

01 11 00	SUMMARY OF WORK	3
01 14 00	WORK RESTRICTIONS	8
01 21 00	ALLOWANCES	14
01 25 20	MOBILIZATION AND DEMOBILIZATION	17
01 29 01	SITE OCCUPANCY	18
01 31 00	PROJECT MANAGEMENT AND COORDINATION	19
01 32 16	CONSTRUCTION PROGRESS SCHEDULES	23
01 33 00	SUBMITTAL PROCEDURES	26
01 35 29	HEALTH AND SAFETY REQUIREMENTS	33
01 35 31	SPECIAL PROCEDURES FOR TRAFFIC CONTROL	36
01 35 43	ENVIRONMENTAL PROCEDURES	40
01 45 00	QUALITY CONTROL	50
01 52 00	CONSTRUCTION FACILITIES	57
01 61 00	COMMON PRODUCT REQUIREMENTS	59
01 74 11	CLEANING	62
01 77 00	CLOSEOUT PROCEDURES	64
01 78 00	CLOSEOUT SUBMITTALS	65
02 81 01	HAZARDOUS MATERIAL	67
03 10 00	CONCRETE FORMING AND ACCESSORIES	70
03 20 00	CONCRETE REINFORCING	73
03 30 00	CAST-IN-PLACE CONCRETE	76
03 60 00	GROUTING	83
05 14 00	STRUCTURAL STEEL	85
31 23 33	EXCAVATING, TRENCHING AND BACKFILLING	91
31 72 13	ROCK ANCHORS	93
33 42 36	SPECIAL PROCEDURES WEATHER STATIONS	97

**Drawings :**

DRAWING INDEX			
DRAWING NO.	SHEET NO.	REVISION NO. AND DATE	SHEET TITLE
G001	1	1	Title Page
G002	2		Location Plan, Drawing Index
S001	3		Bertha Ridgetop & Mid-Mountain Site Plan

**Project Locations:**

Project and staging area locations are included in the Project Location KMZ file.

**Appendices:**

- A. PCA Historical Weather Data and AB Environment Site Specific Wind Pressure Report.  
*Weather data and wind pressure report are provided for reference. PCA makes no guarantee regarding the completeness or accuracy of this data.*
- B. Site photos.  
*Photos are provided for reference and to prompt responsible investigations by potential Contractors. They were taken at a specific time and do not represent the current condition for any time other than the specific time that they were taken. Potential Contractors are advised that the conditions depicted in the photos are very likely to have changed since the time of the photos and that they are wholly responsible for familiarizing themselves with the site prior to submitting their respective prices.*
- C. Westrek Geotechnical Report.
- D. Parks Canada Hazard Standards and Safe Work Practices.
- E. Preapproved Routine Impact Assessment (PRIA) - Prefabricated Structures
- F. Évaluation d'Impact Courante Préapprouvée (EICP) - Structures préfabriquées

## **01 11 00 SUMMARY OF WORK**

### **Part 1 General**

#### **1.2 PRECEDENCE**

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

#### **1.3 DEFINITIONS**

- .1 Alberta Transportation is referred to as "AT". The latest version of the AT Standard Specifications for Highway Construction is to be used.
- .2 Changes in Definition, - The following changes in definitions have been made to the "AT Specifications":
  - .1 Ministry Representative – The word "Ministry Representative" shall mean Parks Canada Departmental Representative or their duly appointed representative.  
Ministry – The word "Ministry" shall mean Parks Canada Agency.
- .3 Waterton Lake National Park of Canada is referred to as "WLNP".
- .4 Parks Canada Agency is referred to as "PCA".
- .5 Environmental Surveillance Officer is referred to as "ESO".
- .6 "Weather station" refers to all structures, foundations, instrumentation, hardware, software and additional infrastructure installed at a single location according to these Contract documents, and may include multiple structures including towers, pedestals, and enclosures.
- .7 Watercourse is as defined in the National Parks Act.
- .8 Site means the areas on or within the limits of Construction as referenced on the Drawings and/or described in the Contract Documents.
- .9 Work means the provision of all labour, services, material, and equipment as necessary for the Contractor to complete and perform its obligations in accordance with the Contract.

#### **1.4 PROJECT LOCATION**

- .1 The project is located in WLNP, AB as indicated in Drawing G002 and the Project Location KMZ file. Construction work is at the following two (2) remote locations, as indicated on Drawing S001, the Project Photos, and in the Project Location KMZ file:
  - .1 The Bertha Ridgetop site is located on the ridge of Bertha Peak at an elevation of ~2,150m and is ~2 km from the Cameron Day Use Area (DUA)..
  - .2 The Bertha Mid-Mountain site is located on the shoulder of Bertha Peak at an elevation of ~1,600m and is ~1 km from the Cameron DUA.
- .2 The Contractor is responsible for verifying the accuracy of any imagery available from online sources (e.g. Google Earth).
- .3 The following are key locations relative to the project:
  - .1 PCA Compound (Primary Staging Area) - 7.3km from the intersection of AB Highway 5 and AB Highway 6 .

- .2 South end of Evergreen Ave – Cameron DUA (Bertha Heli Staging Area) – Nearest point on Evergreen Ave to Bertha sites.
- 4. Access to Bertha Ridgetop and Bertha Mid-Mountain sites is by helicopter. Initial site access to both sites will be on foot in order to establish helicopter landings.

## 1.5 WORK COVERED BY CONTRACT DOCUMENTS

- .1 All requirements noted within the Contract Documents shall be completed by the Contractor unless specifically stated otherwise.
- .2 Without limiting the scope of work, the work of this Contract generally comprises the following, as directed by the Departmental Representative:
  - .1 Design, supply and installation of two (2) new weather stations in two (2) remote locations, including two (2) towers and one (1) precipitation pedestal, required foundations and/or rock anchors, and all associated instrumentation, hardware and software, in accordance with:
    - .1 Sections 03 10 00 Concrete Forming and Accessories, 03 20 00 Concrete Reinforcing and 03 30 00 Cast-in-place Concrete;
    - .2 Section 31 72 13 Rock Anchors;
    - .3 Section 03 60 00 Grouting;
    - .4 Section 05 14 00 Structural Steel;
    - .5 31 23 33 Excavating, Trenching, and Backfilling;
    - .6 33 42 46 Special Procedures Weather Stations;
    - .7 the Contract Drawings and Project Location KMZ.
  - .2 Traffic signage, control and other traffic accommodations in accordance with Section 01 35 31 – Special Procedures for Traffic Control ..
  - .3 Transportation of all workers and materials to and from remote site locations, including but not limited to, transportation by helicopter.
  - .4 All hardware and software required for operation, data processing and data presentation following install.
  - .6 Miscellaneous Additional Work as directed by the Departmental Representative.
- .3 In preparation for and during construction of this project, an “Environmental Protection Plan” (EPP) is to be prepared by the Contractor to meet the requirements of Section 01 35 43 – Environmental Procedures to ensure the desired minimal adverse effects are achieved. The Contractor’s EPP must be approved by Parks Canada Agency prior to the commencement of construction. The Departmental Representative and Parks Canada’s Environmental Surveillance Officer (ESO) will refer to the approved EPP in determining compliance with the Plan and Contract Documents. A template will be provided to the contractor as a reference document after contract award that may be used as a guide in the development of the EPP.
- .4 Where material and construction specifications for work covered under the Contract, including any Change Orders, are not available, AT –**Standard Specifications for Highway Construction (latest edition)** shall apply unless directed otherwise by the Departmental Representative.

## 1.6 CONTRACT METHOD

- .1 Construct Work under combined price Contract.

## 1.7 WORK BY OTHERS

- .1 The Contractor is advised that the following Work and anticipated completion in the vicinity has been or will be contracted by Parks Canada:
  - .1 Crandell Mountain Campground – Until Oct 2021
  - .2 Highway 5 Entrance Road – Until July 2021
  - .3 Bertha Lake Trail Bridge – June 2021
  - .4 Other projects and maintenance work may occur along the WLNK in 2021-2022.
- .2 Where it is necessary that work is to proceed in areas of this project common to both the Contractor and forces of others, the Contractor shall cooperate with the other Contractors and the PCA Departmental Representative in reviewing their construction schedules and sharing their work space, and shall coordinate their operations with the other Contractors, including traffic management and construction staging.
- .3 The Contractors shall coordinate all work on this project with other Contractors including Site Safety and Traffic Control

## 1.8 WORK SEQUENCE

- .1 Schedule work progress to allow Owner / Departmental Representative unrestricted access to inspect all phases of the Work. Contractor will be given minimum 24h notice of inspections so flight loads can be optimized.
- .2 Maintain fire and emergency access on the roadways at all times.
- .3 Co-ordinate Work with other Contractors / Departmental Representatives doing maintenance, survey / testing work.
- .4 The Contractor shall prepare a meaningful bar chart or network diagram showing the proposed schedules of major work, which shall be submitted to the Departmental Representative in accordance with Section 01 32 16 - Construction Progress Schedules.
- .5 The Contractor shall:
  - .1 **Include a milestone completion date of October 31, 2021 in their schedule for all required tree clearing and vegetation removal at all sites.**
  - .2 Not mobilize to site until PCA Visitor Safety has provided clearance (typically mid May – early June).
  - .3 Demobilize immediately from site if at any time PCA or their representatives declare the relevant area to be at risk from winter weather (typically November) or other hazard conditions including but not limited to wildfires.
  - .4 Remobilize to site only when the relevant area is declared to be free of risk from hazardous conditions.

## 1.9 CONTRACTOR USE OF PREMISES

- .1 Contractor has unrestricted use of site subject to Section 01 14 00 –Work Restrictions and Section 01 29 01 – Site Occupancy, until Contract Completion date. The Contractor's use of the site is not exclusive of other contractors or work zones within the limits of this Contract.

- .2 Contractor shall limit use of premises for Work, for storage, and for access, to allow:
  - .1 Owner occupancy.
  - .2 Work by other Contractors.
- .3 Coordinate use of premises under direction of the Departmental Representative.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .5 The Contractor and any subcontractors shall obtain a business license and vehicle work passes in accordance with Section 01 35 43 - Environmental Procedures.

#### **1.10 OWNER OCCUPANCY**

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.
- .3 Contractor must allow access to the Work Site for other Contractors and PCA. It is up to the Contractor to plan their work accordingly.

#### **1.11 CONSTRUCTION SIGNAGE**

- .1 To be in accordance with Section 01 35 31 - Special Procedures for Traffic Control.
- .2 Signage shall be coordinated with other Contractors.
- .3 Signage monitoring during active and inactive working period is the responsibility of the Contractor.
- .4 No signs or advertisements, other than warning signs, are permitted on site.

#### **1.12 SETTING OUT OF WORK**

- .1 Contractor shall:
  - .1 Not permanently mark any infrastructure or feature during their setting out of the work. They shall fully remove any set out marks, markers, or other identifiers that they installed, prior to demobilizing from the Work Sites.
  - .2 Set control points as necessary.
  - .3 Set all work stakes necessary to complete work.
  - .4 Allow sufficient time for Departmental Representative to take measurements for payment.
  - .5 Not damage geodetic benchmarks or control monuments unless authorized by Departmental Representative.
- .2 No separate payment for setting out work, unless changes are made and approved by the Departmental Representative and additional survey costs are incurred. Payment for additional survey required due to changes by Departmental Representative to be paid for as part under **“Lump Sum Price Item 3 – Prime Cost Sum”**.

#### **Part 2 Products**

- .1 To be in accordance with AT Standard Specifications for Highway Construction (latest edition) .

- .2 Wherever American Society for Testing and Materials (ASTM), Canadian Standards Association (CSA/CAN), Canadian General Standards Board (CGSB) or American Association of State Highway and Transportation Officials (AASHTO) standards are referenced the latest versions of those standards shall apply.

### **Part 3 Execution**

- .1 To be in accordance with AT Standard Specifications for Highway Construction (latest edition).
- .2 Wherever American Society for Testing and Materials (ASTM), Canadian Standards Association (CSA/CAN), Canadian General Standards Board (CGSB) or American Association of State Highway and Transportation Officials (AASHTO) standards are referenced the latest versions of those standards shall apply.

**END OF SECTION**

**01 14 00 WORK RESTRICTIONS****Part 1 General****1.1 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.2 WASTE MANAGEMENT AND DISPOSAL**

- .1 All surplus, unsuitable and waste materials shall be removed from the Work Sites to approved sites outside the National Parks. Refer to Section 01 35 43 - Environmental Procedures.
- .2 Deposit of any construction debris into any waterway is strictly forbidden.
- .3 Cost for Waste management and disposal described above shall be considered incidental to the Unit Price items and no additional payment will be made.

**1.3 ACCESS AND EGRESS**

- .1 Provide for pedestrian, cyclist, and vehicular traffic for the duration of the construction.
- .2 Construction operations shall be conducted to cause minimal inconvenience to the public and to owners of adjoining property. Existing access to property shall be maintained as far as possible and if new access must be provided, every effort shall be taken to provide the new access before the existing access is removed. Contractor will be responsible for repairing any damage incurred, at the Contractor's cost.
- .3 The Contractor is responsible for the development and supply of construction access to the Work as approved by the Departmental Representative.

**1.4 USE OF THE SITE AND FACILITIES**

- .1 The Work Sites specified in the Contract shall only be used for the purposes of the Work.
- .2 The Work Site (limits shown on the Drawings) will be specified by Parks Canada and shall only be used for the purposes of the Work. The Work Site will be made available by Parks Canada to the Contractor for its non-exclusive use for the duration of the Work, unless otherwise provided in the Contract Documents.
- .3 The Contractor will not be permitted to set up a camp in the National Parks. PCA regulations prohibit anyone working within the Park from using public campground facilities.
- .4 Contractor office and/or tool trailer may also be set up at the PCA Compound See Section 01 35 43 – Environmental Procedures.
- .5 The Contractor shall not store material or park equipment along the Highway Right of Way within the clear zone.
- .6 Contractor shall maintain adequate drainage at the Work Site.
- .7 The Contractor shall keep the Work Site clean and free from accumulation of waste materials and rubbish regardless of source. Snow shall be removed by the Contractor as necessary and at their cost for the performance and inspection of the Work.
- .8 The Contractor shall provide sanitary facilities for work force in accordance with governing regulations and Section 01 35 43 - Environmental Procedures. The



Contractor shall post notices and take such precautions as required by local health authorities and keep area and premises in sanitary condition.

- .9 Any damage to the Work Site caused by the Contractor shall be repaired by the Contractor at their expense.
- .10 Pets shall not be brought to or maintained at the construction site or worker's camp.

## 1.5 WORKING TIMES

- .1 Work in WLNP is permitted during daylight hours **from 07:00 to 19:00**, Monday to Saturday unless stipulated otherwise in the Contract Documents.
- .2 No work will be permitted on Sundays unless prior written approval is granted by the Departmental Representative
- .3 The Contractor will not be permitted to work during the period of any Alberta statutory holiday long weekend, including one day prior to and one day following. The Contractor will not be permitted to work during the following Civic Holidays or long weekends unless prior written approval is granted by the Departmental Representative:
  - .1 Statutory and Civic Holidays (2021)
    - .1 Civic Holiday weekend: From 19:00 Sunday August 1, 2021 to 07:00 Tuesday August 3, 2021.
    - .2 Labour Day long weekend: From 19:00. Sunday, September 5, 2021 to 07:00 Tuesday, September 7, 2021.
    - .3 Thanksgiving Day weekend: From 19:00 Sunday, October 10, 2021 to 07:00 Tuesday, October 12, 2021.
    - .4 Remembrance Day Weekend: From 19:00 Wednesday, November 10, 2021 to 07:00 Friday, November 12, 2021.
  - .2 Statutory and Civic Holidays (2022)
    - .1 Good Friday weekend: From 19:00 Thursday, April 14, 2022 to 07:00 Tuesday, April 19, 2022.
    - .2 Victoria Day Weekend: From 19:00 Thursday May 19, 2022 to 07:00 Tuesday, May 24, 2022.
    - .3 Canada Day weekend: From 19:00 Thursday June 30, 2022 to 07:00 Tuesday, July 5, 2022.
    - .4 Civic Holiday weekend: From 19:00 Thursday July 28, 2022 to 07:00 Tuesday August 2, 2022.
- .4 The Contractor will not be permitted to work during special events unless prior written approval is granted by the Departmental Representative.
- .5 Variance of the Working Times and any others may be provided on the strict condition of satisfactory performance in all requirements as determined at the Departmental Representative's discretion and may be revoked at any time for any reason. It is provided on the presumption that no additional costs or any delay will be attributed to Parks Canada in relation to conducting Works in accordance with the Variance and if that is not the case, the Contractor shall not commence work under the Variance. No claims for additional costs, delays, schedule impacts, loss of productivity or other extra Works resulting from a Variance will be entertained.

## **1.6 WORK CONDUCTED OVER OR ADJACENT TO WATERWAYS**

- .1 All components of the Work shall be conducted in accordance with Section 01 35 43 – Environmental Procedures and the Environmental Protection Plan prepared for the project.
- .2 All components of the Work shall be conducted without equipment entering into wetlands, water bodies, or streams.
- .3 All waste materials from the Work shall be contained and collected in a manner to prevent any contact with the river valleys and waterways. All collected waste materials shall be disposed of in accordance with Section 01 35 43 – Environmental Procedures and the Environmental Protection Plan prepared for the Project.

## **1.7 UTILITIES**

- .1 The Contractor shall become familiar with all utilities and services adjacent to the Work and shall be responsible for cost of repair of any damage resulting from their operations.
- .2 The Contractor shall establish and maintain direct and continuous contact with the owners or operators of any Utilities which may interfere with the Work. The Contractor shall co-operate with them at all times and in all places of Work. The Contractor shall keep the Departmental Representative informed of all communications with the Utility companies and authorities.
- .3 The Contractor shall notify the Departmental Representative and the Utility companies at least seven (7) days in advance of any activities which may interfere with the operation of such Utilities.
- .4 Whenever working in the vicinity of Utilities, the Contractor shall locate such Utilities and expose those that may be affected by the Work, using hand labour as required.
- .5 The Contractor shall assess the possible impact of its operations on all Utilities that may be affected by its operations, and shall, in consultation with Utility owner(s), protect, divert, temporarily support or relocate, or otherwise appropriately treat such Utilities to ensure that they are preserved.
- .6 The Contractor shall immediately report any damage to Utilities to the Departmental Representative and to the Utility company or authority affected and shall promptly undertake such remedial measures as are necessary at no additional cost to the Owner.

## **1.8 SURVEY OF EXISTING CONDITIONS**

- .1 Submission of tender is deemed to be confirmation that the Contractor has reviewed the tender package in its entirety and is conversant with all conditions affecting execution and completion of the work.
- .2 The Contractor shall regularly monitor the condition of the Work Site and of property on and adjoining the Work Site throughout the construction period and shall immediately notify the Owner if any deterioration in condition is detected. Such monitoring shall cover all pertinent features and property including, but not limited to, buildings, structures, roads, walls, fences, slopes, sewers, culverts and landscaped areas.
- .3 The Departmental Representative may, but shall not be obligated to, survey and record the condition of the Work Site and of property on or adjoining the Work Site prior to the commencement of construction by the Contractor. If requested and available, the Departmental Representative will provide a copy of the survey records to the Contractor for reference.

- .4 Whenever supplied with survey records, the Contractor shall satisfy itself as to the accuracy and completeness of the survey records provided by the Departmental Representative for any area before commencing construction in that area.
- .5 Commencement of construction in any area shall be interpreted to signify that the Contractor has accepted such survey records as being a true record of the existing conditions prior to construction.
- .6 The provision of the records of a survey of existing conditions by the Departmental Representative shall in no way limit or restrict the Contractor's responsibility to exercise proper care to prevent damage to all property within or adjacent to the Work Site, whether all such property is covered by the survey or not.

## **1.9 ARCHAEOLOGICAL RESOURCES**

- .1 As described in Section 01 35 43 - Environmental Procedures.
- .2 The Contractor shall undertake the Works in accordance with the Accidental Finds Protocol in 01 35 43 - Environmental Procedures.

## **1.10 PROTECTION OF PERSONS AND PROPERTY**

- .1 The Contractor shall comply with all applicable safety regulations of OHS AB and the Workers Compensation Act of Alberta including, but not limited to, Occupational Health and Safety Regulations and General Safety Regulations. Within the Site, the Contractor has all the responsibilities of an "employer" under the *Workers Compensation Act* and the *Occupational Health and Safety Regulation* and is designated as the "Prime Contractor". Other contractors will be working within the limits of construction of this project.
- .2 Comply with all applicable safety regulations of the Workers' Compensation Board of Alberta (WCB) including, but not limited to, WCB's Industrial Health and Safety Regulations, Industrial First Aid Regulations, and Workplace Hazardous Materials Information System Regulations.
- .3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.
- .4 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site.
- .5 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.

## **1.11 USE OF PUBLIC AREAS**

- .1 Off-road construction or steel tracked equipment will not be allowed on the existing highway unless approved by the Departmental Representative. Any damage will be repaired at the contractor's expense.
- .2 Flag persons shall be provided when large vehicles are entering or exiting Staging Area access points.
- .3 The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas. All vehicles and equipment leaving the Work Site and entering public roadways shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle. All vehicles arriving at or leaving the Work Site and transporting materials

shall be loaded in a manner that will prevent dropping of materials or debris on the roadways and, where contents may otherwise be blown off during transit, such loads shall be covered by tarpaulins or other suitable covers. Spills of materials in public areas shall be removed or cleaned immediately by the Contractor at no cost to the Owner. All activities shall be in accordance with Section 01 35 43 – Environmental Procedures and the Environmental Protection Plan prepared for the project.

- .4 Construction areas and construction crossings shall be flood-lit for night operations.

## 1.12 SUPERVISORY PERSONNEL

- .1 When requesting a Preconstruction Meeting, in accordance with Section 01 31 00 - Project Management and Coordination, 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.
- .2 At a minimum, the following roles shall be included in the list:
- .1 Contractor Manager
  - .2 Project Superintendent;
  - .3 Safety Representative;
  - .4 Quality Control Manager;
  - .5 Environmental Representative;
  - .6 Traffic Control Representative;
- .3 The above personnel shall perform the following duties:
- .1 Contractor Manager with full authority, as agent of the Contractor, to act on behalf of and legally bind the Contractor in connection with the Work and the Contract. The Contractor may, at its discretion, appoint one person as both Contractor Manager and Project Superintendent.
  - .2 The Project Superintendent shall be employed full time with full authority to supervise the Work, who shall be directly available to the Department Representative during all active periods of Work. Either they or their designated deputy shall be present on the Work Site each and every workday that Work is being performed, from the commencement of Work to Total Performance of the Work. Project Superintendent and their designated Deputy must have significant experience in the type of works being performed. Project Superintendent and their designated Deputy are responsible for supervising all their subcontractors and ensuring each subcontractor has their own foreman onsite during all works.
  - .3 The Project Superintendent shall nominate a Deputy Project Superintendent who shall have the authority of the Project Superintendent during the latter's absence. Deputy Project Superintendent must have significant experience in the type of works being performed.
  - .4 The Safety Representative shall possess suitable construction safety supervisory experience. Their duties shall encompass all matters of safety activities from commencement of Work until the Total Performance of the Work.
  - .5 The Quality Control Representative shall be responsible for the development, implementation and execution of the Quality Management Plan and shall be the single point of contact for all quality related queries.

- .6 The Traffic Control Representative shall be responsible for the development, implementation and execution of the Traffic Management Plan and shall be the single point of contact for all traffic control related queries.
- .7 The Environmental Representative shall be responsible for the development, implementation and execution of the Environmental Protection Plan and shall be the single point of contact for all environmental related queries.

### **1.13 WORK STOPPAGE**

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

**END OF SECTION**

**01 21 00 ALLOWANCES****Part 1 General****1.1 MEASUREMENT AND PAYMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.
- .2 Payment for Work under the **“Lump Sum Price Item 3 – Prime Cost Sum”** made using negotiated rates or by material, labour and equipment rates as per the following:
  - .1 Rental rates will be in accordance with current Alberta Roadbuilders & Heavy Construction Association’s rate schedule and will be all inclusive and fully operated.
  - .2 Vehicles (ie. Pickup trucks) will be paid either at daily rates as per the Alberta Roadbuilders & Heavy Construction Association’s (most recent) or by mileage using National Joint Council (NJC) rates, whichever is lower. The Contractor will not be permitted to claim both daily rental and mileage rates.
    - .1 Hourly rates shall be pro-rated based on the portion of the standard 10-hour work day spent on extra work items up to a maximum value of the daily rate allowance.
    - .2 Fuel price adjustment to be determined from <https://www.alberta.ca/unit-prices-and-cost-adjustments.aspx#jumplinks-0> for the applicable rate at the time the work is being performed.
    - .3 Pick-ups, light plants, service vehicles and similar equipment are excluded from the fuel price adjustments.
  - .3 Hourly rental of equipment will be measured in actual working time and necessary travel time within project limits. Transportation time to and from site to be reimbursed only if equipment is used exclusively for additional work.
  - .4 Equipment paid on standby will be paid on 50% of the relevant Less Operator rates to a maximum of 10 hours per day.
  - .5 When based upon actual costs for additional works under Prime Cost Sum, payment will be based upon supplied invoices and other work records.
  - .6 The Prime Contractor may apply a 10% mark-up to subcontractor or supplier invoices only, as accepted by the Departmental Representative. No mark-up will be allowed on relevant equipment and labour rates.
  - .7 A claim for additional payment will be considered submitted when all required documentation has been received by the Departmental Representative.
  - .8 The Departmental Representative’s, or their delegate's, signature on extra work reports is only a record of the equipment, materials and labour hours utilized on the task, not an agreement to entitlement or quantification of that Work. Review and acceptance may be based on Contractor submitted finalized extra work reports, which are to include appropriate rates, quantities and applicable invoices. Labour and equipment rates are to be reviewed by the Departmental Representative against the appropriate accepted rates when submitted for payment.
  - .9 The Contractor shall submit extra work reports to the Departmental Representative within 24 hours of the day of extra work.

- .1 Extra work reports not submitted within the specified timelines may be denied payment at the Departmental Representative's sole discretion.
- .10 The Departmental Representative's, or their delegate's, signature on any of the Contractor's Daily Extra Work Reports shall not be an agreement to waive any portion of the Contract regardless of any wording to the contrary.
- .11 Unless otherwise provided for in the Contract, payment on a time and materials or lump sum basis represents complete payment (exclusive of GST) and reimbursement for all impacts, related costs and expenses, including, without limitation: time; labour; materials; equipment; mobilization; subcontracting; overhead; profit; general supervision; occupational tax and any other Federal or Provincial revenue legislation exclusive of GST; premiums for public liability and property damage insurance policies; bonding; for the use of all tools and equipment for which no specific rental payment provision exists; and for all costs incurred by the Contractor in supplying materials.
- .12 Reimbursement for Living Out Allowance (LOA), as agreed upon by the Departmental Representative, shall be pro-rated based on the portion of the standard 10-hour work day spent on extra work items up to a maximum of 10 hours. LOA reimbursement will only be considered for extra works completed under Force Account rates and payment for LOA will not exceed the agreed upon daily rate.

## 1.2 PRIME COST SUM

- .1 Included in Contract Price a total Prime Cost Sum of:
  - .1 **\$30,000.00** for items listed below.
- .2 Do not include in the Contract Price, additional contingency allowances for products, installation, overhead or profit.
- .3 Prime Cost Sum provided for in the Lump Sum Arrangement Table is not a sum due to the Contractor. Rather, payment will be made against it for miscellaneous work not included in the unit price table under the General Conditions of the Contract.
- .4 No interpretation of the items listed under Prime Cost Sum Allowances shall indicate that work will be included under the Prime Cost Sum. Items, tasks, and activities included in the Works elsewhere in the Contract, including Unit Price and Lump Sum Items, shall be paid as indicated in those sections and not under the Prime Cost Sum.
- .5 Any and all additional work must be approved in writing by the Departmental Representative prior to commencement.
- .6 All expenditures must be substantiated with verified invoices and/or accepted daily extra work reports as noted in Measurement and Payment Procedures below.
- .7 Such work may include, but not be limited to:
  - .1 Additional supply and installation of weather station towers and precipitation pedestals;
  - .2 Additional supply and installation of weather instrumentation, sensors and/or hardware;
  - .3 Additional supply and installation of infrastructure or equipment related to weather station towers and precipitation pedestals;

- .4 Additional supply and installation of communications infrastructure for weather station towers and precipitation pedestals;
  - .5 Additional supply and installation of fall protection infrastructure and personal equipment;
  - .6 Additional demolition of existing structures and disposal of waste materials as directed by the Departmental Representative;
  - .7 Danger tree assessment and removal, including wildlife surveys if required;
  - .8 Relocation / protection of existing utilities, including payment of utility service provider costs;
  - .9 Additional supply and installation of seeding;
  - .10 Supply and installation of additional landscaping;
  - .11 Drainage improvements, ditching, cleaning or other;
  - .12 Additional supply and installation of rock anchors;
  - .13 Relocation of existing structures;
  - .14 Miscellaneous work as directed by the Departmental Representative.
- .8 The Contract Price, and not Prime Cost Sum, includes Contractor's overhead and profit in connection with the Work.

**Part 2 Products**

- .1 Products shall be in accordance with AT Standard Specifications for Highway Construction or as directed by the Departmental Representative.

**Part 3 Execution**

- .1 Work shall be in accordance with AT Standard Specifications for Highway Construction or as directed by the Departmental Representative.

**END OF SECTION**



**01 25 20 MOBILIZATION AND DEMOBILIZATION****Part 1 General****1.1 DESCRIPTION**

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

**1.2 MEASUREMENT AND PAYMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.
- .2 Mobilization and Demobilization:
  - .1 Payment will be made under “**Lump Sum Price Item 1 – Mobilization / Demobilization**”.
  - .2 50% of Lump Sum Contract Price for Mobilization and Demobilization to be paid when mobilization to site is complete.
  - .3 The remainder of the Lump Sum Price for Mobilization and Demobilization to be paid when work is complete, and all materials, equipment, camp, buildings, shops, offices, and other facilities have been removed from site and site cleaned and left in condition to the satisfaction of the Departmental Representative and all other Agencies having Jurisdiction.
  - .4 Payment of only **5%** of the total price tendered will be scheduled as outlined above. If the amount bid for mobilization and demobilization is greater than **5%** of the total price tendered, payment of the remainder of the amount will be authorized when the Contract has been completed.

**Part 2 Products****2.1 NOT USED.****Part 3 Execution****3.1 NOT USED.****END OF SECTION**

**01 29 01 SITE OCCUPANCY****Part 1 General****1.1 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.2 DEFINITION OF OCCUPANCY**

- .1 The Contractor shall be permitted to lease and occupy sites where they will be working in the National Parks, free of charge from the date of award of the Contract up to and including the specified completion date. The sites to be leased by the Contractor include all the roads and areas specified in the Contract Documents and as directed by the Departmental Representative.
- .2 The Contractor's occupancy of the sites identified in Contract will be deemed to have ended, when the following conditions are met to the satisfaction of Parks Canada:
- .1 All the work identified under this Contract, has been completed.
- .2 Any outstanding deficiencies for the work identified under this Contract have been addressed to the satisfaction of the Departmental Representative.
- .3 Contractor has removed from the park all trailers and equipment and sites have been cleaned-up to the satisfaction of the Departmental Representative.

**Part 2 Products****2.1 NOT USED.****Part 3 Execution****3.1 NOT USED.**

**END OF SECTION**

**01 31 00 PROJECT MANAGEMENT AND COORDINATION****Part 1 General****1.1 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.2 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit requests for payment for review, and for transmittal to Departmental Representative. Payment request on last day of the month.
- .3 Submit requests for interpretation of Contract Documents and obtain instructions through Departmental Representative.
- .4 Process substitutions through Departmental Representative.
- .5 Process change orders through Departmental Representative.
- .6 Submittal Schedule:
  - .1 Prepare a schedule of the required submissions and the date the submissions will be made. Include columns for Actual Date of Submission, Review Comments Received, Final Submission and Final Acceptance Received. Provide this schedule to the Departmental Representative in Excel format.
  - .2 The Owner will not be responsible for any construction delays resulting from delays in submission acceptance if the submittal dates shown in the Submittal Schedule are not achieved.

**1.3 CHANGES TO DESIGN**

- .1 If a change from the IFC design is accepted in writing by the Departmental Representative and agreed on by the Contractor, a design variance letter will be issued by the Departmental Representative. The design variance letter must state what changes are being made from the IFC design and what the method of measurement for payment will be, if varying from the Contract Documents.
- .2 The design variance letter must be signed by both the Contractor's Representative and the Departmental Representative prior to performing the Work.
- .3 The Departmental Representative reserves the right to use as-built survey or neat line measurements for payment if for any reason tolerances are not in accordance with the IFC design.

**1.4 COORDINATION**

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

## **1.5 PROJECT MEETINGS**

- .1 During the course of the Work, the Contractor shall attend weekly construction meetings as scheduled, chaired, and documented by the Departmental Representative.
- .2 The agenda will include among other things, general construction, payment, scheduling, risk, quality, environmental, and safety management items as well as any other reasonably requested by the parties.
- .3 The Contractor shall provide physical space and make arrangements for meetings at or near the Work Sites for all meetings that take place in relation to the Contract from their mobilization until their demobilization.
- .4 Meetings held outside of the time noted above (before mobilization or after demobilization) will either be held in the local PCA Field Unit offices, or at the Owner's site office, as notified by the Departmental Representative.
- .5 The Contractor will attend or otherwise ensure the attendance of their staff, subcontractors, consultants, suppliers, or other key parties all other meetings identified in the Contract or reasonably requested by the Departmental Representative in an effort to resolve specific issues as they may arise.
- .6 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.
- .7 As described in Section 01 35 43 – Environmental Procedures, an environmental briefing for all staff will take place before beginning work at the site.

## **1.6 CONSTRUCTION ORGANIZATION AND START-UP**

- .1 Within seven (7) days after award of Contract, request a Preconstruction meeting of Contract Representatives to discuss and resolve administrative procedures and responsibilities. Meeting shall be chaired by the Departmental Representative who will prepare the minutes of the meeting.
- .2 Senior representatives of the Owner, Departmental Representative, Contractor, major subcontractors, field inspectors and supervisors are to be in attendance.
- .3 Agenda to include the following:
  - .1 Appointment of official representative of participants in Work.
  - .2 Schedule of Work, progress scheduling in accordance with Section 01 32 16 – Construction Progress Schedules.
  - .3 Schedule of submittals in accordance with Section 01 33 00 – Submittal Procedures.
  - .4 Requirements for temporary facilities, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 – Construction Facilities.
  - .5 Site safety and security in accordance with Sections 01 14 00 – Work Restrictions, 01 35 29 – Health and Safety Requirements, 01 52 00 – Construction Facilities and 01 35 43 – Environmental Procedures.
  - .6 Quality Control in accordance with Section 01 45 00 – Quality Control.
  - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
  - .8 Owner-furnished materials.

- .9 Monthly progress claims, administrative procedures, photographs, and holdbacks.
- .10 Closeout procedures and submittals in accordance with Sections 01 77 00 – Closeout Procedures and 01 78 00 – Closeout Submittals.
- .11 Insurances and transcript of policies.
- .12 Other business.
- .4 Comply with Departmental Representative's allocation of mobilization areas of site, for field offices and sheds, and for access, traffic, and parking facilities.
- .5 During construction, coordinate use of site and facilities through Departmental Representative's procedures for intra-project communications: submittals, reports and records, schedules, coordination of Drawings, recommendations, and resolution of ambiguities and conflicts.
- .6 Comply with instructions of the Departmental Representative for use of temporary utilities and construction facilities.
- .7 Coordinate field engineering and layout work with the Departmental Representative.

## **1.7 ON-SITE DOCUMENTS**

- .1 Maintain at job site, one copy each of the following:
  - .1 Contract Drawings if part of tender
  - .2 Specifications
  - .3 Addenda
  - .4 Reviewed Shop Drawings and mix designs
  - .5 Change Orders
  - .6 Other modifications to Contract
  - .7 Traffic Management Plan
  - .8 Safety Plan
  - .9 WHMIS
  - .10 Environmental Protection Plan
  - .11 Quality Control Plan and field test reports
  - .12 Copy of accepted Work schedule and most recent updated schedule
  - .13 Labour conditions and wage schedules
  - .14 Equipment rate schedule and applicable versions of the relevant rate guides
  - .15 Applicable current editions of municipal regulations and by-laws
  - .16 WorkSafe AB Notice of Project

## **1.8 PROJECT SCHEDULES**

- .1 In accordance with Section 01 32 16 - Construction Progress Schedules.

Project No. XXXXXX

Weather Stations

Waterton Lakes National Park

Revision: 0

Parks Canada Agency

Page 22

**Part 2 Products**

**2.1 NOT USED.**

**Part 3 Execution**

**3.1 NOT USED.**

**END OF SECTION**

**01 32 16 CONSTRUCTION PROGRESS SCHEDULES****Part 1 General****1.1 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.2 SUBMITTALS**

- .1 In accordance with Section 01 33 00 – Submittals Procedures.
- .2 Submit to Departmental Representative within 10 working days of Award of Contract a Microsoft Project format Master Plan for planning, monitoring and reporting of project progress.

**1.3 DEFINITIONS**

- .1 Activity: An element of Work performed during course of Project. An activity normally has an expected duration and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (Gantt Chart): A graphic display of schedule-related information. In a 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 accepted plan for Project.
- .4 Construction Work Week: Monday to Saturday, inclusive, will provide six-day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: Number of work periods (not including holidays or other nonworking periods required to complete an activity or other Project element. Usually expressed as workdays or work weeks.
- .6 Master Plan: A summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: A significant event in Project, usually completion of a major deliverable.
- .8 Project Schedule: The planned dates for performing activities and the planned dates for meeting milestones. A dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: Overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

**1.4 REQUIREMENTS**

- .1 Ensure the Project Schedule is practical and remains within specified Contract duration.

- .2 Ensure all the Work required for the Contract is identified in the Project Schedule. Refer to Section 01 11 00 – Summary of Work for a potential list of activities.
- .3 Include an allowance in the schedule for Work performed and paid for as Prime Cost Sum. Refer to Section 01 21 00 – Allowances for a list of potential activities.
- .4 Include the requirements of Section 01 14 00 – Work Restrictions and Section 01 35 43 – Environmental Procedures.
- .5 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.
- .6 After review, revise and resubmit schedule to comply with revised project schedule.
- .7 During progress of Work revise and resubmit as directed by the Departmental Representative. If schedule is requested and not received, the Departmental Representative may hold back progress payment until an updated Project Schedule is received and accepted.

## **1.5 PROJECT MILESTONES**

- .1 Project milestones form interim targets for Project Schedule.
- .2 Include in Project Schedule the Contractual dates under Section 01 11 00 - Summary of Work.

## **1.6 MASTER PLAN**

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Revise Departmental Representative reviewed impractical schedule and resubmit within 5 working days.
- .3 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 separately identifies the Work by area and station.
- .3 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
  - .1 Contract Award
  - .2 Obtaining Permits
  - .3 Pre-mobilization Submittals
  - .4 Site Investigation
  - .5 Mobilization
  - .6 Demolition
  - .7 Excavation
  - .8 Concrete
  - .9 Drilling and Grouting Rock anchors
  - .10 Tower Installation
  - .11 Electrical Hook Up



- .12 Remediation of any noted deficiencies
- .13 Site Clean-up / Demobilization
- .14 Final Completion

## **1.8 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on monthly basis or as and when requested by the Departmental Representative, reflecting activity changes and completions, as well as activities in progress.
- .2 Provide Weekly Progress Reports that identify completed work and Work planned for the following week in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Include as part of Project Schedule Update, a narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

## **1.9 PROJECT MEETINGS**

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

## **Part 2 Products**

### **2.1 NOT USED.**

## **Part 3 Execution**

### **3.1 NOT USED.**

**END OF SECTION**

**01 33 00 SUBMITTAL PROCEDURES****Part 1 General****1.1 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.2 SUBMITTALS****.1 General**

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

**.2 Pre-Mobilization Submittals**

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

- .1 Project schedule, detailing the schedule of the workdays required from Contractor, subcontractors, suppliers and consultants to complete each activity of the project by location in order to meet stages specified in Section 01 32 16 – Construction Progress Schedules. In addition, for each activity critical elements that could impact on the schedule are to be identified. Submission shall include both a paper copy of the schedule and an electronic copy in Microsoft Projects format.
- .2 Environmental Protection Plan (EPP) that meets the requirements of Section 01 35 43 – Environmental Procedures. Submission of EPP must allow 2 weeks for review by the Parks ESO, in accordance with Section 01 35 43 – Environmental Procedures.
- .3 Plan describing methods the Contractor will have to meet their responsibilities as the Prime Contractor for Safety and Traffic Control within the Work limits and to co-ordinate Work, traffic control, site access, safety, with other Contractors working in or adjacent to the Contract Work zone.
- .4 Health and Safety Plan - The Contractor shall have a Representative. The Health and Safety Plan must include:
  - .1 Contractor's safety policy;
  - .2 Identification of applicable compliance obligations;
  - .3 Definition of responsibilities for project;
  - .4 Safety/organization chart for project;
  - .5 Site specific hazard assessment;
  - .6 General safety rules for project;
  - .7 Job specific safe work procedures;
  - .8 Inspection policy and procedures;
  - .9 Incident reporting and investigation policy and procedures;
  - .10 Occupational Health and Safety communications and record keeping procedures;

- .11 Results of safety and health risk or hazard analysis for site tasks and operation.
- .5 The Contractor shall implement and maintain the Health and Safety Plan during the Work. Where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative. Health and Safety Plan must include in accordance with Section 01 35 29-Health and Safety Requirements.
  - .1 Contractor shall develop an “Emergency Procedures Protocol” in consultation with Parks Canada. On site Contingency and Emergency Response Plan to address standard operating procedures to be implemented during emergency situations. Emergency Response Plan can be incorporated into the Health and Safety Plan.
- .6 Traffic Management Plan, in accordance with the requirements of Section 01 35 31 – Special Procedures for Traffic Control.
  - .1 Site Access and Detour Plans shall include, but not be limited to, engineered drawings and procedures for accessing all areas of the Work or for proposed detours.
- .7 Quality Control Plan in accordance with Section 01 45 00 – Quality Control, including Quality Control checklist examples for each item of Work.
- .8 Submit a copy of the filed Notice of Project with Provincial authorities.
- .9 Alberta One Call and Utilities Coordination Plan, including notifications to Utility Owners.
- .10 Contractor and any subcontractors to submit a copy of their valid Parks Canada Business License.
- .11 Contractor and Subcontractor Chain of Command, listing key Contractor personnel, including for each name, position, qualification, experience, telephone and cellular telephone. The list shall include the names and telephone/cellular telephone for contact persons who are available on a 24-hour basis in the event of emergencies.
- .12 List of subcontractors, suppliers and consultants, their role and their key personnel, including Forman, experience of key personnel, including names and positions, addresses, telephone and cellular telephone.
- .13 Work Plan, describing in detail for each activity by location, the Contractor’s intended methods of construction, and materials, equipment and manpower that will be used to meet stages specified in Section 01 32 16 – Construction Progress Schedules. The Work Plan must be linked to the Project Schedule.
- .14 Schedule of Force Account rates, in accordance with Section 01 21 00 – Allowances.
- .15 The Contractor shall not begin any Work on the Site until the Departmental Representative has provided a Notice to Proceed.
- .3 **Construction Phase Submittals**
  - .1 Monthly Progress Reports in accordance with Section 01 32 16 – Construction Progress Schedules.
  - .2 Weekly Progress Reports that outline the detailed Work (Contractor, subcontractors, suppliers, consultants) completed to date as well as the

anticipated Work to be performed for the following week on a day-by-day basis. Work to be linked to activities by location identified in project schedule and to provide information on materials, equipment and manpower. Also, alternate Work to be identified if Work or a portion of, proposed cannot be done due to weather, equipment breakdown, delays in delivery, etc. Weekly Progress Reports shall be submitted at the end of each week.

- .3 Quality Control Inspection Reports - The Contractor shall maintain a daily inspection report that itemizes the results of all Quality Control inspections conducted by the Contractor. The reports shall be submitted to the Departmental Representative with the Weekly Progress Report. A summary of all Quality Control inspections conducted to date shall be submitted by the Contractor with each Weekly Progress Report.
- .4 "Design and Build" documents, Shop Drawings and Mix Designs – The Contractor shall submit all design drawings, shop drawings and mix designs required to fabricate and / or conduct the work a minimum fourteen (14) calendar days prior to fabrication / production.
- .5 Progress Photographs Format:
  - .1 Electronic: .jpg files, minimum three (3) mega pixels.
  - .2 Submission requirements: one (1) set of electronic files.
  - .3 Identification: Name and number of project, description of photograph and date.
  - .4 Viewpoints: viewpoints determined by Construction Manager or Departmental Representative.
  - .5 Submission Frequency: prior to commencement of Work and weekly thereafter with progress statement, or as directed by Construction Manager or Departmental Representative.
  - .6 Submit all electronic pictures as part of closeout package.
- .6 Submit an electronic copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative and authority having jurisdiction, weekly.
- .7 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors immediately.
- .8 Submit copies of incident and accident reports immediately.
- .9 Submit daily extra work reports in accordance with Section 01 21 00 – Allowances.

**.4 Project Completion Submittals**

- .1 Record Drawings -The Contractor shall submit copies of all Contractor's Drawings revised as necessary to record all as-built changes to the Work and the Contractor shall submit a set of Contract Drawings clearly marked to record as-built changes to the Work. Record drawings must be submitted in PDF and AutoCAD format.
- .2 Quality Control Records – The Contractor shall submit a .pdf electronic file containing an itemized set of project quality control documentation.
- .3 All other documents noted within the Contract Documents, and under Section 01 78 00 – Closeout Submittals.

- .5 The Contractor shall not construe the Departmental Representative's authorization of the submittals to imply approval of any particular method or sequence for conducting the Work, or for addressing health and safety concerns. Authorization of the programs shall not relieve the Contractor from the responsibility to conduct the Work in strict accordance with the requirements of Federal or Provincial regulations and 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.
- .6 The Departmental Representative may, at their sole discretion, withhold payment from the Contractor for Work completed until acceptable submittal documents have been provided by the Contractor to the Departmental Representative.

### 1.3 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete, and written acceptance of the submittal has been issued by the Departmental Representative.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Submittals must be accompanied by a completed Quality Control Checksheet in accordance with Section 01 45 00 – Quality Control prior to submission to Departmental Representative. This completed Quality Control Checksheet represents that all the necessary requirements have been met and that the submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.
- .6 Notify Departmental Representative in writing at time of submission, identifying any deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work is consistent.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one accepted copy of each submission on site.

### 1.4 “DESIGN AND BUILD”, SHOP DRAWINGS, PRODUCT DATA, AND MIX DESIGNS

- .1 “Design and Build”: The term “Design” refers to all detailed design activities (survey, investigation, drawings, specifications) based on general requirements contained in the Contract Documents. “Build” refers to construction of Contractor's detailed design after design has been reviewed by the Departmental Representative. Contractor's

- responsibility for error and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .2 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data that are to be provided by the Contractor to illustrate details of a portion of Work.
  - .3 Submit drawings stamped and signed by professional engineer registered or licensed in Alberta, Canada.
  - .4 The term "Mix Design" means an engineered design for proportioning materials in concrete or asphalt concrete pavement including all supporting test results, materials properties, that is acceptable to the Departmental Representative.
  - .5 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of section under which adjacent items will be supplied and installed. Indicate cross-references to Contract Documents.
  - .6 Allow fourteen (14) calendar days for Departmental Representative's review of each submission.
  - .7 Adjustments made on shop drawings by the Departmental Representative are not intended to change the Contract Price. If adjustments affect the value of Work, state such in writing to the Departmental Representative prior to proceeding with the Work.
  - .8 Make changes in shop drawings as the Departmental Representative may require, consistent with the Contract Documents. When resubmitting, notify the Departmental Representative in writing of any revisions other than those requested.
  - .9 Submit letter(s) of certification with all mix designs.
  - .10 Accompany submissions with a transmittal letter containing:
    - .1 Date.
    - .2 Project title and number.
    - .3 Contractor's name and address.
    - .4 Identification and quantity of each shop drawing, mix design, product and sample.
    - .5 Other pertinent data.
  - .11 Submissions shall 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 the Contract Documents.
    - .5 Details of appropriate portions of the Work as applicable:
      - .1 Fabrication,

- .2 Performance characteristics,
- .3 Standards.
- .12 After the Departmental Representative's review, distribute copies.
- .13 Submit one (1) electronic copy of the shop drawings or mix design for each requirement requested in the Contract Documents and as requested by the Departmental Representative.
- .14 Submit one (1) electronic copy of the product data sheets or brochures for requirements requested in the Contract Documents and as requested by the Departmental Representative where shop drawings will not be prepared due to standardized manufacture of the product.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .18 The review of shop drawings and mix designs by Departmental Representative is for the sole purpose of ascertaining conformance with the Contract requirements. This review shall not mean that Departmental Representative approves details of the design inherent in shop drawings, responsibility for that shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract Documents. Without restricting the generality of the foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub-trades.

## **1.5 SAMPLES**

- .1 Material samples to be provided as outlined in the Contract Documents or as requested by the Departmental Representative.

## **1.6 MOCK-UPS**

- .1 Not used.

## **1.7 CERTIFICATES AND TRANSCRIPTS**

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

Project No. XXXXXX

Weather Stations

Waterton Lakes National Park

Revision: 0

Parks Canada Agency

Page 32

**Part 2 Products**

**2.1 NOT USED.**

**Part 3 Execution**

**3.1 NOT USED.**

**END OF SECTION**



## 01 35 29 HEALTH AND SAFETY REQUIREMENTS

### Part 1 General

#### 1.1 REFERENCES

- .1 All standards listed below shall be the latest issue at the time of tender.
- .2 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .3 Health Canada/Workplace Hazardous Materials Information System  
.1 (WHMIS) Material Safety Data Sheets (MSDS).
- .4 Province of Alberta - Occupational Health and Safety Act.
- .5 Appendix D – PCA Safe Work Practices.

#### 1.2 MEASUREMENT AND PAYMENT PROCEDURES

- .1 This work shall be incidental to the Contract and will not be measured for payment.
- .2 Development of a Fall Protection Plan, required for the installation and maintenance of the weather stations, shall be incidental to **“Lump Sum Price Item# 4 – Fall Protection Plan”** and no separate payment shall be made to the Contractor. Fall Protection Plan shall include all fall protection procedures necessary to safely perform install and long-term maintenance work as described in the Contract Documents..

#### 1.3 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work and provide a copy to the Departmental Representative. Notice of Project to be posted onsite upon mobilization and remain posted until project completion.

#### 1.4 SAFETY ASSESSMENT

- .1 Perform task specific safety hazard assessment related to project and prepare applicable task specific safety plans (eg. Fall Protection Plan, Precipitation Gauge Maintenance Plan).

#### 1.5 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work. This meeting may be combined with the Preconstruction meeting identified elsewhere.
  - .1 At this meeting the Contractor is required to complete and sign an Attestation to certify the Contractor will comply with the requirements set out in the Attestation and the terms and conditions of the Contract.
  - .2 A copy of the “Attestation and Proof of Compliance with Occupational Health and Safety (OHS)” form is part of the Invitation to Tender package.
- .2 Parks Canada recognizes that federal Occupational Health and Safety legislation places specific responsibilities upon Parks Canada as owner of the work place. In order to meet those requirements, Parks Canada has implemented a contractor safety regime to ensure roles and responsibilities assigned under Part II of the Canada Labour Code and the Canada Occupational Health and Safety Regulations are implemented and observed

when involving contractor(s) to undertake work in Parks Canada work places, including on Parks Canada property.

## **1.6 REGULATORY REQUIREMENTS**

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

## **1.7 PROJECT / SITE CONDITIONS**

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

## **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. Health and Safety Plan must address Project Specifications.
- .2 Develop written site-specific Fall Protection Plan, according to requirements in Section 33 42 36, based on site specific hazard assessment and weather station design.
- .3 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 The Contractor shall act as the Prime Contractor in all matters relating to Occupational Health and Safety. They shall conduct their work and make all such arrangements necessary to allow them to be accepted as such by the relevant Provincial Authorities.
- .2 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.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

## **1.10 COMPLIANCE REQUIREMENTS**

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

## **1.11 UNFORESEEN HAZARDS**

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

## **1.12 HEALTH AND SAFETY REPRESENTATIVE**

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Co-ordinator must:
  - .1 Have suitable and relevant site-related working experience specific to activities associated with mountain construction.

- .2 Have working knowledge of occupational safety and health regulations.
- .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
- .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

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

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

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

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected. The Contractor shall do as requested at their cost and no claim for time or additional costs will be accepted.

#### **1.15 POWDER ACTUATED DEVICES**

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

#### **1.16 WORK STOPPAGE**

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

### **Part 2 Products**

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

### **Part 3 Execution**

#### **3.1 NOT USED.**

**END OF SECTION**

**01 35 31 SPECIAL PROCEDURES FOR TRAFFIC CONTROL****Part 1 General****1.1 DESCRIPTION**

- .1 Supply, installation, maintenance and removal of Traffic Accommodation for the duration of the Contract or as described in this Section.

**1.2 REFERENCES**

- .1 Alberta - Traffic Accommodation in Work Zones Manual (2018)
- .2 AT – Standard Specifications for Highway Construction – Signing and Pavement Markings (latest edition)
- .3 Manual of Uniform Traffic Control Devices for Canada, (MUTCD) distributed by Transportation Association of Canada. (latest edition)

**1.3 MEASUREMENT AND PAYMENT PROCEDURES**

- .1 This work shall be incidental to the Contract and will not be measured for payment.
- .2 Payment for Traffic Control as described in this Section, shall be made under **“Lump Sum Price Item 2 – Traffic Accommodation”** and the price(s) bid shall be full compensation for the cost of furnishing all labour, materials, equipment, tools and incidentals necessary to complete the work as specified in the Contract Documents.
- .3 Payment for Traffic Accommodation will be on a monthly basis based on the percent of Contract Works completed, not to exceed the total lump sum bid price for Traffic Accommodation. Extra works are not to be included in determining the percent complete of the Contract.
- .4 Payment for Traffic Accommodation will commence once the Contractor has implemented their accepted Traffic Management Plan and setup is accepted by the Departmental Representative.
- .5 Items considered incidental to the Work include, but are not limited to:
  - .1 Traffic control required to close the Cameron Bay Day Use Area to the public when long-lining.
  - .2 Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures.
  - .3 Repairing any damage to any roadway caused by the work.
  - .4 Cost of snow removal required by the Contractor to complete the work identified in the Contract.
- .6 The Contractor shall not be responsible for the snow removal required for general highway road maintenance operations within the limit of construction so long as the roadway has been left in a condition deemed suitable, by Departmental Representative, for maintenance crews to safely complete the work.

**1.4 GENERAL**

- .1 Regardless of type of traffic control being used, **maximum period of delay to public traffic shall be 20 minutes.**

- .2 The Contractor shall develop and implement a Traffic Management Plan in accordance with Alberta - Accommodation in Work Zones Manual (2018) except where specified otherwise in the Contract Documents. The Traffic Management Plan will include plans specific to each roadway for this project.
- .3 The Traffic Management Plan must duly consider the traffic volumes associated with the direction volume increases typically experienced on the lead up to weekends and/or special events. Adjustments to the TMP may be required at the request of the Departmental Representative to mitigate delays in excess of the stipulated maximum 20 minutes.
- .4 The Contractor shall design, supply, erect, move and maintain all traffic control devices, signs, temporary pavement marking, other safety measures and provide staff to ensure safe passage of all traffic from commencement of site work to date of acceptance by the Departmental Representative.
- .5 The Contractor shall supply all necessary traffic control measures to ensure no helicopter long lining of loads occurs over the open highway or public areas. The Contractor shall note the following:  
All cost associated with traffic control during long lining will be incidental to **“Lump Sum Price Item 2 – Traffic Accommodation”**.
- .6 The Contractor shall coordinate traffic management procedures with other Contractors working in the immediate vicinity as well as collaborate with the Departmental Representative in respect to Traffic Management restrictions on the Highway Network. In consideration of the number of grading, paving and bridge construction projects in the corridor the Contractor must make a concerted effort to coordinate their traffic management strategies with other stakeholders. The Contractor must also be prepared to attend traffic management and construction staging coordination meetings as requested by the Departmental Representative.
- .7 The Contractor is responsible for keeping the roadway, within the Construction Limits, clean at all times. Sweeping, grading and/or dust control to the acceptance of the Departmental Representative is considered incidental to the Contract and no additional payment will be made.

## 1.5 PROTECTION OF PUBLIC TRAFFIC

- .1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- .2 Carry out traffic regulation in accordance with AT – Standard Specifications for Highway Construction – Signing and Pavement Markings (latest edition)), except where specified otherwise.
- .3 When working on existing travelled way:
  - .1 Place equipment in a position presenting a minimum of interference and hazard to traveling public.
  - .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
  - .3 Do not leave equipment on travelled way overnight.
- .4 The Contractor shall develop and have in place a completed Traffic Management Plan taking into account all hazards associated with construction operations on a busy highway and minimize risks to motorists prior to beginning Work. This plan shall be

- updated regularly in response to any incidents or changes in conditions, be they weather, work, traffic, or otherwise.
- .5 The Contractor shall submit a Traffic Management Plan prior to commencement of work. Short closures may be allowed by the Departmental Representative for some activities such as long lining over the highway as long as the delay to motorists does not exceed the stipulated maximum 20 minutes.
  - .6 Do not close any lanes of road without approval of Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with the requirements of the Alberta - Accommodation in Work Zones Manual (2018) except where specified otherwise.
  - .7 Emergency vehicles (i.e., ambulance, RCMP, Park Warden) must be granted immediate passage at all times. The Departmental Representative reserves the right to reduce delay time for public traffic at times when specified delay results in excessive backup of public traffic.
  - .8 The Contractor shall provide competent supervision and/or contact personnel as required during non-working hours to ensure that safety flares, flashing beacons, signs, lights, etc., are in proper working order.
  - .9 Traffic control measures will be monitored by the Departmental Representative, who may require modifications of these measures from time to time to achieve satisfactory traffic flow, safety of traveling public and coordination with adjacent contracts.
  - .10 The Contractor shall maintain a dust free construction zone by means of cleaning and watering when required.

## 1.6 CONTROL OF PUBLIC TRAFFIC

- .1 Contractor shall provide competent flag persons, trained in accordance with, and properly dressed and equipped as specified in Alberta - Accommodation in Work Zones Manual (2018).
  - .1 When public traffic is required to pass working vehicles or equipment, that block all or part of travelled roadway.
  - .2 When large vehicles are entering or exiting Work Site access points.
  - .3 When it is necessary to institute traffic control during helicopter long lining over the highway.
  - .4 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
  - .5 Where temporary protection is required while other traffic control devices are being erected or taken down.
  - .6 For emergency protection when other traffic control devices are not readily available.
  - .7 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
  - .8 At each end of restricted sections where pilot cars are required.
- .2 In consideration of the anticipated cumulative effect of the multiple construction sites in the corridor traffic total travel time delay through the construction zones must not exceed 90 minutes, as a result of all construction activities in WLNP. To maintain that

objective a concerted effort must be made between all of the active contractors to coordinate construction sequencing.

- .3 No stoppage of traffic will be allowed for the periods specified in Section 01 14 00 – Work Restrictions, pertaining to Statutory Holiday or long weekend unless approved in advance by the Departmental Representative.

## **1.7 OPERATIONAL REQUIREMENTS**

- .1 Maintain existing conditions for traffic throughout period of Contract except that, when required for construction under Contract and when measures have been taken as specified herein and approved by Departmental Representative to protect and control public traffic, existing conditions for traffic to be restricted as follows:
  - .1 Speed limit reduced to 70 km/h in work zones in non-work periods.
  - .2 Speed limit reduced to 50 km/h in work zones in work periods.
  - .3 Speed limit reduced to 50 km/h on detours at all times.
  - .4 Full traffic closures for the purposes of helicopter long lining over the highway will be permitted under the following conditions:
    - .1 Short full closures for a maximum of 20 minutes will be permitted by the Departmental Representative, provided the site specific total delay time to motorists does not exceed 45 minutes.
    - .2 Coordinate full closures with other contractors in the area.
    - .3 Overall traffic delay in Waterton Lake National Park shall not exceed 20 minutes.
  - .5 There may be restrictions to accommodate special events within the National Parks.
  - .6 The Departmental Representative reserves the right to stop work in the case of excessive traffic delays. The Contractor shall do as requested at their cost and no claim for time or additional costs will be accepted.
  - .7 Maintain existing conditions for traffic crossing right-of-way.
  - .8 Provide the Departmental Representative with construction advisories for posting to the 511.alberta website (<http://511.alberta.ca/>) and update advisories regularly to reflect the current and planned construction activities and highway closures. A minimum of 4 days notice is required for changes to the accepted TMP.
  - .9 Emergency vehicles are to be directed through the Work Site immediately once conditions are safe.
  - .10 No stoppage of traffic shall be allowed during inclement weather conditions.

## **Part 2 Products**

### **2.1 NOT USED.**

## **Part 3 Execution**

### **3.1 NOT USED.**

**END OF SECTION**

## **01 35 43 ENVIRONMENTAL PROCEDURES**

### **Part 1 General**

#### **1.1 REFERENCES**

- .1 All standards listed below shall be the latest issue at the time of tender.
- .2 DFO Measures to Protect Fish and Fish Habitat
  - .1 <https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html>
- .3 Environmental Protection Plan Template to be provided after contract award.

#### **1.2 MEASUREMENT AND PAYMENT PROCEDURES**

- .1 This Work shall be incidental to the Contract and will not be measured for payment.
- .2 Preparation and implementation of an Environmental Protection Plan (EPP) in accordance with this Section 01 35 43 – Environmental Procedures, including certification by a registered Qualified Environmental Professional (QEP), will not be measured separately for payment and will be considered incidental to the Work.
- .3 Payment for Environmental Procedures and controls as described in this Section, shall not be measured for payment and will be considered incidental to the unit price items.
- .4 Items considered incidental to the Work include, but are not limited to:
  - .1 All environmental mitigations required in accordance with the Contract Documents.
  - .2 Any required briefings by a PCA Environmental Surveillance Officer.
  - .3 Preparation and implementation of an Environmental Protection Plan in accordance with this Section 01 35 43 – Environmental Procedures, including certification by a registered QEP.

#### **1.3 SUBMITTALS**

- .1 The Contractor is required to prepare and submit an Environmental Protection Plan in accordance with this Section 01 35 43 – Environmental Procedures and Section 01 33 00 – Submittal Procedures. The EPP document will be reviewed and accepted for use on the project by the Departmental Representative in collaboration with the Parks Canada designated Environmental Surveillance Officer (ESO).

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

- .1 The Contractor and workers shall dispose of hazardous wastes in conformance with the Environmental Contaminants Act and applicable provincial regulations while observing the Code of Good Practice for Management of Hazardous and Toxic Wastes at Federal Establishments.
- .2 All wastes originating from construction, trade, hazardous and domestic sources, shall not be mixed, but will be kept separate.
- .3 Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site or elsewhere in the National Parks. These wastes shall be contained and removed in a timely and approved manner by the Contractor and workers and disposed of at an appropriate waste landfill site located



outside the Park. Construction waste storage containers, provided by the Contractor, shall be emptied by the Contractor when 90% full. Waste containers will have lids, and waste loads shall be covered while being transported.

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

## 1.5 NATIONAL PARK REGULATIONS

- .1 The Contractor shall ensure that all work is performed in accordance with the ordinances, laws, rules and regulations set out in the Canada National Parks Act and Regulations.
- .2 The Contractor and any sub-contractors shall obtain a business license from a Parks Canada Administration Office, prior to commencement of the Contract. The business license must be valid for the Park in which the Work is occurring.
- .3 All Contractor's vehicles are required to display a vehicle work pass from PCA. These permits may be obtained free of charge from the PCA Administration Office once a business permit has been obtained.

## 1.6 IMPACT ASSESSMENT ACT (IAA)

- .1 Execution of the work is subject to the provisions within the *Impact Assessment Act* and subsequent amendments.
- .2 The Contractor is required to implement all recommendations and mitigations and follow all procedures and processes whether supply, construction, administration or otherwise as described in particular in this Section 01 35 43 – Environmental Procedures, the PRIA and all Contract Documents.
- .3 The Contractor shall prepare their Environmental Protection Plan (EPP) to implement the mitigations identified in this Section 01 35 43 – Environmental Procedures, the PRIA and all Contract Documents as a minimum but shall ensure that all environmental requirements under the Contract and associated with the Works are appropriately managed through their EPP processes.

- .4 Where there is a discrepancy or inconsistency between this Section 01 35 43 – Environmental Procedures and other documents, this Section takes precedence over other documents.
- .5 Failure to comply with or observe environmental protection measures as identified in the Contract Documents may result in the work being suspended pending rectification of the problems. The Contractor shall do as requested at their cost and no claim for time or additional costs will be accepted.

## 1.7 ENVIRONMENTAL BRIEFING AND ESO

- .1 **All staff employed at the construction site will be required to attend an approximate one (1) hour environmental briefing presented by PCA prior to their commencement of work on site.** It is recognized that new employees may join the Contractors' work force after the initial round of "environmental briefing". In that case and as required, subsequent "environmental briefings" can be presented as numbers warrant, by arrangement with the ESO through the Departmental Representative. Also, some sub-trades may be present at the site for a short time, to perform once-only duties. In these cases, the "environmental briefing" will be replaced by the Contractor explaining the environmental sensitivity of the work location to the sub-trade worker(s), and reviewing highlights of personal conduct expected, with reference to a one-page briefing summary to be provided to the Contractor by the ESO. A copy of this summary will be provided to each sub-trade worker joining the work force at the site.
- .2 Parks Canada will have an ESO attending the site to inspect 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 inspect 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.
- .3 The ESO is not to act as daily environmental monitor but shall check activities with the approved EPP to ensure compliance, at their discretion.
- .4 The Contractor's QEP shall be responsible for ensuring all activities are conducted in accordance with the Contract Documents.

## 1.8 ENVIRONMENTAL PROTECTION PLAN

- .1 The EPP is to be prepared using the provided EPP Template and certified by a Qualified Environmental Professional. Certification by a QEP is considered incidental to the Works and no additional payment will be made.
- .2 Changes and/or revisions to the EPP may be required by the ESO as the Work progresses and more information becomes available. No additional payment will be made for changes and/or revisions to the EPP.
- .3 The Contractor's EPP will detail how the work limits shall be marked and what procedures will be employed to ensure trespass outside these limits does not occur, to the satisfaction of the Departmental Representative and the ESO.
- .4 The EPP will include how the Contractor will manage all environmental risks and specify site-specific details for implementing mitigation or achieving mitigation

outcomes identified in particular in this Section 01 35 43 – Environmental Procedures, PRIA, and all Contract Documents.

- .5 Spill Response and Erosion and Sedimentation Management Plans are to be included in the EPP, in accordance with this Section.
- .6 QEP resumes are to be included in the EPP for Departmental Representative and ESO review.
- .7 The Contractor shall submit the EPP in accordance with Section 01 33 00 – Submittal Procedures, shall **allow no less than 2 weeks for the review of their EPP** and shall address and respond to all comments raised during the review within a maximum of 2 weeks.

## 1.9 RESTRICTED ACTIVITY PERMITS

- .1 Prior to commencing any activity, the Contractor may be required to first obtain a Restricted Activity Permit (RAP) in consultation with PCA and Departmental Representative.
- .2 Prior to mobilization, Contractor is to establish what RAPs are required for the Works, for the duration of the project. Include, in the project schedule, the acquisition of the application for RAPs, allowing no less than 2 weeks for review and acceptance by the PCA Field Unit.
- .3 Contractor shall list RAPs they require in the EPP / on the RAP Application form which will be provided by the Departmental Representative.
- .4 The Contractor is required to submit an application form to the Departmental Representative for each required RAP.
- .5 RAP application details include, but are not limited to: Name of activity, start and end date of activity, location of Work, Contractor company name and address, Contractor contact name, phone number and email address and vehicle / equipment information.
- .6 Following the application submission, the Contractor may be required to provide further details regarding the Work to PCA.
- .7 Submission of a RAP application to the Departmental Representative does not permit the Contractor to commence the restricted activity.

## 1.10 CONSTRUCTION SITE ACCESS AND PARKING

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

**1.11 ACCIDENTAL FINDS**

- .1 It is possible that undocumented historic objects will be found within the Project limits. If significant features are encountered, stop Work in the immediate area, notify the Departmental Representative, take photographs of the findings and a GIS location reading.
- .2 Significant features include items such as:
  - .1 Structural remains, high artifact concentrations, tent platforms, cornerstones, commemorative plaques, inscribed tablets, log cribbing retaining features, human remains, marked trees and other various items.
  - .2 If unsure, contact the Departmental Representative immediately.
- .3 The Departmental Representative will notify the Contractor when Works can resume in the area.
- .4 Should any process or requirements regarding archeological matters listed in this Section contradict the PRIA and other Contract Documents, the PRIA shall take precedence.
- .5 All historical or archaeological objects found in the National Parks are protected under the National Parks Act and Regulations and are the property of Parks Canada. The Contractor and workers shall protect any articles found and request direction from the ESO or the Departmental Representative.

**1.12 MISCELLANEOUS SITE MANAGEMENT CONTINGENCIES**

- .1 A Contractor's office and work headquarters material laydown, equipment parking and storage area will be permitted in accordance with this Section and Section 01 14 00 - Work Restrictions.
- .2 Removal and storage of snow shall be in accordance with Section 01 35 31 - Special Procedures for Traffic Control. If coordination is required, the Contractor shall coordinate through the Departmental Representative.
- .3 The Contractor shall control blowing dust and debris generated from the construction site by means such as covering or wetting down dry materials and rubbish. Dust generated during the grade construction and or utilization of any temporary access roads must be kept at a reasonable level so as not to impart any hazard to the public traffic. Control measures must be initiated as and when required and may require increased vigilance at the discretion of the Departmental Representative.

**1.13 SPECIFIC CONCERNS RELATIVE TO EROSION CONTROL AND SEDIMENTATION**

- .1 The Contractor's QEP shall prepare an Erosion and Sedimentation Management Plan (ESMP) for the components of the Contract that are undertaken in proximity to watercourses, wetlands or riparian environments. The plan shall be included in the EPP and prepared to the satisfaction of the Departmental Representative and ESO.
- .2 The ESMP shall be prepared so as to ensure that there is no release into watercourses of sediments in levels that are deleterious to fish or that would harmfully alter, disrupt, or destroy fish habitat. Similarly, there is to be no sediment release into areas of vegetation growth or sensitive areas of sediments in levels that would adversely alter growing or hydraulic conditions. The target is 0 mg/L of TSS over background levels. The

threshold is a maximum instantaneous increase of 25 mg/L over background levels when background levels are <250 mg/L, or a maximum instantaneous increase of 10% over background levels when background levels are >250 mg/L. This threshold shall not be exceeded.

- .3 If necessary, on-site sediment control measures shall be constructed and functional prior to initiating construction activities.
- .4 The regular monitoring and maintenance of all erosion control measures shall be the responsibility of the Contractor. If the design of the control measures is not functioning effectively they are to be repaired. The Departmental Representative and ESO also will monitor erosion control performance.
- .5 The site will be secured against erosion during any periods of construction inactivity or shutdown.

#### **1.14 POLLUTION CONTROL**

- .1 The Contractor shall prevent any deleterious and objectionable materials from entering streams, rivers, wetlands, water bodies or watercourses that would result in damage to aquatic and riparian habitat. Hazardous or toxic products shall be stored no closer than 100 metres from watercourses.
- .2 A Spill Response Plan will be prepared by the Contractor's QEP as part of the EPP and shall detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative and PCA and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
- .3 The containment, storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the use of any hazardous or toxic products shall be in accordance with all applicable federal and provincial legislation. Hazardous products shall be stored no closer than 100 metres from watercourses.
- .4 An impervious berm shall be constructed around fuel tanks and any other potential spill area. The berms shall be capable of holding 110% of tank storage volumes and shall be to the satisfaction of the Departmental Representative and the ESO before start-up. Measures such as collection / drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double-lined fuel tanks can prevent spills into the environment.
- .5 The Contractor shall prevent blowing dust and debris by covering and/or providing dust control for temporary roads and on-site work by methods that are approved by the Departmental Representative or ESO.
- .6 The Contractor shall provide spill kits at re-fuelling, lubrication, and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The ESO and Departmental Representative prior to project start-up must approve these spill kits. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.

- .7 Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. Parks Canada Dispatch shall be notified immediately of any spill immediately and can be contacted at a phone number provided in the Preconstruction Meeting. Following notification of Parks Canada Dispatch, the Departmental Representative and the ESO shall be notified. Spill response cards will be distributed during the initial Environmental Briefing with basic instructions and phone numbers.
- .8 In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
- .9 The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill conditions), shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the expected standard and to the satisfaction of the Departmental Representative and ESO.

#### **1.15 EQUIPMENT MAINTENANCE, FUELLING AND OPERATION**

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

Contractor may hire a security person employed to prevent vandalism in accordance with Section 01 52 00 - Construction Facilities.

## **1.16 OPERATION OF EQUIPMENT**

- .1 Equipment movements shall be restricted to the 'footprint' of the construction area. The work limits shall be identified by stake and ribbon or other methods approved by the Departmental Representative. Unless authorized by the Departmental Representative, activities beyond the work limits are not permitted. No machinery will enter, work in or cross over streams, rivers, wetlands, water bodies or watercourses, nor damage aquatic and riparian habitat or trees and plant communities. Some of the construction shall require working close to watercourses or water bodies. In these instances, the Contractor is to describe measures to be employed to ensure fugitive materials (e.g. rocks, soil, branches) and especially deleterious substances (e.g. chemicals) do not enter any watercourses, to the satisfaction of the Departmental Representative and ESO.
- .2 The Contractor shall instruct workers to prevent pushing, placement, raveling, storage or stockpiling of any materials (e.g. slash, rock, fill or topsoil) in the trees bordering the right-of-way or into watercourses or water bodies.
- .3 When, in the opinion of Parks Canada, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the designated work area, the Contractor shall be responsible, at their expense, for complete restoration including the replacement of trees, shrubs, topsoil, grass, etc., to the satisfaction of the Departmental Representative and ESO.
- .4 Restrict vehicle movements to work limits.
- .5 Workers private vehicles are to remain within the construction footprint.

## **1.17 FIRE PREVENTION AND CONTROL**

- .1 A fire extinguisher shall be carried and available for use on each machine and at locations within the plant in the event of fire. Basic firefighting equipment recommended (e.g. a water truck; minimum 500 Imperial gallons with 500 feet of fire hose and a pump capable of producing 45 psi water pressure at the nozzle, three shovels, two pulaskis, and two five gallon backpack pumps) shall be maintained at the construction site at a location known and easily accessible to all the Contractors' staff.
- .2 A water truck may be necessary and will depend on the timing of the Contract (e.g. not required during winter or snow covered conditions).
- .3 Construction equipment shall be operated in a manner and with all original manufacturers' safety devices to prevent ignition of flammable materials in the area.
- .4 Care shall be taken while smoking on the construction site to ensure that the accidental ignition of any flammable material is prevented. Fires or burning of waste materials is not permitted.
- .5 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. Parks Canada Dispatch shall be notified immediately of any fire immediately and can be contacted at a phone number provided in the Preconstruction Meeting. Following notification of Parks Canada Dispatch, the Departmental Representative and the ESO shall be notified.
- .6 Fires or burning of waste materials is not permitted.

**1.18 WILDLIFE**

- .1 During the Environmental Briefing all personnel shall be instructed by the ESO on procedures to follow in the event of wildlife appearance near or within the work site and any other wildlife concerns.
- .2 Avoid or terminate activities on site that attract or disturb wildlife and vacate the area and stay away from the immediate location if bears, cougars, wolves, elk or moose display aggressive behaviour or persistent intrusion. Extra care to control materials that might attract wildlife (e.g. lunches and food scraps) must be exercised at all times.
- .3 Notify the ESO and Departmental Representative immediately about dens, litters, nests, carcasses (road kills), bear activity or encounters on or around the site or crew accommodation. Other wildlife-related encounters are to be reported within 24 hours. If the ESO or Departmental Representative is not available, Parks Canada Dispatch will be contacted at a phone number provided in the Preconstruction Meeting.

**Part 2 Products****2.1 NOT USED.****Part 3 Execution****3.1 WATER EXTRACTION AND DISTRIBUTORS**

- .1 All water related activities are to be conducted in accordance with Whirling Disease Protocols as included in the PRIA.
- .2 Backflow prevention is required on all water trucks.
- .3 All water trucks and water extraction equipment must be thoroughly cleaned prior to entering any Park. Proof of cleaning must be provided to the Departmental Representative and ESO for verification.
- .4 Extraction of water within any National Park requires a RAP.
- .5 Care must be taken by the Contractor to ensure extracted water does not enter another water body, other than the initial source of extraction.
- .6 ESO may require water trucks to be cleaned prior to moving between sites within the Parks to mitigate the risk of cross- contamination of water bodies.

**3.2 CLEARING AND GRUBBING**

- .1 Clearing, grubbing and/or tree removal is only permitted outside the migratory bird nesting window, which is April 1 – August 30 in Waterton Lake National Park. A RAP must be obtained prior to any vegetation removal. No clearing, grubbing or tree removal is anticipated as new towers will be installed in footprints of existing towers. Clearing, grubbing and/or tree removal will only be permitted outside of the migratory bird least risk window upon written approval by the Departmental Representative and will require a bird nest sweep by a Qualified Environmental Professional (QEP).

**3.3 SPECIFIC CONCERNS RELATIVE TO SENSITIVE SITES AND ACTIVITIES**

- .1 Construction activity near streams, rivers, wetlands, water bodies or watercourses must be undertaken with care to prevent damage to aquatic and riparian habitat or associated



tree and plant communities. A large and mobile spill kit shall be kept at hand during construction at these sensitive sites in proximity to watercourses.

**END OF SECTION**

**01 45 00      QUALITY CONTROL****Part 1    General****1.1      DESCRIPTION**

- .1      The Contractor is responsible for quality control inspection throughout every stage of the Work to ensure that equipment, materials and workmanship comply with the requirements of the Contract Documents.

**1.2      REFERENCES**

- .1      All standards listed below shall be the latest issue at the time of tender.
- .2      Canadian Standards Association (CSA)
  - .1      CAN/CSA-A23.2-04, Methods of Test and Standard Practices for Concrete
- .3      AT – Standard Specifications for Highway Construction Manual (latest edition)

**1.3      MEASUREMENT AND PAYMENT PROCEDURES**

- .1      All Quality Control is to be done by the Contractor.
- .2      This work shall be incidental to the Contract and will not be measured for payment.
- .3      Work that is deemed unacceptable in accordance with the Contract Documents will not be eligible for payment from the applicable Item for that Work.
- .4      The Completion Certificate will not be issued if there are any unresolved Non-Conformance Reports.
- .5      Items considered incidental to the Work include, but are not limited to:
  - .1      All Quality Control required in accordance with the Contract Documents.
  - .2      Monthly Quality Control audits and reporting by the Contractor's Quality Manager.
  - .3      Preparation and implementation of the Quality Control Plan in accordance with this Section and the Contract documents.

**1.4      QUALITY CONTROL PLAN**

- .1      Contractor's Quality Control Plan shall be in accordance with Section 101 of the AT–Standard Specifications for Highway Construction (latest edition).
- .2      Submittals in accordance with Section 01 33 00 – Submittals Procedures.

**1.5      TESTING BY THE CONTRACTOR**

- .1      Testing required to provide quality control to assure that the Work strictly complies with the Contract requirements shall include, but not be limited to:
  - .1      Testing all structural concrete, grout, reinforcing steel, asphalt concrete pavement, structural backfill, corrugated steel culverts, miscellaneous metals, concrete barriers, and all source acceptance testing; and
  - .2      All testing specified in the Contract Documents; and
  - .3      Any other testing required as a condition for deviation from the specified Contract procedures.

- .2 Testing proposed shall be based on testing requirements in the latest edition of the AT Standard Specifications for Highway Construction in collaboration with current ASTM and CSA Standards or as stated below.
- .3 All Quality Control technicians are to be certified by Canadian Council of Independent Laboratories (CCIL) for testing asphalt, aggregates and concrete, as applicable to the testing requirements for that item of Work.
- .4 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.
- .5 Approval of tested samples will be for characteristics or use named in such approval and shall not change or modify any Contract requirements.
- .6 Testing agencies, their inspectors, and their representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of the Contract Documents, nor to approve or accept any part of the Work
- .7 The minimum frequency for Quality Control testing during embankment construction will be as follows:

CONSTRUCTION TYPE	TEST TYPE	MINIMUM FREQUENCY OF TESTS
Tests During Concrete Pour	C 39 / C 39M-05e2 Compressive Strength of Cylindrical Concrete Specimens	Minimum of one set of cylinders for each pour with at least one set for each tower with concrete foundation.
Tests during Grout Pour	Compressive strength testing at 7 and 28 days.	Minimum of one set (3) grout cubes for each batch of grout with at least one set cast for each tower with rock anchor foundations.

*\*These are the minimum frequencies and the Contractor is responsible to assess the need to increase testing frequency, where aggregate source is not uniform or any other condition exists that may warrant it. QC frequencies may be reduced below this level, subject to the Departmental Representative's authorization, should the Contractor's QC plan be proven very effective.*

*\* Passing the minimum quantity of QC tests does not relieve the Contractor from the obligation of meeting the Contract requirements and any identified non-compliant works or products shall be rectified by the Contractor at their cost.*

## 1.6 CONTRACTOR'S QUALITY CONTROL PROGRAM

- .1 The Contractor shall prepare a Quality Control Program. The purpose of the program shall be to ensure the performance of the Work in accordance with Contract requirements.

- .2 The Quality Control Program shall be described in a Quality Control Plan. The Contractor shall submit the Manual to the Departmental Representative for review in accordance with Section 01 33 00 - Submittal Procedures. The Manual shall develop a logical system for tracking and documenting the Quality Control of the Work. A systematic format and a set of procedures patterned on a recognized Quality Control Standard will be acceptable, subject to review by the Departmental Representative.
- .3 The Quality Control Plan shall include the following information:
  - .1 Distribution list, providing a list of names to whom the Manual shall be distributed;
  - .2 Title page, identifying the Contract, Contractor and copy number;
  - .3 Revision page, identifying the revision number and date of the Manual;
  - .4 Table of contents;
  - .5 Revision control, tabulating the revision number, date of revision, description of revisions and authorized signature;
  - .6 Details of measuring and testing equipment including methods and frequency of calibration;
  - .7 Purchasing details of all materials and equipment including procurement documents and vendor's Quality Control Program standards;
  - .8 Procedures for inspection of incoming items, in-process inspection and final inspection and tagging of all supply items;
  - .9 Details of special processes as identified by the Departmental Representative, including qualifications of personnel and certification;
  - .10 Procedures for shipping, packaging and storage of materials;
  - .11 Procedures for maintaining quality records and Statements of Compliance, including filing and storage of documents for a period of one year after Completion of the Works;
  - .12 Details of any non-conformance, including identification and recording of deficiencies, tagging procedures for "HOLD" or "REJECT" items, and final disposition of non-conformance forms by the Quality Control Manager;
  - .13 Inspection and test checklists, including tabulated checklists describing all manufacturing and delivery activities such as Inspection or Test, frequency of tests, description of tests, acceptance criteria of tests, such as verification, witnessing or holding tests and sign-off by the Quality Control Manager and the Departmental Representative, if the Departmental Representative witnesses the tests; and
  - .14 Forms used to ensure the application of the inspection and test checklist requirements. These forms shall be identified in the checklists and describe all testing requirements for Contract Document compliance.
- .4 The Contractor shall appoint a full time qualified and experienced Quality Control Manager, dedicated to quality matters and who will report regularly to the Contractor's management at a level that shall ensure that Quality Control requirements are not subordinated to manufacturing, construction or delivery. The Quality Control Manager shall be empowered by the Contractor to resolve quality matter and shall be onsite for the duration of the Contract.

- .5 The Quality Control Plan shall include samples of all forms to be filled in by the Quality Control Inspectors. All forms shall be signed by the Quality Control Manager and submitted promptly to the Departmental Representative who will add its review signature.
- .6 An independent check of all Work shall be performed by the Contractor. The Contractor shall appoint Quality Control Inspectors to ensure compliance of products and workmanship with Contract requirements. The same personnel may not be used to perform a given task and to check the quality and accuracy of the task.
- .7 At completion of the Work a bound and itemized copy of all Quality Control documents and reports shall be prepared by the Contractor's Quality Manager and submitted to the Departmental Representative.

## **1.7 INSPECTION**

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

## **1.8 INDEPENDENT INSPECTION AGENCIES**

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

## **1.9 ACCESS TO WORK**

- .1 Allow inspection / testing agencies access to Work, including but not limited to: off site manufacturing and fabrication plants, and QC testing facilities.
- .2 Co-operate to provide reasonable facilities for such access.

**1.10 PROCEDURES**

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

**1.11 NON-CONFORMANCES**

- .1 A Non-Conformance can relate to any item within the Contract including but not limited to: materials testing, lines and levels, products, design-build items, traffic accommodation, quality control, environmental, health and safety, and other general procedural matters including communication protocols.
- .2 Contractor's Internal Non-Conformance Report (NCR):
  - .1 Should the Contractor's QC reporting indicate that the Work is not in conformance, the Contractor's QC Manager shall issue an internal Non-Conformance Report (NCR) to the Contractor, with a copy to the Departmental Representative, including a response time.
- .3 The Contractor shall then respond to the QC Manager, with a copy to the Departmental Representative, with respect to the NCR, within the specified time, with proposed resolutions and corrective actions. The Contractor and/or the QC Manager shall consult with the Departmental Representative on the resolutions.
- .4 The Departmental Representative will accept or reject the proposed resolution and corrective action proposal.
- .5 Payment for the Work itself may be withheld until the NCR issue is resolved.
- .6 Owner Issued NCR:
  - .1 Should the Quality Assurance reporting indicate that the Work is not in conformance, the Departmental Representative will issue to the Contractor a NCR, including a response time.
  - .2 The Contractor shall then respond to that NCR, within the specified time, with proposed resolutions and corrective actions.
  - .3 The Departmental Representative will accept or reject the proposed resolution and corrective action proposal.
  - .4 Assurance testing and inspection will be performed to determine if the corrective action has provided an acceptable product. Acceptance and rejection will continue until the Departmental Representative determines that a quality product has been achieved.
  - .5 Payment for the Work itself may be withheld until the NCR issue is resolved.
- .7 The Completion Certificate will not be issued if there are any unresolved Non-Conformance Reports.
- .8 Appealing an NCR:
  - .1 If the Contractor disputes the validity of a finding in an NCR, the Contractor may file an appeal with the Departmental Representative. The Departmental Representative and the Contractor Representative will use all reasonable efforts to refine the area of dispute and to resolve the determination of conformance with the Contract.

- .2 If the Departmental Representative and the Contractor Representative cannot come to a mutually agreeable resolution, the Work that is the subject of the Non-Conformance Report shall be re-evaluated by an independent third-party, selected by the Departmental Representative in consultation with the Contractor, at a test frequency equivalent to twice that specified in the Contract or to such other frequency as may be mutually agreed between the Departmental Representative and the Contractor.
- .3 If the appeal testing confirms the non-conformance determination, all appeal testing costs will be borne by the Contractor. If the appeal testing shows that the Work did in fact meet the requirements of the Contract, all appeal testing costs will be borne by the Owner.

#### **1.12 OPPORTUNITIES FOR IMPROVEMENT**

- .1 Should the QA review indicate that the Work is not in conformance, but the variance is deemed minor by the Departmental Representative, the Departmental Representative may issue an Opportunity for Improvement (OFI) report.
- .2 The Contractor is encouraged to review the findings and undertake such modifications to the QC Plan and the work procedures as necessary to address the issue.

#### **1.13 REJECTED WORK**

- .1 Defective products or work, whenever identified, 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.
- .2 Remove defective Work, whether as a result of poor workmanship, use of defective products or damage and whether incorporated in Work or not. Replace or re-execute defective Work in accordance with Contract Documents, through the NCR process.
- .3 Make good other Contractor's work damaged by such removals or replacements promptly.
- .4 If in the opinion of the Departmental Representative, it is not expedient to the greater benefit of the Project to remedy defective Work or Work not performed in accordance with Contract Documents, the Owner may deduct from the Contract Price the difference in value between the Work performed and that called for by Contract Documents, the amount of which shall be determined by Departmental Representative.

#### **1.14 TESTS AND MIX DESIGNS**

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

Project No. XXXXXX

Weather Stations

Waterton Lakes National Park

Parks Canada Agency

Revision: 0

Page 56

**Part 2            Products**

**2.1        NOT USED.**

**Part 3            Execution**

**3.1        NOT USED.**

**END OF SECTION**



**01 52 00 CONSTRUCTION FACILITIES****Part 1 General****1.1 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.2 INSTALLATION AND REMOVAL**

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

**1.3 SITE STORAGE / LOADING**

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

**1.4 CONSTRUCTION PARKING**

- .1 Provide and maintain adequate access and parking at the project site in areas approved by the Departmental Representative.
- .2 Build and maintain temporary roads and provide snow removal during period of Work.
- .3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

**1.5 SECURITY**

- .1 If required by the Contractor, provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays. For extended shut-downs, the Contractor shall provide the level of security as required to protect the Work. The Contractor is advised that some random acts of vandalism to equipment have occurred within the Park. Cost of security personnel is incidental to the Work and no additional payment will be made.
- .2 It is strongly advised that the Contractor consider the provision of security personnel.

**1.6 EQUIPMENT, TOOL AND MATERIALS STORAGE**

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

**1.7 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations, ordinances and the EPP.

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

**Part 2 Products**

**2.1 NOT USED.**

**Part 3 Execution**

**3.1 NOT USED.**

**END OF SECTION**

**01 61 00 COMMON PRODUCT REQUIREMENTS****Part 1 General****1.1 REFERENCE STANDARDS**

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in the Contract Documents.
- .3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance in accordance with Section 01 45 00 – Quality Control.
- .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.

**1.2 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.3 QUALITY CONTROL**

- .1 In accordance with Section 01 45 00 - Quality Control.
- .2 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .3 Defective products or work, whenever identified, 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 any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in Contract Documents, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .7 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .8 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative whose decision is final.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Handle and store products in manner to prevent damage, alteration, 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 and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

**1.5 AVAILABILITY**

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

**1.6 TRANSPORTATION**

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

**1.7 MANUFACTURER'S INSTRUCTIONS**

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

**1.8 CO-ORDINATION**

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

**1.9 CONCEALMENT**

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

**1.10 REMEDIAL WORK**

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

**Part 2 Products**

- .1 Materials shall be in accordance with AT – Standard Specifications for Highway Construction (latest edition), or as directed by the Departmental Representative.

**Part 3 Execution**

- .1 Work shall be completed in accordance with AT – Standard Specifications for Highway Construction (latest edition), or as directed by the Departmental Representative.

**END OF SECTION**

**01 74 11      CLEANING****Part 1    General****1.1      MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.2      PROJECT CLEANLINESS**

- .1      Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2      Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative and in accordance with Section 01 35 43 - Environmental Procedures. Do not burn waste materials on site.
- .3      Clear snow and ice in accordance with Section 01 35 31 – Special Procedures for Traffic Control.
- .4      Keep roadway clean in accordance with Section 01 35 31 – Special Procedures for Traffic Control.
- .5      Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6      Contractor to provide on-site bear proof containers or remove waste materials and debris from site each day.
- .7      Remove waste material and debris from site at end of each working day.
- .8      Dispose of waste materials and debris off site in accordance with Section 01 35 43 - Environmental Procedures.
- .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.
- .12     The Departmental Representative and ESO may, at their total discretion, require the Contractor to suspend work activities until such a time as the Work Site is cleaned and debris, waste, and animal attractants are satisfactorily managed. The Contractor shall do as requested at their cost and no claim for time or additional costs will be accepted.
- .13     Maintain excavation and trenches free of debris and waste.

**1.3      FINAL CLEANING**

- .1      When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2      Prior to final review, remove surplus products, tools, construction machinery and equipment.
- .3      Remove waste products and debris including that caused by Owner or other Contractors.

- .4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6 Inspect finishes and ensure specified workmanship and operation.
- .7 Remove dirt and other disfiguration from exterior surfaces.
- .8 Sweep and wash clean paved areas.
- .9 Remove all construction debris and accumulated dirt from completed drainage systems; manholes; catch basins; and all piping.
- .10 Clean hydroseed / hydromulch overspray from buildings, pavement, fences, light poles, and other unintended surfaces.

**Part 2 Products****2.1 NOT USED.****Part 3 Execution****3.1 NOT USED.****END OF SECTION**

**01 77 00 CLOSEOUT PROCEDURES****Part 1 General****1.1 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.2 INSPECTION AND DECLARATION**

- .1 Contractor's Inspection: Contractor and all subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  - .2 Request Departmental Representative's Inspection.
- .2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
  - .1 Work has been completed and inspected for compliance with Contract Documents.
  - .2 Defects have been corrected and deficiencies have been completed.
  - .3 Work is complete and ready for Final Inspection.
  - .4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative, and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

**Part 2 Products****2.1 NOT USED.****Part 3 Execution****3.1 NOT USED.**

**END OF SECTION**



**01 78 00 CLOSEOUT SUBMITTALS****Part 1 General****1.1 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.2 CLOSEOUT SUBMITTALS**

- .1 The Contractor shall provide the following documents and information to the Departmental Representative prior to them being eligible for Final Completion as detailed in Section 01 77 00 – Closeout Procedures.

**1.3 AS-BUILTS AND SAMPLES**

- .1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to the Contract.
  - .5 Reviewed shop drawings, product data, and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

**1.4 RECORDING ACTUAL SITE CONDITIONS**

- .1 Record information on set of black line opaque Drawings and in copy of the 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 on original Contract Drawings.
- .4 References to related shop drawings and modifications.
- .4 Specifications: legibly mark each item to record actual construction, including:
  - .1 Changes made by Addenda and change orders.

## **1.5 WARRANTIES AND BONDS**

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible personnel.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- .4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and bonds until time specified for submittal.

## **Part 2 Products**

### **2.1 NOT USED.**

## **Part 3 Execution**

### **3.1 NOT USED.**

**END OF SECTION**

**02 81 01 HAZARDOUS MATERIAL****Part 1 General****1.1 REFERENCES**

- .1 All standards listed below shall be the latest issue at the time of tender.
- .2 Export and Import of Hazardous Waste Regulations (EIHWR Regulations), SOR/92-637.
- .3 National Fire Code of Canada 1995.
- .4 Transportation of Dangerous Goods Act, 1992 (TDG Act) [1992], (c. 34).
- .5 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).

**1.2 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.3 SUBMITTALS**

- .1 In accordance with Section 01 33 00 - Submittal Procedures.
- .2 Retain current Material Safety Data Sheet (MSDS) for each hazardous material required on site. Submit MSDS to Departmental Representative upon request.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 In accordance with Section 01 35 43 - Environmental Procedures.
- .2 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
- .3 Recycle hazardous wastes for which there is an approved, cost effective recycling process available.
- .4 Send hazardous wastes only to authorized hazardous waste disposal or treatment facilities.
- .5 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- .6 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Coordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.
- .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
- .3 Store and handle flammable and combustible materials in accordance with current National Fire Code of Canada requirements.
- .4 All explosives must be mixed outside of the Park and delivered to the site. No storage of explosives shall be allowed within the National Parks.
- .5 Observe smoking regulations at all times. Smoking is prohibited in any area where hazardous materials are stored, used, or handled.

- .6 Abide by the following storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
  - .1 Store hazardous materials and wastes in closed and sealed containers which are in good condition.
  - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
  - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
  - .4 Segregate incompatible materials and wastes.
  - .5 Ensure that different hazardous materials or hazardous wastes are not mixed.
  - .6 Store hazardous materials and wastes in a secure storage area with controlled access.
  - .7 Maintain a clear egress from storage area.
  - .8 Store hazardous materials and wastes in a manner and location which will prevent them from spilling into the environment.
  - .9 Have appropriate emergency spill response equipment available near the storage area, including personal protective equipment.
  - .10 Maintain an inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .7 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .8 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

## 1.6 DEFINITIONS

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

## 1.7 TRANSPORTATION

- .1 Transport hazardous materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

- .2 If exporting hazardous waste to another country, ensure compliance with federal Export and Import of Hazardous Waste Regulations.
- .3 If hazardous waste is generated on site:
  - .1 Coordinate transportation and disposal with Departmental Representative.
  - .2 Ensure compliance with applicable provincial laws and regulations for generators of hazardous waste.
  - .3 Use only a licensed carrier authorized by provincial authorities to accept subject material.
  - .4 Prior to shipping material, obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept the material.
  - .5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.
  - .6 Ensure that only trained personnel handle, offer for transport, or transport dangerous goods.
  - .7 Provide a photocopy of all shipping documents and waste manifests to Departmental Representative.
  - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide a photocopy of completed manifest to Departmental Representative.
  - .9 Report any discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.

## **Part 2 Products**

### **2.1 MATERIALS**

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

## **Part 3 Execution**

### **3.1 NOT USED.**

**END OF SECTION**

**03 10 00 CONCRETE FORMING AND ACCESSORIES****Part 1 General****1.1 RELATED WORK**

- .1 Special Procedures Weather Stations 33 42 36.

**1.2 DESCRIPTION**

- .1 Supply and installation of Concrete Formwork as required to complete the Work as specified in the Contract Documents and as directed by the Departmental Representative.

**1.3 REFERENCES**

- .1 All standards listed below shall be the latest issue at the time of tender.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-O86S1, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
  - .3 CSA O121-[M1978(R2003)], Douglas Fir Plywood.
  - .4 CSA O151, Canadian Softwood Plywood.
  - .5 CSA O153-[M1980(R2003)], Poplar Plywood.
  - .6 CSA O437 Series-[93(R2006)], Standards for OSB and Waferboard.
  - .7 CSA S269.1-[1975(R2003)], Falsework for Construction Purposes.
  - .8 CAN/CSA-S269.3-[M92(R2003)], Concrete Formwork, National Standard of Canada.
- .3 Council of Forest Industries of British Columbia (COFI)
  - .1 COFI Exterior Plywood for Concrete Formwork.
- .4 AT – Standard Specifications for Highway Construction (latest edition)
  - .1 Section 211 Portland Cement Concrete

**1.4 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.5 SUBMITTALS**

- .1 In accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for formwork and falsework.
- .3 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Alberta.
- .4 MSDS in accordance with Section 02 81 01 - Hazardous Material.
- .5 Indicate method and schedule of construction, shoring, stripping, and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties,

liners, and locations of temporary embedded parts. Comply with CSA S269.1 for falsework drawings and CAN/CSA S269.3 for formwork drawings.

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

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Formwork materials:
  - .1 Forms for unexposed surfaces are at the discretion of the Contractor subject to approval of the Departmental Representative.
  - .2 Forms for exposed surfaces including the cast in place concrete shall be new material, made of "Coated Formply", consisting of Douglas Fir substrate with resin-impregnated paper overlay and factory treated chemically active release agent.
  - .3 All form material for exposed surfaces shall be full-sized sheets, as practical. The re-use of any forms must have the acceptance of the Departmental Representative.
- .2 The minimum acceptable forming for all exposed concrete where the pour height is 1.5 m or less shall have 18 mm approved plywood, supported at 300 mm maximum on centres. Where the pour height is greater than 1.5 m the minimum acceptable forming for all exposed concrete shall have 18 mm approved plywood, supported at 200 mm maximum on centres. Strong-backs or walers placed perpendicularly to the supports shall be employed to ensure straightness of the form.
- .3 Metal bolts or anchorages within the forms shall be so constructed as to permit their removal to a depth of at least 50 mm from the concrete surface.
- .4 Break-back type form ties shall have all spacing washers removed and the tie shall be broken back a distance of at least 20 mm from the concrete surface.
- .5 All fittings for metal ties shall be of such design that, upon their removal, the cavities that are left will be of the smallest possible size. Torch cutting of steel hangers and ties will not be permitted. Formwork hangers for exterior surfaces of decks and curbs shall be an acceptable break-back type with surface cone, or removable threaded type.
- .6 Cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in color.
- .7 Form release agent shall be non-toxic, biodegradable, low VOC.
- .8 Falsework materials shall conform to CSA-S269.1.

## **Part 3 Execution**

### **3.1 FABRICATION AND ERECTION**

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with Drawings.
- .2 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.

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

### **3.2 REMOVAL AND RESHORING**

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
  - .1 Seven (7) days for slabs, decks, barriers, and other structural members.
- .2 Remove formwork when concrete has reached 50% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Reuse formwork and falsework subject to requirements of CAN/CSA-A23.1.

**END OF SECTION**



**03 20 00 CONCRETE REINFORCING****Part 1 General****1.1 RELATED WORK**

- .1 Special Procedures Weather Stations 33 42 36.

**1.2 DESCRIPTION**

- .1 Supply and installation of Concrete Reinforcing as required to complete the Work as specified in the Contract Documents and as directed by the Departmental Representative.

**1.3 REFERENCES**

- .1 All standards listed below shall be the latest issue at the time of tender.
- .2 CSA International
  - .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  - .2 CAN/CSA-A23.3, Design of Concrete Structures.
  - .3 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement.
  - .4 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .3 Reinforcing Steel Institute of Canada (RSIC)
  - .1 RSIC, Reinforcing Steel Manual of Standard Practice.

**1.4 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.5 QUALITY CONTROL**

- .1 In accordance with Section 01 45 00 - Quality Control.
- .2 Provide the Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, prior to commencing reinforcing work.
- .3 Inform the Departmental Representative of proposed source of material to be supplied.

**1.6 SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
- .3 Shop Drawings:
  - .1 Indicate placing of reinforcement and:
    - .1 Bar bending details.
    - .2 Lists.
    - .3 Quantities of reinforcement.

- .4 Sizes, spacing, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
- .5 Indicate sizes, spacing and locations of chairs, spacers and hangers.
- .4 Provide Departmental Representative with certified copy of mill test report of reinforcing steel.
- .5 Submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Reinforcing steel: billet steel, grade 400W, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .2 Cold-drawn annealed steel wire ties: to ASTM A1064/1064M for black reinforcing.
- .3 Stainless steel wire ties to UNS standards identified above.
- .4 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .5 Mechanical splices: subject to approval of Departmental Representative.

### **2.2 FABRICATION**

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada, unless indicated otherwise.
- .2 All hooks and bends shall be bent using the pin diameters and dimensions as recommended in the Reinforcing Steel Institute of Canada (RSIC), Manual of Standard Practice.
- .3 Obtain the Departmental Representative's approval for locations of reinforcement splices other than those shown on placing Drawings.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

**Part 3 Execution****3.1 FIELD BENDING**

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by the Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars that develop cracks or splits.

**3.2 PLACING REINFORCEMENT**

- .1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.
- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.
- .4 All lifting and handling shall be done using devices that do not mark, mar, damage or distort the galvanized / stainless members and assemblies in any way.
- .5 Delivery of a damaged product will be cause for rejection.
- .6 Ensure cover to reinforcement is maintained during concrete pour.
- .7 Protect coated portions of bars with covering during transportation and handling.
- .8 Existing reinforcing steel shall be electrically isolated from the new galvanized reinforcing steel.
- .9 Metal accessories such as anchor bolts, coverplates and electrical boxes that are exposed to the atmosphere shall be electrically isolated from the steel reinforcement.

**END OF SECTION**

**03 30 00 CAST-IN-PLACE CONCRETE****Part 1 General****1.1 RELATED WORK**

- .1 Special Procedures Weather Stations 33 42 36.

**1.2 DESCRIPTION**

- .1 Supply and installation of Cast-in-Place Concrete as required to complete the Work as specified in the Contract Documents and as directed by the Departmental Representative.

**1.3 REFERENCES**

- .1 All standards listed below shall be the latest issue at the time of tender.
- .2 ASTM International.
  - .1 ASTM C260/ C260M Specification for Air-Entraining Admixtures for Concrete.
  - .2 ASTM C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - .3 ASTM C494/ C494M Specification for Chemical Admixtures for Concrete.
  - .4 ASTM C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
  - .5 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
  - .6 ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
  - .7 ASTM D2240, Standard Test Method for Rubber Property – Durometer Hardness
  - .8 ASTM D1751 Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
  - .9 ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
  - .10 ASTM F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .4 CSA International
  - .1 CAN/CSA-A3000, Cementitious Materials Compendium. (Consists of A3001, A3002, A3003, A3004 and A3005)
  - .2 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction.

- .3 CAN/CSA-G40.20/G20.21, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

#### **1.4 MEASUREMENT AND PAYMENT PROCEDURES**

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

#### **1.5 SUBMITTALS**

- .1 In accordance with Section 01 33 00 - Submittal Procedures.
- .2 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature, and test samples taken as per the Contract Documents.
- .3 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.
- .4 Provide Departmental Representative with valid and recognized certificate from plant delivering concrete, in accordance with Section 01 33 00 – Submittal Procedures.
  - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
  - .2 Ensure testing laboratory and personnel are certified to CSA A283.
- .5 In accordance with Section 01 33 00 – Submittal Procedures, provide proposed Quality Control procedures for review by Departmental Representative on following items:
  - .1 Falsework erection.
  - .2 Hot weather concrete.
  - .3 Cold weather concrete.
  - .4 Curing.
  - .5 Finishes.
  - .6 Formwork removal.
  - .7 Joints.
- .6 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 In accordance with Section 01 61 00 – Common Product Requirements.
- .2 Concrete hauling time: deliver to site of Work and discharged within 120 minutes' maximum after batching.
- .3 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
- .4 Deviations to be submitted for review by Departmental Representative.
- .5 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.Products

## **1.7 ABBREVIATIONS AND ACRONYMS**

- .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.
- .2 Type GU, GUb and GUL - General use cement.
- .3 Type MS and MSb - Moderate sulphate-resistant cement.
- .4 Type MH, MHb and MHL - Moderate heat of hydration cement.
- .5 Type HE, HEb and HEL - High early-strength cement.
- .6 Type LH, LHb and LHL - Low heat of hydration cement.
- .7 Type HS and HSb - High sulphate-resistant cement.
- .8 Fly ash:
  - .1 Type F - with CaO content less than 15%.
  - .2 Type CI - with CaO content ranging from 15 to 20%.
  - .3 Type CH - with CaO greater than 20%.
- .9 GGBFS - Ground, granulated blast-furnace slag.

## **1.8 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-installation Meetings: in accordance with Section 01 32 16 – Construction Progress Schedules, convene pre-installation meeting one (1) week prior to beginning concrete works.
  - .1 Ensure key personnel, site supervisor, Departmental Representative, speciality Contractor - finishing, forming, concrete producer and testing laboratories attend.

## **Part 2 Products**

### **2.1 DESIGN CRITERIA**

- .1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in this Section.

### **2.2 PERFORMANCE CRITERIA**

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in this Section.

### **2.3 MATERIALS**

- .1 Portland Cement: to CAN/CSA-A3000, Type GU.
- .2 Blended hydraulic cement: Type GUb to CAN/CSA-A3000.
- .3 Supplementary cementing materials: with maximum 25% fly ash replacement, by mass of total cementitious materials to CAN/CSA-A3000.
- .4 Water: to CSA A23.1.
- .5 Aggregates: to CSA A23.1/A23.2.
- .6 Admixtures:
  - .1 Air entraining admixture: to ASTM C260 / C260M.

- .2 Chemical admixture: 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 to CSA A23.1/A23.2.
  - .1 Compressive strength: 20 MPa at 48 hours, 45 MPa at 28 days.
  - .2 Net shrinkage at 28 days: maximum 0.01 %.
- .8 Curing compound: to CSA A23.1/A23.2.
- .9 Premoulded joint fillers:
  - .1 Bituminous impregnated fiber board: to ASTM D1751.
- .10 Epoxy Grout: as indicated.
- .11 Elastomer: as indicated.
- .12 Steel Laminae: as indicated.
- .13 Anchor Rods and Anchor Bolts: as indicated.
- .14 Concrete sealers:
  - .1 Sikagard SN-40 Lo-VOC (or approved equivalent)

## 2.4 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
  - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
- .2 Provide concrete mix to meet following plastic state requirements:
  - .1 Uniformity: as required by CSA A23.1/A23.2.
  - .2 Workability: free of surface blemishes, loss of mortar, colour variations, and segregation.
- .3 Provide concrete mix to meet following hard state requirements:
  - .1 Durability and class of exposure: C-1.
  - .2 Compressive strength at 28 days age: 35 MPa minimum.
  - .3 Intended application: Foundations.
  - .4 Aggregate size 20 mm maximum.
- .4 Provide quality management plan to ensure verification of concrete quality to specified performance.
- .5 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

## Part 3 Execution

### 3.1 PREPARATION

- .1 Obtain the Departmental Representative's acceptance before placing concrete.
  - .1 Provide 24 hours' notice prior to placing of concrete.

- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
  - .1 Development of cold joints not allowed.
  - .2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.
- .4 Pumping of concrete is permitted only after acceptance of equipment and mix by Departmental Representative.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain the Departmental Representative's acceptance of proposed method for protection of concrete during placing and curing.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 Do not place load upon new concrete until authorized by Departmental Representative.

### 3.2 INSTALLATION/APPLICATION

- .1 Cast-in-place concrete work in accordance with CAN/CSA-A23.1/A23.2.
- .2 Sleeves and inserts.
  - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.
  - .2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
  - .3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Departmental Representative.
  - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
  - .5 Confirm locations and sizes of sleeves and openings shown on drawings.
  - .6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Anchor rods:
  - .1 Set anchor rods to templates in co-ordination with appropriate trade prior to placing concrete.
  - .2 Grout anchor rods in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.
    - .1 Formed holes: 100 mm minimum diameter.
    - .2 Drilled holes: 25 mm minimum diameter larger than bolts used.
  - .3 Protect anchor rod holes from water accumulations, snow and ice build-ups.
  - .4 Set rods and fill holes with shrinkage compensating grout.
- .4 Grout using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.



- .5 Finishing and Curing.
  - .1 Finish concrete to CSA A23.1/A23.2 unless noted otherwise.
  - .2 Schedule:
    - .1 Top of slabs – broom finish for traction.
  - .3 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
- .6 Joint fillers:
  - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
  - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
  - .3 Locate and form construction and expansion joints as indicated.
  - .4 Install joint filler.

### 3.3 FIELD QUALITY CONTROL

- .1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described this Section.
  - .1 Concrete pours.
  - .2 Slump.
  - .3 Air content.
  - .4 Compressive strength at 7 and 28 days.
  - .5 Air and concrete temperature.
- .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Contractor to CSA A23.1/A23.2.
  - .1 Ensure testing laboratory is certified to CSA A283.
- .3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and departmental representative.
- .4 Take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .5 Non-destructive methods for testing concrete: to CSA A23.1/A23.2.
- .6 Inspection or testing by the Departmental Representative will not augment or replace Contractor quality control nor relieve Contractor of their contractual responsibility.

### 3.4 PROTECTION

- .1 Protection and curing for concrete shall comply with following requirements in addition to cold weather requirements of CSA A23.1/A23.2 if applicable.
  - .1 Protect concrete with windproof shelter of canvas or other material to allow free circulation of inside air around fresh concrete.
  - .2 Do not let walls of shelter touch formwork.
  - .3 Provide sufficient space for removal of formwork for finishing.
  - .4 Use heating equipment approved by Departmental Representative.

- .5 Vent products of combustion outside protective shelter: equipment to be capable of keeping inside air at constant temperature sufficiently high to maintain concrete at following curing temperatures:
- .2 For initial 3 days: minimum temperature of 15 degrees C, maximum of 27 degrees C at concrete surfaces.
- .3 Unformed surfaces: cure with burlap and water.
  - .1 Place two layers of damp burlap on surface of concrete.
  - .2 Overlap each strip by minimum 75 mm and secure against displacement by wind.
  - .3 Maintain burlap in place and keep thoroughly wet for seven days after placement.
- .4 Formed surfaces:
  - .1 No additional curing will be required if formwork is left in place for seven days or more.
  - .2 If formwork removed in less than seven days, cure in manner specified for unformed surfaces for remainder of seven (7) day period.
- .5 During curing period, only uncover areas needed for finish treatment. Re-cover and continue curing.

**END OF SECTION**

**03 60 00      GROUTING****Part 1    General****1.1      RELATED WORK**

- .1 Special Procedures Weather Stations 33 42 36.

**1.2      DESCRIPTION**

- .1      Section 03 60 00 refers to the requirements for grout at the concrete foundation pads for the tower columns.

**1.3      REFERENCES**

- .1      All standards listed below shall be the latest issue at the time of tender.
- .2      Canadian Standards Association (CSA International).
  - .1      CSA A23.1-09/A23.2-09      Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

**1.1      MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.1      SUBMITTALS**

- .1      For the grout proposed for use in the Work, submit manufacturer's Product datasheets and printed instructions to the Departmental Representative for review.

**Part 2****2.1      CEMENTITIOUS GROUT**

- .1      Grout to be prepared and placed as per the manufacturer's recommendations.
- .2      The following grouts are pre-approved.
  - .1      Target Machine Base Grout (9991106).
  - .2      Sika Grout 212.

**2.1      EPOXY ADHESIVE GROUT**

- .1      Two-component epoxy grout for bonding drilled in anchors and reinforcing bar to existing concrete shall be to ASTM C881. The following product and/or approved equal is pre-approved:
  - .1      Hilti HIT HY-200.

### **Part 3 Execution**

#### **3.1 PLACING OF GROUT**

- .1 Grout under baseplates and in grout pockets using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

**END OF SECTION**

**05 14 00      STRUCTURAL STEEL****Part 1    General****1.1      RELATED WORK**

- .1      Special Procedures Weather Stations 33 42 36.

**1.2      DESCRIPTION**

Section 05 14 00 describes the requirements for steel plates, rolled sections, angles, channels, pipe and hollow sections, structural steel fabrications, inserts, connections, anchor bolts, and miscellaneous steel.

**1.3      REFERENCES**

- .1      All standards listed below shall be the latest issue at the time of tender.
- .2      ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .3      ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .4      ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .5      ASTM A167-99 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .6      ASTM F3125 Standard Specification for High-Strength Bolts, Steel, Heat Treated 120 / 105 ksi Minimum Tensile Strength.
- .7      ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts.
- .8      ASTM A780/A780M Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- .9      ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .10     ASTM E709 Standard Guide for Magnetic Particle Testing.
- .11     CAN/CSA G40.20-04/G40.21 General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
- .12     CSA S6 Canadian Highway Bridge Design Code
- .13     CAN/CSA S16 Design of Steel Structures
- .14     CSA S-37 Antennas, Towers, and Antenna-supporting Structures
- .15     CSA W47.1 Certification of Companies for Fusion Welding of Steel
- .16     CSA W48 Filler Metals and Allied Materials for Metal Arc Welding
- .17     CSA W59 Welded Steel Construction (Metal Arc Welding)

- .18 CSA W178.1 Certification of Welding Inspection Organizations
- .19 CSA W187.2 Certification of Welding Inspectors
- .20 ASTM F3125 Standard Specification for High Strength Structural Bolts
- .21 This work shall be incidental to the Contract and will not be measured for payment.

#### **1.4 MEASUREMENT AND PAYMENT PROCEDURES**

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

#### **1.5 QUALITY CONTROL**

- .1 In accordance with Section 01 45 00 - Quality Control.
- .2 Establish and implement a program of quality control as described in these Specifications. All welding inspection shall be carried out to the minimum level specified in Clause 2.5 - Non-Destructive Testing, by agencies qualified under CSA W178.1 and W178.2. The cost of the quality control program will be borne by the Contractor.
- .3 All Work specified under this Contract is subject to inspection at any time by independent inspectors implementing the Owner's quality assurance program.

#### **1.6 SUBMITTALS**

- .1 Submit Shop Drawings, clearly indicate layout, grades, dimensions, materials, member sizes, connections, anchorages, bracing, finishes, and support details.
- .2 The proposed schedule for fabrication, delivery, and erection.
- .3 Prior to commencing the Work of this section, submit two certified copies of mill reports covering chemical and physical properties of steel to be used in the Work.
- .4 Name of fabricator and erector, evidence of plant certification, qualifications of welders, and name of the fabricator's professional Consultant.
- .5 Review of Shop Drawings and erection methods will assess their compatibility with the general design concept only. This review will not relieve the Contractor of their responsibility for accuracy of the detail dimensions, general fit-up of parts to be assembled, adequacy of connection details, errors or defects contained in the Drawings, or for the safety and adequacy of erection methods proposed
- .6 Allow a fourteen (14) day period for review of each submittal.

#### **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Suitably secure and protect from damage all material supplied during fabrication, shipping, storage, and erection.
- .2 Make good all damaged materials to the satisfaction of the Departmental Representative, at no expense to the Owner.

#### **1.8 STAGED CONSTRUCTION**

- .1 Provisions for staged construction shall be shown in the shop drawings, including any temporary support required, until towers are complete.

**Part 2 Products****2.1 DESIGN CRITERIA**

- .1 Design details and connections in accordance with requirements of CAN/CSA-S136 resist forces, moments, shears and allow for movements indicated.
- .2 Shear connections:
  - .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
  - .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.
- .3 For composite construction select or design minimum end connection to resist reaction resulting from factored movement resistance as tabulated in the "Handbook of the Canadian Institute of Steel Construction" assuming 100% shear connection with depth of steel deck and/or slab shown on drawings.
- .4 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Alberta, Canada for non-standard connections

**2.2 MATERIALS**

- .1 Use new materials free from excessive rust, scale, discoloration, and other defects which would reduce the strength or general serviceability thereof.
- .2 Tolerances: to CAN / CSA G40.20 / G40.21.
- .3 Rolled Steel Sections: to CAN / CSA-G40.21, Grade 300W, unless noted otherwise.
- .4 Hollow Structural Sections: to CAN / CSA-G40.21, Grade 300W, Class C, unless noted otherwise.
- .5 Plates: to CAN / CSA-G40.21, Grade 300W.
- .6 Structural Bolts: to ASTM F3125, Grade A490. Nuts shall be heavy hexagonal and shall conform to ASTM Standard A563M. Nuts shall be oversize of DH quality. Threads shall be lubricated with beeswax, cetyl alcohol, or commercial wax.
- .7 Grout: to Section 03 60 00.
- .8 Galvanized Materials: to ASTM A123 / A123M or ASTM A153 / A153M.
- .9 Handrail, and Miscellaneous Pipe: ASTM A53 Grade B.
- .10 Welding Electrodes: to CSA W48 Series.
- .11 Do not use structural plate less than 6 mm thick unless noted otherwise on the Drawings.
- .12 All superstructure steelwork to be coated with a system approved by the Departmental Representative.
- .13 All coated steel to be painted white.

**2.3 FABRICATION**

- .1 Fabricate Work square, true, straight, and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble Work, ready for erection or installation.
- .3 Close all hollow sections and pipe with end plates and seal airtight with welds, unless noted otherwise on the Drawings.
- .4 Do not use intermittent welds. File or grind exposed welds smooth and flush. Seal weld all joints unless restricted otherwise by W59. If seal welding is prohibited by W59, then use approved sealant to create watertight joint. Sealant type to be approved by the Departmental Representative.
- .5 Weld in a manner to avoid distortion or damage to the members.
- .6 Provide minimum 24-hour notice to the Departmental Representative of completion of fit-up.

## **2.4 WELDING**

- .1 Carry out all welding in fabricating shops certified to Division 1 or Division 2.1 under CSA Standard W47.1. Welding operators shall hold valid Canadian Welding Bureau certification, under the requirements of CSA Standard W47.1, for the processes, positions and electrodes which will be employed on the Work.
- .2 Perform all welding in accordance with the requirements of CSA Standard W59, except where additional requirements are specified in the Contract Documents.
- .3 Prior to commencement of welding, provide the Departmental Representative with copies of welding procedures Specifications and welding procedure datasheets, which have been approved by the Canadian Welding Bureau for the processes and procedures which the Contractor intends to employ in the performance of the Work.
- .4 Welds shall be continuous for the full length of the joint.

## **2.5 NON-DESTRUCTIVE TESTING**

- .1 Visually inspect 100% of all welds in accordance with CSA W59.
- .2 In addition to visual inspection carry out varying degrees of NDT as defined herein. The four levels of non-destructive testing are defined as follows:
  - .1 Type 1: Radiographic tests shall be performed on 100% of the weld length. The Departmental Representative shall receive a full set of radiographs for permanent retention, and an inspection report interpreting the results. Radiographic tests shall be performed in accordance with CSA W59.
  - .2 Type 2: Radiographic tests or ultrasonic examination shall be carried out on 100% of the weld length. The Departmental Representative shall only receive the inspection report interpreting the results. The tests shall be performed in compliance with CSA W59.
  - .3 Type 3: Spot radiographic or ultrasonic examination shall be conducted over a length equal to 20% of the weld, with each spot examined covering at least 100 mm of weld. This examination shall be performed in accordance with CSA W59.



- .4 Type 4: Spot magnetic particle testing in accordance with ASTM E709 shall be conducted on 10% of the total weld length. Alternatively, for a series of several shorter and similar welds, magnetic particle testing may be performed on 10% of the number of such similar welds.
- .3 Non-destructive inspection procedures shall be carried out to provide the following minimum levels of inspection:
  - .1 Complete penetration welds shall be tested to Type 2 NDT inspection.
  - .2 Full-strength shop and field welded member splices shall be tested to Type 1 inspection.
  - .3 HSS joints shall be tested to Type 4 inspection on a minimum of one joint in four.
  - .4 Miscellaneous fillet welds for connections shall be tested to Type 4 inspection.
- .4 When a weld test reveals a discontinuity, then two adjacent areas, similar in length, shall also be tested. If a defect requiring repair appears in either of those areas, then all welds in that inspection zone shall be subjected to testing.
- .5 Should non-destructive testing of welds indicate faulty welding, repair and retest such welds at no additional cost to the Owner.
- .6 Obtain approval from the Departmental Representative for the location and procedure of any splices proposed in steel members.

## **2.6 INSPECTION AUTHORITY**

- .1 Employ, at the cost of the Contractor, a certified welding inspection organization. This organization shall perform the inspection routine outlined herein to verify that the requirements of the Specifications are met.
- .2 The selection of the inspection organization shall be subject to the approval of the Departmental Representative. Submit duplicate copies of all reports, tests, and correspondence from this organization to the Departmental Representative directly.
- .3 The Owner reserves the right to verify that the specified acceptance standards are met. To this end, the Owner or their authorized agent shall have access to the Contractor's or Subcontractor's premises and records to carry out the tests and acquire the necessary information.
- .4 The cost of any additional inspection and testing which results from the Contractor's failure to meet the requirements of the Specifications shall be borne by the Contractor.

## **2.7 FABRICATION TOLERANCES**

- .1 Member shall be true to line and free from twists, bends, and open joints.
- .2 A variation of 1 mm will be permitted in the overall length of members with both ends milled. Members without milled ends may have a variation from the detailed lengths not greater than 2 mm for members of 10 m or less in length, and not greater than 4.0 mm for members over 10 m in length.
- .3 Centre-to-centre distance between two holes of a group of holes to vary by not more than 2 mm from dimensioned distance between such holes.

## **2.8 CORROSION PROTECTION**

- .1 Unless noted otherwise, all structural steel including embedded concrete hardware, connection plates, connection bolts, anchor bolts, and any other items as indicated on the Contract Drawings, shall be hot-dip galvanized after fabrication in accordance with ASTM A123 / A123M and A153 / A153M. Minimum thickness of zinc 100 microns.
- .2 Contractor shall submit proposed zinc-based metalizing touch-up Product to the Departmental Representative for review and written approval. Alternatively, the galvanizing may be repaired using two coats of a one component zinc-rich coating containing >95% non-toxic electrolytic zinc powder (pure to 99.995%) in a non-toxic solvent.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Install Work square, plumb, straight and true, accurately fitted, with tight joints and intersections.
- .2 At completion of installation, touch-up connections, welds, and burned or damaged surfaces per ASTM A780 / A780M. Method to be approved by the Departmental Representative.
- .3 Inspect work of other contractors which affect the Work and advise the Departmental Representative of any errors or discrepancies prior to commencement of Work.
- .4 Provide temporary bracing wherever necessary to take care of all loads to which the structure may be subjected, including wind and temporary loading due to equipment and its operation. Leave such bracing in place for as long as it is required for safety.

**END OF SECTION**

**31 23 33 EXCAVATING, TRENCHING AND BACKFILLING****Part 1 General****1.1 RELATED WORK**

- .1 Special Procedures Weather Stations 33 42 36.

**1.2 REFERENCES**

- .1 All standards listed below shall be the latest issue at the time of tender.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C117-[04] , Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136-[05] , Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D422-63[2002] , Standard Test Method for Particle-Size Analysis of Soils.
  - .4 ASTM D698-[00ae1] , Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
  - .5 ASTM D1557-[02e1] , Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).
  - .6 ASTM D4318-[05] , Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-[88] , Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-[M88] , Sieves, Testing, Woven Wire, Metric.
- .4 Canada Green Building Council (CaGBC)
  - .1 LEED Canada-NC Version 1.0-[2004] , LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007] ).
  - .2 LEED Canada-CI Version 1.0-[2007] , LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .5 CSA Group (CSA)
  - .1 CAN/CSA-A3000-[03] , Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1 CSA-A3001-[03] , Cementitious Materials for Use in Concrete.
  - .2 CSA-A23.1/A23.2-[04] , Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .6 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.3 MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Preconstruction Submittals:
  - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.

**Part 2 Products**

**NOT USED.**

**Part 3 Execution****3.1 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .4 Protect buried services that are required to remain undisturbed.
- .5 Protect open excavations against flooding and damage due to surface run-off.
  - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

**3.2 BACKFILLING**

- .1 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .2 Do not use backfill material which is frozen or contains ice, snow or debris.
- .3 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
  - .3 Place layers simultaneously on both sides of installed Work to equalize loading.
  - .4 Compaction to be approved by the Departmental Representative.

**END OF SECTION**

**31 72 13      ROCK ANCHORS****Part 1 General****1.1      RELATED WORK**

- .1      Special Procedures Weather Stations 33 42 36.

**1.2      DESCRIPTION**

- .1      Rock anchors consist of the installation of deformed steel bars (tendons) in holes drilled into rock or soil. Rock anchors shall be fully grouted and either tensioned or un-tensioned (dowels) as directed by the Contractor's Geotechnical Engineer and confirmed by the Departmental Representative.
- .2      Unless otherwise specified, the Post Tensioning Institute (PTI) recommendations for prestressed rock anchors shall apply to rock anchors and other rock anchoring systems.
- .3      The required number, length, location, and orientation of rock anchors will be determined on site by the Contractor's Geotechnical Engineer and confirmed by the Departmental Representative. The Contractor shall be prepared to install any number of rock anchors at any or all of the work sites.

**1.3      REFERENCES**

- .1      All standards listed below shall be the latest issue at the time of tender.
- .1      AT - Standard Specifications for Highway Construction (latest edition)

**1.4      MEASUREMENT AND PAYMENT PROCEDURES**

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

**1.5      QUALITY CONTROL**

- .1      In accordance with Section 01 45 00 - Quality Control.
- .2      Drill and install rock anchors under the direct supervision of an individual having substantial experience in the installation of resin and cement grouted rock anchors.
- .3      All the rock anchors shall be installed in the presence of the Departmental Representative.
- .4      Hydraulic jacks, gauges, and torque wrenches used for testing and tensioning of rock anchors shall be calibrated by an independent, certified testing laboratory within one (1) year of use.
- .5      Provide the Departmental Representative with any samples of grouting materials that may be requested for quality assurance testing.
- .6      Grout quality control measures shall comprise:
  - .1      Specific Gravity compliance.
  - .2      Apparent viscosity with an ASTM Flow Cone or Marsh Cone.
  - .3      Bleed tests as per CSA A23.2-1B Clause 1.6.

## 1.6 SUBMITTALS

- .1 In accordance with Section 01 33 00 – Submittal Procedures.
- .2 Anchor Installation Procedure: Prior to ordering anchor materials, the Contractor shall submit an Anchor Installation Procedure for review by the Departmental Representative. The Installation Procedure shall include product information from the anchor hardware and grout manufacturers including their recommended installation procedures, drilling equipment and hole diameter, grouting and tensioning procedures, calibration certificate(s) for anchor testing equipment, and similar information.
- .3 Anchor Installation Records: The Contractor shall submit anchor installation records to the Departmental Representative daily in a format approved by the Departmental Representative. The records shall include, but shall not be limited to, individual anchor reference number, bar length, bar grade/diameter, depth of anchor distal end, proximal extension from face, proximal bar extension behind nut, over-drill depth, grout type, grout temperature, grout volume used, number of spacers used, grout samples taken, lock off load/tension, date/time tested, as-constructed anchor azimuth, dates/time of staged grouting, and date/time completed.
- .4 Driller's Logs: The Contractor shall submit the Driller's Logs to the Departmental Representative within one (1) day after drilling or upon request. The records shall include, but shall not be limited to, details of flush losses/reductions, inferred faults, depth of overburden, hole diameter, rig type, type of flush, water ingress, jamming during drilling, changes in rock type, and other relevant information that may affect the quality of the anchor installation.
- .5 Grout Testing Results: The Contractor shall submit to the Departmental Representative grout testing results, including but not limited to, Compressive Strength Testing within seven (7) days following completion of testing.
- .6 Mill and Galvanizing Certificates: The Contractor shall submit to the Departmental Representative mill and galvanizing certificates in accordance with Section 01 33 00 – Submittal Procedures.
- .7 Calibration Certificates: The Contractor shall submit calibration certificates for testing and tensioning equipment within one (1) day of commencing work on site, including but not limited to, hydraulic jacks, gauges, and torque wrenches.

## Part 2 Products

### 2.1 MATERIALS

- .1 Materials to be as specified by the Contractor's Geotechnical Engineer and confirmed by the Departmental Representative unless otherwise specified in the Contract Documents.
- .2 Rock anchors and all associated hardware shall be hot-dip galvanized to CSA G164 & CSA G30.18M. Field cut anchor bar shall be touched up with "Galvanox" zinc-rich paint or equivalent as approved by the Departmental Representative.

- .3 Resin grout or cementitious grout may be used. Resin grout shall not be used where the rock is excessively fractured or wet, as determined by the Departmental Representative.
- .4 Resin Grout shall be the product of an established manufacturer who has been producing these products for at least five (5) years. Resin shall be supplied in cartridge form and have a shelf life of not less than six (6) months, as dated on the container, and be used within the first three (3) months of the shelf life. Cartridges shall be stored in accordance with the manufacturer's recommendations. Resin used for the anchorage length of the bolt shall have a gel set time of one (1) to two (2) minutes. Resin used to encapsulate the remainder of the bolt length shall have a gel time of fifteen (15) to thirty (30) minutes.
- .5 Cement grout shall be a pre-bagged, non-shrink cementitious product such as "Microsil® Anchor Grout" produced by Basalite Concrete Products, or equivalent as approved by the Departmental Representative. Cement grout shall have a minimum three (3) day and twenty-eight (28) day compressive strengths of 30 MPa and 50 MPa, respectively, when tested in accordance with CAN/CSA A23.2-1B. Equipment for mixing and pumping grout shall be capable of satisfactorily mixing and agitating the grout, and pumping it into the holes at the water/cement ratio recommended by the grout manufacturer. Grouting shall be tremied from the base of the hole to rock face. Cementitious grouts and mortar shall not be warmer than 30°C or colder than 5°C during mixing or pumping.
- .6 Cement mortar levelling pads shall be SIKA 212, or equivalent as approved by the Departmental Representative, and shall be mixed, placed, and cured in accordance with the manufacturer's recommendations.
- .7 The Contractor shall maintain on site a Reserve Supply of anchor accessories and grout such that there are no delays for procurement of materials.

### **Part 3 Execution**

#### **3.1 PROCEDURES**

- .1 Drill holes for each anchor to a uniform diameter recommended by the tendon manufacturers. Completely clean holes of all drill cuttings, sludge, debris, and water using clean water and air. In the case of resin grout the borehole diameter shall be compatible with the bar and the resin capsules used.
- .2 If required, Rock anchors shall be installed with sufficient thread exposed to accept a plate and nut and to facilitate tensioning and testing. Where a plate and nut is not required, rock anchors shall be cut off flush with the rock surface after tensioning and testing, and be covered with mortar coated with drill cuttings. Wet burlap shall be placed over all mortar to aid curing.
- .3 Use commercially manufactured centralizers at intervals not greater than 2 m to keep the bar centered in the hole. Fill the holes with grout by pumping the grout through a delivery line that extends to the lowest end of the hole, while providing a means of venting at the highest end of the hole. Prior to the grout setting, perform testing and tensioning, and attach the bearing plate and nut (if required).
- .4 Installation – Resin Grouted Anchorages. Insert resin cartridges in the hole. The number of cartridges per hole shall be not less than recommended by the manufacturer for the hole length, diameter, and bar size combination. Add additional cartridges as necessary to

ensure holes are completely filled with resin. Use at least three (3) fast setting cartridges at the bottom of the hole for anchorage and slow setting cartridges for the remainder of the hole. Mix the resin by inserting the bolt in the hole and rotating it at a uniform penetration rate, rotation rate and duration as recommended by the resin manufacturer. After allowing the fast setting cartridges to set, but at least 10 minutes prior to the gel time of the slower cartridges, perform testing and tensioning, and attach the bearing plate and nut (if required).

- .5 Remove all excess cement grout from rock surfaces.
- .6 Testing: Testing equipment shall consist of a suitably sized hollow core jack, an adjustable bearing truss for aligning the direction of pull with the centreline of the anchor, an extension bar for attaching the jack to the anchor, a hydraulic pump with a gauge, a calibration chart for the ram/gauge combination that provides the applied load directly in kN, and an independently mounted dial gauge for measuring the strain of the anchor under load. Rock anchors for testing will be selected by the Contractor's Geotechnical Engineer and observed by the Departmental Representative. All testing will be undertaken by the Contractor as directed by the Departmental Representative. The Contractor shall supply all necessary equipment and be capable of performing adequate testing as required by the Contractor's Geotechnical Engineer and approved by the Departmental Representative.
- .7 Additional tests shall be performed as directed by the Contractor's Geotechnical Engineer and approved by the Departmental Representative where different rock types or anchor installation conditions are encountered as construction progresses.
- .8 Tensioning of the rock anchors to be in accordance with the Contractor's Geotechnical Engineer with the approval of the Departmental Representative.

#### **END OF SECTION**



**33 42 36 SPECIAL PROCEDURES WEATHER STATIONS****Part 1 General****1.1 RELATED WORK**

- .1 03 10 00 CONCRETE FORMING AND ACCESSORIES
- .2 03 20 00 CONCRETE REINFORCING
- .3 03 30 00 CAST-IN-PLACE CONCRETE
- .4 03 60 00 GROUTING
- .5 05 14 00 STRUCTURAL STEEL
- .6 31 23 33 EXCAVATING, TRENCHING AND BACKFILLING
- .7 31 72 13 ROCK ANCHORS

**1.2 DESCRIPTION**

- .1 This section describes the requirements for the design, supply and install of weather stations and all associated infrastructure.

**1.3 REFERENCES**

- .1 All references listed below shall be the latest issue at the time of tender.
- .2 Historical weather data is available at:  
[https://climate.weather.gc.ca/historical\\_data/search\\_historic\\_data\\_e.html](https://climate.weather.gc.ca/historical_data/search_historic_data_e.html).  
and provided in Appendix A for PCA Akamina Pass, Summit Lake and Waterton Townsite stations (2016 – 2021).
- .3 Environment Canada Site Specific Wind Pressure Report for Bertha Ridgetop is provided in Appendix A.
- .4 All materials and components must be designed, constructed and installed in accordance with the following current codes and regulations:
  - .1 National Building Code (Canadian), where applicable
  - .2 Workers Compensation Board regulation (Province of AB), where applicable
  - .3 Alberta Electrical Utility Code (wiring)
  - .4 WHMIS, where applicable
  - .5 Canadian Radio-television and Telecommunications Commission regulations, where applicable
  - .6 Natural Resources Canada Explosives Regulatory Division regulations, where applicable
  - .7 Transportation of Dangerous Good regulations, where applicable
  - .8 Alberta Safety Code Authority

**1.4 MEASUREMENT AND PAYMENT PROCEDURES**

- .1 Weather tower supply and install shall be measured per tower supplied and installed in the described locations. Payment will be made under “**Unit Price Item 1 – Supply and Install Weather Station Towers**” and the price bid shall be full compensation for the cost of furnishing all labour, materials, equipment, tools and incidentals necessary to

Section 33 42 36

SPECIAL PROCEDURES WEATHER STATION

complete the work as specified in the Contract Documents. Transportation costs, including helicopter time and fuel, are considered incidental to the work and no additional payment shall be made. All components and work associated with weather tower supply and install, including but not limited to site preparation, tower foundation construction, and tower fabrication, transportation and install, are incidental to the work and no additional payment shall be made.

- .2 Precipitation pedestal supply and install shall be measured per pedestal supplied and installed at the described locations. Payment will be made under “**Unit Price Item #2 – Supply and Install Precipitation Pedestal**” and the price bid shall be full compensation for the cost of furnishing all labour, materials, equipment, tools and incidentals necessary to complete the work as specified in the Contract Documents. Transportation costs, including helicopter time and fuel, are considered incidental to the work and no additional payment shall be made. All components and work associated with precipitation pedestal supply and install, including but not limited to site preparation, foundation construction, and pedestal fabrication, transportation and install, are incidental to the work and no additional payment shall be made.
- .3 Helipad supply and install shall be measured per helipad supplied and installed at the described locations. Payment will be made under “**Unit Price Item #3 – Supply and Install Permanent Engineered Helipad**” and the price bid shall be full compensation for the cost of furnishing all labour, materials, equipment, tools and incidentals necessary to complete the work as specified in the Contract Documents. Transportation costs, including helicopter time and fuel, are considered incidental to the work and no additional payment shall be made. All components and work associated with helipad supply and install, including but not limited to site preparation, foundation construction, and helipad supply, transportation and install, are incidental to the work and no additional payment shall be made.
- .4 Payment for supply, install, commissioning and training PCA staff in the use and maintenance of all weather station components including sensors, data processing, power and communication components and all associated hardware, mountings, connectors, cables, shields, and housings will be made under “**Unit Price Item #4 – Design, Supply, Install & Commission Weather Station Components**”. Each component will be priced separately under **Unit Price Item #4** and will include all associated hardware required for the mounting and operation of each component according to the Contract Documents. The Contractor must supply full versions of all necessary software and hardware licenses and any necessary sim cards and subscriptions (e.g. satellite plan) required for data processing and communication for the first year of operation.
- .5 Development of a Fall Protection Plan, required for the installation and maintenance of the weather stations, and supply and install of any required fall protection infrastructure, shall be incidental to “**Lump Sum Price Item# 4 – Fall Protection**” and no separate payment shall be made to the Contractor. Fall Protection Plan shall include all fall protection procedures necessary to safely perform install and long-term maintenance work as described in the Contract Documents. Fall Protection infrastructure shall include any temporary or permanent hardware required for fall protection of workers during install and long term maintenance, including but not limited to bolts, hangers and wire rope. The Contractor must supply all necessary equipment for PCA to perform all required maintenance, including but not limited to any required portable ladders or siphons.

- .6 Detailed weather station design and submittal of design drawings in accordance with the plans and specifications shall be considered incidental to “**Lump Sum Item #5 – Design Weather Stations**”. Weather station designs must include foundation designs, structure designs, make and model and configuration of all instrumentation to be mounted on the structures, and associated wiring diagrams.
- .7 Detailed helipad design and submittal of design drawings in accordance with the plans and specifications shall be considered incidental to “**Lump Sum Item #6 – Design Helipad**”.
- .8 The Contractor shall be able to supply all consumables required by the system to PCA should Parks request this service.
- .9 Other Work required shall be paid under the following items:
  - .1 Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the contract and no separate payment shall be made to the Contractor.

## 1.5 DESIGN CRITERIA

- .1 **Anchors, foundations, structures and rockfall protection:**
  - .1 The Contractor must design weather stations for install at the two (2) locations indicated in the Contract Drawings and Project Location KMZ. Weather stations must be designed to meet the performance criteria described in Clause 1.6, this Section.
  - .2 The Contractor must design anchors, foundations, structures, and rockfall protection to ensure a minimum effective service life of 50 years. The design shall be stamped and signed by a Professional Engineer registered in Alberta. The Contractor shall provide the values used to calculate snow, wind and icing loads with the design drawings.
  - .3 Weather station design for the Bertha Ridgetop location must include a climbable tower of minimum 3 m height suitable for mounting all components required to record and transmit the measurements described in Clause 1.6, this Section.
  - .4 Weather station design for the Bertha Mid-Mountain location must include two independent structures, spaced at an adequate distance for accurate measurements. One structure must be a climbable tower of minimum 3 m height suitable for mounting all components required to record and transmit the measurements described in Clause 1.6, this section. The second structure (hereafter referred to as the precipitation pedestal) must be suitable for mounting all components required to record and transmit solid and liquid precipitation rate and quantity as described in Clause 1.6, this section. The precipitation measuring components must be accessible for maintenance (including but not limited to emptying and refilling) by a worker using a portable ladder, without requiring the worker’s feet to exceed 2.4 m off the ground. The orifice of the precipitation measuring system must be at least 3 m off the ground.
  - .5 Tower designs must consider loading from all components to be mounted on each structure, as required to meet the performance criteria in Clause 1.6, this

section, and loading from optional additional components up to a total weight of 50 kg and area of 0.7 m<sup>2</sup> mounted at a height up to 3 m.

- .6 Precipitation pedestal design must consider loading from all components to be mounted on each structure, as required to meet the performance criteria in Clause 1.6, this section.
- .7 Weather stations must be designed to ensure accurate measurements and minimal interference. This includes mounting components at adequate heights to account for snow cover or disturbance from nearby objects, and mounting components at adequate lateral distances from structures to ensure account for disturbance from the structures themselves.
- .8 Designs of tower and antenna-supporting structures must meet the requirements of CSA-S37.
- .9 Ice loading, wind loading, and wind gust loading must be designed using CSA-S37 with settings specific to the individual locations. A site-specific Environment Canada wind pressure report is provided in Appendix A, as well as data from nearby weather stations. Data from additional nearby stations (Castle Mountain) shows ridgetop gusts up to 200 km/h which must be considered in the design.
- .10 Towers must be designed to Reliability Class 1 (Importance Factor 1.0) as defined by CSA-S37.
- .11 Towers must be designed such that workers can safely climb the towers and perform maintenance on all components using a fall protection system, procedure and equipment compliant with all applicable regulations and PCA Safe Work Practices (provided in Appendix D). This fall protection system, procedure and equipment must be outlined in a Fall Protection Plan according to the requirements in this section. Proposed fall protection system, procedure and equipment must be approved during the design review process.
- .12 Precipitation pedestals must be designed such that workers can safely perform maintenance on the precipitation measuring components in accordance with all applicable regulations and PCA Safe Work Practices (provided in Appendix D). A maintenance procedure must be submitted specifically for the precipitation measuring system and approved during the design review process.
- .13 The Contractor shall ensure that all components of the system are protected from rockfall if required based on the site conditions. The design, supply and installation of permanent rock fall protection is considered incidental to the work and no separate payment shall be made.
- .14 All structures must be structurally designed for installation in the geological conditions found at the sites as described in the attached Geotechnical Report, and according to any requirements specified by further geotechnical analysis performed at the request of the Departmental Representative or as required by the Contractor's qualified Professional Engineer. The Contractor is responsible for a detailed geotechnical investigation and/or geotechnical testing if required to perform the Work.
- .15 All designs and implementations must conform to the requirements of any licenses, permits, registrations or guidelines issued by any Canadian authority having jurisdiction. For details on licensing and permitting requirements, it is the Contractor's responsibility to contact any authorities directly and to act as

agent, once approved to do so, on behalf of Parks in obtaining the necessary permits.

**.2 Weather station components:**

- .1 The Contractor must design all components, including but not limited to sensors, instrumentation, mounting hardware, connectors, power sources, housing, communications technology, and lightning protection, to ensure a minimum effective service life of 10 years.
- .2 The Contractor must design to ensure all components operate in the environmental conditions experienced at the project locations, remain operable year-round and do not require mid-winter maintenance.
- .3 The Contractor must design to ensure all components are accessible year-round in case unplanned repair or replacement is required. This includes mounting instruments at an adequate height to account for snow cover.
- .4 The Contractor must design all components to ensure operation is not affected by rime or snow build-up. Manual rime clearing midwinter cannot be relied upon for clearing of rime. Power supply and battery design must account for rime of solar panels. If used, solar panels must be designed to operate when partially snow or rime covered.
- .5 Independent power systems must be designed such that systems operate 24/7 year-round in all weather conditions without requiring midwinter maintenance, and such that all performance criteria in Clause 1.6, this section, are met.
- .6 Precipitation measuring systems must be designed such that no midwinter maintenance is required. Capacity must be designed to capture minimum 1,500 mm of solid and liquid precipitation without emptying, such that emptying and refilling consumables is not required during the winter (Nov 1 – May 31). Precipitation system design must consider environmental conditions and have mechanisms in place to ensure accurate and consistent measurements.
- .7 Weather station towers must be designed such that all components are protected from the effects of lightning. Repairs or replacements of components damaged by lightning within the contract duration are the responsibility of the Contractor and no additional payment shall be made. Precipitation pedestals do not require lightning protection.

**.3 Helicopter landing areas:**

- .1 The Contractor must design a permanent helicopter landing pad for install at the Bertha Ridgetop location.
- .2 Permanent helicopter landing pad must be designed to accommodate the landing of an A-Star helicopter or equivalent, year-round, with minimum landing area of 4.8m x 4.8m. Design must meet all applicable standards and regulations, including those pertaining to worker safety and fall protection.
- .3 The Contractor shall design helipads to ensure minimum effective service life of 25 years.
- .4 The Contractor must clear all obstacles to accommodate the landing of an A-Star helicopter, or equivalent, year-round at the Bertha Mid-Mountain site. This includes but is not limited to tree clearing to accommodate helicopter blade clearance as required by all applicable standards, and danger tree clearing.

## 1.6 PERFORMANCE CRITERIA

### .1 General

- .1 Supplier, make and model of all components to be submitted at time of bidding.
- .2 All components must operate and provide the required measurements at the required intervals 24/7 year-round in all environmental conditions.
- .3 All installed components must withstand and remain fully operational under the effects of any natural forces that will be encountered at each location where the components are installed. These forces include, but are not limited to, the effects of avalanche, cornice fall, rock fall, creep and glide loads from seasonal snow cover, severe riming or icing, frost jacking, snow glide, wind loads and wildlife.
- .4 With the exception of batteries, all enclosures or cabinets for housing components must be lockable, provide adequate drainage and ventilation, and be mounted at a height which accounts for the snowpack and allows access year-round.

### .2 Sensors

- .1 Weather stations must be equipped with sensors which measure the following parameters at the following locations according to all of the requirements of the Contract Documents:
  - .1 Bertha Ridgetop:
    - .1 Wind speed and direction;
    - .2 Air temperature;
    - .3 Relative humidity;
    - .4 Incoming solar radiation.
  - .2 Bertha Mid-Mountain:
    - .1 Wind speed and direction;
    - .2 Air temperature;
    - .3 Relative humidity;
    - .4 Snow depth;
    - .5 Solid and liquid precipitation.
- .2 All sensors must be supplied by a manufacturer which offers a factory exchange services, wherein PCA staff can mail sensors to the supplier for calibration on an annual basis without requiring a technician onsite.
- .3 All sensors must use Military Style Bayonet connectors color-coded to match the appropriate inputs on the datalogger enclosure such that component types are clearly indicated on both connector and datalogger port and no cable tracing is required to manage connections. A laminated wiring diagram must be provided and stored in the enclosure.
- .4 All cables must be custom length suitable for their specific applications.
- .5 All sensors must be installed with mounts and cabling suitable for their specific application, at locations which accurately measure the required parameter and are accessible by workers for maintenance.

- .6 All sensors must be rated for alpine applications and remain operable in the environmental conditions at each site location, as indicated in the weather data provided in Appendix A, and have an operating temperature range of at least -40°C to +50°C.
- .7 All sensors must be capable of outputting maximum, minimum and average values for user definable intervals.
- .8 Wind sensors:
  - .1 Must provide wind speed and direction measurements from a single body sensor that provides SDI-12 output.
  - .2 Must output wind speed maximums and averages, and wind direction at maximum. Units must be user definable and include km/h, mph, knots or m/s. Vector or scalar averaging algorithms must be supported with adjustable intervals.
  - .3 Must measure wind speeds up to 100 m/s, with accuracy of  $\pm 0.5$  m/s.
  - .4 Must measure wind direction with accuracy of  $\pm 5$  degrees.
  - .5 Must be mechanical with propellor diameter suitable for alpine environment and expected maximum wind speeds.
  - .6 Must be ice-resistant.
  - .7 Must not require heating to operate at the site locations.
- .9 Air temperature and relative humidity sensors:
  - .1 Must output temperature maximums, minimums and averages. Units and intervals must be user definable.
  - .2 Must measure temperatures with an accuracy of  $\pm 0.5^\circ\text{C}$ , and relative humidity with an accuracy of  $\pm 1\%$ .
  - .3 Must include solar radiation shield.
  - .4 Must be protected from airborne contaminants.
- .10 Solar radiation sensors:
  - .1 Must be digital with SDI-12 output and store all calibration coefficients within the sensor.
  - .2 Must be precision instruments capable of delivering scientific-grade data.
  - .3 Must be environmentally shielded.
  - .4 Daily totals must be accurate to  $\pm 5\%$ .
  - .5 Incoming radiation sensors must be pyranometers that measure total light available up to at least  $1,800 \text{ W/m}^2$ .
  - .6 Incoming and outgoing radiation sensors must measure broadband incoming (short wave) and outgoing (long wave and reflected short wave) radiation.
- .11 Snow depth sensors:
  - .1 Must be ultrasonic or laser.
  - .2 Must compensate for temperature.

- .3 Must be capable of outputting one-minute precipitation rate, and total amount of precipitation in 1-hour, 8-hour, 12-hour and 24-hour intervals.
- .4 Must be capable of measuring snow depths from 0 to 250 cm, with an accuracy of  $\pm 1$  cm.
- .12 **Precipitation sensors:**
  - .1 Must be load cell technology which measures all types of solid and liquid precipitation.
  - .2 Must be capable of outputting one-minute precipitation rate, and total amount of precipitation in 1-hour, 8-hour, 12-hour and 24-hour intervals. Units and intervals must be user definable.
  - .3 Must consider wind vibration, particles including but limited to dirt and insects, false weight charges, evaporation and temperature fluctuation.
  - .4 Must not require heating to operate at the site locations.
  - .5 Must provide a capacity alert function.
  - .6 Must have a capacity adequate for containing one winter season of precipitation without emptying.
  - .7 Must have capacity to capture 1,500 mm of solid and liquid precipitation without emptying. This required 1,500 mm capacity is prior to the addition of any consumables.
  - .8 Must not require the use of ethylene glycol. Any required consumables must be non-toxic.
  - .9 Must measure precipitation rates up to at least 100 mm/min.
  - .10 Must be accurate to 0.1%.
  - .11 Must include a wind shield.
  - .12 Must not be a tipping bucket.
  - .13 Must account for icing.
  - .14 Method for emptying and refilling must meet all applicable regulations and be approved prior to acquisition.
  - .15 Must be accessible by workers for emptying and refilling year-round.
  - .16 Calibration must be verifiable by users onsite.
- .3 **Data processing and communication:**
  - .1 Data for all required measurements must be processed and stored onsite at each location and transmitted via satellite to a web-based platform.
  - .2 Required measurements must be transmitted and presented via the online web-based platform at 1-hour intervals 24-hours a day year-round.
  - .3 Sampling interval must be user definable and have higher temporal resolution than 1-hour.
  - .4 Time lag between measurement and presentation of data on the web-based platform must not exceed 30 minutes. Satellite communication method must be selected accordingly.



- .5 All data must be hosted and processed by the Contractor, or by an appropriate third-party platform, according to PCA requirements. All data is the property of PCA and must be available to PCA at any time upon request. Permission to use PCA's data for any purpose, research or otherwise, or to share PCA's data with any other party, is subject to the approval of PCA.
- .6 Datalogger, satellite communications and independent power design must consider remote site locations and environmental conditions.
- .7 Datalogger must be enclosed in an IP-54, or approved equivalent, rated housing.
- .8 Datalogger must provide a mechanism which allows users to view and configure the datalogger in real-time at the site locations.
- .9 Datalogger must be able to load any software upgrades or new software (including applications or operating systems) using a standard USB Flash memory drive, or via RS232 connectivity via Bluetooth / WIFI etc.
- .10 Software upgrades must be available via website download as they become available.
- .11 Datalogger must have capacity to store 5-years of data for stated measurements and recording intervals at each weather station.
- .12 Data must be stored such that oldest stored data is overwritten by newest data once memory has reached capacity.
- .13 Datalogger must support a minimum of two electronically independent SDI ports with each being able to provide a minimum of 500mA supply voltage.
- .14 Datalogger must be capable of managing up to 12 independent sensors per site using SDI 12 protocol, in case additional sensors are added after Contract Completion.
- .15 Datalogger enclosure must use Military Style Bayonet connectors for attaching all components, labelled or color coded such that component types are clearly indicated on both connector and datalogger port.
- .16 Connectors must be hardwired on the sensor end.
- .17 Datalogger and component connectors and USB connections and ports must be protected against all environmental conditions whether connected or not.
- .18 Connectors must support inputs from sensors required for all stated measurements.
- .19 Datalogger must include an internal integrated power management system and, in the case of power by solar input, internal, temperature-compensated solar charge regulator sealed inside the IP-54 (or equivalent) housing.
- .20 Datalogger must be able to record and transmit solar voltage and current, battery voltage and current, and battery and internal ambient temperature measurements in graphical and tabular format.
- .21 Datalogger must be able to accept power input from 10-watt to 100-watt solar panels.
- .22 Datalogger must have the ability to directly control the charge rate and voltage storage level of the battery based on the temperature of the battery.
- .23 Datalogger must have the ability to control power to the datalogger telemetry ports based on the available power stored in the batteries.

- .24 Datalogger must automatically shut off telemetry ports at time when the power in the site batteries is unable to keep transmissions operational. If this occurs, the datalogger must continue to record data for a minimum of 3 weeks after the site telemetry is deactivated. Users must be able to retrieve data from the internal memory. Telemetry voltage cut-off must be user definable. Telemetry and datalogging operations must automatically restart without user intervention once the datalogger senses the site batteries have achieved a minimum user define charge level. Datalogger must issue a warning at least 1 hour prior to automatic shut off.
- .25 Datalogger clock must be stable to:
  - .1 < 100 microseconds initial accuracy once synchronized to GPS;
  - .2 < 10 milliseconds drift for operational temperature range of datalogger for 28 days after initial GPS Synchronization.
- .26 Datalogger must be able to support multiple telemetry types including, but not limited to GOES compatible transmitter, cellular transmitter, Iridium/cellular modems.
- .27 Primary communication must be via Geostationary Operational Environmental Satellite (GOES) connection unless otherwise approved by the Departmental Representative. The Contractor is responsible for testing the satellite connection to all weather station locations.
- .28 Satellite transmitter must be enclosed in an IP-54, or approved equivalent, rated housing.
- .29 The system shall include security features in the communications to avoid tampering.
- .30 The system shall allow the user to define parameters for error and failure alerts for all components.
- .31 The communications systems must be configured such that they are not susceptible to cyber-attacks (e.g. spam).
- .32 The Contractor must provide a secure, password protected, web-based interface, allowing simultaneous, multi-user access (applications such as TeamViewer are not permitted), which unifies data presentation from all weather stations. The interface must be a web-based application accessible via the internet on both desktop and mobile devices, scaled appropriately for both and be functional on any operating system (e.g. Windows, Android, iOS, Blackberry).
- .33 The system shall be designed such that all required measurements can be automatically input into the Canadian Avalanche Association InfoEx at scheduled intervals for user-defined time ranges in the formatting required by the Canadian Avalanche Association.
- .34 Web-based platform must allow users to create and extract graphs of any measurement for any available date range.
- .35 Web-based platform must allow users to view or extract any range of data in tabular format (i.e. “.csv”, “.txt”, “.xlsx” etc).
- .36 The user must be able to view all required data from anywhere with an internet connection.

#### .4 **Power**

- .1 Independent power system must be designed to ensure 24/7 year-round operation of all specified components at the site locations, and allow for the future addition of the following at each site:
  - .1 Bertha Ridgetop: Web cam.
  - .2 Bertha Mid-Mountain: Incoming and outgoing solar radiation sensor, web cam, snowpack temperature profiler which measures snowpack temperature at 20cm intervals up to 200cm.  
Power design to be approved prior to manufacturing.
- .2 If design uses batteries and solar panels, each site must have a minimum of two heavy duty starved electrolyte batteries and one 100W solar panel, unless otherwise approved by the Departmental Representative.
- .3 Any required solar panels must be supplied with Military Style Bayonet connectors compatible with the datalogger and telemetry systems.
- .4 Any required solar panels must be designed to operate when partially snow or rime covered.
- .5 Any required batteries must be certified for transport by helicopter.
- .6 Any required batteries must not leak or explode if punctured.
- .7 Any required batteries must be 100% recyclable.
- .8 Battery enclosure must be minimum IP-54 rated, or approved equivalent, and contain all spills in accordance with Section 01 35 43 Environmental Procedures.

## 1.7 SUBMITTALS

- .1 Design drawings including any required rock anchors, foundations and structures for each site signed and stamped by a Professional Engineer registered in Province of Alberta, in accordance with Section 01 33 00 Submittal Procedures, including values used to calculate snow, wind and icing loads.
- .2 Helipad design drawing signed and stamped by a Professional Engineer registered in Province of Alberta, in accordance with Section 01 33 00 Submittal Procedures, including values used to calculate snow and wind loads.
- .3 Component configuration and design including layout of all components on structures, attachment points and mechanisms, component types and environmental ranges. Components include all instrumentation, hardware and software required to obtain the required measurements at each site location, and store and communicate the data in compliance with the performance criteria outlined in this section.
- .4 Service plan outlining maintenance and calibration requirements and intervals for all components including outlining the specific procedure for annual precipitation system maintenance which meets applicable standards and PCA safe work practices.
- .5 Fall Protection Plan for access to, and onsite maintenance of, all components.

## 1.8 DESIGN REVIEW

- .1 Within two (2) weeks of Contract Award, the Contractor shall provide the Departmental Representative with one (1) electronic copy of complete working Drawings, and one (1) electronic copy of detailed design calculations. Drawings to bear signature and stamp of qualified Professional Engineer registered in Province of Alberta.

- .2 The Contractor shall verify existing site conditions and ground elevations before preparing foundation Drawings. The Contractor shall submit anchor, foundation and structure drawings within two (2) weeks of the first site visit. Anchor, foundation and structure drawings and design calculations to bear signature and stamp of qualified Professional Engineer registered in Province of Alberta, Canada. Contractor to include in this submittal plans for any anticipated rock bolting, scaling and/or blasting.
- .3 The Contractor shall verify existing site conditions before submitting recommendations for rockfall protection including scaling plan. Recommendations to be signed and stamped by qualified Geotechnical Engineer.
- .4 Shop Drawings, the Contractor shall:
  - .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
  - .2 Submit shop drawings of all structures and all required consumables (including explosive charges).
  - .3 Ensure each drawing submitted bears stamp and signature of qualified Professional Engineer registered in the Province of Alberta.
- .5 Within three (3) weeks of Contract Award, the Contractor shall submit documentation verifying that each of the Design Criteria and the Performance Requirements are satisfied by the proposed system. The Contractor should address each Criteria individually and include drawings or details to verify that the criteria is satisfied.
- .6 The Departmental Representative retains right of final approval for equivalent products and locations.

## **1.9 QUALITY CONTROL**

- .1 All Quality Control testing shall be performed by the Contractor.
- .2 Testing shall be as per approved Manufacturer's and Contractor's Quality Control Plan.
- .3 The Contractor is required to complete all inspections as required by the Weather Station manufacturer, as recommended by any of the additional system Design Engineers, or as a result of studies carried out as part of the installation of the Weather Station.

## **1.10 WARRANTY**

- .1 In addition to any other requirement of the Contract, all material and workmanship shall be under warranty for five (5) years after the date of Final Certificate of Completion. All parts, hardware, software, and any other materials supplied and/or installed by the Contractor for a period of five (5) years from the date of final acceptance that fail to operate, break, are defective or show unusual wear will be replaced or repaired by the Contractor without charge for material or costs associated with reinstallation.
- .2 Any required unplanned mid-winter repair or replacement during the warranty period is the responsibility of the Contractor.
- .3 Deficiencies identified under the warranty will be considered rectified after one full winter of successful performance. Any costs associated with warranty repairs are the Contractor's responsibility and will not be paid for under any Service Contract.

**Part 2 Products****Part 3 Execution****3.1 STAGING**

- .1 The Primary Staging Area is the PCA Compound. The Primary Staging Area will be closed for public use, suitable for helicopter operations, overnight helicopter storage and suitable for storage of fuel and support equipment/supplies according to Section 01 35 43. The Contractor is responsible for preparing the Staging Area to the specifications of Clause 3.2 Work Site Preparation, this Section. The designated area will be the laydown for materials receiving and storage during Construction. The pilot must avoid long-lining over public areas and wait for a break in traffic prior to long-lining over any roadways.
- .2 The Heli Staging Area is the Cameron Day Use Area, located at the south end of Evergreen Ave as shown in Drawing S001 and the Project Location KMZ. The Contractor will be provided an area approximately 20 m by 20 m and use of this area will be limited to specific days for long-lining materials only from Sept 1, 2021- June 30, 2022. Advance notice and a detailed schedule of use will be required as this area is heavily used by the public and can only be closed for short durations. The helicopter will not be permitted to land at the Cameron Day Use Area. Any long-lining required after June 30, 2022 will take place from the Primary Staging Area.
- .3 The Contractor shall ensure, through treatment if required, that the staging site does not include any invasive species with the potential of being transported within the National Parks.

**3.2 WORK SITE PREPARATION**

- .1 The Contractor shall prepare safe landing areas for the helicopter on the mountain. The following will be required at the following locations:
  - .1 Bertha Ridgetop – Permanent engineered helipad.
  - .2 Bertha Mid-Mountain– Tree clearing and ground leveling.
- .2 The Contractor shall assess the work site and staging location for potential hazards including, but not limited to, loose rock and dangerous trees. Only areas where work is undertaken need be surveyed.
- .3 The Contractor shall scale loose rock from the work site and surrounding as required to protect workers and equipment from rockfall hazard, and ensure competent rock is used for rock anchors and foundations (as determined by the Contractor's geotechnical engineer).
- .4 The Contractor shall carry out any necessary access construction, including but not limited to, trail building, access ropes or anchors, staging or platforms for workers, and supply of equipment and materials to facilitate construction operations.
- .5 Disturbance to surrounding area shall be kept to a minimum; the Contractor shall remove only trees, vegetation and overburden where weather stations or helipads are to be installed in accordance with Section 01 35 43 - Environmental Procedures.
- .6 Danger tree clearing will be required at the Bertha Mid-Mountain site, around both the weather station and helicopter landing area locations. Initial access to Bertha Mid-Mountain will be on foot in order to clear trees and establish a helicopter landing area.

The contractor is responsible for danger tree clearing such that risk to infrastructure and workers is mitigated.

- .7 Initial access to Bertha Ridgetop may not be possible by helicopter due to some small trees near the helicopter landing and challenging helicopter landing conditions along the ridge. The Contractor must assume initial access will be on foot for minor tree clearing, or by toe-in landing and hover exit with a capable pilot and flying conditions.

### 3.6 INSTALLATION

- .1 Install foundations in accordance with Contractor's design drawings and Sections 03 10 00 Concrete Forming and Accessories, 03 20 00 Concrete Reinforcing and 03 30 00 Cast-in-place Concrete.
- .2 Install rock anchors in accordance with Contractor's design drawings and Section 31 72 13 Rock Anchors.
- .3 Install structural steel in accordance with Contractor's design drawings and Section 05 14 00 Structural Steel.
- .4 Install instrumentation, hardware and software in accordance with Contractor's drawings and manufacturer recommendations.
- .5 The Contractor must install four (4) Weather Towers and (2) Precipitation Pedestals in accordance with Section 05 14 00 Structural Steel and the Contract Drawings and transport them to the locations indicated in the drawings and the KMZ.
- .8 The Contractor must supply and install lightning protection for each tower and supply one back-up lightning protection rod and cabling. Each device and component must be protected from the effects of lightning, whether a direct strike to the infrastructure or a lightning strike nearby traveling up any cabling into the unit. Any components that may potentially be damaged by lightning must be removed immediately following the end of avalanche season, and replaced immediately preceding the start of avalanche season. Exact timing to be outlined by the Departmental Representative. Tower ground resistance must be 5 ohms or less.
- .9 The Contractor must supply and install 'Do not climb' signs on all towers that will stop unauthorised access of the tower.
- .10 The Contractor shall ensure that safety measures are in place for worker access during construction. This includes fall protection and rock fall protection of workers. This is considered incidental to the work and no additional payment will be made.
- .11 The Contractor shall ensure that safety measures are in place for worker access to all weather station components when snow is not present at the location, and that these comply with industry best practices and AT –Standard Specifications for Highway Construction. This includes but is not limited to Fall Protection systems for maintenance access. This is considered incidental to the work and no additional payment will be made.

### 3.4 FALL PROTECTION

- .1 All construction and maintenance work, and any other work performed by accessing or working on the tower or pedestal structure and any attached or related structures or equipment must be planned and executed in accordance with all applicable occupational health and safety (OHS) and environmental legislation including but not limited to:

- .1 Canada Occupational Health and Safety Regulations including but not limited to:
  - .1 Part 12 - Protection Equipment and Other Preventative Measures, and
  - .2 Part 3 - Temporary Structures and Excavations.
- .2 All applicable OHS Alberta legislation including the OHS Act, OHS Regulation, and OHS Code including but not limited to:
  - .1 OHS Code Part 9 - Fall Protection, and
  - .2 OHS Code Part 8 - Entrances, Walkways, Stairways and Ladders.
- .3 Parks Canada Safe Work Practices, including but not limited to:
  - .1 Portable Ladders, Use of
  - .2 Working at Heights
- .2 The Fall Protection Plan (FPP) must be developed for the scope of work to be performed for or at each tower and pedestal, including construction and long-term annual maintenance. The FPP must contain the sections and content required by the OHS legislation referenced within this section including procedures for rescue and emergency response of a fallen or fallen and suspended (in air) person. The FPP must cover work performed by the construction Contractor, the annual maintenance Contractor and PCA staff. Fall Protection Equipment and Training requirements must be outlined in the FPP. Fall Protection Training for PCA staff must be provided by the Contractor. The FPP must be signed by a qualified HSE representative.
- .3 The Contractor must perform a hazard assessment prior to performing work to identify specific hazards for the scope of work at each tower and pedestal location and determine the appropriate controls to effectively mitigate the risk of injury, property damage, environmental harm, or other incident.
- .4 Safety inspections must be performed on all tools, equipment, ladders, prior to use including but not limited to the verification of hazard controls, securement, physical integrity, general safety, and OHS legislation compliance.

### **3.5 TESTING AND COMMISSIONING**

- .1 The Contractor shall arrange for qualified and experienced representative of the weather sensor, instrumentation and hardware supplier to test all weather station components following installation. Weather stations will be considered to be commissioned once one (1) full week of data is available on the web platform in compliance with all performance requirements.
- .2 The Contractor shall submit an outline of the testing and commissioning procedure to the Departmental Representative in accordance with manufactures specifications.

### **3.6 TRAINING**

- .1 The Contractor shall arrange for a qualified and experienced fall protection safety representative to be onsite for PCA staff fall protection training once installation is complete.
- .2 The following minimum training is required by the Contractor:
  - .1 Training of up to 4 operational staff members and any other staff required to operate and maintain the systems, including electronics technicians, radio technicians, and information technologists, resulting in the trainees being

- capable of operating and maintaining the weather stations correctly, safely and efficiently.
- .2 The Contractor shall include one site visit to at least one Mid-Mountain and one Ridgetop weather station location and will provide transportation for trainers and trainees to the site from the staging area.
- .3 The Contractor shall submit a detailed program of the training to be provided that includes but is not limited to:
  - .1 a schedule of training, hours of training that will be delivered;
  - .2 topics that training will cover;
  - .3 description of training materials/manuals;
  - .4 any certifications that are required to operate the equipment.

### **3.7 SERVICE**

- .1 The weather station component manufacturer or its partners must be capable of:
  - .1 Providing qualified technical support year-round;
  - .2 Providing ongoing system development support, training, maintenance, repair, replacement and calibration services;
  - .3 Providing a factory exchange service for calibration of all components for the design life of the weather stations.

### **3.8 DOCUMENTATION**

- .1 The Contractor shall supply all necessary documentation for the weather sensors, instrumentation, hardware and their supporting software and infrastructure, including but not limited to permits, licenses, maintenance and operation manuals, and shop drawings for all design components, including but not limited to specifications and design drawings for consumables
- .2 Maintenance and Operation Manual
  - .1 The Contractor shall prepare and submit a Maintenance and Operations Manual which will be used during the training of the PCA staff. This manual shall include but is not limited to the following:
    - .1 Equipment models and serial numbers;
    - .2 Procedures for annual maintenance;
    - .3 Safety requirements, including fall protection procedures and equipment;
    - .4 Contact information for replacement parts and consumables;
    - .5 Contact information for service locations;
    - .6 Site access methods and plans;
    - .7 Troubleshooting;
    - .8 Recommended intervals for inspections, maintenance and calibration.

**END OF SECTION**