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Technical Specifications for JASPER HERITAGE TRAIN STATION

Asset Management – Project #709

June 2019

	No. of Pages
Division 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS	
Section 00 01 10 - Table of Contents	2
Division 01 - GENERAL REQUIREMENTS	
Section 01 11 00 - SUMMARY OF WORK	3
Section 01 14 00 - WORK RESTRICTIONS	2
Section 01 27 00 – MEASUREMENT AND PAYMENT	9
Section 01 31 19 - PROJECT MEETINGS	3
Section 01 32 16.07 - CONSTRUCTION PROGRESS SCHEDULE	2
Section 01 33 00 - SUBMITTAL PROCEDURES	3
Section 01 35 29.06 - HEALTH AND SAFETY REQUIREMENTS	3
Section 01 35 43 - ENVIRONMENTAL PROCEDURES	3
Section 01 41 00 - REGULATORY REQUIREMENTS	1
Section 01 43 00 - QUALITY CONTROL	3
Section 01 51 00 - TEMPORARY UTILITIES	1
Section 01 52 00 - CONSTRUCTION FACILITIES	2
Section 01 56 00 - TEMPORARY BARRIERS AND ENCLOSURES	1
Section 01 61 00 - COMMON PRODUCT REQUIREMENTS	3
Section 01 71 05 - SURVEY REQUIREMENTS	5
Section 01 74 11 - CLEANING	1
Section 01 74 21 - CONSTRUCTION DEMOLITION AND WASTE MANAGEMENT	5
Section 01 77 00 - CLOSEOUT PROCEDURES	2
Section 01 78 00 - CLOSEOUT SUBMITTALS	2
Division 02 - EXISTING CONDITIONS	
Section 02 41 13 - SELECTIVE SITE DEMOLITION	2
Section 02 41 13.14 - ASPHALT PAVING REMOVAL	2
Division 03 - CONCRETE	
Section 03 10 00 - CONCRETE FORMWORK AND FALSEWORK	6
Section 03 20 10 - CONCRETE REINFORCING	5
Section 03 25 00 - CONCRETE ACCESSORIES	2
Section 03 30 00 - CAST-IN-PLACE CONCRETE	9
Division 04 - MASONRY	
Section 04 05 10 - MASONRY PROCEDURES	4
Section 04 05 10 - MORTAR AND MASONRY GROUT	1
Section 04 43 00 – NATURAL STONE VENEER	5
Division 05 - METALS	
Section 05 12 00 - STRUCTURAL STEEL	6
Division 31 - EARTHWORK	
Section 31 05 16 - AGGREGATE MATERIALS	3
Section 31 23 13 - EARTHWORKS AND GRADING	3
Section 31 23 33.01 - EXCAVATING, TRENCHING AND BACKFILLING	6

Division 32 - EXTERIOR IMPROVEMENTS

Section 32 00 01 - SUBGRADE PREPARATION	2
Section 32 00 02 - GRANULAR BASE.....	2
Section 32 12 16 - ASPHALT PAVING	12
Section 32 11 16.01 - GRANULAR SUB-BASE	2
Section 32 12 13.16 - ASPHALT PRIME AND TACK COATS.....	2
Section 32 14 10 - UNIT PAVING ON SAND BED	3
Section 32 15 60 - ROADWAY DUST CONTROL	1
Section 32 16 15 - CONCRETE WALKS, CURBS AND GUTTERS.....	5
Section 32 17 23 - PAVEMENT MARKINGS.....	2

Division 33 - UTILITIES

Section 33 05 12 - SEWER STRUCTURES	3
Section 33 05 14 - ADJUSTMENT OF MANHOLES, HYDRANTS AND WATER VALVES	2
Section 33 41 00 – STORM UTILITY DRAINAGE PIPING	4

END OF TABLE

PART 1. GENERAL

1.1 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other divisions of this specification.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work under this Contract comprises: removal of existing onsite stormwater drainage system, construction of onsite major and minor drainage system including swale, catch basins, downspout storm pipe, storm sewer pipes, catch basin manholes and connection to existing storm system, restoration of paving stone and asphalt surface, repair and overlay of existing parking lot, modification to existing concrete retaining wall, construction of weeping tile system behind existing retaining wall, application of concrete cap and natural stone veneer to modified retaining wall, restoration of topsoil, and internal basement floor repairs.

1.3 WORK SCHEDULE

- .1 This project will be undertaken according to the following schedules:
 - .1 Commence – September 16, 2019
 - .2 Completion – June 1, 2020
- .2 The work will be planned and phased to ensure pedestrian access for Parks Canada Staff and the public is maintained to Jasper Heritage Train Station building and train platform at all times.
- .3 Construction equipment will operate only between 7:30 am and 9:00 pm from Monday to Sunday, to minimize disturbance to the public. No work will be allowed on holidays and long weekends.
- .4 No additional compensation will be provided to the Contractor for cold weather work or other weather-related delays or costs.
- .5 Within two weeks of contract award, the successful bidder will be required to provide a detailed project schedule to meet the above completion date for the Parks Canada Representative approval. When schedule has been approved by Parks Canada Representative, take necessary measures to complete work within scheduled time. No schedule changes will be permitted without Parks Canada Representative's approval.

1.4 CONTRACTOR USE OF PREMISES

- .1 For the purpose of this contract, west parking lot will be available to the Contractor for storage of materials.

1.5 NATIONAL PARK REGULATIONS

- .1 Contractor and all sub-contractors shall ensure that all work is performed in accordance with ordinances, laws, rules and regulations set out in the National Park Act.
- .2 Contractor and all sub-contractors shall obtain business licenses from Jasper Municipal Services Administration Office prior to commencement of work.
- .3 Contractor and all sub-contractors shall comply with all laws and government regulations applicable to work under this contract.
- .4 All Contractor's and all sub-contractor's business and private vehicles are required to obtain vehicle passes from the Parks Canada Administration Office.
- .5 Contractor to equip all service vehicles and supervisory vehicles with Emergency Spill Kit DOT-E-10102 or equivalent.

- .6 Contractor is responsible to ensure all sub-contractors comply with the National Park Regulations in addition to the conditions of contract.

1.6 EXISTING SERVICES

- .1 The project requires some very important requirements related to maintaining access and continuity of existing services to areas provided in Section 01 14 00 Work Restrictions.
- .2 Carry out work at times and in a way as directed by Parks Canada Representative and governing authorities with minimum disturbance to public.
- .3 Notify Parks Canada Representative and utility companies of intended interruption of services and obtain required permission.
- .4 Where work involves breaking into or connecting to existing services, give Parks Canada Representative minimum 7 days' notice for necessary interruption of services throughout course of work. Minimize duration of interruptions, the maximum time of interruption for any services will be not more than 3 hours.
- .5 Provide alternative routes for pedestrian and vehicular traffic, where and when required.
- .6 A pedestrian access plan required to be provided by the contractor.
- .7 Evacuation plan required to be revised for the train station if/when exits are closing off.
- .8 Establish location and extent of building site service lines in area of work before starting Work. Notify Parks Canada Representative of findings.
- .9 Submit schedule to and obtain approval from Parks Canada Representative for any shut-down or closure of active service or facility including water, sewer, gas, power and communications services or public roadways. Adhere to approved schedule and provide notice to affected parties.
- .10 Where unknown services are encountered, immediately advise Parks Canada Representative and confirm findings in writing.
- .11 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by the Parks Canada Representative and authorities having jurisdiction.
- .12 Record locations of maintained, re-routed and abandoned service lines. This includes lines both abandoned in this project and previously abandoned lines which are encountered during the construction.
- .13 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.7 DOCUMENTS REQUIRED

- .1 Maintain "one" copy of each of the following documents at the job site:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Building Permit.
 - .12 Business Licences.
 - .13 Other documents as specified.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, ramps or ladders, independent of finished surfaces and in accordance with relevant regulations.

1.2 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of facilities.
- .2 Make arrangements with Parks Canada Representative to facilitate work as stated in this section.
- .3 Maintain existing services to facility and provide all traffic diversion arrangements for safe personnel and vehicle access.
- .4 Maintain pedestrian access to Jasper Heritage Train Station; construction will need to be staged appropriately to ensure one door on either side of the building is kept open for pedestrian traffic at all times and the northwest entrance will need to be maintained open at all times.
- .5 Maintain pedestrian access to Jasper Heritage Train Station most westerly entrance on north side of the building for the duration of construction. Any disruption to access to this entrance will need to be approved by the Parks Canada Representative.
- .6 Maintain water, sanitary, power, communication and gas services throughout construction to the Jasper Heritage Train Station. The Contractor is required to execute the work in phases to meet the above requirements for which a phasing plan will be submitted for approval by Parks Canada Representative to ensure minimal interruptions. Any disruptions require 7 days' notice and are limited to no more than 3 hours.
- .7 The Contractor shall prepare a Phasing Plan, which shall be of sufficient detail to the satisfaction of the Department Representative and identify the key components within each phase of construction, including the anticipated start and completion date in consideration of proceeding and subsequent tasks that demonstrate the contractors plan and ability to meet the overall schedule objective. The intent of the phasing plan is to show more than a schedule. The Phasing Plan must show in each phase where the work will be taking place, where the accesses to the building will be during that phase and which accesses will be closed. The Contractor shall obtain approval of the Phasing Plan by Parks Canada. Thereafter, during the work, if the Contractor believes it is necessary to alter the Phasing Plan, the Contractor shall prepare and present a revised draft Phasing Plan and obtain approval from Parks Canada prior to implementing any changes to the phasing of the work.
- .8 Contractor will arrange sanitary facilities for use by Contractor's personnel and will keep facilities clean all the time.
- .9 Closures: protect work temporarily until permanent enclosures are completed.

1.3 SPECIAL REQUIREMENTS

- .1 Hours of work: As provided in 01 11 00 – Summary of Work.
- .2 Submit schedule in accordance with 01 32 16.07 - Construction Progress Schedule.
- .3 Ensure Contractor's personnel employed on site become familiar with the restrictions and comply with Parks Canada regulations including safety, fire, traffic and security regulations.
- .4 Ensure Contractor's personnel employed on site are aware that the Jasper Heritage Train Station building is a Classified Federal Heritage Building. Caution must be taken to avoid damage to the building.

1.4 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions. Smoking is not permitted.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 MEASUREMENT FOR PAYMENT

- .1 For each unit price item the Contractor shall provide measurements and calculations for the Department Representative's determination of units of work items completed for purposes of payment. If requested by the Departmental Representative the Contractor shall provide additional measurements and calculations to satisfy the Departmental Representative the accuracy of the quantities used for payment. All cost associated with quantity measurements and calculations shall be included in the other unit prices bit, will be considered incidental to the work, and as such no separate or additional payment will be made for this item.
- .2 Method of measurement to be used is detailed in the section of the specification covering each work item and in 1.2 Measurement for Payment Clauses below.
- .3 Where a method of measurement for payment for a work item is not specified, payment for that item will be deemed to be included in another pay item or other pay items.
- .4 Extra payment will not be made to the Contractor for expenses incurred without prior written approval from the Department Representative/Consultant.

1.2 MEASUREMENT FOR PAYMENT CLAUSES

- .1 Section 01 31 19 – Project Meetings
 1. The work included in this section is considered incidental to project work, No payment will be made for items in this section.
- .2 Section 01 32 16.07 – Construction Progress Schedule
 1. The work included in this section is considered incidental to project work, No payment will be made for items in this section.
- .3 Section 01 33 00 - Submittal Procedures
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .4 Section 01 35 29.06 - Health and Safety Requirements
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .5 Section 01 35 43 – Environmental Procedures
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .6 Section 01 41 00 – Regulatory Requirements
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .7 Section 01 43 00 – Quality Control & Materials Testing
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .8 Section 01 51 00 – Temporary Utilities
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .9 Section 01 52 00 – Construction Facilities
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .10 Section 01 56 00 – Construction Facilities

1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .11 Section 01 61 00 – Common Product Requirement
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .12 Section 01 71 11 – Cleaning
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .13 Section 01 74 21 – Construction Demolition and Waste Management
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .14 Section 01 77 00 – Closeout Procedures
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .15 Section 01 78 00 – Closeout Submittals
 1. The work included in this section is considered incidental to project work. No payment will be made for items in this section.
- .16 Mobilization / Demobilization
 1. The work shall be measured and paid as lump sum item. The approved amount in any one invoice shall not exceed 50% of the total lump sum Bid Price. The final 50% will be held until after Substantial Completion, all materials and equipment and materials have been removed and cleanup is complete to the satisfaction of Parks Canada.
- .17 Pedestrian Traffic Accommodation
 1. The work shall be paid as per the lump sum bid in bid schedule and shall include all materials, labour, equipment, supply and install, preparation and revision of an access plan, evacuation plans for building as required, maintenance throughout construction period and removal upon completion of work, including any amendments, approvals and provisions that may become necessary during the course of work. No progress payments will be made for Pedestrian Traffic Accommodation, which will be paid following Substantial Completion of the work.
- .18 Environmental Construction Operations (ECO) Plan
 1. The ECO Plan is considered to be an important component of the work and is considered to be incidental to all aspects of this project. As such, there is no separate bid or pay item for the ECO Plan which shall be incidental to all and included in the other items bid.
- .19 Erosion and Sedimentation Control
 1. Erosion and sediment control is considered to be incidental to all aspects of this project. As such, there is no separate bid or pay item and it shall be incidental to all and included in the other items bid. Erosion and sediment control shall include all materials, labour, equipment, supply and install, maintenance throughout construction period and removal upon completion of work.
- .20 Removal of Existing Materials
 1. The work shall be measured and paid as per the unit price bid in bid schedule and shall include all, material, labour, equipment, removal, hauling, disposal to outside the National Park and clearing the site of all debris and all associated work to complete the task.

.21 Existing Structures

1. The cost involved in the removal and replacement of existing fences, poles and other structures to accommodate construction shall be included in the tendered unit rates, including fill holes to provide a safe condition.
2. The cost involved to install drainage infrastructure on south side of project site shall include work required to maintain, remove and replace existing fence, as required.

.22 Building Foundation Repairs

1. Foundation repairs shall be paid as lump sum. The price shall be compensation in full for all materials, labour, equipment, supply and install.

.23 Restoration of Parking Lot Curb and Gutter

1. The intent is to protect and retain all existing curbs and gutters on and adjacent to the site. No payment will be made to the Contractor any restoration of curbs and/or gutters that may become damaged by the Contractor. Any such restorations shall be done at the expense of the Contractor.

.24 Subgrade Preparation

1. Subgrade preparation under paver work as shown on the drawings or specified herein shall be included in unit price bid in bid schedule for installation of paver work.
2. Subgrade preparation under concrete work as shown on the drawings or specified herein shall be included in unit price bid in bid schedule for installation of concrete work.
3. Subgrade preparation under asphalt work as shown on the drawings or specified herein shall be included in unit price bid in bid schedule for installation of asphalt work.

.25 Granular Base Course

1. Granular Base Course under paver work as shown on the drawings or specified herein shall be included in unit price bid in bid schedule for installation of paver work. Granular base course work shall include supplying, crushing, hauling, placing, compacting, watering and shaping the material. The depth of granular base course shall be as specified or as shown on the drawing.
2. Granular Base Course work under concrete work as shown on the drawings or specified herein shall be included in unit price bid in bid schedule for installation of concrete work. Granular base course work shall include supplying, crushing, hauling, placing, compacting, watering and shaping the material. The depth of granular base course shall be as specified or as shown on the drawing.
3. Granular Base Course work under asphalt work as shown on the drawings or specified herein shall be included in unit price bid in bid schedule and shall include supplying, crushing, hauling, placing, compacting, watering and shaping the material. The depth of granular base course shall be as specified or as shown on the drawing.
4. Where Granular Base Course material is used to replace unsuitable material, it shall be paid for at the tendered unit rate for the measured compacted volume in place.
5. Additional granular base, when ordered by the Consultant in writing, shall be paid for at the tendered unit price per cubic metre compacted in place for granular base course.

.26 Roadway Structure

1. Hot-mix asphaltic concrete pavement shall be paid for at the unit price bid which will be compensation in full for the furnishing, mixing, transporting, placing and rolling, and for all other labour and materials required to complete the work in

accordance with these specifications. The price bid shall include prime and tack coats.

2. The area paid for will be measured for the full length and width as constructed and paid for at the tendered Unit Price per square metre. The depth shall be as shown on the Schedule of Quantities and Drawings.
3. The Contractor is responsible for the cost and completion of all re-core samples needed in order to obtain CCC. The Contractor further acknowledges that at the point of substantial completion of the roadworks, that 75% of the contract value will be paid. The remaining 25% will be paid once acceptable asphalt core samples and re-core samples, as required, have been received satisfactory to obtaining the CCC. This is to ensure timeliness in having all re-core samples taken and submitted. The same procedure applies at final acceptance. Should the Contractor decide to re-core, the Contractor, shall provide the results of the re coring within 21 days of the original core results being determined by the Geotechnical Consultant, the Contractor shall be deemed to have accepted the results of the original coring.

.27 Sawcutting Existing Asphalt

1. Sawcutting existing asphalt shall be paid by the lineal metre. Payment shall be for the full depth of the existing Asphalt and shall be compensation in full for the supply of all necessary labour and equipment.

.28 Pavement Markings

1. Pavement markings shall be paid for at the unit price bid in bid schedule. The unit bid price shall include supply of materials, equipment and labour and all work incidental to the complete installation in accordance with the specifications and dimensions or as designated by the Engineer.

.29 Concrete Swales

1. The tendered unit price for concrete swales shall be full compensation for excavation, preparing the subgrade, as required, supply and placing granular base course, forming, supplying and placing concrete including any concrete saw cutting of existing concrete and reinforcing steel, jointing, jointing material, finishing, curing, stripping forms and backfilling as specified, shown on the drawings or directed by the Consultant.

.30 Paving Stone Surface

1. Removal and restoration of paver surface will be paid as lump sum. Payment shall compensation in full for lifting existing pavers, hauling and storing onsite, subgrade preparation, supply and install of crushed gravel base and sand bedding and replacing the existing pavers.
2. Additional pavers, when ordered by the Consultant in writing, shall be paid for at the tendered unit price per square metre. Payment shall compensation in full subgrade preparation, sand bedding and pavers.

.31 Excavating, Trenching and Backfilling

1. Trenching and backfilling will not be measured as units for payment but will be included in the price for linear metres of pipe installed.
2. Rock excavation will be measured in cubic metres in its original place. Boulders exceeding 1.0 m³ in volume shall be measured complete, as removed from the trench. Ledge rock shall be measured by actual length and actual width of the trench. A greater width than the approved width will not be paid for. Depth shall be measured by the distance from the surface of the rock to the level to which the Engineer orders the rock to be excavated. Any over excavation will not be paid for. Payment for rock excavation shall include hauling and disposing of the material excavated at a location approved by the Department Representative, and replacement with suitable material.
3. Imported granular material used for stabilizing trench bases and replacement of unsuitable material will be measured in cubic metres. The volume of the material

used shall be computed from the length and depth specified by the Engineer, and the width which shall be the trench width as specified. Payment shall be compensation in full for supplying and hauling the material to the site, placing and compacting, the cost of any extra excavation involved and the disposal of any extra excavated material.

4. Filter fabric used for wrapping trench stabilizing gravel for installation of catch basins, pipes or other infrastructure shall be included in unit price bid in bid schedule for supply and hauling the material to the site, placing, sewing, welding, cutting and all other incidentals necessary to complete the work prescribed. No separate payment will be made.
5. The cost of supplying, placing, maintaining and removal of shoring, bracing, cofferdams, underpinning and dewatering equipment will be incidental to the price paid for pipe installation. No extra payment will be made.

.32 Trench Foundation Stabilization

1. This shall include trench foundation stabilization with screened rock and shall be measured and paid as per the unit price bid in the bid schedule.

.33 Filter Fabric or Geo-grid

1. Filter fabric and geo-grid shall be included in unit price bid for installation and supply of catch basins, pipes and other infrastructure as per the design drawings, including placing and compacting, removal and disposal of any extra material, labour, equipment and all other associated tasks incidental to the task. No separate or extra payment will be made for filter fabric or geo-grid.
2. Rock socks and filter fabric used for wrapping new catchbasins as shown on the drawings or specified herein shall be included in unit price bid in bid schedule for installation of catchbasin.

.34 Adjustment of Appurtenances

1. Adjustment of appurtenances shall be included within the unit price for that appurtenance and will not be measured for separate payment.
2. Manholes which cannot be adequately adjusted shall be reconstructed. Measurement for payment will be by the vertical metre from the elevation of the undisturbed portion of the manhole to the revised rim elevation. Payment shall include all labour and material necessary for the work indicated. Manhole vertical measurements are from the lowest invert to the rim elevation, with the exception that catch basin manholes are measured to the sump invert.

.35 Storm Drain Pipes

1. Storm drain pipes shall be measured centre to centre between manholes or catchbasin, or from the centre of a manhole to a required termination where applicable or as specified.
2. Prices shall be based on depth classification, as specified. The applicable depth shall be determined by the Department Representative at the time the grade stakes are set by measuring the depth from existing ground to the invert of the pipe at 20 m stations between every pair of manholes. The depth classification shall be obtained by averaging these measured depths between each pair of manholes.
3. Payment shall be at the price bid per metre as specified. The price paid shall be compensation in full for excavation; supply of materials; bedding; laying and jointing of the pipe, Mandrill testing, connection to manholes, compaction, backfilling and all restoration work. The price for Sewer Mains shall include the in-line service wyes or tees and plugs.

- .36 Downspout Drainage Pipe Connections
 - 1. Connections between the existing downspout drainage pipes and the new storm drain pipes shall be included in and incidental to the bid price for storm drain pipes.
 - 2. Re-routing the downspouts to drain into the new catch basins to be installed at the northeast and southeast corners of the building shall be paid for at the lump sums bid
- .37 Manholes and Catchbasin Manholes
 - 1. Manholes shall be paid at the unit price bid. Manholes shall be measured in metres from the top of cover to the lowest invert or units acceptably installed. The price paid shall be compensation in full for excavation, supply of materials, installation of the manhole complete with benching, frame and cover as specified, bedding as designated on the drawings, polyurethane sealant, backfilling, grade adjustment and all restoration work. Manhole vertical measurements are from the lowest invert to the rim elevation, with the exception that catch basin manholes are measured to the sump invert.
- .38 Complete System
 - 1. The prices bid shall include all materials and work necessary to provide of a complete and operational storm drain system.
- .39 Catch basins
 - 1. Catchbasins shall be measured in units. Payment shall be at the unit price bid. The price paid shall be compensation in full for excavation, supply of materials, installation or relocation of the catch basin complete with frame, cover, and concrete pad, backfilling, filter fabric, grade adjustment and all restoration work.
 - 2. The unit price bid for catch basins shall apply to all new catch basins, including the new catch basins to be installed at the northeast and southeast corners of the building. That unit price shall include removal and disposal of the exiting catch basins
- .40 Downspout Catch basins
 - 1. NDS 9" x 9" downspout catchbasins with metal grate and outlet adaptor shall be measured in units. Payment shall be at the unit price bid. The price paid shall be compensation in full for excavation, supply of materials, installation of downspout catchbasin complete with grate, outlet adaptor, backfilling, grade adjustment and all restoration work, as per manufacturer's specifications.
- .41 Connections
 - 1. Connections shall be measured in units acceptably completed. Payment shall be at the unit price bid. The price paid shall be compensation in full for excavation; cutting into the manhole, catch basin, sump or sewer; supply of all concrete; grouting the junction area; benching and rechanneling the manhole floor, backfilling and all restoration work.
- .42 Utility Crossings
 - 1. No separate payment will be made for crossing over or under any existing utilities.
 - 2. No separate payment will be made for any support required for crossing under or over any existing sewers or other underground utilities.
- .43 Televising
 - 1. Televising shall be measured per lineal metre. Payment shall include all material and labour, a comprehensive report of CCTV including any flushing or cleaning required.
- .44 Retaining Wall Extension and Curb
 - 1. The reinforced concrete retaining wall extension shall be paid for in linear metres. The unit price shall include the supply and install of reinforcement bars and dowels

and epoxy anchoring of dowels into the existing concrete wall, all necessary formwork, supply of concrete including pouring, finishing and clear up. The bid prices shall include the concrete curb as shown on the detail in the drawings. Allowance for all changes in direction to be included as well as all materials, labour, equipment, supply and install.

.45 Basement Floor Repairs

1. Basement floor repairs and resurfacing shall be paid as lump sum. The price shall be compensation in full for all materials, labour, equipment, supply and install.

.46 Retaining Wall Concrete Cap

1. The concrete cap shall be paid for in linear metres. The unit price shall include the ends of the wall cap, changes in direction, reduction in cross section passing the four concrete plinths, reduction in cross section against the sidewalk (see Section B drawings 60476902 S-100 and S101), cutting the cap to suit existing steps (see detail 2 drawings 60476902 S-100 and S101), removal of any existing concrete or mortar projections, epoxy anchoring concrete cap to retaining wall or existing concrete sidewalk, mortar, caulking and dry ram packed grout and all materials, labour, equipment, supply and install.

.47 Stair Railing

1. Removal and replacement of a stair railing shall be paid for as each for one side of the existing stair railing. The price shall be compensation in full for removal and disposal of the existing handrail and two posts, repair of the removed post holes in the concrete steps, fabrication of new handrail, drilling sockets for the new posts in the existing concrete steps and grouting in place. The bid price shall include all materials, labour and equipment necessary.
2. Restoration of an existing stair railing shall be paid for as each for one side of the existing stair railing. The price shall be compensation in full for sanding and painting of existing rail as necessary to match new railing on opposite side. The bid price shall include all materials, labour and equipment necessary.

.48 Telecommunications Concrete Pad & Conduits

- .1 Removal and disposal of telecommunications concrete pad shall be paid at the lump sum bid. The bid price shall include all, material, labour, equipment, removal, hauling, disposal to outside the National Park and clearing the site of all debris and all associated work to complete the task. This item shall include excavation and removal of the foundation, including removal of the telecommunications conduit and patch hole in foundation wall, filling the holes and waterproofing the exterior walls as per the drawings and all shall be paid as one lump sum. The bid price shall include apply self adhesive waterproof membrane and backfill to grade.

.49 Natural Stone Veneer

1. The natural stone veneer shall be paid for in square metres. The unit price shall include changes in direction, wall ties, mortar, incorporation of weeping tile hole pipes and shall include all materials, labour, equipment, supply and install.
2. Galvanized steel ledger angles and fixings (see Sections B drawings 60476902 S-100 and S101) shall be included in and considered incidental to the unit price bid for natural stone veneer, and shall include all materials, labour, equipment, supply and install.

.50 Retaining Wall Weeping Tile System

1. The retaining wall weeping tile shall be paid for in linear metres. The unit price shall include for excavation, supply and installation of materials, geotextile fabric, all tees and fittings, gravel bedding and surround, laying and jointing of the weeping tile, cored holes in retaining wall, incorporation of pipe in cored holes, connection of pipes to weeping tile, backfilling with existing material, include all materials, labour, equipment, supply and install. The unit shall include supply of

materials, bedding, laying and jointing to the weeping tile of the tee riser pipe and plug, and backfilling. The bid price shall include removal and disposal of any components of the existing components where necessary.

.51 Cold Weather Costs

1. The Contractor shall be responsible for any additional costs due to the cold weather concrete, and tarping or heating. No extra payment will be made.

.52 Materials Stored Onsite

1. No payment will be made for materials delivered to the site until they have been fully integrated to work.

.53 Survey Layout:

- .1 Survey layout and all measurements necessary for construction shall be the responsibility of the Contractor and as such shall be included in and is considered incidental to all other items bid for this project. No separate payment will be made for this item.

.54 Materials Testing:

- .1 Material testing necessary to confirm compliance with the specifications and drawings shall be the responsibility of the Contractor and as such shall be included in and is considered incidental to all other items bid for this project. No separate payment will be made for this item.

.55 Insulation:

- .1 Insulation shall be measured and paid on the basis of area in square meters installed in accordance with the dimensions shown on the cross-section details on the drawings.

.56 Removal or Moving of Boulders:

- .1 Moving and/or removal of boulders as necessary to complete the work shall be paid on the basis of one lump sum for the project at the price bid, which shall include all of the labour, equipment and all related costs to move, remove, load, haul and unload at a storage location to be identified by the Departmental Representative at a distance of no more than 10 km. from the work site, for re-use by Parks Canada.

1.3 PROGRESS CLAIMS

.1 Contractor's Responsibilities:

1. Submit Application for Payment within 5 days after the 25th of each month. Claim to cover preceding month.
2. Progress claim to show estimate of percentage of work completed against each item of Bid Breakdown.
3. Progress claim to include all labour and materials incorporated in the Work.
4. Progress claim to include all agreed extras and deductions.
5. Supply documentation to support claim for materials on site in the form of itemized lists or unpriced purchase orders showing quantities.
6. Supply other evidence required by Consultant in support of progress claim.
7. "Advance against material" – prior written approval from the consultant and the owner shall be obtained before any claim is submitted for approvals.

.2 Consultant's Responsibilities:

1. Review Contractor's claim, prepared Progress Payment Certificate and issue to Department Representative within 10 days following receipt of Contractor's claim.

.3 Inform Contractor of amendments to claim by copy of Progress Payment Certificates.

1.4 CHANGE ORDERS

- .1 The Contractor shall complete and promptly return all change price requests issued by Department Representative, quoting unit and/or lump sum prices as requested.
- .2 Do not proceed with work affected by price request until authorized to do so by Change Order.
- .3 Make no change in Work unless a Change Order is issued. The Change Order is only valid when signed by Consultant, Department Representative and Contractor.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 ADMINISTRATIVE

- .1 The Parks Canada Representative will administer the Pre-Construction Meeting, Progress Meetings and the Site Administration / Contract Coordination Meetings.
- .2 The Parks Canada Representative will give advance notice of meeting dates, times and locations to affected parties.
- .3 Ensure that all meetings are attended by at least the Contractor's Superintendent, the Contractor's Project Manager and senior representatives of major Sub-Contractors, if requested by the Parks Canada Representative.
- .4 Ensure representatives of the Contractor, Sub-Contractor and Suppliers or Manufacturers attending the meetings are qualified and authorized to act on behalf of the party each represents.
- .5 The Parks Canada Representative will chair the meetings and record discussions and decisions, and circulate the minutes to PCA and the Contractor. The Contractor is to circulate the minutes to Sub-Contractors, Suppliers and Manufacturers.
- .6 Notify the Parks Canada Representative in writing of any discrepancies or inconsistencies within two (2) days of receipt of minutes for recording in the next meeting. Failure to notify the Parks Canada Representative of discrepancies or inconsistencies within two (2) days of receipt of minutes will be deemed acceptance of the minutes as recorded.

1.2 PRE-CONSTRUCTION MEETING

- .1 Approximately seven (7) days after receipt of the Notice of Award, the Parks Canada Representative will schedule a meeting to discuss administrative procedures and responsibilities.
- .2 The Contractor's Superintendent, the Contractor's Project Manager and senior representatives of major Sub-Contractors involved in the Work, to be in attendance.
- .3 The meeting will be held in the on the Site or at an alternate location at or near the Site.
- .4 Agenda includes the following:
 - .1 Appointment of official representative of participants in the Work (Contractor's Superintendent, Contractor's Project Manager, Contractor's Safety Professional, Contractor's Scheduler and Quantity Surveyor, Contractor's Foreman, the Resident Engineer and a Parks Canada Representative).
 - .2 Responsibilities of the Contractor, and the Parks Canada Representative.
 - .3 Site safety, site restrictions and hours of operation.
 - .4 Occupational health and safety relationships and responsibilities. Submittal of Site Safety Manual and implementation of Site orientation program.
 - .5 Sustainable issues compliance and coordination.
 - .6 Schedule of Work, progress scheduling.
 - .7 Schedule of submittals.
 - .8 Requirements and schedule for temporary facilities, offices, utilities, fences.
 - .9 Delivery schedule of major and key equipment.
 - .10 Site security and arrangements for Parks Canada Representative and PCA access to the Site.
 - .11 Document Management Procedures (method of tracking and filing requests for information (RFIs), COs, etc., procedures used for logging record drawing information, and other document related issues).
 - .12 Submittal procedures and schedule.
 - .13 Change Order procedures.

- .14 Record Drawings.
- .15 Acceptance and warranties.
- .16 Monthly progress payments, administrative procedures, holdbacks, protocols for communication, reporting, inspection etc.
- .17 Inspection and testing agencies or firms.
- .18 Ambiguities or questions of interpretation identified in the Contract Documents.

1.3 PROGRESS MEETINGS

- .1 The Contractor's Superintendent, Contractor's Project Manager and senior representatives of major Sub-Contractors involved in the Work to be in attendance.
- .2 The meeting will be held on the Site or at an alternate location at or near the Site.
- .3 The Progress Meetings are to be held at intervals of approximately two weeks, or more frequently if so decided by the Parks Canada Representative.
- .4 Agenda includes the following:
 - .1 Review approval of minutes of previous meeting.
 - .2 Old business.
 - .3 Occupational health and safety incidents, records and procedures.
 - .4 Schedule (provide a 3-week 'look-ahead' schedule – Refer to Section 01 32 16.06 Construction Progress Schedule).
 - .5 Document Management Issues.
 - .6 Submittal status.
 - .7 Requests for information.
 - .8 Proposed Contract modifications.
 - .9 Change Order status.
 - .10 Site coordination.
 - .11 Quality control.
 - .12 Site cleanliness.
 - .13 Erosion and Sedimentation Control Measures.
 - .14 Construction Site Solid Waste Management Program.
 - .15 Other action items.
- .5 If requested by Parks Canada Representative, submit for information only, in accordance with Section 01 33 00 Submittal Procedures, at each regularly scheduled progress meeting:
 - .1 Totals of all personnel currently on Site associated with the Contract, broken down by trade and Sub-Contractor including all staff.

1.4 SPECIAL MEETINGS

- .1 Special meetings may be held at the request of the Parks Canada Representative, PCA, or the Contractor to discuss specific items. Arrange for attendance by parties requested by the Parks Canada Representative.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

- .1 Sections as noted herein.

1.2 DEFINITIONS

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

1.3 REQUIREMENTS

- .1 Ensure Master Plan and detail schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 14 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.
- .5 The Bar Chart shall identify the activities on the Critical Path.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Parks Canada Representative within fourteen (14) days of Award of Contract, a Bar (GANTT) Chart as the Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Consultant within seven days of receipt of acceptance of Master Plan.

1.5 MASTER PLAN

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

1.6 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award
 - .2 Shop Drawings, Samples, Permits.
 - .3 Mobilization
 - .4 Storm Drainage Utilities
 - .5 Retaining Wall Modifications
 - .6 Basement Floor Repairs
 - .7 Testing and Commissioning
 - .8 Parking Lot Asphalt Paving
 - .9 Topsoil
 - .10 Any required access disruptions to the Jasper Heritage Train Station
 - .11 Other activities and milestones necessary to complete the project
 - .12 Anything else that may impact any Parks Canada Agency operations (i.e. temporary services).

1.7 PROJECT SCHEDULE REPORTING

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

1.8 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular Project Meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 ADMINISTRATIVE

- .1 Submit to Parks Canada Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Parks Canada Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Parks Canada Representative in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by the Parks Canada Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Parks Canada Representative's review.
- .10 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by Professional Engineer registered or licensed in Alberta, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 7 days for Parks Canada Representative's review of each submission.
- .5 Adjustments made on shop drawings by the Parks Canada Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Parks Canada Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Parks Canada Representative may require, consistent with Contract Documents. When resubmitting, notify Parks Canada Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.

- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Parks Canada Representative's review, distribute copies.
- .10 Submit PDF copies of shop drawings for each requirement requested in specification Sections and as Parks Canada Representative may reasonably request.
- .11 Submit PDF of product data sheets or brochures for requirements requested in specification Sections and as requested by the Parks Canada Representative where shop drawings will not be prepared due to standardized manufacture of product.
 - .1 Submit PDF copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by the Parks Canada Representative
 - .2 Supplement standard information to provide details applicable to project.
 - .3 If upon review by the Parks Canada Representative no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .12 The review of shop drawings by Parks Canada Agency is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Parks Canada Agency approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

- .1 Submit for review samples in duplicates requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Parks Canada Representative's site office
- .3 Notify Parks Canada Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by the Parks Canada Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Parks Canada Representative prior to proceeding with Work.
- .6 Make changes in samples which Parks Canada Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpeg, standard resolution or PDF
- .2 Take daily photographs of all utility and underground work
- .3 Take photographs of site conditions before, during, and after construction. Take photographs of any unique or unusual items.
- .4 Photographs to be submitted on USB stick. All photographs to be labelled with meaningful titles.

1.5 CERTIFICATES AND TRANSCRIPTS

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

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of Alberta
- .3 Occupational Health and Safety Act, R.S.A. - Updated 2013.
- .4 Parks Canada Best Management Practices for Routine Development Project: Town of Jasper - Updated March 2017.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .3 Results of site specific safety hazard assessment.
 - .4 Results of safety and health risk or hazard analysis for site tasks and operation.
 - .1 Submit 1 copy of Contractor's authorized representative's work site health and safety inspection reports to Parks Canada Representative bi-weekly, including minutes of safety toolbox meetings.
 - .2 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
 - .3 Submit copies of incident and accident reports.
 - .4 Submit WHMIS MSDS - Material Safety Data Sheets to Parks Canada Representative.
 - .5 Parks Canada Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 3 days after receipt of plan. Revise plan as appropriate and resubmit plan to Parks Canada Representative within 3 days after receipt of comments from Parks Canada Representative.
 - .6 Parks Canada Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
 - .7 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Parks Canada Representative.
 - .8 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
- .5 Emergencies: In the event of emergency call 911
 - .1 All other inquiries: Jasper Park Wardens – 780 852 6155.
 - .2 All predator sightings to be reported to Jasper Park Wardens.

1.3 FILING OF NOTICE

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

1.4 SAFETY ASSESSMENT

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

1.5 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Parks Canada Representative prior to commencement of Work.

1.6 REGULATORY REQUIREMENTS

- .1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.7 GENERAL REQUIREMENTS

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

1.8 RESPONSIBILITY

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

1.9 COMPLIANCE REQUIREMENTS

- .1 Comply with Occupational Health and Safety Act, General Safety Regulation, Alberta Reg.
- .2 Comply with R.S.Q., c. S-2.1, an Act respecting Health and Safety, and c. S-2.1, r.4 Safety Code for the Construction Industry.
- .3 Comply with latest Occupational Health and Safety Regulations.
- .4 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.
- .5 Comply with Best Management Practices for Routine Development Project: Town of Jasper.

1.10 UNFORSEEN HAZARDS

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

1.11 POSTING OF DOCUMENTS

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

1.12 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Parks Canada Representative.
- .2 Provide Parks Canada Representative with written report of action taken to correct non-compliance of health and safety issues identified.

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

1.13 WORK STOPPAGE

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

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 NATIONAL PARKS ACT

- .1 Perform work in accordance with the ordinances and laws set out in the National Parks Act and Regulations.

1.2 BEST MANAGEMENT PRACTICES

- .1 Perform work in accordance with the Parks Canada's Best Management Practices for Routine Development Projects – Town of Jasper.

1.3 CANADIAN ENVIRONMENTAL ASSESSMENT ACT

- .1 Execution of work is subject to provisions within the Canadian Environmental Assessment Act, 2012.
- .2 Failure to comply with or observe environmental protection measures, as identified in these specifications, may result in work being suspended pending rectification of problem(s).

1.4 MIGRATORY BIRDS ACT

- .1 Avoid any construction activities which affect nesting birds.
- .2 Any trees required to be cut prior to must be inspected for nesting birds, roosting bats by a qualified professional, to be approved by Parks Canada Representative. Trees found to have nesting birds or roosting bats at not to be disturbed until the tree is permanently vacated.

1.5 RELICS AND ANTIQUITIES

- .1 Give immediate notice to the Parks Canada Representative if evidence archaeological finds are encountered during construction, and await Parks Canada Representative's written instructions before proceeding with work in this area.
- .2 Relics, antiquities, items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found on site shall remain Department's property. Protect such articles and request directives from Parks Canada Representative.
- .3 Provide 48 hours' notice to Parks Canada Representative prior to commencing any work that may interfere with or affect an identified historical or archaeological site. Commence work only upon written instructions from Parks Canada Representative.

1.6 ENVIRONMENTAL CONSTRUCTION OPERATIONS (ECO) PLAN

- .1 An ECO plan is a project-specific plan that identifies and mitigates the potential environmental impacts of construction. Contractor is responsible for developing and implementing ECO Plans for this project. Contractor must submit their ECO plans to Parks Canada for review and completed to their satisfaction. All costs associated with the ECO plan or any other provisions to protect the environment or mitigate any environmental issues during the work shall be included in and considered incidental to all other items bid. No separate or extra payments will be made for this item.

1.7 WILDLIFE

- .1 Avoid or terminate activities on site that attract or harass wildlife.
- .2 Immediately notify Parks Canada Representative who will notify Parks Canada Environmental Surveillance Officer of any predator sightings, including bear, wolf, cougar activity or encounters on or around site. Other wildlife encounters should be reported within 24 hours.

1.8 FIRES

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

1.9 DISPOSAL OF WASTE

- .1 All garbage must be stored and handled in conformance with National Parks Garbage Regulations.
- .2 All domestic garbage should be stored over the short term in wildlife-proof dumpsters. Domestic recycling should be put in appropriate facilities. Contaminated materials are to be taken out of the Park. Receipt of hazard material disposal is required.
- .3 Do not bury rubbish and waste materials on site.
- .4 Maintain the site in a tidy condition, free of waste material, debris and litter.
- .5 All waste must be removed from the Park within a reasonable time as directed by the Parks Canada Representative.

1.10 DRAINAGE

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Dewatering of a construction site will require a special permit.
- .3 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with Parks Canada requirements and in conformance with the Environmental Contaminants Act and applicable provincial regulations while observing the Code of Good Practice for Management of Hazardous and Toxic Wastes at Federal Establishments.
- .5 An Erosion and Sedimentation Control (ESC) plan will be required to be approved by Parks Canada Representative prior to beginning work.

1.11 CONTRACTOR'S OPERATIONS

- .1 Hazardous Materials Management Plan and Spill Response Plan required to be approved by Parks Canada Representative prior to mobilizing to site.
- .2 Confine all operations to work limits as staked or designated by Parks Canada Representative. No activities of any kind may be carried out beyond those work limits without Parks Canada Representative's written permission.
- .3 Do not store or stockpile construction materials in trees bordering, or being preserved on site. Do not unreasonably encumber site with products.
- .4 Equipment maintenance shall only be carried out in designated areas or as approved by Parks Canada Representative and Parks Canada Environmental Surveillance Officer. Use of turnouts, campgrounds, picnic areas, work camps, etc., for equipment oil changes and other servicing will not be permitted.
- .5 Equipment must be clean and in good operating order, free of leaks and fitted with standard air emission control devices prior to arrival to site.
- .6 Used oil, filter and grease cartridges, lubrication containers and other products of equipment maintenance shall be collected and disposed of at nearest industrial waste facility.
- .7 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.
- .8 Provide sufficient sanitary facilities and maintain in a clean condition.
- .9 Refuelling. No refuelling is allowed within the project area.
- .10 A spill kit capable of handling 110% of the total fuels onsite must be available at the worksite and all personnel trained in its use.

- .11 In the event of a spill, implement spill response procedures immediately and notify the Parks Canada Environmental Surveillance Officer (or designate) at 780-883-0794. If 100 litres or more of a petroleum product has been released into the environment please call 9-1-1 immediately.
- .12 Conduct operations at all times in such a manner as to preserve natural features and vegetation in area. Cut and fill slopes shall be blended with adjoining topography. Material from fill slopes will not be permitted to slough or roll into surrounding tree cover or to bury any plant material designated to be retained.
- .13 As no non-native vegetation is allowed in Park, all construction equipment shall be thoroughly washed before entering Jasper National Park.
- .14 If any soil contamination is found, work must cease immediately at that location. The Parks Canada Environmental Surveillance Officer (or designate) must be notified immediately at 780-883-0794.

1.12 CONTRACTOR'S EMPLOYEE BRIEFING

- .1 Conduct briefing sessions for all employees and sub-contractor employees highlighting requirements of this section, including operation of equipment strictly.
- .2 Initial site meeting with Contractor, Parks Canada Representative, Park Project Manager and Parks Canada Environmental Surveillance Officer will occur prior to construction commencing.
- .3 Contract documents have been developed in accordance with Canadian Environmental Assessment Act screening requirements. Construction methods which are directly affected by CEAA screening will be reviewed at initial site meeting. Contractor will be expected to comply with and ensure construction practices meet the CEAA Standards. Failure to comply may lead to cessation of work.

1.13 COMPLIANCE WITH PARKS CANADA DEVELOPMENT PERMIT

- .1 Read, understand and comply with Parks Canada Building Permit and all stipulations provided therein.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 REFERENCES AND CODES

- .1 Perform Work in accordance with National Building Code of Canada (NBC) and Alberta Building Code including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.2 WHMIS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.

1.3 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions and municipal by-laws.

1.4 NATIONAL PARKS ACT

- .1 Perform Work in accordance with National Parks Act when projects are located within boundaries of National Park.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

- .1 The Contractor is totally responsible for quality of Material and Product which he provides for the Work.
- .2 The Contractor is responsible for quality control testing and shall perform such inspections and tests as are necessary to ensure that the Work conforms to the requirements of the Contract Documents.
- .3 During the progress of the Work, a sufficient number of tests shall be performed by the Contractor to determine that Material, Product and installation meet the specifications and standards requirements.
- .4 Minimum requirements regarding quality control are specified in various sections of the specifications, however, the Contractor shall perform as many inspections and tests as are necessary to ensure that the Work conforms to the requirements of the Contract Documents.
- .5 Testing shall be in accordance with pertinent codes and regulations and with selected standards of the American Society for Testing Materials (ASTM) and Canadian Standards Association (CSA).
- .6 Product testing, mill test and laboratory reports to demonstrate that Product and Material supplied by the Contractor meet the specifications are specified under various sections of the Contract Documents.

1.2 QUALITY CONTROL TESTING BY THE CONTRACTOR

- .1 The Contractor shall retain the services of a licenced independent testing agency under supervision of a registered professional Engineer, and pay for the cost of testing services for quality control including, but not limited to, the following:
- .2 Sieve analysis of sands and aggregates to be supplied to the Work.
- .3 Concrete Testing
- .4 Asphalt Testing
- .5 Backfill, subgrade, base course and asphalt concrete paving
- .6 Any product testing that is required and is specified under various sections of the specifications
- .7 The Contractor shall promptly process and distribute all required copies of test reports and test information and related instructions to all of his Subcontractors and Suppliers to ensure that all necessary retesting and replacement of construction can proceed without delay.
- .8 The onus shall be on the Contractor to provided documented proof to Parks Canada which confirms that the materials and workmanship meet or exceed the requirements of the drawings and specifications. Payment for components of work may be held back until after the Contractor has provided such documented proof to the satisfaction of Parks Canada.

1.3 QUALITY ASSURANCE TESTING BY THE OWNER

- .1 The Owner shall retain and pay for the services of an independent testing agency for testing for quality assurance, for the Owner's purposes.
- .2 The Owner's testing agency and the Parks Canada Representative shall inspect and test Materials, Products and the Work for conformance with the test requirements of the Contract Documents; however, they do not undertake to check the quality of the Work on behalf of the Contractor nor to provide quality control.
- .3 Inspections and test by the Owner's testing agency and by the Parks Canada Representative do not relieve the Contractor of his responsibility to supply Materials and Products and to perform the Work in accordance with the requirements of the Contract Documents.

- .4 The Parks Canada Representative, at his discretion, may order or perform any additional inspections and test for purposes of his own or for purposes of the Owner.
- .5 The Contractor shall coordinate with the Parks Canada Representative the scheduling of testing and inspection by the Owner's testing agencies or by the Parks Canada Representative, to enable testing to be done as necessary, without delay, and the Contractor shall notify in writing the Parks Canada Representative minimum one week in advance of operations to allow for such inspection and test by the Parks Canada Representative's testing agency. Coordination shall include providing equipment and safe access necessary to perform testing and inspections (i.e. trench box, loaded truck for proof roll, etc.)

1.4 INSPECTION

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

1.5 ACCESS TO WORK

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

1.6 PROCEDURES

- .1 Notify appropriate agency and Parks Canada Representative minimum one week in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.7 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 Parks Canada 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 Parks Canada Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Parks Canada Representative.

1.8 REPORTS

- .1 Submit 1 copy of inspection and test reports to Parks Canada Representative.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

1.2 INSTALLATION AND REMOVAL

- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Remove from site all such work after use.
- .3 Restore any affected areas after removal.

1.3 DEWATERING

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

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

END OF SECTION

PART 1. GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

1.2 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Prepare pedestrian access and management plan to show which entrance and exits will be available during the construction work, where protected pedestrian pathways will run and how access will change as work progresses. The cost of this work shall be incidental to the Pedestrian Accommodation lump sum bid.
- .3 Identify areas to be used for stockpiling soil and material and get approval from Parks Canada Representative.
- .4 Indicate use of supplemental or other staging area.
- .5 Provide construction facilities in order to execute work expeditiously.
- .6 Remove from site all such work after use and restore the areas in their original condition.

1.3 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.4 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work or normal operations of the National Park. Parking areas must be approved by Parks Canada Representative.
- .2 Provide and maintain adequate access to project site.

1.5 SECURITY

- .1 Contractor to ensure all equipment, tools, supplies and materials are secure after hours.

1.6 OFFICES

- .1 If required by Contract, provide office of sufficient size to accommodate required work activities of Contractor and all Sub-Contractors and Parks Canada Representatives. Parks Canada Representative to approve location of trailer.
- .2 Contractor is responsible to deal directly with utility companies for any utility hook ups required for site office.
- .3 Provide marked and fully stocked first-aid case in a readily available location.

1.7 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.8 SANITARY FACILITIES

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

1.9 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Parks Canada Representative.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .8 Dust control: adequate to ensure safe operation at all times and enjoyment of surrounding areas by the public to the satisfaction of PCA.
- .9 Provide snow removal during period of Work.

1.10 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Contractor will be responsible for clean-up of surrounding areas in the case of negligence of waste management. (i.e. waste blown away in the wind).
- .4 Store materials resulting from demolition activities that are salvageable.
- .5 Stack stored new or salvaged material not in construction facilities.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

END OF SECTION

PART 1. GENERAL

1.1 INSTALLATION AND REMOVAL

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

1.2 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations. All excavations left unattended must be barricaded or covered. Animals must not be able to gain access.

1.3 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work as per Section 01 14 00 Work Restrictions. Exceptions may be made with prior written approval from the Parks Canada Representative.

1.4 PUBLIC TRAFFIC FLOW

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

1.5 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.6 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 REFERENCES

- .1 If there is question as to whether products or systems are in conformance with applicable standards, Parks Canada Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .2 Cost for such testing will be borne by Parks Canada Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Parks Canada Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Parks Canada Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Parks Canada Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Parks Canada Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Remove and replace damaged products at own expense and to satisfaction of Parks Canada Representative.

1.5 TRANSPORTATION

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

1.6 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Parks Canada Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Parks Canada Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Parks Canada Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Parks Canada Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Parks Canada Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Parks Canada Representative, whose decision is final.

1.8 CO-ORDINATION

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

1.9 SETTING OUT OF WORK

- .1 Parks Canada Representative will supply horizontal reference control points benchmark elevations only for this project.
- .2 Contractor will set grades and layout work in detail from control points established by Parks Canada Representative.
- .3 Contractor shall employ competent survey staff for complete detailed layout of work.
- .4 Survey supervisor shall have experience in urban field survey work, including obtaining horizontal and vertical measurements, record keeping and calculation of quantities.
- .5 Contractor will be responsible for correction of any error associated with his layout.
- .6 Contractor shall supply such devices as straight edges and templates required to facilitate Parks Canada Representative's inspection of work.
- .7 Contractor shall supply stakes and other survey markers required for laying out the work.
- .8 Cost of setting out of work will not be paid for directly but shall be considered incidental to contract unit prices tendered.

1.10 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by PCA, with minimum of disturbance to Work, building occupants and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 77 00 – Closeout Procedures.

1.2 QUALIFICATIONS OF SURVEYOR

- .1 The Contractor Shall engage the services of independent third-party fully qualified construction surveyors and other technical staff, all working under the supervision of a professional Civil Engineer accredited to practice in the location of the project , who shall maintain professional responsibility for the accuracy and correctness of all survey, survey product and calculations.
- .2 The construction surveyor(s) and technical support staff shall be experienced and capability of using AutoCAD and Civil 3D files to obtain layout and quantity information to be provided to the Departmental Representative and generate deliverables for record and payment purposes.
- 3. Submit to the Departmental Representative written documentation identifying the qualifications and experience of surveyor, survey equipment and survey methodology a minimum of ten (10) days prior to commencing Work. The qualifications and experience of the surveyors shall also be to the satisfaction of the Departmental Representative.
- 4. The Contractor and the Contractor's surveyors shall not rely upon the Department or the Department's consultants to check or verify the accuracy of any survey, layout or calculation. However, in the event that the Departmental Representative may request that Contractor's surveyors perform additional survey, additional calculations or provide other work or documentation to confirm that accuracy of such work, all of which shall promptly be completed and provided at the Contractor's expense.

1.3 SURVEY REFERENCE POINTS

- .1 Any available site survey control points and related information are presented on the Drawings. Any additional survey work required to establish or confirm survey control for the project will be the responsibility of the Contractor. The Contractor's Surveyor shall fully establish all survey contract necessary for construction on this project throughout the project site prior to the installation of any new infrastructure or other improvements.
- .2 Locate, confirm and protect survey control points prior to starting site Work. Preserve permanent reference points during construction. Contractor to re-establish local survey control points where required.
- .3 Confirm that measurements of site Survey Control Points match existing site plans and drawings, or account for any difference between current and previous measurements from control points
- .4 Make no changes or relocations without approval from the Departmental Representative.
- .5 Report to the Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .6 Replace survey control points as required.

1.4 SURVEY REQUIREMENTS

- .1 Establish stable temporary survey control points for use in laying out Work and during construction as required, including but not limited to the calculation of survey layout points based upon AutoCAD drawings that will be provided by the Department.
- .2 Layout points will not be provided by the design consultant or the engineering consultant working on behalf of the Department. The onus will be on the Contractor's surveyor to calculate and determine any points needed for the layout and be responsible for the accuracy of those layout points.
- .3 Establish lines and levels, locate and lay out, by instrumentation.
- .4 Complete surveys required to lay out the Work, progressing the Work, measurement of quantity and record purposes. Carry out a detailed survey of the detailed location and elevation at each stage of construction, including but not limited to the following:
 - .1 Existing ground prior to construction.
 - .2 Stripped ground, after top soil / marginal material stripping. The frequency of survey points, grid spacing or cross section intervals shall be to the satisfaction of the Departmental Representative.
 - .3 Grading
 - .1 Graded Areas:
 - .1 Top edges of cuts and fills
 - .2 Toes of fills
 - .3 Toes of excavations
 - .4 Ditches
 - Top edge (both sides)
 - Toes of slope (both sides)
 - Center line of ditch
 - .5 Top of grade breaks on pads and large areas (25m interval).
 - .6 Center line and edges of all swales and low areas.
 - .4 Road subgrade
 - .1 Center line
 - .2 Edges
 - .3 Changes in slope
 - .5 Gravel base course
 - .1 Center line
 - .2 Edges
 - .3 Changes in slope
 - .4 Stockpile volumes
 - .6 Asphalt finished grade
 - .1 Center line
 - .2 Edges
 - .3 Changes in slope
 - .7 Installed Utilities
 - .1 Culverts:
 - .1 Upstream and downstream invert and top of culvert elevations.
 - .2 Upstream and downstream riprap limits.
 - .3 Top of road subgrade above the culvert.
 - .4 Top of finished road surface above the culvert.
 - .2 New Water lines:
 - .1 Invert elevations surveyed at maximum 15m interval along runs.
 - .2 Invert elevations at all vertical and horizontal deflections.
 - .3 All valves and other fittings. Valve casing at surface.

- .4 Hydrants
 - Connection to water main.
 - Hydrant valve. Valve casing at surface.
 - Hydrant flange.
 - Ground elevation at hydrant.
 - Protection bollards.
 - Limit of riprap around hydrant pad.
- .5 Flush Points
 - Connection to water main.
 - Curb Stop at surface.
 - Valve Casing at surface.
- .3 New Sanitary Sewers:
 - .1 Center of Manhole bases.
 - .2 Manhole rim elevations at center of Manhole cover.
 - .3 Invert elevations of all pipes at Manholes and at 15m maximum intervals.
- .4 New Force mains: (if applicable)
 - .1 Invert elevations surveyed at 25m interval along runs.
 - .2 Invert elevations at all vertical and horizontal deflections.
 - .3 All valves and other fittings. Valve casing at surface.
 - .4 Invert elevations at anaerobic cells
- .5 New Water Service to individual sites or lots or Campsites
 - .1 Connection at water main.
 - .2 Curb Stop at surface.
 - .3 Invert at end of service.
 - .4 Any horizontal changes in direction.
 - .5 Any vertical changes in slope.
- .6 New Sanitary Service to individual sites or lots
 - .1 Connection at sanitary sewer main.
 - .2 Invert at end of service.
 - .3 Any horizontal changes in direction.
 - .4 Any vertical changes in slope.
- .7 New Powerlines:
 - .1 Center line of installation trench, assuming cable is in centerline of trench at bottom.
 - .2 Extents of any Conduits
- .8 New Electrical Equipment:
 - .1 Four corners of all electrical transformers.
 - .2 Four points around base of light standards and any other electrical surface furniture.
- .9 Traffic Control Signs
- .10 Existing oTENTik Structures
- .11 Campsite Improvements
- .8 New Structures and Buildings
 - .1 Bottom of excavation.
 - .2 Bottom & top of footings & foundations
 - .3 Bottom of wet well (lift stations only)
 - .4 Top & bottom of finished floor
 - .5 Pipe invert elevations
 - .6 Surface features such as blower, vent pipe, hatches, sidewalks, cubs, ramps, light poles, etc.
 - .7 Tree clearing limit record survey and plans

- .4 Perform survey for record drawings. Forward survey to Departmental Representative upon completion.
- .5 Calculate quantities based upon construction surveys and provide that information to the Departmental Representative for payment purposes along with documentation to substantiate the claim. The onus shall be on the Contractor to demonstrate the correctness of all quantity surveys and calculations and provide clarifications to the Departmental Representative upon request, all at the Contractor's expense.

1.5 SURVEY MARKERS

- .1 Provide all survey markers and other items required to complete Work as specified, including, but not limited to:
 - .1 Pointed stakes (minimum 1.2 m in length, 12 mm thick, 38 mm wide).
 - .2 Pointed hubs (minimum 0.5 m in length, 20 mm thick, 38 mm wide).
 - .3 Nails (100 mm long), spikes (250 mm long), pins (1 m long), etc.
 - .4 Fluorescent paint, flagging, etc. Colors subject to approval of Departmental Representative.
 - .5 Felt markers, chalk, wax pens, etc.
- .2 Maintain supply of survey markers for Departmental Representative's use.

1.6 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 Provide PDF and electronic survey data of all surveys to the Departmental Representative.

1.7 SUBMITTALS

- .1 Upon request of the Departmental Representative, submit documentation to verify the accuracy of field work.
- .2 Provide all survey data in all of the following formats or in equivalent formats accepted by the Departmental Representative prior to completion of surveys:
 - .1 Point file in Comma Separated (.csv) format for each completed survey.
 - .2 Survey description code legend if abbreviations are used in CSV files and drawing files.
 - .3 For grading, an AutoCAD (.dwg) Civil 3D drawing file containing the following:
 - .1 Imported survey points.
 - .2 3D breaklines.
 - .3 Surface models.
 - .4 For utilities, an AutoCAD (.dwg) Civil 3D drawing file containing the following:
 - .1 Imported survey points.
 - .2 2D linework of all water lines, sanitary sewer lines and force mains with layer names or labels denoting pipe size installed.
 - .3 2D linework of electrical cables with layer names or labels denoting type of service installed and number of cables or conduits at each location.

- .3 Submit raw survey data in electronic form containing (at minimum):
 - .1 Survey Company Name.
 - .2 Name of surveyor.
 - .3 Survey coordinate system used.
 - .4 Date of survey.
 - .5 Name of survey file, including description of survey feature / purpose.
 - .6 Point numbers, Northing, Easting, elevation, point description.
- .4 All survey data files shall include sufficient points and included all changes in lines, dimensions and slopes to accurately depict the Work.
- .5 Submit all survey data at a minimum monthly, with all requests for progress payments or upon the Departmental Representative's request.
- .6 Submit the survey data files as the latest as-constructed information during the progression of and upon completion of the Work.
- .7 At completion of all Work, submit certificate signed by the Professional Engineer certified to practice in the jurisdiction within which the project is located, certifying and noting those elevations and locations of completed work that conform and do not conform to Contract Documents. Submit certificate of completed survey work seven (7) days prior to requested Final Inspection.

PART 2. PRODUCTS

- .1 Not used.

PART 3. EXECUTION

- .1 Not used.

END OF SECTION

PART 1. GENERAL

1.1 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of. Do not burn waste materials on site.
- .3 Clear snow and ice as required. Pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Waste containers must be secure and prevent animals and public from accessing.
- .7 Dispose of waste materials and debris outside of Jasper National Park.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris, 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 exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .5 Mop clean and wipe down any interior areas affected by the work.
- .6 Remove dirt and other disfiguration from exterior surfaces.
- .7 Sweep and wash clean paved areas.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 SECTION INCLUDES

- .1 This schedules and procedures for systematic Waste Management Program for construction, deconstruction, demolition, and renovation projects, including:
 - .1 Diversion of Materials.
 - .2 Waste Audit (WA) - Schedule A.
 - .3 Waste Reduction Workplan (WRW) - Schedule B.
 - .4 Demolition Waste Audit (DWA) - Schedule C.
 - .5 Cost/Revenue Analysis Workplan (CRAW) - Schedule D.
 - .6 Materials Source Separation Program (MSSP).
 - .7 Canadian Governmental Responsibility for the Environment Resources – Schedule E.

1.2 DEFINITIONS

- .1 Demolition Waste Audit (DWA): Relates to actual waste generated from project.
- .2 Materials Source Separation Program (MSSP): Consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .3 Recyclable: Ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.
- .4 Recycle: Process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .5 Recycling: Process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .6 Reuse: Repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .7 Salvage: Removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .8 Separate Condition: Refers to waste sorted into individual types.
- .9 Source Separation: Acts of keeping different types of waste materials separate beginning from first time they became waste.

1.3 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

- .1 Prepare MSSP and have ready for use prior to project start-up.
- .2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by authorities having jurisdiction.
- .3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide containers to deposit reusable and recyclable materials.
- .5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations. Containers shall be clearly marked.
- .6 Locate separated materials in areas which minimize material damage.

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

1.4 STORAGE, HANDLING AND PROTECTION

- .1 Unless specified otherwise, materials for removal become Contractor's property.
- .2 Protect, stockpile, store and catalogue salvaged items.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to approved local facility.
- .4 Protect structural components not removed for demolition from movement or damage.
- .5 Support affected structures. If safety of building is endangered, cease operations and immediately notify Department having jurisdiction.
- .6 Protect surface drainage, mechanical and electrical from damage and blockage.
- .7 Separate and store materials produced during dismantling of structures in designated areas.
- .8 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
- .1 On-site source separation is recommended.

1.5 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of any waste into waterways, storm, or sanitary sewers.
- .3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .4 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

1.6 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Provide security measures approved by Parks Canada Representative.

1.7 SCHEDULING

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

PART 2. PRODUCTS

2.1 NOT USED.

PART 3. EXECUTION

3.1 APPLICATION

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

3.2 CLEANING

- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

- .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Parks Canada Representative and consistent with applicable fire regulations.
 - .1 Mark containers or stockpile areas.
 - .2 Provide instruction on disposal practices.
- .2 On-site sale or distribution of salvaged materials to third parties is not permitted.
- .3 Demolition Waste:

Demolition Waste		
Material Type	Recommended Diversion (%)	Actual Diversion %
Pipes	100	
Valves and fittings	100	
Electrical Equipment	80	
Asphalt	100	
Metal	100	
Rubble	100	
Wood (uncontaminated)	100	
Other	100	

Construction Waste		
Material Type	Recommended Diversion (%)	Actual Diversion %
Cardboard	100	
Plastic Packaging	100	
Rubble	100	
Steel	100	
Wood (uncontaminated)	100	
Other	100	

SCHEDULE A - Waste Audit (WA)

Material Category	Material Quantity (unit)	Estimated Waste (%)	Total Waste Quantity (units)	Generation Point	Recycled %	Reused %
Wood and Plastics Material - Description						
Off cuts						
Warped pallets						
Forms						
Plastic Packaging						
Cardboard Packaging						
Doors / Windows						
Painted frames						
Glass						
Wood						
Metals						
Others						

SCHEDULE B – Waste Reduction Workplan (WRW)

Material Category	Person Responsible	Total Quantity of Waste (unit)	Actual Reused Amount (unit)	Actual Recycled Amount (unit)	Material Destination
Wood and Plastics Material					
Chutes					
Warped Pallets					
Plastic Packaging					
Forms					
Pallets					
Painted frames					
Glass					
Wood					
Metals					
Others					

SCHEDULE C – Demolition Waste Audit (DWA)

Material Description	Quantity	Unit	Total	Volume	Weight	Remarks and Assumptions
Wood, Plywood						
Pipes						
Valves and fittings						
Electrical Equipment						
Asphalt						
Metal						
Rubble						
Wood (uncontaminated)						
Others						

SCHEDULE D – Cost / Revenue Analysis Workplan (CRAW)

Material Description	Quantity (unit)	Volume (cumulative)	Weight (cumulative)	Disposal Cost/Credit \$(+/-)	Category Sub Total \$(+/-)
Wood, Plywood					
Wood, Plywood					
Pipes					
Valves and fittings					
Electrical Equipment					
Asphalt					
Metal					
Rubble					
Wood (uncontaminated)					
Others					

3.4 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule E - Government Chief Responsibility for the Environment:

Province	Address	General Inquires	Fax
Alberta	Alberta Environmental Protection Petroleum Plaza, South Tower 9915 - 108 th Street Edmonton AB T5K 2G8	403-427-2739	
	Alberta Special Waste Management Corporation Pacific Plaza, Suite 610 10909 Jasper Avenue NW Edmonton AB T5J 3L9	403-422-5029	403-428-9627

END OF SECTION

PART 1. GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Parks Canada Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Parks Canada Representative's inspection.
 - .2 Parks Canada Representative's Inspection:
 - .1 Parks Canada Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted and fully operational.
 - .4 Certificates required by Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Parks Canada Representative, and Contractor.
 - .2 When Work incomplete according to Parks Canada Representative, complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when Parks Canada Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
 - .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
 - .7 Final Payment:
 - .1 When Parks Canada Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .2 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with Parks Canada Representative, to:
 - .1 Verify Project requirements.
 - .2 Review warranty requirements.
 - .2 Parks Canada Representative to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf [219 x 279] mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content under Section numbers and sequence of Table of Contents.
- .6 Text: manufacturer's printed data, or typewritten data.
- .7 Drawings: provide with reinforced punched binder tab.

1.4 AS-BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, at site for Parks Canada Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.

- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
 - .2 Keep record documents and samples available for inspection by Parks Canada Representative.

1.5 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of drawings, provided by Parks Canada Representative.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .3 Field changes of dimension and detail.
 - .4 Changes made by change orders.
 - .5 Details not on original Contract Drawings.
 - .6 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 NOT USED

END OF SECTION

PART 1. GENERAL

1.1 NOT USED

PART 2. PRODUCTS

2.1 EQUIPMENT

- .1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.
- .2 Select such type of equipment for demolition to minimize damage to site and disruption to adjacent areas.

PART 3. EXECUTION

3.1 PREPARATION

- .1 Inspect site with Parks Canada 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.

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 Parks Canada Representative.
 - .2 Protect adjacent joints and load transfer devices.
 - .3 Protect underlying and adjacent granular materials.
- .4 Remove and dispose of any abandoned utilities which are encountered during excavation for utility installations.
- .5 Remove wooden chlorine chamber and surrounding concrete without causing any damage to the pipes and fittings to be salvaged.
- .6 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving.
- .7 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.
- .8 Remove designated shrubs during demolition.
 - .1 Obtain written approval of Parks Canada Representative prior to removal of shrubs not designated.
- .9 Stockpile topsoil for final grading and landscaping at locations approved by the Parks Canada Representative
 - .1 Provide erosion control and seeding if not immediately used.

- .10 Disposal of Material:
 - .1 Dispose of materials not designated for salvage to approved disposal facility outside of Jasper National Park or reuse on site as instructed by Parks Canada Representative.
- .11 Backfill:
 - .1 Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

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

PART 1. GENERAL

1.1 SECTION INCLUDES

- .1 Methods for removal of existing asphalt pavement.

PART 2. 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.

PART 3. 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 Parks Canada Representative areas, depths and lines of asphalt pavement to be removed. Areas to be removed must be clearly marked out on site with paint and approved by the Parks Canada Representative prior to saw cutting.

3.2 PROTECTION

- .1 Protect existing pavement not designated for removal, light units and structures from damage. Asphalt to be removed adjacent to pavement to be left in place must include saw cutting to preserve the intact pavement.
- .2 In event of damage, immediately replace or make repairs to approval of Parks Canada Representative at no additional cost.
- .3 Saw cutting in accordance with Section 02 41 13 - Selective Site Demolition

3.3 REMOVAL

- .1 Remove existing asphalt pavement to lines and grades as indicated.
- .2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.
- .3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.
- .4 Provide for suppression of dust generated by removal process.
- .5 Asphalt removed areas under public traffic use will require temporary ramping and signage at transition areas until the area is restored.

- .6 All removed asphalt shall be removed to approved disposal facility outside of Jasper National Park or reuse on site as instructed by Parks Canada Representative.

3.4 FINISH TOLERANCES

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

3.5 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

PART 1. 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 Void forms under grade beams and pile caps.
- .4 Shoring, bracing, and anchorage.
- .5 Form openings for other trades.
- .6 Supply and installation of concrete accessories.
- .7 Set anchor rods, anchors, sleeves, dowels, frames and other items supplied by other trades.
- .8 Clean erected formwork prior to concrete placement.
- .9 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 Alberta Building Code 2010.
- .3 Alberta Occupational Health and Safety Code 2014.
- .4 ASTM F1167-IS Standard Specification for Driven Fasteners:
 - .1 Nails, Spikes and Staples
- .5 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .6 CSA-O86-14, Engineering Design in Wood.
- .7 CSA-O121-17, Douglas Fir Plywood.
- .8 CSA-O141-16, Softwood Lumber
- .9 CSA-O151-17, Canadian Softwood Plywood.
- .10 CSA-O325-16, Construction Sheathing.
- .11 CAN/CSA-S269.1-16, Falsework and formwork.

1.4 DESIGN STANDARDS

- .1 Design and detail formwork and supporting falsework in accordance with CSA-A23.1, CSA-S269.1, 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 Parks Canada Representative shall decide which requirement is the most stringent.
- .3 Use load combinations in accordance with the Alberta Building Code 2014.
- .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 Alberta.

1.5 QUALITY ASSURANCE

- .1 Construct and erect formwork and falsework in accordance with CSA-A23.1, CSA-S269.1, 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.

1.6 SHOP DRAWINGS

- .1 Submit shop drawings for formwork, falsework, and reshoring well in advance of the work in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings for formwork and falsework shall clearly indicate the following:
 - .1 Design loads and load combinations;
 - .2 Proposed construction methods and field adjustment of forms;
 - .3 Specifications for formwork materials and overall formwork scheme;
 - .4 Density of plastic concrete;
 - .5 Rate, sequence, and method of placing concrete;
 - .6 Concrete slump, concrete admixtures, and concrete temperature;
 - .7 Maximum member panel deflection;
 - .8 Mass of components of formwork to be erected;
 - .9 Location and details of construction joints;
 - .10 Compressive strength of concrete at formwork removal and application of construction loads.
- .3 Shop drawings for reshoring shall clearly indicate the following:
 - .1 Description of reshoring concept;
 - .2 Stripping schedule;
 - .3 Sequence of installing reshores;
 - .4 Formwork details relating to stripping and reshoring.
- .4 Shop drawings and design briefs are to bear the seal of a Professional Engineer registered in the Province of Alberta.
- .5 Formwork, falsework, and reshoring are to be reviewed by the same Professional Engineer prior to each concrete pour.
- .6 Professional Engineer to report, in writing, that reviewed formwork, falsework, and reshoring are in accordance with the design prior to each concrete pour.
- .7 Shop drawing review by the Parks Canada Representative is solely to ascertain conformance to the general design concept.
- .8 Responsibility for approval of detail design inherent in shop drawings rests with the Contractor and review by the Parks Canada Representative shall not imply such approval.
- .9 Review shall not relieve the Contractor of his responsibility for errors or omissions in shop drawings or for proper completion of the Work in accordance with the Contract Documents.

PART 2. 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 Void Forms under Structural Slabs: 150 thick, low density closed-cell expanded polystyrene (EPS) designed to collapse or compress under soil expansion; Dynavoid by Beaver Plastics, Geovoid by Plasti-Fab or approved equal. Use 10mm sheathing or hardboard between void form and concrete. Locations as noted on Drawings.

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.

PART 3. 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 Parks Canada 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 Parks Canada Representative's permission before framing openings in concrete slabs, beams and columns 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 Parks Canada 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 Parks Canada Representative at no cost.
- .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 Parks Canada 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 Parks Canada 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 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.
- .2 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.
- .3 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.
- .4 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 Parks Canada Representative when formwork is complete and has been cleaned to allow for inspection. Parks Canada 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 Parks Canada Representative to inspect each section of formwork prior to reuse. Formwork may be re-used if approved by the Parks Canada Representative.

3.8 CLEANING

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 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.
- .3 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 Parks Canada Representative prior to removing formwork.
- .2 The following Table is to be used as a guide for the removal of forms and supports:

	Minimum Period of Time	Minimum Concrete Strength (based on 28 Day Strength)
Walls and critical vertical faces	2 days	50%

- .3 The concrete strength referenced in the table above shall be based on test results of field-cured cylinders (i.e. cylinders cured on site under the same conditions as the in-situ concrete).
- .4 Remove falsework progressively in accordance with regulatory requirements and ensure that no shock loads or imbalanced loads are imposed on the structure.
- .5 Loosen forms carefully. Do not apply tools to exposed concrete surfaces.
- .6 Leave forms loosely in place for protection until complete removal is approved by the Parks Canada Representative.
- .7 Store removed forms for exposed architectural concrete in a manner that surfaces to be in contact with fresh concrete will not be damaged. Marked or scored forms will be rejected.
- .8 Removal of forms subject to approved on-going curing procedures

END OF SECTION

PART 1. 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 adjacent to architectural concrete surfaces.
- .4 All labour, materials, and equipment to supply and place the reinforcing steel shown on the Drawings.

1.2 RELATED WORK

- | | | |
|----|----------------------------------|------------------|
| .1 | Concrete Formwork and Falsework. | Section 03 10 00 |
| .2 | Concrete Accessories. | Section 03 25 00 |
| .3 | Cast-In-Place Concrete. | Section 03 30 00 |

1.3 REFERENCES

- .1 ACI Detailing Manual – 2004.
- .2 ACI 439.3R-07, “Types of Mechanical Splices for Reinforcing Bars”.
- .3 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .4 ASTM A1064/1064M, “Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain, for Concrete”.
- .5 ASTM A497/A497M-07, “Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete”.
- .6 CAN/CSA-A23.1-14, “Concrete Materials and Methods of Concrete Construction”.
- .7 CAN/CSA-A23.3-14, “Design of Concrete Structures”.
- .8 CAN/CSA-G30.18-M92 (R2014), “Carbon Steel Bars for Concrete Reinforcement”.
- .9 CAN/CSA-W47.1-14, “Certification of Companies for Fusion Welding of Steel”.
- .10 CAN/CSA-W186-M1990 (R2016), “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 Parks Canada 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 Section 01 33 00 - Submittal Procedures..
- .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 Parks Canada 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 Parks Canada Representative.

1.9 CONSTRUCTION REVIEW

- .1 Notice for inspection must be given to the Parks Canada Representative 48 hours prior to actual concrete placing. Failure to give adequate notice may cause the Parks Canada 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 Parks Canada Representative, at no cost.
- .4 The Parks Canada Representative's general review is undertaken to inform of the Contractor's performance, and in no way shall augment the Contractor's quality control procedure, or relieve the Contractor of contractual responsibility.

PART 2. 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 A 185/A 185M or deformed type, conforming to ASTM A 497/A 497M.
- .4 Tie Wire: minimum 1.6 mm annealed type, or patented system approved by Parks Canada 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.

PART 3. EXECUTION

3.1 EXAMINATION

- .1 Before starting this work, examine work done by others which affects this work.
- .2 Notify the Parks Canada 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 When specifically requested, obtain Parks Canada Representative's approval of reinforcing steel and position before placing concrete.
- .3 Reinforcement shall be free from loose rust, scale, grease, clay, or other coatings which will destroy or reduce concrete bond.

- .4 Concrete cover shall be as specified on the Drawings, or if not specified, in accordance with CSA-A23.1.
- .5 Reinforcement shall be adequately secured in position by approved chairs, support bars, and spacers.
- .6 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.
- .7 Necessary splices shall be lapped not less than 24 bar diameters unless noted otherwise, and be in accordance with CSA-A23.3.
- .8 Revise, reseal, and correct improperly positioned reinforcing prior to placing concrete to the satisfaction of the Department Representative.
- .9 Provide horizontal “L” shaped corner bars of same cross-sectional area and spacing as horizontal bars around wall and grade beam corners, unless shown otherwise on Drawings.
- .10 Provide 10M support bars in hooks and corners of beam stirrups unless shown otherwise on the Drawings.
- .11 Provide 4 extra 15M diagonal corner bars around holes larger than 100 mm in floor slabs and walls, 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.
- .12 Provide 1-15M bar for each wall face at each side of hole for holes larger than 750 mm in walls, unless shown otherwise on the Drawings.
- .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 Prior to closing forms and placing concrete, obtain Parks Canada 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.

3.4 FIELD BENDING

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

- .1 Do not field bend reinforcement except where indicated or authorized in writing by the Parks Canada 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 Proceed in accordance with Section 01 74 11 – Cleaning.

- .2 Ensure concrete reinforcing is clean and free from oil and deleterious matter.
- .3 Remove all loose scale, loose rust and other deleterious matter from surfaces of reinforcing.

END OF SECTION

PART 1. 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 Concrete Formwork and Falsework. Section 03 10 00
- .2 Concrete Reinforcing. Section 03 20 00
- .3 Cast-in-Place Concrete. Section 03 30 00

1.3 QUALITY ASSURANCE

- .1 Verification of Details: Contractor to notify the Parks Canada 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 Section 01 33 00 - Submittal Procedures..

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.

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

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

2.5 EPOXY BONDING AGENT

- .1 Sikadur 32 Hi-Mod. or W.R. Meadows Sealtight Intralok.

2.6 VAPOUR BARRIER

- .1 6 mil thick polyethylene vapour barrier, continuous under all slabs on grade and throughout the crawl space.

PART 3. 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 damp proofing with a fibreboard protection board, minimum 300 mm wide.

END OF SECTION

PART 1. 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 | Concrete Formwork and Falsework. | Section 03 10 00 |
| .2 | Concrete Reinforcement. | Section 03 20 00 |
| .3 | Concrete Accessories. | Section 03 25 00 |

1.3 REFERENCES

- .1 ASTM C260-16, "Standard Specification for Air-Entraining Admixtures for Concrete".
- .2 ASTM C494/C494M-16, "Standard Specification for Chemical Admixtures for Concrete".
- .3 ASTM C1017-13, "Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete".
- .4 CSA-A23.1-14, "Concrete Materials and Methods of Concrete Construction".
- .5 CSA-A23.2-14, "Methods of Test and Standard Practices for Concrete".
- .6 CSA-A3001-13, "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 Parks Canada 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 01 and Table 5 in CSA-A23.1 Alternate 1.
- .2 At the request of the Parks Canada Representative, submit a letter, signed and sealed by a Professional Engineer registered in the Province of Alberta, 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 Parks Canada 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 Parks Canada 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 m3 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 Parks Canada 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.

PART 2. 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 Parks Canada Representative.

2.2 CONCRETE MIXES

- .1 Pay all costs for mix design. Submit design of a proven mix to Inspection and Testing Firm and Parks Canada Representative for review.
- .2 Do not change concrete mix without prior approval of Parks Canada Representative. Should change in material source be proposed, submit new mix designs to be reviewed by Parks Canada Representative.
- .3 Use accelerating admixtures in cold weather only when approved by Parks Canada 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 Parks Canada Representative.
- .5 All admixtures are subject to the approval of the Parks Canada Representative. List all proposed admixtures in mix design submission. Do not change or add admixtures to approved design mixes without Parks Canada 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 (%)
Mud Slab	N	GU	2 @ 3 Days 5 @ 56 Days	-	20	-
New Wall, Wall 'Capping' Stone, Swale and Curbs	C-2	GU	32 @ 28 Days	0.4	20	5-8

PART 3. EXECUTION

3.1 EXAMINATION

- .1 Before starting this work, examine work done by others which affects this work.
- .2 Notify the Parks Canada 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 Parks Canada 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 bonding a topping to previously placed substrate concrete is required, ensure that the substrate concrete surface is rough, clean and free of oil, grease, laitance and loose material such as dust and debris. Thoroughly clean the substrate and place the bonding agent to substrate immediately prior to placing the topping in accordance with the manufacturer's recommendations.
- .14 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.

- .15 The concrete surfaces shall be protected from rain until the final set occurs.
- .16 A minimum of 72 hours shall elapse between adjacent pours separated by construction joints or expansion joints.
- .17 Do not place concrete in the interior of a building if carbon dioxide producing equipment has been in operation in the building during the 12 hours preceding the pour. This equipment shall not be used during placing or for 24 hours after placing. During placing and curing concrete, surfaces shall be protected by formwork or an impermeable membrane from direct exposure to carbon dioxide, combustion gases or drying from heaters.
- .18 Honeycombing or embedded debris in concrete is not acceptable.
- .19 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 Parks Canada Representative. Joints shall be in accordance with CSA-A23.1, or as indicated on Drawings or direct by the Parks Canada 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 Where the Contractor elects to employ construction joints other than shown and the Parks Canada Representative so approves, waterstops shall be provided for the full length of the joint if required by the Parks Canada Representative and without additional compensation to the Contractor.
- .4 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 Parks Canada Representative.

3.4 COLD AND HOT WEATHER CONCRETING

- .1 Conform to requirements of CSA-A23.1.
- .2 Refer to Division 1 for temporary enclosure and heating requirements.
- .3 Protect slabs being finished during drying conditions above 25°C 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 drains as noted on Drawings.
- .2 Depress floors for tile floors or toppings as shown on Drawings.

3.7 CONDUITS AND PIPES

- .1 Conduit and pipe embedded in concrete shall be of a material not harmful to the concrete and shall:

- .1 Not displace more than 4% of the area of the cross section of a column on which stress is calculated, including the area of concrete displaced by the bending of the conduit or exit path of the conduit out of the column.
- .2 Not exceed one-third the solid portion of the slab thickness.
- .3 Not be spaced closer than three diameters on centre.
- .4 Have a concrete covering of not less than 25 mm.
- .5 Be so installed that it will not require cutting, bending or displacement of the reinforcement or impair the structural strength of the system.

3.8 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 the Parks Canada Representative before placing concrete.

3.9 SLAB ON GRADE

- .1 Seal punctures and damaged areas of vapour barrier before placing concrete. Use vapour barrier material, lapped over punctures and damaged areas minimum 300 mm in all directions in crawlspace. Seal with tape.
- .2 Place adjustable screeds at suitable locations. Do not pierce vapour barrier.
- .3 Carefully place concrete to required elevations indicated on Drawings.
- .4 Separate slabs-on-fill from vertical surfaces with 25 mm thick joint filler. Extend joint filler from bottom of slab to within 13 mm of finished surface.
- .5 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.

3.10 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 non-watertight walls 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.

3.11 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.

3.12 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 Parks Canada Representative's approval.
- .3 Modify or replace concrete not conforming to qualities, lines, details and elevations specified herein or indicated on Drawings.

3.13 FINISHING FORMED SURFACES

- .1 Finish all exposed formed concrete surfaces with sack rubbed finish conforming to CSA-A23.1.
- .2 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.
- .3 Inspect concrete surfaces immediately upon removal of all formwork.
- .4 Patch imperfections when concrete is green.
- .5 Remove all exposed metal form ties, nails and wires, break off fins and remove all loose concrete.
- .6 Thoroughly wet all form tie pockets and patch with patching mortar followed by proper curing.
- .7 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.

3.14 FINISHING WALKS, CURBS, RAMPS, STEPS

- .1 Finish edges of curbs, walks and pads to smooth radius.
- .2 On walks, tool control joints across at spacing shown on Drawings.
- .3 Broom finish surface of man door aprons, steps, walks, curbs and ramps.
- .4 Apply curing and sealing compound to manufacturer's directions.

3.15 FINISHING CONCRETE PAVEMENT

- .1 Screed to plane surfaces and use wood floats.
- .2 Immediately after floating, give walk surface uniform troweled finish.
- .3 Apply light sandblast finish to all walk surfaces and concrete pavement.
- .4 Provide round edges and joint spacings using standard tools.

- .5 Install expansion joints as indicated or as directed by the Parks Canada Representative at intervals of 3.6 to 4.0 m.
 - .1 Install joint filler in expansion joints in accordance with Section 03 30 00 - Cast-in-Place Concrete as indicated.
- .6 The finished surfaces of all concrete work shall be true to the required cross-section with a tolerance of plus or minus 6 mm from the required elevation and dimensions. Surface of curbs or concrete walks shall not show any depressions or bumps exceeding 3 mm under a straight edge 3 m long placed parallel to the curb or walk. Concrete not meeting the requirements specified shall be removed to the nearest joint and replaced at the Contractor's expense.

3.16 GROUTING

- .1 Install non-shrink grout under equipment bases as shown on Drawings and in accordance with the manufacturer's recommendations.

3.17 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 Parks Canada 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 Parks Canada 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 Parks Canada 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 Parks Canada 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 Parks Canada Representative.

3.18 CONCRETE PAVEMENT, WALK AND CURB FAILURES

- .1 Replacement of affected sections shall be required when one or more of the following exist:
 - .1 Any crack greater than 3 mm in width with no vertical displacement or chipping or spalling edges.
 - .2 Any crack with vertical displacement or chipping or spalling edges.
 - .3 Any longitudinal crack greater than or equal to 1.5 mm in width.

- .4 A displacement at a joint of greater than or equal to 12 mm.
- .5 A dished surface concrete walk.
- .6 A reverse crossfall or crossfall greater than 8% or less than 0.7%.
- .7 A random cracking of any size.
- .8 Any feature considered detrimental to pedestrian safety or appearance of the concrete walk.
- .9 A corner cut exists.

3.19 PATCHING

- .1 Allow Parks Canada 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.

3.20 CLEAN-UP

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 At completion of work, remove from site all debris, excess materials and equipment.

END OF SECTION

PART 1. GENERAL

1.1 RELATED WORK

- .1 Mortar and Masonry Grout Section 04 05 12

1.2 REFERENCES

- .1 CSA A179-04 (R2014), Mortar and Grout for Unit Masonry.
- .2 CSA-A371-04 (R2014), Masonry Construction for Buildings.
- .3 CSA-A370-14, Connectors for Masonry.

1.3 SAMPLES

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

1.4 TEST REPORTS

- .1 Submit laboratory test reports in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specification requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials to job site in dry condition.
- .2 Keep materials dry until use.
- .3 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Cold weather requirements:
 - .1 In accordance with CSA-A371.
 - .2 Supplement Clause 6.7.2 of CSA-A371 with following requirements:
 - .1 Maintain temperature of mortar between 5°C and 50°C until batch is used.
- .2 Hot weather requirements:
 - .1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
 - .2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.
- .3 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.
- .4 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

PART 2. PRODUCTS

2.1 MATERIALS

- .1 Masonry materials are specified in related Sections indicated in Clause 1.1 of this Section.
- .2 Natural Stone Veneer:

Description	Suggested or Similar	Comments
Natural Stone Veneer	Subcontractor: Halfrocks	Stone to be provided by the Contractor.

PART 3. EXECUTION

3.1 INSTALLATION

- .1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.2 WINTER CONSTRUCTION

- .1 In accordance with CSA-A371.
- .2 Materials shall be stored and installed so that they are protected from snow and ice and shall be free of road salt or other deleterious materials.
- .3 When the air temperature is less than 5°C, sand and mixing water shall be heated to produce mortar at a temperature of not less than 5°C or more than 50°C.
- .4 When the air temperature is less than -4°C, walls shall be protected and heated in a manner that will maintain an air temperature above 0°C on both sides of the wall under construction.
- .5 The temperature of masonry units shall be not less than -7°C during installation.
- .6 Mortar that has been frozen shall not be used.
- .7 Incomplete masonry exposed to the weather shall be covered on the top surface with a waterproof material except when construction is in progress.
- .8 After masonry has been laid, it shall be protected when the air temperature is less than 0°C to maintain a masonry temperature of not less than 0°C for 24 hours by means of a covering or enclosure and where necessary by supplementary heat.

3.3 WORKMANSHIP/INSTALLATION

- .1 Perform masonry work in accordance with CSA A371.
- .2 Place natural stone veneer in accordance with lines and levels indicated on the Drawings.
- .3 Fully bond external and internal corners and intersections.
- .4 Buttering corners of joints, deep or excessive furrowing of mortar joints is not permitted.
- .5 Do not shift or tamp masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- .6 Perform job site cutting with proper power tools to provide straight and true, unchipped edges.
- .7 All vertical and horizontal joints are to be equal and of uniform thickness.
- .8 Lay flat rock surface in full bed of mortar, properly jointed with other work.

- .9 Remove excess mortar and projections. Take care to prevent breaking rock corners.
- .10 Form concave mortar joints.

3.4 EXPOSED MASONRY:

- .1 Remove chipped, cracked, and otherwise damaged units in exposed masonry and replace with undamaged units.

3.5 JOINTING:

- .1 Allow joints to set just enough to remove excess water, then use tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints.

3.6 CUTTING AND FITTING:

- .1 Cut and fit for electrical outlets, chases, pipes, conduit, sleeves and ground. Co-operate fully with other sections of work to ensure correct size, shape and location.
- .2 Obtain Engineer's approval prior to cutting or fitting any area which is not indicated on drawings, or which may impair appearance or strength of masonry work.

3.7 BUILDING-IN:

- .1 As work progresses, build in hollow metal frames, steel angle lintels, nailing strips, anchor bolts, plates and all other items supplied by other sections of work.
- .2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
- .3 Build in items plumb and true to lines and levels indicated on drawings.
- .4 Do not build in organic materials which will be subjected to rot or deterioration.

3.8 SUPPORT OF LOADS:

- .1 Use concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units.
- .2 Use grout to CSA A179 where grout is used in lieu of solid units.

3.9 CONTROL JOINTS:

- .1 Provide control joints in masonry and veneer masonry at 9 metre maximum spacing. Coordinate with Consultant prior to installation.
- .2 Control joints shall be formed by placing building paper between the vertical joint.
- .3 Provide control joints in veneer where indicated.
- .4 Construct expansion joints as indicated. Masonry reinforcing and wall flashing shall not continue across expansion joints.

3.10 WEEP HOLES

- .1 Weep holes to be cored at approximately 2000 mm maximum on centre or as detailed on the drawings.
- .2 Weep holes to be 50 mm diameter PVC pipe.
- .3 Weep hole pipe to be sealed in the cored holes to avoid water accumulating between the pipe and hole.
- .4 Weep holes to be installed with a 2% minimum fall to the front of the retaining wall.

3.11 SITE TOLERANCES

- .1 Tolerances in notes to Clause 6.2 of CSA-A371 apply.

3.12 PROTECTION

- .1 Cover top of completed and partially completed walls not enclosed or sheltered with waterproof covering at end of working day. Tie securely in position to prevent lifting under high winds.
- .2 Maintain protective boards at exposed external corners which may be damaged by construction activities. Provide such protection without damaging completed work.
- .3 Keep expansion joint void clear of mortar.

3.13 CLEANING

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove excess mortar and smears upon completion of masonry work, without damaging surface.
- .3 Point or replace defective mortar to match adjacent work.
- .4 Clean solid surfaces using a non-acidic solution which will not harm masonry or adjacent materials. Consult masonry manufacturer for acceptable cleaners. Use non-metallic tools in cleaning operation.

END OF SECTION

PART 1. GENERAL

1.1 RELATED WORK

- .1 Masonry Procedures Section 04 05 10

1.2 REFERENCES

- .1 CSA A179-04 (R2014), Mortar and Grout for Unit Masonry.

1.3 SAMPLES

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

PART 2. PRODUCTS

2.1 MATERIALS

- .1 Use same brands of materials and source of aggregate for entire project.
- .2 Mortar and grout: CSA A179.
- .3 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
- .4 Colour: ground coloured natural aggregates or metallic oxide pigments.
- .5 Mortar for exterior masonry above grade:
 - .1 Loadbearing: Type S based on Property specifications.
 - .2 Non-loadbearing: Type S based on Property specifications.
- .6 Grout: to CSA A179, Table 7.

2.2 MIXES

- .1 Mix grout to semi-fluid consistency.

PART 3. EXECUTION

3.1 CONSTRUCTION

- .1 Do masonry mortar and grout work in accordance with CSA A179 except where specified otherwise.
- .2 Apply parging in uniform coating not less than total 10 mm thick, where indicated.

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 04 05 00 Common Work Results for Masonry
- .2 Section 04 05 13 Masonry Mortaring and Grouting
- .3 Section 04 05 19 Masonry Anchorage and Reinforcing
- .4 Section 04 05 23 Masonry Accessories
- .5 Section 07 62 00 Sheet Metal Flashing and Trim
- .6 Section 07 92 00 Joint Sealants

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A153/A153M-09, Standard Specification for Zinc Coated (Hot Dip) on Iron and Steel Hardware.
 - .2 ASTM A508/A508M-05b(2010), Standard Specification for Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forgings for Pressure Vessels.
 - .3 ASTM A580/A580M-13a, Standard Specification for Stainless Steel Wire.
 - .4 ASTM C144-11, Standard Specification for Aggregate for Masonry Mortar.
 - .5 ASTM C150/C150M-12, Standard Specification for Portland Cement.
 - .6 ASTM C207-06(2011), Standard Specification for Hydrated Lime for Masonry Purposes.
 - .7 ASTM C241/C241M-13, Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.
 - .8 ASTM C270-12a, Standard Specification for Mortar for Unit Masonry.
 - .9 ASTM C780/C780M-12a, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 - .10 ASTM C1242-12a¹, Standard Guide for Design, Selection, and Installation of Stone Anchors and Anchoring Systems.
- .2 CSA Group
 - .1 CAN/CSA-A179-04(R2009), Mortar and Grout for Unit Masonry.
 - .2 CAN/CSA-A370-04(R2009), Connectors for Masonry.
 - .3 CAN/CSA-A371-04(R2009), Masonry Construction for Buildings.
 - .4 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Shop Drawings:
 - .1 Indicate sizes and sections of stone, arrangements of joints and bonding, anchoring, dowelling and cramping.

.3 Samples:

- .1 Submit sample for each finish product specified, one (1) complete set representing full range of available colours, textures, and patterns.

1.4 QUALITY ASSURANCE

.1 Mock-ups:

- .1 Construct mock-ups in accordance with Section 01 45 00- Quality Assurance and Quality Control.
 - .1 Construct mock-up panel of exterior natural stone veneer construction 1000 x 1000 mm, showing colours and textures, use of reinforcement, ties, through wall flashing, weep holes, jointing, coursing, mortar and quality of work.
 - .2 Mock-up used: To judge quality of work, substrate preparation, operation of equipment and material application.
 - .3 When accepted by the Departmental Representative, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

1.5 SITE CONDITIONS

.1 Ambient Conditions:

- .1 Do not install at temperatures below 12 degrees C or above 38 degrees C.
- .2 Maintain temperatures at or above 12 degrees C until cementitious materials have fully cured.
- .3 Cold Weather Requirements: IMIAC - Recommended Practices and Specifications for Cold Weather Masonry Construction.
- .4 Do not apply epoxy mortar and grouts at temperatures below 15 degrees C or above 25 degrees C.

.2 Field Measurements:

- .1 Make field measurements necessary to ensure the proper fit of all members.

PART 2. PRODUCTS

2.1 ACCEPTABLE PRODUCTS

- .1 Natural stone from local quarry / supplier.
 - .1 Size, pattern and finish to match stone at the Jasper Amphitheatre (River Rock).
 - .2 Supply cap stone with sawn finish.

2.2 MORTAR MATERIALS

- .1 Portland Cement: to CAN/CSA-A3000, Type GU: colour as selected by Departmental Representative.
- .2 Hydrated Lime: to ASTM C207, Type SA.
- .3 Mortar Aggregate: to CAN/CSA-A179, standard masonry type; clean, dry, protected against dampness, freezing, and foreign matter.

- .4 Colour Pigment: natural oxide pigment, to be selected by Departmental Representative
- .5 Water: potable, clean and free of deleterious amounts of acids, alkalies or organic materials.

2.3 ACCESSORIES

- .1 Anchors and ties: in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .2 Mortar & Grout: in accordance with Section 04 05 13- Masonry Mortaring and Grouting.
- .3 Setting Buttons: resilient plastic, type; non-staining; sized to suit joint thicknesses and bed depths without intruding into required depths of joint sealants or causing third-side adhesion between sealant and setting button.
- .4 Weep Hole Vents: purpose made plastic louvered vents, insect proof.
- .5 Sealant and Backer Rod: in accordance with Section 07 92 00- Joint Sealants.
- .6 Flashings: in accordance with Section 04 05 23 - Masonry Accessories

PART 3. EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- .1 Waterproof exterior slabs on back prior to setting.
- .2 Clean stone surfaces by washing with stiff fibre brush and water.

3.3 SETTING STONE - GENERAL

- .1 Construction in accordance with CAN/CSA-A371.
- .2 Reinforcement and anchorage in accordance with Section 04 05 19- Masonry Anchorage and Reinforcing.
- .3 Set stones plumb, true, and level, to requirements as indicated and approved shop drawings.
- .4 Align stone edges and faces according to established relationships and indicated tolerances.

- .5 Provide movement joints of widths and at locations indicated. Ensure movement joints are kept free of mortar.

3.4 SETTING STONE WITH MORTAR

- .1 Set stones in full bed of mortar with vertical joints buttered and placed full, except where otherwise specified. Completely fill anchor, dowel and lifting holes.
- .2 Lay stone similar to stone at Amphitheatre. Connect stone veneer to structural back-up with approved wall ties, spaced not more than 405 mm horizontally and 610 mm vertically.
- .3 Embed only ends of lugged sills and steps in mortar. Leave balance of joint open for final pointing.
- .4 Place soft-wood wedges under stones to maintain joint thickness. Set heavy stones and projecting courses after mortar in courses below has hardened sufficiently to support weight.
- .5 Brace and anchor projecting stones until wall above is set.
- .6 Use soaked softwood wedges to support stone in proper alignment until mortar has set. Remove wedges when dry and without breaking them off, fill voids with pointing mortar.
- .7 Install through-wall flashing membranes at continuous shelf angles, steel lintels, ledges and similar obstructions to the downward flow of water.
- .8 Install weep hole vents at 800 mm on center at bottom of walls.
- .9 Tool joints after initial set has occurred.
- .10 Rake out joints to 25 mm depth and make ready for pointing with pointing mortar sealant. Sponge stone face along joints and remove droppings and splashed mortar immediately.
- .11 Set copings, with unfilled vertical joints.
- .12 Grouting: pack ends of exposed joints with plastic foam joint filler and after wetting ends of stone, fill joint with grouting mortar to within 19 mm of top.
 - .1 Grout vertical joints of copings.
 - .2 After grout has set, remove packing for pointing.
- .13 Pointing: remove dirt and loose mortar from joints by using pressurized airstream.
 - .1 Wet joints for mortar pointing. Dry joints for sealant pointing.
 - .2 Point joints with pointing mortar in 2 stages. Rub smooth with appropriate tool to slightly concave joint.
 - .3 Point coping joints with sealant. Do work in accordance with Section 07 92 00-Joint Sealants.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning. Leave Work area clean at end of each day.
- .2 Clean stone as work progresses.
- .3 Allow mortar droppings on stone to partially dry then remove by means of brushing with a stiff fibre brush.
- .4 Post-Construction: clean mock-up panel as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, clean masonry as follows:
 - .1 Protect windows, sills, doors, trim and other work from damage.
 - .2 Remove large particles with stiff fibre brushes without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
 - .3 Scrub with solution of 25 ml trisodium phosphate and 25 ml household detergent dissolved in 1 litre of clean water using stiff fibre brushes, then clean off immediately with clean water using hose.
 - .4 Repeat cleaning process as often as necessary to remove mortar and other stains.
- .5 Use alternative cleaning solutions and methods for difficult to clean stone only after consultation with masonry unit manufacturer.

3.6 PROTECTION

- .1 Protect stone from damage resulting from subsequent construction operations.
- .2 Use protection materials and methods which will not stain or damage stone.
- .3 Remove protection materials upon Substantial Performance of Work, or when risk of damage is no longer present.

END OF SECTION

PART 1. GENERAL

1.1 WORK INCLUDED

- .1 Structural framing including columns, beams, hollow sections and channels.
- .2 Architecturally exposed structural steel (AESS) members.
- .3 Support channels and angles attached to structural framing.
- .4 Baseplates, bearing plates, anchor rods, and vertical and horizontal bracing.
- .5 Welds, bolts, washers, nuts, shims, and connecting material.
- .6 Prime paint and/or galvanize structural steel members and appurtenances.
- .7 Field touch up of primed or galvanized surfaces including field welding.
- .8 Temporary erection bracing during construction.

1.2 RELATED WORK

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

1.3 REFERENCES

- .1 ASTM A123/A123M-15, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM F3125/F3125M 2015, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
- .3 ASTM A490M REV A 2014, Specification for High-Strength Steel Bolts.
- .4 ASTM A572/A572M 2015, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- .5 ASTM A992/A992M 2011 R2015, Standard Specification for Structural Steel Shapes.
- .6 CISC/CPMA 1-73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.
- .7 CISC/CPMA 2-75, A Quick-Drying Primer for Use on Structural Steel.
- .8 CISC Code of Standard Practice for AESS definitions of Categories.
- .9 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .10 CSA-S16-14, Limit States Design of Steel Structures.
- .11 CSA-S136-12, North American Specification for the Design of Cold Formed Steel Structural Members.
- .12 CSA-W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel.
- .13 CSA-W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
- .14 CSA-W55.3-08 (R2013), Certification of Companies for Resistance Welding of Steel and Aluminum
- .15 CSA-W59-13, Welded Steel Construction (Metal Arc Welding).
- .16 SSPC-SP 1, Solvent Cleaning
- .17 SSPC-SP 3, Power Tool Cleaning
- .18 SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning.
- .19 SSPC-SP 7 /NACE No. 4, Brush Off Blast Cleaning.
- .20 SSPC-SP 8, Pickling.
- .21 SSPC-SP 10/NACE No.2, Near-White Blast Cleaning.

1.4 DESIGN STANDARDS, CODE REQUIREMENTS

- .1 Conform to requirements of CSA-S16-14, CSA-S136-12, the Canadian Institute of Steel Construction (CISC) "Code of Standard Practice for Buildings", and the Provincial Construction Safety Act.
- .2 Use loads, load combinations, and stress levels shown on Drawings and in accordance with the Alberta Building Code 2014.
- .3 Architecturally exposed structural steel (AESS) members to conform to the CISC Code of Standard Practice, according to the Category as specified by the Architect.
- .4 Shear connections:
 - .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
 - .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.
- .5 Submit sketches and design calculations stamped and signed by a qualified Professional Engineer registered in the Province of Alberta for non-standard connections.
- .6 All shop drawings containing connection details to be stamped and signed by a qualified Professional Engineer registered in the Province of Alberta.
- .7 Perform all welding in accordance with requirements of CSA-W59.

1.5 QUALIFICATIONS

- .1 All work is to be performed by a firm certified by the Canadian Welding Bureau to the requirements of CSA W47.1 in Division 1 or Division 2.1.
- .2 All welders employed for erection are to possess valid "S" Classification Class "O" certificates issued by the Canadian Welding Bureau.

1.6 INSPECTION & TESTING

- .1 Shop and field inspection and testing may be performed by an Inspection and Testing Firm appointed and paid for by the Owner.
- .2 Provide free access to all portions of work in the shop and in the field and cooperate with appointed firm.
- .3 Pay all additional costs for inspection and re-inspection due to defective workmanship or materials.
- .4 If requested by the Parks Canada Representative, submit four (4) copies of mill test reports, properly correlated to materials actually used.
- .5 Radiographic and magnetic particle inspection of welds may be performed by the Inspection and Testing Firm, in accordance with CSA W59 and ASTM E109, for all full penetration welds and, all column splices.
- .6 All welds are to be visually inspected.
- .7 Welds are to be considered defective if they fail to meet quality requirements of CSA W59.
- .8 High strength bolted connections are to be inspected and tested in accordance with Clause 23.9 of CSA-S16.

1.7 SHOP DRAWINGS AND SUBMITTALS

- .1 Provide a fabrication and erection schedule to the Parks Canada Representative prior to commencement of shop fabrication and field erection, in ample time to allow proper scheduling of inspection and testing.
- .2 Submit details of typical connections and special connections for review prior to preparation of shop drawings.
- .3 All shop drawings containing connection details to be stamped and signed by a qualified Professional Engineer registered in the Province of Alberta.
- .4 Submit shop drawings for review in accordance with Division 1.
- .5 Clearly indicate profiles, sizes, spacing and locations of structural members, connections, attachments, reinforcing, anchorage, framed openings, size and type of fasteners, cambers and loads, accessories, column anchor bolt locations, and setting details.
- .6 Include erection drawings, elevations, and details.
- .7 Indicate welded connections using welding symbols in compliance with CISC Welding Standards. Clearly indicate net weld lengths.
- .8 Shop drawing review by the Parks Canada Representative is solely to ascertain conformance to the general design concept.
- .9 Responsibility for approval of detail design inherent in shop drawings rests with the Contractor and review by the Parks Canada Representative shall not imply such approval.
- .10 Review shall not relieve the Contractor of his responsibility for errors or omissions in shop drawings or for proper completion of the Work in accordance with the Contract Documents.
- .11 Responsibility for verification and correlation of field dimensions, fabrication processes, and techniques of construction, installation and coordination of all parts of the Work rests with the Contractor.

PART 2. PRODUCTS

2.1 MATERIALS

- .1 All materials are to be new.
- .2 Beam End Plates, Ledger Angles, and Miscellaneous Steel: to CSA-G40.21, Grade 300W with minimum yield strength of 300 MPa.
- .3 Base and Cap Plates: to CSA-G40.21, Type 300W with minimum yield strength of 300 MPa.
- .4 Structural steel wide flange sections (W shapes): conforming to CSA-G40.21, Grade 350W with minimum yield strength of 350 MPa, or conforming to ASTM A992 or A572, Grade 50 with minimum yield strength of 345 MPa.
- .5 Structural Channels (C shapes): conforming to CSA-G40.21, Grade 300W with minimum yield strength of 300 MPa.
- .6 Hollow Structural Sections: conforming to CAN/CSA G40.21, Grade 350W Class 'C' with minimum yield strength of 350 MPa. Hollow structural sections conforming to ASTM A500 Grade C will not be acceptable unless approved by the Parks Canada Representative.
- .7 Bolts, Nuts and Washers: conforming to ASTM A325M; finished to match members to which they attach.
- .8 Anchor Rods: fabricated from material conforming to CSA-G40.21, Grade 300W with minimum yield strength of 300 MPa; nuts and washers to be of equal or greater strength than rods.

- .9 Welding Materials: conforming to CSA-W59.
- .10 Primer: primer to CISC/CPMA 1-73b or CISC/CPMA 2-75. Color to be selected by Architect from standard color chart.
- .11 Galvanizing: conforming to ASTM A123.
- .12 Touch-up galvanizing with minimum 2 coats of zinc rich primer.

2.2 FABRICATION

- .1 Fabricate structural steel members in accordance with CSA-S16 and CSA-S136.
- .2 Verify all drawing dimensions prior to commencing fabrication.
- .3 Provide openings and punched holes 10 – 30 mm in diameter in structural members for other building components. Reinforce openings with steel plates sized and welded in place, to restore members to original design strength. Locate holes so as to cause no appreciable reduction in strength of members.
- .4 Provide connections for loads indicated on the Drawings as a minimum.
- .5 Provide for field connections to be bolted except where field welded connections are shown on the Drawings. Bolted connections shall be bearing type connections with the thread excluded from the planes of shear.
- .6 Provide CISC double angle header connections wherever possible.
- .7 Provide top and bottom flange angle clips for all spandrel beams.
- .8 Accurately cut and mill column ends and bearing plates to assure full contact of bearing surfaces prior to welding.
- .9 Close and weatherproof all gaps, butt joints, and connections exposed to exterior of building. Grind all exposed welds flush with surface of welded members.
- .10 Weld shear studs in place with stem perpendicular to member, in full fusion weld.
- .11 Design and detail connections for structural steel so that corrosion potential is minimized. Cap and seal weld all exposed ends of HSS sections.
- .12 Weld reinforcing bars to structural steel where approved by the Parks Canada Representative or as shown on Drawings in accordance with CSA-W186.

2.3 SHOP PAINTING

- .1 Clean all members, remove loose mill scale, rust, oil, dirt and other foreign matter. Prepare surfaces according to SSPC-SP3 “Power Tool Cleaning”, unless noted otherwise.
- .2 Clean surfaces according to SSPC-SP10 “Near-White Blast Cleaning” for all steel that will be galvanized. All steel outside of the building envelope and in the washbays located between Grids B and D (inclusive) to be galvanized, unless noted otherwise. Refer to Drawings for extent of galvanized steel.
- .3 Clean surfaces prior to painting according to SSPC-SP6 “Commercial Blast Cleaning” for all architecturally exposed steel. Refer to Drawings for extent of architecturally exposed steel.
- .4 Apply one coat of prime paint in the shop to all steel surfaces, except:
 - .1 Surfaces to be encased in concrete.
 - .2 Surfaces to receive field installed stud shear connectors.
 - .3 Surfaces and edges to be field welded.
 - .4 Faying surfaces of friction-type connections.
 - .5 Surfaces to receive sprayed fireproofing.

- .6 Surfaces to be galvanized.
- .5 Apply paint under cover, on dry surfaces only and when surface and air temperatures are above 5°C.
- .6 Maintain dry condition and 5°C minimum temperature until paint is thoroughly dry.
- .7 Patch paint bolts, nuts, sharp edges, and corners one coat before full prime coat is applied.
- .8 Apply paint by brush, spray, or dipping to a dry film thickness of 0.05 mm minimum.
- .9 Clean surfaces prior to galvanizing according to SSPC-SP8 "Pickling" unless noted otherwise.

PART 3. EXECUTION

3.1 EXAMINATION

- .1 Before starting erection, take field measurements and examine other work that may affect this work.
- .2 Notify the Parks Canada Representative of any conditions which would prejudice proper installation of this work.
- .3 Commencement of this work implies acceptance of existing conditions.

3.2 DAMAGED MEMBERS

- .1 Repair or replace members damaged during transit or erection, before securing in position.
- .2 Before starting erection, check all AESS members upon delivery for twist, kinks, gouges or other imperfections which may result in the rejection of the appearance of the member. Coordinate remedial action with fabricator prior to erecting steel.

3.3 ERECTION

- .1 Erect structural steel in accordance with CSA-S16 and Drawings.
- .2 Field connections are to be bolted or welded, or as shown on Drawings.
- .3 Do not field weld wet surfaces or during rain unless under cover.
- .4 Do not weld at temperature below 5°C except with express permission of the Parks Canada Representative.
- .5 Conform to requirements of CSA-W59 for minimum preheat and interpass temperatures.
- .6 Make adequate provision for all erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of necessary permanent bracing.
- .7 Provide connections for temporary shoring, bracing and supports only where noted on the approved shop erection drawings. Temporary connections shall be made at locations not exposed to view in the final structure or as approved by the Architect.
- .8 Set column bases and other vertical members to design elevations on levelling nuts or steel shims. Do not use wood shims.
- .9 Use only light drifting to draw parts together. Enlarge holes for bolted connections with reamers or twist drill only. Do not burn to form holes, enlarge holes or match unfair holes.
- .10 Erection error is not to exceed requirements of CSA-S16.
- .11 Obtain Parks Canada Representative's written permission prior to field cutting or altering structural members.

3.4 CLEANING AND TOUCH UPS

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 After erection field prime welds, nuts, bolts, washers, and touch up abrasions and damage to shop primed surfaces.
- .3 Touch-up galvanizing with minimum 2 coats of zinc rich primer.

END OF SECTION

PART 1. GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations
- .3 Samples:
 - .1 Submit 1 sample per 500 square meters of road base for each 300 mm lift.
 - .2 Allow continual sampling by Parks Canada Representative during production.
 - .3 Provide Parks Canada 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.

PART 2. PRODUCTS

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, 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 Bedding material shall be well graded material consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
 - .1 Pipes and services bedding material shall meet the following gradations:
 - .1 Well rounded or fractured gravel:

Sieve Size (mm)	Percent Passing (By Weight)
20	100
10	20 - 80
4.75	10 – 50
0.075	0 - 5

2.2 SOURCE QUALITY CONTROL

- .1 Inform Parks Canada 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 Parks Canada Representative 2 week's 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.

PART 3. 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 gradation requirements for material and, percentage of crushed particles, or particle shapes specified.
 - .1 Use methods and equipment approved in writing by Parks Canada 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 Parks Canada Representative.
- .4 Stockpiling:
 - .1 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
 - .2 Material should be stockpiled on existing asphalt surfaces. Obtain Parks Canada Representative approval prior to stockpiling in vegetated areas.
 - .3 Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
 - .4 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
 - .5 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials within 48 hours of rejection.
 - .6 Stockpile materials in uniform layers of thickness as follows:
 - .1 Maximum 1.5 m for coarse aggregate and base course materials.
 - .2 Maximum 1.5 m for fine aggregate and sub-base materials.
 - .3 Maximum 1.5 m for other materials.
 - .7 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
 - .8 Do not cone piles or spill material over edges of piles.
 - .9 Do not use conveying stackers.

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

PART 1. GENERAL

1.1 DEFINITIONS

- .1 Common Excavation: "Common Excavation" means the excavation of on-Site soils required as structural fill by the Contract Documents, excluding Topsoil and Subsoil Stripping, Borrow Area Excavation, Rock Excavation, and Excavation to stockpile or offsite disposal.
- .2 Earthwork: Earthwork means excavating of all types, backfilling, filling, compacting, grading and related work.
- .3 "Borrow Area Excavation" means the excavation of soil materials in the specified borrow areas required by the Contract Documents, excluding Topsoil and Subsoil Stripping.
- .4 "Rock Excavation" is divided into two categories; Type A and Type B. Type 'A' Rock: refers to materials, such as fractured sandstone, shale or ledge rock, which is rippable by a D8 Cat or equivalent powered excavator. For open excavation, it refers to materials which, in the opinion of the Parks Canada Representative, result in:
 - .1 Substantial delay or decrease in the normal rate of excavation using conventional equipment.
 - .2 Significant damage or wear to the excavating equipment.
 - .3 Type 'B' Rock: requires drilling, blasting, wedging or jack hammering to remove, as determined by the Parks Canada Representative, and cannot be ripped into individual detached masses smaller than 1.5 m³ in size with a single tooth ripper mounted on a Caterpillar D8 or equivalent powered excavator as outlined in the Alberta Roadbuilders and Heavy Construction Association Equipment Rental Rates Guide.
- .5 Waste Excavation is the work involved in excavation, disposing and levelling in designated locations those materials determined to be unsuitable or unstable by the Parks Canada Representative and cannot be removed by conventional earthmoving equipment.

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, water and sewer mains, building services, cables, culverts, sidewalks and other works. All damage incurred shall be repaired by the Contractor at his expense.

PART 2. PRODUCTS

- .1 The Contractor shall supply all labour, materials and equipment required for site grading.

PART 3. EXECUTION

3.1 GRADING

- .1 Grading shall include the removal and/or satisfactory placement of all materials necessary for the construction and preparation of embankment, slopes, drainage works, alignment, grade and cross-section shown on the Drawings or as required by the Parks Canada Representative. Grade to elevations and dimensions indicated on Drawings within a tolerance of plus or minus 50 mm.

- .2 Contractor will be responsible for grading areas adjacent to pavement where required to ensure no pooling on pavement surfaces.
- .3 Conditions requisite for the completion of grading work will be a roadway or other works which are smooth and compact over the entire width, firm side slopes with regular shoulder lines, clean side ditches, satisfactory approaches, intersections and entrances, and smooth back slopes. All soft and yielding material in the roadway, if so directed shall be removed and replaced with acceptable material, and all loose stones, clods, weeds, trash, etc. shall be removed from the roadway, side slopes, ditches and back slopes. All improperly compacted material shall be excavated, brought to optimum moisture content if required, and recompacted at the Contractor's own expense. On the side slopes and back slopes, and in the bottom of ditches, all projecting boulders must be removed or broken off at least flush with the lines and grades, and the resultant cavities, if any, backfilled.
- .4 Sequence, schedule and perform excavation and fill placement operations to make the best use of all excavated material, and to minimize the volume of Borrow Area Excavation.
- .5 Locate and protect utility lines, survey reference points, instrumentation, fencing, and other facilities.
- .6 Remove and dispose of all snow, surface ice, and excess water prior to starting the excavation.
- .7 Prior to commencing excavation:
 - .1 Contact all affected utility companies regarding exact location and current status of all utilities, voltage of underground and overhead power lines and pressure of natural gas lines.
 - .2 Notify Parks Canada Representative if any utility lines have been omitted from or incorrectly indicated on Drawings.
 - .3 Identify known underground utilities. Stake and flag locations. Identify and flag surface and aerial utilities.
 - .4 Expose utilities to be crossed to confirm horizontal and vertical alignment of existing utilities.
 - .5 Expose existing utility lines by hand excavation to confirm location before machine digging within 600 mm of lines.
 - .6 Maintain and protect existing above and below grade utilities which pass through work area. Protect active utility lines exposed by excavation, from damage. Hand excavate to final elevations and dimensions.
 - .7 Where existing pipes, ducts or other underground services intersect a trench, support trench in a manner approved by Utility.
 - .8 Where existing overhead line poles are adjacent to excavations, temporarily support poles in a manner approved by Utility.

3.2 EMBANKMENT

- .1 Embankment shall be constructed by depositing, shaping and compacting acceptable excavated materials. The embankments shall be constructed above the natural ground or other level as required by the Parks Canada 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 Parks Canada Representative may require.
- .3 Embankment 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 material 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 Parks Canada 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 Embankment 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 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 Parks Canada 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 Parks Canada 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 Parks Canada 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 herein before 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 disced 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 Parks Canada Representative.

3.4 SURPLUS MATERIAL

- .1 Surplus material in excavation which is not required in the adjacent embankments, test fills, entrances or subsidiary road connections, shall be otherwise utilized or disposed of in the area indicated on the Drawings or as required by the Parks Canada Representative. No material shall be wasted, unless approved by the Parks Canada Representative. In no case shall material be deposited above the established grade without the approval of the Parks Canada Representative.
- .2 Unacceptable excavated topsoil, unacceptable native excavated material, waste material, trash and debris: Remove from site and ensure proper disposal.

END OF SECTION

PART 1. GENERAL

1.1 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock excavation: excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1 m³. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
 - .3 Rock excavation shall be divided into two categories: Type A and Type B, contingent upon its hardness and difficulty experienced in excavation.
 - .4 Type A - rock such as fractured sandstone, shale or ledge rock, which can be removed by the size of backhoe specified in the following table for the depth of trench excavation and size of pipe being installed or a D-8 Caterpillar with a single ripping tooth for open excavation or other equipment specified elsewhere in the documents and in the opinion of the Parks Canada Representative, results in:
 - .1 A substantial or decrease in the normal rate of excavation for the project and/or
 - .2 significant damage or wear to the excavating equipment.

Minimum Size Backhoe for Rock Excavation Table (Cu. Yd.)

Pipe Diameter (mm)	<u>Depth Range (metres)</u>				
	0-3.00	3.01-4.00	4.01-5.00	5.01-7.5	Over 7.50
100 - 300	1	1.5	2	2.5	2.5
301 - 525	1.5	1.5	2	2.5	2.5
526 - 750	2	2	2	2.5	2.5
751 - 1050	2.5	2.5	2.5	2.5	4
1051 - 1350	2.5	2.5	2.5	4	4
1351 - 1650	2.5	2.5	4	4	4
1651 - 1950	2.5	2.5	4	4	4
1951 - 2101	2.5	2.5	4	4	4
2100 - larger	2.5	2.5	4	4	4

- .5 Type B - rock which requires drilling, blasting, wedging or jack-hammering to remove.
- .2 Washed Gravel:
 - .1 Washed, crushed or screened stone or gravel consisting of hard and durable particles meeting the following gradation limits and free from sand, clay, cementitious, organic and other deleterious material.

Sieve Size (mm)	Percent Passing by Mass
25	100
5	Maximum 10
0.08	Maximum 2

- .3 Native Backfill:

- .1 Native backfilling shall consist of replacing the excavated material in even layers not exceeding 300 mm in depth, and compacting each layer by mechanical means to 98% Standard Proctor Density.
- .4 Borrow Backfill:
 - .1 Suitable borrow material excavated from designated borrow areas or as directed by the Parks Canada Representative shall be used to backfill all or portions of utility trenches excavated in Type "A" or Type "B" rock.
- .5 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.
- .6 Bedding Material:
 - .1 In accordance with Section 31 05 16 - AGGREGATE MATERIALS.

1.2 PROTECTION OF EXISTING FEATURES

- .1 Existing buried utilities and structures:
 - .1 Prior to commencing any excavation work, notify applicable owner or authorities and Parks Canada Representative; establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work. Markings must be maintained throughout construction.
 - .2 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. All damage incurred shall be repaired by the Contractor at his expense.
- .2 Existing buildings and surface features:
 - .1 Maintain and protect from damage existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, paving, survey bench marks and monuments which may be affected by work. All damage incurred shall be repaired by the Contractor at his expense.

1.3 SAFETY REQUIREMENTS

- .1 The Contractor will be required to observe all applicable sections of the Alberta Regulations 271/76 made under the Occupational Health and Safety Act covering worker safety in trenches and excavations.
- .2 Open cut trenches shall be sheeted and braced as required by the Accident Prevention Regulations of the Occupational Health and Safety Division of the Department of Labour and Municipal Ordinances, and as may be necessary to protect life, property and the work.
- .3 Prefabricated cages or shields, provided they conform with all applicable safety requirements, may be used to supplement or replace conventional shoring.

1.4 SAMPLES

- .1 At least 2 weeks prior to commencing work, inform Parks Canada Representative of proposed source of granular materials.
- .2 The Contractor shall provide a sieve analysis of the material for the Parks Canada Representative's approval.
- .3 Sand and gravel shall be approved by the Parks Canada Representative before being used.

PART 2. PRODUCTS

2.1 STABILIZING BASE GRAVEL

- .1 Stabilizing base gravel shall be well graded gravel consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
- .2 The material shall meet the following gradations:

Screened Rock	
Sieve Size (µm)	Percent Passing (by weight)
40,000	100
25,000	90 – 100
20,000	20 – 55
10,000	0 – 5

2.2 FILTER FABRIC

- .1 The synthetic filter fabric shall consist of a durable, permeable, non-woven, polyester fabric composed of continuous synthetic filaments in a random arrangement:
 - .1 Filter fabric shall be:

Non-Woven Geotextile Filter Fabric Specifications and Physical Properties	
Grab Strength	650 N
Puncture	275 N
Burst Strength	2.1 MPa
Trapezoidal Tear	250 N
Permeability K	2.1 cm/s

- .2 Layfield LP6, or approved equal.
- .3 Minimum Fabric Lap to be 300 mm.

2.3 CLASS 1 BACKFILL MATERIAL

- .1 Material for Class 1 backfill shall consist of sound, hard, durable, uniformly graded pit-run or crushed gravel and shall not contain organic or soft materials, materials that break up when alternately frozen and thawed or wetted and dried, or other deleterious materials. When compacted near the optimum moisture content to not less than 98% of the maximum dry density corrected for the stone content as determined by ASTM D698, the material shall have a minimum bearing ratio as defined by ASTM D1883, of fifteen percent (15%).

2.4 FILLCRETE

- .1 Non-shrinking fill made up of a mixture of Portland cement, sand, water and admixtures conforming to the following:
 - .1 Minimum 28 day compressive strength 0.30 to 0.60 MPa
 - .2 Slump 100 mm ±25 mm
 - .3 Portland Cement Type 10
 - .4 Air entrainment 5% ±1%

PART 3. EXECUTION

3.1 SITE PREPARATION

- .1 The Contractor will be required to strip organic material, clear and grub, remove weeds and grasses as specified or as required by the Parks Canada Representative prior to excavation. Avoid intermixing of subsoil fill materials with organic material and from other forms of contamination. Stripped material to be stockpiled on site for use in site restoration.

3.2 TRENCHING

- .1 Trench width:
 - .1 A standard trench is defined as a trench with vertical walls at a width of 600 mm greater than the outside diameter of the pipe. Where the maximum trench width is exceeded, the Contractor shall, at his own expense, provide special bedding or take other precautions as directed by the Parks Canada Representative. Where more than one pipe is laid in the same trench, the widths shall be as directed by the Parks Canada Representative.
 - .2 The Contractor shall confine his activities to the immediate area of the trench. All activities outside trench boundaries shall be performed so as not to damage other existing features. The Contractor shall be required to use appropriate techniques including trench boxes to keep the width to minimum possible. Every effort shall be made to restrict the trench widths to minimize the area disturbed.
 - .3 The saw cut width of the pavement shall not exceed the standard trench width shown on the drawings. Anywhere where gravel sloughs out from under pavement, the pavement shall be removed to allow for proper gravel base compaction at the contractors cost.
- .2 All excavated material shall be piled at least 1.0 m clear of the trench top to prevent material from falling back into the excavation. The material shall be piled in such a manner that it will not endanger the work, or obstruct other work or rights-of-way. Sufficient clear space must be left on one side of the trench to accommodate the Parks Canada Representative's stakes.
- .3 The trench shall be excavated so that the pipe can be laid to the alignment, grade and depth required.
- .4 Trench Rock Excavation:
 - .1 Where excavation is made in rock or where excavation is made in a material which cannot provide an even, uniform and smooth surface; or where large stones are encountered in the trench, such material shall be removed to provide a clear distance between any part or projection of such material and the surface of all pipe and fittings of not less than 150 mm for 600 mm outside diameter pipe or less, and 200 mm for pipe having an outside diameter greater than 600 mm. The subgrade shall then be made by backfilling with an approved material compacted in 75 mm layers at the Contractor's expense. The finished subgrade surface shall be shaped by hand tools to provide a uniform and continuous support for the pipe.
 - .2 Blasting for excavation will be permitted only with the approval of the Parks Canada Representative and only when proper precautions are taken for the protection of persons or property. The Contractor's method of procedure in blasting shall conform to provincial statutes and municipal ordinances.
- .5 The subgrade shall provide a uniform and continuous support for the pipe and fittings on solid undisturbed ground. Any over excavation by the Contractor below the required grade shall be backfilled at his expense with an approved compacted material.

3.3 UNSTABLE SUBGRADE

- .1 Where the subgrade of the trench is unstable or will not properly support the pipe, or where it contains materials harmful to the pipe such as ashes, cinders, refuse, vegetable or organic material, the Contractor shall excavate such material to the width of the trench, depth and length ordered by the Parks Canada Representative and dispose of the material as directed. The subgrade shall then be made by backfilling with an approved stabilizing gravel compacted in 75 mm layers. The finished subgrade surface shall be shaped by hand tools to provide a uniform and continuous support for the pipe.
- .2 The stabilization gravel shall be wrapped in the non-woven geotextile as specified. The non-woven geotextile shall be overlapped a minimum of 300 mm at all joints to provide a full, continuous wrap and shall be smooth and free of tension, stress, folds, wrinkles or creases.

3.4 SHORING

- .1 When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting. The Parks Canada Representative reserves the right to order the sheeting driven to the full depth of the trench or to such additional depths as may be required for the protection of the work.
- .2 Trench bracing may be removed when the backfilling has reached the respective level of such bracing. Sheeting shall be removed as the backfilling proceeds. Backfilling of holes left by sheeting below the trench bottom shall be carefully compacted, and thereafter backfilling and withdrawal of sheeting shall proceed together. No voids shall be left in the backfill by the withdrawal of the sheeting.
- .3 When a cage or shield is used in the trench instead of shoring, special care shall be taken to ensure that there is no lateral or longitudinal movement of the pipe when the cage is moved. The cage shall be raised vertically so that the bottom member is clear of the crown of the pipe before the cage is pulled forward in the trench.

3.5 TRENCH DRAINAGE

- .1 Gutters, storm water ditches or natural drainage channels shall not be obstructed. Satisfactory provisions shall be made for alternate drainage where this is impractical.
- .2 The trench shall be so drained that the workmen may work safely and effectively. All water encountered in trenches shall be pumped or bailed out, and in no case shall the pipe be used as a drain for such water. Contractor will be required to replace bedding material at these encountered locations, incidental to the original rate. It is essential that the discharge of the trench dewatering pumps be conducted away from the site of the work and into natural drainage channels, drains or storm sewers.

3.6 BACKFILLING

- .1 Bedding and initial backfilling shall be as specified for the particular pipe installed.
- .2 General backfilling:
 - .1 Class 1 backfill as defined in Section 1.1 - Definitions shall be used.
 - .2 No boulders, rock, ice, snow, organic material or debris shall be permitted in the trench. These unsuitable materials shall be hauled and disposed of off site.
 - .3 All surplus excavated material shall also be hauled away, or disposed of as directed by the Parks Canada Representative. In the event of deficiency of backfill material, suitable material shall be supplied by the Contractor at his expense. Supplied material shall be approved by the Parks Canada Representative prior to importing to site.
 - .4 All trenches shall be backfilled as the work proceeds and no more than 30 m shall be left open at the end of a days work. All open trenches to be fenced off to prevent wildlife entrapment.

3.7 BACKFILL COMPACTION

- .1 The Contractor shall be responsible for adequate compaction of the trenches and for the correction of settlement during the maintenance period of the Contract. Mechanical compaction equipment shall not be used until there is sufficient cover to prevent damage to the pipe.
- .2 The type of compaction equipment shall be chosen with regard to minimizing the vibration effect on nearby buildings and utilities. The Contractor shall inspect the condition of buildings prior to construction. The Parks Canada Representative shall have the right to request the Contractor to replace any equipment causing unacceptable vibrations. The Contractor is responsible for any damage caused to buildings due to construction.

3.8 TESTING BACKFILL COMPACTION

- .1 Compaction results shall be based on a minimum of two density tests per 100 linear metres of trench for each 0.3 metres of compacted vertical backfill. Additional tests may be called for by the Parks Canada Representative as deemed necessary.
- .2 If a density test indicates insufficient compaction at any depth, then two more densities, where are proportionally representative of trench length, shall be taken at that depth. If the average of these tests is below the required density, the trench shall be re-excavated and re-compacted to meet the specified density.
- .3 This testing in no way relieves the Contractor of his maintenance responsibilities with respect to settlements as specified. The Contractor shall repair any settlement and damaged surface improvements due to the settlement, which occurs during the maintenance period.
- .4 The cost of all initial testing will be borne by the Owner and the Contractor is responsible for the costs of any re-testing for areas where initial testing failed. Non-conformity with the specified density or moisture content shall constitute sufficient grounds for rejection of the work.

END OF SECTION

PART 1. GENERAL

1.1 NOT USED

PART 2. PRODUCTS

2.1 NOT USED

PART 3. EXECUTION

3.1 UNSTABLE SUBGRADE

- .1 Where the subgrade is unstable, or where it contains materials such as ashes, cinders, refuse, vegetable or organic material, the Contractor shall excavate such material to the width, depth and length ordered by the Parks Canada Representative and dispose of the material as directed. The subgrade shall then be made by backfilling with approved native material or imported granular material as directed by the Parks Canada Representative. Material shall be placed in successive layers not exceeding 150 mm in depth and compacted to a minimum of 95% Standard Proctor Density.

3.2 SUBGRADE PREPARATION

- .1 The subgrade of 150 mm depth shall be scarified and compacted to a minimum of 98% Standard Proctor Density at optimum moisture content ($\pm 2\%$), over the full width of the cross-section. The material shall be worked to ensure as much uniformity as possible in material.
- .2 Water shall be added or the material shall be aerated to bring the moisture content to optimum value. The supply of water shall be the responsibility of the Contractor.

3.3 COMPACTION

- .1 Field tests for density and moisture content shall be taken by the Owner or his representative. The cost of this testing shall be borne by the Owner. Non-conformity with the specified density or moisture content shall constitute sufficient grounds for rejection of the work.
- .2 Trench backfill encountered in the preparation of the subgrade which has not been compacted sufficiently, shall be excavated and re-compacted.

3.4 TESTING COMPACTION

- .1 Quality Control Testing
 - .1 Compaction results shall be based on a minimum of one density test per 500 square meters of prepared subgrade area. Additional tests may be called for by the Quality Control Agency or by the Parks Canada Representative as deemed necessary.
 - .2 Field density tests shall conform to ASTM D1556, ASTM D2167, or ASTM D6938 for comparison with a maximum density determined according to ASTM D698 Method A.
- .2 Quality Assurance Testing
 - .1 Compaction result shall be based on a minimum of two density tests. Additional tests may be called for by the Parks Canada Representative as deemed necessary.

- .2 Field density tests shall conform to ASTM D1556, ASTM D2167, or ASTM D6938 for comparison with a maximum density determined according to ASTM D698 Method A.

3.5 PROOF ROLLING

- .1 When required by the Parks Canada Representative, the Contractor shall supply and operate a loaded test vehicle of 8,200 kg axle load to test the subgrade for rutting, weaving and soft spots. Where proof rolling indicates areas that are defective, the Contractor shall remove and replace the material with suitable compacted material. Proof rolling shall be considered incidental to the subgrade construction.

3.6 TOLERANCES

- .1 The finished surface of the subgrade shall conform to grades approved by the Parks Canada Representative, and shall show no depression more than 15 mm under a straightedge 3.0 m long when placed parallel to the centreline. Subgrade higher than the approved grades shall be cut to the required grades.
- .2 The tolerance for ditches, boulevards, etc., shall be ± 30 mm.

END OF SECTION

PART 1. GENERAL

1.1 SAMPLES

- .1 At least two (2) weeks prior to commencing work, inform Parks Canada Representative of proposed source of granular materials.
- .2 The Contractor shall provide a sieve analysis of the material for the Parks Canada Representative's review.
- .3 The gradation curve developed shall be free from acute changes.

1.2 SUBMISSIONS

- .1 Granular base course shall be submitted to the Parks Canada Representative before being used.
- .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 Parks Canada Representative has the right to request additional testing if there are any concerns with the proposed aggregate.

PART 2. PRODUCTS

2.1 GRANULAR BASE

- .1 Material for the granular base course shall consist of sound, hard, 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. When compacted near the optimum moisture content to not less than 100% of the maximum dry density corrected for the stone content as determined by ASTM D698, the material shall have a minimum bearing ratio as defined by ASTM D1883 of fifty-five percent (55%).
- .2 Granular base course shall meet the following gradation when tested to ASTM C136 and ASTM C117, and give a smooth curve without sharp breaks when plotted on a semi-log grading chart:

Sieve Size	Percent Passing (by weight)
25 mm	100
20 mm	95 - 100
10 mm	55 - 80
5 mm	35 - 65
2.5 mm	28 - 52
630 µm	13 - 35
315 µm	9 - 26
160 µm	6 - 18
80 µm	4 - 10

- .3 At least 50 percent by weight of material retained on the #4 sieve shall have two or more fractured faces.
- .4 The liquid limit shall not exceed 25 and the plasticity index shall not exceed 6 for the portion of material passing the 1,000 sieve.

PART 3. EXECUTION

3.1 PLACING

- .1 The base material shall not be placed until the underlying course has been accepted by the Parks Canada Representative. The granular material shall be placed in uniform layers not exceeding 300 mm in thickness before compaction. The material shall be placed by mechanical spreaders or deposited in windrows and levelled with suitable equipment.

3.2 COMPACTION

- .1 Each layer of granular base course shall be compacted near the optimum moisture (+/- 2%) content to not less than 100% of the maximum dry density corrected for the stone content as determined by ASTM D698 Method A for the material used.
- .2 During compaction, the moisture content shall be maintained at the optimum moisture content as determined by ASTM D698. If the moisture content exceeds the optimum moisture content the material shall be aerated by mechanical means until the material has dried sufficiently to reach the optimum moisture content. Water shall be added if the moisture content is below optimum.

3.3 TESTING COMPACTION

- .1 Compaction results shall be based on a minimum of one density test per 500 square meters of road per each lift. Additional tests may be called for by the Parks Canada 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 A.

3.4 SHAPING AND FINISHING

- .1 The finished surface of the granular base course shall conform to grades approved by the Parks Canada Representative, and shall show no depression more than 5 mm under a straight edge 3.0 m long placed parallel to the road centreline. Granular base course higher than the approved grades shall be cut to the required grades.

3.5 INSPECTION

- .1 Before acceptance by the Parks Canada Representative the granular base course surface shall be true to cross-section and grade, shall conform to the density and bearing ratio requirements specified.
- .2 Field density and moisture content tests will be made by the Parks Canada Representative or his representative to ensure that the material is satisfactory. Material not meeting the specification requirements will not be approved.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 74 00 – Cleaning
- .3 Section 01 74 19 – Waste Management and Disposal
- .4 Section 32 12 13.16 – Asphalt Tack Coats
- .5 Section 32 12 13.23 – Asphalt Prime Coats

1.2 REFERENCES

- .1 American Association of State Highway and Transportation Officials (AASHTO)
 - .1 AASHTO M320, Standard Specification for Performance Graded Asphalt Binder.
 - .2 AASHTO R29, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
 - .3 AASHTO T245, Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
- .2 Asphalt Institute (AI)
 - .1 AI MS-2, Mix Design Methods for Asphalt Concrete and Other Hot Mix Types. ASTM International.
 - .2 ASTM C88 05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
 - .3 ASTM C117, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .4 ASTM C123, Standard Test Method for Lightweight Particles in Aggregate.
 - .5 ASTM C127, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - .6 ASTM C128, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
 - .7 ASTM C131, Standard Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .8 ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .9 ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes.
 - .10 ASTM D995, Standard Specification for Mixing Plants for Hot Mixed, Hot Laid Bituminous Paving Mixtures.
 - .11 ASTM D2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 - .12 ASTM D3203, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
 - .13 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 8.1, Sieves Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB 8.2, Sieves Testing, Woven Wire, Metric.
- .4 Alberta Transportation – Standard Specifications for Highway Construction (Edition 15)
 - .1 Specification 3.50 – Asphalt Concrete Pavement (EPS).

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Performance graded asphalt cement: Mix Type PG 64 - 28 to AASHTO M320, Grade PG 64 - 28 when tested to AASHTO R29.
- .2 Aggregates: in accordance with requirements as follows:
 - .1 Crushed stone or gravel.
 - .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117.
 - .3 Table:

<u>Designation (mm)</u>	<u>Percent Passing (µm)</u>
12,500	100
10,000	83-92
8,000	
5,000	55-70
1,250	26-45
630	18-38
315	12-30
160	8-20
80	4-10
 - .4 Aggregate Production:
 - .1 The Contractor shall split aggregates for above specified material into coarse and fine fractions.
 - .2 Prior to crushing of the coarse fraction. The crushed coarse and the fine fractions shall be stockpiled separately.
 - .3 The Contractor shall select a screen size at which splitting will take place. Splitting of aggregates shall be controlled such that the coarse aggregate fraction, before crushing, shall contain no more than 5% passing the 5000 sieve for all mix types.
 - .4 Further splitting of the crushed coarse aggregate into separate stockpiles may be performed at the Contractor's option. No additional payment will be made for this work.
 - .5 Production and addition of Blend Sand:
 - .1 When the aggregate being produced is destined for further processing through a mixing plant, the addition of any required blend sand shall take place at the mixing plant.

- .2 Prior to the mix production, blend sand shall be separately stockpiled so that a representative sample can be obtained in order to establish a mix design.
- .3 All blend sand shall be screened before being incorporated into the mix, to remove clay lumps, roots and other deleterious materials. All blend sand so screened shall pass the 5 000 sieve.
- .4 Blend sand shall be dried if necessary to ensure a uniform feed
- .5 All other aggregates requiring an addition of blend sand to meet the gradation requirements shall be adjusted at the crushing stage by means of a separate conveyor or other approved device capable of metering the blend sand at a specified uniform rate. The blend sand shall be added prior to or onto the crusher screen deck.
- .6 Production of Extra Manufactured Fines.
 - .1 Manufactured fines are defined as that portion of the material passing the 5 000 sieve size which is produced by the crushing process.
 - .2 In the event the manufactured fines in the total combined aggregate do not meet the requirement for the specified Asphalt Concrete Mix Type, extra manufactured fines shall be produced by screening the pit-run material so that the screened material contains no more than 5% material passing a 5 000 sieve. This material shall be crushed and all material produced by this crushing process shall be placed in a separate stockpile and designated as Extra.

2.2 EQUIPMENT

- .1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
 - .1 Drum diameter: 1200 mm minimum.
 - .2 Follow the manufacturer's recommended operation procedure
- .4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
 - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
 - .4 Use only trucks which can be weighed in single operation on scales supplied.
- .5 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by the Departmental Representative, may be used instead of tamping irons.

- .3 Straight edges, 3 m in length, to test finished surface.

2.3 MIX DESIGN

- .1 Mix Design and Job Mix Formula.

- .1 Engage a qualified Professional Geotechnical Engineer to prepare a mix design and job mix formula for aggregate. The mix design and job mix formula shall be submitted five (5) days prior to paving. The mix design shall be submitted under Professional Engineer's seal. The Departmental Representative will not provide any approval of the mix design. The Contractor's Geotechnical Engineer shall retain professional responsibility for the mix design.

- .2 Design of mix: by Marshall Method to requirements below and as directed by the Departmental Representative. The percentage of Reclaimed Asphalt Pavement permitted in the mix design shall be as directed by the Departmental Representative.

- .3 Mix Properties:

	<u>M1</u>
Max size of aggregate (µm)	12,500
No. of Blows (each end of specimen)	75
Stability (Kn) (min.)	8
Flow (mm)	2 - 3.5
% Air Voids in Total Mix	3.5 - 4
% Retained Stability	70
Minimum Film Thickness	6.2

- .1 Measure physical requirements as follows:
- .1 Marshall load and flow value: to AASHTO T245.
 - .2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.
 - .3 Air voids: to ASTM D3203
- .2 Do not change job mix without prior approval of the Departmental Representative. When change in material source proposed, new job mix formula to be approved by the Departmental Representative.
- .3 Return plant dust collected during processing to mix in quantities acceptable to the Departmental Representative.
- .4 Should the Contractor's Geotechnical Engineer have any concern with respect to any portion of this section, those concerns shall be brought to the attention of the Departmental Representative before the design is prepared.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving in accordance with the manufacturer's written instructions.

- .1 Visually inspect substrate in presence of the Departmental Representative.
- .2 Inform the Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative.

3.2 EXAMINATION

- .1 Batch and continuous mixing plants.
 - .1 To ASTM D995.
 - .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.
 - .3 Feed cold aggregates to plant in proportions to ensure continuous operations.
 - .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
 - .5 Before mixing, dry aggregates to moisture content not greater than 1% by mass or to lesser moisture content if required to meet mix design requirements.
 - .6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job mix requirements.
 - .7 Store hot screened aggregates in manner to minimize segregation and temperature loss.
 - .8 Do not heat asphalt cement above 160 degrees C.
 - .9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used to the Departmental Representative to review the temperature of completed mix at plant and at paver after considering hauling and placing conditions.
 - .10 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.
 - .11 Mixing time:
 - .1 In batch plants, both dry and wet mixing times as directed by Departmental Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.
 - .2 In continuous mixing plants, mixing time as directed by the Departmental Representative but not less than 45s.
- .2 Dryer drum mixing plant:
 - .1 To ASTM D995.
 - .2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.
 - .3 Feed aggregates to burner end of dryer drum by means of multi bin cold feed unit and blend to meet job mix requirements by adjustments of variable speed feed belts and gates on each bin.
 - .4 Meter total flow of aggregate using electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump to ensure proportions of aggregate and asphalt entering mixer remain constant.
 - .5 Allow for easy calibration of weighing systems for aggregates without having material enter mixer.

- .6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
 - .1 Calibrate weight bridge on charging conveyor by weighing amount of aggregate passing over weight bridge in set amount of time.
 - .2 In continuous mixing plants, mixing time as directed by the Departmental Representative but not less than 45s.
- .7 Make provision for conveniently sampling full flow of materials from cold feed
- .8 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.
- .9 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
- .10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream.
 - .1 Calibrate weight bridge on charging conveyor by weighing amount of aggregate passing over weight bridge in set amount of time.
 - .2 In continuous mixing plants, mixing time as directed by the Departmental Representative but not less than 45s.
- .11 Ensure mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer is 2 % maximum.
- .3 Temporary storage of hot mix:
 - .1 To ASTM D995.
 - .2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.
- .4 While producing asphalt mix for this Project, do not produce mix for other users unless separate storage and pumping facilities are provided for materials supplied to this project.
- .5 Addition of anti-stripping agent:
 - .1 Plant to be equipped with pug mill to thoroughly mix aggregates and lime prior to entering the plant.
 - .2 Plant to be equipped with suitable conveyor systems capable of supplying aggregates and lime at constant rate.
 - .3 Plant and equipment used for addition of lime to be equipped with covers to control loss of lime.
 - .4 Plant to be equipped to control rate of lime incorporation to within 1/4%.
 - .5 Add water to aggregate prior to entering pug mill.
 - .6 Add water to lime sufficiently in advance to permit time to slake prior to entering pug mill.

3.3 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Implement Erosion and Sedimentation Control Plan.
- .2 Apply tack coat in accordance with Section 32 12 13.16 Asphalt Tack Coats prior to paving.

- .3 Apply prime coat in accordance with Section 32 12 13.23 Asphalt Prime Coats prior to paving.
- .4 Prior to laying mix, clean surfaces of loose and foreign material.

3.4 TRANSPORTATION OF MIX

- .1 Transport mix to job site in vehicles cleaned of foreign material and plants as outlined in the Environmental Management Plan.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required.
 - .1 Raise truck bed and thoroughly drain, and ensure no excess solution remains in truck bed.
- .3 Schedule delivery of material for placing in daylight, unless the Departmental Representative approves artificial light for night placing.
- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.
 - .1 Do not dribble mix into trucks.
- .5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.
- .6 Deliver loads continuously in covered vehicles and immediately spread and compact.
 - .1 Raise truck bed and thoroughly drain, and ensure no excess solution remains in truck bed.

3.5 PLACING

- .1 Obtain Departmental Representative's approval of base tack coat prior to placing asphalt.
- .2 Place asphalt concrete to thicknesses, grades and lines as indicated.
- .3 Placing conditions:
 - .1 Place asphalt mixtures only when air temperature is 5 degrees C minimum and rising.
 - .2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
 - .3 Do not place hot mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Place asphalt concrete in compacted lifts of thickness as follows:
 - .1 Minimum compacted lift thickness is 40 mm (12.5 mm max aggregate size)
 - .2 Maximum compacted lift thickness is 80 mm.
- .5 Where possible do tapering and levelling where required in lower lifts.

- .6 Spread and strike off mixture with self-propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings.
 - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver.
 - .1 Calibrate weight bridge on charging conveyor by weighing amount of aggregate passing over weight bridge in set amount of time.
 - .3 Maintain constant head of mix in auger chamber of paver during placing.
 - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .6 Correct irregularities in surface of pavement course directly behind paver.
 - .7 Do not throw surplus material on freshly screeded surfaces.
- .7 When hand spreading is used:
 - .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section.
 - .1 Calibrate weight bridge on charging conveyor by weighing amount of aggregate passing over weight bridge in set amount of time.
 - .2 Distribute material uniformly without broad casting material.
 - .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes.
 - .1 Calibrate weight bridge on charging conveyor by weighing amount of aggregate passing over weight bridge in set amount of time.
 - .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
 - .5 Provide heating equipment to keep hand tools free from asphalt.
 - .1 Control temperature to avoid burning material.
 - .2 Do not use tools at higher temperature than temperature of mix being placed.

3.6 COMPACTING

- .1 Roll asphalt continuously using established rolling pattern for test strip and to density of not less than 100 % of maximum density determined for the test strip.
- .2 Do not change rolling pattern unless mix changes or lift thickness changes.
- .3 Roll asphalt continuously to density not less than 96.5% of blow Marshall density.
- .4 General:
 - .1 Provide at least 3 rollers and as many additional rollers as necessary to achieve specified pavement density. When more than 2 rollers are required, 1 roller must be pneumatic tired type.
 - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
 - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.

- .4 Use static compaction for levelling coarse less than 25 mm thick.
- .5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per meter of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.
- .6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
- .7 Keep wheels of roller slightly moistened with water to prevent pick up of material but do not over water.
- .8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
- .9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
- .10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.
 - .1 Control temperature to avoid burning material.
- .11 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
- .12 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re rolling.
- .5 Breakdown rolling:
 - .1 Begin breakdown rolling with static steel wheeled roller immediately following rolling of transverse and longitudinal joint and edges.
 - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
 - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super elevated sections use operation approved by the Departmental Representative.
 - .4 Use only experienced roller operators.
- .6 Intermediate rolling:
 - .1 Use pneumatic tired or steel wheel rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
 - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.
- .7 Finish rolling:
 - .1 Accomplish finish rolling with two axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks.
 - .1 Control temperature to avoid burning material.
 - .2 Conduct rolling operations in close sequence.

3.7 JOINTS

- .1 General:
 - .1 Remove surplus material from surface of previously laid strip.
 - .1 Control temperature to avoid burning material.

- .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
- .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
- .2 Transverse joints:
 - .1 Offset transverse joint in succeeding lifts by at least 1200 mm.
 - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
 - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
- .3 Longitudinal joints:
 - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
 - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 105 degrees C prior to paving of adjacent lane. Any Cold joints in the road shall be done at the center of the road.
 - .3 Overlap previously laid strip with spreader by 50 to 80 mm.
 - .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
 - .5 Roll longitudinal joints directly behind paving operation.
 - .6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.
- .4 Construct butt joints at 30 degree skews from perpendicular or as indicated.

3.8 FINISH TOLERANCES

- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm.

3.9 THICKNESS TOLERANCE

- .1 Representative Cores: At the Departmental Representative's request, the quality assurance laboratory will take one or more sets of cores from asphalt pavement suspected to be deficient in total thickness, each set comprising 3 cores whose average thickness represents not more than 1000 m² of asphalt pavement.
- .2 Deficient Thickness: If average core thickness is deficient that area of asphalt pavement will be assessed a pay factor according to Table 3.9 to be applied to the price of the quantities of asphalt in that area.
- .3 Excess Thickness: Asphalt pavement with excess thickness may be accepted with no extra payment, if surface and grade tolerances and texture are met.

Table 3.9 ASPHALT THICKNESS PAY FACTORS

Thickness Deficiency (%)	Pay Factor (%)
10.0	100
11.0	95.0
12.0	90.0
13.0	85.0
14.0	80.0
15.0	75.0
16.0	70.0
17.0	65.0
18.0	60
19.0	50
Over 19.0%	Grind and Resurface

3.10 DENSITY TOLERANCE

- .1 Sampling and Testing: The quality assurance laboratory will:
 - .1 Determine the density of laboratory compacted Marshall specimens at a minimum frequency of one Marshall density for every 1000 tonnes of hot-mix, or a day's production, whichever is less.
 - .2 Drill cores from compacted mat placed from same load of hot-mix from which Marshall specimens were taken, or from suspected compacted mat, or use of Nuclear Densometer and test for density.
- .2 Basis of Acceptance: Pavement compaction will be accepted on the basis of the ratio (in percent of the core density to the density of Marshall specimen. If cores were drilled from the mat where no Marshall specimen was taken, acceptance will be based on the ratio of core density to the average density of all Marshall specimens to date.
- .3 Representative Cores: A single core is initially taken representing the quantity of hot-mix in not more than 1000 m² of mat, with a minimum of one core taken from a day's production. If the initial core density is below specified, that initial density is discarded, and 3 new cores will be taken from the same area. The average density of the 3 new cores represents that area.
- .4 Deficient Density: If the average core density is below specified, the represented area of mat may be accepted subject to a pay factor according to Table 3.10 to be applied of the quantities of asphalt in that mat areas.

Table 3.10 ASPHALT DENSITY PAY FACTORS

Actual Density (%)	Pay Factor (%)
98.0	100
97.9	99.5
97.8	99.0
97.7	98.5
97.6	98.0
97.5	97.0
97.4	96.0
97.3	93.0
97.2	90.0
97.1	88.0
97.0	85.0
96.9	80.0
96.8	75.0
96.7	70.0
96.6	65.0
96.5	60.0
Less than 96.5	Remove and Replace

Actual Density = % of Marshall Density

Pay Factor = % of contract unit price

3.11 DEFECTIVE WORK

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.
 - .1 If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking or rippling.
- .3 Repair areas showing segregation in accordance with Alberta Transportation Paving Guidelines and Segregation Rating Manual.
- .4 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.12 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.

END OF SECTION

PART 1. GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM).
 - .1 ASTM C117, Standard Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .4 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .5 ASTM D4318, Standard Test Methods for Liquid Unit, Plastic Unit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch series.
 - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

PART 2. PRODUCTS

2.1 MATERIALS

- .1 Granular sub-base material to Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Crushed pit run or screened stone, gravel or sand.
 - .2 Granulations to be within limits specified when tested to ASTM C136 and ASTM C117 - sieve sizes to CAN/CGSB-8.1.

Sieve Size (mm)	Percent Passing (%)
100	100
80	100
40	60 -90
20	40-70
10	25-60
5.0	15-25
2.5	10-35
0.63	5-23
0.08 mm	0-5

- .3 Other properties as follows:
 - .1 % Fracture, by weight (2 faces) - 20 min
 - .2 Los Angeles Abrasion, loss, % - 45 max.
 - .3 Liquid limit: to ASTM D4318, maximum 25
 - .4 Plasticity index: to ASTM D4318, maximum 6
 - .5 California Bearing Ratio, when compacted to 100% of ASTM D698 - 40 min.

PART 3. EXECUTION

3.1 PLACING

- .1 Place granular sub-base after subgrade is inspected and approved by Parks Canada Representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Owner's Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 98% corrected maximum dry density ASTM D698.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Parks Canada Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 SITE TOLERANCES

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

3.4 PROTECTION

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

END OF SECTION

PART 1. GENERAL

1.1 DEFINITIONS

- .1 Prime Coat:
 - .1 Prime coat shall be the application of bituminous material to previously prepared subgrade or granular base course, preparatory to placing bituminous surfacing materials or asphaltic concrete base course.
- .2 Tack Coat:
 - .1 Tack coat shall be the application of bituminous material to a previously constructed paving surface of any type in preparation of placing bituminous surfacing materials.

PART 2. PRODUCTS

2.1 PRIME COAT

- .1 The bituminous material for priming the base course shall be liquid asphalt. The asphalt types shall be slow setting (SS) type SS-1 to SS-1H or a special emulsified asphalt primer S.E.P. 1 depending on conditions to suit the base.

2.2 TACK COAT

- .1 The bituminous material for tacking the existing asphalt surface shall be liquid asphalt. The asphalt types shall be a slow setting (SS) type SS-1 to SS-1H depending on conditions to suit the base and time of season.

2.3 SAND BLOTTER

- .1 The materials for sand cover shall consist of clean granular mineral material approved by the Parks Canada Representative, all of which shall pass a 5,000 sieve.

PART 3. EXECUTION

3.1 EQUIPMENT

- .1 Cleaning equipment shall consist of power brooms, flushers, and whatever hand scrapers may be necessary to remove all foreign material.
- .2 The pressure distributor used for applying asphaltic material shall distribute the asphaltic material at an even temperature, uniformly on variable widths of surface up to 5 metres. Uniform spray without atomization shall be determined and controlled from 0.2 to 5.4 litres per minute (L/m) with uniform pressure, and with an allowable variation from any specified rate not exceeding 0.1 L/m.
- .3 Suitable means for accurately indicating the temperature of the asphaltic material shall be provided at all times. The thermometer well shall be so placed as not to be in contact with a heating tube.
- .4 If provided with heating attachments the distributor shall be so equipped and operated that the asphaltic material shall be circulated or agitated throughout the entire heating process.

3.2 PREPARATION

- .1 Immediately prior to applying the asphalt primer, tack or fog coat, the surface shall be brought to uniform cross-section by patching all depressions and defective areas using an approved patching material and by removing all bumps and irregularities. Asphalt surface must be dry prior to application.
- .2 All loose and foreign material shall be removed by light sweeping.

3.3 APPLICATION

- .1 Obtain Parks Canada Representative's approval of existing surface before applying asphalt prime, tack or fog coats. Clean surface as required.
- .2 Upon the prepared surface the asphalt shall be applied uniformly at a rate of from 2.0 litres/square metre (L/m^2) for asphalt primer, and at a rate of from 0.5 L/m^2 for tack coat. The asphalt primer, tack or fog coat shall be applied only when the surface is dry or slightly damp, unless otherwise allowed by the Parks Canada Representative in writing.
- .3 The application temperature of the asphalt primer, tack or fog coat shall be as follows:
 - .1 Medium Curing Asphalt:

MC-30	51 - 68°C
MC-70	74 - 88°C
MC-250	100 - 110°C
 - .2 Emulsified Asphalt:

SS-1	20 - 50°C
SS-1H	20 - 50°C
 - .3 Emulsified Asphalt Primer: 15 - 50°C
- .4 Coat contact surfaces of curbs, gutters, headers, manholes and like structures with a thin uniform coat of asphalt material. Do not prime or tack surfaces that will be visible when paving is complete. Work adjacent to the roadway shall be completely protected from the application operation by a suitable covering. Any unnecessary splashing of the concrete shall be cleaned.
- .5 Do not apply asphalt coat when air temperature is less than 5°C or when rain is forecast within 2 hours.
- .6 The Contractor shall maintain the primed surface until the surface course has been placed. Maintenance shall include spreading any additional sand and patching any breaks in the primed surface with additional asphaltic material.
- .7 The asphalt primer should preferably be entirely absorbed by the base course and therefore require no sand cover. If, however, the asphalt has not been completely absorbed 24 hours after application, sufficient sand shall be spread over the surface to blot up excess asphalt and prevent it from being picked up by any traffic.
- .8 Traffic shall not be permitted to travel on tack or fog coat until cured. The Contractor shall use flagmen, if required, and signage to control traffic until the tack or fog coat has cured.
- .9 Traffic shall not be permitted to travel on prime coat until 6 hours after application or until it has cured. After this period of time, excess asphalt material remaining on the surface shall be blotted by sand before traffic is permitted to travel on the surface.

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 32 00 01 – Subgrade Preparation
- .2

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C136-01, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .2 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³(600kN-m/m³)).
 - .3 ASTM D1557-00, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700kN-m/m³)).
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International).
 - .1 CSA A23.1/A23.2-00] Concrete Materials and Methods of Construction/Methods of Test for Concrete.
 - .2 CSA-A231.1-99, Precast Concrete Paving Slabs.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit following product test data:
 - .1 Sieve analysis for gradation of bedding and joint material.
 - .2 Unit paver test data.
- .2 Indicate layout, pattern and relationship of paving joints to fixtures and project formed details.
- .3 Submit samples in accordance with Section 01 33 00- Submittal Procedures.
- .4 Submit full size sample of new paving unit, if required.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials in accordance with Section 01 74 21- Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Divert unused concrete materials from landfill to local facility as approved by Parks Canada Representative.
- .4 Divert unused aggregate materials from landfill to facility for reuse as approved by Parks Canada Representative.
- .5 Divert unused geotextiles from landfill to plastic recycling facility approved by Parks Canada Representative.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

PART 2. PRODUCTS

2.1 MATERIALS

- .1 Unit pavers: uniform in material, colour, size and from one manufacturer.

- .2 Existing pavers to be salvage and reused whenever possible.
- .3 Additional pavers, as required, to match existing.
- .4 Crushed stone or gravel base: consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

- .1 Gradations: within limits specified when tested to Sieve sizes to CAN/CGSB-8.2.

Sieve Designation	% Passing
19 mm	100
12.5 mm	70-100
4.75 mm	40- 70
2.00 mm	23- 50
0.425 mm	7- 25
0.075 mm	3- 8

- .5 Manufactured sand for bedding: hard, durable, crushed stone particles, conforming to gradation of concrete sand as specified in CAN/CSA A23.1. Sand: free from clay lumps, cementation, organic material, frozen material and other deleterious materials. Do not use limestone screenings or stone dust.

- .1 Gradations: within limits specified when tested to Sieve sizes to CAN/CGSB-8.2.0% to pass 0.075 mm sieve.

Sieve Designation	% Passing
10 mm	100
5 mm	95-100
2.5 mm	80-100
1.25 mm	50- 90
0.630 mm	25- 60
0.315 mm	10- 35
0.160 mm	2- 10

- .6 Joint sand: to CSA A179, hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

PART 3. EXECUTION

- .1 Prevent damage to swale, building, curbs and fences. Make good any damage.
- .2 Provide access to building at all times. Coordinate paving schedule to minimize interference with normal use of premises.

3.2 SUBGRADE

- .1 Ensure that subgrade preparation conforms to levels and compaction required to allow for installation of granular base.

3.3 GRANULAR BASE

- .1 Base minimum thickness: as indicated
- .2 Spread and compact crushed stone or gravel base in uniform layers not exceeding 100mm compacted thickness.
- .3 Compact base to a density of not less than 95% Standard Proctor Density in accordance with ASTM D698
- .4 Shape and roll alternately to obtain smooth, even and uniformly compacted granular base and ensure conformity of grades with finish surface.

- .5 Apply water as necessary during compaction to obtain specified density. If granular base is excessively moist, remove it and install more granular material to rid it of sponginess.
- .6 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.
- .7 Ensure top of granular base does not exceed plus or minus 10mm over 3m straightedge.

3.4 EDGING

- .1 Install edging true to grade, in location, layout and pattern as indicated.

3.5 BEDDING SAND

- .1 Place and spread bedding sand to as indicated.
- .2 Maximum thickness after compaction: 50mm.
- .3 Use material other than bedding sand to compensate for depressions that exceed specified tolerances in surface of base.
- .4 Do not use joint sand for bedding sand.

3.6 SURFACE COURSE

- .1 Ensure bedding sand and granular base are not saturated prior to placement of unit pavers.
- .2 Install unit paving true to grade on the bedding sand, in location, layout and pattern as indicated.
- .3 Where required, cut units accurately without damaging edges.
- .4 Precast concrete paving slabs.
 - .1 For vehicular areas, use cut pieces no smaller than one-third of a whole paver.
 - .2 Compact and level brick with min. 19kN force mechanical plate vibrator until units are true to grade and free of movement.
 - .3 Do not compact unit paving within 1 m of unrestrained edges.
 - .4 Fill spaces between pavers by sweeping in sand.
 - .5 Pass mechanical plate vibrator over unit paving to achieve compaction of sand in joints. Ensure joints are full at completion of compaction.
 - .6 At completion of each work day, ensure work within 1 m of laying face is left fully compacted with sand filled joints.
 - .7 Surface of finished pavement: free from depressions exceeding 3mm as measured with 3 m straight edge.
 - .8 Sweep surface clean and check final elevations for conformance to drawings.

END OF SECTION

PART 1. GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 13 - Earthworks and Grading.
- .2 Section 01 35 43 - Environmental Procedures

1.2 MEASUREMENT OF PAYMENT

- .1 No separate payment will be made for the measures needed for dust control including supply and application of water.

PART 2. PRODUCTS

2.1 NOT USED.

PART 3. EXECUTION

3.1 EXECUTION APPLICATION.

- .1 Apply water with distributors equipped with means of shut-off and with spray system to ensure uniform application.
- .2 Request permission prior to application of water for dust control.

END OF SECTION

PART 1. GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Parks Canada Representative of proposed source of materials and provide access for sampling at least 2 weeks prior to commencing work.
- .3 If materials have been tested by accredited testing within previous 2 months and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.

PART 2. PRODUCTS

2.1 MATERIALS

- .1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .2 Granular base: material to Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Type 1 or 2 fill.
 - .2 Crushed stone or gravel.
 - .3 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.
- .3 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.
- .4 Fill material: to Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Type 1 or 2 fill.
 - .2 Crushed stone or gravel.
 - .3 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

PART 3. EXECUTION

3.1 SUBGRADE PREPARATION

- .1 Do subgrade preparation work in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.
- .2 Construct embankments using excavated material free from organic matter or other objectionable materials.
 - .1 Dispose of surplus and unsuitable excavated material outside of the Park unless otherwise directed.
- .3 Place fill in maximum 300 mm layers and compact to at least 98% of maximum dry density to ASTM D 698.

3.2 GRANULAR BASE

- .1 Obtain Parks Canada Representative's approval of subgrade before placing granular base.
- .2 Place granular base material to lines, widths, and depths as indicated.
- .3 Compact granular base in maximum 300 mm layers to at least 100% of maximum density to ASTM D 698.

3.3 CONCRETE

- .1 Obtain Park Canada Representative's approval of granular base prior to placing concrete.
- .2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Immediately after floating, give slab surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
- .4 Provide slope on concrete to provide positive drainage.
- .5 Provide edging as indicated with 10 mm radius edging tool.
- .6 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Parks Canada Representative can be demonstrated. Hand finish surfaces when directed by Parks Canada Representative.
- .7 The concrete mix shall be designed as follows:

Class A

- .1 Minimum 28 day compressive strength 28 MPa
- .2 Slump not exceeding 65 mm
- .3 Maximum aggregate size 20 mm
- .4 Air entrainment 5.5% - 8%
- .8 The concrete mix, on or after September 30 to April 30 of the following year, shall be designed as follows:

Class A

- .1 Minimum 7 day compressive strength 28 MPa
- .2 Slump not exceeding 65 mm
- .3 Maximum aggregate size 20 mm
- .4 Air entrainment 5.5% - 8%
- .9 Lean Concrete (Concrete Slurry).
- .1 The followings are the specifications for lean concrete:

Aggregate Sieve Size	% Passing by Weight
25 mm	100
19 mm	70 - 100
4.75 mm	35 - 65
4.26 mm	15 - 30
75 mm	0 - 15

Slump: 25 mm to 85 mm
Compressive Strength: 6 MPa to 10 MPa
Entrained Air: 6% to 8%
Cement Content: 150 kg/m³
Fly Ash: 10% by Cement Content
Maximum Aggregate Size: 20 mm

- .10 Ready mixed concrete shall be mixed and transported in accordance with ASTM C-94 and CSA Standard A.23.1.3 for Ready Mixed Concrete.

3.4 TOLERANCES

- .1 Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.

3.5 EXPANSION AND CONTRACTION JOINTS

- .1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals shown on the drawings.
- .2 Install expansion joints.
- .3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.6 ISOLATION JOINTS

- .1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
- .2 Install joint filler in isolation joints in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Seal isolation joints with sealant.

3.7 CURING

- .1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound.
- .2 Where burlap is used for moist curing, place two pre-wetted layers on concrete surface and keep continuously wet during curing period.
- .3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

3.8 FINISHES

- .1 Formed surfaces exposed to view: sack rubbed finish in accordance with CSA A23.1/A23.2.
- .2 Pavements, walks, curbs and exposed site concrete:
 - .1 Screed to plane surfaces and use wood floats.
 - .2 Provide round edges and joint spacings using standard tools.
 - .3 Trowel smooth to provide lightly brushed non-slip finish.

3.9 TOLERANCES

- .1 The finished surfaces of all concrete work shall be true to the required cross-section with a tolerance of plus or minus 6 mm from the required elevation and dimensions. Surface of curbs, gutters or sidewalks shall not show any depressions or bumps exceeding 3 mm under a straight edge 3 m long placed parallel to the curb or sidewalk. Concrete not meeting the requirements specified shall be removed to the nearest joint and replaced at the Contractor's expense.

3.10 FIELD TESTS

- .1 Tests shall be made of the concrete to ensure that it meets these specifications. Testing shall be done to conform to the following standard specifications:

Test	Current Issue of ASTM
Sampling of Fresh Concrete	1c
Obtaining and Testing Drilled Cored for Compressive Strength	14c
Test for Slump of Concrete	5c
Compression and Flexure Test	8c
Compressive Strength of Moulded Concrete Cylinders	9c
Measurement of Air Content	7c
Making and Curing Concrete Compression and Flexural Test Specimens	3c

- .1 Three concrete cylinders shall constitute one test and shall be made from the same batch or load. They shall be stored undisturbed on site for 24 hours, covered with a plastic sheet to prevent loss of moisture. They shall then be delivered to an approved testing laboratory, and laboratory cured with one cylinder tested at seven days and the other two at twenty-eight days. A set of three cylinders shall be taken for every 100 m³ of concrete poured, or as directed by the Parks Canada Representative. Test cylinders shall be 150 mm or 100 mm in diameter.
 - .2 When construction begins, the Parks Canada Representative reserves the right to request additional cylinders to be made in order to establish a concrete strength pattern as quickly as possible.
 - .3 The Parks Canada Representative shall make the cylinders and slump tests.
- .2 PENALTIES FOR INSUFFICIENT STRENGTH
- .1 Where there are variations from specified design strength, the following adjustments will be made based on the 28 day, laboratory cured cylinders:
 - .1 When concrete strength of any set exceeds 95% of design strength, full payment for the work shall be made at the contract unit prices.
 - .2 When concrete strength of any set is greater than 80% but less than 95% of design strength, the price paid to the Contractor for the work represented by that set of cylinders shall be determined by the following formula:

$$P - \left[\frac{2P(A - B)}{A} \right]$$

Where:

P = unit price

A = specified strength

B = average 28 day cylinder strength.

- .3 If concrete strength of any set is less than 80% of design strength, the work represented by that set of cylinders will be rejected.
- .4 Where the average strength of all tests for the total work falls below design strength, but above 95% of design strength, that work not already having a price adjustment under the preceding clauses shall be subject to the following adjustment. The price paid by the Contractor shall be determined by the following formula:

$$P - \left[\frac{2(A - B)}{A} \right]$$

Where:

P = unit price

A = specified strength

B = average 28 day cylinder strength.

.3 PROTECTION

- .1 The Contractor shall be responsible for keeping all animals and pedestrians off the newly constructed sidewalks or curb until completely set. The Contractor shall also be responsible for keeping all vehicles off the work for a period of 5 days after the concrete has been finished.

3.11 BACKFILL

- .1 Allow concrete to cure for 7 days prior to backfilling.

- .2 Backfill to designated elevations with material as shown on the drawings
- .1 Compact and shape to required contours.

3.12 CLEANING

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

3.13 CONCRETE DETERIORATION

- .1 Concrete that shows surface scaling, deterioration or loss of cement or aggregate during the maintenance period will be rejected and require removal and replacement by the Contractor at no cost to Parks Canada.

3.14 SIDEWALK, CURB AND GUTTER FAILURES

- .1 Replacement of affected sections shall be required when one or more of the following exist:
 - .1 Any crack greater than 3 mm in width with no vertical displacement or chipping or spalling edges.
 - .2 Any crack with vertical displacement or chipping or spalling edges.
 - .3 Any longitudinal crack greater than or equal to 1.5 mm in width.
 - .4 A displacement at a joint of greater than or equal to 12 mm.
 - .5 A dished surface of sidewalk and/or gutter.
 - .6 A reverse crossfall or crossfall greater than 8% or less than 0.7%.
 - .7 A random cracking of any size.
 - .8 Any feature considered detrimental to pedestrian safety or appearance of the sidewalk and/or curb and gutter.
 - .9 A corner cut exists.

END OF SECTION

PART 1. GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit to Departmental Representative following material sample quantities at least 2 weeks prior to commencing work.
 - .1 Two 1 L samples of each type of paint.
 - .2 One 1 kg sample of glass beads.
 - .2 Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, specification number and formulation number and batch number.

1.2 DELIVERY, STORAGE AND HANDLING

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

PART 2. PRODUCTS

2.1 MATERIALS

- .1 Paint and Markings:
 - .1 To CGSB 1-GP-74M-79, Paint, Traffic, Alkyd.
 - .2 Colour: to CGSB 1-GP-12C-68, yellow 505-308, white 513-301.
- .2 Thinner: to CAN/CGSB-1.5.

PART 3. EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings previously installed under other Sections or Contracts are acceptable for product installation in accordance with MPI instructions prior to pavement markings installation.
 - .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.
- .3 Proceed with Work only after unacceptable conditions have been rectified.

3.2 EQUIPMENT REQUIREMENTS

- .1 Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.
- .2 Distributor: capable of applying reflective glass beads as overlay on freshly applied paint.

3.3 APPLICATION

- .1 Pavement markings: laid out by Contractor.
- .2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast within next 4 hours.
- .3 Apply traffic paint evenly at rate of 3 m²/L.
- .4 Do not thin paint unless approved by Departmental Representative.
- .5 Symbols and letters to dimensions indicated.
- .6 Paint lines of uniform colour and density with sharp edges.
- .7 Thoroughly clean distributor tank before refilling with paint of different colour.

3.4 TOLERANCE

- .1 Paint markings: within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings to the satisfaction of the Departmental Representative.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.6 PROTECTION

- .1 Protect pavement markings until dry.
- .2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION

PART 1. GENERAL

- .1 This Section specifies requirements for supply and installation of manholes and sewer appurtenances.

1.2 SUBMITTALS

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

PART 2. PRODUCTS

2.1 MATERIALS

- .1 Cast-in-place concrete:
 - .1 In accordance with Section 03 30 00.
 - .2 Portland cement to CAN/CSA-A5, Type HS.
 - .3 Concrete mix design to produce 25 MPa minimum compressive strength at 28 days and containing 25 mm maximum size coarse aggregate, with water/cement ratio to CSA-A23.1.
 - .4 Air entrainment to CSA-A23.1.
 - .5 Additives: Fly ash to CAN/CSA-A23.5.
- .2 Concrete reinforcement as indicated in drawings.
- .3 Precast manhole units: to ASTM C478M, circular. Top sections flat slab top type with opening offset for vertical ladder installation.
- .4 Precast catchbasin sections: to ASTM C478M.
- .5 Joints as follows:
 - .1 Manhole shall have all joints made watertight utilizing rubber gaskets conforming to the requirements of CSA-A257.3 and ASTM C443, preformed bituminous gasket (Rub-R-Nec) or other approved sealant.
- .6 Mortar:
 - .1 Aggregate: to CAN3 – A82.56
 - .2 Masonry Cement: to CAN/CSA-A3000-A8, sulphate resistant, Type HS.
- .7 Ladder rungs: to CAN/CSA-G30.18, No.25M billet steel deformed bars, hot dipped galvanized to CAN/CSA-G164. Rungs to be safety pattern drop step type.
- .8 Adjusting rings: to ASTM C478M.
- .9 Concrete Brick: to CAN3-A165 Series.
- .10 Drop manhole pipe: to be same as sewer pipe.
- .11 Frames, gratings, covers to dimensions as indicated in drawings and the following requirements:
 - .1 Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.
 - .2 Gray iron castings: to ASTM A48, Class 20.
- .12 Castings: sand blasted or cleaned and ground to eliminate surface imperfections and coated with two applications of asphalt varnish.
- .13 Granular bedding and backfill in accordance with Section 31 05 16.
- .14 Concrete mixes and materials: in accordance with Section 03 30 00.01.

.15 Downspout catchbasins:

Description	Suggested or Similar	Model/Part No	Size	Comments
Downspout Catchbasin	NDS 9" Catchbasin Series	900MTLKIT	9" x 9"	Metal Grate. Refer to drawings for locations.
Downspout Catchbasin Outlet	NDS Catchbasin Universal Outlets	1242	3" & 4" Universal Outlet	Refer to drawings for locations.

PART 3. EXECUTION

3.1 EXCAVATION AND BACKFILL

- .1 Excavate and backfill in accordance with Section 31 23 33.01.
- .2 Obtain approval of Parks Canada Representative before installing manholes.

3.2 CONCRETE WORK

- .1 Do concrete work in accordance with Section 03 30 00.01.
- .2 Place concrete reinforcement in accordance with Section 03 20 10.
- .3 Position metal inserts in accordance with dimensions and details as indicated.

3.3 INSTALLATION

- .1 Construct units in accordance with details indicated in drawings, plumb and true to alignment and grade.
- .2 Complete units as pipe laying progresses. Maximum of three units behind point of pipe laying will be allowed.
- .3 Dewater excavation to approval of Parks Canada Representative and remove soft and foreign material before placing concrete base.
- .4 Cast bottom slabs directly on undisturbed ground.
- .5 Set precast concrete base on a minimum of 300 mm washed gravel material.
- .6 Precast units:
 - .1 Set bottom section of precast units in bed of cement mortar and bond to concrete slab or base. Make each successive joint watertight for with approved rubber ring gaskets or bituminous compound or combination thereof.
 - .2 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
 - .3 Plug lifting holes with concrete plugs set in cement mortar or mastic compound.
- .7 Set frame and cover to required elevation on no more than three concrete rings and no more than one course of brick. Make brick joints and join brick to frame with cement mortar. Parge and make smooth and watertight using bituminous gasket.
- .8 Place manhole frame and cover on top section to an elevation 5 mm below finished asphalt surface elevation or 19 mm to 25 mm below finished paving stone surface. If adjustment required use concrete ring.
- .9 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.
- .10 Connecting pipe to manholes and catchbasins
 - .1 SDR PVC piped shall be connected to the new or existing pre-cast manhole/catchbasin wall through a cored or formed opening, and a resilient

connector installed into the manhole/catchbasin in a manner that meets the performance requirements of ASTM C923.

- .2 Plug lifting holes with low-shrink grout set in cement mortar. Insure all mortar is set prior to backfilling.
- .11 Downspout catchbasins:
 - .1 Downspout catchbasins to be installed as per manufacturer's installation recommendations.
 - .2 Paving stones to be restored to existing pattern around downspout catchbasins in accordance with Section 32 17 23.

3.4 ADJUSTMENT OF EXISTING UNITS

- .1 As per Section 33 05 14 – Adjustment of Manholes, Hydrants and Water Valves.

END OF SECTION

PART 1. GENERAL

1.1 MEASUREMENT FOR PAYMENT

- .1 Cost of new manholes, valves, hydrants and service boxes adjustment shall be incidental to installation unit rate. All labour and equipment necessary to adjust the appurtenance in accordance with the drawings and specifications shall be provided at no extra cost.
- .2 Manholes which cannot be adequately adjusted or adjustment required is greater than 300 mm, shall be reconstructed.

PART 2. PRODUCTS

2.1 GENERAL

- .1 Materials used for setting and adjustment of frames shall be of good commercial quality. Use of miscellaneous random material, such as stones, wood blocks, etc., is not acceptable.

2.2 VALVE BOX RISERS

- .1 Valve box extensions shall be 75, 100 or 150 mm cast iron conforming to ASTM A48 Class 25 and are to be completely coated with an asphaltic type varnish to prevent corrosion.

2.3 MANHOLE GRADE RINGS AND BLOCKS

- .1 Precast grade rings and blocks for manhole grade adjustment shall conform to ASTM C478 and C139, respectively.

2.4 MORTAR

- .1 Mortar shall be Sulphate Resistant ASTM Type 50.
- .2 Mortar used for sealing pipe penetrations shall consist of one part cement to two parts of clear sharp sand

PART 3. EXECUTION

- .1 General
 - .1 All manholes, valves and service boxes shall be raised, lowered, or remain at 10 mm below final grade. Asphalt pavement shall be tapered up in a 0.3 m radius, measured from the exterior circumference of the appurtenance. An application of a fog coat shall be applied to the surrounding area upon completion. Metal risers for raising the manhole cover only will not be allowed.
- .2 Valve Boxes
 - .1 The Contractor shall shorten or lengthen the boxes and stems as required and block the boxes to prevent any settlement. The adjustments shall be so made that the valves operate effectively.
 - .2 If the top box fails to move, risers can be used to bring it to grade.

.3 Manholes

- .1 Manhole and catch basin covers shall be adjusted so that the cover conforms to the required elevation. All adjustments are to be made with mortar and brick or grade rings firmly set in position and grouted.
- .2 Mortar must completely fill any spaces between collars, and the top slab and frame, in order to provide a continuous bearing surface. Mortar must be trowelled smooth with the inside of the collars. Mortar must not be applied to the inside of the collars.
- .3 The slab top, collars and frame shall be level and true, and shall not rock when stacked. A layer of mortar, not exceeding 1.0 cm in thickness, shall be placed between the slab top, all collars, and the frame as a bonding and leveling course.
- .4 Where the height of adjustment does not permit use of a full precast collar, or the frame must be on an angle to suit the surface grades, the following shall apply:
 - .1 Use iron or steel wedges, brick, or a combination of wedges and brick to support the frame. Once correct height and grade has been confirmed, the full width of the space under the frame shall be filled with mortar, or mortar and brick, depending on the space required to be filled.
 - .2 The amount of mortar shall be minimized. It may be necessary to temporarily lift the frame in order to place the brick and mortar, so that the full bearing surface of the frame will be supported.
 - .3 Care must be taken when removing and reinstalling the frame to ensure height and slope is maintained.
- .5 Collars and bricks must be installed in vertical alignment.

.4 Water Valves

- .1 Excavate and expose adjustable portion of water valve casing.
- .2 Adjust water valve casing to design elevation.
- .3 Recess top of water valve 5 mm below finished asphalt surface elevation or to a maximum of 25 mm below finished gravel lane surface.
- .4 Provide gravel cap on all buried valves.
- .5 Backfill excavation. Ensure water valve casing will not settle.
- .6 Operate valve in presence of Parks Canada Representative to verify it is operational.

.5 Backfill

- .1 Should any backfill be required around the valve box, manhole or catch basin cover below the elevation of the road base course surface, crushed gravel (20 mm) shall be used and properly compacted in place.

END OF SECTION

PART 1. GENERAL

- .1 This Section specifies requirements for supply and installation of storm utility drainage piping.

1.2 SUBMITTALS

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

1.3 SCHEDULING

- .1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.
- .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.
- .3 Notify Parks Canada Representative 48 hours prior to completion of pipe installation before backfill to allow for as-built survey by the Consultant's Resident Inspector and verification of pipe slopes.

PART 2. PRODUCTS

2.1 MATERIALS

- .1 Concrete Pipe
 - .1 Reinforced circular concrete pipe and fittings: ASTM C76 Class III minimum, designed for flexible rubber gasket joints to ASTM D3034,
 - .2 Lifting holes:
 - .1 Pipe 900mm and less diameter: no lift holes. Use approved lifting anchors, not to exceed two per pipe.
 - .2 Pipe greater than 900mm diameter: no lift holes. Use approved lifting anchors, not to exceed two per pipe.
 - .3 Concrete to be made with Type 50 cement.
 - .4 Pipe shall be jointed with rubber gaskets or gasketed fittings or couplings.
 - .5 Reinforced concrete CAN/CSA A257, 65D min.
- .2 Polyvinyl Chloride (PVC) Pipe
 - .1 PVC pipe and fittings to ASTM D3034 for 200 mm to 400 mm diameters. The minimum dimension ratio used shall be DR 35.
 - .2 400 mm to 600 mm diameter PVC pipe shall be PVC Ultra Rib to CSA-D182.4, 320 kPa pipe stiffness.
 - .3 Locked-in gasket and integral bell system.
- .3 Pipe Zone Material
 - .1 Granular material in accordance with Section 31 05 16- Aggregate Materials and following requirements:
 - .2 Concrete mixes and materials for bedding, cradles, encasement, supports: in accordance with Section 03 30 00- Cast-in-Place Concrete.
- .4 Joint Mortar
 - .1 Portland cement: to CAN/CSA-A300 normal type 50.
 - .2 Mortar to consist of one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additives.

PART 3. EXECUTION

3.1 PREPARATION

- .1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Parks Canada Representative.

3.2 TRENCHING

- .1 Do trenching Work in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling.
- .2 Protect trench from contents of sewer.
- .3 Trench alignment and depth to approval of the Parks Canada Representative prior to placing bedding material and pipe.
- .4 Water jetting of backfill under haunches of corrugated steel pipe may be permitted if recommended by manufacturer and approved by the Parks Canada Representative.

3.3 CONCRETE BEDDING AND ENCASEMENT

- .1 Do concrete Work in accordance with Section 03 30 00- Cast-in-Place Concrete. Place concrete to details as indicated by Consultant.
- .2 Position pipe on concrete blocks to facilitate placing of concrete.
 - .1 When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.
- .3 Backfill over concrete once cured.

3.4 GRANULAR BEDDING

- .1 Place bedding in unfrozen condition.
- .2 Place granular bedding material in uniform layers not exceeding 150mm compacted thickness to depth as indicated.
- .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
 - .1 Do not use blocks when bedding pipes.
- .4 Shape transverse depressions as required to suit joints.
- .5 Compact each layer full width of bed to at least 95% Standard Proctor Density.
- .6 Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted bedding material.

3.5 INSTALLATION

- .1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Parks Canada Representative.
- .2 Handle pipe using methods approved by Parks Canada Representative.
 - .1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
- .3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .4 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
- .5 Lay corrugated steel pipe:
 - .1 With outside circumferential laps facing upgrade and longitudinal laps or seams at side or quarter points.
 - .2 With longitudinal centre line of paved invert coinciding with flow line.

- .6 Joint deflection permitted within limits recommended by pipe manufacturer.
- .7 Water to flow through pipes during construction only as permitted by Parks Canada Representative.
- .8 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .9 Install plastic pipe and fittings in accordance with CAN/CSA-B1800.
- .10 Joints:
 - .1 Install gaskets as recommended by manufacturer.
 - .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
 - .3 Align pipes carefully before joining.
 - .4 Maintain pipe joints free from mud, silt, gravel and other foreign material.
 - .5 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.
 - .6 Complete each joint before laying next length of pipe.
 - .7 Minimize joint deflection after joint has been made to avoid joint damage.
 - .8 At rigid strictures, install pipe joints not more than 1.2m from side of structure.
 - .9 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .11 When any stoppage of Work occurs, restrain pipes as directed by Parks Canada Representative, to prevent "creep" during down time.
- .12 Plug lifting holes with Parks Canada Representative approved prefabricated plugs, set in non-shrink grout.
- .13 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .14 Make watertight connections to manholes and catch basins.
 - .1 Use shrinkage compensating grout when suitable gaskets are not available.
- .15 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes.
 - .1 Joint to be structurally sound and watertight.
- .16 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.6 PIPE SURROUND

- .1 Prior to installing pipe, a layer of pipe zone material shall be placed as bedding in the trench bottom and compacted to grade by approved hand tampers or mechanical means to form a firm pipe base. This cushion shall cover the full width of the trench bottom and have a minimum depth as shown on details on completion of compaction.
- .2 Place pipe bedding as shown on drawings.
- .3 In rock excavation, the minimum depth of bedding below the pipe shall be 150mm.
- .4 Bell or coupling holes shall be dug such that the full barrel of the pipe is supported throughout its length by the bedding material.
- .5 Place pipe zone material in unfrozen condition.
- .6 Upon completion of pipe laying, and after the Parks Canada Representative has inspected pipe joints, surround and cover pipes as indicated. Leave joints and fittings exposed until field testing is completed.
- .7 Place pipe zone material in uniform layers not exceeding 150 mm compacted thickness as indicated.

- .8 Place layers uniformly and simultaneously on each side of pipe.
- .9 Compact each layer from top of bedding to underside of backfill to at least 95% of Standard Proctor.
- .10 When field test results are acceptable to Parks Canada Representative, place pipe zone material at pipe joints.

3.7 BACKFILL

- .1 Place backfill material in unfrozen condition.
- .2 Place backfill material, above pipe surround, in uniform layers not exceeding 150mm compacted thickness up to grades as indicated.
- .3 Under paving and walks, compact backfill to at least 95% standard proctor density to ASTM D698. In other areas, compact backfill to at least 90% standard proctor density to ASTM D698.
- .4 Place unshrinkable backfill in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling.

3.8 FIELD TESTS AND INSPECTIONS

- .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 Draw tapered wooden plug with diameter of 50mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction directed by the Parks Canada Representative.
- .3 Remove foreign material from sewers and related appurtenances by flushing with water.
- .4 Television and photographic inspections:
 - .1 Carry out inspection of installed sewers by television camera, photographic camera or by other related means.
- .5 Provide means of access to permit Parks Canada Representative to do inspections.
- .6 Provide means of access to permit Consultant Resident Inspector to survey installed pipe for as-built information.

3.9 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION