaces free from dirt, water, oil, rust, frost, and any other loose foreign matter. When recommended by manufacturer, prime contact surfaces of concrete.

.6 Install protective boards over joint covers when potentially damaging construction activities are not complete. Protect wall joint sealants from bituminous dampproofing with a fibreboard protection board, minimum 300 mm wide.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 All cast-in-place concrete shown on Drawings.

.2 Repairing concrete imperfections.

.3 Finishing formed concrete surfaces.

1.2 Related Work

.1 Section 03 10 00 - Concrete Formwork and Falsework.

.2 Section 03 20 00 - Concrete Reinforcing.

.3 Section 03 25 00 - Concrete Accessories.

1.3 References

.1 ASTM C260-06, "Standard Specification for Air-Entraining Admixtures for Concrete".

.2 ASTM C494-08, "Standard Specification for Chemical Admixtures for Concrete".

.3 ASTM C1017-07, "Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete".

.4 CSA-A23.1-09, "Concrete Materials and Methods of Concrete Construction".

.5 CSA-A23.2-09, "Methods of Test and Standard Practices for Concrete".

.6 CSA-A3001-08, "Cementitious Materials for Use in Concrete".

1.4 Quality Assurance

.1 Cast-in-place concrete to conform to CSA-A23.1.

.2 Testing shall conform to CSA-A23.2.

.3 These standards shall be available in the Contractor’s site office for the use of the Contractor, Subtrades, and Departmental Representative.

.4 Provide a system of quality control and quality assurance to ensure that the minimum standards specified herein are attained.

.5 Obtain acceptance of resultant concrete surface finish prior to placing or finishing subsequent concrete.

1.5 Submittals for Review

.1 Submit concrete mix proportions in accordance with Division 1 and Table 5 in CSA-A23.1 Alternate 1.

.2 At the request of the Departmental Representative, submit a letter, signed and sealed by a Professional Engineer registered in the Province of British Columbia, stating that all concrete supplied meets the project specifications and requirements of CSA-A23.1.

.3 Submit proposed source of aggregates, including results of petrographic examination indicating petrographic number (PN) and ironstone content for each coarse aggregate proposed for use, which will include evidence that aggregates are not susceptible to alkali-aggregate reactions. Petrographic analysis shall be performed by an experienced qualified petrographer of a CSA certified laboratory. 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 ninety (90) days prior to concrete production. Refer to 2.1.5 for ironstone and coal/lignite limits

1.6 Inspection and Testing

.1 Notify Departmental Representative at least 24 hours before complete formwork and concrete reinforcement will be ready for inspection.

.2 Allow ample time for inspection and corrective work, if required, before scheduling concrete placement.

.3 Concrete sampling, inspection and testing is to be performed by an Inspection and Testing Firm appointed and paid by the Contractor.

.4 Provide free access to all portions of work and cooperate with appointed firm.

.5 Submit proposed mix design of each class of concrete to Departmental Representative for review prior to commencement of work.

.6 Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.

.7 Notify Inspection and Testing Firm before placing concrete, in ample time to permit scheduling.

.8 One (1) set of concrete test cylinders will be taken for every 50 to 100 m^3 or less of each class of concrete placed each day.

.9 A set of test cylinders will consist of:

.1 Three (3) cylinders, unless noted otherwise. One (1) cylinder will be tested at 7 days, and two (2) cylinders will be tested at 28 days.

.2 Four (4) cylinders for concrete with CSA exposure class S-1, S-2, S-3, or concrete defined as HVSCM-1. One (1) cylinder will be tested at 7 days, one cylinder will be tested at 28 days, and two cylinders will be tested at 56 days.

.3 One (1) additional test cylinder will be taken during cold weather concreting, and be cured on job site under the same conditions as concrete it represents. The field cylinders will be tested at 28 days.

.10 One slump test and one air content test will be taken for each set of test cylinders taken.

.11 Additional slump tests may be taken as necessary to verify quality of concrete.

.12 Concrete for the test cylinders, slump and air tests will be taken from the discharge point closest to the point of final deposit in the form in order to best represent the in situ conditions. These samples will not be taken from the first or last portions of concrete discharged from the delivery truck.

.13 Testing of concrete will be performed in accordance with CAN/CSA-A23.2. Test results will be issued to Contractor and Departmental Representative.

.14 Pay costs for retesting required due to defective materials or workmanship.

.15 Contractor may arrange and pay for additional tests for use as evidence to expedite construction.

2.0 PRODUCTS

2.1 Concrete Materials

.1 Portland cement: to CSA-A3000, Type GU.

.2 Supplementary cementing materials (SCM): to CSA-A23.1, Type F, CI, or CH flyash. A maximum of 25% flyash shall be permitted for concrete with exposure class Class C-1 and C-2 when exposed to freezing and thawing.

.3 Water: to CSA-A23.1.

.4 Aggregates: to CSA-A23.1. Coarse aggregates to be normal density. Ironstone content shall not exceed one percent (1.0%) for coarse aggregate and one point five percent (1.5%) for fine aggregate. Coal and lignite content shall not exceed 0.1% for coarse aggregate and 0.5% for fine aggregate.

.5 Air entraining admixture: to ASTM C260. Notwithstanding tabulated concrete properties in Section 2.2 below, air may be deleted for interior slab work.

.6 Chemical admixtures: to ASTM C494/C494M. Admixtures containing chlorides are not permitted.

.7 Bonding agent: 100% Acrylic high strength.

.8 Superplasticizers: to ASTM C1017/1017M.

.9 Ensure that no aggregates are used which may undergo volume change due to alkali reactivity, moisture retention or other causes. Confirm suitability of aggregate with a petrographic analysis as directed by Departmental Representative.

2.2 Concrete Mixes

.1 Pay all costs for mix design. Submit design of a proven mix to Inspection and Testing Firm and Departmental Representative for review.

.2 Do not change concrete mix without prior approval of Departmental Representative. Should change in material source be proposed, submit new mix designs to be reviewed by Departmental Representative.

.3 Use accelerating admixtures in cold weather only when approved by Departmental Representative. If approved, the use of admixtures will not relax cold weather placement requirements. Do not use calcium chloride.

.4 Use set-retarding admixtures during hot weather only when approved by Departmental Representative.

.5 All admixtures are subject to the approval of the Departmental Representative. List all proposed admixtures in mix design submission. Do not change or add admixtures to approved design mixes without Departmental Representative's approval.

.6 Concrete delivered to Site must be accompanied by a delivery slip in accordance with CAN/CSA-A23.1.

.7 Provide concrete mixed in accordance with requirements of CSA-A23.1 to give the following properties:

Location	CSA Exposure Class	Cement Type	Minimum Compressive Strength (MPa)	Max w/c Ratio	Max Aggregate (mm)	Air Content (%)
Exterior Slab-on-Grade	C-2	GU	32 @ 28 Days	0.45	20	5-8
Piles	F-2	HS	25 @ 28 Days	0.55	20	4-7

3.0 EXECUTION

3.1 Examination

.1 Before starting this work, examine work done by others which affects this work.

.2 Notify the Departmental Representative of any conditions which would prejudice proper completion of this work.

.3 Commencement of work implies acceptance of existing conditions.

3.2 Placing Concrete

.1 Place concrete in accordance with requirements of CSA-A23.1 and as indicated on drawings.

.2 Immediately before concrete is placed, all forms shall be carefully inspected to ensure that they are properly placed, sufficiently rigid and tight, and that all reinforcing steel is in the correct position and secured against movement during the placing operation. All forms shall be thoroughly cleaned and all debris, snow, ice or other foreign material removed. Chemicals shall not be used to remove ice or hardened concrete from the forms. All forms shall be thoroughly soaked with water except in freezing weather.

.3 Handling equipment shall be kept free from hardened concrete or foreign material, and cleaned at frequent intervals.

.4 Notify Departmental Representative and Inspection and Testing Firm minimum 24 hours prior to commencement of concrete operations.

.5 Ensure all anchors, seats, plates and other items to be cast into concrete are securely placed, and will not interfere with concrete placement.

.6 Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent the separation or loss of the ingredients. Concrete shall be deposited in the forms as nearly as practicable in its final position to avoid rehandling or flowing. Vibrators shall not be used to move concrete. Under no circumstances shall the concrete which has partially hardened by deposited in the forms.

.7 When concrete is started, it shall be carried on as a continuous operation until the placing of the section is completed. When shown on the Drawings, concrete shall be placed in the sections indicated and according to the sequence given.

.8 Maintain accurate records of cast-in-place concrete items. Record date, location of pour, quantity, air temperature and test samples taken.

.9 Ensure reinforcement, inserts, embedded parts, formed expansion and control joints and heating pipes are not disturbed during concrete placement.

.10 Prepare set concrete by removing all laitance and loose materials and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.

.11 Place concrete continuously between present construction and control joints.

.12 Vibrate concrete using the appropriate size equipment as placing proceeds in strict accordance with CSA-A23.1. Check frequency and amplitude of vibrations prior to use. Provide additional standby vibrators in the event of equipment failure.

.13 Where placing operations would involve dropping the concrete more than 1.5 meters, it shall be placed through “canvas elephant trunks” or galvanized iron chutes. Concrete levels shall not be raised at a rate greater than that for which proper vibration may be affected.

.14 The concrete surfaces shall be protected from rain until the final set occurs.

.15 A minimum of 72 hours shall elapse between adjacent pours separated by construction joints or expansion joints.

.16 Honeycombing or embedded debris in concrete is not acceptable.

.17 Remove and replace defective concrete in accordance with Clause 3.16 of this Section.

3.3 Construction Joints

.1 Joints not indicated on the Drawings shall be located so as to least impair the strength of the structure. The location of these joints shall be subject to the prior approval of the Departmental Representative. Joints shall be in accordance with CSA-A23.1, or as indicated on Drawings or direct by the Departmental Representative.

.2 Construction joints shall be completed as follows:

.1 Reinforcement continuous through the joint.

.2 Roughen surface to a minimum 5 mm amplitude by sandblasting and/or high pressure water blasting.

.3 The surface of hardened concrete shall be roughened and thoroughly cleaned of foreign matter and laitance, and shall be thoroughly wetted with water but not saturated and the forms re-tightened against the face of the hardened concrete before depositing additional concrete. Epoxy bonding agents may be required as directed by the Departmental Representative.

3.4 Cold and Hot Weather Concreting

.1 Conform to requirements of CSA-A23.1.

.2 Refer to Division 01 for temporary enclosure and heating requirements.

.3 Protect slabs being finished during drying conditions above 25ºC and/or during high winds with moisture retention film.

3.5 Concrete Protection for Reinforcement

.1 Ensure reinforcement is placed to provide minimum concrete cover in accordance with CSA-A23.1 or as shown on Drawings.

3.6 Screeding

.1 Screed floors and slabs in accordance with CSA-A23.1. Screed level, maintain a straightedge value of ±3 mm in 3m. Pitch to slab edges to provide drainage off the slab.

3.7 Install Items Specified Under Other Sections

.1 Install hangers, sleeves, anchors, etc. specified under other Sections.

.2 Pour concrete after other trades have satisfactorily installed their materials.

.3 Do not eliminate or displace reinforcement to accommodate hardware. If hangers, inserts, anchors, etc. cannot be located as specified obtain approval of all modifications from Departmental Representative before placing concrete.

3.8 Slab on Grade

.1 Place adjustable screeds at suitable locations.

.2 Carefully place concrete to required elevations indicated on Drawings.

.3 Separate slabs-on-fill from vertical surfaces with 13 mm thick joint filler. Extend joint filler from bottom of slab to within 13 mm of finished surface.

.4 Saw cut control joints in straight lines for slabs-on-grade, within 12 hours after finishing (green cutting is acceptable). Cut in pattern shown on Drawings. Use 5 mm thick blade, 1/3 depth of slab unless noted otherwise.

3.9 Curing and Protection

.1 Cure and protect freshly placed concrete in accordance with CSA-A23.1 and this specification.

.2 Cure concrete and concrete toppings by maintaining concrete surfaces continuously moist at a minimum temperature of 10°C for the minimum length of time as specified in CSA A23.1.

.3 Cure concrete slab and concrete toppings by one of the following methods:

.1 Ponding or continuous sprinkling.

.2 Absorptive fabric covered with polyethylene and kept continuously moist.

.4 During hot weather provide additional initial curing for concrete slabs in accordance with recommendations of ACI 305R.

.1 Keep surface moist by fogging until bleeding has stopped if rate of evaporation exceeds rate of bleeding.

.2 Apply evaporation retardant if rapid drying ambient conditions exist.

.5 Curing compounds may be used on columns, non-watertight walls and roof slabs except as noted. Contractor to submit proposed application procedure for review.

.1 Apply compound immediately after removal of forms.

.2 Apply compound with roller, brush, or airless sprayer in accordance with manufacturer's instructions.

.3 Submit proof of compound compatibility with subsequent coatings and membranes.

.4 Submit procedure for removing curing compound where subsequent coating or membranes are not compatible with curing compound.

.6 Curing compounds may not be used for floor slabs, toppings, architectural concrete or surfaces to receive bonded toppings.

3.10 Frost Protection

.1 After concrete curing process is completed, provide continuous protection for slabs and foundations on ground to prevent subgrade below from freezing during cold weather. Provide heated enclosures, insulation, etc., as required.

.2 All concrete poured shall be hoarded and heated to protect the work during freezing conditions. The cost of this shall be included in the Contractor’s tender cost.

3.11 Formed Concrete

.1 Inspect concrete surfaces immediately upon removal of forms.

.2 Treat imperfections in formed surfaces in accordance with CSA-A23.1 and to Departmental Representative's approval.

.3 Modify or replace concrete not conforming to qualities, lines, details and elevations specified herein or indicated on Drawings.

3.12 Finishing Formed Surfaces

.1 Fill all surface voids wider than 0.5mm and deeper than 1.0mm for all exposed wall surfaces. Surface voids shall be filled with patching mortar in accordance with the manufacturer's instructions.

.2 Inspect concrete surfaces immediately upon removal of all formwork.

.3 Patch imperfections when concrete is green.

.4 Remove all exposed metal form ties, nails and wires, break off fins and remove all loose concrete.

.5 Thoroughly wet all form tie pockets and patch with patching mortar followed by proper curing.

.6 Chip away honeycombed and other defective surfaces to depth of not less than 25mm with the edges perpendicular to the surface. Thoroughly wet and patch with patching mortar followed by proper curing.

3.13 Slab Finish

.1 Finish edges of slab to smooth radius.

.2 Tool control joints across at spacing shown on Drawings.

.3 Light broom finish surface of slab.

.4 Apply curing and sealing compound to manufacturer's directions.

3.14 Existing Wall Finish

.1 Inspect site with Departmental Representative and verify extent of sandblasting.

.2 Protect underlying and adjacent materials.

.3 Provide immediate temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, ponds, designated site holding pond or other areas of water impoundment, or the delivery and deposition of sediment onto adjacent roads or properties.

.4 Provide dust control to eliminate the spread of dust from sandblasting.

.5 Start with a 1m x 1m sample area with Departmental Representative present to discuss acceptable finish and level of sandblasting.

.6 Light sandblast concrete 1-2mm proud of the surface.

.7 Do not over sandblast and remove excessive amounts of solid concrete from face of wall.

.8 Progressively clean, refer 01 74 11.

3.15 Defective Concrete

.1 Concrete not meeting the requirements of the Specifications and Drawings shall be considered defective concrete.

.2 Concrete not conforming to the lines, detail and grade specified herein or as shown on the Drawings shall be modified or replaced at the Contractor's expense and to the satisfaction of the Departmental Representative. Finished lines, dimensions and surfaces shall be correct and true within tolerances specified herein and in the Formwork Section of these Specifications.

.3 Concrete not properly placed resulting in excessive honeycombing, and all honeycombing and other defects in critical areas of stress shall be repaired or replaced at the Contractor's expense and to the satisfaction of the Departmental Representative.

.4 To conform to the strength requirements, the average of all tests shall exceed the specified strength. When five or more tests of the same class of concrete are available, the average of any five consecutive tests shall be equal to, or greater than the specified strength, and no strength test shall fall more than 3.5 MPa below the specified strength. If any of the criteria of the above clause are not met, the Departmental Representative shall have the right to require one or more of the following:

.1 Changes in mix proportions for the remainder of the work.

.2 Cores drilled and tested from the areas in question as directed by the Departmental Representative and in accordance with CSA-A23.2. The test results shall be indicative of the strength of the in-place concrete.

.3 Load testing of the structural elements. The changes in the mix proportions and the testing shall be at the Contractor's expense.

.5 Concrete failing to meet the strength requirements of this specification shall be strengthened or replaced at the Contractor's expense and the satisfaction of the Departmental Representative.

3.16 Patching

.1 Allow Departmental Representative to inspect concrete surfaces immediately upon removal of all formwork.

.2 Patch imperfections when concrete is green.

.3 Remove all exposed metal form ties, nails and wires, break off fins and remove all loose concrete.

.4 Thoroughly wet all form tie pockets and patch with patching mortar followed by proper curing.

.5 Chip away honeycombed and other defective surfaces to depth of not less than 25mm with the edges perpendicular to the surface. Thoroughly wet and patch with patching mortar followed by proper curing.

3.17 Clean-Up

.1 At completion of work, remove from site all debris, excess materials and equipment.

END OF SECTION

1.0 GENERAL

1.1 Related Sections

.1 Section 09 91 00 Painting

1.2 References

.1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Steamless.

.2 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.

.4 CISC/CPMA 2-75, Quick-Drying, Primer for use on Structural Steel.

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

.6 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

.7 CSA-S16-09, Limit States Design of Steel Structures.

.8 CSA-W48-06, Filler Metals and Allied Materials for Metal Arc Welding.

.9 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).

1.3 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Division 01.

.1 For finishes, coatings, primers and paints.

1.4 Delivery, Storage, and Handling

.1 Schedule delivery of components to site to coincide with installation of this work.

.2 Store components to prevent damage and distortion.

.3 Protect finishes from scratches and soiling.

2.0 PRODUCTS

2.1 Materials

.1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.

.2 Steel pipe: to ASTM A53/A53M standard weight black finish.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A307.

.6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

.7 Galvanizing: to CSA G164. Minimum coating 610 g/m².

.8 Aluminum sections and plate: to CSA HA.5 Type 6061 T6 unless otherwise shown.

2.2 Fabrication

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof countersunk flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 Channel Frames

.1 Fabricate frames from steel, sizes of channel as indicated.

.2 Finish: prime coat painted.

3.0 EXECUTION

3.1 Erection

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Engineer such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Provide components for building by other sections in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CSA-S16, or weld.

.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.8 Touch-up field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 Channel Frames

.1 Install steel channel frames to openings as indicated.

3.3 Miscellaneous Items

.1 In addition to the above, provide other steel fabrications indicated on Drawings.

3.4 Cleaning

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1.0 GENERAL

1.1 Related Sections

.1 Wood Decking Section 06 15 00

1.2 References

.1 American National Standards Institute/National Particleboard Association (ANSI/NPA)

.1 ANSI/NPA A208.1-2009, Particleboard.

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

.1 ASTM A123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A563M-07(R2013), Standard Specification for Carbon and Alloy Steel Nuts

.3 ASTM D1761-12, Standard Test Methods for Mechanical Fasteners in Wood.

.4 ASTM D5933-96(2001), Standard Specification for 2 5/8-in. and 4-in. Diameter Metal Shear Plates for Use in Wood Constructions

.5 ASTM F1167-15, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.6 ASTM F568M, Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

.3 American Wood Preservers' Association (AWPA)

.1 AWPA M2-15, Standard for Inspection of Treated Wood Products.

.2 AWPA M4-11, Standard for the Care of Preservative-Treated Wood Products.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-11.3-M87, Hardboard.

.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.3 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction and amendment.

.4 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.5 Canadian Standards Association (CSA International)

.1 CSA O80 Series-15 and O80S2-05, Wood Preservation.

.2 CSA O86-14, Engineering Design in Wood.

.3 CSA O112.9-10 (2014), Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).

.4 CSA O121-08 (R2013), Douglas Fir Plywood.

.5 CAN/CSA O122-16, Structural Glued-Laminated Timber.

.6 CSA O141-05 (R2014), Softwood Lumber.

.7 CSA O151-09 (R2014), Canadian Softwood Plywood.

.8 CSA O153-13, Poplar Plywood.

.9 CSA O325-07 (R2012), Construction Sheathing.

.10 CSA O437 Series-93 (R2011), Standards on OSB and Waferboard.

.11 CAN/CSA-Z809-08 (R2013), Sustainable Forest Management.

.6 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber.

.7 American Institute of Timber Construction (AITC)

.1 AITC 108, "Standard for Heavy Timber Construction."

1.3 Submittals

.1 Submit Submittal submissions: in accordance with Division 01.

.2 Product Data:

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

.2 For connectors, include installation instructions.

.3 For products treated with preservative by pressure impregnation, submit following information certified by authorized signing officer of treatment plant:

.1 Information listed in AWPA M2 and revisions specified in CSA O80 Series, Supplementary Requirement to AWPA M2 applicable to specified treatment.

.2 Moisture content after drying following treatment with water-borne preservative.

.3 Acceptable types of paint, stain, and clear finishes that may be used over treated materials to be finished after treatment.

.3 Shop Drawings: Submit drawings showing layout, dimensions of each member, and details of connections. Shop drawings to be stamped and signed by a Professional Engineer registered in the Province of British Columbia.

.4 Material Certificates:

.1 Indicate species and grade selected for each use per National Lumber Grades Authority - Standard Grading Rules for Canadian Lumber.

.5 Certificates of Inspection: Issued by lumber grading agency for exposed timber not marked with grade stamp.

1.4 Quality Assurance

.1 Certification: Material certificate required per National Lumber Grades Authority - Standard Grading Rules for Canadian Lumber. Each section to be marked with grade identifying stamp.

.2 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.3 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

1.5 Delivery, Storage, and Handling

.1 Deliver, handle, store and protect materials of this section in accordance with Division 01.

.2 Schedule delivery of lumber to avoid extended on-site storage and to avoid delaying the Work.

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

.4 Storage and Handling Requirements:

.1 Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings.

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

.3 Replace defective or damaged materials with new.

1.6 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Division 01.

2.0 PRODUCTS

2.1 Description

.1 Sustainability Characteristics:

.1 Lumber to be CAN/CSA-Z809 or FSC or SFI certified.

.2 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber

.3 Light-frame trusses in accordance with "Truss Design and Procedures for Light Metal Connected Wood Trusses", The Truss Plate Institute of Canada.

.4 Framing and board lumber: Douglas Fir-Larch No.1/No.2 Grade or S.P.F. No.1/No.2 Grade unless noted otherwise.

.5 Furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers:

.1 Board sizes: "Standard" or better grade.

.2 Dimension sizes: "Standard" light framing or better grade.

.3 Post and timbers sizes: "Standard" or better grade.

.6 Plywood, OSB and wood based composite panels: to CSA O325. Thickness as indicated on Drawings.

.7 Douglas fir plywood (DFP): to CSA O121, standard construction.

.8 Canadian softwood plywood (CSP): to CSA O151, standard construction.

.9 Poplar plywood (PP): to CSA O153, standard construction.

.10 All lumber materials in contact with concrete or soil to be pressure treated to CSA O80.

2.2 Accessories

.1 Nails, spikes and staples: to CSA B111.

.2 Bolts: diameter as indicated on the Drawings or shop drawings, complete with nuts and washers.

.3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.4 Joist hangers: minimum 1 mm thick sheet steel, galvanized coating designation unless noted otherwise.

.5 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, formed to prevent dishing. Bell or cup shapes not acceptable.

.6 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Departmental Representative.

.7 Fastener Finishes:

.1 Galvanizing: to ASTM A123/A123M, use galvanized fasteners for exterior work, interior highly humid areas, pressure-preservative treated lumber and where noted on the Drawings.

.2 Black powder coated steel: for exposed connectors as shown on the Drawings.

.8 Wood Preservative: to CSA O80 Series, in accordance with manufacturer's recommendations for surface conditions:

.1 Preservative: VOC limit 350 g/L maximum to SCAQMD Rule 1113.

2.3 Fabrication

.1 Camber: Fabricate horizontal members and inclined members with a slope of less than 1:1, with natural convex bow (crown) up, to provide camber.

.2 Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.

.3 Predrill for fasteners and assembly of units.

.4 Coat crosscuts with end sealer.

.5 Seal Coat: After fabricating and surfacing each unit, apply a saturation coat of penetrating sealer on surfaces of each unit except for treated wood where the treatment included a water repellent.

3.0 EXECUTION

3.1 Installation

.1 General: Erect lumber true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

.1 Install lumber to comply with Shop Drawings.

.2 Install horizontal and sloping members with crown edge up and provide not less than 102 mm of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports if not continuous.

.3 Handle and temporarily support lumber construction to prevent surface damage, compression, and other effects that might interfere with indicated finish.

.2 Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

.3 Fit members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.

.1 Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.

.2 Coat crosscuts with end sealer.

.4 Install wall sheathing in accordance with manufacturer's printed instructions and as indicated on the Drawings.

.5 Install roof sheathing in accordance with requirements of the NBCC and as indicated on the Drawings.

.6 Install furring and blocking as required to space-out and support casework, wall and ceiling finishes, facings, fascia, soffit, siding, electrical equipment mounting boards, and other work as required.

.7 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.

.1 Align and plumb faces of furring and blocking to tolerance of 1:600.

.8 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.9 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using steel fasteners.

.10 Install sleepers as indicated.

.11 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

.12 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.13 Countersink bolts where necessary to provide clearance for other work.

.14 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

.15 Install connectors as indicated.

.1 Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.

.2 Install bolts with orientation as indicated or, if not indicated, as directed by Department Representative.

3.2 Adjusting

.1 Repair damaged surfaces and finishes after completing erection. Replace damaged lumber construction if repairs are not approved by Department Representative.

END OF SECTION

1.0 GENERAL

1.1 Related Sections

.1 Rough Carpentry Section 06 10 00

1.2 References

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

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

.2 ASTM F1667, Driven Fasteners: Nails, Spikes, and Staples.

.2 Canadian Standards Association (CSA International)

.1 CSA O86, Consolidation Engineering Design in Wood.

.3 National Lumber Grades Authority

.1 NLGA Standard Grading Rules for Canadian Lumber.

1.3 Submittals

.1 Submit Submittal submissions: in accordance with Division 01.

1.4 Quality Assurance

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

1.5 Delivery, Storage, and Handling

.1 Deliver, handle, store and protect materials of this section in accordance with Division 01.

1.6 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Division 01.

2.0 PRODUCTS

2.1 Materials

.1 Forest Stewardship Council (FSC) certified.

.2 Wood decking: to NLGA standard Grading Rules for Canadian Lumber, Commercial grade Douglas Fir-Larch, 64 mm x 127 mm, pre-drilled at 750 mm on centre for lateral spiking, double tongue and groove and "Veed" one side. Kiln dry decking to 15% maximum moisture content.

.3 Decking lengths: 1.8 to 6 m or longer with a minimum of 90% planks exceeding 3m, minimum of 50% planks exceeding 4.9m. For single spans shorter than 3m use decking of same length as span.

.4 Nails: to ASTM F1667, galvanized finish; sizes as recommended in CSA O86. Supply 200 mm spiral spikes for lateral nailing.

.5 Splines: galvanized metal, as recommended by decking manufacturer.

3.0 EXECUTION

3.1 Installation

.1 Do wood deck work in accordance with CSA O86 except where specified otherwise.

.2 Install decking in accordance with CSA O86, controlled random pattern with two nails per support.

.3 Provide minimum of one bearing support for each plank. Install sloping deck with tongues up. Join butt ends with splines to assure tight square fit.

.4 Stagger end joints in adjacent planks minimum of 0.5 m. Separate joints in same area by at least two intervening courses. Avoid joints in first fifth of end spans. Minimize joints in middle third of span.

3.2 Cleaning

.1 Remove tool marks, bruises, and scratches.

END OF SECTION

1.0 GENERAL

1.1 References

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

.1 ASTM C919-02, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing.

.2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

.5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.2 Submittals

.1 Submit product data and samples.

.2 Manufacturer's product to describe.

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Cured samples of exposed sealants for each color where required to match adjacent material.

.4 Submit manufacturer's instructions that include installation instructions for each product used.

1.3 Delivery, Storage and Handling

.1 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.4 Project Conditions

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.5 Environmental Requirements

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

2.0 PRODUCTS

2.1 Sealant Materials

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 Sealant Selection

.1 At perimeter of exterior aluminum and pressed steel frames; to CAN/CGSB 19.24-M90 multi-component chemical curing polysulphide sealant, colour to match adjacent surfaces, Sternson DuoflexNS, Meadows Sealtight CM-60NS, or approved equal.

.1 Approved equal sealant: to CAN/CGSB 19.24-M90 multi-component, chemical curing polyurethane sealant, colour to match adjacent surfaces, Sternson RC-2, Sikaflex 2CNS, Tremco Dymeric, Sonneborn Sonolastic NP2, Bostik Chem-Calk 500.

.2 Approved equal sealant: to CAN/CGSB 19.13-M87 single component, elastomeric chemical curing, silicone sealant, colour to match adjacent surfaces, GE Silproof SCS2000, Tremsil 300 (Rhodorsil 3B), Dow Corning 790.

.2 Between millwork and adjacent surfaces, between ceramic tile, plumbing fixtures and adjacent surfaces; to CAN/CGSB 19-GP-22M mildew resistant silicone sealant, translucent colour, GE Sanitary SCS1701, Dow Corning 786, or approved equal.

.3 Between wood structural members, between wood and steel structural members; to CAN/CGSB 19.13-M87 single component, elastomeric, chemical curing silicone sealant, translucent colour, GE Sanitary SCS 1701, GE SCS 1201, Tremco Proglaze, Dow Corning 786 or approved equal.

.4 Between mullionless glass panes, and at perimeter of mullionless glass areas: to CAN/CGSB 19.13-M87 single component elastomeric, chemical curing, silicone sealant, clear/translucent colour, GE SCS 1201, Tremsil 300 (Rhodorsil 3B), Tremco Proglaze, Dow Corning 999-A, or approved equal.

.5 Between precast concrete walls, slab, and septic tank: Butyl rubber material in flexible rope to meet or exceed all requirements of AASIO M198 and ASTM C990 Section 6.2.

2.3 Joint Cleaner

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

2.4 Backing Materials

.1 Preformed Compressible and Non-Compressible back-up materials.

.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.

.1 Extruded open cell foam backer rod.

.2 Size: oversize 30 to 50 %.

.2 Neoprene or Butyl Rubber.

.1 Round solid rod, Shore A hardness 70.

.3 High Density Foam.

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

3.0 EXECUTION

3.1 Protection

.1 Protect installed Work of other Subcontractors from staining or contamination.

3.2 Surface Preparation

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 Priming

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 Backup Material

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 Mixing

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 Application

.1 Sealant.

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.

.1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

END OF SECTION

1.0 GENERAL

1.1 Description

.1 The work of this Section shall include all labour, materials, tools, scaffolds and other equipment, services and supervision required for preparation and painting of all surfaces scheduled herein.

.2 Include all field painting necessary to complete work shown, scheduled or specified, including back priming and surface preparation.

.3 The work shall also include the painting of shop primed items and equipment installed under any other sections of the Specifications.

.4 Ensure that surface preparation and shop primers comply with finishing paint system specified.

.5 Prepare and touch up any damaged finish with same type, quality and colour of paint as originally used.

.6 Do not paint aluminum, stainless steel or rubber surfaces and nameplates unless noted otherwise.

1.2 Reference Standards

.1 Master Painters Institute (MPI), Architectural Painting Specification Manual, latest edition.

.2 Steel Structures Painting Council (SSPC), Steel Structures Painting Manual, Volume I & II.

.3 Manufacturer’s product and safety data sheets, and application instructions.

1.3 Qualifications

.1 The work of this Section shall be performed by experienced applicators specializing in the surface preparation and application of the products specified herein.

1.4 Submittals

.1 Comply with Section 01 33 00.

.2 Provide the Departmental Representative with the credentials of the applicators, who will be performing the work on Work Site, which clearly demonstrates compliance with the required qualifications, including:

.1 Key Work Site personnel;

.2 Equipment which will be used;

.3 Information on projects of similar scope with similar products, including references.

.3 Submit three (3) copies of the manufacturer's product data sheets, application instructions and safety data sheets.

1.5 Delivery/Storage

.1 Deliver materials in sealed, original, labeled containers, bearing manufacturer’s name, type, brand name, colour designation and instructions for mixing and/or reducing. No unsealed materials will be allowed onto the Work Site.

.2 Provide adequate storage facilities. Store materials at a minimum ambient temperature of 7° C and in a well ventilated area.

.3 Take all precautionary measures to prevent fire hazards and spontaneous combustion.

1.6 Colour Schedule/Samples

.1 Paint colours shall be selected by the Departmental Representative.

1.7 Environmental Conditions

.1 Measure moisture content of surfaces using an electronic "Moisture Meter". Do not apply finishes unless the moisture content of surfaces are below the maximums established on product data sheets.

.2 Ensure surface temperatures and the surrounding air temperature are within the range established on product data sheets.

.3 Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures established on product data sheets for 24 hours before, during, and 48 hours after interior application of finishes.

.4 Provide minimum 325 lux (30 f.c.) of lighting on surfaces during application of finishes.

.5 Do not apply finishes in areas where dust is being generated.

2.0 PRODUCTS

2.1 Materials

.1 Paints: technically appropriate first line products as listed in Schedule of Finishes.

.2 Paint accessory materials: linseed oil, shellac, turpentine and other materials not specifically indicated herein but required to achieve the finishes specified shall be of highest quality product and approved manufacture.

.3 Solvents: to be the odor free type where possible.

.4 All markings and labeling of piping and equipment shall be black, stencil, spray coated, one quarter diameter of pipe or 25 mm for equipment. Stick- on markers not allowed.

2.2 Mixing

.1 Paints shall be ready-mixed except for field catalyzed coating types.

3.0 EXECUTION

3.1 Condition of Surfaces

.1 Thoroughly examine all surfaces scheduled to be finished prior to commencement of work. Report in writing to the Departmental Representative any condition that may potentially affect proper application. Do not commence until all such defects have been corrected.

.2 Be responsible for the condition of surfaces or for correcting defects and deficiencies in the surfaces which may adversely affect work of this section.

.3 Commencement of work shall imply acceptance of surfaces.

3.2 Preparation of Work Site Areas

.1 Thoroughly vacuum and wipe clean all surfaces within the area to be finished, prior to and during painting application.

3.3 Protection

.1 Adequately protect other surfaces from paint and damage. Make good any damage as a result of inadequate or unsuitable protection.

.2 Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being finished and, in particular, surfaces within storage and preparation area.

.3 Place cotton waste, cloths, empty containers and material which may constitute a fire hazard in closed metal containers and remove daily from Work Site.

.4 Remove all electrical plates, surface hardware, fittings and fastenings, prior to finishing operations. These items are to be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvent to clean hardware that may remove the permanent lacquer finish.

3.4 Preparation of Surfaces

.1 Prepare surfaces to be painted or finished in accordance with MPI Architectural Painting Specification Manual, or the coating manufacturer’s printed instructions, whichever is the more stringent.

.2 Concrete surfaces which have been previously cured with conventional curing compounds or are contaminated with form oils must be completely cleaned by abrasive blasting. Acid etching is not acceptable, as it will not normally remove these contaminates. After surface is properly prepared, small holes or voids shall be filled in accordance with the coating manufacturer's recommendations.

.3 Remove factory-applied bituminous coating from ductile iron piping, scheduled for painting, by shot-blast cleaning to SSPC method and degree specified in the applicable painting formula. Shop apply primer as specified, prior to installation of piping.

.4 Touch up pre-primed steel and iron surfaces with a primer compatible with the shop applied primer. Remove dust, dirt and grease.

.5 Previously painted surfaces scheduled for painting shall be cleaned using appropriate previously specified method. Check existing paint coatings for compatibility with paint with which they are to be over coated. If coatings are not compatible, submit recommendations for review by Departmental Representative.

3.5 Application

.1 Ensure that all testing of equipment and process and building systems has been successfully completed, before commencing painting of related surfaces.

.2 Apply paint and other finishes in accordance with good trade practice, and manufacturers' printed instructions.

.3 Cover surfaces satisfactorily with an even colour tone. Apply primer immediately after surface preparation, where recommended.

.4 Apply each coat at the proper consistency.

.5 Sand and dust between coats to remove defects visible from distance up to 1.5 m. Refer to paint manufacturer's technical sheets for coating and re-coating recommendations.

.6 Do not apply finishes on surfaces that are not sufficiently dry.

.7 Allow each coat of finish to dry before a following coat is applied, unless directed otherwise by manufacturer.

.8 Back prime interior woodwork which is to receive a paint finish with enamel undercoat paint, immediately upon arrival at the Work Site.

.9 Exterior and interior woodwork to be stained and/or varnished shall be back primed with gloss varnish reduced 25% with mineral spirits.

.10 Prime top and bottom edges of wood and metal doors in accordance with applicable paint formula.

.11 Use the following reference for contact surfaces.

.1 Steel surfaces in contact with aluminum shall receive one prime coat and one aluminum finish coat.

.2 Aluminum surfaces in contact with steel surfaces: prime coat with fast-dry modified alkyd primer.

.3 Wood surfaces in contact with other surfaces: prime coat (sealer).

.4 Aluminum surfaces in contact with concrete or masonry shall be prime coated with fast-dry modified alkyd primer, and painted with two coats of interior/exterior acrylic enamel.

.5 Any surfaces not in direct bonded contact but inaccessible after assembly shall receive either the full specified paint system or three coats of the specified primer before assembly.

.12 Painting of previously painted surfaces touch-ups:

.1 Clean areas to be painted using appropriate previously specified method.

.2 Minimum coating requirements for spot-painting shall be as follows:

.1 No rusting, but prime coat exposed - Sand lightly and feather edges. Apply 1 to 2 finish coats to regain specified minimum dry film thickness.

.2 No rusting, but prime coat damaged - Clean area to base material, sand lightly and feather edges. Apply prime coat and two finish coats. Sand and feather edges between coats.

.3 Rust areas - Clean to original standard of surface preparation. Apply coats as per .2 above. Only apply additional spot finished coat, if required, to maintain appearance.

.3 Check existing paint coatings for compatibility with paint with which they are to be over-coated. If not compatible, submit recommendations for review by the Departmental Representative.

3.6 Cleaning

.1 As the work proceeds and upon completion, remove all paint where spilled, splashed or spattered.

.2 During the progress of the work, keep the premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris.

.3 At the conclusion of the work leave the premises neat and clean.

3.7 Inspection

.1 Contractor shall use wet thickness indicators for application guide.

.2 Provide necessary facilities and co-operate with inspector.

.3 Painted surfaces will be checked for actual dry film thickness in accordance with Steel Structures Painting Council, Paint Application Specification No. 2 (SSPC-PA2) five-spot method.

.4 Repaint wherever dry film thickness found inadequate.

.5 When defects are revealed, the Departmental Representative may request additional inspection to ascertain full degrees of defect, at no cost.

.6 Correct defects and irregularities as advised by the Departmental Representative and subject to further inspection under similar conditions as earlier inspections, at no cost.

3.8 Schedule of Finishes

.1 Outdoor Finishes

Surface	Protective Coating System	Minimum D.F. Thickness
Ferrous Metal	Surface Preparation: Blast Clean New Steel to SSPC-SP10 Near White Blast, Surface Profile: 1-2 mils (25 – 50 microns).	
	1st Coat: Zinc-rich epoxy primer, CAN/CGSB-1.181 Acceptable Products: - Ameron Amercoat 68HS - Devoe Catha-Coat 303H - International Interzinc 52 - Carboline Carbozinc 859	2.5 mils
	2nd Coat: High-build epoxy, CAN/CGSB-1.153-M Acceptable Products: - Ameron Amercoat 385 - Devoe Bar Rust 236 - International Interseal 670HS - Carboline Carboguard 890	6-8 mils

Surface	Protective Coating System	Minimum D.F. Thickness
	3rd Coat: Low V.O.C. polyurethane, CAN/CGSB-1.177-M Acceptable Products: - Ameron Amercoat 450 H.S. - Devoe Devthane 369 - International Interthane 990 H.S. - Carboline Carbothane 134 HG	2-3 mils
Galvanized Metal	Surface Preparation: Clean to SSPC-SP1 Solvent Wash, as per Manufacturer's instructions. Welds must be neutralized. 1st Coat: Vinyl etch primer, CAN/CGSB-1.121 Acceptable Products: - General Paint 39103/104 Metaprime - Glidden 27301/302 Vinyl Wash Primer - International Interprime VTA528/529 2nd Coat: High-build epoxy, CAN/CGSB-1.153-M Acceptable Products: - Ameron Amercoat 385 - Devoe Bar Rust 236 - International Interseal 670HS 3rd Coat: Low V.O.C. polyurethane, CAN/CGSB-1.177-M Acceptable Products: - Ameron Amercoat 450 H.S. - Devoe Devthane 369 - International Interthane 990 H.S.	0.3 - 0.5 mils 5-6 mils 2-3 mils
Wood Stained	1st Coat: Alkyd/Oil stain, CAN/CGSB-1.145 Acceptable Products: - General Paint 01-line - Glidden 4710 - Porter Pittsburgh 1819 Series 2nd Coat: Alkyd/Oil stain, CAN/CGSB-1.145 Acceptable Products: - General Paint 01-line - Glidden 4710 - Porter Pittsburgh 1819 Series	

.2 Indoor Finishes

Surface	Protective Coating System	Minimum D.F. Thickness
Galvanized Metal	Surface Preparation: Clean to SSPC-SP1 Solvent Wash, as per Manufacturer's instructions. Welds must be neutralized.	

Surface	Protective Coating System	Minimum D.F. Thickness
	1st Coat: Vinyl etch primer, CAN/CGSB-1.121 Acceptable Products: - General Paint 39103/104 Metaprime - Glidden 27301/302 Vinyl Wash Primer - International Interprime VTA528/529	0.3 - 0.5 mils
	2nd Coat: High-build epoxy, CAN/CGSB-1.153-M Acceptable Products: - Ameron Amercoat 385 - Devoe Bar Rust 236 - International Interseal 670HS	5-6 mils
	3rd Coat: Low V.O.C. polyurethane, CAN/CGSB-1.177-M Acceptable Products: - Ameron Amercoat 450 H.S. - Devoe Devthane 369 - International Interthane 990 H.S.	2-3 mils
Wood Painted	1st Coat: Enamel undercoat or Waterborne epoxy (thinned) as per manufacturer's recommendations.	1.5 mils
	2nd Coat: Waterborne epoxy (semi-gloss finish) Acceptable products: - Ameron Amercoat 335 - Devoe Tru-Glaze-WB 4408 - International Intergard 735	2 - 3 mils
	3rd Coat: Waterborne epoxy (semi-gloss finish) Acceptable products: - Ameron Amercoat 335 - Devoe Tru-Glaze-WB 4408 - International Intergard 735	2 - 3 mils

END OF SECTION

1.0 GENERAL

1.1 Design Requirements

.1 Sign supports and appurtenances to be capable of withstanding summation of following loads:

.1 Wind and ice loading specified to be consistent with anticipated loads in locality of installation. Refer to National Building Code of Canada and/or applicable provincial building code.

.2 Dead load of signboards, sign supports and appurtenances.

.3 Ice load on one face of signboards and around surface of all structural members and appurtenances.

.2 Structural deflections and vibration in accordance with American Association of State Highway and Transportation Officials (AASHTO), "Specifications for the Design and Construction of Structural Supports for Highway Signs".

1.2 Shop Drawings

.1 Submit shop drawings for signage structures indicating product data and design.

2.0 PRODUCTS

2.1 Sign Supports

.1 Metal/ channel, powder coated black.

.1 Dimensions: heights to fit signs as indicated on the Drawings.

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

2.2 Signboards

.1 Aluminium sheet to ASTM B209M, pre-cut to required dimensions. Minimum thickness to be 1.6 mm for signboards up to 750 mm wide. Minimum thickness to be 2.0 mm for signboards 750-1200 mm wide.

.2 Connecting straps and brackets to ASTM B209M.

.3 3M HI-Intensity Scotch lite.

2.3 Fabrication

.1 Signboards

.1 Aluminium blanks: Degrease, etch and bonderize with chemical conversion coating.

.2 Clean surfaces with xylene thinner. Dry. Aluminium signboards are to be painted before installation. Spray and bake face of signboards with two coats of enamel in accordance with CAN/CGSB-1.104.

.3 Sign identification

.1 Apply sign number and date of installation with 25 mm high stencil painted black letters on lower left back face of each signboard.

3.0 EXECUTION

3.1 Installation

.1 Sign Support

.1 Metal powder coated post installations are to be excavated with an auger. Compact bottom of hole to provide firm foundation. Set post and backfill in 150 mm layers with excavated material. Compact each layer before placing each subsequent layer.

.2 Permissible tolerance is ±12 mm departure from vertical.

.2 Signboard

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

.2 Use strapping with crimped or bolted connections where signs fastened to utility poles.

3.2 Protection

.1 Place temporary covering on signboards where required. Covering to be capable of withstanding rain, snow and wind and be non-injurious to signboard. Replace deteriorated covering and remove covers as reviewed by Departmental Representative.

3.3 Correcting Defects

.1 Correct defects, identified by Departmental Representative, consistency of reflectivity, colour or illumination.

END OF SECTION

1.0 GENERAL

1.1 Action and Informational Submittals

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

.2 Product Data:

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

.3 Samples:

.1 Submit 1 sample.

.2 Allow continual sampling by Departmental Representative during production.

.3 Provide Departmental Representative with access to source and processed material for sampling.

.4 Supply new or clean sample bags or containers according appropriate to aggregate materials.

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

2.0 PRODUCTS

2.1 Materials

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.

.2 Flat and elongated particles of coarse aggregate: to ASTM D 4791.

.1 Greatest dimension to exceed 5 times least dimension.

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

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

.2 Reclaimed asphalt pavement.

.3 Reclaimed concrete material.

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

.1 Crushed rock.

.2 Crushed gravel composed of naturally formed particles of stone.

.3 Reclaimed asphalt pavement.

.5 All utility pipe bedding to be:

.1 25 mm minus washed drain rock (wrapped in non-woven geotextile in accordance with 31 32 19.01 Geotextiles); or

Sieve Size	Percent Passing by Weight
25 000	100
16 000	90-100
10 000	45-75
5 000	0-15
1 250	0-5

.2 Bedding sand (not required to be wrapped in non-woven geotextile)

Sieve Size	Percent Passing by Weight
10 000	100
5 000	70-100
160	5-20
75	0-12

.6 Base Course Aggregate shall meet the following sizes:

Sieve Size	Percent Passing by Weight
25 000	100
20 000	82-97
16 000	70-94
10 000	52-79
5 000	35-64
1 250	18-43
630	12-34
315	8-26
160	5-18
80	2-10

2.2 Source Quality Control

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 2 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Departmental Representative 2 weeks minimum in advance of proposed change of material source.

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

3.0 EXECUTION

3.1 Preparation

.1 Processing:

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

.1 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy graduation requirements for material and, percentage of crushed particles, or particle shapes specified.

.1 Use methods and equipment approved in writing by Departmental Representative.

.2 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.

.3 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.

.1 Use only equipment approved in writing by Departmental Representative.

.4 Stockpiling:

.1 Stockpile aggregates on site.

.2 Stockpile aggregates in sufficient quantities to meet project schedules. Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.3 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate.

.4 Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

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

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials within 48 hours of rejection.

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

.1 Maximum 3.0 m for coarse aggregate and base course materials.

.2 Maximum 3.0 m for fine aggregate and sub-base materials.

.3 Maximum 3.0 m for other materials.

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

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

.3 Do not use conveying stackers.

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

3.2 Cleaning

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

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

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

.3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.1 Leave any unused aggregates in neat compact stockpiles

END OF SECTION

1.0 GENERAL

1.1 Definitions

.1 Clearing:

.1 Clearing the areas within the limits of construction shall consist of cutting and disposing of trees, brush vegetative growth and logs above the ground surface.

.2 Grubbing:

.1 Grubbing shall consist of removal or close cut stumps within the clearing limits with minimum disturbance to the terrain outside the clearing limits.

1.2 Regulatory Requirements

.1 Obtain necessary permits from Authorities Having Jurisdiction and adhere to Provincial, Federal and local bylaws regarding disposal of merchantable timber in the area. The Contractor shall follow the Basic Impact Analysis (BIA) and Approved Environmental Protection Plan (EPP) in accordance with section 01 35 43 Environmental Protection.

1.3 Protection

.1 Prevent damage to trees, landscape, natural features, bench marks, existing buildings, utility lines, site appurtenances, water courses and root systems of trees which are to remain. All damage incurred shall be repaired by the Contractor at their expense.

.2 Apply tree paint approved by Departmental Representative, to cuts or scars suffered by vegetation designated to remain.

2.0 PRODUCTS

.1 Supply all labour, materials and equipment required for clearing and grubbing.

3.0 EXECUTION

.1 Undertake clearing and grubbing as required to complete the work. Coordinate extent of clearing and grubbing with Departmental Representative.

.2 All cut vegetation from clearing shall be disposed in an approved landfill outside of the National Park.

.3 Where the Contractor fails to observe clearing and grubbing restrictions and limitations, and causes damage to property beyond areas as indicated on the Drawings or as designated by Departmental Representative, such damages shall be the Contractor’s liability and shall be corrected immediately at the Contractor’s expense.

END OF SECTION

1.0 GENERAL

1.1 Definitions

.1 Topsoil:

.1 The top layer of soil containing organic material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

2.0 PRODUCTS

.1 Supply all labour, materials and equipment required for topsoil stripping.

3.0 EXECUTION

.1 Excavate topsoil as close as is practicable to the lines and grades shown on the Drawings, or as required by Departmental Representative.

.2 Topsoil shall be stripped to a depth that will ensure complete removal of all organic materials. The topsoil shall be stockpiled in areas indicated on the drawings or as otherwise designated by Departmental Representative.

.3 Special care must be taken to avoid mixing topsoil with the underlying soil. Departmental Representative may require that the Contractor provide a separate stockpile for topsoil contaminated with common material.

END OF SECTION

1.0 GENERAL

1.1 Definitions

.1 Common Excavation:

.1 After stripping the topsoil surface from the site, common excavation is the excavation of all materials including, native material, hardpan, quicksand, and frozen earth; also rock, shall be classified as common excavation.

1.2 Protection

.1 The Contractor shall be responsible for locating and protecting all existing underground and surface structures, utility pipelines, overhead lines and poles, fences, and other works. All damage incurred shall be repaired by the Contractor at his expense.

2.0 PRODUCTS

.1 Supply all labour, materials and equipment required for site grading.

3.0 EXECUTION

3.1 Grading and Excavation

.1 Grading and excavation shall include the removal and/or satisfactory placement of all materials necessary for construction of the Project.

3.2 Embankment (Berms)

.1 The embankments shall be constructed above the natural ground or other level as required by the Departmental Representative, in conformity with the lines, grades and cross-sections shown on the Drawings.

.2 All suitable material from excavations shall be used in forming embankments or shall be otherwise disposed of as the Departmental Representative may require.

.3 Embankments shall be formed of suitable unfrozen material. Stumps, trees, rubbish, sod, topsoil or other unsuitable material shall not be placed in the embankment.

.4 Embankment materials shall not be placed on frozen earth, snow or ice, nor shall frozen soils, ice or snow be placed in any embankment. However, on approval of the Departmental Representative, embankment material may be placed on the existing ground surface if frost penetration is 0.10 m or less. Any frozen material in the embankment shall be removed and disposed of at the Contractor's expense before proceeding with further embankment construction.

.5 Embankments shall be constructed so that after settlement is complete the required grade and cross-section is attained at all points. If at any time before

final acceptance of the work the embankment settles below the required grade, it shall be brought back to the required grade by the Contractor.

3.3 Borrow Excavation

.1 The borrowing of materials for embankment will be allowed only after all excavations have been completed.

3.4 Compaction

.1 All material placed in embankments shall be spread and bladed smooth in successive layers, not to exceed 0.15 m in depth when compacted and to the full width of the cross-section. Each layer shall be compacted by means approved by the Departmental Representative to a minimum of 98% Standard Proctor Density. Materials placed in the upper 0.3 m of embankments shall not contain rock which has a diameter larger than 0.15 m. The material in each layer shall be compacted at the optimum moisture content plus or minus 2%, unless otherwise required by the Departmental Representative. In case of controversy, the degree of compaction and/or moisture content will be determined by in situ density testing before the succeeding layer is placed.

.2 Compaction over the entire surface area of each layer shall be obtained by equipment to meet the specified density requirements. Hauling equipment will not be accepted in lieu of compaction equipment. Compaction to the specified density shall be obtained uniformly throughout each layer.

.3 Where the embankment to be placed traverses muskeg or yielding ground and it is not possible to place the initial embankment lift in a 0.15 m compacted depth, the Contractor may, upon approval of the Departmental Representative, construct the first embankment lift to a depth sufficient to support the construction equipment. All embankment to be constructed above this support will be constructed in 0.15 m compacted depths, as hereinbefore specified.

.4 Where moisture content tests indicate that material being used for embankment is above optimum moisture content, the material shall be thoroughly worked until its optimum moisture content is reached.

.5 Where moisture content tests indicate the material for embankment is below optimum moisture, water shall be added. The material shall be thoroughly diced and broken down, water added in amounts as required, and the material thoroughly worked to mix the water uniformly throughout the soil prior to commencing compaction operations. The type of water hauling and spraying equipment used shall be satisfactory to the Departmental Representative.

3.5 Surplus Material

.1 Where excavated material is not specifically directed to be used as fill or for any other purpose, the Contractor will be required to haul the material work to an approved disposal site. There is no separate payment for this work and is considered included in the subgrade preparation unit payment.

.2 All materials deemed to be in excess of requirements or unsuitable shall be disposed of appropriately by the Contractor outside of Yoho National Park (and any National Park).

END OF SECTION

1.0 GENERAL

1.1 Requirements

.1 Read in conjunction with all Sections and Drawings of this contract.

1.2 Description of Work

.1 Temporary Erosion and Sediment Control: includes the installation and maintenance of temporary structural control measures as required or specified to reduce or eliminate the erosion of soil and transport of sediment off-site. This may include, but not be limited to, silt fences, erosion control blankets, ditch checks, and sediment traps.

.2 Dust control: includes the management of operations and the application of water of dust palliatives in order to reduce or eliminate the spread of dust from the project limits.

2.0 PRODUCTS

2.1 Materials

.1 Silt Fence:

.1 Nilex- Amoco 2130 or approved equal.
.2 Layfield Silt Fence (SF 135) and wire back or approved equal.

.2 Erosion Control Blanket: evaluate with the Departmental Representative the existing conditions where erosion control blanket is being installed, prior to installation. If not suitable for conditions found, notify Departmental Representative prior to commencement of work.

Material	**Performance Properties for Slopes**	**Performance Properties for Channels**
	Cover Factor, C[1,2]	**Permissible Shear Stress [3,4] (N/M^2)**
Type A: (<12 months Functional Longevity) Single-net Erosion Control Blankets and Open Weave Textiles	≤ 0.15 @ 3:1 (h:v) and flatter	72
Type B: (<12 months Functional Longevity) Double-net Erosion Control Blankets and Open Weave Textiles	≤ 0.20 @ 2:1 (h:v) and flatter	84
Type C: (<12 months Functional Longevity) Erosion Control Blankets and Open Weave Textiles	≤ 0.25 @ 1:1 (h:v) and flatter	96

[1] C-factor calculated as ratio of soil loss from RECP protected slope to ration of soil loss from unprotected (control) plot in large-scale testing. These performances test values should be supported by periodic bench testing under similar conditions using ECTC Test Method #2.

[2] Acceptable large-scale testing protocol may include ASTM D 6459 or other independent testing deemed acceptable by the department engineer.

[3] Minimum shear stress RECP (unvegetated) can sustain without physical damage or excess erosion [>12.7 mm soil loss] during a 30-minute flow event in large-scale testing. These performance test values should be supported by periodic bench scale testing under similar test conditions using ECTC Test Method #2.

[4] Acceptable large-scale testing protocol may include ASTM D 6460 or other independent testing deemed acceptable by the department engineer.

.1 Type A: North American Green: S75, S75BN or approved equal.

.2 Type B: North American Green: S150, S150BN, or approved equal.

.3 Type C: North American Green: C125, C125BN, SC150, SC150BN, or approved equal.

.3 Water: apply water to the construction site as appropriate to reduce or eliminate the spread of dust outside the Project Limits.

3.0 EXECUTION

3.1 Erosion and Sedimentation Control

.1 Minimize the amount of disturbed land that is susceptible to erosion. Ensure that areas outside the limits of construction are clearly defined and protected from all construction activities.

.2 Provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, ponds, designated site holding pond or other areas of water impoundment, or the delivery and deposition of sediment onto adjacent roads or properties.

.3 Clear haul routes to site and provide dust control measures.

3.2 Slurry and Silt Control Measures

.1 Saw cutting slurry is not permitted to enter any water body in the vicinity, nor any storm sewer system.

.2 Minimize the amount of water used to cool and lubricate the saw, so as to minimize the amount of slurry generated.

.3 Cover/ block drains to prevent slurry from entering them.

.4 Direct saw cutting slurry into an excavation. Do not allow slurry to migrate to a nearby water body or storm drain.

.5 Clean up contained slurry remaining on the road. Place an absorbent material on the slurry and clean up as a solid either manually or by calling street sweeper. (Pay all cost for a street sweeper) Alternatively, collect as a slurry using an appropriate sized vacuum. (e.g. Vacuum sweeper or Vactor Unit for large amounts or wet/dry vacuum cleaner for small amounts.)

.6 Dispose of slurry off site. Contractor is responsible for all disposal and cost associated.

3.3 Silt Fence

.1 Place silt fence in a manner that will intercept run-off at or close to right angles to flow. Refer to drawings for specific locations.

.2 Fence pole length to be minimum 1800 mm total.

.3 Position post at maximum 2000 mm o.c., drive post a minimum depth that can adequately brace post to prevent overturning of fence due to sediment loading.

.4 Ensure fence fabric remains naturally taut and fence posts are securely in place.

.5 Silt fence fabric shall be exposed max. 1000 mm and min. 600 mm above the ground surface.

.6 Excavate a trench min. 150 mm deep. Bury excess fabric at bottom of silt fence minimum of 150 mm in the excavated trench located upstream such that no flow can pass under fence. Backfill over silt fence fabric ensuring good backfill compaction such that no gap exists between ground and fabric.

.7 Splice subsequent lengths of barrier only at support post locations. Splice by wrapping geo-textile fabric completely around each of the two abutting support post, as indicated on the drawings and/ or reviewed shop drawings, such that gap between abutting posts is completely covered by other sections of fabric.

.8 Improper installation of silt fence may result in removal and re-installation at Contractor's cost.

.9 Where silt fence is placed within or at the bottom of a slope, turn the ends of the silt fence slightly upslope in "J" or "smile" configuration to ensure flow does not bypass end of silt fence.

3.4 Monitoring and Maintenance Requirements

.1 Maintain integrity of silt fences, and all other erosion and sedimentation control measures as long as necessary to contain sediment run-off. Inspect all temporary silt fences and all other erosion and sedimentation control measures immediately after each storm, rainfall, snow melt and the like, within 24 hours of such event, weather permitting and at least daily during prolonged rainfall or storm. Immediately correct any deficiencies.

.2 Remove sediment deposits when deposits reach approximately one-third of height of silt fence or install second silt fence up slope.

.3 Remove and dispose of sediment offsite. Notify the Departmental Representative prior to disposing of sediment.

.4 Monitor erosion control blanket to ensure that all anchoring is stable and staples securely installed. Replace damaged erosion control blankets if erosion control measures and performance is compromised. Reseed as required prior to replacement. Repair installation and anchoring as required.

.5 Reseed and repair seeded areas that have become bare or damaged by construction activity. Reseed with approved seeding material at Contractors own cost. Departmental Representative must approve seed samples prior to reseeding.

3.5 Clean Up

.1 Remove erosion and sedimentation controls after completion of work when they are no longer required. Obtain approval from Departmental Representative prior to removing any erosion and sedimentation control measures.

END OF SECTION

1.0 GENERAL

1.1 Intent

.1 The Contractor shall supply and place non-woven geotextile filter fabric as indicated on the drawings, and as directed by the Departmental Representative in areas where the subgrade foundation conditions are considered soft and unstable.

2.0 PRODUCTS

2.1 Non-Woven Geotextile

.1 The non-woven geotextile filter fabric shall be in accordance with the following table:

Non-Woven Geotextile Filter Fabric Specifications and Physical Properties	
Grab Strength	400 N min
Elongation (Failure)	50 % min
Puncture Strength	240 N min
Burst Strength	1.27 MPa min
Trapezoidal Tear	175 N min
Minimum Fabric Lap	300 mm min
Permittivity	2.1 /s min

3.0 EXECUTION

3.1 Examination

.1 Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.

.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Installation

.1 Construction shall be as per Manufacturer's instructions.

.2 Place geotextile by unrolling onto graded surface in locations indicated on Drawings.

.3 Place geotextile material smooth and free of tension, stress, folds, wrinkles, and creases.

.4 Overlap each successive strip of geotextile 300 mm over previously laid strip. In the case of use below rip rap and rip rap channels, the upstream strip of geotextile is to overlap overtop of the downstream strip of geotextile.

.5 Protect installed geotextile material from displacement, damage, or deterioration before, during, and after placement.

END OF SECTION

1.0 GENERAL

1.1 Action and Informational Submittals

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

2.0 PRODUCTS

2.1 Not Used

.1 Not Used.

3.0 EXECUTION

3.1 Reservation of Material

.1 Whenever gravel, sand topsoil, or any other material suitable for special use is encountered, it shall be deemed to be the property of the Yoho National Park.

.2 Where layers of gravel or gravely mixtures are encountered, suitable materials shall be excavated separately from other excavation and shall be stockpiled at Yoho National Park or incorporated into the work as base material after testing the material in a laboratory to determine the grain size distribution and CBR values.

3.2 Disposal of Material

.1 Where excavated material is not specifically directed to be used as fill or for any other purpose, the Contractor will be required to haul the material from site to an approved disposal site. There is no separate payment for this work and is considered included in the subgrade preparation unit payment.

.2 All materials deemed to be in excess of requirements or unsuitable shall be disposed of appropriately by the Contractor outside of Yoho National Park (or any National Park).

3.3 Finishing and Compacting Subgrade

.1 The excavated sections shall be ploughed to a depth of at least 150 mm below the surface of the subgrade and compacted to a minimum of one hundred percent (100%) of Standard Proctor Density. The cut shall be left sufficiently high the after compaction so that it can be trimmed to the final grade, and any loose material resulting from this operation removed. All depressions caused by the finishing rollers shall be removed during the final blading operation.

3.4 Excavation Below Grade

.1 Unsuitable Materials: When topsoil, muskeg, or other soft areas are encountered below the finished subgrade, which in the opinion of the Departmental Representative require removal, the area shall be subcut and the unsuitable material excavated, loaded and disposed of outside of Yoho National Park (and

any National Park). These materials shall be replaced with suitable common excavation.

.2 Placing Fill: Fill material shall be placed in successive horizontal layers not exceeding 150 mm in compacted thickness. Suitable spreading and leveling equipment shall be kept in continuous operation at all times.

.3 Compaction: The compaction shall be sufficient to obtain a minimum density of 98% of maximum dry density in accordance with ASTM D698 (Method C or D), unless otherwise stated in the specifications. Where it is necessary to add or remove moisture from the soil to obtain the compaction, it shall be done as part of the requirements of this section.

.4 Finishing: The fill section shall be compacted to a level slightly above the finished grade, and cut back to the final elevation. All loose material shall be removed from the surface of the subgrade.

3.5 Compaction Procedures

.1 The following tests shall be employed to establish compaction procedures:

.1 The maximum dry density of the soil shall be determined by ASTM procedure D-698 (Moisture Density Relationships of soils), to be determined for each soil type. The optimum moisture content of the soil shall be determined from the laboratory compaction curve established.

.2 Fill material shall be placed in compacted lifts at a moisture content within ±2% of the optimum moisture content.

.3 The field density of soils shall be determined by ASTM D-2922 – Determining density of soil and soil aggregate in place by nuclear methods (shallow depth).

.4 The exposed subgrade should be proof rolled using a heavily loaded gravel truck or equivalent piece of equipment to identify any soft areas undetected during site grading. Proof rolling should be completed under the supervision of qualified technical personnel. Recommendations pertaining to the repair of soft areas shall be provided at the time of inspection but may include subcutting the subgrade.

3.6 Compacted Thicknesses of Lifts

.1 The following table shows normal compacted thicknesses of lifts:

Equipment Type	Cohesive Soils	Non-Cohesive Soils
Vibratory Sheepsfoot Packer	300 mm	300 mm
Sheepsfoot Packer	200 mm	--
Pneumatic Tire	200 mm	200 mm
Vibratory Roller	150 mm	300 mm
Pneumatic Tamper	100 mm	100 mm

(contact area < 130 sq cm)		
Pneumatic Tamper	100 mm	100 mm
(contact area > 130 sq cm)	100 mm	100 mm
Mechanical Tamper		
(diesel or gas – jumping jack)	100 mm	200 mm

.2 Thickness of lifts for other equipment shall be determined by laboratory testing procedures during the construction process. The Departmental Representative may grant approval in writing to alter lift thicknesses upon evidence of satisfactory compaction at other lift thicknesses.

3.7 Testing Compaction

.1 Compaction results shall be based on a minimum of one density test per 1000 square metres of asphalt. Additional tests may be called for by the Departmental Representative as deemed necessary.

.2 Field density tests shall conform to ASTM D1556, ASTM D2167, or ASTM D2922 for comparison with a maximum density determined according to ASTM D698 Method C or D.

END OF SECTION

1.0 GENERAL

1.1 Action and Informational Submittals

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

2.0 PRODUCTS

2.1 Samples

.1 At least two (2) weeks prior to commencing work, provide the Departmental Representative of proposed source of aggregates and provide materials certification of properties below.

2.2 Materials Certification

.1 Aggregates: At least two (2) weeks prior to commencing work provide:

.1 Test data reports representing granular base and/or granular sub-base processed into stockpile. Submit one (1) complete aggregate gradation analysis report for every 1,000 tonnes of each material required for the project or one complete analysis for each production day when production is less than 1,000 tonnes.

.2 Include percentage of crushed coarse aggregate particles in granular base reports.

.3 Certification that the physical properties of the aggregates meet the requirements of this section.

.4 Reports and certification shall be provided by an independent testing consultant under the signature and professional seal of a qualified materials engineer.

.2 At least two (2) weeks prior to contemplate change in source of aggregates, provide written notification to the Departmental Representative and provide new materials certification in accordance with the requirements of this section.

2.3 Granular Base

.1 Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Physical properties of Aggregates:

% Fracture, by weight (2 faces)	60 min.
Los Angeles Abrasion, loss, %	45 max.
Liquid Limit, %	25 max.
Plasticity Index, %	6 max.
Lightweight Particles, %	5 max.
California Bearing Ratio, when compacted to 100% of ASTM D698	55 min.

.3 Gradation to be within the following limits when tested to ASTM C-117 with sieve sizes to CAN/CGSBD 8-GP-2M rather than ASTM E11, and to have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

Sieve	Percent Passing by Weight
25 000	100
20 000	82-97
16 000	70-94
10 000	52-79
5 000	35-64
1 250	18-43
630	12-34
315	8-26
160	5-18
80	2-10

3.0 EXECUTION

3.1 Preparation

.1 The Contractor shall maintain the subgrade to the specified section, free from ruts, waves and undulations until granular base course material is placed. The subgrade shall be in a firm dry condition and must be approved by the Departmental Representative before gravel is placed. The depositing of granular base on a soft, muddy or rutted subgrade will not be permitted.

3.2 Placing

.1 Place material on a clean unfrozen surface, properly shaped and compacted and free from snow and ice.

.2 Place using methods which do not lead to segregation or degradation of aggregate. Use approved methods to create uniform windrow of material along a crown line or high side of a one-way slope.

.3 Place material to full width in layers not exceeding 150 mm in compacted thickness.

.4 Shape each layer to a smooth contour and compact to the specified density before succeeding layer is placed.

.5 Remove and replace any portion of a layer in which material becomes segregated during spreading.

.6 Remove and replace any portion of a layer in which material becomes segregated during compaction.

3.3 Compacting

.1 Moisture condition of granular base course materials to be within plus or minus 2 percent of the optimum moisture content of the material.

.2 Compact to density not less than ninety eight (98%) of maximum dry density in accordance with ASTM D698 (Method C or D). Compact the top 150 mm layer to density not less than one hundred 100% of maximum dry density in accordance with ASTM D698 (Method C or D).

.3 Shape and compact alternately to obtain a smooth, even and uniformly compacted base.

.4 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.

3.4 Finish Tolerances

.1 Finished base surfaces shall be within plus or minus 10 mm of established grade, but not uniformly high or low.

.2 Correct surface irregularities by loosening and adding or removing materials until surface is within the specified tolerances.

3.5 Maintenance

.1 Maintain finished base in a condition conforming to this section until succeeding material is applied or until acceptance.

3.6 Testing Compaction

.1 The Contractor shall perform all quality assurance tests for acceptance in accordance with the requirements of this section. Compaction results shall be based on a minimum of one density test per 1000 square metres of asphalt. Additional tests may be called for by the Departmental Representative as deemed necessary.

.2 Field density tests shall conform to ASTM D1556, ASTM D2167, or ASTM D2922 for comparison with a maximum density determined according to ASTM D698 Method C or D.

END OF SECTION

1.0 GENERAL

1.1 Action and Informational Submittals

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

1.2 Definitions

.1 End Product Specification (EPS) – A specification whereby the methods of construction are not defined. Under EPS the Departmental Representative will monitor the Contractor's control of the process that produces the items of construction and will accept or reject the end product according to a specified acceptance plan. The Contractor is responsible for quality control. End product acceptance, including quality acceptance is responsibility of the Departmental Representative.

.2 Project Category – For the purposes of this specification, projects are to be identified as Category A or Category B. Generally, Category A projects have asphalt concrete quantities greater than 2,000 tonnes of any one mix type; and Category B projects have quantities of any one mix type less than 2,000 tonnes.

.3 Lot – A lot is a portion of the Work being considered for acceptance, and is defined as the following:

.1 Category A projects – One day of plant production, per mix type, when the day's quantity is greater than 1,000 tonnes. When a day's production is less than 1,000 tonnes, the material may be added to the previous or subsequent day(s) of production, at the Departmental Representative's discretion. The maximum Category A lot size shall be 2,000 tonnes.

.2 Category B projects – The entire project quantity for each mix type.

.3 At the Departmental Representative's discretion, any portion of the Work may be deemed a lot.

.4 Stratified Random Sample – A Stratified random Sample is a set of test measurements taken one each from 5 or more separate (stratified) areas or segments within a Lot in an unbiased way.

2.0 PRODUCTS

2.1 Materials

.1 Type 1 or Type 2 shall be used.

.2 Asphalt Cement

.1 Asphalt Cement shall be prepared by the refining of petroleum and shall not foam when heated to 177 C.

.2 The tolerance allowed by ASTM for testing precision will be applied from acceptance of asphalt cement.

.3 Asphalt cement shall meet the following requirements:

Table 2.1: Asphalt Cement Requirements

REQUIREMENTS	ASTM TEST METHOD	VALUES
Kinematic Viscosity at 135 °C, mm^2 /sec	D2170	200-300
Absolute Viscosity at 60 °C, 300 mm, hg Vacuum, Pa.S	D2171	60-100
Penetration at 25 °C, 100g, 5sec; dmm	D5	150-200
Flash Point (Cleveland Open Cup) , °C	D92	205 min.
Thin Film Oven Test. Penetration after test at 25 °C, 100g, 5sec.; % of Original	D5	50 min
Ductility at 25 °C and greater, 5 cm/min.; cm	D113	100 max
Solubility in Trichlorethylene, % by Mass	D2042	99.5 min.

.4 Aggregates:

.1 Coarse aggregate is aggregate retained of the 5 000 µm sieve; fine aggregate is aggregate passing the 5 000 µm sieve.

.2 Aggregate material shall be crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.3 Gradation to be within limits specified, when tested to ASTM C-136 and ASTM C-117 with sieve sizes to CAN/CGSB 8-GP-2M rather than ASTM E11.

.4 Aggregate shall be processed to meet the following requirements:

.1 Natural fines shall be pre-screened and stockpiled with not more than 10% of material retained in the 5 000 µm sieve and 100% passing the 10 000 µm sieve.

.2 Fine fraction or manufactured sand to contain no more than 20% of material retained on the 5 000 µm sieve.

.5 Physical properties of aggregates to meet the following the requirements in Table 2.2.

Table 2.2: Aggregate Physical Property Requirements

REQUIREMENT	TEST STANDARD	MIX TYPES I, II AND III
Los Angeles Abrasion, Grading B (% loss)	C131	32.0 max.
Magnesium Sulphate Soundness (% loss) Coarse Aggregate:	C88	12.0 max.
Fine Aggregate:		12.0 max.
Lightweight Particles (%)	C123	1.5 max.

.6 Blend sand:

.1 To consist of natural of manufactured sand passing the 5 000 µm sieve.

.2 Stockpile volumes shall be maintained to ensure a minimum of 5 000 tonne of plant mix production at all times.

.7 Blended Aggregate Requirements:

.1 Aggregate Gradation Requirements, including Reclaimed Asphalt Pavement (RAP), to meet the requirements of Table 2.3.

Table 2.3: Blended Aggregate Gradation Requirements

SIEVE SIZE (µm)	Percent Passing					
	Type I		Type II		Type III	
	Max.	Min.	Max.	Min.	Max.	Min.
25 000	-	-	100	100	-	-
20 000	-	100	95	85	-	-
16 000	100	97	88	77	-	100
12 500	95	85	80	65	100	90
10 000	85	70	72	57	90	75
5 000	65	50	55	40	75	60
2 500	50	40	42	30	60	45
1 250	40	30	33	23	45	30
630	30	20	27	17	36	22
315	23	15	22	12	27	15
160	16	6	15	6	18	6
80	8.0	4.0	8.0	4.0	10.0	4.0

.2 Coarse Aggregate Fracture: of coarse fraction (retained on 5 000 µm sieve size) the percentage of particles with two (2) or more fractured faces shall be by mass:

.1 Mix Type I – 80% minimum

.2 Mix Type II – 60% minimum

.3 Mix Type III – 80% minimum

.3 Flat and Elongated Particles: of coarse fraction (retained on the 5 000 µm sieve size) the percentage of flat and elongated particles greater than a 5:1 ratio shall be by mass less than 10%.

.4 Manufactured Sand: of total fine fraction (passing 5 000 µm sieve size), manufactured sand shall be by mass:

.1 Mix Type I – 70% minimum

.2 Mix Type II – 50% minimum

.3 Mix Type III – 50 % minimum

.5 For mixes incorporating RAP, 50% of the RAP sand portion shall be considered manufactured sand.

.6 The sand equivalent value (ASTM D2419, mechanical method) determined for the fine aggregate portion shall be:

.1 Mix Types I and III – 45% minimum

.2 Mix Type II – 40% minimum

.7 Of total aggregate, the maximum RAP portion shall be by mass:

.1 Mix Type I – 15% maximum

.2 Mix Type II – 15% maximum

.3 Mix Type III – 20% maximum

.8 Delivery and Storage:

.1 Aggregates: Stockpile minimum of 50% of total amount of aggregate required before commencing trial mix designs.

.2 RAP: Stockpile minimum of 100% of total amount of RAP required before commencing trial mix designs.

2.2 Mix Design

.1 An asphalt mix design must be prepared and submitted to the Departmental Representative for review and approval at least one week prior to the work. The

Contractor shall use qualified engineering and testing services licensed to practice in the Province of British Columbia.

.2 The mix design shall follow the Marshall method of mix design as outlined in the latest edition of the Asphalt Institute Manual Series No. 2 (MS-2), and shall include five separate trial values of asphalt content.

.3 Design of mix:

.1 Mix Types I and II – 75 blows on each face of test specimens.

.2 Mix Type III – 50 blows on each face of test specimens.

.4 Include the following data with mix design submission:

.1 Aggregate specific gravity and asphalt absorption.

.2 Sand equivalent, coarse aggregate fracture, flat and elongated particles, and percent manufactured sand values.

.3 Asphalt cement supplier/refinery, specific gravity and mixing and compaction temperatures, based on temperature-viscosity properties of asphalt cement.

.4 Job mix formula including aggregate gradation and blending proportions, and design asphalt content.

.5 Maximum relative density at each trial asphalt content.

.6 Where RAP is to be incorporated into the mix supply, RAP gradation, RAP asphalt cement content and design recycle percentage.

.7 Data to satisfy the requirements shown in Table 2.4:

Table 2.4: Mixture Physical Property Requirements

PROPERTY	REQUIREMENTS		
	Mix Type		
	I	II	III
Marshall Stability (kN)	10.0 min.	10.0 min.	5.4 min.
Marshall Flow (0.25 mm units)	8 - 14	8 – 15	8 – 14
Air Voids (%)	3.8 – 4.2	4.3 – 4.7	2.8 – 3.2
Voids in Mineral Aggregate (VMA) (%)	13.5 – 15.0	12.5 – 14.0	14.0 – 16.0
Voids Filled With Asphalt (VFA) (%)	65 – 75	60 – 70	70 – 80
Film Thickness (µm)	7.0 – 8.5	6.0 – 8.0	7.0 min.

2.3 Job Mix Formula (JMF)

.1 Subject to approval by the Departmental Representative, the aggregate proportioning (including RAP), target gradation, asphalt content and air void content from the Mix Design will become the Job Mix Formula for the supply of hot mix asphalt.

.2 Once established, no alterations to the Job Mix Formula will be permitted unless the Contractor submits a new Job Mix Formula and approved by the Departmental Representative.

.3 If the sum of any alterations to the Job Mix Formula is in excess of any one of the following limits, a new Mix Design is required.

.1 ± 5% passing the 5 000 µm sieve size

.2 ± 1% passing the 80 µm sieve size

.3 ± 0.30% asphalt content

.4 Any alteration to the Job Mix Formula shall not result in properties which do not meet the requirements of this Specification.

2.4 Production Tolerances

.1 All mixtures shall be supplied to the Job Mix Formula within the range of tolerances specified.

.2 Asphalt cement content: ± 0.30% of JMF value.

.3 Temperature: Mix temperature at point of plant discharge shall not vary from that specified in the JMF by more than ± 10°C.

.4 Aggregate Gradation:

Table 2.5: Production Tolerances

AGGREGATE PASSING SIEVE SIZE (µm)	TOLERANCE (% BY MASS)
Max. Size to 5 000	± 5.0
2 500 & 1 250	± 4.0
630 & 315	± 3.0
160	± 2.0
80	± 1.0

.5 Air Voids: ± 1.0 % of the JMF value.

.6 Mixture Properties: Marshall Stability, Marshall Flow, Voids Filled with Asphalt, Voids in Mineral Aggregate, and Film Thickness as per requirements identified in Table 2.4.

.7 Moisture in Mix: Maximum permissible moisture, at point of plant discharge, is 0.2% by mass of mix.

.8 Asphalt cement recovered from freshly produced hot mix by the Abson Method, ASTM D1856 and subsequently tested in accordance with ASTM D5, shall retain a minimum value of 50% of its original penetration value.

3.0 EXECUTION

3.1 Sampling and Testing

.1 General

.1 The Departmental Representative shall have access to all production processes and materials used for the work to monitor material quantity as often as deemed necessary. Such inspection and testing shall not relieve the Contractor of the responsibility for meeting the requirements of this specification.

.2 At least three (3) weeks prior to commencing work, inform the Departmental Representative of the proposed source of aggregates and provide access for sampling, and provide samples of asphalt cement.

.2 Quality Control

.1 Quality control is the responsibility of the Contractor throughout every stage of the work from aggregate processing to the final accepted product. Tests performed by the Departmental Representative will not be considered as quality control tests.

.2 The Contractor shall be totally responsible for production of materials and construction that meets all specified requirements.

.3 All quality control shall be conducted by qualified personnel. The Contractor shall bear the cost of all quality control testing and consulting services.

.4 Pre-production testing and sampling and minimum frequencies are described in Table 3.1.

Table 3.1: Pre-Production Quality Control Requirements

Quality Control Requirement	Test Standard	Minimum Frequency
Asphalt Cement Certification	-	Once per year or for change in supplier.
Aggregate Physical Properties Table 2.1	Table 2.1	Once per year, or for change in source.
Crushed Coarse Aggregate Gradation Analysis and Fracture Content	ASTM C 136 ASTM D 5821	One for every 1,000 tonnes of each class of material processed into stockpile, or one analysis for each material, every production day when production rate is less than 1,000 tonnes.

Manufactured Sand Aggregate Gradation	ASTM C 117 ASTM C 126	
Natural Fine Aggregate Gradation	ASTM C 117 ASTM C 126	
Blend Sand Aggregate Gradation	ASTM C 117 ASTM C 126	
Reclaimed Asphalt Pavement (RAP) Asphalt Content and Extracted Aggregate Gradation	ASTM D 2172 ASTM C117 ASTM C 136	One for each 500 tonnes delivered to stockpile, or one for each location when delivery rate is less than 500 tonnes.

Quality Control Requirement	**Test Standard**	**Minimum Frequency**
Penetration of Asphalt Cement Recovered from RAP by Absorption Method	ASTM D 1856 ASTM D 5	One for each 2,000 tonnes delivered to stockpile.
Trial Mix Design by Marshall Method Section 2.2	Asphalt Institute MS-2	One per mix type every 3 years, or as required for a change in asphalt cement supply, aggregate gradation or aggregate source. See Note 1.
Plant Calibration	-	As required.

Note 1: A laboratory/plant JMF verification is required each year when a trial mix design is not conducted.

.5 Post-Production testing and sampling at minimum frequencies are described in Table 3.2, Recommended Post-Production Quality Control Requirements.

Table 3.2: Production Quality Control Requirements

Quality Control Requirement	**Test Standard**	**Minimum Frequency**
Hot Mix Asphalt Analysis (including Asphalt Content, Aggregate Gradation, Marshall Density and Void Properties)	ASTM D 6307 ASTM C117 ASTM C 136 ASTM D 3203	One for every 500 tonnes of each mix type supplied under this specification. See note 1.
Quality Control Charts (including 3 test running average for Binder Content, Aggregate Gradation, Marshall Density and Void Properties)	-	For each hot mix analysis. Test results and updated 3 test running average to be submitted to the Departmental Representative as they become available.
Hot Mix Asphalt Temperature	-	Minimum frequency not specified.
Cold Feed Aggregate Analysis	ASTM C 117 ASTM C 1236	Minimum frequency not specified.
Maximum Relative Density of Hot Mix Asphalt	ASTM D 2041	Minimum frequency not specified.
Compaction Monitoring (Core or Nuclear Density)	ASTM D 2726 ASTM D 2950	Minimum frequency not specified. See note 2.

Note 1: Where an individual test indicates non-compliance, another test shall be initiated immediately.

Note 2: Coring is subject to approval by the Departmental Representative.

.6 Pre-Production Quality Control test data as specified in Table 3.1 shall be reported to the Departmental Representative one week prior to commencing the project, or as requested.

.7 Post-Production Quality Control test data as specified in Table 3.2 shall be reported to the Departmental Representative daily as the work proceeds.

3.2 Quality Control Compliance With Specified Tolerances

.1 Asphalt Content, Aggregate Gradation and Mixture Properties

.1 The test data derived by Post-Production Quality Control mix testing, described in Section 3.2, shall be compared to the tolerances set forth in of this specification. The Contractor shall document, and make available to the Departmental Representative, any adjustments made to correct non-compliance with the specified tolerances.

.2 The Contractor shall suspend mix production when the 3 test running average for any property is outside of the specified tolerance limits for three consecutive tests. Supply shall not commence again until it is demonstrated that corrective action has been taken.

.2 Hot Mix Asphalt Temperature

.1 Plant mix that does not meet temperature requirements of Section 2.4.3 at the point of plant discharge shall be subject to rejection at the discretion of the Departmental Representative.

3.3 Acceptance Sampling and Testing

.1 Within this Specification, certain requirements, limits and tolerances are specified regarding supplied materials and workmanship. Compliance with these requirements shall be determined from acceptance testing as described in this section.

.2 Acceptance testing is the responsibility of the Departmental Representative.

.3 Initial acceptance testing will be undertaken free of cost to the Contractor.

.4 Sampling and acceptance testing is described in Table 3.3, Acceptance Testing Requirements – Category A & B Projects.

Table 3.3: Acceptance Testing Requirements – Category A & B Projects

Acceptance Testing	Test Standard	Minimum Frequency
Hot Mix Asphalt Analysis (including Binder Content, Aggregate Gradation, Marshall Density, Maximum Relative Density, Void Properties, Marshall Stability and Flow)	ASTM D 6307 ASTM C 117 ASTM C 136 ASTM D 2041 ASTM D 3203	For each mix type, one test for each 3,500 sq.m. of placement, or three tests per lot, whichever is greater. See note 1.
Compaction Testing (Core Density) and Thickness Determination	ASTM D 2726 ASTM D 3549	For each mix type, one test for each 2,000 sq.m. of placement, or three tests per lot, whichever is greater.
Hot Mix Asphalt Temperature	-	No minimum frequency.

Note 1: For Category B projects, the Departmental Representative may, at their discretion, acquire the minimum number of mix samples, but reduce the number of tests to a minimum of one (1). Should non-compliance be indicated by the sample(s) tested, the Departmental Representative reserves the option to test the remaining samples

.5 Acceptance Sampling Procedures:

.1 Loose mix samples shall be acquired from the Work site in accordance with Alberta Transportation Test (ATT) procedure ATT-37. Auger samples may be used if approved by both the Departmental Representative and the Contractor.

.2 The timing of mix sampling shall be stratified, with each sample representing a similar production quantity.

.3 Core locations will be selected using stratified random sampling procedures. The lot will be divided into segments meeting or exceeding the minimum frequency in Table 3.3 and of approximately equal area. In each segment a test site will be located using random numbers to determine the longitudinal and transverse coordinates. Areas within 3 metres of transverse joints or 0.3 metres of a mat edge are excluded from compaction acceptance sampling and testing.

.6 Reporting Protocols

.1 Test reporting accuracy shall be as stipulated in the referenced test procedures, including:

.1 Gradation to the nearest whole number, except the percent passing the 80 µm sieve, which shall be reported to the nearest 0.1%.

.2 Binder content to the nearest 0.01%.

.3 Air voids and compaction to the nearest 0.1%.

.4 Thickness to the nearest whole millimeter (mm).

.2 Lot averages shall be reported to the same accuracy as test results.

3.4 Appeal of Acceptance Testing Results

.1 General

.1 The Contractor may appeal the results of acceptance testing for Compaction Standard, Asphalt Content or Air Voids for any lot subject to rejection or unit price reduction. The notice of appeal shall be in writing and submitted to the Departmental Representative within 48 hours of receipt of the acceptance testing results.

.2 Appeals will only be considered if cause can be shown and the requirements of Table 3.2 have been satisfied.

.3 Quality Control tests initiated after the Contractor's receipt of the acceptance testing results will not be considered when evaluating cause for appeal.

.4 For Category A projects, only Quality Control testing during production for the subject project will be considered when evaluating cause for appeal. For Category B projects, Quality Control test results from production prior to the subject project may be considered when evaluating cause for appeal.

.2 Asphalt Content Appeal

.1 A stratified random sampling plan shall be developed by the Departmental Representative with the same number of segments as the original number of samples for the subject lot. Sufficient core samples will be acquired from each segment to enable asphalt content determinations.

.2 For asphalt content appeal testing, the Contractor will have the option for the testing to be done by the Departmental Representative or an independent testing laboratory selected by the Departmental Representative.

.3 The average of the appeal test results will be used for acceptance and unit price adjustment, and shall be binding on both the Departmental Representative and the Contractor.

.4 If the average appeal test result verifies that any unit price reduction of rejection applies for that Lot, the costs of the appeal sampling and testing will be borne by the Contractor. If the results show that a penalty or rejection no longer applies, the sampling and appeal costs will be the responsibility of the Departmental Representative.

.3 Compaction Standard or Air Void Appeals

.1 The testing laboratory conducting the project acceptance sampling and testing will routinely retain companion samples sufficient for the determination of maximum relative density and/or Marshall density.

.2 For compaction standard or air void (Marshall density) appeal testing, the Contractor will have the option for the testing to be done by the Departmental Representative or an independent testing laboratory selected by the Departmental Representative.

.3 The average of the appeal test results will be used for acceptance and unit price adjustment, and shall be binding on both the Departmental Representative and the Contractor.

.4 If the new compaction standard verifies that any unit price reduction of rejection applies for that Lot, the costs of the appeal sampling and testing will be borne by the Contractor. If the results show that a penalty or rejection no longer applies, the appeal costs will be the responsibility of the Departmental Representative.

4.0 PART 4

4.1 Continuity of Production

.1 During the time period that work is in progress on any project for which this specification is in effect, and at the Departmental Representative's discretion, the plant may be limited to producing only the mix type required for that project.

4.2 Mix Production

.1 Preparation of Mineral Aggregate

.1 The Mineral aggregates shall be at as low a temperature as is consistent with proper mixing and lay down and in no case to exceed 165°C.

.2 Composition of Mixture

.1 The mineral aggregate, reclaimed asphalt pavement (where applicable) and asphalt cement shall be mixed in a manner to produce a homogeneous mixture in which all particles of the mineral aggregate are uniformly coated.

.2 Incorporate RAP such that it does not come in direct contact with the burner flame.

.3 Plant emissions shall not exceed the limits set by British Columbia Environment and Climate Change.

4.3 Preparation for Paving

.1 The Contractor shall provide the Departmental Representative a minimum of six hours' notice of the intention to commence paving over any previously approved primed or tacked surface.

.2 The hot asphalt mixture shall be laid upon a dry firm surface, true to grade and cross- section and free from all loose or foreign material. No hot mix shall be placed when the surface is wet or when other conditions prevent proper spreading, finishing or compaction.

.3 If undercutting, and subsequent backfill with asphalt concrete is done, the backfill operation shall be performed sufficiently far ahead of the paving operation to allow the asphalt concrete time to cool down enough to support equipment.

4.4 Hot Mix Asphalt Placing Temperature

.1 No hot mix asphalt shall be dispatched to the field unless the temperature, as issued by Environment Canada, is rising and meets the following minimum temperature requirements:

.1 Thickness less than 50 mm: 7°C

.2 Thickness greater than 50 mm: 2°C

.2 A tolerance will be permitted for plant start-up.

.1 No surface lift asphalt shall be placed regardless of temperature until the road surface is 5°C or higher.

4.5 Hours of Operation

.1 No loads of hot mix asphalt shall be dispatched from the plant after sunset or during hours of darkness unless loads can be placed and compacted in accordance with these Specifications, and suitable artificial illumination is provided, all subject to the Departmental Representative's approval.

4.6 Transportation of Hot Mix Asphalt

.1 Trucks shall be equipped with tarpaulins of sufficient weights and size to cover the entire open area of the truck box. Regardless of weather conditions, tarpaulins shall be used.

.2 Vehicles used for the transportation of hot mix asphalt from the plant to the site of work shall have tight metal boxes previously cleaned of all foreign matter. The inside surface may be lightly lubricated with a soap solution just before loading. Excess lubrication will not be permitted.

.3 For purposes of checking asphalt mixture temperatures, trucks shall have an accessible 13 mm diameter hole drilled into the driver's side of the truck box, at a

distance of 0.3 metres from the bottom of the box and 150 mm clear of the reinforcing ribs.

.4 The speed and weight of hauling trucks shall be regulated so that, in the opinion of the Departmental Representative, no damage will occur to any portion of the work underway. The Contractor at their own expense shall repair any damage to the tack coat, prime coat or the existing surface caused by the Contractor's equipment.

4.7 Hot Mix Asphalt Spreaders

.1 The spreading machine shall be self-propelled and capable of placing a uniform layer of asphalt mix to the depth and grades as shown on the plans or as indicated by the Departmental Representative.

.2 The screed shall include a tamping bar or vibratory strike-off device for use when required. The screed shall strike-off the mix to the depth and cross-section specified and produces a finished surface of uniform texture.

.3 Control of the screed shall be by automatic sensing devices. Longitudinal control shall be accomplished by a sensor, which follows a string line, ski, or other reference. The grade sensor shall be movable and mounts provided so that grade control can be established on either side of the paver. A slope control sensor shall also be provided to maintain the proper transverse slope of the screed. Use automatic grade control for paving operations.

4.8 Hand Tools

.1 Only lutes shall be used during the spreading operation and when the asphalt is worked by hand in areas in which the paver cannot reach.

.2 Tamping irons may be used to consolidate the material along structures inaccessible to the rollers. Mechanical compaction equipment, satisfactory to the Departmental Representative, may be used instead of tamping irons.

.3 For purposes of checking the finished surface, the Contractor must provide and carry on each paving machine a 3 metre straight edge and slope measuring level.

4.9 Pre-Levelling for Asphalt Concrete

.1 Pre-levelling of uneven surfaces over which asphalt concrete is to be placed shall be accomplished by the use of asphalt concrete placed with a grader, paver, hand or by a combination of these methods.

.2 After placement, the asphalt concrete used for pre-levelling shall be compacted thoroughly with pneumatic tired rollers.

4.10 Paving Operations

.1 The asphalt concrete shall be placed to the design thickness as shown on the contract drawings. On new construction where an established reference is lacking, a string-line reference will be required. Adjacent mats on the same lift are to be controlled by use of the grade sensor. No relaxation of the above procedure will be permitted without written approval of the Departmental Representative.

.2 The spreader shall be operated in such a manner as to distribute the asphalt concrete mix to proper cross section, width and thickness without causing segregation of the mix.

.3 Segregated areas, which may occur, shall be corrected immediately. The forward motion of the spreader shall be controlled so that no irregularities in the pavement surface are caused by excessive speed. The rate of placement of the mixture shall be uniform, and shall be co-ordinated with the production rate of the asphalt plant without intermittent operation of the spreader.

.4 Any failure of the machine or operation to produce a smooth, uniformly dense mat, free from irregularities, shall be corrected immediately to the satisfaction of the Departmental Representative.

4.11 Areas Inaccessible to the Paving Machine

.1 Areas that are inaccessible to the paving machine may be paved by other methods, as approved by the Departmental Representative.

.2 In small areas or where the use of mechanical equipment is not practical, the mix may be spread and finished by hand. The asphalt mixture shall be dumped on the area and immediately thereafter distributed into place by shovels and spread with lutes in a loose uniform layer uniform density and correct depth. Material must be handled so as to avoid segregation.

4.12 Compaction

.1 The Contractor shall supply sufficient compaction equipment to:

.1 Provide a compaction rate that will equal or exceed the placing rate of the spreader.

.2 Ensure the specified compaction is attained before the temperature of the mat falls below 80°C.

4.13 Longitudinal and Transverse Joints

.1 Longitudinal and transverse joints shall be made in a manner consistent with industry standards. Coarse aggregate removed from the hot mix during joint preparation shall not be placed in the same vertical plane. Longitudinal joints

shall be offset at least 150 mm and transverse construction joints shall be offset at least 2 metres from one lift to the next.

.2 Longitudinal joints shall not be located within the edge of travel lanes in the final lift, unless approved by the Departmental Representative.

.3 Edges where additional pavement is to be placed shall be vertically formed to true line. A lute shall be used immediately behind the paver when required to obtain a true line and vertical edge.

.4 The exposed edges of all cold asphalt joints and the face of concrete curb and gutter shall be cleaned and painted with a thin coat of asphalt tack.

.5 At the end of each day's paving of the surface course and upper lift of the base course mix, the uncompleted paving mats shall be provided with vertically cut transverse joints. Joints between old and new pavements or between successive days' work shall be carefully made in such a manner as to ensure a thorough and continuous bond between the old and new surfaces.

4.14 Opening to Traffic

.1 Prior to any application of traffic, paving mats shall be sufficiently cool to resist and deformation or surface scuffing.

.2 The Departmental Representative may, at their discretion, require means of cooling (e.g. application of water) completed pavements prior to opening to traffic.

.3 At their discretion, the Departmental Representative may prohibit traffic from travelling on newly paved surfaces for any length of time deemed necessary.

5.0 PART 5

5.1 General

.1 The Contractor shall provide an end product conforming to the quantity and tolerance requirements of this specification. Where no tolerances are specified, the standard of workmanship shall be in accordance with accepted industry standards.

.2 Acceptance of any Lot at full or increased payment will occur if there are no obvious defects and the Lot mean results for asphalt content, pavement density, air voids and thickness meet or exceed the specified tolerances.

.3 Unit price reductions will only be applied on the basis of full acceptance testing in accordance with Table 3.3.

5.2 Asphalt Content

.1 For full payment, the Lot Mean Asphalt Content must be within ± 0.30% of the approved JMF value, as specified in Section 2.4.

.2 Payment adjustment for asphalt content is as follows:

Table 5.1: Payment Adjustments

Asphalt Content Deviation from JMF Value (%)	Payment Adjustment Factor
± 0.30 or less	1.00
± 0.31 to ± 0.50	As per Chart A
Greater than ± 0.50	Reject (Note 1)

Note 1: Subject to removal and replacement at the discretion of the Departmental Representative.

5.3 Pavement Compaction

.1 For full or increased payment, the Lot Mean Pavement Compaction must be equal to or greater than 93% of the Lot Mean Maximum Relative Density.

.2 Payment adjustment for pavement compaction is as follows:

Table 5.2: Pavement Compaction Payment Adjustment Factor

Pavement Compaction % of Maximum Relative Density	**Payment Adjustment Factor**
94.6 to 95.5 (Note 1)	1.03
93.5 to 94.5 (Note 1)	1.02
93.0 to 93.4	1.00
90.0 to 92.9	As per Chart B
Less than 90.0	Reject (Note 2)

Note 1: Where no individual test result is less than 93% otherwise the payment adjustment factor 1.00.

Note 2: Subject to removal and replacement at the discretion of the Departmental Representative.

5.4 Air Void Content

.1 For full payment, the Lot Mean Air Voids must be within ± 1.0% of the JMF value, as specified in Section 2.4.

.2 Payment adjustment for air void content is as follows:

Table 5.3: Air Void Adjustment Factor

Air Void Content % Deviation from JMF Value	**Payment Adjustment Factor**
Less than 1.0	1.00
1.0 to 2.0	As per Chart C
Greater than 2.0 (Lower Lifts)	0.80
Greater than 2.0 (Upper Lifts)	0.60

5.5 Thickness (New Construction and Top Lift Only)

.1 Pavement of any type found to be deficient in thickness by more than 13.0 mm shall be removed and replaced by pavement of specified thickness, at the Contractor's expense.

.2 The Lot Mean Thickness for any Lot will be determined on the basis of the acceptance cores described in Table 3.3. Core thickness shall be determined in accordance with ASTM D 3549.

.3 If the deficiency of any individual core exceeds 13 mm, additional cores may be extracted in the proximity to the location of the core of excessive deficiency, to identify the extremities of the pavement area subject to be removed and replaced. The Contractor shall pay for such additional coring.

.4 For full payment, the Lot Mean Thickness must be equal to, or greater than, the specified thickness.

.5 Payment adjustment for the thickness is as follows:

Table 5.4: Average Thickness Payment Adjustment Factor

Average Thickness Compared to Specified Thickness	**Payment Adjustment Factor (Note 1)**	
	Total Thickness (Single or Multiple Lifts)	**Top Lift Thickness (Multiple Lifts)**
Compliant or Greater	1.00	1.00
1 mm to 13 mm Deficient	As Per Chart D	As Per Chart D
More than 13 mm Deficient	Reject (Note 2)	Reject (Note 2)

Note 1: As single Thickness Payment Adjustment Factor shall be applied. Total Thickness of Top Lift Thickness, whichever results in the greatest adjustment.

Note 2: Subject to removal and replacement at the discretion of the Departmental Representative.

5.6 Smoothness

.1 The completed asphalt concrete surface shall be true to the dimensional and tolerance requirements of the specifications and drawings. Unless detailed otherwise in the contract documents, the tolerances in both profile and crown are:

.1 Base course: 10 mm in 3 m

.2 Surface Course: 5 mm in 3 m

.2 When deviations in excess of the above tolerances are found, the pavement surface shall be corrected by methods satisfactory to the Departmental Representative. Correction of defects shall be carried out until there are no deviations anywhere greater than the allowable tolerances.

5.7 Segregation

.1 The finished surface shall have a uniform texture and be free of segregated areas. A segregated area is defined as an area of the pavement where the texture differs visually from the texture of the surrounding pavement.

.2 All segregation will be evaluated by the Departmental Representative to determine repair requirements.

.3 The severity of segregation will be rated as follows:

.1 Slight: The matrix of asphalt cement and fine aggregates is in place between the coarse aggregate particles, however there is more stone in comparison to the surrounding acceptable mix.

.2 Moderate: Significantly more stone that the surrounding mix, and exhibit a lack of surrounding matrix.

.3 Severe: Appears as an area of very stony mix, stone against stone, with very little or no matrix.

.4 Segregated areas shall be repaired by the Contractor. The following methods of repair are identified.

.1 Slight: Squeegee asphalt to completely fill the surface voids.

.2 Moderate: Slurry seal for full mat width.

.3 Severe: Removal and replacement or overlay.

.5 All repairs shall be regular in shape and finished using good workmanship practices to provide and appearance suitable to the Departmental Representative.

.6 Any other methods of repair proposed by the Contractor will be subject to the approval of the Departmental Representative.

.7 Repairs will be carried out by the Contractor at their expense.

6.0 PART 6

6.1 Payment Adjustments

.1 The Unit Price applicable to each Lot quantity as asphalt concrete will be calculated as follows:

.1 LOT UNIT PRICE = CONTRACT UNIT PRICE x PAAC x PACOM x PAAV x PAT

Where:

PA_{AC} = Asphalt Content Payment Adjustment

PA_{COM} = Compaction Payment Adjustment

PA_{AV} = Air Void Payment Adjustment

PAT = Thickness Payment Adjustment

CHART A
ASPHALT CONTENT
PAYMENT ADJUSTMENT FACTOR

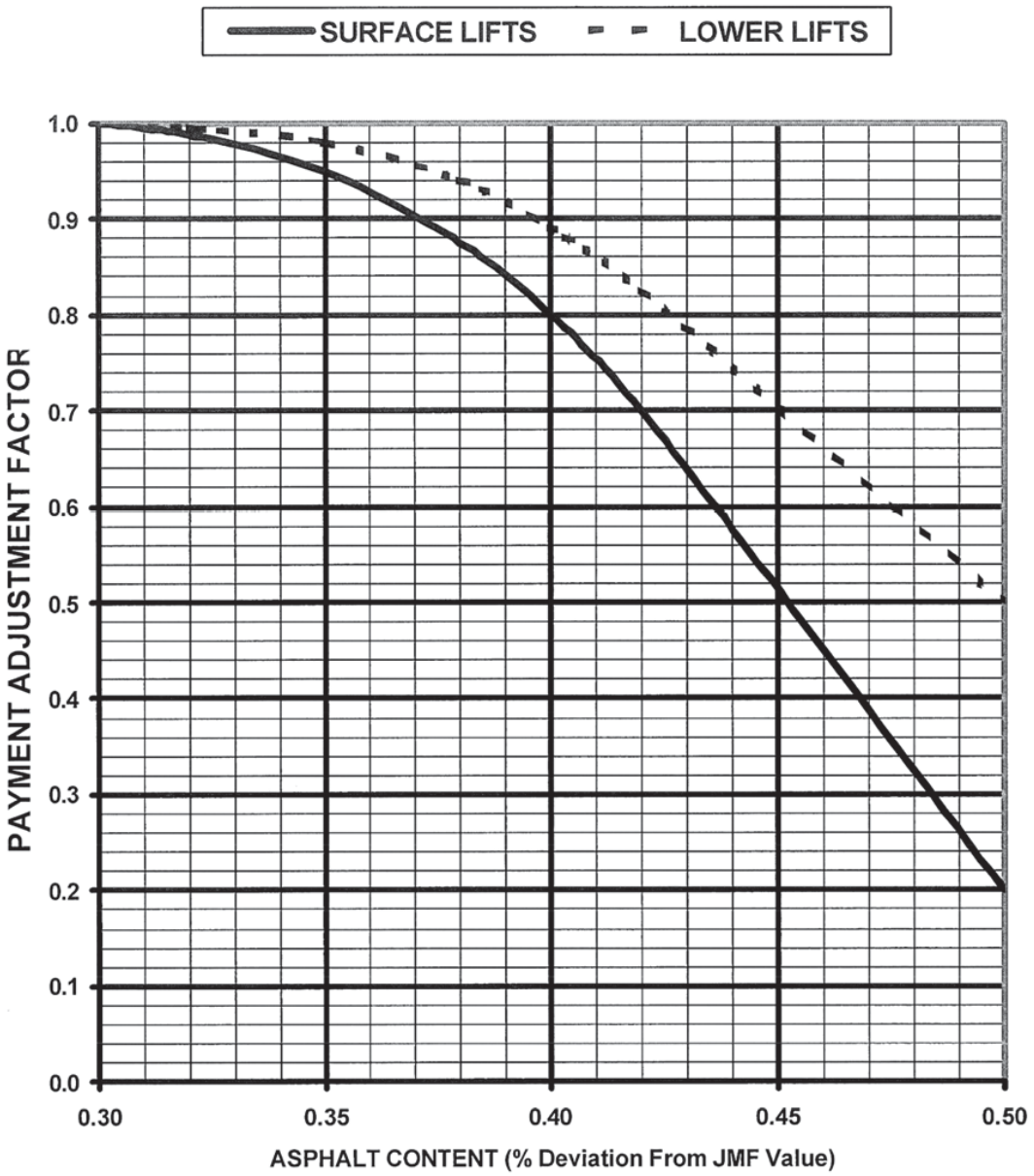


CHART B
COMPACTION
PAYMENT ADJUSTMENT FACTOR

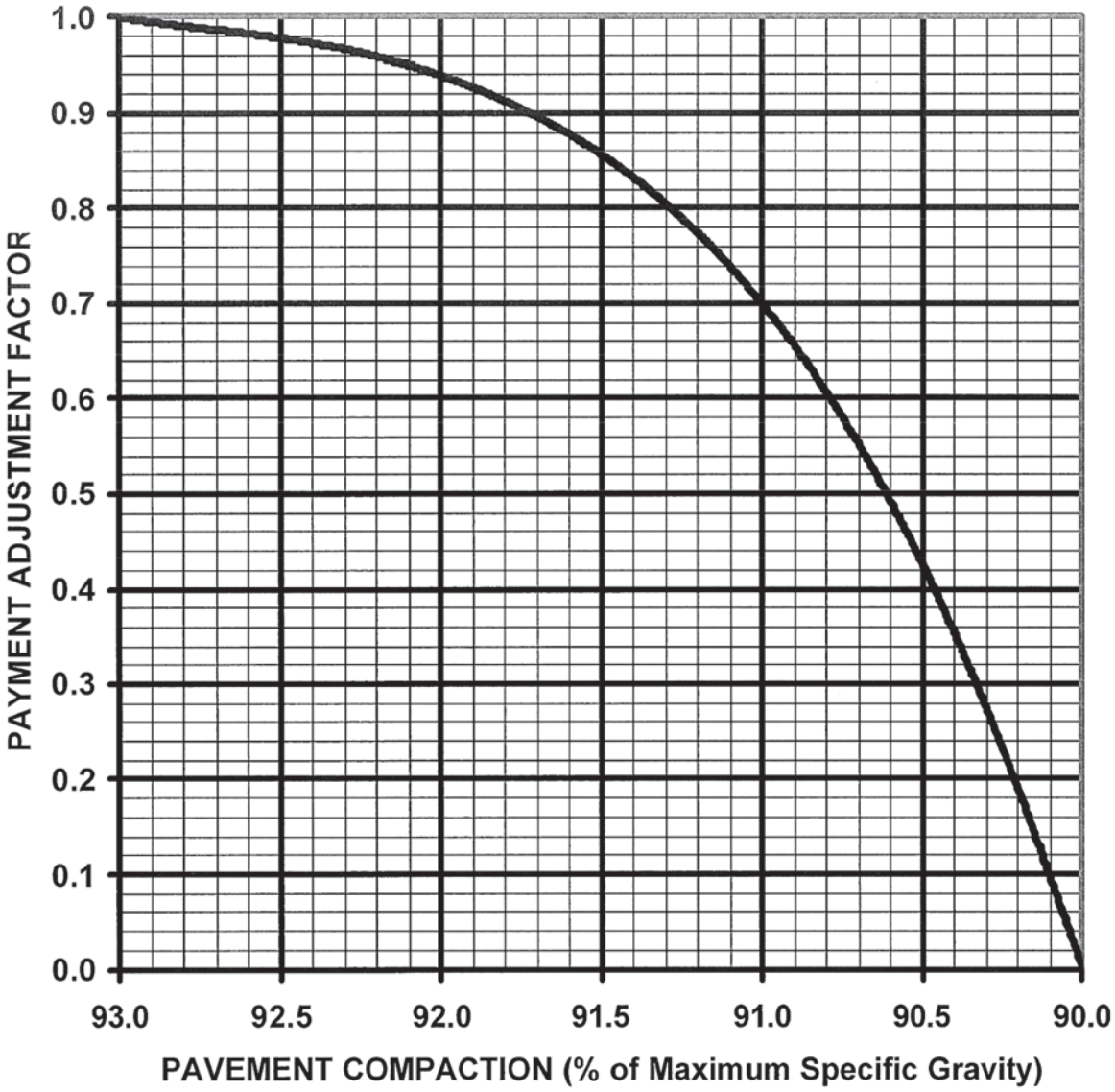


CHART C
AIR VOID CONTENT
PAYMENT ADJUSTMENT FACTOR

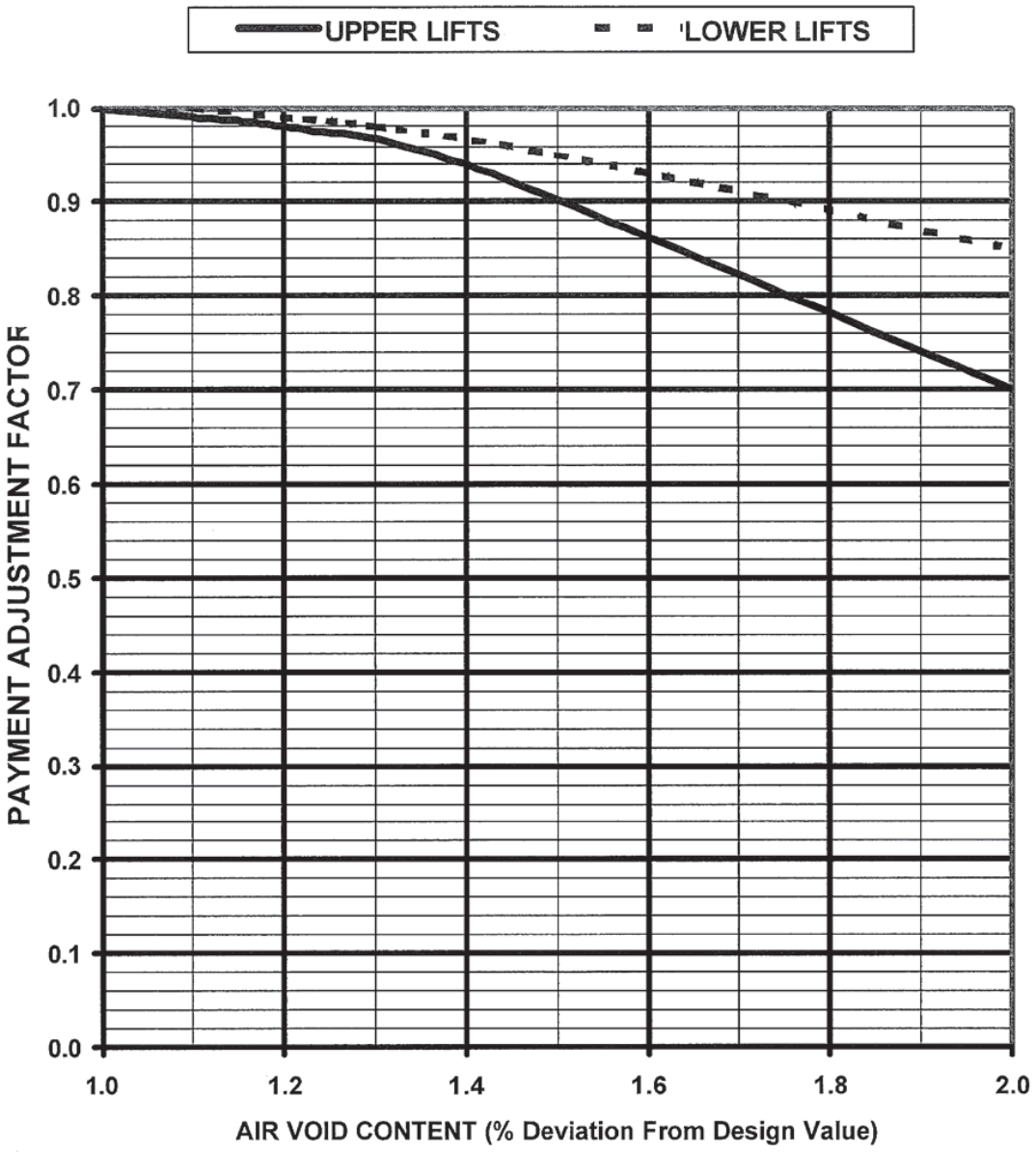
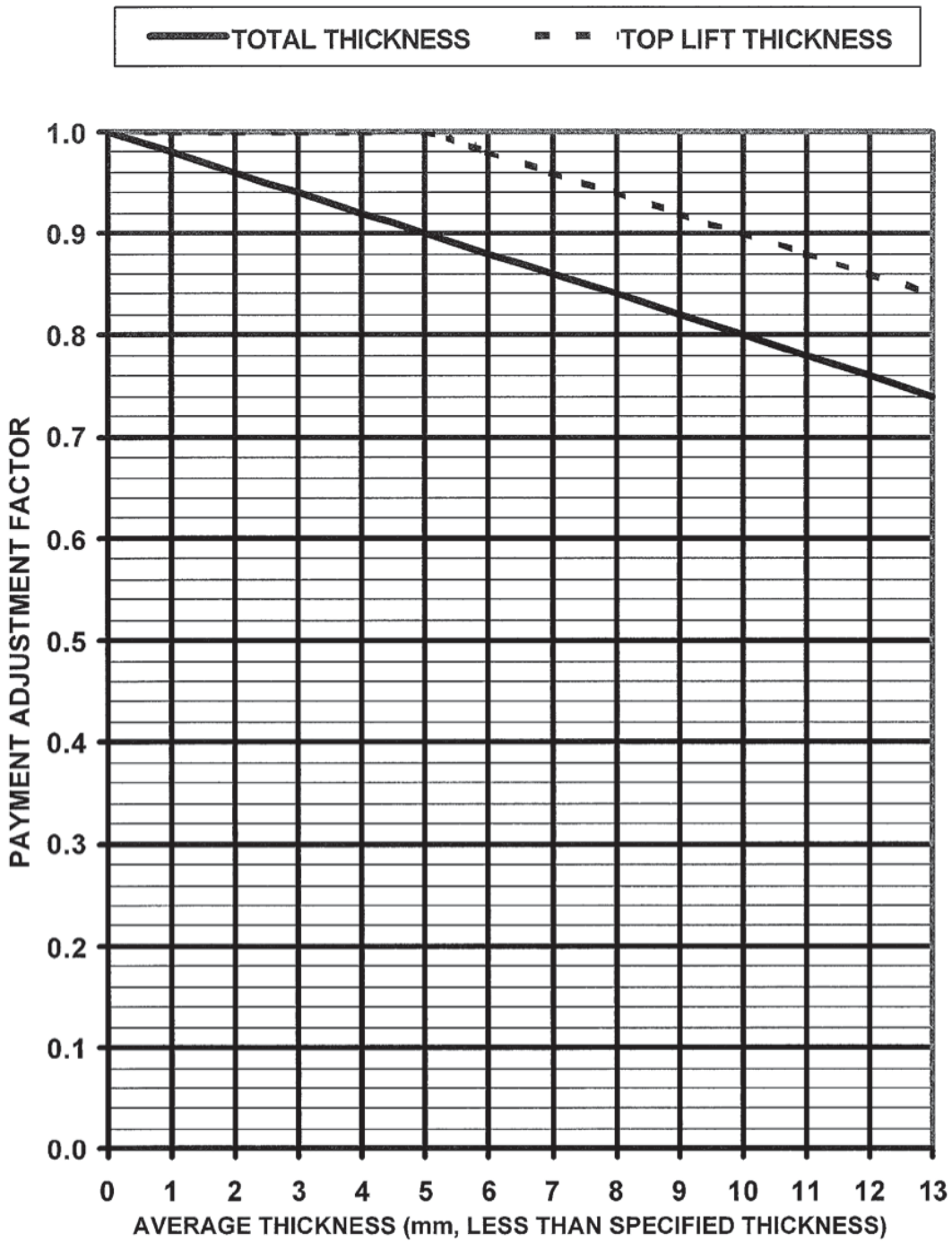


CHART D
AVERAGE THICKNESS
PAYMENT ADJUSTMENT FACTOR



END OF SECTION

1.0 GENERAL

1.1 Action and Informational Submittals

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

.2 Samples:

.1 Submit two - 1 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth jars or bottles made with plastic to Departmental Representative, at least 2 weeks prior to beginning Work.

.2 Sample asphalt tack coat material to: ASTM D 140.

.3 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work to ASTM D 140.

1.2 Quality Assurance

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

1.3 Delivery, Storage and Handling

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect asphalt tack coats from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Deliver, store and handle materials in accordance with ASTM D 140.

.5 Provide, maintain and restore asphalt storage area.

2.0 PRODUCTS

2.1 Materials

.1 Asphalt tack: Anionic emulsified asphalt, slow setting SS-1h

.2 Cut-back asphalt; to AASHTO M081-92-UL, grade RC-70 or RC-250.

.3 Water: clean, potable, free from foreign matter.

2.2 Equipment

.1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.

.2 Pressure distributor:

.1 Designed, equipped, maintained and operated so that asphalt material can be:

.1 Maintained at even temperature.

.2 Applied uniformly on variable widths of surface up to 5 m.

.3 Applied at readily determined and controlled rates from 0.2 to 5.4 L/m^2 with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m^2.

.4 Distribute in uniform spray without atomization at temperature required.

.2 Equipped with meter, registering travel in metres 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.

.1 Measure temperature to closest whole number.

.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 in increments of 0.6 metres and capable of being raised or lowered.

.8 Cleaned if previously used with incompatible asphalt material.

3.0 EXECUTION

3.1 Application

.1 Apply asphalt tack coat only on clean and dry surface. Surface to be reviewed by the Departmental Representative prior to applying tack coat.

.2 Dilute asphalt emulsion with water at 1:1 ratio for application.

.1 Mix thoroughly by pumping or other method approved by Departmental Representative.

.3 Apply asphalt tack coat evenly to pavement surface at rate of 0.5L/sq. m.

.4 Paint contact surfaces with thin, uniform coat of asphalt tack coat material.

.5 Apply asphalt tack coat only when air temperature greater than 10 degrees C and when rain is not forecast within 2 hours minimum of application.

.6 Apply asphalt tack coat only on unfrozen surface.

.7 Evenly distribute localized excessive deposits of tack coat by brooming.

.8 Where traffic is to be maintained, treat no more than one half of width of surface in one application.

.1 Control traffic in accordance with Section 01 35 00.07 Traffic Regulation.

.9 Keep traffic off tacked areas until asphalt tack coat has set.

.10 Re-tack contaminated or disturbed areas.

.11 Permit asphalt tack coat to set before placing asphalt pavement.

.12 Submit summary report within 7 days minimum of date of application and include information as follows:

.1 Total area tack coated.

.2 Quantity of tack coat used.

.3 Mean application rate.

.4 Actual product quantity used when using equipment on pressure distributors.

.5 Dipstick measurements or electronic printouts are acceptable.

.13 Carry out measurements in presence of Departmental Representative upon request.

.14 Inspect tack coat application to ensure uniformity.

.1 Re-spray areas of insufficient or non-uniform tack coat coverage.

.2 Ensure tack coating performed using hand held devices is consistent in appearance with adjacent areas of machine applied material.

3.2 Cleaning

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

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

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

END OF SECTION

1.0 GENERAL

1.1 Submit in Accordance with Section 01 33 00 - Submittal Procedures

.1 Samples:

.1 Submit two 1 L samples of asphalt prime proposed for use in new, clean, air tight sealed, wide mouth, jars or bottles made with plastic, to Departmental Representative, 2 weeks prior to commencing Work.

.2 Sample asphalt prime coat materials in accordance with ASTM D 140.

.3 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work, in accordance with ASTM D 140.

1.2 Quality Assurance

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

1.3 Delivery, Storage and Handling

.1 Storage and Handling Requirements:

.1 Deliver, store and handle materials to ASTM D 140.

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

.3 Store and protect asphalt prime coats from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

2.0 PRODUCTS

2.1 Material

.1 Asphalt material: to Can/ CGSB-16.1 Grade MC-30.

.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:

.1 Designed, equipped, maintained and operated so that asphalt material can be:

.1 Maintained at even temperature.

.1 Applied uniformly on variable widths of surface up to 5 m.

.2 Applied at controlled rates from 0.2 to 5.4 L/m^2 with uniform pressure, and allowable variation from any specified rate not exceeding 0.1 L/m^2.

.3 Distributed in uniform spray without atomization at temperature required.

.2 Equipped with meter registering travel distance in metres 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.

.1 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.

.1 Temperature to be measured to nearest whole number.

.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 in increments of 0.6 metres and capable of being raised or lowered.

.8 Cleaned if previously used with incompatible asphalt material.

2.3 Aggregate Spreader

.1 Apply blotter sand to primed surfaces using roll type spreader, or rotating disc sander capable of applying aggregate at variable widths and at variable rates.

3.0 EXECUTION

3.1 Application

.1 Proceed with application of prime coat only after receipt of written approval of granular base surface from Departmental Representative.

.2 Cutback asphalt:

.1 Heat asphalt prime to between 40 °C and 95 °C for pumping and spraying.

.2 Apply asphalt prime to granular base at a rate of 1.5 -/+ 0.5 L/m².

.3 Apply on dry surface.

.3 Apply asphalt prime only on unfrozen surface.

.4 Apply asphalt prime coat only when air temperature is greater than 10 degrees C and when rain is not forecast within 2 hours.

.5 Paint contact surfaces with thin, uniform coat of asphalt prime material.

.6 Where traffic is to be maintained, treat no more than one-half width of surface in one application.

.7 Prevent overlap at junction of applications.

.8 Do not prime surfaces that will be visible when paving is complete.

.9 Apply additional material to areas not sufficiently covered.

.10 Keep traffic off primed areas until asphalt prime has cured.

.1 Control traffic in accordance with Section 01 35 00.07 – Traffic Regulation.

.11 Permit prime to cure 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.

.4 Do not roll blotter sand.

.5 Sweep and remove excess blotter material.

3.3 Cleaning

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

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

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

END OF SECTION

1.0 GENERAL

1.1 Submissions

.1 At least 2 weeks prior to commencing work inform the Departmental Representative of proposed source of granular materials and submit a sieve analysis of the material for the Departmental Representative's review.

.2 Preliminary review of the material as represented in the test results shall not constitute general acceptance of all material in the deposit or source of supply. Materials may be considered unsuitable even though particle sizes are within the limits of the gradation sizes required, if particle shapes are thin or elongated or any other characteristic precludes satisfactory compaction or if the material fails to provide a roadway suitable for traffic. Rejected material will not be paid for. The Departmental Representative has the right to request additional testing if there are any concerns with the proposed aggregate.

2.0 PRODUCTS

2.1 Gravel Surfacing

.1 Material for gravel surfacing shall consist of sound, hard, well graded, durable crushed rock or crushed gravel and shall not contain organic or soft, thin, elongated, or laminated materials, materials that break up when alternately frozen and thawed or wetted and dried, or other deleterious materials.

.2 Aggregate for gravel surfacing shall meet the following gradation as shown below:

Sieve Size (mm)	Percent Passing (by weight)
20	100
10	35-77
5	15-55
1.25	0-30
0.08	0-12

.3 At least 40 percent by weight of material retained on the 5 mm sieve shall have two or more fractured faces.

3.0 EXECUTION

3.1 Preparation

.1 Clear to a minimum of 0.5 m wider than the trail width and ensure a minimum vertical clearance of 3.0 m above finished grade.

.2 Subgrade must be free of stumps, roots and rocks greater than 50 mm diameter and other deleterious material.

.3 Line the excavation with geotextile fabric. Stretch the fabric taut and free of wrinkles. Ensure fabric completely covers the base and both sides of the excavation. Overlap each new strip of fabric by 500 mm over the previously laid strip. Remove and replace damaged or deteriorated fabric.

3.2 Placing

.1 Once uniformly placed to design depth, lightly water and use steel drum roller, providing two full passes over entire surface for compaction.

.2 Spread gravel uniformly on the geotextile and compact to 97% of Standard Proctor Density.

.3 The finished gravel surface shall be smooth and free of loose material and shall conform to the crossfall and longitudinal slope as shown on drawings.

.4 Trim high spots and refinish surface.

.5 Add gravel to low areas, scarify, blend, re-spread and re-compact to the required finish.

.6 Trim all protruding geotextile level with the graded surface.

.7 Restore areas disturbed by construction to original condition. Rehabilitate disturbed edges with topsoil and seed.

.8 Clean up and dispose of all debris and surplus material.

.9 The Contractor shall maintain the graveled surface until it is accepted by the Departmental Representative. Maintenance shall be at the Contractor's own expense.

END OF SECTION

1.0 GENERAL

1.1 Related Sections

.1 Granular Base Courses Section 32 00 02

2.0 MATERIALS

2.1 Posts and Rails

.1 Lodgepole Pine or equivalent, strength to following dimensions:

.1 Posts: minimum 150 mm top
.2 Rails: minimum 100 mm top

.2 Pressure treated with Chromated Copper Arsenate (CCA) in conformance with CSA 080.5.

.3 All cuts treated with 3 coats of Clear ACQ

.

.4 Apply 3 coats of stain.

2.2 Hardware

.1 Carriage bolts shall be 10 mm diameter, length as required.

.2 Washers shall be 25 mm O.D. nut end only.

.3 All hardware shall be hot-dipped galvanized to CSA-B35.4 coating designation.

.4 Submit samples for approval.

3.0 EXECUTION

3.1 Rail End And Corner Posts

.1 Lay out and space for approval by the Departmental Representative.

.2 Do not begin installation until lay out has been approved by the Departmental Representative.

.3 Erect true to line and level.

.4 Auger 1200 mm post hole for posts, backfill 150 mm washed gravel, set post.

.5 Notch posts 30 mm to fit rails.

.6 Trim posts to consistent level height and chamfer at 10º.

3.2 Rails

.1 Rails fastened to posts to face toward upslope side of fence.

.2 Bolts from rail side and nuts and washers countersunk.

.3 Lag bolts to be countersunk.

.4 Rails shall alternately overlap pile or post as detailed.

END OF SECTION

1.0 GENERAL

1.1 Scope

.1 All landscape furniture elements to be fully assembled in shop prior to delivery to the site.

.2 Protect furniture during transportation to site.

.3 Supply and install and bollards to manufacturer’s specifications.

1.2 Inspection

.1 The Departmental Representative will inspect all landscape furniture prior to installation. Broken, scarred, or damaged furniture elements will not be accepted.

2.0 PRODUCTS

2.1 Submittals

.1 Product Data: Manufacturer's data sheets on each product to be used, including:

.1 Preparation instructions and recommendations.
.2 Storage and handling requirements and recommendations.
.3 Installation methods.

.2 Shop Drawings: Complete details of layout and assembly, showing member sizes and part identification, fasteners, anchors, and fittings.

.3 Selection Samples: Color selections shall be made from the manufacturer's brochure representing manufacturer's full range of available colors and patterns.

.4 Manufacturer's Certificates: Certify products meet or exceed specified requirements.

.5 Manufacturer’s warranties.

2.2 Delivery, Storage, and Handling

.1 Store products in manufacturer's unopened packaging until ready for installation.

.2 Do not deliver until conditions are ready for installation.

2.3 Project Conditions

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

3.0 EXECUTION

3.1 Examination

.1 Do not begin installation until substrates have been prepared and approved by the Consultant.

3.2 Preparation

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 Installation

.1 Install in accordance with manufacturer's instructions.

3.4 Protection

.1 Protect installed products until completion of project.

.2 Touch-up, repair or replace damaged products before Substantial Completion.

3.5 Warranty

.1 All site furnishings shall have a one year warranty period from issuance of the Construction Completion Certificate.

END OF SECTION

1.0 GENERAL

1.1 Definitions

.1 Topsoil:

.1 The top layer of soil containing organic material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Weeds:

.1 Includes, but not limited to, dandelions, jimsonweed, quack grass, horsetail, morning glory, rush grass, mustard, lambs quarter, chickweed, crabgrass, Canadian thistle, tansy, ragwort, Bermuda grass bindweed, bent grass, perennial sorrel, brome grass, red root, pigweed, buck weed, scentless chamomile, toadflax, foxtail and perennial sow thistle.

1.2 Product Delivery, Storage and Handling

.1 Delivery grass seed in the original containers, tagged with identification as to the analysis of seed mixture, percentages of seed, year of seed production, net weight and date.

.2 Deliver seed to site only when required.

1.3 Substitution

.1 Departmental Representative will review all requests by the Contractor for substitution of seed mixes.

2.0 PRODUCTS

2.1 Seed

.1 Grass seed shall meet the minimum requirements for Common No.1 Seed as defined by the Grade Tables under the Canada Seeds Act & Regulations, and having minimum germination of 85% and minimum purity of 97%.

.2 Native Grass Seed Mix:

.1 40% Agrostis Scabra

.2 40% Bromus Ciliatus

.3 20% Agropyron Trachycaulum Var. Subsecundus

.3 The seed mix percentages are by weight.

.4 Contractor to place using hydro seeding method.

1.0 GENERAL

1.1 Definitions

.1 Stripping:

.1 Refer to Section 31 14 13 Soil Stripping and Stockpilling. The Contractor shall use the stripped material. If required, topsoil brought into the National Park must be certified weed and invasive seed free.

.2 Topsoil:

.1 The top layer of soil containing organic material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.3 Weeds:

.1 Includes, but not limited to, dandelions, jimsonweed, quack grass, horsetail, morning glory, rush grass, mustard, lambs quarter, chickweed, crabgrass, Canadian thistle, tansy, ragwort, Bermuda grass, bindweed, bent grass, perennial sorrel, brome grass, red root, pigweed, buck weed, scentless chamomile, toadflax, foxtail and perennial sow thistle.

2.0 PRODUCTS

2.1 Topsoil

.1 Topsoil will be retained to facilitate recovery of construction areas and revegetation. Imported topsoil subject to approval by the Departmental Representative prior to ordering. Topsoil must be certified weed and seed free or another weed-free material may be used instead of topsoil. If requested, the suitability of the material may require verification.

3.0 EXECUTION

3.1 Topsoil

.1 Strip, stockpile and protect existing native topsoil and then spread native topsoil upon completion of the backfilling.

.2 Do not place topsoil when either topsoil or subgrade is frozen, excessively wet, extremely dry, or in a condition inhibiting proper grading, cultivation, or compaction.

.3 Spread topsoil uniformly on prepared subsoil to achieve the depth shown on the drawings.

.4 Cultivate topsoil to a depth of 75 mm, breaking down lumps. Remove stones larger than 50 mm, weeds, roots and other foreign matter.

.5 Manually spread topsoil around trees and plants to prevent damage by grading and levelling equipment.

.6 Float the area until surface is smooth. Remove all lumps, rocks, roots and other debris from the finished material and from the site.

.7 Fine grade to eliminate rough or low areas and to ensure positive drainage.

.8 Compact topsoil with suitable rollers to the satisfaction of Departmental Representative.

.9 Final topsoil grades for seeded areas shall be flush to finished grade at surface structures.

.10 Departmental Representative shall approve topsoil preparation prior to seeding.

3.2 Clean-Up

.1 Clean soil and debris resulting from work done under this section off roadway, walkway and surrounding areas at the end of each working day or as reviewed by Departmental Representative.

END OF SECTION

2.2 Binder

.1 Use Turfmaster Hydro Seal or equivalent compatible binder additive at the manufacturer's recommended rate, sufficient to mix consistent slurry.

.2 Binder shall be mixed and supplied by a recognized supplier and shall have tested rates or purity.

2.3 Mulch

.1 Material shall be wood cellulose fibre containing no contaminants.

.2 Fibre shall be supplied by a recognized supplier and shall have a certified weight and composition.

.3 Minimum application rate is 16.0 kg of air dry fibre per 100 m².

.4 Fibre shall be measured as it is fed into the seeder.

2.4 Water

.1 Clean and free of any substance that may inhibit vigorous growth of grass.

2.5 Equipment

.1 Cultivators: capable of scarifying, discing or harrowing.

.2 Dry Seeders: of the "Brillion" type, capable of rolling and covering the seed with 3 mm to 6 mm of soil; or of the cyclone type, with flexible wire mat drag.

.3 Hydro Seeders: capable of thoroughly mixing water, seed, and pulverized wood fibre and of uniformly spraying the mix at designated rate.

.4 Rollers: of suitable size and mass.

3.0 EXECUTION

3.1 Planting Season

.1 Grass Seeding: recommended season May 1 to September 15.

3.2 Preparation

.1 Remove weeds and debris from topsoil already in place.

.2 Examine the site, verify the grades and check that the topsoil has been placed as specified.

.3 The work shall be done in calm weather, during the normal planting season for the type of seed mixture supplied.

.4 Notify Departmental Representative prior to the start of the seeding operations.

.5 Cultivate existing topsoil and apply additional topsoil as required to obtain minimum required depths of topsoil. Additional topsoil shall be spread evenly and lightly compacted.

.6 Float and level out the finished topsoil surface.

3.3 Mechanical Seeding

.1 Do not seed when prepared topsoil is covered with frost, snow or standing water. Proceed with seeding operations only during favourable weather conditions in accordance with sound horticultural practices.

.2 Slopes flatter than 3 horizontal to 1 vertical: apply seed by mechanical dry spread (Brillion or Cyclone type) at a rate of 24 kg/1,000 m². Apply in two passes, each pass at a rate of 12 kg/1,000 m² at 90 degrees to each other. Lightly roll seeded area.

.3 Hand broadcast seeding is unacceptable under any conditions except for site specific repair work and pre-approved work in naturalization areas.

.4 Thoroughly harrow the site after seed application on ground flatter than 3 horizontal to 1 vertical.

3.4 Hydro Seeding

.1 Use a hydro seeder to seed slopes 3 horizontal to 1 vertical or steeper.

.2 Mix seed with water, and mulch in the following suggested quantities to cover 4,000 m²:

.1 Grass Seed: 96 kgs

.2 Water: 6,400 litres

.3 Mulch: 640 kgs

.3 Hydro seeding should not be carried out in wind velocities which cause seed mix to be blown.

.4 Measure quantities of materials to be fed into the seeder, either by weight or by using another approved system.

.5 Application rates:

.1 Grass seeds 2.4 kg per 100 m² or as specified for the seed type.

.2 Water 160 L/100 m².

.3 Mulch 16 kg/100 m² or sufficient to apply the specified amount of seed per 100 m².

.6 Thoroughly mix seed, mulch, binder (if specified) and water in a slurry and uniformly apply in one operation. Apply seed mixture than cover with approved mulch.

3.5 Seed Germination, Dry Seed and Hydro Seed Applications

.1 If seed fails to germinate within four growing months, re-cultivate and re-seed until germination takes place.

3.6 Warranty

.1 All grass shall have a one year warranty period from issuance of the Construction Completion Certificate.

.2 Areas showing deterioration, bare spots or thin areas shall be re-seeded at the Contractor's expense.

3.7 Maintenance

.1 Maintenance shall include all measures necessary to establish and maintain seeded areas in an acceptable, vigorous and healthy growing condition for a period of one growing season from the issuance of a Construction Completion Certificate and until the issuance of the Final Acceptance Certificate. Maintenance shall include:

.1 Mowing at the end of the growing season to a minimum height of 150 mm and a maximum height of 200 mm. Do not cut more than 1/3 blade height at any one mowing. Remove heavy clippings immediately.

.2 Replacing areas that show root growth failure, deterioration, bare or thin spots or which have been damaged by any means. "Bare" will be determined by a count of plants. Density of native seedlings must be greater than 60 seedlings per sq.metre eight weeks after seeding. Plants will be counted in a sample area with the lowest germination.

.3 Top dressing and rolling to repair ruts or erosion.

.2 Departmental Representative may review the use of herbicides for weed control. They shall be applied in accordance with the manufacturer's recommendations by a licensed applicator. Damage resulting from the Contractor's improper use of herbicides shall be remedied at the Contractor's own expense.

3.8 Final Inspection

.1 Final inspection of seeded areas will be made prior to the end of the warranty period.

.2 At the time of inspection all the areas shall be alive and in a healthy satisfactory growing condition, free from weeds.

.3 Grass is free of eroded, bare, or dead spots and 98% free of all annual and perennial weeds.

3.9 Clean-Up

.1 Clean roadway, walkway and surrounding areas of soil, seed and other debris resulting from work done under this section at the end of each working day or as reviewed by Departmental Representative.

END OF SECTION

1.0 GENERAL

1.1 Action and informational submittals

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

.2 For every one tree removed due to Contractor negligence, three (3) tree plantings in kind will be required at Contractors expense.

1.2 Delivery, Storage and Handling

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Materials and Equipment.

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

.1 Protect plant material from frost, excessive heat, wind and sun during delivery.

.2 Protect plant material from damage during transportation:

.1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.

.2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical. Vehicle shall be refrigerated in the event of hot weather.

.3 Storage and Handling Requirements:

.1 Immediately store and protect plant material which will not be installed within 1 hour in accordance with supplier's written recommendations and after arrival at site in storage location approved by Parks Canada Agency Representative.

.2 Protect stored plant material from frost, wind and sun and as follows:

.1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in topsoil and watering to full depth of root zone.

.2 For pots and containers, maintain moisture level in containers until installation.

.3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones until installation.

.3 Store and manage hazardous materials in accordance with Manufacturer's written instructions.

1.3 Warranty

.1 Contractor hereby warrants that plant material will remain free of defects for 2 full growing season.

.2 End-of-warranty inspection will be conducted by Parks Canada Agency Representative.

.3 Parks Canada Agency Representative reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

2.0 PRODUCTS

2.1 Plant Material

.1 Plant material including trees and shrubs shall be provided as specified by the Parks Canada Agency Representative.

.1 Trees and shrubs shall be species not cultivars.

.2 Coniferous trees shall be a minimum of 2.5m height; deciduous trees shall be a minimum of 40mm caliper.

.3 Requests for substitutions, whether for different size, species, or other reason, shall be made in writing by the contractor to the Parks Canada Agency Representative. No substitutions shall be permitted unless approved by Parks Canada Agency Representative in writing. The Contractor shall allow at least ten (10) days for such requests to be processed by the Parks Canada Agency Representative.

.2 Type of root preparation, sizing, grading and quality: comply to *Canadian Standards for Nursery Stock*, latest edition.

.3 Plant material: free of disease, insects, insect or rodent damage, sunscald, hail damage, cankers, frost cracks, or other defects or injuries and structurally sound with strong fibrous root system. All parts of the plant material shall be moist and show live, green cambium tissue when cut.

.4 Trees: with straight trunks, well and characteristically branched for species. Conifers shall show branching within 400mm of root crown. Deciduous trees shall show branching within 1/3 of the total height of the tree. Trees shall have a well-balanced crown and no weak crotches.

.5 Trees shall have one sturdy, reasonably straight, vertical, and well-developed leader, where this is characteristic of the species.

.6 Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container grown.

.7 Collected stock: maximum 40 mm in caliper, with well-developed crowns and characteristically branched; no more than 40% of overall height may be free of branches.

.1 During collection, ensure 10% maximum seed crop (or plants) are collected from healthy population of many individuals, and from several plants of same species.

.2 Leave remainder for natural dispersal and as food for dependent organisms.

.8 Plant material brought in from other provinces or states must be approved in writing by Parks Canada Agency Representative prior to delivery and inspected and approved by Parks Canada Agency Representative prior to installation.

.9 Branches shall be carefully bound in such a way as to prevent damage, breakage, or bruising during transportation. Plants with broken or abraded trunks or branches or which are badly desiccated may be rejected.

.10 Plant material that has been sheared or pruned to produce an untypical shape, height and stem diameter, or shoot density may be rejected.

.11 Plant material may be rejected when the ball of earth surrounding the roots has been cracked or broken preparatory to or during the process of planting, or when the burlap, staves, and ropes, required in connection with their shipping or transplanting, have been removed.

.12 Plant material shall be subject to inspections for conformity to specification requirements and approval by Parks Canada Agency Representative at their place of growth and/or upon delivery. Such inspection and approval does not relieve the Contractor of Contractor's responsibilities under this contract.

.13 Plant material supplied by the Contractor and rejected by Parks Canada Agency Representative shall be replaced with acceptable plant material at the Contractor's sole expense.

.14 Contractor shall provide plant material list from nursery of origin (i.e., where the trees or shrubs were grown) identifying species and quantity to be supplied for project to Parks Canada Agency Representative for review and written approval in advance of delivery.

.15 Contractor to provide plant material invoice or bill of sale from nursery of origin identifying species and quantity supplied for project to Parks Canada Agency Representative for review and approval prior to installation.

2.2 Water

.1 Free of impurities that would inhibit plant growth.

2.3 Mulch

.1 Deciduous / coniferous wood mulch shall consist of maple, poplar, birch, pine, spruce, douglas-fir chipped wood or bark or other wood material subject to review and approval by Parks Canada Agency Representative. Do not use ash or elm.

.2 Chip size shall be 50 – 76 mm.

.3 Mulch shall be free of non-organic material, wood preservatives, paint, nails, screws, or other metal, and rotting or diseased wood. Mulch shall be free of soil, sawdust, or peat moss (no more than 5% by dry weight). Mulch may be recycled wood. Mulch may be chipped wood and branches from tree cutting on site.

.4 Provide sample to Parks Canada Agency Representative for review and approval prior to construction.

2.4 Stakes

.1 Wood, pointed one end, 38 x 38 x 2300 mm.

2.5 Guying Collar

.1 Tube: plastic, 13 mm diameter, nylon reinforced.

2.6 Trunk Protection

.1 Trunk protection may be wire mesh or plastic strip.

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

.3 Plastic: perforated spiralled strip.

2.7 Tree Protection

.1 Page wire fence 2.2 to 2.4m high c/w post staking and guying.

.2 16 gauge galvanized 50mm x 50mm stucco wire fence or silt fence, attached to page wire fence.

2.8 Fertilizer

.1 Not used

3.0 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for planting installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Parks Canada Agency Representative.

.2 Inform Parks Canada Agency Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Planting Periods

.1 Installation of plant material must be done May 1 through Victoria Day or Labour Day through October 15.

3.3 Pre-planting Preparation

.1 Proceed only after receipt of written acceptability of plant material from Parks Canada Agency Representative.

.2 Remove damaged roots and branches from plant material.

.3 Locate and protect utility lines.

3.4 Excavation and Preparation of Planting Beds

.1 For individual planting holes:

.1 Stake out location and obtain approval from Parks Canada Agency Representative prior to excavating.

.2 Excavate to depth and width as indicated.

.3 Do not bury removed wrapping, wire, rope, or other material in tree pit.

.4 Remove subsoil, rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.

.5 Scarify sides of planting hole.

.6 Remove water which enters excavations prior to planting. Notify Parks Canada Agency Representative if water source is ground water.

3.5 Planting

.1 For bare root stock, place 50 mm backfill soil in bottom of hole.

.1 Plant trees and shrubs with roots placed straight out in hole.

.2 For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball.

.1 Do not pull burlap or rope from under root ball.

.3 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.4 Plants vertically in locations as indicated.

.1 Orient plant material to give best appearance in relation to structure, roads and walks.

.5 For trees and shrubs:

.1 Backfill soil in 150 mm lifts.

.1 Tamp each lift to eliminate air pockets.

.2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.

.3 After water has penetrated into soil, backfill to finish grade.

.2 Form watering saucer as indicated.

.6 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.

.7 Mulch trees and shrubs with 50mm depth mulch.

.8 Water plant material thoroughly.

.9 After soil settlement has occurred, fill with soil to finish grade.

.10 Do not dispose of plant wrapping in tree or shrub pit.

3.6 Tree and Shrub Protection

.1 Install trunk protection on deciduous trees as indicated.

.2 Install trunk protection before installation of tree supports.

.3 Install tree protection around all trees and shrubs immediately after planting to prevent animal damage. A fence 2.2 to 2.4m high is recommended against deer and elk.

.4 It is advisable to screen young plants from wind over the winter.

3.7 Tree Supports

.1 Install tree supports as indicated.

.2 Use single stake tree support for deciduous trees less than 3 m in height and evergreens less than2 m in height.

.1 Place stake on prevailing wind side and 150 mm minimum from trunk.

.2 Drive stake 150 mm minimum into undisturbed soil beneath roots.

.3 Ensure stake is secure, vertical and unsplit.

.4 Install 150 mm long guying collar 1500 mm above grade.

.5 Thread Type 1 guying wire through guying collar tube.

.6 Twist wire to form collar and secure firmly to stake. Cut off excess wire.

.3 After tree supports have been installed, remove broken branches with clean, sharp tools.

3.8 Maintenance During Establishment Period

.1 Immediately following plant material installation, any dead, broken, damaged, diseased, weak crotches, or interfering branches that have not caused the plant material's rejection shall be pruned. Pruning shall preserve the natural character or form of the plant material. Pruning tools shall be sharp and clean.

.2 Perform the following maintenance operations from time of planting to acceptance by Parks Canada Agency Representative.

.1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.

.1 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.

.2 Keep trunk protection and guy wires in proper repair and adjustment.

.3 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

3.9 Maintenance During Warranty Period

.1 From time of Substantial Completion acceptance by Parks Canada Agency Representative to end of warranty period, perform following maintenance operations.

.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.

.2 Remove dead, broken or hazardous branches from plant material.

.3 Keep trunk protection and tree supports in proper repair and adjustment.

.4 Remove trunk protection, tree supports and level watering saucers at end of warranty period.

.5 Remove and replace dead plants and plants not in healthy growing condition.

.6 Make replacements in same manner as specified for original plantings.

.7 Submit monthly written reports to Parks Canada Agency Representative identifying:

.1 Maintenance work carried out.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required which are outside Contractor's responsibility.

3.10 Substantial Performance

.1 Warranty period two (2) years for trees and one (1) year for shrubs is from Substantial Completion.

.2 Trees and shrubs shall be reviewed immediately after initial planting and during the growing season by the Parks Canada Agency Representative.

.3 Final inspection of plants installed will be made by the Parks Canada Agency Representative prior to the end of the Warranty Period.

.4 At the time of final inspection, all installed plant material shall be alive and in a healthy, satisfactory growing condition. Any deficiency in this respect shall be remedied at the Contractor’s own expense.

.5 Deficiencies may include: dead plants, an unhealthy or unsightly condition, and/or has lost its natural shape due to dead branches, excessive pruning, inadequate or improper maintenance.

.6 A warranty period of two (2) years will apply to replacement trees from date of their installation.

.7 Where dead trees are identified, the dead material shall be removed within four (4) weeks of notification. When necessary, approved soil and grass seed shall be added to the pit to reclaim the site and eliminate potential tripping hazards at the time of removal.

3.11 Cleaning

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

.1 Work area clean at end of each day.

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

3.12 Closeout Activities

.1 Submit maintenance reports for trees, shrubs, and other plantings.

END OF SECTION

1.0 GENERAL

1.1 The Work Shall Include Construction of the Following Items

.1 These cast-in-place, extruded or precast structures shall consist of air entrained Portland cement concrete with reinforcing steel, prepared in accordance with the Specifications and to the lines, grades and typical cross-sections as shown on the Drawings or as designated by the Departmental representative.

.2 Loading, transporting and unloading of precast concrete barriers, including the associated hardware, from the designated storage location to the site.

.3 Positioning and pinning of the precast concrete barriers at the job site.

1.2 Quality Assurance

.1 Submit manufacturer's instructions, printed product literature and data sheets for [concrete mixes, reinforcement, connectors, granular, and kerosene] and include product characteristics, performance criteria, physical size, finish and limitations.

2.0 EXECUTION

.1 During loading, transporting, unloading and storing, the precast concrete barriers shall be protected and maintained in an upright position and shall be supported at the bearing areas. Care of the precast concrete barrier units shall be exercised to avoid twisting, cracking or other distortion that may result in damage to the barrier.

.2 Concrete barrier shall be accurately set to the required alignment, in a manner resulting in a smooth continuous installation as shown on the Drawings.

.3 The Contractor shall install the precast concrete barriers as specified on the Drawings or as directed by the Departmental Representative. During all stages, the barriers shall be properly aligned, pinned together and seated firmly to the roadway surface to the satisfaction of the Departmental Representative.

.4 Anchorage: Four 25mm diameter 1m long deformed rebar dowels to be driven through holes provided to be flush with the face of the concrete barrier to prevent snagging.

.5 Tolerance for plumb and grade of barrier shall be 5 mm maximum.

END OF SECTION