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**END OF DOCUMENT**

**Part 1            General**

**1.1                SCOPE OF WORK**

- .1    Scope of Work for this Contract comprises:
  - .1    The Installation of Q-Free equipment which will be free-issued from Parks Canada to the contractor. For each site Q-free Parking controllers and pre-formed induction loops will be free-issued. All wiring and equipment other than controller and induction loops to be provided by the contractor. Contractor is to pick up Q-Free equipment at the Parks Canada Agency Office, 240 Hawk Avenue, Banff.
  - .2    The installation of smart parking monitoring equipment at seven sites in the Banff National Park. These sites are Bourgeau Lake, Cave & Basin, Cascade Ponds, Cascade Overflow, Lake Minnewanka, Lake Louise and Moraine Lake.
    - .1    Supply and install solar power supplies at Bourgeau Lake, Cave & Basin, Cascade Ponds, and Cascade Overflow. Each solar power supply to be complete with enclosure for housing Q-Free parking monitor equipment.
    - .2    Supply and install utility power at Lake Minnewanka and Moraine Lake.
    - .3    Supply and install utility and solar power at Lake Louise.
  - .3    Provide labour and materials for testing and commissioning of the complete installation, with remote assistance from Q-Free.
  - .4    Lake Louise and Moraine Lake layout and installation drawings will follow in an addendum.
  - .5    All above Work is further identified collectively as Work.

**1.2                CONTRACT METHOD**

- .1    Construct Work under lump sum contract.

**1.3                WORK BY OTHERS**

- .1    Co-operate with other Contractors in carrying out their respective works and carry out instructions from the Departmental Representative.
- .2    Co-ordinate Work with that of other Contractors. If any part of the Work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Department Representative, in writing, any defects which may interfere with proper execution of Work.

**1.4                OWNER OCCUPANCY**

- .1    Owner will occupy all seven sites during entire construction period for execution of normal operations.

**1.5                WORK SEQUENCE**

- .1    Construct Work to accommodate Owner's continued use of premises during construction and public access.

- .2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
- .3 Construction will be completed whilst the site is still in operation. Temporary signage and barriers for pedestrian and traffic management is to be provided by the contractor throughout the works. Maintain fire access/control throughout the duration of the Work.
- .4 The project is to be completed by September 30, 2017.
- .5 Within seven (7) days after award of contract, submit detailed Project Schedule which includes the following milestones and activity types.
  - .1 Award.
  - .2 Submittal of Shop Drawings.
  - .3 Permits.
  - .4 Survey.
  - .5 Mobilization.
  - .6 Environmental Protection Plan (EPP), review and implementation.
  - .7 Health and Safety Plan, review and implementation.
  - .8 Traffic Accommodation strategy, review and implementation.
  - .9 Quality Management Plan.
  - .10 On site installation works.
  - .11 Final Inspection.
  - .12 Demobilization.
  - .13 Completion.

## **1.6 CONTRACTOR USE OF PREMISES**

- .1 The Contractor shall limit use of premises for Work to allow:
  - .1 Owner Occupancy.
  - .2 Work by other contractors.
  - .3 Public usage of all sites throughout the duration of the Work.
- .2 Coordinate use of premises under direction of the Departmental Representative.
- .3 The Contractor shall obtain a business license from Parks Canada for Work in the National Park area.
- .4 The Contractor shall obtain a vehicle work pass from Parks Canada for all business and private vehicles it intends to use on site. All contractor vehicles on site should display the work pass.
- .5 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .6 Repair or replace portions of existing work which have been altered or damaged during construction operations to match existing or adjoining work, as directed by Departmental Representative.

- .7 At completion of operations, condition of existing work to be equal to or better than that which existed prior to construction, to the satisfaction of the Departmental Representative.

#### **1.7 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1 Execute Work with no interference or disturbance to buildings within and adjacent to the sites, owner, public and normal use of premises. Arrange with Departmental Representative to facilitate execution of Work.

#### **1.8 EXISTING SERVICES**

- .1 The Contractor shall perform utility locates and provide copies to Departmental Representative prior to undertaking any Work.
- .2 The Contractor shall obtain permission from Departmental Representative and utility companies prior to intended interruption of services.
- .3 Provide alternative access routes during work for pedestrian and vehicular traffic to the each sites during construction, as a part of the Traffic Accommodation Strategy.
- .4 Where unknown services are encountered, immediately advise Department Representative and confirm findings in writing.

#### **1.9 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy of each document as follows:
  - .1 Contract Drawings, marked up with as-built information.
  - .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 Environmental Protection Plan.
  - .11 Traffic Accommodation Strategy.
  - .12 Quality Management Plan.
  - .13 Health and Safety Plan and Other Safety Related Documents.
  - .14 Other documents as specified.
  - .15 Restricted Activity Permits.

#### **1.10 HOURS OF WORK**

- .1 The Work must be performed between 7 am and 7 pm. Work will not be permitted on days indicated on Section 01 14 00 -Work Restriction.

### **1.11 SURVEY RESPONSIBILITIES**

- .1 The Contractor is responsible for all surveying required to construct the Work to the lines and grades shown on the Drawings. Survey Work must be tied to the nearest Alberta Survey Control Monument or temporary benchmarks established by the Department Representative. Elevations shown on the Drawings are geodetic.
- .2 The Contractor must conduct a survey circuit of the project monuments and submit a report to the Department Representative at least seven (7) days prior to installation of any works.
- .3 The Contractor is responsible for quantity survey measurements for progress payment application.
- .4 The Contractor will complete as-built survey of all Works for Record Drawings and provide the results to the Departmental Representative prior to Substantial Performance of the Work.

### **1.12 EROSION AND SEDIMENT CONTROL (ESC) PLAN**

- .1 The Contractor must prepare an ESC plan for the project to be included in the Environmental Protection Plan described in Section 01 35 43 Clause 1.3.2. The plan must detail temporary and permanent environmental control measures that the Contractor will undertake to comply with all applicable legislation, regulations and approvals during the course of their construction. The plan should address the following items:
  - .1 Pre-Construction Actions:
    - .1 Prepare and submit for review by Departmental Representative the “Environmental Protection Plan”
  - .2 Construction Considerations:
    - .1 Clearing and excavation must start only after installing the sediment and runoff measures as per the plan which has been reviewed and accepted by the Departmental Representative. Only areas required for immediate construction activity and as approved by the Departmental Representative may be cleared. Additional control measures must be installed as excavation advances.
    - .2 Sediment and debris must be prevented from reaching waterways.
    - .3 Dust control measures must be implemented to prevent wind transport of dust from disturbed soil surfaces.
    - .4 On-going inspection and maintenance of Erosion and Sediment Controls must be performed by the Contractor until restoration is achieved.
  - .3 Post-Construction Activities:
    - .1 All accumulated sediment and debris must be removed as required after construction activities are complete.
    - .2 Stockpile, storage and laydown areas must be cleaned and restored to pre-construction condition.
  - .4 The ESC Plan must include natural area protection measures for natural areas impacted by the project.

**1.13 TRAFFIC ACCOMMODATION STRATEGY (TAS)**

- .1 The Contractor must prepare a traffic accommodation strategy for each site of the project. The TAS must detail temporary construction signage and detours for public use of the park area during all Stages of construction.
- .2 Traffic accommodation during construction must allow for public access through one lane traffic in each direction at all times, from the campground access and campground kiosk to the camping area. The plan should address the following items:
  - .1 Pre-Construction Actions:
    - .1 Prepare and submit for review by Departmental Representative the “Traffic Accommodation Strategy”.
    - .2 Receive acceptance from the Departmental Representative to proceed prior to beginning Work.
  - .2 Construction Considerations:
    - .1 Vehicle and pedestrian traffic detours to enable the continuous use of the campground including the campground access, campground kiosk and sanitary dump station during daily construction operations.
    - .2 Vehicle and pedestrian traffic detour during the construction work in the existing parking lot area.
- .3 No signs or advertisements, other than warning signs, are permitted on site.
- .4 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall be diamond grade and shall conform to CAN3-Z321.
- .5 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by the Departmental Representative.
- .6 Signage shall be coordinated with other Contractors.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

**1.1                USE OF THE WORK SITES**

- .1        The work sites shall be specified by the Departmental Representative and shall only be used for the purposes of the Work. The work sites will be made available by Parks Canada to the Contractor for its non-exclusive use for the duration of the Work, unless otherwise provided in the Contract Documents.
- .2        While the work sites are under the Contractor's control, the Contractor shall be entirely responsible for the security of the work sites and of the Work, and for the security of the Work of other contractors located on the work sites.
- .3        The Contractor shall keep the work sites clean and free from accumulation of waste materials and rubbish regardless of source. Snow shall be removed by the Contractor as necessary for the performance and inspection of the Work.
- .4        Execute Work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate Work as stated.
- .5        The Contractor will not be permitted to establish a worker's accommodation camp inside Banff National Park.
- .6        The Contractor shall be provided with a work space identified in the construction drawings. The Contractor is permitted to use this space for construction requirements and temporary facilities in accordance with the Contract Documents.
- .7        The Contractor shall provide sanitary facilities for work force in accordance with governing regulations and the Environmental Procedures for this project. The Contractor shall post notices and take such precautions as required by local health authorities and keep area and premises in sanitary condition.
- .8        Any damage to the Work Sites caused by the Contractor shall be repaired by the Contractor at its expense.
- .9        Any damage caused to the access road/trails by construction equipment shall be repaired, which may include re-grading, levelling and seeding, to the satisfaction of the Departmental Representative at the Contractor's own expense.
- .10       All equipment permitted shall not exceed the posted speed limit.
- .11       A restricted activity permit will be required for each work site. The Contractor shall submit work description, equipment used, and personnel information to Parks Canada Agency 1 week prior to mobilization for each site. Parks Canada Agency (PCA) will issue the restricted activity permit to the Contractor.
- .12       The Work must be performed between 7 am and 7 pm with exception as noted below. Work may not be performed on:
  - .1        June 29, 30, 2017
  - .2        July 1, 2, 3, 4, 5, 2017
  - .3        August 4, 5, 6, 7, 2017



## **1.2 UTILITIES**

- .1 Existing utilities shown are for information only; the Contractor is responsible for locating any existing utilities prior to construction.

## **1.3 EXISTING SITE CONDITIONS**

- .1 Submission of a tender is deemed to be confirmation that the Contractor has inspected the site and is completely familiar with all existing conditions or restrictions affecting execution and completion of the Work.
- .2 Regularly monitor the condition of the Work Site throughout the construction period.

## **1.4 PROTECTION OF PERSONS AND PROPERTY**

- .1 The Contractor shall comply with all applicable provincial safety regulations, Industrial First Aid Regulations, and Workplace Hazardous Materials Information System Regulations.
- .2 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or adjacent to the Work Site to the extent that may be affected by conduct of work.
- .3 The Contractor shall promptly take such measures as are required to repair, replace or compensate for any loss or damage caused by the Contractor to any property or, if Parks Canada so directs, shall promptly reimburse to Parks Canada the costs resulting from such loss or damage.

## **1.5 USE OF PUBLIC AREAS**

- .1 The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas.
- .2 All vehicles and equipment leaving the Work Site and entering public roadways shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle.
- .3 All vehicles arriving at or leaving the Work Site and transporting materials shall be loaded in a manner which will prevent dropping of materials or debris on the roadways or trails, and where contents may otherwise be blown off during transit such loads shall be covered by tarpaulins or other suitable covers. Spills of materials in public areas shall be removed or cleaned immediately by the Contractor at its own expense.
- .4 All activities shall be in accordance with Section 01 35 43 - Environmental Procedures and the Environmental Protection Plan prepared for the project.

## **1.6 SUPERVISORY PERSONNEL**

- .1 After award notification, the Contractor shall submit to the Departmental Representative confirmation of the names of the supervisory personnel and other key staff designated for assignment on the Contract.

The following personnel shall be included in the list:

- .1 Project Superintendent.
- .2 Deputy Project Superintendent.
- .3 Health, Safety and Environment Coordinator.

- .2 The Project Superintendent shall be employed full time and shall be present on the Work Site each and every workday that Work is being performed, from the commencement of Work to the completion of Work.
- .3 The Project Superintendent shall nominate a Deputy Project Superintendent who shall have the authority of the Project Superintendent during the Project Superintendent's absence.
- .4 Health, Safety and Environment Co-ordinator must:
  - .1 Have minimum 2 years' site related working experience specific to activities associated with electrical construction.
  - .2 Have working knowledge of occupational health, safety and environmental regulations.
  - .3 Be responsible for completing Contractor's health and safety training sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
  - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's health and safety Plan.
  - .5 Be responsible for implementing, enforcing daily and monitoring the Environmental Protection Plan (EPP).
  - .6 Be on site during execution of Work and report directly to and be under direction of the Project Superintendent.

#### **1.7 MEETINGS**

- .1 The Work includes attending meetings between the Contractor and the Departmental Representative. The meetings will be called and chaired by the Departmental Representative as required. The Contractor shall be represented at such meetings to the satisfaction of the Departmental Representative.
- .2 The Departmental Representative will schedule an initial meeting to be held on site after award notification. This meeting shall be attended by senior representatives of the Owner, the Departmental Representative, Contractor, major subcontractors and field inspectors.
- .3 Progress and status meetings will be held on a weekly basis or more frequently as directed by the Departmental Representative.
- .4 Cost of attending the above meetings shall be considered incidental to the Work and no additional payment will be made.

#### **1.8 WASTE DISPOSAL**

- .1 Refer to Section 01 35 43 - Environmental Procedures.
- .2 All surplus, unsuitable and waste materials shall be removed from the job site to approved sites outside Banff National Park, unless specified otherwise in other sections of these Specifications.
- .3 Deposits of any construction debris into any waterway are strictly forbidden unless specifically instructed to within the contract documents or by the Departmental Representative.

- .4 Cost for waste disposal described above shall be considered incidental to the Work and no additional payment will be made.

**1.9 WORK STOPPAGE**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1      Prime Cost Sum
- .2      Approval Process and Schedule.
- .3      Measurement procedures.

**1.2                PRIME COST SUM**

- .1      Include in Contract Price a Prime Cost Sum as provided in the Schedule of Quantities.
- .2      The Contract Price, and not Prime Cost Sum, includes Contractor's overhead and profit in connection with such Prime Cost Sum.
- .3      Prime Cost Sum provided for in the Schedule of Quantities is not a sum due to the Contractor. Rather, payment will be made against it for any miscellaneous work not included in the Contract or under the General Conditions of the Contract.
- .4      The use of any part of Prime Cost Sum will be on sole discretion of the Departmental Representative. The Contractor cannot make any claim if some or the entire Prime Cost Sum amount is deemed unnecessary.
- .5      Prime Cost Sum items may include but are not limited to:
  - .1      Other Miscellaneous work as such as additional trenching, asphalt repair, or landscaping, directed by the Departmental Representative.
- .6      Once a Prime Cost Sum item has been agreed upon with Departmental Representative, it shall be included as an item on the Project Schedule. This shall occur on the next update of the Project Schedule.

**1.3                APPROVAL PROCESS AND SCHEDULE**

- .1      For any additional works identified by the Parks Canada Representative, the Contractor will submit a Contract Change Notice (CCN) outlining the work to be completed, the cost of work (excluding overhead and profit) and the impact to the schedule to the Parks Canada Representative. Once the CCN is approved, a Change Order will be required for charging any CCN item against the Prime Cost Sum
- .2      The substantial completion date for the project will only be renegotiated to reflect the schedule of the Prime Cost Sum item if the Prime Cost Sum item interferes with the critical path of the project.

**1.4                MEASUREMENT PROCEDURES**

- .1      Payment for work under the Prime Cost Sum will be made using negotiated rates or the material, labour and equipment rates as per the following:
  - .1      Rental rates will be in accordance with current Alberta Roadbuilders and Heavy Construction Association rate schedule, and will be all inclusive and fully operated. Hourly rental of equipment will be measured in actual working time and necessary travel time within project limits.

- .2 Transportation time to and from site to be reimbursed only if equipment is exclusively used for additional work.
- .3 Labour rates and material costs shall be paid in accordance with the General Conditions.

**Part 2 PRODUCTS**

**2.1 NOT USED**

- .1 Not Used.

**2.2 EXECUTION**

- .1 Not used.

**END OF SECTION**

**Part 1        General**

**1.1        MEASUREMENT FOR PAYMENT**

- .1        For lump sum price item, Departmental Representative will issue payment after the completion and acceptance of the item.
- .2        Where a method of measurement for payment for a work item is not specified, payment for that item will be deemed to be incidental to the contract price.
- .3        For each item listed in Part 3, pricing is to include mobilization/demobilization, which shall include mobilization; permits; moving personnel, equipment, fencing, safety measures, and materials to the site; setting up temporary facilities; public notices; storage of materials; all preparation for performing the work; full demobilization of the above; site clean-up; site restoration; and costs associated with the warranty period.
- .4        For each item listed in Part 3, pricing is to include site specific traffic accommodation strategy, which shall include supply and erection of all necessary temporary signage, flag persons and detours; all labour, permitting, equipment and materials required to complete the work; clean up; and any incidental work for which payment is not specified elsewhere. This pay item includes multiple phases of the TAS to accommodate the Work as defined.
- .5        For each item listed in Part 3, pricing is to include site specific Environmental Protection Plan, which shall include supply and installation of all necessary erosion and sediment control measures and necessary measures indicated in the EPP; all labour, permitting, equipment and materials required to complete the work, sediment disposal; clean up; maintenance, removal of all measures at such time as approved by the Departmental Representative, and any incidental work for which payment is not specified elsewhere.
- .6        For each item listed in Part 3, pricing is to include all removal and restoration to existing condition after installation. Backfill and compact all trenching and fill and restore all saw cut asphalt to original condition. Restore all existing pavement markings, curbs, traffic signage if applicable.
- .7        For each item listed in Part 3, pricing is to include supply and install of Qwick Kurb Separator Curb and L104 Mega Marker lane delineators as detailed on drawings. Use yellow reflectors on both sides of the delineators between incoming and outgoing traffic at each inductive loop installation sites.
- .8        For each item listed in Part 3, pricing is to include all test and commission the complete system, prove operation to the owner's representative, and assist Q-Free to provide site labour and equipment for testing and commissioning.
- .9        Where solar power is used, supply and assemble all components of each solar power supply into a complete system. Each solar power supply will consist of a battery, solar cell, collapsible mast, solar charge controller and enclosure with power distribution. A ground pit is to be provided for each solar mast and connected to both mast and control panel. A minimum of two 3m manufactured grounding electrodes are to be used, the maximum ground resistance is to be 5 ohms. Minimum #6 AWG bare copper conductors to be used for ground connection.

**Part 2 Part 2 Products**

**2.1 NOT USED**

.1 Not Used.

**Part 3 Execution**

This section prescribes the measurement and payment for items of Work described in the Bid and Acceptance form. The measurement and payment clauses shall be read in conjunction with the various items of work listed in the Bid and Acceptance form.

.1 Infrastructure

.1 Bourgeau Lake, Supply and install complete parking monitor system  
Payment for this item shall be compensation in full for completing the Bourgeau Lake site parking monitor equipment installation. Provide solar power supply with mast & enclosure at the location shown, install Q-free equipment within enclosure. Supply and install concrete mast base with bolt cage. Trench cabling from parking controller to asphalt edge. Saw cut through asphalt to install induction loops and connect to conduits, refer to drawing for loop locations and quantities. All labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Payment: Lump sum price bid.

Measurement: Lump sum payable after work is complete.

.2 Cave and Basin, Supply and install complete parking monitor system  
Payment for this item shall be compensation in full for completing the Cave and Basin site parking monitor equipment installation. Provide solar power supply with mast & enclosure at the location shown, install Q-free equipment within enclosure. Supply and install three protective bollards around the mast. Supply and install concrete mast base with bolt cage. Trench cabling from parking controller to asphalt edge. Saw cut through asphalt to install induction loops and connect to conduits, refer to drawing for loop locations and quantities. All labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Payment: Lump sum price bid.

Measurement: Lump sum payable after work is complete.

.3 Cascade Ponds, Supply and install complete parking monitor system  
Payment for this item shall be compensation in full for completing the Cascade Ponds site parking monitor equipment installation. Provide solar power supply with mast & enclosure at the location shown, install Q-free equipment within enclosure. Supply and install concrete mast base with bolt cage. Trench cabling from parking controller to asphalt edge. Saw cut through asphalt to install induction loops and connect to conduits, refer to drawing for loop locations and quantities. All labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Payment: Lump sum price bid.

Measurement: Lump sum payable after work is complete.

.4 Cascade Overflow, Supply and install complete parking monitor system  
Payment for this item shall be compensation in full for completing the Cascade Overflow site parking monitor equipment installation. Provide solar power supply with mast & enclosure at the location shown, install Q-free equipment within enclosure. Supply and install concrete mast base with bolt cage. Trench cabling from parking controller to asphalt edge. Saw cut through asphalt to install induction loops and connect to conduits, refer to drawing for loop locations and quantities. All labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Payment: Lump sum price bid.

Measurement: Lump sum payable after work is complete.

.5 Lake Minnewanka, Supply and install complete parking monitor system  
Payment for this item shall be compensation in full for completing the Lake Minnewanka site parking monitor equipment installation. Supply and install power distribution enclosure within the existing utility room. Provide 120VAC power supply to enclosure from nearby panelboard. Install two Q-Free parking controllers within the enclosure. Wall mount cellular radio antennas within building, one for each parking controller. Trench cabling from parking controllers to asphalt edge. Saw cut through asphalt to install induction loops at both locations and connect to conduits, refer to drawing for loop locations and quantities. All labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Payment: Lump sum price bid.

Measurement: Lump sum payable after work is complete.

.6 Moraine Lake, Supply and install complete parking monitor system  
Payment for this item shall be compensation in full for completing the Moraine Lake site parking monitor equipment installation. Provide solar power supply with mast & enclosure at the location shown, install Q-free equipment within enclosure. Supply and install concrete mast base with bolt cage. Trench cabling from parking controller to asphalt edge. Saw cut through asphalt to install induction loops and connect to conduits, refer to drawing for loop locations and quantities. All labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Payment: Lump sum price bid.

Measurement: Lump sum payable after work is complete.

.7 Lake Louise, Supply and install complete parking monitor system  
Payment for this item shall be compensation in full for completing the Lake Louise site parking monitor equipment installation. Provide solar power supply with mast & enclosure



at the locations shown, install Q-free equipment within enclosures. Supply and install concrete mast base with bolt cage for each power supply. Trench cabling from parking controller to asphalt edge. Saw cut through asphalt to install induction loops and connect to conduits, refer to drawing for loop locations and quantities. All labour, equipment and materials required to complete the work; clean up; and any other incidental work for which payment is not specified elsewhere.

Payment: Lump sum price bid.

Measurement: Lump sum payable after work is complete.

.2 Prime cost sum

Refer to Section 01 21 00 – Allowances

**END OF SECTION**

**Part 1            General**

**1.1                APPLICATIONS FOR PROGRESS PAYMENT**

- .1 Contractor's Responsibilities:
  - .1 Make applications for payment on account monthly as Work progresses.
  - .2 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Work performed and products delivered to place of work at that date.
  - .3 Submit progress payment application to Departmental Representative within 5 working days after each month end.
  - .4 Progress payment application to include all labour and materials incorporated in Work and all materials stored at site.
  - .5 Progress payment application to include all Approved Change Orders.
  - .6 Supply other evidence required by Department Representative in support of progress claim including survey data.
- .2 Departmental Representative's Responsibilities:
  - .1 Review Contractor's payment application, prepare Progress Payment Certificate and issue to Owner within 10 working days following receipt of Contractor's payment application.
  - .2 Departmental Representative's estimate of percentage of work completed will govern calculation of payment on all Progress Payment Certificates.
  - .3 Inform Contractor of amendments to claim by copy of Progress Payment Certificate.

**1.2                SCHEDULE OF VALUES**

- .1 Provide schedule of values supported by evidence as Departmental Representative may reasonably direct and when accepted by Departmental Representative, be used as basis for applications for payment.
- .2 Include statement based on schedule of values with each application for payment.
- .3 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Departmental Representative may reasonably require to establish value and delivery of products.

**1.3                PROGRESS PAYMENT**

- .1 Progress payment submission to the Departmental Representative should match the structure of the Bid and Acceptance form.
- .2 Departmental Representative will issue to Owner, no later than 10 days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as Departmental Representative determines to be due. If Departmental Representative amends application, Departmental Representative will give notification in writing to the Contractor giving reasons for amendment.

#### **1.4 CHANGE ORDERS**

- .1 Complete and promptly return all change price requests issued by Departmental Representative, quoting unit and/or lump sum prices as requested. Include appropriate supporting documentation to verify prices.
- .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 Change Order issued. Change Order is only valid when signed by Departmental Representative, Owner and Contractor.

#### **1.5 SUBSTANTIAL PERFORMANCE OF WORK**

- .1 Prepare and submit to Departmental Representative comprehensive list of items to be completed or corrected and apply for a review by Departmental Representative to establish Substantial Performance of Work or Substantial Performance of designated portion of Work. Failure to include items on list does not alter responsibility to complete Contract.
- .2 Departmental Representative: state date of Substantial Performance of Work or designated portion of Work in certificate.
- .3 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Departmental Representative, establish reasonable date for finishing Work.

#### **1.6 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK**

- .1 After issuance of certificate of Substantial Performance of Work:
  - .1 Submit application for payment of holdback amount or partial holdback amount as deemed appropriate by Departmental Representative.
  - .2 Submit statutory declaration that accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Owner might in be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.
- .2 After receipt of application for payment and sworn statement, Departmental Representative will issue certificate for payment of holdback amount or partial holdback amount as recommended by Departmental Representative.

#### **1.7 PROGRESSIVE RELEASE OF HOLDBACK**

- .1 Refer to G.C 5 Terms of Payment

#### **1.8 FINAL PAYMENT**

- .1 Submit application for final payment when Work is completed.
- .2 Departmental Representative will review Work to verify validity of application. Departmental Representative will give notification that application is valid or give reasons why it is not valid.

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 11 00 – Summary of Work.
- .2        Section 01 27 00 – Measurement and Payment.

**1.2                ADMINISTRATIVE**

- .1        The Departmental Representative will schedule and administer weekly project meetings throughout the progress of the Work.
- .2        The Departmental Representative shall prepare agenda for meetings.
- .3        The Departmental Representative will distribute notice of each meeting four days in advance of meeting date to Owner and the Contractor.
- .4        The Contractor shall provide physical space and make arrangements for meetings.
- .5        The Departmental Representative will preside at meetings.
- .6        The Departmental Representative will record the meeting minutes, include significant proceedings and decisions and identify actions by parties.
- .7        The Departmental Representative will reproduce and distribute copies of minutes after meetings and transmit to meeting participants and, affected parties not in attendance.
- .8        Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

**1.3                PRECONSTRUCTION MEETING**

- .1        Within ten (10) days after award of Contract, the Departmental Representative will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2        Representatives from Owner, Contractor, major Subcontractors and Departmental Representative will be in attendance.
- .3        The Departmental representative will establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4        Agenda to include:
  - .1        Appointment of official representative of participants in the Work.
  - .2        Schedule of Work in accordance with 01 32 16.06
  - .3        Schedule of submission of Shop Drawings. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .4        Requirements for temporary facilities, offices, storage sheds, utilities, fences.
  - .5        Health and safety requirements.
  - .6        Traffic Accommodation Strategy.
  - .7        Environmental Protection Plan.
  - .8        Quality Management.

- .9 Delivery schedule of specified equipment.
- .10 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .11 Owner provided products.
- .12 Record Drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .13 Monthly progress claims, administrative procedures, photographs, hold backs.
- .14 Appointment of inspection and testing agencies or firms.
- .15 Insurances, transcript of policies.

#### **1.4 PROGRESS MEETINGS**

- .1 During course of Work and one week prior to project completion, progress meetings will be scheduled weekly.
- .2 Contractor, major Subcontractors involved in Work, Owner representative and Departmental Representative are to be in attendance.
- .3 The Departmental Representatives will notify parties of confirmed attendance minimum four (4) days prior to meetings.
- .4 The Departmental Representative will record minutes of meetings and circulate to attending parties and affected parties not in attendance within three (3) days after meeting.
- .5 Agenda to include the following:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Review of Work progress since previous meeting.
  - .3 Field observations, problems, conflicts.
  - .4 Problems which impede construction schedule.
  - .5 Corrective measures and procedures to regain projected schedule.
  - .6 Revision to construction schedule.
  - .7 Progress schedule, during succeeding work period.
  - .8 Review submittal schedules: expedite as required.
  - .9 Maintenance of quality standards.
  - .10 Review proposed changes for effect on construction schedule and on completion date.
  - .11 Health and safety incidents or corrective actions.
  - .12 Traffic Accommodation.
  - .13 Erosion Control/Environmental Protection.
  - .14 Other business.

#### **Part 2 Products**

##### **2.1 NOT USED**

- .1 Not Used.

<b>Part 3</b>	<b>Execution</b>
<b>3.1</b>	<b>NOT USED</b>
.1	Not Used.

**END OF SECTION**

**Part 1            General**

**1.1            RELATED REQUIREMENTS**

- .1            Section 01 31 19 – Project Meetings.

**1.2            DEFINITIONS**

- .1            Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2            Bar Chart (GANNT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally, Bar Chart should be derived from commercially available computerized project management system.
- .3            Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4            Construction Work Week: Monday to Sunday, excluding Statutory Holidays and their associated weekends as per Section 01 14 00, will provide seven-day work week and define schedule calendar working days as part of Bar (GANNT) Chart submission.
- .5            Duration: number of work periods (not including holidays or other nonworking periods) required to complete 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 project, usually completion of major deliverable.
- .8            Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9            Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

**1.3            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 ten (10) 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.

#### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within ten (10) working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within five (5) working days of receipt of acceptance of Master Plan.

#### **1.5 PROJECT MILESTONES**

- .1 Project milestones form interim targets for Project Schedule.
  - .1 Banff Area Work completed by 2017 August 31
  - .2 Lake Louise Area Work completed by 2017 August 31
  - .3 Substantial Performance 2017 August 31
  - .4 Final Completion 2017 September 30

#### **1.6 MASTER PLAN**

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

#### **1.7 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 Submittal of Shop Drawings.
  - .3 Permits.
  - .4 Survey.
  - .5 Mobilization.
  - .6 Environmental Protection Plan (EPP), review and implementation.
  - .7 Health and Safety Plan, review and implementation.
  - .8 Traffic Accommodation strategy, review and implementation.
  - .9 Quality Management Plan.
  - .10 Banff Area Work.

- .1 Bourgeau Lake
- .2 Cave and Basin
- .3 Cascade Ponds
- .4 Cascade Overflow
- .5 Lake Minnewanka
- .11 Lake Louise Area Work.
  - .1 Lake Louise Day Use Area
  - .2 Moraine Lake
- .12 Substantial Performance Inspection.
- .13 Demobilization.
- .14 Completion.

**1.8 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress.

**1.9 PROJECT MEETINGS**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 45 00 – Quality Control.

**1.2                REFERENCES**

- .1        Not Used.

**1.3                ADMINISTRATIVE**

- .1        Submit to Departmental Representative the submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in the stipulated timeframe below is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2        The Contractor should provide all submittals at-least five (5) days prior to any work that will involve the use of the information or material indicated in the submittal.
- .3        Do not proceed with Work affected by submittal until review is complete.
- .4        Present Shop Drawings, product data, samples and mock-ups in SI Metric units and as per Clause 1.4.
- .5        Where items or information is not produced in SI Metric units converted values are acceptable.
- .6        Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Shop Drawing is to be submitted under cover of a signed letter confirming that Drawings have been reviewed and approved by the Contractor. Submittals not submitted with a signed letter will be returned without being examined and considered rejected.
- .7        Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .8        Verify field measurements and affected adjacent Work are co-ordinated.
- .9        Contractor's responsibility for errors and omissions in submission is not relieved by the Departmental Representative's review of submittals.
- .10      Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Departmental Representative's review.
- .11      Keep one reviewed copy of each submission on site.

**1.4                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 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.
- .3 Allow five (5) days for Departmental Representative's review of each submission.
- .4 Adjustments made on Shop Drawings by the Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Departmental Representative prior to proceeding with Work.
- .5 Make changes in Shop Drawings as the Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .6 Accompany submissions with transmittal letter, 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.
- .7 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 Connections.
    - .5 Capacities.
    - .6 Performance characteristics.
    - .7 Standards.
    - .8 Operating weight.
    - .9 Wiring diagrams.
    - .10 Single line and schematic diagrams.

- .11 Relationship to adjacent work.
- .8 After Departmental Representative's review, distribute copies.
- .9 Submit electronic copy of Shop Drawings for each requirement requested in specification Sections and as the Departmental Representative may reasonably request.
- .10 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested Departmental Representative where Shop Drawings will not be prepared due to standardized manufacture of product.
- .11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within three (3) years of date of contract award for project.
- .12 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by the Departmental Representative.
  - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
  - .2 Certificates must be dated after award of project contract complete with project name.
- .13 Submit electronic copies of manufacturer's instructions for requirements requested in specification Sections and as requested by the Departmental Representative.
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .14 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by the Departmental Representative.
- .15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit 2 electronic copies of Operation and Maintenance Data for requirements stated in the technical specifications. Delete information not applicable to project.
- .17 Supplement standard information to provide details applicable to project.

## 1.5 REQUIRED CONTRACTOR SUBMITTALS

- .1 General
  - .1 This Clause identifies the plan, program, and documentation required prior to mobilization on site and during the construction phase.
- .2 Pre-Mobilization Submittals
  - .1 Submit the following plans and programs to the Departmental Representative for review a minimum of five (5) days prior to mobilization to the project site. The Contractor shall not begin any site Work until the Departmental Representative has authorized acceptance of the submittals in writing. The Contractor shall not construe the Departmental Representative's authorization of the submittals to imply approval of any particular method or sequence for conducting the Work, or for addressing health and safety or environmental concerns. Authorization of the programs shall not relieve the Contractor from the responsibility to conduct the Work in strict accordance with the requirements of Federal or Provincial regulations, this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor shall remain solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.
    - .1 Proof of Business License
    - .2 Construction schedule for all Work in accordance with Section 01 32 16.07 – Construction Progress schedule.
    - .3 Survey of all utilities in the work area via locates and hydrovac, especially ones near the proposed pit privy location, submitted to the Department Representative.
    - .4 Construction Staging Plan.
    - .5 Environmental Protection Plan in accordance with Section 01 35 43 – Environmental Procedures.
    - .6 Traffic Accommodation Strategy in accordance with the requirements identified in Section 01 11 00 – Summary of Work.
    - .7 Quality Management Plan in accordance with Section 01 45 00 – Quality Control.
    - .8 Health and Safety Plan in accordance with Section 01 35 29.06 Health and Safety Requirements.
    - .9 Submit site-specific Health and Safety Plan within seven (7) days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
      - .1 Results of site specific safety hazard assessment.
      - .2 Results of safety and health risk or hazard analysis for site tasks and operations found in the Work Plan.
    - .10 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to the Departmental Representative and the authority having jurisdiction weekly.

- .11 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .12 Submit copies of incident and accident reports.
- .13 Submit WHMIS Material Safety Data Sheets (MSDS) to the Departmental Representative.
- .14 The Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within two (2) days after receipt of plan. Revise plan as appropriate and resubmit plan to the Departmental Representative within two (2) days after receipt of comments from the Departmental Representative.
- .15 The Departmental Representative's review of the 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.
- .16 On site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
- .2 The Contractor shall not begin any Work until the Departmental Representative has authorized acceptance of the submittals in writing.
- .3 Construction Phase Submittals
  - .1 Weekly Progress Reports that outline the Work completed to date as well as the anticipated Work to be performed for the following week on a day-by-day basis.
  - .2 Manufacturers test data and certification for the electrical equipment.
  - .3 Manufacturers product data, specifications, and certification for all electrical equipment.
  - .4 Manufacturers product data, specifications, and certification for bollards, rubber median and delineator.
  - .5 Concrete mix design and trial mix test results.
- .4 Project Completion Submittals
  - .1 Record Drawings
  - .2 Quality Assurance/Quality Control Records.

## 1.6 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of digital photography in .jpg format, weekly with progress statement.
- .2 Project identification: name and number of project and date photograph taken indicated.
- .3 Frequency of photographic documentation: weekly.
  - .1 Prior to commencement of Work.
  - .2 Before concealment of Work.
  - .3 Upon completion of items in bid and acceptance form.
- .4 Submit 4 copies of CD with all electronic pictures as part of closeout package.

**1.7 CERTIFICATES AND TRANSCRIPTS**

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcript of insurance five (5) days after award of Contract.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



**Part 1            General**

**1.1            SECTION INCLUDES**

- .1        Health and safety considerations required to ensure that Parks Canada Agency (PCA) shows due diligence towards health and safety on construction sites.

**1.2            RELATED SECTION**

- .1        Section 01 33 00 – Submittal Procedures

**1.3            REFERENCES**

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

**1.4            SUBMITTALS**

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

**1.5            FILING OF NOTICE**

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

**1.6            SAFETY ASSESSMENT**

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

**1.7            MEETINGS**

- .1        Conduct weekly safety meetings at the beginning of each week to discuss the scheduled work for that week and the associated safety hazards.

**1.8            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.
- .2        The Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

**1.9            RESPONSIBILITY**

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

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

#### **1.10 COMPLIANCE REQUIREMENTS**

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

#### **1.11 EMERGENCY RESPONSE PLAN**

- .1 Prepare a plan to address any unforeseen or peculiar safety related factor, hazard, or condition occur during performance of Work. Advise the Departmental Representative immediately verbally and in writing.

#### **1.12 HEALTH AND SAFETY CO-ORDINATOR**

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
  - .1 Have minimum two (2) years' site related working experience specific to activities associated with parking lot expansion.
  - .2 Have a working knowledge of occupational safety and health regulations.
  - .3 Be responsible for completing Contractor's Health and Safety Training site orientation and ensuring that personnel on site have completed an orientation prior to completing Work.
  - .4 Be responsible for daily implementation, enforcement and monitoring of Contractor's site specific Health and Safety Plan.
  - .5 Be on site during execution of Work, report directly to and be under direction of the site supervisor.

#### **1.13 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Alberta OH & S Act and Regulations, and in consultation with the Departmental Representative.

#### **1.14 CORRECTION OF NON- COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by the Departmental Representative.
- .2 Provide the Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 The Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

#### **1.15 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**

.1                Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**Part 1           General**

**1.1           GENERAL**

- .1 All Contractor operations shall be performed in such a manner that no detritus from his operations shall enter any river, waterway, ditch, or wetland within Banff National Park.
- .2 If, in the opinion of the Departmental Representative or Parks Canada, full containment of Contractor's detritus is not being achieved, operations may be ordered halted until the situation is rectified.
  - .1 Contactor to adhere to requirements identified in the Parks Canada Basic Impact Analysis document provided as a reference document.

**1.2           NATIONAL PARK REGULATIONS**

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

**1.3           CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)**

- .1 Execution of the Work is subject to the provisions within the Canadian Environmental Assessment Act (CEAA) 2012 and subsequent amendments.
- .2 The Contractor is required to prepare an Environmental Protection Plan (EPP), which will include the topics in the following sub sections.
- .3 Failure to comply with or observe environmental protection measures as identified in these specifications may result in the Work being suspended pending rectification of the problems.
- .4 The Contractor shall notify the ESO (Environmental Surveillance Officer) and the Departmental Representative in a reasonably timely manner of any actual or potential environmental incidents or failure of protection measures.
- .5 The Contractor shall notify the ESO and the Departmental Representative immediately of any violations of environmental approvals, permits, authorizations or EPP measures.

**1.4           RELICS AND ANTIQUITIES**

- .1 Give immediate notice to Parks Canada if evidence of archaeological finds are encountered during construction, and wait for written instructions before proceeding with Work in this area.

- .2 Relics and antiquities and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found on the site shall remain the property of Parks Canada. Protect such articles and request directives from Parks Canada.
- .3 Provide forty-eight (48) hours notice to Parks Canada prior to commencing any work that may interfere with or affect any identified historical or archaeological site. Commence work only upon written instruction from Parks Canada.

## **1.5 WILDLIFE**

- .1 Avoid or terminate activities on site that attract or disturb wildlife.
- .2 Pets are not allowed on the work site, or in any administrative or laydown areas.
- .3 All personnel will be instructed by Parks Canada's ESO the procedures to follow in the event of wildlife appearance near or intrusion into the construction site. Personnel are not to attract or approach any wildlife seen near the site, and are to vacate their location in the event of aggressive behaviour or persistent intrusion by bears, cougars, wolves, elk or moose. The ESO and the Departmental Representative are to be notified about the circumstance immediately. The Banff Warden Services will be called to determine the course of action. The general presence of wildlife observed near the construction site, any carcasses or unusual wildlife observations shall be reported to the ESO and the Departmental Representative.

## **1.6 FIRE PROTECTION AND CONTROL**

- .1 A fire extinguisher will be carried and available for use on each machine in the event of fire (e.g. ignited by a spark) to prevent the fire from burning the unit or spreading to other fuels in the work area. Basic firefighting equipment – e.g., three (3) shovels, two (2) pulaskis, and two (2) 20 litre backpack pumps shall be maintained at the construction site at a location known and easily accessible to all the Contractor's staff. Contractor's staff shall receive basic training in early response to wildfire events during the "environmental briefing".
- .2 Machinery and equipment shall be operated in a manner and with all original manufacturers' safety devices to prevent ignition of flammable materials in the area.
- .3 No smoking is allowed on the construction site to ensure that accidental ignition of any flammable material is prevented. Fires or burning of waste materials are not permitted.
- .4 The Contractor shall maintain an awareness of the fire danger rating (Index) in the work area by contacting the Banff Fire Duty Officer. Fire prevention care is to be commensurate with the Fire Index.
- .5 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The ESO and the Departmental Representative shall be notified of any fire immediately.
- .6 Deliberately lighting of fires or burning of waste materials is strictly not permitted.

## **1.7 SITE ACCESS AND PARKING**

- .1 A plan detailing access to the construction site shall be prepared by the Contractor and included in the EPP. This includes access and facilities at the work sites and within the

work limits, including day-to-day entry/egress and plans for delivery and approach for large dimension materials will be anticipated and described. The access plan shall describe worker transportation to and from the construction site, and parking of workers' private vehicles. Specific details of any vehicles to transport workers to site or site equipment to be used on the trails are to be provided.

- .2 Restrict vehicle movements to work limits.
- .3 Do not park vehicles in areas beyond work limits, unless specifically authorized by the ESO and the Departmental Representative.
- .4 A construction office is anticipated for the parking lot contract. The construction office may be located at the campground area, actual location subject to the approval of the Departmental Representative and ESO. It is anticipated the construction office may comprise the Contractor's main office, a materials testing trailer and ESO trailer and toilets.
- .5 As an alternative to the above mentioned locations, a Contractor's office and work headquarters may be established at another location at the discretion of Parks Canada. The Contractor shall prepare a plan regarding structures, equipment, waste materials management, water, power and sewage services, materials lay-down area, fuel storage, operations, etc. required at this location. The plan will be subject to review and approval by the Departmental Representative. This site may be shared with other Contractors.
- .6 A workers' accommodation camp will not be permitted.

## **1.8 DRAINAGE**

- .1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .3 Prior to directing stored water off site, obtain approval from Departmental Representative and ESO.
- .4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

## **1.9 SITE CLEARING AND PLANT PROTECTION**

- .1 Vegetation Clearing:
  - .1 Protect trees and plants on site and adjacent properties as shown in the Drawings.
  - .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
  - .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
  - .4 Avoid unnecessary traffic, dumping and storage of materials over root zones.
  - .5 Minimize stripping of topsoil and vegetation.

- .6 Restrict tree removal to areas indicated in contract documents.
  - .7 Tree and vegetation clearing must occur outside of Environment Canada's restricted timing windows for migratory breeding birds, outside of May 1 to July 31.
  - .8 If any vegetation clearing is proposed between May 1 and July 31, nest sweeps must be conducted seven to ten (7-10) days prior to clearing and grubbing activities.
  - .9 If any nest or dens are discovered during work, the area must be flagged and work temporarily ceased until Departmental Representative has taken appropriate action.
  - .10 All works shall be undertaken in a manner that prevents the introduction or minimizes the spread of invasive alien species and noxious weeds.
- .2 Soil Stripping
- .1 Soil horizons must be excavated and stored separately. Organics and topsoil should be salvaged and replaced in the reverse order of excavation over mineral soils during re-contouring activities, wherever possible.
  - .2 Soils must be stored in separate piles on an impervious surface within temporary workspaces approved by the Departmental Representative. If soil storage is required for an extended period (greater than seven (7) days) or if heavy rain or wind is forecast, soil piles must be covered to reduce erosion loss.

#### **1.10 POLLUTION CONTROL**

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment in accordance with local authorities' emission requirements.
- .3 Spills or releases of hazardous materials or deleterious substances that may cause damage to the environment or human health shall be immediately reported to Parks Canada and, if required, to the Provincial authority.
- .4 The Contractor shall take all reasonable measures to contain all spills. The Contractor shall contain, collect and dispose of spilled products at their expense.
- .5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .6 All equipment must be properly maintained, in sound mechanical condition and free of any fuel, oil, and hydraulic fluid or coolant leaks.
- .7 Equipment must be free of external grease, loose dirt or oil and the machinery must be pressure washed prior to the start of the project.
- .8 All machinery must be equipped with emergency spill kits large enough to contain 110% of any possible spills or leaks of oil, fuel, hydraulic fluid or coolant during the project.
- .9 The operators of the equipment must be familiar with how to properly use the spill kits in the event of an emergency.
- .10 Fuel, oils, lubricants, chemicals, and any potentially hazardous material must not be dispelled into the environment.

- .11 Machinery and vehicles must keep to roads, trails, or designated temporary workspaces and turnaround points. The Departmental Representative will identify approved off-road workspaces.
- .12 Rutting and/or compaction of ground surfaces should be avoided as much as possible by keeping to designated work areas and away from wet locations.
- .13 All areas with rutting damage or noticeable compaction from heavy equipment must be re-graded and back-filled if necessary.
- .14 Any holes or depressions caused by site preparation or construction will be back-filled and compacted to an appropriate degree.

#### **1.11 CONTRACTOR'S OPERATIONS**

- .1 Confine all operations to the work limits as staked or designated by the Departmental Representative. No activities of any kind may be carried out beyond those work limits without the written permission of the Departmental Representative.
- .2 Do not store or stockpile construction materials in the trees bordering or being preserved on site. Do not unreasonably encumber the site with products.
- .3 Provide sufficient sanitary facilities and maintain in a clean condition.
- .4 Conduct operations at all times in such a manner as to preserve the natural features and vegetation in the area. Cut and fill slopes shall be blended with adjoining topography. Material from fill slopes shall not be permitted to slough or roll into surrounding tree cover or to bury any plant material designated to be retained.
- .5 When in the opinion of Parks Canada, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the staked or designated work area, the Contractor shall be responsible, at his expense, for complete restoration including the replacement of trees, shrubs, topsoil, grass, etc. to the satisfaction of Parks Canada.
- .6 Failure to comply with or observe environmental protection requirements as identified in these specifications may result in work being suspended pending rectification of the problems and operators of equipment being charged under the National Park Act.

#### **1.12 START- UP AND ENVIRONMENTAL BRIEFING**

- .1 All staff employed at the construction site shall attend an orientation conducted by the Contractor regarding their individual and collective responsibilities, to ensure avoidable adverse environmental impact does not arise from their activities and personal choices. Employees must attend this briefing before beginning their work at the site. Each employee, having received the environmental briefing, will be issued a certification sticker to be displayed on their helmet. Employees of other service and materials providers who attend at the site – e.g., concrete truck operators, crane operators, and truck drivers must be apprised of their duty not to cause adverse environmental impact.
- .2 Parks Canada will have an ESO attending the site to monitor the construction activity for conformance with the EPP. The ESO or alternate designated Parks Canada staff member will present the "environmental briefing". The ESO's main duties are to monitor the progress of the construction on an on-going basis to ensure compliance with environmental protection measures, and to provide guidance through the Departmental



Representative, in the event of unanticipated environmental problems. Although the ESO has authority to enforce National Parks Act violations, direction to the Contractor will be the duty of the Departmental Representative.

### **1.13 HAZARDOUS PRODUCTS AND MATERIALS**

- .1 A list of products and materials to be used or brought to the construction site that are considered or defined as hazardous to the environment shall be presented in the EPP. Such products include, but are not limited to; grout, fuel, concrete finishing agents, paint, etc. A plan detailing the containment and storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the application of these products shall be presented in the EPP.
- .2 Hazardous products shall be stored no closer than 100 m from any waterway.
- .3 MSDS sheets for hazardous material are to be provided in a location accessible to all workers.

### **1.14 EQUIPMENT FUELLING AND MAINTENANCE**

- .1 A fuel delivery, storage and distribution plan shall be submitted. Topics to be addressed in the EPP will include, but not necessarily be limited to:
  - .1 Diesel and gasoline supply vehicles, including bulk tankers shall be parked more than 100 m from rivers.
  - .2 Fuel tanks with manual or electric pump delivery systems shall be used, gravity feed is not allowed.
  - .3 Fuelling personnel shall maintain immediate attention to and presence at the fuelling operation.
  - .4 Fuelling sites will be identified by the Contractor in the EPP.
  - .5 Lubricant changes and minor repairs shall be conducted at a location identified by the Contractor in consultation with the ESO. Waste lubricants, used filters and other waste maintenance products shall be removed from Banff National Park to recycling or certified disposal sites.
  - .6 Equipment shall be inspected daily for fluid/fuel leaks and maintained in good working order.
  - .7 Equipment to be used on the project site shall be thoroughly cleaned of soil, seeds and any debris or external contaminants outside the national park before delivery to the work site.

## **1.15 WASTE MATERIAL STORAGE AND REMOVAL**

- .1 The Contractor shall prepare a Construction and Waste management plan as a part of the EPP. The Plan shall include the following basic principle:
  - .1 Waste reduction which follows the 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
  - .2 Wastes generated at the construction site are to be contained and removed in a timely and approved manner. The EPP shall detail the waste management procedures, including the following:
    - .1 Describe the management of waste.
    - .2 Construction wastes shall be stored in containers at an approved location and removed promptly when the containers are 90% full.
    - .3 A concerted effort to reduce, reuse and recycle materials is expected.
    - .4 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
    - .5 Provide containers to deposit recyclable materials.
    - .6 Transport all recyclable materials to an approved recycling facility off site.
    - .7 Waste materials are to be disposed at a certified construction waste landfill outside Banff National Park. No burying, burning or discarding of waste materials will be permitted at the construction site, or elsewhere in Banff National Parks.
    - .8 No materials attractive to wildlife are to be stored at the site overnight – daily removal is mandatory. Human food products are to be contained in a manner so as not to attract animals and waste food stuffs are to be removed from the construction site every day.
    - .9 Portable container toilets are to be provided in sufficient numbers and locations to ensure convenient usage including frequency of pump out.
  - .3 All garbage must be stored and handled in conformance with the National Parks' Garbage Regulations.
  - .4 No food, domestic garbage or hazardous wastes may be deposited in the trade waste site.
  - .5 Dispose of all hazardous wastes in conformance with the Environmental Contaminates Act and applicable provincial regulations while observing the Code of Good Practice for Management of Hazardous and Toxic Wastes at Federal Establishments.
  - .6 Provide bear proof garbage containers on-site for domestic garbage generated on-site by Contractor's personnel and make arrangement for collection and disposal on a daily basis or when directed by the Departmental Representative.
  - .7 Maintain the site in a tidy condition, free from the accumulation of waste products, debris and litter.
  - .8 Do not dispose of or allow dispersing waste or volatile materials such as mineral spirits, oil or paint thinners or other hazardous wastes into waterways. Provide clean- up equipment and adequate supply of absorbent material on-site.

**1.16 NOTIFICATION**

- .1 Parks Canada representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Parks Canada Representative and Departmental Representative of proposed corrective action and take such action for approval by Parks Canada Representative.
  - .1 Take action only after receipt of written approval by Parks Canada representative.
- .3 Parks Canada representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 CLEANING**

- .1 Leave Work area clean at end of each day as per Section 01 74 11 – Cleaning.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment from the work site.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 11 00 – Summary of Work.

**1.2                REFERENCES AND CODES**

- .1            Perform Work in accordance with Contract Documents, National Building Code of Canada (NBC) 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.

**1.3                CANADIAN ENVIRONMENTAL PROTECTION ACT**

- .1            Perform Work in accordance with Canadian Environmental Protection Act.

**1.4                NATIONAL PARKS ACT**

- .1            Perform Work in accordance with Canada National Parks Act and Regulations.

**Part 2            Products**

**2.1                NOT USED**

- .1            Not Used.

**Part 3            Execution**

**3.1                NOT USED**

- .1            Not Used.

**END OF SECTION**

**Part 1           General**

**1.1           DEFINITIONS**

- .1   Quality Control (QC): The process of checking specific product or services to determine if they comply with relevant quality standards and identify ways to eliminate causes of unsatisfactory product or service performed.
- .2   Quality Assurance (QA): The process of ensuring that the Contractor's Quality Management Plan (QMP) (QC, non-conformances, etc.) is being followed. The results of the QA are provided as feedback to both the Contractor and the Departmental Representative. Where required, the Contractor shall implement changes to the project based on the feedback received from the QA process.

**1.2           QUALITY MANAGEMENT PROGRAM**

- .1   The Contractor shall prepare a Quality Management Program. The purpose of the program shall be to ensure the performance of the Work in accordance with Contract requirements.
- .2   The Quality Management Program shall be described in a Quality Management Plan. The Contractor shall submit the Quality Management Plan to the Departmental Representative for acceptance in accordance with Section 01 33 00 - Submittal Procedures. The Plan shall develop a logical system for tracking and documenting the Quality Control of the Work as well as the Contractor's internal Quality Assurance procedures to verify the compliance of the Quality Control process. A systematic format and a set of procedures patterned on a recognized Quality Control Standard will be acceptable, subject to review by the Departmental Representative.
- .3   The Quality Management Plan shall at a minimum include the following information:
  - .1   Distribution list, providing a list of names to whom the Manual shall be distributed.
  - .2   Title page, identifying the Contract, Contractor and copy number.
  - .3   Revision page, identifying the revision number and date of the Manual.
  - .4   Table of Contents.
  - .5   Revision control, tabulating the revision number, date of revision, description of revisions and authorized signature.
  - .6   Details of measuring and test equipment including methods and frequency of calibration.
  - .7   Purchasing details of all materials and equipment including procurement documents and vendor's Quality Control Program standards.
  - .8   Procedures for inspection of incoming items, in-process inspection and final inspection and tagging of all supply items.
  - .9   Details of special processes as identified by the Departmental Representative, including qualifications of personnel and certification.
  - .10   Procedures for shipping, packaging and storage of materials.

- .11 Procedures for maintaining quality records and Statements of Compliance, including filing and storage of documents for a period of one year after Completion of the Works.
  - .12 Details of any non-conformance, including identification and recording of deficiencies, tagging procedures for "HOLD" or "REJECT" items, and final disposition of non-conformance forms by the Quality Control Manager.
  - .13 Inspection and test checklists, including tabulated checklists describing all manufacturing and delivery activities such as Inspection or Test, frequency of tests, description of tests, acceptance criteria of tests, such as verification, witnessing or holding tests and sign-off by the Quality Control Manager and the Quality Assurance Manager, if the Quality Assurance Manager witnesses the tests.
  - .14 Forms used to ensure the application of the inspection and test checklist requirements. These forms shall be identified in the checklists and describe all testing requirements for Specification compliance.
  - .15 Details of the Quality Assurance Program including the Contractor's procedures to verify the compliance to the Quality Control process of on-site work and off-site work by fabricators.
- .4 The Contractor shall appoint qualified and experienced Quality Control Personnel, who is dedicated to quality matters and who will report regularly to the Quality Control Manager as well as Contractor's management at a level which shall ensure that Quality Control requirements are not to be subordinated to manufacturing, construction or delivery. The Quality Control Personnel shall be empowered by the Contractor to resolve quality matters. Personnel involved in Quality Assurance shall be independent of the Quality Control Process.
  - .5 The Quality Management Plan shall include samples of all forms to be filled in by the Quality Control Personnel. All forms shall be signed by the Quality Control Manager and submitted promptly to the Departmental Representative.
  - .6 An independent check of all Work shall be performed by the Contractor. The Contractor shall appoint Quality Control Inspectors to ensure compliance of products and workmanship with Contract requirements. Quality Assurance Inspectors retained by the Departmental Representative, will periodically (at the completion of sub grade preparation, granular base course placement, concrete delivery on site and asphalt paving) perform a second independent check to assess if the Quality Control process is being followed.
  - .7 The Contractor must facilitate any independent Quality Assurance checks by representatives designated by the Departmental Representative.
  - .8 At completion of the Work a bound and itemized copy of all Quality Control and Quality Assurance documents and reports shall be prepared by the Contractor's Quality Control Manager and submitted to the Departmental Representative.

### 1.3 TESTING

- .1 Testing required to provide Quality Control to assure that the Work strictly complies with the Contract requirements shall include, not be limited to:
  - .1 Testing of all structural concrete, granular material and compaction, and all source acceptance testing.
  - .2 All testing specified in the Contract Documents; and
  - .3 Any other testing required as a condition for deviation from the specified Contract procedures.
- .2 The quality control testing proposed and testing frequency shall at a minimum, achieve the requirements of the following:
  - .1 Wherever these standard specifications refer to standards (e.g. CSA, ASTM, and others) the minimum testing frequencies in these standards shall be utilized.
  - .2 The Contractor and its independent Quality Assurance testing agency that will carry out the testing must satisfy themselves that the test frequencies being completed are sufficient to ensure the quality requirements of the QMP.
- .3 The Contractor shall be fully responsible and bear all costs for all quality control testing and shall conduct such testing in the following manner:
  - .1 Provide testing facilities and personnel for the tests and inform the Departmental Representative in advance to enable the Departmental Representative to witness the tests if it so desired;
  - .2 Notify the Departmental Representative when sampling will be conducted;
  - .3 Within one day after completion of testing, submit test results to the Departmental Representative; and
  - .4 Identify test reports with the name and address of the organization performing all tests, and the date of the tests.
- .4 Approval of tested samples will be for characteristics or use named in such approval and shall not change or modify any Contract requirements.
- .5 Quality Assurance testing will be undertaken by the Departmental Representative through an independent CSA certified testing firm. The independent testing firm will complete random sampling, inspection, and testing for the purposes of determining the compliance with specifications and other contract documents. The frequency, location of the inspections, sampling, and tests shall be at the end of the subgrade preparation work, granular base course placement, asphalt paving and concrete placement.
- .6 The Contractor shall be responsible for third party testing of materials incorporated into the works.
- .7 The Departmental Representative may perform quality audits as desired. Such audits will not relax the responsibility of the contractor to perform work in accordance with Specifications. To facilitate this work the contractor shall:
  - .1 Notify appropriate agency and Departmental Representative in advance of work which the Departmental Representative may want to test.

- .2 Submit samples and/or materials required for testing. As specifically requested in the Specifications or as requested by the Departmental Representative. Submit within 2 days so as not to cause delay in the work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site.

#### **1.4 INSPECTION**

- .1 Refer to GC 2.5 – Review and Inspection of Work.
- .2 Further to GC 2.5, the Contractor should notify the Departmental Representative 72 hours prior to any special tests or inspections required.

#### **1.5 INDEPENDENT INSPECTION AGENCIES**

- .1 Independent Inspection/Testing Agency will be engaged by the Department Representative for purpose of inspecting and/or testing of backfill compaction, granular base construction and asphalt placement.
- .2 Cost of the independent testing will be borne by the Departmental Representative.
- .3 The Contractor shall assist the inspector or testing agency in carrying out their duties.
- .4 Employment of inspection/testing agencies by the Owner does not relax responsibility to perform Work in accordance with Contract Documents.
- .5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Owner. Contractor shall cover the costs for retesting and re-inspection.

#### **1.6 ACCESS TO WORK**

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

#### **1.7 PROCEDURES**

- .1 Notify appropriate agency and Departmental Representative seventy-two (72) hours 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.



**1.8 REJECTED WORK**

- .1 Any instances of unacceptable work discovered by either the Quality Control or Quality Assurance personnel will require the preparation of a non-conformance report (NCR).
- .2 If instances of unacceptable work are discovered by the Departmental Representative, the Departmental Representative may issue a non-conformance report (NCR).
- .3 The Contractor shall expediently correct any non-conformances, whether the result of poor workmanship, use of defective products or damage; and whether incorporated in the Work on not, the Contractor shall replace or re-execute in accordance with the Contract Documents.
- .4 Payment for the work itself may be withheld until the NCR issue has been resolved to the satisfaction of the Departmental Representative.
- .5 If in opinion of the Departmental Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price the difference in value between Work performed and that called for by Contract Documents, the amount of which will be determined by the Department Representative.

**1.9 REPORTS**

- .1 Submit one (1) electronic copy of all inspection and test reports to the Departmental Representative.
- .2 Submit to the Departmental Representative one paper copy and one electronic copy of all Non-Conformance Reports.
- .3 Provide copies to subcontractor of work being inspected or tested.

**1.10 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as specified in Section 01 33 00.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 11 00 – Summary of Work.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.3                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 within the Work limits defined on the drawings.
- .2            Identify areas which have to be gravelled to prevent tracking of mud.
- .3            Indicate use of supplemental or other staging area.
- .4            Provide construction facilities in order to execute Work expeditiously.
- .5            Remove from site all such Work after use.

**1.4                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.

**1.5                CONSTRUCTION PARKING**

- .1            Parking is only permitted in the designated work area specified.
- .2            Provide and maintain adequate access to project site.

**1.6                SECURITY**

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

**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 CLEAN-UP**

- .1 Clean up to be in accordance with Section 01 74 11 – Cleaning.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 11 00 – Summary of Work.

**1.2                INSTALLATION AND REMOVAL**

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

**1.3                HOARDING**

- .1            The Contractor shall erect 1.2 m high temporary site enclosure. Provide one lockable truck gate. Maintain fence in good repair.
- .2            Paint public side of site enclosure in selected colours with one coat primer to CAN/CGSB 1.189 and one coat exterior paint to CGSB 1.59. Maintain public side of enclosure in clean condition.
- .3            Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

**1.4                GUARD RAILS AND BARRICADES**

- .1            Provide secure, rigid guard rails and barricades around deep excavations, and trenches.
- .2            Provide as required by governing authorities.

**1.5                ACCESS TO SITE**

- .1            Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

**1.6                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.

**1.7                FIRE ROUTES**

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

**1.8                PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

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

**1.9                PROTECTION OF BUILDING FINISHES**

- .1            Provide protection for finished building finishes and equipment during performance of Work.

- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Departmental Representative locations and installation schedule seven (7) days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1      Section 01 45 00 - Quality Management.
- .2      All Technical Specification sections.

**1.2                REFERENCES**

- .1      Within text of each specifications section, reference may be made to reference standards.
- .2      Conform to these reference standards, in whole or in part, as specifically requested in the specifications.
- .3      If there is question as to whether products or systems are in conformance with applicable standards, the Departmental Representative reserves the right to have such products or systems tested to prove or disprove conformance.
- .4      Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date or issue is specifically noted.
- .5      Cost for such testing will be borne by the Owner in the event of conformance with Contract Documents or by the Contractor in event of non-conformance.

**1.3                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 the Departmental Representative based upon requirements of Contract Documents.
- .5      Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout the project.

#### **1.4 AVAILABILITY**

- .1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work. In accordance with Section 01 33 00 – Submittal Procedures, submit all required documentation at least two weeks before product use. If more than two weeks is required due to product delay, notify the Departmental Representative immediately.

#### **1.5 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in a manner to prevent damage, adulteration, deterioration and soiling, and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber and miscellaneous metals on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store coating materials (paint) shall be stored in a clean, dry, well-ventilated area, protected from sparks, flame, direct rays of the sun and extreme heat or cold. If stored on a concrete floor the material shall be elevated (e.g. on a pallet) while being stored. Storage conditions shall meet requirements of the Supplier product data sheet.
- .8 Remove and replace damaged products at own expense and to satisfaction of the Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to the Departmental Representative's satisfaction. Use touch-up materials to match original.

#### **1.6 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by the Departmental Representative. Unload, handle and store such products.

#### **1.7 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify the Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that the Departmental Representative may establish a course of action.

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

## **1.8 QUALITY OF WORK**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify the Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. The Departmental Representative reserves the 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 the Departmental Representative, whose decision is final.

## **1.9 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

## **1.10 CONCEALMENT**

- .1 The Departmental Representative will inspect all Work prior to any concrete pours or backfilling. The Contractor shall notify the Departmental Representative 24 hours before any pour or backfilling operation for inspection.
- .2 Concealment of Work that has not been inspected shall be considered just cause for rejection of said Work.

## **1.11 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.

## **1.12 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.



- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

**1.13 FASTENINGS - EQUIPMENT**

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

**1.14 PROTECTION OF WORK IN PROGRESS**

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

**1.15 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and 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 Alternate Proposed Products**

- .1 Product Data Sheets and MSDS for all alternate proposed products shall be provided to Departmental Representative for approval a minimum of one (1) week prior to intended use.

**Part 3 Execution**

**3.1 NOT USED**

- .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, including that caused by Owner or other Contractors.
- .2      Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the Departmental Representative. Do not burn waste materials on site.
- .3      Clear snow and ice from access to site.
- .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      Provide and use marked separate bins for recycling.
- .7      Dispose of waste materials and debris off site.
- .8      Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9      Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10     Provide adequate ventilation during use of volatile or noxious substances.
- .11     Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

**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 other than that caused by others, and leave Work clean and suitable for occupancy.
- .3      Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4      Remove waste products and debris including that caused by Owner or other Contractors. Obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5      Remove waste materials from site at regularly scheduled times or dispose of as directed by the Departmental Representative. Do not burn waste materials on site.
- .6      Inspect finishes and ensure specified workmanship and operation.
- .7      Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .8      Remove dirt from exterior surfaces.
- .9      Sweep and wash clean finished overlay surface and paved areas within the work site.
- .10     Clean drainage systems.

- .11 Remove debris and surplus materials from site.
- .12 Remove snow and ice from access to site.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        Section 01 78 00 – Closeout Submittals.

**1.2                ADMINISTRATIVE REQUIREMENTS**

- .1        Acceptance of Work Procedures:
- .2        Substantial Performance Inspection:
  - .1        Notify the Departmental Representative in writing when Work is considered ready for Substantial Performance and request the Departmental Representative’s inspection.
  - .2        Accompany the Departmental Representative on preliminary inspection to determine items listed for completion or correction.
  - .3        Comply with the Departmental Representative’s instructions for correction of items of Work listed in executed certificate of Substantial Performance and those determined in the final inspection.
  - .4        Notify the Departmental Representative of completion of items of Work listed in executed certificate of Substantial Performance and those determined in the final inspection.
- .3        Completion Tasks: submit certificates that tasks have been performed as follows:
  - .1        Work: completed and inspected for compliance with Contract Documents.
  - .2        Defects: corrected and deficiencies have been completed.
  - .3        Work: complete and ready for final inspection.
- .4        Final Inspection:
  - .1        When Completion Tasks noted above have been completed, request final inspection of Work by the Departmental Representative and Contractor. If Work is deemed incomplete by the Departmental Representative, complete outstanding items and request re-inspection.

**1.3                FINAL CLEANING**

- .1        Undertake a final cleaning in accordance with Section 01 74 11.

**Part 2            Products**

**2.1                NOT USED**

- .1        Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        Section 01 77 00 – Closeout Procedures.

**1.2                RECORD DOCUMENTS AND SAMPLES**

- .1        Maintain, in addition to requirements in General Conditions, at site for the Departmental 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 on site.
- .3        Label record documents and samples on site apart from documents used for construction.
  - .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.
- .5        Keep record documents and samples available for inspection by the Departmental Representative.

**1.3                RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**

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

- .5 Other Documents: maintain manufacturer's certifications, inspection certifications, and field test records required by individual specifications sections.
- .6 Provide digital photos, if requested, for site records.
- .7 The Contractor shall provide as built drawings to Departmental Representative at project completion.

**1.4 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Warranty management plan to include required actions and documents to assure that the Departmental Representative receives warranties to which it is entitled.
- .3 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .4 Submit, warranty information made available during construction phase, to the Departmental Representative for approval prior to each monthly pay estimate.
- .5 Assemble approved information in binder, submit upon acceptance of work and organize binder as follow:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier, and manufacturer, with name, address, telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
  - .4 Verify that documents are in proper form, contain full information and are notarized.
  - .5 Co-execute submittals when required.
  - .6 Retain warranties and bonds until time specified for submittal.
- .6 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .7 Respond in timely manner to oral or written notification of required construction warranty repair work.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

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<b>Part 3</b>	<b>Execution</b>
<b>3.1</b>	<b>NOT USED</b>
.1	Not Used.

**END OF SECTION**



**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        This section of the specifications forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

**1.2                REFERENCES**

- .1        ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.
- .2        ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3        ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
- .4        ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .5        CGSB 51-GP-51M, Polyethylene Sheet for Use in Building Construction.
- .6        CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .7        CSA-A23.2, Methods of Test for Concrete.
- .8        CAN/CSA-A5, Portland Cement.
- .9        CAN/CSA A3001, Cementitious Materials for Use in Concrete.

**1.3                CERTIFICATES**

- .1        Minimum four (4) weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that the following materials will meet specified requirements:
  - .1        Portland cement.
  - .2        Supplementary cementing materials.
  - .3        Admixtures.
  - .4        Aggregates.
  - .5        Water.
- .2        Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1.
- .3        Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA-A23.1 and that mix design is adjusted to prevent alkali aggregate reactivity problems.
- .4        Provide results of a current, applicable petrographic examination of proposed aggregates in accordance with ASTM C295.

- .5 Submit mix designs and aggregate tests for Departmental Representative's review, minimum of four (4) weeks prior to starting concrete work. The Departmental Representative's review of mix designs is for general conformance with specified requirements only, and in no way mitigates the Contractor's obligation to provide concrete suitable for placing in the locations shown and meeting all specified requirements.

#### **1.4 CONSTRUCTION QUALITY CONTROL**

- .1 Submit proposed quality control procedures for Departmental Representative's approval.

### **Part 2 Products**

#### **2.1 MATERIALS**

- .1 Portland cement: to CAN/CSA3001.
- .2 Supplementary cementing materials: to CAN/CSA-A3001.
- .3 Water: to CSA-A23.1.
- .4 Aggregates: to CSA-A23.1. Coarse aggregates to be normal density.
- .5 Air entraining admixture: to ASTM C260.
- .6 Chemical admixtures: to ASTM C494/C494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
  - .1 Compressive strength: 30 MPa at twenty-eight (28) days.
- .8 Curing compound: to CSA-A23.1 and to ASTM C309, Type 1-chlorinated rubber.
- .9 Premoulded joint fillers:
  - .1 Sponge rubber: to ASTM D1752 (except for density), Type I, firm grade.
- .10 Polyethylene film 0.15 mm: to CGSB 51-GP-51M.
- .11 Pressure injected epoxy grout: submit product information for approval.
- .12 Bonding agent: sand-cement slurry to CSA A23.1.
- .13 Use of calcium chloride not permitted.
- .14 Separation board: asphalt impregnated fibre board.
- .15 Waterproof grout and chemical waterproofing. Waterproofing compound, consisting of a patented formula of chemicals, cement and special treated quartz which waterproofs by crystalline growth through the capillary voids in the concrete – KRYSTOL, XYPEX, PERMAQUICK or approved alternative.

**2.2 CONCRETE MIXES**

.1 Use the following criteria for concrete mix designs for application indicated:

Mix	Application
M1	Footings and Pole Bases

.2 Proportion normal density concrete in accordance with CSA-A23.1 Alternative 1 (Performance), to give following properties:

Mix	M1
CSA Exposure Class	C-1 S-2
Minimum Specified Strength (MPa)	35
Age (days) for Specified Strength	56
Maximum W/CM Ratio	0.40
Maximum Aggregate Size	20
Exposure to Sulphate Attack	Y
Alkali Aggregate Reactivity Addressed (Y/N)	Y
Aggressive Chemical/Waste/Other	N
Air Content Category	1
Curing	2
Color (Y/N)	Y
<b>Materials</b>	
SCM Usage (Y/N)	Y
Fly Ash Class (30% maximum)	F or CI

Table Notes:

- .1 As per mix design for the strength required
- .3 Maximum slump at time and point of discharge:
  - .1 Footings, foundations, slabs-on-grade - 60 mm.
  - .2 If superplasticizers are used to assist concrete placement, the noted slumps are prior to the addition of the superplasticizers. The slump following addition of the superplasticizer to be less than 120 mm.
- .4 Volume stability to be considered in mix proportions to prevent creep and shrinkage in accordance with C1.4.1.1.9 and C1.4.3.6 of CSA A.23.1.

- .5 Do not change concrete mix without prior approval of Departmental Representative. Should change in materials source be proposed, the new mix design is to be approved by Engineer.
- .6 Mix design to minimize shrinkage and to maximize water-tightness.
- .7 Temperature of the concrete during discharge into the forms is to be between 10°C and 20°C. The temperature of the mix is to be maintained below 20°C maximum temperature. Typical methods of reducing mix temperature include evaporative cooling of aggregate stockpiles, use chilled batch water or the inclusion of ice to the mix at the plant, taking care to maintain the design water/cementing material ratio. Obtain Engineer's approval of proposed method of temperature control.

### **Part 3 Execution**

#### **3.1 GENERAL**

- .1 Do cast-in-place concrete work in accordance with CSA-A23.1.

#### **3.2 WORKMANSHIP**

- .1 Obtain Departmental Representative's approval before placing concrete. Provide twenty-four (24) hr notice prior to placing of concrete.
- .2 Pumping of concrete is permitted (see 2.2.1.7).
- .3 Ensure reinforcement, spacers and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
- .5 Do not place fresh concrete against any surfaces that have a surface temperature of less than 0°C.
- .6 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .7 Do not place load upon new concrete until authorized by Departmental Representative.
- .8 All concrete is to be consolidated using internal vibrators. Use pencil vibrators where larger sizes would be unsuitable.
- .9 Anchor bolts:
  - .1 Place anchor bolts to templates under supervision of trade supplying anchors, prior to placing concrete.

#### **3.3 PLACING GROUT**

- .1 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

### **3.4 FINISHING**

- .1 Finish concrete in accordance with CSA-A23.1.
- .2 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated. All concrete edges are to be made true and smooth with no sharp corners.
- .3 Exposed exterior concrete surfaces are to have a smooth form finish. Unexposed concrete surfaces are to have a plain, smooth form finish except those specified as having sandblasted finish. Sandblasted finish to be approved by Departmental Representative.
- .4 Finish all formed concrete in contact with backfill with a rough form finish.
- .5 All tie recesses are to be grouted with waterproof grout.
- .6 Where honeycomb areas, cold joints, inclusions or other areas of imperfections are discovered, cut off affected area and patch with waterproof grout, or as approved by Departmental Representative.
- .7 Use procedures acceptable to Engineer or those noted in CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.
- .8 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.

### **3.5 CURING**

- .1 In accordance with CSA-A23.1.

### **3.6 HOT WEATHER CONCRETING**

- .1 Hot weather concreting procedures to be followed when ambient air temperature exceeds 20°C during the placing period.
- .2 Temperature of concrete placed during hot weather not to exceed the limits specified in Paragraph 2.2.7.

### **3.7 CRACK REPAIR**

- .1 Utilize the best possible care and construction techniques to minimize cracking of concrete slabs.
- .2 Cracks which do appear shall be routed out on each face and repaired with water proof grout or epoxy in accordance with manufacturer's recommendations, except that cracks which are in excess of 0.50 mm width, or deemed by the Departmental Representative to be structurally detrimental, or subject to movement shall be epoxy grouted.
- .3 Obtain approval from Departmental Representative of pressure grouting techniques and epoxy materials to be utilized prior to proceeding with the work.
- .4 Depth of epoxy grouting shall be sufficient to restore structural integrity as required, but shall not be less than 100 mm.
- .5 Cure crack repairs to manufacturer's instructions.

### **3.8 FIELD QUALITY CONTROL**

- .1 Inspection and testing of concrete and concrete materials will be carried out by a testing laboratory under the Contractor, designated by Departmental Representative in

- accordance with CSA-A23.1. The testing is to be arranged and managed by the Contractor.
- .2 Take concrete samples for testing in accordance with CSA A23.2. One (1) strength test shall consist of a minimum of four (4) test cylinders for each site, or portions of each mix type of concrete or each separate type of structural element in any one (1) day's pour. For concrete with specified twenty-eight (28) day strength, strength test shall consist of minimum three (3) test cylinders. Test first cylinder at seven (7) days and remaining two (2) at twenty-eight (28) days.
  - .3 The Contractor will take additional test cylinders during cold weather concreting if required. Cure such cylinders on job site under same conditions as concrete which they represent.
  - .4 Nondestructive Methods for Testing Concrete shall be in accordance with CSA-A23.2. Make good concrete surfaces after completion of tests.
  - .5 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

**END OF SECTION**

## **1 General**

### **1.1 REFERENCES**

- .1 CSA C22.2

## **2 Products**

### **2.1 EQUIPMENT**

- .1 Clamps for grounding of conductor: size as indicated on drawing to electrically conductive underground water pipe.
- .2 Copper conductor: minimum 6m long for each concrete encased electrode, bare, stranded, tinned, soft annealed, size as indicated.
- .3 Rod electrodes: copper 19 mm dia by 3m long.
- .4 Plate electrodes copper, surface area 0.2 m<sup>2</sup>, 1.6 mm thick.
- .5 Grounding conductors: bare stranded copper, soft annealed, size as indicated.
- .6 Insulated grounding conductors: green, type.
- .7 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.
- .8 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
  - .1 Grounding and bonding bushings.
  - .2 Protective type clamps.
  - .3 Bolted type conductor connectors.
  - .4 Thermit welded type conductor connectors.
  - .5 Bonding jumpers, straps.
  - .6 Pressure wire connectors.
- .9 Oxide inhibitor joint sealant shall be used for all copper crimp connections after the compression.
  - .1 Deox Oxide Inhibitor or equivalent.

### **3 Execution**

#### **3.1 INSTALLATION GENERAL**

- .1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Make buried connections, and connections to conductive water main, electrodes, using permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE837.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.
- .7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- .9 Connect building structural steel and metal siding to ground by welding copper to steel.
- .10 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
- .11 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.
- .12 Ground secondary service pedestals.
- .13 Coat all joints with oxide inhibitor.

#### **3.2 ELECTRODES**

- .1 Make ground connections to continuously conductive underground water pipe on street side of water meter.
- .2 Install water meter shunt.



- .3 Install concrete encased electrodes in building foundation footings, with terminal connected to grounding network.
- .4 Install rod, plate electrodes and make grounding connections.
- .5 Bond separate, multiple electrodes together.
- .6 Use size 2/0 AWG copper conductors for connections to electrodes.
- .7 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

### **3.3 EQUIPMENT GROUNDING**

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting.

### **3.4 GROUNDING BUS**

- .1 Install copper grounding bus mounted on insulated supports on wall of electrical room.
- .2 Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections size 2/0AWG.

### **3.5 COMMUNICATION SYSTEMS**

- .1 Install grounding connections for telephone, systems as follows:
  - .1 Telephones: make telephone grounding system in accordance with telephone company's requirements.

### **3.6 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 16010 - Electrical General Requirements.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Engineer and local authority having jurisdiction over installation.
- .3 Ground grid resistance and ground loop continuity are to be confirmed. The ground loop can be confirmed by checking the impedance between the transformer X0 and the building main ground. Consideration should be given to using a Fluke 1653B installation tester w/autotest complete with geo-earth-stake A604510350 ground/earth earth stake for earth resistance measurement and 2403368 NEMA 5-15 plug 3 ea 4mm banana for loop impedance. Earth resistance shall be less than 5 ohms.

- .4 Tests must indicate that, on the occurrence of a fault of negligible impedance, a current not less than five times the rating of the overcurrent device protecting the circuit will flow.
- .5 Perform tests before energizing electrical system.
- .6 Disconnect ground fault indicator during tests.

**END OF SECTION**

**Part 1      General**

**1.1          GENERAL**

- .1      This Section covers items common to Division 26. This Section supplements requirements of the General Conditions and all of Division 01.
- .2      The Contractor shall furnish all labour, materials and necessary tools and equipment to provide complete and operating electrical systems, as set forth on the plans and in these specifications and as called for elsewhere in the Contract Documents. Any work which is obviously necessary or reasonably implied to complete the work, even if not shown or specified, shall be carried out as if it were both shown and specified.
- .3      The Contractor shall review the information contained in the appendices to determine the scope of supply of the Owner preselected equipment and his own scope of supply relating to the installation of the Owner preselected equipment.

**1.2          INTENT**

- .1      The electrical drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of the work. The Drawings are not to be scaled to determine accurate measurements. Take field measurements when material and equipment dimensions are dependent upon site features, process and mechanical installations.
- .2      The Drawings do not show all conduits, cables, fastenings and supports. Provide conduit, cables, cable trays, fastenings and supports as required to implement the drawings, process and instrumentation diagrams, schematics, riser diagrams, single line diagrams and all electrical documents.
- .3      The electrical drawings do not show every circuit that is to be installed under this Contract. Specific circuiting requirements for power circuits above the 208 V level are generally shown on the Drawings. Cables which are not shown on the cable schedules are to be sized based on the equipment circuit breaker and in accordance with the Canadian Electrical Code (CEC). Circuits are to be installed per the specific information included here. The plan drawings provide the general locations for the equipment to be circuited.

- .4 Branch circuit wiring for 120/208 V equipment, lighting and receptacle circuits including conduits, and any structural floor or wall penetration requirements are generally not shown. The Contractor is responsible for determining the circuiting requirements for these circuits based on the branch circuit schedules, the locations of equipment and devices indicated on the plan drawings, and the wiring requirements given in other Sections of these specifications and the CEC. The circuiting requirements for instrumentation and control wiring are generally shown on the Drawings.

### **1.3 EXAMINATION OF THE DOCUMENTS**

- .1 Prior to submitting Tender, the Contractor shall visit the site and thoroughly investigate locations, connections and details of all services and systems which in any way affect or tie-in with work of these specifications and drawings.
- .2 No extra payment will be allowed for work resulting from conditions which would have been evident upon a thorough examination of the site.
- .3 Notify Engineer, in writing, fourteen (14) days prior to Tender closing date of any discrepancies or points of doubt or contention. Failing this, allow in the Tender for the most expensive course of action.

### **1.4 CODES AND STANDARDS**

- .1 Do complete installation in accordance with the Canadian Electrical Code, latest edition in effect at the time, except where specified otherwise.
- .2 Abbreviations for electrical terms to CSA Z85.

### **1.5 VOLTAGE RATINGS**

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

### **1.6 PERMITS, FEES AND INSPECTION**

- .1 The Contractor shall submit to Electrical Inspection Department and utility, the necessary number of drawings and specifications for examination and approval prior to commencement of Work.

- .2 Notify Engineer of changes required by Electrical Inspection Department prior to making any changes.
- .3 The Contractor shall obtain all required permits, pay all fees levied and furnish Certificates of Acceptance from Electrical Inspection Department and other authorities having jurisdiction on completion of work to Engineer.

## **1.7 MATERIAL AND EQUIPMENT**

- .1 Provide materials and equipment in accordance with Division 01.
- .2 Equipment and material shall be new and CSA certified. Where there is no alternative to supplying equipment, which is not CSA certified, obtain special approval from Electrical Inspection Department. This approval to be arranged with knowledge of this by the Engineer.
- .3 Factory assemble control panels and component assemblies

## **1.8 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA C22.1-09 Canadian Electrical Code, Part 1 (21st Edition), Safety Standard for Electrical Installations.
  - .2 CSA C22.2.
  - .3 CAN3-C235-83 (R2006), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
  - .1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
  - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7<sup>th</sup> Edition.

## **1.9 DEFINITIONS**

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.
- .2 For purposes of this Contract, the term "Contractor" means the Electrical Room Skid Builder.

## **1.10 DESIGN REQUIREMENTS**

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English.

## **1.11 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit WHMIS MSDS.
- .3 Submit for review single line electrical and fire alarm riser diagrams in glazed frames and locate as indicated.
  - .1 Electrical distribution system in electrical rooms on skids.
- .4 Submit for review fire alarm riser diagram, plan and zoning in glazed frames at fire alarm control panel and transponders.
- .5 Shop drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Alberta, Canada.
  - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
  - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
  - .4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
  - .5 Refer to Section 01 33 00 - Submittal Procedures.
  - .6 If changes are required, notify Engineer of these changes before they are made.

- .6 Quality Control:
  - .1 Provide CSA certified equipment and material.
  - .2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special approval before delivery to site.
  - .3 Submit test results of installed electrical systems and instrumentation.
  - .4 Permits and fees: in accordance with General Conditions of contract.
  - .5 Submit, upon completion of Work, load balance report.
  - .6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Engineer.
- .7 Manufacturer's Field Reports: submit to Engineer manufacturer's written report, within three (3) days of review, verifying compliance of Work and electrical system and instrumentation testing.

## **1.12 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 – Quality Control.
- .2 Qualifications: electrical Work shall be carried out by qualified, licensed electricians or apprentices as per the conditions of the Act respecting manpower vocational training and qualification.
  - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
  - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .3 Site Meetings:
  - .1 Initial site meeting to brief the contractor concerning his interface with the electrical room skid.

## **1.13 SYSTEM START-UP**

- .1 Instruct Engineer and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Check, adjust, balance and calibrate components and instruct operating personnel, during functional testing at the skid assembly plant and at the construction site.
- .3 Provide these services for such period as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

## **1.14 OPERATING INSTRUCTIONS**

- .1 Refer to Section 01 78 00 - Closeout Submittals.
- .2 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .3 Operating instructions to include following:
  - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
  - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
  - .3 Safety precautions.
  - .4 Procedures to be followed in event of equipment failure.
  - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .4 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .5 Post instructions where directed.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

## **Part 2 Products**

### **2.1 MATERIALS AND EQUIPMENT**

- .1 Provide material and equipment.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval documentation to the Engineer.
- .3 Factory assembled control panels and component assemblies.

### **2.2 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS**

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.



## 2.3 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction and inspection authorities.
- .2 Porcelain enamel signs, minimum size 175 x 250 mm.

## 2.4 WIRING TERMINATIONS

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

## 2.5 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
  - .1 Nameplates: lamicoid 3 mm, matt white finish, black core, lettering accurately aligned and engraved into core mechanically attached with self-tapping screws.
  - .2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters
- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Engineer prior to manufacturing.
- .4 Allow for minimum of twenty-five (25) letters per nameplate and label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets: indicate system and voltage.
- .8 Transformers: indicate capacity, primary and secondary voltages.

## 2.6 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

## 2.7 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 25 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

## 2.8 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Paint outdoor electrical equipment "equipment green" finish.
  - .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

## Part 3 Execution

### 3.1 INSTALLATION

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

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

### **3.2 NAMEPLATES AND LABELS**

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.
- .2 Provide a CSA label for each skid as an assembly.

### **3.3 LOCATION OF OUTLETS**

- .1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .2 Locate light switches on latch side of doors.

### **3.4 MOUNTING HEIGHTS**

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
  - .1 Local switches: 1400 mm.
  - .2 Wall receptacles: 300 mm.
  - .3 Panelboards: as required by Code or as indicated.
  - .4 Fire alarm stations: 1500 mm.
  - .5 Fire alarm horns: 2100 mm.
  - .6 Wall mounted speakers: 2100 mm.

### **3.5 CO-ORDINATION OF PROTECTIVE DEVICES**

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

### **3.6 FIELD QUALITY CONTROL**

- .1 Conduct following tests in accordance with Division 01 45 00 - Quality Control
  - .1 Power distribution system including phasing, voltage, grounding and load balancing.
  - .2 Circuits originating from branch distribution panels.

- .3 Lighting and its control.
- .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
- .5 Systems: fire alarm system and communications.
- .6 Insulation resistance testing:
  - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
  - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
  - .3 Check resistance to ground before energizing.
- .2 Carry out tests in presence of Engineer.
- .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .4 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

### **3.7 CLEANING**

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

**END OF SECTION**

## **1 General**

### **1.1 RELATED SECTIONS**

- .1 This Section of the Specifications forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

### **1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International):
  - .1 CAN/CSA C22.2-09 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
  - .2 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.
  - .3 CSA C22.2 No. 227.1-06 Electrical Non-Metallic Tubing.

### **1.3 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturers' printed product literature, specifications and datasheets:
- .3 Quality assurance submittals:
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 All waste shall be managed and disposed of in accordance with Section 01 74 21 - Construction Waste Management.

## **2 Products**

### **2.1 CONDUITS**

- .1 Rigid PVC conduit: to CSA C22.2 No. 211.2.
- .2 ENT conduit: to CSA C22.2 No.227.1-06.

### **2.2 CONDUIT FITTINGS AND CONNECTORS**

- .1 Fittings and connectors: to CAN/CSA C22.2 No. 18, manufactured for use with rigid PVC and ENT specified.

### **2.3 EXPANSION FITTINGS FOR RIGID CONDUIT**

- .1 Concrete proof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion protected against ingress of concrete.
- .2 Concrete proof expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection protected against ingress of concrete.
- .3 Concrete proof expansion fittings for linear expansion at entry to panel protected against ingress of concrete.

### **2.4 FISH CORD**

- .1 Polypropylene.

## **3 Execution**

### **3.1 MANUFACTURERS' INSTRUCTIONS**

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

### **3.2 INSTALLATION**

- .1 Embed conduits in at least 100 mm of concrete.
- .2 Use rigid PVC conduit and ENT in concrete.
- .3 Minimum conduit size for lighting and power circuits: 19 mm.
- .4 Install fish cord in empty conduits.
- .5 Remove and replace blocked conduit sections:
  - .1 Do not use liquids to clean out conduits.
- .6 Dry conduits out before installing wire.

### **3.3 CONDUIT EMBEDDED IN CONCRETE**

- .1 Locate in accordance with Section 26 05 00.
- .2 Protect conduits from damage where they stub out of concrete.
- .3 Install sleeves where conduits pass through slab or wall.

- .4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed:
  - .1 Use cold mastic between sleeve and conduit.
- .5 Conduits in slabs: minimum slab thickness four (4) times conduit diameter.
- .6 Encase conduits completely in concrete with minimum 100 mm concrete cover.
- .7 Organize conduits in slab to minimize cross overs.
- .8 All conduit positions shall be recorded for as-built and coordination purposes.
- .9 Seal all end of conduits against ingress of debris, including immediately after form strip down.

### **3.4 RIGID PVC UNDERGROUND**

- .1 Slope conduits to provide drainage.
- .2 Provide drainage fittings.

### **3.5 CLEANING**

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

## 1. GENERAL

### 1.1 RELATED SECTIONS

- .1 This Section of the Specifications forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

### 1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM):
  - .1 ASTM C117, Standard Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D422-63, Standard Test Method for Particle Size Analysis of Soils.
  - .4 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN m/m).
  - .5 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB):
  - .1 CAN/CGSB 8.2, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International):
  - .1 CAN/CSA A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005):
    - .1 CSA A3001, Cementitious Materials for Use in Concrete.
  - .2 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

### 1.3 DEFINITIONS

- .1 Common Excavation: Excavation of materials of existing ground nature.
- .2 Topsoil:
  - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
  - .2 Material reasonably free from clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 mm in any dimension.
- .3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .4 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.



- .2 Frost susceptible materials:
  - .1 Fine grained soils with plasticity index less than ten (10) when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422-63 and ASTM C136: Sieve sizes to CAN/CGSB 8.2.

- .2 Table:

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

- .3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
- .5 Unshrinkable Fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

#### 1.4 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00 - Quality Control, Testing and Inspections.
- .3 Submit condition survey of existing conditions as described in Clause 1.7 - Existing Conditions of this Section.
- .4 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Inform the Consultant at least four (4) weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.
- .5 Submit design and supporting data at least two (2) weeks prior to beginning Work.
  - .1 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered in the Province of Alberta.
  - .2 Keep design and supporting data on site.
  - .3 Engage services of qualified professional engineer who is registered in the Province of Alberta in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .6 Do not use soil material until written report of soil test results are reviewed and approved by the Consultant.

#### 1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 All waste shall be managed and disposed of in accordance with Section 01 35 43 – Waste Material Storage and Removal.

## 1.6 EXISTING CONDITIONS

- .1 Buried services:
  - .1 Before commencing work establish location of buried services on and adjacent to site.
  - .2 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
  - .3 Prior to beginning excavation Work, notify applicable authorities having jurisdiction to establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
  - .4 Confirm locations of buried utilities by careful test excavations or soil hydrovac methods. Clearly mark locations and depths for site reference.
  - .5 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
  - .6 Where utility lines or structures exist in area of excavation, notify the Consultant before removing or rerouting.
  - .7 Record location of maintained, rerouted and abandoned underground lines.
  - .8 Confirm locations of recent excavations adjacent to area of excavation.
- .2 Existing buildings and surface features:
  - .1 Conduct, with the Consultant, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work. All existing damage shall be clearly noted.
  - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair to restore damaged features to the same or better condition than prior to construction commencement.
  - .3 Where required for excavation, cut roots or branches.

**2. PRODUCTS**

**2.1 MATERIALS**

.1 Backfill materials: to Section 31 05 16 - Aggregate Materials: General and the following:

Percent Passing Sieve Size (mm)	Granular Fill	Granular Drainage Rock		Granular Pipe Bedding and Surround Material
		40 mm minus	50 mm minus	
50	100		100	
40	90-100	100	90-100	
20	50-75	95-100	35-70	
16		25-60		
10	25-52		10-30	100
5	15-40	0-10	0-5	95-100
2.5	10-33	0-5		80-100
1.25				50-85
0.630	5-23			25-60
0.314				10-30
0.160	2-14			2-10
0.080	1-10			

- .1 Granular fill: well graded, granular material free from organic matter, frozen lumps, weeds, sod, roots, logs, stumps or any other unsuitable material:
  - .1 Gradation shall comply with the above table when tested in accordance with ASTM C117 and ASTM C136.
  - .2 Liquid limit: to ASTM D4318, Max 25.
- .2 Granular drainage rock: manufactured aggregate, well graded, screened material free from organic matter, frozen lumps, weeds, sod, roots, logs, stumps or any other unsuitable material:
  - .1 Gradation shall comply with the above table when tested in accordance with ASTM C117 and ASTM C136.
  - .2 Liquid limit: to ASTM D4318, Max 25.
  - .3 Plasticity index: to ASTM D4318, Max 6.
- .3 Granular pipe bedding and surround material: granular material free from organic matter, frozen lumps, weeds, sod, roots, logs, stumps or any other unsuitable material:
  - .1 Gradation shall comply with the above table when tested in accordance with ASTM C117 and ASTM C136.
  - .2 Liquid limit: to ASTM D4318, Max 25.
  - .3 Plasticity index: to ASTM D4318, Max 6.

- .4 Native Fill: selected material from excavation areas, designated borrow areas or borrow stockpiles as shown on the Drawings, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, organic matter, refuse or other deleterious materials.
- .2 Unshrinkable Fill: proportioned and mixed to provide:
  - .1 Maximum compressive strength of 5.0 MPa at twenty-eight (28) days.
  - .2 Concrete aggregates: to CSA A23.1/A23.2.
  - .3 Cement: Type HS.
  - .4 Slump: 160 mm to 200 mm.

### **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, according to sediment and erosion control plan, specific to site, that complies with 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.

#### **3.2 SITE PREPARATION**

- .1 Remove obstructions, ice, snow, and frost penetrated soils from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

#### **3.3 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with applicable local regulations.
- .2 Keep excavations clean, free of standing water, ice, snow and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect.
- .4 Protect natural and manmade features required to remain undisturbed. Protect buried services that are required to remain undisturbed.

#### **3.4 STOCKPILING**

- .1 Stockpile fill materials in areas as directed by Consultant or Construction Manager:
  - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.

- .3 Implement erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

### **3.5 DEWATERING AND HEAVE PREVENTION**

- .1 Provide for the Consultant's review of details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut offs.
- .2 Avoid excavation below groundwater table if quick condition or heave is likely to occur:
  - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut offs, or other means.
- .3 Protect open excavations against flooding and damage due to surface run off.
- .4 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures and in a manner not detrimental to public and private property, or portion of Work completed or under construction:
  - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .5 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

### **3.6 EXCAVATION**

- .1 Excavate to provide a minimum cover of 1.0m for all conduits and cables. For induction loops, refer to Q-FREE installation for cover requirement. Sawcut wherever possible to minimum trench width, and minimize trench width in general if trench excavation is required.
- .2 Excavation shall not interfere with bearing capacity of adjacent foundations.
- .3 Keep excavated and stockpiled materials safe distance away from edge of trench in accordance with the Alberta Occupational Health and Safety Act, Regulations and Code (latest edition).
- .4 Restrict vehicle operations directly adjacent to open trenches. Restrict construction equipment to low ground pressure vehicles only.
- .5 Dispose of surplus and unsuitable excavated material on-site in designated locations as directed by the Construction Manager. Haul distance will be less than 2.5 km.
- .6 Do not obstruct flow of surface drainage or natural watercourses.
- .7 Base of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .8 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth specified or as directed by the Consultant.
- .9 Correct unauthorized over excavation as follows:
  - .1 Fill with Granular Fill compacted to minimum 98% of corrected maximum dry density at no additional cost to Airport Authority.
- .10 Hand trim, make firm and remove loose material and debris from excavations:

- .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

### **3.7 FILL TYPES AND COMPACTION**

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D1557 in accordance with Section 35 05 10 - Corrected Maximum Dry Density:
  - .1 Under proposed and future pavement areas, compact backfill to minimum 98% corrected maximum dry density.
  - .2 Under other areas compact backfill to minimum 95% corrected maximum dry density.

### **3.8 BEDDING AND SURROUND OF UNDERGROUND SERVICES**

- .1 Place and compact granular material or concrete for bedding and surround of underground services as indicated and as specified in other sections.
- .2 Place bedding and surround material in unfrozen condition and against unfrozen surfaces.

### **3.9 BACKFILLING**

- .1 Do not proceed with backfilling operations until completion of following:
  - .1 The Consultant has inspected installations.
  - .2 Inspection, testing, approval, and recording location of underground utilities.
  - .3 Removal of concrete formwork.
  - .4 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Do not backfill around or over cast-in-place concrete within twenty-four (24) hours after placing of concrete.
  - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 300 mm.
- .6 Place unshrinkable fill in areas as indicated.
- .7 Consolidate and level unshrinkable fill with internal vibrators.
- .8 Install drainage system in backfill as indicated.

### **3.10 RESTORATION**

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 35 43, trim slopes, and correct defects to the satisfaction of the Consultant.

- .2 Replace topsoil to the satisfaction of the Consultant.
- .3 Reinststate all existing surface conditions, asphalt pavement, concrete, to existing condition.
- .4 Reinststate to elevation which existed before excavation where required.
- .5 Clean and reinststate areas affected by Work to the satisfaction of the Consultant.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial twenty-four (24) hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            This Section of the Specifications forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

**Part 2            Products**

**2.1                MATERIALS**

- .1            Abrasives and solvents used for removal of paint, oil, grease, rubber deposits: proprietary products specially designed for pavement cleaning, subject to approval by the Prime Consultant.

**Part 3            Execution**

**3.1                REMOVING PAVEMENT MARKINGS**

- .1            Remove sealing compound which has protruded excessively, where indicated by Consultant. Dispose of removed material.
- .2            Exercise care to avoid dislodging of coarse aggregate particles, excessive removal of fines, damage to bituminous binder or damage to joint and crack sealers.
- .3            Removal of pavement markings to be high pressure water blasting, as directed by the Consultant.

**3.2                PAVEMENT SURFACE CLEANING**

- .1            Remove dust, contaminants, loose and foreign materials, oil and grease and curing compound prior to application of pavement marking.
- .2            Pavement cleaning to be high pressure water blasting, as directed by the Prime Consultant.

**END OF SECTION**



**Part 1            General**

**1.1                DESCRIPTION**

- .1        The work shall consist of supplying, hauling, dumping, spreading and compacting base material on a prepared surface at locations indicated in the Contract Drawings.

**1.2                DEFINITIONS**

- .1        Acceptance Limit: The maximum or minimum value for a test result above or below which the section of roadway shall be rejected.
- .2        Acceptance Testing: The testing performed to determine compliance with the specification regarding certain requirements, limits and tolerances for the quality of materials and workmanship to be supplied.
- .3        Surface Defects: Surface defects that are due to the Contractor's operation shall include but shall not be limited to the following:
  - .1        Potholing.
  - .2        Surface failures.
  - .3        Ravelling.
  - .4        Rutting.
  - .5        Bumps or dips.
  - .6        Irregular cross slopes.
  - .7        Segregation.

**1.3                REFERENCES**

- .1        ASTM International:
  - .1        ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2        ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3        ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4        ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .5        ASTM D1557-09, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700kN-m/m<sup>3</sup>).
  - .6        ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7        ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

#### 1.4 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative sieve analysis, Atterberg Limits, percent fractured faces and percent lightweight pieces of materials proposed for use at least two (2) weeks prior to commencing work.

### Part 2 Products

#### 2.1 MATERIALS

- .1 Granular base course materials shall meet the following requirements:
  - .1 Base aggregate shall be composed of sound, hard and durable particles of sand, gravel and rock free from injurious and quantities of elongated soft or flaky particles, shale, loam, clay balls and organic or other deleterious materials.
  - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117.
    - .1 Granular base course gradation to meet the following:

<b>SIEVE DESIGNATION</b>	<b>PERCENT BY WEIGHT PASSING CANADIAN METRIC SIEVE SERIES</b>
18.0 mm	100.0
12.5 mm	75.0 – 100.0
5.0 mm	50.0 – 75.0
2.0 mm	32.0 – 52.0
900 um	20.0 – 35.0
400 um	15.0 – 25.0
160 um	8.0 – 15.0
71 um	6.0 – 11.0
Plasticity Index	0 – 6.0
Fractured Face %	50.0 Minimum
Lightweight Pieces %	5.0 Maximum

- .2 Crushed particles at least 50% of particles by mass of the material retained on the 5.00 mm sieve to have at least one (1) freshly fractured face.

### Part 3 Execution

#### 3.1 DELIVERY, STORAGE AND HANDLING

- .1 Deliver and stockpile, aggregates as noted below.
  - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.

- .2 No stockpiling of aggregate to be permitted on site unless otherwise directed by the Departmental Representative. Do not stockpile on completed pavement surfaces. Stockpile on an impervious, previously disturbed site as approved by the Departmental Representative.
- .3 Stockpile aggregates in sufficient quantities to meet project schedules.

### 3.2 PLACING

- .1 Place granular base after subgrade is inspected and approved by Departmental Representative in writing.
- .2 Place granular base mix to avoid mixing with subgrade material.
- .3 Construct granular base to depth and grade in areas indicated.
- .4 Ensure no frozen material is placed.
- .5 Place material only on clean unfrozen surface, free from snow and ice.
- .6 Place material using methods which do not lead to segregation or degradation of aggregate.
- .7 Place material to full width in uniform layers not exceeding 100 mm compacted thickness.
  - .1 Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .9 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .10 If excess moisture originating from external causes including but not limited to precipitation and/or Contractor's operation is present in the subgrade, sub-base, and/or base course prior to the acceptance of the completed surfacing structure; the Contractor shall dry the subgrade, sub-base, and/or base course to not less than the specified density or the optimum density in accordance with the requirements for Moisture-Density Proctor at no additional cost to the Owner.

### 3.3 COMPACTION

- .1 Compaction equipment to be capable of obtaining required base course densities.
- .2 Shape and roll alternately to obtain smooth even, uniformly compacted base course.
- .3 Apply water as necessary during compaction to obtain the specified density. Water will not be paid directly but considered a subsidiary to the contract.
- .4 In areas not accessible to rolling equipment, compact to the specified density with mechanical tampers approved by Departmental Representative.
- .5 Correct surface irregularities by loosening and adding or removing material until the surface is within specified tolerance.
- .6 Base mix shall not be compacted if the atmospheric temperature is less than 2°C.

- .7 The section of base course shall be considered acceptable if it has no surface defects and is true to grade and cross-section and if:
  - .1 The average density meets or exceeds 100% maximum dry density in accordance with ASTM D698.
  - .2 All individual test results are greater than 98% of maximum density.
  - .3 The moisture content is less than or equal to the optimum moisture content.
- .8 If the density for any section of the roadway are outside the acceptance limits outlined in Section 3.3.7 the section shall be rejected as unacceptable work and the following shall apply:
  - .1 The Contractor shall have the opportunity to remedy existing base course by re-rolling or by any other method suggested by the Contractor and approved by the Departmental Representative. The Contractor may request that the section of the roadway be retested during or after the completion of the remedial attempts.
  - .2 The section shall be tested a total of 3 times free of cost to the Contractor. The Contractor shall pay the cost of any additional testing.
  - .3 If the base course in the section remains outside the acceptance limits after the remedial attempts, the Contractor shall remove and replace all the base course in that section.
- .9 Any section with surface defects shall be rejected as unacceptable work.
  - .1 Surface defects shall be repaired in a manner acceptable to the Departmental Representative.

### **3.4 SITE TOLERANCES**

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

### **3.5 CLEANING**

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

### **3.6 PROTECTION**

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

**END OF SECTION**

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**Part 1            General**

**1.1                WORK INCLUDED**

- .1        Supply and install asphalt pavement in location indicated on the Drawings.
- .2        Notify Departmental Representative of proposed date for installation and schedule shipments to coincide with construction schedule.
- .3        Application of prime coat and tack coat.

**1.2                RELATED SECTIONS**

- .1        Rough Grading - Section 31 22 13.
- .2        Granular Base Course - Section 32 11 23.

**1.3                REFERENCES**

- .1        Alberta Transportation Standard Specifications for Highway Construction (current edition).
- .2        Alberta Transportation Test Methods as listed in the Standard Specifications for Highway Construction.
- .3        Alberta Transportation's Design Bulletin #13, #27 and #47.

**1.4                SUBMITTALS**

- .1        Submit submittals in accordance 01 33 00 – Submittal Procedure.
- .2        Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least one (1) week prior to commencing work.

**Part 2            Products**

**2.1                MATERIALS**

- .1        All materials supplied by Contractor to Alberta Transportation specification for "Aggregate Production and Stockpiling", Specification 3.2.
- .2        Asphalt Type M1 with PG 52-34 Asphalt Cement.
- .3        All granular base course to be Designation 2, Class 25.

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**Part 3            Execution**

**3.1                ASPHALT PAVEMENT**

- .1            All work to be executed in accordance with:
- .1            Alberta Transportation Standard Specifications for Highway Construction, (current edition).
  - .2            Alberta Transportation's Design Bulletin #13, "Revisions to Pavement Design Manual for Selection of ACP Mix Types and Asphalt Binder Grades", dated July 2003.
  - .3            Alberta Transportation's Design Bulletin #27, "Provision of Additional Pavement Width to Allow for Two Future Overlays", dated October 2006.
  - .4            Alberta Transportation's Design Bulletin #47, "Paving and Upgrading of Highway Intersection with Gravel/Paved Roadways at the Time of Grading or First Stage Paving and Final Paving or Pavement Rehabilitation", dated April 2007.
  - .5            Prime Coat and Tack Coat as per Alberta Transportation Standard Specifications for Highway Construction, (current edition).

**END OF SECTION**

**Part 1            General**

**1.1                WORK INCLUDED**

- .1        The following work is included:
  - .1            Supply and paint traffic lines and markings.

**1.2                REFERENCES**

- .1        Alberta Transportation Standard Specification for Highway Construction (current version).
- .2        Alberta Transportation Pavement Marking Guide (current version).
- .3        Alberta Transportation Pavement Marking Guide (current version). Figure TCS-C-501.3.
- .4        AT Design Bulletin #56.

**Part 2            Products**

**2.1                MATERIALS**

- .1        The Contractor shall choose the glass beads, paint and durable paint materials to be supplied from the list of Proven Products shown in the Alberta Transportation Products List, found on the Department's web page. The Contractor shall be responsible for ensuring that the quality of the paint and beads supplied meets the requirement specified.
- .2        The Contractor shall advise the Departmental Representative of any change in paint formulation.
- .3        The Contractor shall provide the Departmental Representative with the following information prior to commencing the Work:
  - .1            Name and mailing addresses of the suppliers and manufacturers.
  - .2            Formulation to be supplied.
  - .3            Written confirmation from the manufacturer that the materials to be supplied meet all specified requirements.
  - .4            The Contractor shall verify that all materials delivered and used in the Work are the type ordered.

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**Part 3            Execution**

**3.1                EQUIPMENT REQUIREMENTS**

- .1        The Contractor shall provide all equipment necessary for completion of the Work including, but not limited to the painting truck, a pilot truck, a crash attenuator vehicle and all ancillary equipment such as fork lifts, hoists, pumps and transport vehicles required to load, unload and transport the paint and glass beads.

**3.2                APPLICATION**

- .1        All painting shall be carried out during hours of daylight between an 0.5 hour after sunrise and an 0.5 hour before sunset.
- .2        Loading of glass beads or paint onto the painting truck is not permitted on a roadway surface.
- .3        All painted lines shall be uniformly applied at a minimum rate of not less than 38 L/km of solid 100 mm wide line. Glass beads shall be applied immediately following the paint application at a uniform rate of not less than 600 g/L of paint.
- .4        The Contractor may heat alkyd paint to a maximum temperature of 65°C prior to application to the paved surface to reduce drying time. The Contractor shall use due care in heating the paint because of it's volatile nature. Waterborne paints shall not be heated.
- .5        Painting shall not be performed during the following conditions:
  - .1        When the temperature is below 0°C for alkyd paints and 10°C for waterborne paints.
  - .2        When wind conditions cause overspray.
  - .3        When the visibility is less than 700 m.
  - .4        During period of rainfall.
  - .5        Area to be painted shall be clean and dry during the application of paint and shall be inspected by the Contractor prior to painting.

**3.3                TOLERANCE**

- .1        Paint markings: within plus or minus 12 mm of dimensions indicated.
- .2        All paint shall be applied at the proper locations in accordance with the drawings or as directed by Departmental Representative.
- .3        All painted lines shall be uniform in thickness and free of tire tracking, with no splatter excessive overspray or other defects.
- .4        Remove incorrect markings in accordance with Section 32 01 11.01 – Pavement Cleaning and Marking Removal.



**3.4 PROTECTION**

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

**END OF SECTION**