DENNY ISLAND AND SAFETY MOUNTAIN COMMUNICATION TOWER AND SUPPORTING INFRASTRUCTURE

CANADIAN COAST GUARD (CCG)

CCG WESTERN REGION MARITIME AND CIVIL INFRASTRUCTURE
CCG PROJECT REFERENCES: 8B200-19002; 8B200-19003

Prepared by: SC
Revision: 0
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SPECIFICATIONS

APPENDICIES

CANADIAN COAST GUARD (CCG) DRAWINGS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 03 30 00 – Concrete Work
.2 13 36 13.13 – Steel Towers
.3 26 05 27 – Grounding
.4 32 30 00 – Waveguide Bridge

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises of the construction of reinforced concrete foundations, site grading, and a self-supported tower on two undeveloped remote CCG communication sites. Work on both sites includes, but is not limited to:

.1 **Denny Island**

.1 Mobilization and Demobilization of all manpower, equipment, materials, and other resources necessary to execute the Work.
.2 Design, supply, and installation of a new 39.40m self-supported tower with work platform and associated concrete foundations;
.3 Design, supply, and installation of antenna mounts and obstruction lighting;
.4 Design and supply of one (1) new waveguide bridge;
.5 Design, supply, and installation of concrete foundations for one (1) new waveguide bridges;
.6 Supply and installation of a grounding system for the new tower, waveguide bridge, building, and fuel tank;
.7 Supply and installation of ten (10) concrete pier foundations for a CCG building;
.8 Supply and installation of concrete foundations for a fuel tank;
.9 Supply and installation of concrete retaining walls for a helipad; and
.10 Supply and installation of granular backfill material for helipad.

.2 **Safety Mountain**

.1 Mobilization and Demobilization of all manpower, equipment, materials, and other resources necessary to execute the Work.
.2 Design, supply, and installation of a new 39.40m self-supported tower with work platform and associated concrete foundations;
.3 Design, supply, and installation of antenna mounts and obstruction lighting;
.4 Design and supply of one (1) new waveguide bridge;
.5 Excavation, blasting of mass rock, and movement of earth;

.6 Design, supply, and installation of concrete foundations for one (1) new waveguide bridges;

.7 Design, supply, and installation of a grounding system for the new tower, waveguide bridge, building, and fuel tank;

.8 Supply and installation of ten (10) concrete pier foundations for a CCG building;

.9 Supply and installation of concrete foundations for a fuel tank;

.10 Supply and installation of concrete retaining walls for a helipad; and

.11 Supply and installation of granular backfill material for helipad

1.3 PROJECT LOCATION

.1 **Denny Island**

.1 Work is to be completed on Denny Island which is a undeveloped site located approximately 8 kilometres southeast from Bella Bella, BC. Site coordinates are approximately 52° 06’ 12.7” N, 128° 04’ 27.6” W.

.2 **Safety Mountain**

.1 Work is to be completed on Safety Mountain which is a undeveloped site located approximately 68 kilometres south from Bella Bella, BC. Site coordinates are approximately 51° 32' 39.4"N, 127° 56' 54.3"W.

.3 Both sites are accessed via helicopter only. The Contractor is responsible for providing all transportation services of materials, equipment and crew to and from the site before and during construction.

.4 Contractors must familiarize themselves with the location, scope of work, site restrictions, and temporary measures required for completing the work as specified.

1.4 BACKGROUND INFORMATION

.1 Both mountaintop sites have previously been cleared of vegetation and scrubbed of loose material. However, there may be small amounts of localized excavation required to clear to bedrock for Concrete foundations.

1.5 SUBMITTALS

.1 All Submissions to be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Mandatory submittals and schedule for submission are detailed below. The following identifies general requirements only. The relevant sections of the specifications must be consulted for a complete listing of mandatory content. This summary is not an exhaustive list of all submissions required for the duration of the project, as additional submissions may be required after award.

.1 Design Drawings
  .1 To be submitted no later than 28 days following contract award.
  .2 Submission to include:
    .1 Tower and waveguide bridge design drawings;
    .2 Foundation design drawings; and
    .3 Grounding design drawings.
.2 Shop Drawings
  .1 To be submitted no later than 14 days following acceptance of Design Drawings.
  .2 Submission to include:
    .1 Tower and waveguide bridge fabrication shop drawings; and
    .2 Grounding products' specification sheets.
.3 Schedule
  .1 To be submitted no later than 28 days following contract award.
  .2 The construction schedule is to be built in collaboration with CCG.
.4 Construction Plan
  .1 To be submitted no later than 28 days following contract award except as stated otherwise in the relevant Sections.
.5 As-Built Information
  .1 To be submitted no later than 21 days following completion of site works.

1.6 CCG RESPONSIBILITIES

.1 The CCG Representative is responsible for the following:
  .1 Attend a site meeting at the start of construction to review scope of work and provide any clarifications.
.2 The CCG may undertake various monitoring functions during the Work. This includes but is not limited to:
  .1 First Nations observers: CCG may retain First Nations observers for the project. They may observe and report on construction activities. Direct involvement on construction activities is to be limited, except where there is a cultural or archeological concern that arises at a particular site.
  .2 Environmental monitors: CCG, or its representatives, may monitor construction activities for conformance to the Environmental Reports and Bulletins provided in Appendix D.
  .3 Construction monitors: CCG may monitor various stages of construction performance for conformance to the contract documents and for final acceptance of the Work.

1.7 CONSTRAINTS

.1 It is the responsibility of the Contractor to be familiar with the site location and identify project constraints as they relate to the scope of the Work. Among the various constraints includes, but not limited to, the following:

.1 Weather: Weather on coastal mountains can be unpredictable and subject to sudden changes. High wind, fog, snow and rain can hinder helicopter access and construction progress and pose safety hazards. Snow accumulation is expected throughout the winter months.

.2 Remote Work Location: Due to the remoteness of the site, there may be additional challenges with mobilizing materials and equipment, site safety, travel and accommodations, availability of workers and other service providers.

.3 Communications: There may be no cell coverage or internet service available on site. Other means of communication may need to be planned for such as satellite devices or use of the VHF marine radio network.

.4 Site Access: The site is only accessed by helicopter.

.5 Site Services: The Work site does not provide any utilities or services for Contractor use.

.6 Wildlife: Grizzly bears, Black bears, and Cougars are known to be local to the area. CCG has a cache of emergency supplies on site for CCG employees and the cache has been tampered with by bears in the recent past. The hazards associated with wildlife activity must be addressed within the Health and Safety Plan

1.8 TRAVEL AND ACCOMMODATIONS

.1 The Contractor is responsible for all travel and accommodation related expenses incurred for the Contractor's representatives as it relates to the Work.

.2 Any camping on site will be at the discretion of the Contractor and the Contractor will be responsible for preparing and providing adequate safety, meal, and evacuation plans for the Contractor's representatives, see Section 01 35 29 – Health and Safety.

1.9 FEES, PERMITS, AND CERTIFICATES

.1 Contractor to pay fees, obtain certificates and permits, and provide information to authorities having jurisdiction where required.

.1 Contractor to provide copies to CCG of any documentation submitted to other authorities related to the Work.

.2 Contractor to furnish certificates and permits when requested.

1.10 TEMPORARY FACILITIES

.1 Sanitary Facilities

.1 No washroom facilities are available on the construction site. Contractor to provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 The Contractor must maintain the sanitary facilities in a satisfactory and sanitary condition at all times and must enforce their use; and must rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the CCG, or on adjacent property.

.2 Water Supply

.1 Temporary water supply connection is not available at the site. Contractor to arrange for temporary water supply needed for personal or construction use as required.

.3 Temporary Power

.1 Temporary power supply connection is not available at the site. Contractor to arrange for temporary power supply needed for personal or construction use as required.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used

PART 3 EXECUTION

3.1 WORK COMPLETION DEADLINES

.1 **Denny Island**

.1 Steel fabrication complete March 31, 2022

.2 Building foundations and helipad complete May 31, 2022

.3 Final site completion June 30, 2022

.2 **Safety Mountain**

.1 Steel fabrication complete March 31, 2022

.2 Final site completion September 30, 2022

3.2 HELICOPTER OPERATIONS

.1 Helicopters and helicopter cranes used for external load lifting during construction, maintenance, and demolition activities must comply with any and all applicable regulations of the Canadian Aviation Regulations (CAR), SOR/96-433 for helicopter external sling load operations.

.2 Every practical precaution must be taken to provide for the protection of the employees from flying objects in the rotor downwash. All loose gear, equipment and materials within 100 feet of the load lifting area and setting the load, and all other areas susceptible to rotor downwash, must be secured or removed.

.3 Maintain constant, reliable communication between the pilot and a competent rigger. Signal systems between aircrew and ground personal must be checked and understood in advance of hoisting the load. This applies to either radio or hand signal systems.

3.3 COMMUNICATIONS

.1 Daily Updates:

.1 The Contractor is to provide daily updates to the CCG Representative while site construction is in progress. The daily updates are to include:

.1 Work completed that day;

.2 Planned work activities the next day; and

.3 Details of crew on site.

.2 Site Check-in/out Procedures:

.1 In addition to the Daily Updates, upon arrival or departure from site, the Contractor is to contact Victoria Coast Guard Radio on VHF channel 83A (frequency 157.175 MHz) or phone 250-363-6611 and report on number of people on site and provide any other information as requested by Coast Guard Radio. A Restricted Radiotelephone Operator's Certificate Maritime (ROC-M) is required to use a marine VHF radio.

.3 Availability:

.1 The Contractor must be available at all times while working on site. Reliable communication services are to be employed and monitored by the Contractor to allow the CCG Representative to make contact at any time.

3.4 USE OF SITE

.1 The Contractor is to ensure that the site is left in the same state or better than it was found at the start of Work: all waste or excess materials must be removed.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 03 30 00 – Concrete Work
.2 13 36 13.13 – Steel Towers
.3 26 05 27 – Grounding
.4 32 30 00 – Waveguide Bridge

1.2 ADMINISTRATIVE

.1 Submit to Canadian Coast Guard (CCG) submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
.2 Do not proceed with Work affected by submittal until review is complete.
.3 Present drawings, product data, samples and mock-ups in SI Metric units.
.4 Where items or information is not produced in SI Metric units converted values are acceptable.
.5 Review submittals prior to submission to CCG. This review represents necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents.
.6 Notify CCG, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
.7 Contractor's responsibility for errors and omissions in submission is not relieved by CCG's review of submittals.
.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by CCG's review, unless CCG gives written acceptance of specific deviations.
.9 All submissions include:
    .1 Date and revision dates.
    .2 Project title and number.
    .3 Name and address of:
        .1 Subcontractor
        .2 Supplier
        .3 Manufacturer
.10 Unless noted otherwise, submittals in electronic format are required.

1.3 DESIGN DRAWINGS

.1 Submit all design drawings stamped and signed by a professional engineer registered and licensed in British Columbia, Canada.

.2 Allow five (5) working days, or as otherwise stipulated in the specifications, for the CCG Representative to review of each submission.

.3 Adjustments made on design drawings by CCG are not intended to change contract price. If adjustments affect value of Work, state such in writing to the CCG Representative and await authorization prior to proceeding with Work.

.4 Make changes in design drawings as CCG may require, consistent with Contract Documents. When resubmitting, notify the CCG Representative in writing of revisions other than those requested.

.5 Any changes to engineering plans must be approved by the CCG Representative.

.6 Indicate materials, connections, explanatory notes and other information necessary for completion of Work.

.7 Submissions to include:

.1 Details of appropriate portions of Work as applicable:

.1 All details required by specifications;

.2 All applicable information recommended in Annex A of CSA S37-18;.

.3 Any other information deemed relevant by the Engineer of Record;

.4 A capacity profile of the tower giving designed % load capacity for tower legs, diagonals, and foundations; and

.5 For drawings of items outside of the scope of CSA S37-18, the same information recommended in Annex A is to be provided.

.8 Submit electronic copies of drawings for each requirement requested in specification Sections and as CCG may reasonably request.

1.4 SHOP DRAWINGS

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit all shop drawings stamped and signed by professional engineer registered and licensed in British Columbia, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow five (5) working days, or as otherwise stipulated in the specifications, for CCG to review of each submission.

.5 Adjustments made on shop drawings by CCG are not intended to change contract price. If adjustments affect value of Work, state such in writing to CCG and await authorization prior to proceeding with Work.

.6 Make changes in shop drawings as CCG may require, consistent with Contract Documents. When resubmitting, notify CCG in writing of revisions other than those requested.

.7 Submissions to include:

.1 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to adjacent work.

.8 After CCG's review, distribute copies.

.9 Submit electronic copies of shop drawings for each requirement requested in specification Sections and as CCG may reasonably request.

.10 Submit three (3) copies of product data sheets or brochures for requirements requested in specification Sections and as requested by CCG where shop drawings will not be prepared due to standardized manufacture of product.

.11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by CCG.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.12 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by CCG.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.13 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by CCG.

.14 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.15 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by CCG.

.16 Delete information not applicable to project.

.17 Supplement standard information to provide details applicable to project.

.18 upon review by CCG, 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.

.19 The review of shop drawings by CCG is for sole purpose of ascertaining conformance with general concept.

.1 This review does not mean that CCG approves detail design inherent in shop drawings, responsibility for which must remain with Contractor submitting, and such review does not relieve Contractor of responsibility for errors or omissions in shop drawings or of the responsibility for meeting requirements of the construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.5 SCHEDULE

.1 Submit a Detailed Project Schedule for planning, monitoring and reporting of project progress and to allow orderly planning, organizing, and executing of Work.

.2 Allow five (5) working days, or as otherwise stipulated in the specifications, for CCG to review submission.

.3 Submission format to include a Bar Chart (GANTT).

.4 Accepted Schedule will be used as baseline for progress and updates.

.5 Project Milestones form targets for Project Schedule. Milestones include:

.1 Completion of Steel Fabrication;

.2 Completion of Concrete Foundations;

.3 Completion of Grounding Work;

.4 Completion of Steel Erection; and

.5 Final Completion of all Work.

.6 Submission to include as a minimum:

.1 Contract award;

.2 Permits;

.3 Dates of submittals;

.4 Project Milestone completion dates; and

.5 Detailed description of the Work Plan including:

.1 Mobilizations of equipment, crews, and materials;

.2 Site Work activities; and

.3 Site clean-up and demobilizations.

.7 The schedule must indicate details of the critical path and detail the relevant activities which effect it.

.8 Update Schedule and submit to the CCG Representative on a weekly basis reflecting activity changes and completions, activities in progress, comparing current progress to baseline, and presenting forecasts.

1.6 CONSTRUCTION PLAN

.1 Submit a Construction Plan to be of sufficient detail to demonstrate that the challenges of the project have been considered and preparations have been made to undertake the Work in a competent and professional manner.

.2 Allow five (5) working days, or as otherwise stipulated in the specifications, for CCG to review of each submission.

.3 Submission to include:

.1 List of Sub-Contractors and suppliers;

.2 Prime Contractor/co-ordination with other Contractors Plan;

.3 Contractor Chain of Command including Sub-Contractors and Departmental Representatives;

.4 Work Plan for all items including:

.1 Mobilization;

.2 Material Delivery;

.3 Staging Areas;
.4 Accommodations Plan;
.5 Demolition;
.6 Earth Movement;
.7 Interim Inspections; and
.8 Site Clean-up and Demobilizations

.5 Health and Safety Plan (Section 01 35 30);
.6 Environmental Protection Plan (Section 01 35 43);
.7 Concrete Plan (Section 03 30 00);
.8 Grounding Plan (Section 26 05 27); and

.4 The Construction Plan can be submitted in parts.

1.7 AS-BUILT DOCUMENTATION

.1 Submit As-built information following completion of Work.
.2 Allow five(5) working days, or as otherwise stipulated in the specifications, for CCG to review each submission.
.3 Submissions to include:
.1 As-built drawings clearly marked up in red markings containing any changes or variations from the original design documents.
.2 Construction photographs clearly showing the completion of Work and any changes or variations from the original design documents.
.3 Test reports as required in the specifications.
.4 A detailed inspection report in accordance with Annex D of CSA S37-18 signed and sealed by the Engineer of Record.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 03 30 00 – Concrete Work
.2 13 36 13.13 – Steel Towers
.3 26 05 27 – Grounding
.4 32 30 00 – Waveguide Bridge

1.2 REFERENCE STANDARDS

.1 Work under this section to comply with all listed references. In the case of conflict or discrepancy, the more stringent shall apply:
  .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
  .2 British Columbia Workers Compensation Act, Occupational Health and Safety Regulation B.C. Reg. 296/97.
  .3 British Columbia Public Health Act, Industrial Camps Regulation B.C. Reg. 70/2012

1.3 ACTION AND INFORMATION SUBMITTALS

.1 Submit a site-specific Health and Safety Plan in accordance with Section 01 33 00.
.2 Submit Health and Safety plan as part of the Construction Plan. Submission to include:
  .1 Results of site specific safety hazard assessment.
  .2 Listing of all activities specific to the project and their Health and Safety risks or hazards.
  .3 Detailed descriptions of how the activities are to be carried out as well as methods for mitigating hazards and risks.
  .4 Listing of personnel responsible for Health and Safety measures, and Emergency procedures.
  .5 Proof of training for all employees working at heights and proof of rescue training for at least one employee working on site.
  .6 Proof of adequate first aid training on site and details of first aid kits.
  .7 An effective rescue and response plan.
  .8 A COVID-19 Safety Plan in accordance with Federal and Provincial Health Orders.
  .9 If the Contractor plans to camp on site, the remote camp must meet, but not limited to, the following:
    .1 The location must be preapproved by the CCG Representative and meet applicable standards and regulations.

.2 The remote camp must have a first-aid room which is suitable for the Contractors crew size and meet applicable regulations such as WorkSafe BC and the BC Guidelines for Industrial Camps Regulation, if applicable.

.3 Have a walk off plan in case of an emergency where helicopter support cannot be achieved due to visibility concerns. The plan is to include, but not limited to, a trail down to the water where pick-up by boat can be arranged. This trail must be verified by the Contractor and adequately marked prior to performing the Work.

.3 CCG will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within seven (7) calendar days.

.4 CCG's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

1.4 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 CCG may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.5 RESPONSIBILITY

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

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

1.6 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factors, hazards, 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 CCG verbally and in writing.

1.7 HEALTH AND SAFETY COORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:

.1 Have site-related working experience specific to activities of the Work.

.2 Have working knowledge of occupational safety and health regulations.

.3 Have applicable first-aid certification and meets the required regulations.

.4 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.

.5 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.6 Be on site during execution of Work.

1.8 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by CCG.

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

1.9 PRIORITY OF HEALTH AND SAFETY

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

1.10 NOTIFICATION

.1 CCG may notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal health and safety laws or regulations, permits, and other elements of Contractor's Health and Safety Plan.

.2 Contractor: after receipt of such notice, inform CCG of proposed corrective action and take such action for approval by CCG.

.3 CCG will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 03 30 00 – Concrete Work
.2 13 36 13.13 – Steel Towers
.3 26 05 27 – Grounding
.4 31 00 99 – Earthworks for Minor Works
.5 32 30 00 – Waveguide Bridge

1.2 REFERENCE STANDARDS

.1 Canadian Environmental Protection Act (CEPA)
.2 Canadian Environmental Assessment Act, 2012 (CEAA)

1.3 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.4 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit Environmental Protection Plan before commencing construction activities or delivery of materials to site.
.3 Submit Environmental Protection Plan as part of the Construction Plan. Submission to include:
  .1 Name of person responsible for ensuring adherence to Environmental Protection Plan.
  .2 Name and qualifications of person responsible for manifesting hazardous waste to be removed from site.
  .3 Name and qualifications of person responsible for training site personnel.
  .4 A comprehensive overview of known or potential environmental issues to be addressed during construction.
  .5 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.6 Drawings indicating locations of proposed temporary excavations or embankments for material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas. Plan to indicate staging, refueling, and cleaning areas.

.8 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.9 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.11 Waste Water Management Plan identifying methods and procedures for management and discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, discharge of collected surface run-off, disinfection water, hydrostatic test water, and water used in flushing of lines.

.12 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.13 Equipment to be used on site identifying age and spill containment procedures.

1.5 FIRES

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

1.6 DRAINAGE, EROSION AND SEDIMENTATION

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

.2 Ensure pumped water into waterways is free of suspended materials and meets BC Water Quality Guidelines for the Protection of Aquatic Life.

.3 Do not pump water containing deleterious substances into waterways.

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

1.7 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated.

.2 Only clear vegetation in areas required for safe construction.

.3 Minimize stripping of topsoil and vegetation. Where possible retain topsoil for revegetation post-construction

.4 Disturbed areas are to be restored to their original condition or better after construction.

1.8 POLLUTION CONTROL

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

.2 Provide methods, means, and facilities to prevent the contamination of soil, water, and atmosphere from the discharge of pollutants produced by construction operations.

.3 Vehicles, machinery, and equipment must be in good repair, equipped with emission controls as applicable and operated within regulatory requirements.

.4 Avoid unnecessary idling of vehicles or heavy machinery.

.5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

1.9 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

.1 Develop and implement a plan which details spill response measures to be employed. The plan will include a list of spill response equipment that will be present on the site and will assign implementation and monitoring roles. On-site personnel will review the plan, understand their roles and responsibilities, and will be properly trained and equipped to conduct spill response activities.

.1 Identify high-risk locations where spills are probable and maintain spill kits, capable of handling the largest potential spill through the duration of the project, at these locations. Consider the location of the generator and the associated fuel tank to be a high-risk location. Include an inventory of required contents at the top of the kit. Locate PPE at the top of the spill kit to enable easy access for the spill responder(s). Keep spill kits closed with a safety seal affixed to indicate if the kit has been used or tampered with.

.2 Respond immediately to all spills in accordance with plan and applicable regulations.

.2 Immediately report all spills, regardless of severity to CCG representative.

.3 Submit a written report within 24 hours of the spill.

1.10 NOTIFICATION

.1 CCG may notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform CCG of proposed corrective action and take such action for approval by CCG.

.3 CCG will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used

PART 3 EXECUTION

3.1 NOT USED

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Do not bury or burn rubbish and waste materials on site.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.4 Waste Management: separate waste materials for recycling or reuse from materials for disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 03 30 00 – Concrete Work
.2 13 36 13.13 – Steel Towers
.3 26 05 27 – Grounding
.4 31 00 99 – Earthworks for Minor Works
.5 32 30 00 – Waveguide Bridge

1.2 INSPECTION

.1 Allow Canadian Coast Guard (CCG) access to Work. If part of Work is in preparation at locations other than Project Location, allow access to such Work whenever it is in progress.

.2 The below list identifies key milestones where CCG will require an opportunity to take samples/inspect. Such inspections are to satisfy CCG's internal requirements and do not alleviate the Contractor's Engineer of Record's responsibility to review and inspect the work for conformance to design documents.

.1 Steel fabrication: CCG may inspect steel fabricated items after fabrication is complete and prior to site installation.

.2 Rock anchor installation: CCG may be on site while Contractor performs rock anchor pull-tests and verify size and quantity of anchors prior to concrete or surrounding grout installation. The Contractor is to provide documented results of all pull-tests to CCG.

.3 Reinforcing steel installation: CCG may inspect rebar for concrete foundations prior to placing concrete, or, at CCG's discretion, request photographic documentation to be reviewed prior to concrete pour.

.4 Concrete Formwork: CCG may inspect formwork prior to placing concrete.

.5 Concrete Materials: CCG may test concrete for air content, slump, and compressive strength during any concrete pour.

.6 Grounding Installation: CCG may inspect placement of below grade grounding materials prior to back filling or encasement in GEMs.

.7 Grounding System Testing: CCG may witness testing of the grounding system.

.8 Final Completion: CCG will conduct a final inspection upon completion.

.3 Give a minimum of 96 hours' notice for inspections of all key milestones listed above. The Contractor will be responsible for any delays in work if the required notice was not provided as specified.

.4 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.5 CCG will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, CCG will pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies must be engaged by the Contractor when such testing has been specified for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Contractor.

.2 The Contractor must obtain CCG's approval of Independent Inspection/Testing Agencies to be used.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 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

1.4 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by CCG as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

1.6 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

1.7 MILL TESTS

.1 Submit mill test certificates as required of specification Sections or as otherwise requested by CCG.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 13 36 13.13 – Steel Towers

.2 26 05 27 – Grounding

.3 32 30 00 – Waveguide Bridge

1.2 REFERENCE STANDARDS

.1 Work under this section to be in compliance will all listed references. In the case of conflict or discrepancy, the more stringent must apply:

.1 CSA A23.1, Concrete Materials and Methods of Concrete Construction;

.2 CSA A23.2, Methods of Test and Standard Practices for Concrete;

.3 CSA A23.3, Design of Concrete Structures;

.4 CSA S269.3 Concrete Formwork;

.5 National Building Code of Canada;

.6 ACI Specification 306 Cold Weather Concreting (if applicable).

1.3 SCOPE OF WORK

.1 **Denny Island**

.1 Work in this section includes the supply of all labour, material, and equipment necessary for the supply and installation required for the concrete foundation details as per CCG Drawings. This includes the following activities:

.1 Construction of CCG designed concrete foundations for a building and fuel tank; and

.2 Design and construction of tower and waveguide bridge foundations.

.2 **Safety Mountain**

.1 Work in this section includes the supply of all labour, material, and equipment necessary for the supply and installation required for the concrete foundation details as per the CCG Drawings. This includes the following activities:

.1 Construction of CCG designed concrete foundations for a building and fuel tank; and

.2 Design and construction of tower and waveguide bridge foundations.

1.4 PERFORMANCE REQUIREMENTS

.1 The Work shall be designed to perform as reasonably expected for a life of 50 years.

1.5 ACTION AND INFORMATION SUBMITTALS

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

.2 Submit Foundation Design Drawings as part of the Design Drawings applicable to the design required by the Contractor. Submission to include:

- .1 Drawings showing locations, plans and section views of the foundations;
- .2 Drawings showing reinforcement steel, anchorage steel and bonding to bedrock and required anchorage pull-test results;
- .3 Other information listed in Section 01 33 00 – Submittal Procedures.
- .4 Design completed by CCG as noted on CCG Drawings to be identified on Contractors drawings as Design By CCG.

.3 Submit Concrete Plan as part of the Construction Plan applicable to the design required by the Contractor. Submission to include:

- .1 High level summary of mix properties and admixtures to demonstrate compliance with CCG criteria and Foundation Design Drawings;
- .2 Concrete placing plan identifying the location of the source of ready mix concrete, the transport and placement plan and any other relevant information required to demonstrate a plan for placing the concrete in the required amount of time;
- .3 Finishing procedures;
- .4 Curing methods and schedule;
- .5 Clean-up procedures;
- .6 Procedures to place and cure concrete in hot or cold temperatures where reasonably anticipated during the construction period;
- .7 Procedures for testing concrete samples as outlined within this specification; and
- .8 Name of proposed independent material inspection agency to perform concrete quality testing.

.4 Provide test result reports for review by CCG and do not proceed without written approval when deviations from mix design or parameters are found, refer below for details.

.5 Submit foundation As-Built documentation.

1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Concrete samples:

- .1 To be obtained and tested in accordance with CSA A23.2 to verify concrete quality including: age, air content, slump, and compressive strength.
- .2 Sampling and testing to be conducted by an Independent Inspection Agency.
- .3 Each batch of concrete is to be sampled.

.4 A minimum of 4 cylinders are to be cast for each sample and are to be tested for compressive strength as follows: one at 7 days, one at 14 days, and two at 28 days.

1.7 DESIGN REQUIREMENTS

.1 Design a suitable foundation for the tower and waveguide bridge in consideration as per:
- .1 The design reaction loads of the tower and waveguide bridge;
- .2 Any other loads that could be reasonably anticipated to affect the foundation;
- .3 The Geotechnical Report provided in Appendices; and
- .4 In accordance with Section 01 33 00 – Submittal Procedures.

PART 2 PRODUCTS

2.1 PERFORMANCE CRITERIA

.1 The Contractor must ensure the concrete supplier meets performance criteria of the concrete as established by the Contractor's Engineer of Record and that specified on the CCG Drawing WM-697-1003 for the relevant scope of the Work and provide verification in accordance to the specifications.

2.2 MATERIALS

.1 Portland Cement: to CAN/CSA-A5.
.2 Water: to CAN/CSA-A23.1.
.3 Aggregates: to CAN/CSA-A23.1.
.4 Air entraining admixtures: to CAN/CSA-A266.1
.5 Chemical admixtures: to CAN/CSA-A266.2
- .1 Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

2.3 MIXES

.1 Concrete mix to be determined by Contractor and must meet specifications on Foundation Design Drawings for the tower and waveguide bridge.
.2 Contractor must meet concrete mix details for items designed by CCG as shown on CCG Drawings.
- .1 Concrete Mix Designs Shall Conform To
  - .1 CSA A23.1 TYPE GU Portland Cement
  - .2 Class of Exposure = F1
  - .3 Specified Slump = 80mm (3.15") ± 20mm (0.75")

.4 Air Content = 4-7%

.5 Compressive Strength = 35 MPa (5075psi)

.3 The use of calcium chloride as an admixture is not permitted.

.1 Free from all loose scaly corrosion, dirt, oil, paint, or other coatings that may be detrimental from reinforcement;

.2 With no field bends or field welds except where indicated or authorized by CCG;

.3 As indicated on the Design Drawings and the CCG Drawing WM-697-1003; and

.4 Ensure adequate cover to reinforcement is maintained during concrete pour.

2.4 FORMS

.1 Forms: to CAN/CSA-A23.1.11.

.2 Free from surface defects for all concrete faces exposed to view.

.3 Form ties to be metal and of type such that no metal left within 25mm of concrete surface when forms removed.

2.5 FORM RELEASE AGENT

.1 Non-staining material type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.

PART 3 EXECUTION

3.1 GENERAL

.1 Do all cast-in-place concrete work including surface tolerances, finishing, and field quality control in accordance with CAN/CSA-A23.1 except where specifically stated otherwise.

3.2 PREPERATION

.1 Place, finish, and cure concrete in accordance with the submitted Concrete Construction Plan and the CCG Drawings.

.2 Place concrete reinforcement:

.1 Free from all loose scaly corrosion, dirt, oil, paint, or other coatings that may be detrimental from reinforcement;

.2 With no field bends or field welds except where indicated or authorized by CCG;

.3 As indicated on the Design Drawings and the CCG Drawings; and

.4 Ensure adequate cover to reinforcement is maintained during concrete pour.

.3 During concreting operations:

.1 Development of cold joints is not allowed unless otherwise approved in writing by CCG.

.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structures or Work.

3.3 INSTALLATION/APPLICATION

.1 Formwork

.1 Formwork to confirm to shape, lines, and dimensions shown on Contract Drawing.

.2 Formwork to be substantial, sufficiently tight to prevent leakage of mortar, and braced and tied to maintain position and shape.

.3 Strip forms ensuring no damage to concrete.

.2 Finishing and curing:

.1 Finish concrete to CSA A23.1/A23.2 making all adjustments necessary to account for climatic conditions anticipated during the curing period.

.2 Provide a lightly brushed non-skid surface on exposed concrete surfaces, unless otherwise specified in the submitted design.

.3 Finish concrete so as to slope gently away from the center of the slab. No water to pond on the finished surface.

.4 Provide appropriate chamfers at all exposed concrete edges.

.3 Provide samples as required for the performance of quality assurance testing.

.1 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature, and test samples taken.

3.4 WORKMANSHIP

.1 Allow Departmental Representative to review bedrock bearing conditions, rock anchorage, reinforcing steel, and formwork prior to placing concrete.

.2 Obtain Departmental Representative's written approval before placing concrete.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Do not place load upon new concrete until authorized by departmental representative.

3.5 CLEANING

.1 Cleanup in accordance with Section 01 35 43 – Environmental Procedures

END OF SECTION

PART 1 GENERAL

RELATED SECTIONS

.1 03 30 00 – Concrete Work

.2 26 05 27 – Grounding

.3 32 30 00 – Waveguide Bridge

1.2 REFERENCE STANDARDS

.1 Work under this section to be in compliance will all listed references. In the case of conflict or discrepancy, the more stringent must apply:

.1 CSA S37-18, Antenna, Towers, and Antenna Supporting Structures;

.2 CSA G40.20, General Requirements for Rolled or Welded Structural Quality Steel;

.3 CSA G40.21, Structural Quality Steel;

.4 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures;

.5 CSA W59, Welded Steel Construction (Metal-Arc Welding);

.6 ASTM A123 / A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products;

.7 Canada Labour Code Part II;

.8 Health and Welfare Canada Limits of Exposure to Radio-Frequency Fields Frequencies from 3kHz – 300GHz, Safety Code 6;

.9 WorkSafeBC Occupational Health and Safety Regulation;

.10 National Building Code of Canada;

.11 TC CAR Standard 621.19, Standards Obstruction Markings;

.12 SSPC-SP 1, Solvent Cleaning;

.13 SSPC-SP 7/NACE No. 4, Brush-Off Blast Cleaning.

1.3 SCOPE OF WORK

.1 **Denny Island**

.1 Work in this section includes the supply of all labour, material, and equipment necessary to complete the following activities:

.1 Design, supply, and installation of a new 36.0m tall self-supported tower with work platform, accessories listed in this section, and hardware; and

.2 Design, supply, and installation of antenna mounts for antennas identified in CCG Drawings excluding antennas noted as “future.”

.2 **Safety Mountain**

.1 Work in this section includes the supply of all labour, material, and equipment necessary to complete the following activities:

.1 Design, supply, and installation of a new 36.0m tall self-supported tower with work platform, accessories listed in this section, and hardware; and

.2 Design, supply, and installation of antenna mounts for antennas identified in CCG Drawings excluding antennas noted as "future."

1.4 PERFORMANCE REQUIREMENTS

.1 The Work must be designed to perform as reasonably expected for a life of 50 years.

1.5 GUARANTEE

.1 The Contractor must guarantee that all material and workmanship used in the fabrication and construction is in accordance with all applicable specifications listed in the Section.

.2 For a period of one year from the date of the installation, the Contractor must replace, free of charge, all defective components. A failure of 10% or more of a particular item must be interpreted as failure in all similar units. All these items must be replaced by units of a superior design at no cost to CCG.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit Tower Design as part of the Design Drawings. Submission to include:

.1 Plan and section views of the tower;

.2 Other requirements identified in this Section;

.3 Installation and erection instructions; and

.4 Other information listed in Section 01 33 00 – Submittal Procedures.

.3 Submit Tower Shop Drawings.

.4 Submit Tower As-Built Documentation.

1.7 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 – Quality Control.

1.8 DESIGN REQUIREMENTS

.1 Design a tower in accordance with CSA S37-18. The tower must be capable of supporting all initial and future antenna loading requirements and all appurtenances.

.2 The design of the tower and supporting foundation must achieve a minimum 20% reserved structural capacity when comparing the factored strength to factored loads and associated deflection criteria.

.3 Design all tower accessories including: new mounts for all initial equipment, Tx brackets with sufficient capacity for all cables, a climbing facility with a fall arrest assembly, a lightning rod, and anti-climb assembly.

.4 Tower to be designed to resist: all loads specified in CSA S37-18, maximum loads caused by all immediate and future equipment installed on the tower, and site specific wind pressure supplied in Site Specific Wind Loading for each site.

.5 Tower to be designed in consideration with the Geotechnical Reports provided.

.6 The maximum face width of the tower is 6.0m

.7 Unless otherwise specified, determine loading in accordance with the CSA S37, latest edition, reliability Class I.

.8 Tower to be designed for a minimum radial ice load of +25mm (Class II).

.9 The operational requirement for maximum twist is 0.05 degrees and for maximum tilt is 0.5 degrees.

.10 Tower to be designed to support a High Gain X-Band SWG radar antenna. Refer to Appendix J for antenna and loading information.

.11 Tower to be designed and include a work platform on top to provide a work platform for future maintenance to the radar antenna to the following requirements:

.1 Materials: Galvanized Steel frame construction with guardrails all around the perimeter.

.2 Work platform to meet applicable regulations and fit for use for CCG workers performing maintenance activities on the High Gain X-Band SWG Antenna. Such regulations include, but not limited to, WorkSafeBC Occupational Health and Safety Regulation as it relates to guardrails and the latest edition of the National Building Code of Canada for the design and fabrication standard of the platform.

PART 2 PRODUCTS

2.1 GENERAL

.1 Structural steel to be grade 300W or better.

.2 All mounts, mount hardware, and line hangers must be heavy-duty hot-dip galvanized.

.3 All tower and anchor hardware, where possible, including turnbuckles, thimbles and shackles must be Crosby products or approved equivalent, manufactured from AISI 1035 steel, heat treated, and must be hot-dip galvanized.

.4 Bolts must be hot-dip galvanized with hexagonal heads and be supplied with hexagonal nuts. The unthreaded part of the bolt must be long enough for full bearing of the adjoining parts and enough washers must be placed on each bolt under the nut to prevent the nut from reaching the end of the bolt threads when tightened.

PART 3 EXECUTION

3.1 FABRICATION

.1 Provide to CCG a copy of Canadian Welding Bureau (CWB) certification for the tower fabricating company and for each worker assigned to the project.

.2 Designate each tower segment with a number that is easily read after galvanizing. Stamp the mark into each piece in such a manner, or in such a place, as will not injure or reduce the strength of the piece. The marks on like pieces must be in the same relative position on each piece. The markings on each piece must correspond with the erection drawings.

.3 Fabricate all members in accordance with the Engineered Drawings and the referenced codes and standards.

.4 All like parts to be interchangeable. All like parts to have the same number.

.5 In any bending or reworking of any material, methods employed must ensure that the physical properties of the material are not impaired.

.6 Provide electrical continuity between all tower sections.

3.2 GALVANIZING

.1 All materials, structural steel, pipe and fittings, including bolts, nuts and washers must be hot-dip galvanized to the requirement of CSA S37-18 and CSA-G164 and as otherwise specified therein.

.2 All materials must be completely fabricated before galvanizing (except the tapping of nuts).

.3 Before galvanizing, the steel must be thoroughly cleaned of all paint, grease, rust, scale or other materials that will interfere with proper binding of the zinc with the steel.

.4 Tests for thickness and uniformity of coating must be made as considered necessary by CCG. Tests must be conducted in full accordance with the requirements of CSA S37-13. If required, contractor must pay for testing, all costs to be included in the tender price.

.5 Steel members that have a slightly damaged finish must be given three coats of zinc-enriched paint applied according to the manufacturer's printed instructions.

.6 Contractor must warranty all galvanizing work for a period of not less than 3 years.

3.3 HANDLING OF MATERIAL AND TRANSPORTATION

.1 The tower and parts are to be built so they may be safely transported to the Work site from the manufacturer's premises.

.2 Materials must be handled and stored in the plant and on the drop off location in such a manner that no damage is done to the materials of any existing building or structure.

.3 All material to be transported and handled in accordance with Manufacturer's specifications and recommendations.

.4 Special care must be taken to ensure that galvanizing is not damaged during handling of materials.

3.4 INSTALLATION

.1 Obtain written authorization from CCG prior to site mobilization.

.2 The precise tower location and orientation will be laid out by CCG.

.3 The Contractor must give Coast Guard a written notice of 14 days prior to the commencement of the standing of the tower.

.4 The tower must be erected in a manner that will not bend, scrape, distort, or injure the component parts of the galvanizing.

.5 Every failure of the tower sections to join together properly must be reported to CCG.

.6 Upon completion of erection, the tower must be inspected by the Contractor for damage. Any damaged or missing items, including nuts, bolts, etc., must be replaced. The tightness of all bolts must be rechecked at this time.

.7 The Contractor must be responsible to ensure that no members of the tower are over stressed during erection.

.8 Any members damaged during erection must be replaced at the Contractor's cost.

.9 The Contractor must be responsible for any damages done to the work of others, or to adjoining structures and property during erection.

3.5 FIELD QUALITY CONTROL

.1 Allow for CCG to monitor any tower field erection to confirm submitted plans are being followed.

3.6 CLIMBING APPARATUS

.1 The tower must be equipped with a climbing apparatus complete with a fall arrest rail, in compliance with CSA S37-18.

.2 Provide an unobstructed and continuous climbing path and maintain the required climbing clearance radius as per CSA S37-18.

.3 Climbing apparatus configuration must comply with CSA S37-18 and the Canada Labour Code. Rungs are to be horizontal, have adequate clearance, and line up vertically.

3.7 FALL ARREST SYSTEM

.1 The Contractor must supply and install a Trylon Cougar Fall Arrest Rail to meet CSA S37-18 requirements and CSA Z259.2.4-15 or approved equivalent.

.2 The fall arrest rail must be free from obstructions for the complete height of the tower.

.3 The fall arrest rail must be supported at spans not more than 1m, or to meet the manufacturer's instructions.

.4 The fall arrest rail must run up the tower or ladder in a manner to facilitate climbing. The fall arrest rail must be straight and true to prevent trolley binding.

.5 The extension of the fall arrest rail beyond the top of the tower must be structurally supported for the entire height.

.6 Proper manufactured stop hardware is to be installed at the top of the fall arrest rail to prevent accidental dislodging of the trolley from the rail.

3.8 TRANSMISSION LINE BRACKETS

.1 All transmission lines as indicated on CCG Drawings.

.2 All cable to be supported in such a manner that the maximum distance between hangers does not exceed one meter or the manufacturer's recommended spacing, whichever is less.

.3 Location of cabling is to be submitted to the Coast Guard for approval, and represented on the stamped tower drawings.

3.9 ANTI CLIMBING

.1 Design and supply anti climbing hardware for the ladder face.

3.10 ANTENNA MOUNTS

.1 Antenna mounts for all initial antennas must be installed as indicated on CCG Drawings.

.2 Microwave antenna mounts must be configured to support high wind kits (hurricane kits).

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 03 30 00 – Concrete Work

.2 13 36 13.13 – Steel Towers

.3 32 30 00 – Waveguide Bridge

1.2 REFERENCE STANDARDS

.1 Work under this section to be in compliance with all listed references. In the case of conflict or discrepancy, the more stringent must apply:

.1 Motorola R56, Standards and Guidelines for Communication Sites.

.2 CSA C22.1, Canadian Electrical Code.

.3 CSA S37-18, Antennas, Towers, and Antenna-Supporting Structures.

.4 CAN/CSA-B72-M87(R2013), Installation Code for Lightning Protection Systems.

.5 NFPA 780, Standard for the Installation of Lightning Protection Systems.

.6 National Building Code of Canada.

.7 Canada Labour Code Part II.

.8 WorkSafeBC Occupational Health and Safety Act and Regulation.

1.3 SCOPE OF WORK

.1 **Denny Island**

.1 Work in this section includes the supply of all labour, material, and equipment necessary to provide a grounding system comprising: copper-clad steel ground rods and tinned copper ground cable complete with exothermic ground rod connections.

.2 The grounding system is to be provided for the tower and waveguide bridge, and for future CCG installations: building, decks, stairs, solar panel stands, and fuel tanks as shown on CCG Drawings.

.2 **Safety Mountain**

.1 Work in this section includes the supply of all labour, material, and equipment necessary to provide a grounding system comprising: copper-clad steel ground rods and tinned copper ground cable complete with exothermic ground rod connections.

.2 The grounding system is to be provided for the tower and waveguide bridge, and for future CCG installations: building, decks, stairs, solar panel stands, and fuel tanks as shown on CCC Drawings.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
  .1 Lightning protection equipment.
.2 Submit Grounding Plan as part of the Construction Plan. Submission to include:
  .1 High level summary of procedures, methods, and equipment to be used during construction to meet the Specifications.
  .2 Name of proposed Independent Inspection Agency to perform grounding electrode system testing.
.3 Provide test result reports for review by CCG and do not proceed without written approval when deviations from design parameters are found.
.4 Submit grounding As-Built documentation.

1.5 QUALITY ASSURANCE

.1 Quality assurance: in accordance with Section 01 45 00 – Quality Control.
.2 Grounding electrode system testing/verification:
  .1 To be carried out in accordance with Motorola R56.
  .2 To be conducted by an Independent Inspection Agency.

PART 2 PRODUCTS

2.1 GENERAL

.1 All products used in this installation shall be new, and of highest quality available.
.2 All materials shall meet or exceed the specifications as noted in Motorola R56, Standards and Guidelines for Communications Sites.
.3 Only copper ground conductors will be accepted.
  .1 Use of ground plates will only be accepted with prior written permission for mitigating circumstances. All ground electrodes to be copper clad rod type or concrete encased electrodes.
.4 All connections shall be irreversible and hydraulically or exothermically completed. Bolted connection to be accepted at bus bar and similar type of connections using compression fittings affixed to the cable.
.5 All fasteners and hardware shall be corrosion resistant and selected to be compatible with the cable and fastening substrate such as not to case galvanic action or similar accelerated corrosion or reactions.

PART 3 EXECUTION

3.1 GENERAL

.1 Ensure other site infrastructure and grounding systems are not disturbed by excavation and backfill activities.

.2 Obtain CCG's written approval before installing grounding system.

.3 In areas where topsoil is present, strip 152mm topsoil and stockpile. Upon completion of backfilling, spread topsoil evenly over affected areas.

.4 All grounding systems shall acknowledge actual site conditions in preliminary calculations. Amend design and installation as required based on conditions found on site in order to achieve grounding system design performance values.

.5 System ground grid resistance shall be tested on site at completion of the system installation. Deviations from the achieved ground resistance from that indicated in the design shall be reported to the Design Engineer and Departmental Representative for review. All testing shall be witnessed by the Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D1557-15, Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft3 (2,700 kN-m/m3)

.2 CSA International

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

1.2 GENERAL WORK DESCRIPTION

.1 Work of this Section comprises site clearing activities to support site development for Canadian Coast Guard's (CCG) infrastructure. Work includes, but not limited to, the following:

.1 Mobilization and Demobilization of all manpower, equipment, materials, and other resources necessary to execute the Work;

.2 Minor earthwork to clear material down to bedrock;

.3 Backfilling areas as noted on drawings; and

.4 Working with the CCG Representative to assess the Work done.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Excavated or graded material existing on site suitable to use as fill for grading work if approved by Departmental Representative.

.1 Any blasted rock to be used as backfill material must be in general conformance with gradations provide within this section.

.2 All material brought to the site that does not comply with the Canadian Council of Ministers of the Environment (CCME) Guidelines will be removed from the property immediately at the Contractors cost. Contractor responsible for all remediation costs associated with import of non-compliant material.

2.2 CRUSHED GRANULAR SUB-BASE

.1 To be 75mm crushed gravel conforming to the following gradations

Sieve Designation	Percent Passing
80 mm	100
75 mm	100
38 mm	60 – 100
25 mm	–
19 mm	35 – 80
12.5 mm	–
9.5 mm	26 – 60
4.75 mm	20 – 40
2.36 mm	15 – 30
1.18 mm	10 – 20
0.6 um	5 – 15
0.3 um	3 – 10
0.18 um	–
0.15 um	–
0.075 um	0 – 5

2.3 GRANULAR BASE

.1 To be 25mm crushed gravel conforming to the following gradations

Sieve Designation	Percent Passing
19 mm	100
12.5 mm	75 – 100
9.5 mm	60 – 90
4.75 mm	40 – 70
2.36 mm	27 – 55
1.18 mm	16 – 42
0.6 um	8 – 30
0.3 um	5 – 20
0.075 um	2 – 8

PART 3 EXECUTION

3.1 SITE PREPERATION

.1 Removal:

.1 Remove any material and debris within areas designated on drawings where required to expose bedrock for Concrete Foundation Work.

3.2 STOCKPILING

.1 Stockpile fill materials in areas designated by Departmental Representative or as shown on Contract Documents. Stockpile granular materials in manner to prevent segregation.

.2 Stockpiling the stripped material is to be done in an environmentally sensitive manner as to limit the environmental footprint. Refer to Section 01 35 43 – Environmental Procedures for details.

3.3 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 Dispose of water in accordance with Section 01 35 43 – Environmental Procedures to approved runoff areas or containment facilities and in manner not detrimental to public and private property, or portion of Work completed or under construction. Provide and maintain temporary drainage ditches and other diversions outside of excavation limits as required.

3.4 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected installations.

.1 Inspection, testing, approval, and recording location of underground utilities and grounding.

.2 Removal of concrete formwork.

.3 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.3 Placing:

.1 Place backfill, fill and basecourse material in 300 mm lifts. Add water as required to achieve specified density.

.2 Place unshrinkable fill in areas as indicated. Consolidate and level unshrinkable fill with internal vibrators.

.4 Compaction:

.1 Compact each layer of material as specified on Contract Documents.

.2 Submit compaction tests in accordance with Section 01 33 00 – Submittal Procedures.

3.5 GRADING

.1 Grade to ensure that water will drain away from concrete foundations to disposal areas approved by Departmental Representative. Grade to be gradual between finished spot elevations as indicated.

3.6 RESTORATION

.1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.

.2 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.3 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

3.7 CLEANING

.1 Progress Cleaning:

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 31 00 99 – Earthworks for Minor Works

1.2 DEFINITIONS

.1 Rock is defined as all solid rock in form of bedrock, masses, ledges, seams, or layers and includes igneous rock of any sort, conglomerate, sandstone, or shale, that requires breaking by continuous drilling and blasting before excavation and removal. Rock also includes rock having individual volumes in excess of 1.0m^3, which cannot be removed by means of heavy duty mechanical excavating equipment.

.2 Dense tills, hardpan, partially cemented materials, clay or frozen materials which do not require breaking by continuous drilling and blasting before excavation and removal are not classified as rock.

.3 PPV is defined as peak particle velocity.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 **Blasting Submittals:**

.1 Submit within 28 calendar days of contract award, a proposed Blasting Plan for review by Departmental Representative.

.2 Blasting Plan must include, but not be limited to the following

.1 Proposed method of carrying out work. Include details on protective measures, time of blasting and other pertinent details.

.2 Required permits if applicable.

.3 Preparation requirements of surface to be blasted.

.4 Drilling requirements and techniques.

.5 Equipment required.

.6 Explosive storage requirements according to applicable regulations.

.7 Health and safety hazards and mitigations identified and adequately accounted for according to standard practice and local regulations. This is to be included in the Health and Safety Plan as stated in Section 01 35 29 – Health and Safety.

.3 Submit within 28 calendar days of contract award, a proposed Blasting Design for review by Departmental Representative:

.1 The blast design must be certified by a qualified Blasting Consultant retained and paid by the Contractor. The Blasting Consultant must be registered with an applicable professional organization such as Engineers and Geoscientist BC or approved alternate.

.2 Indicated design parameters with the blasting techniques and meet applicable standards and regulations.

.3 Plan and cross section sketch drawings of proposed trim showing the drill pattern (burden and spacing), dimensions, and estimated volume.

.4 Diameter, inclination, orientation, depth, and number of drilled holes.

.5 Loading diagram showing type and amount of high explosive or non-explosive products, powder factor, initiators, and depth and type of stemming for each type of blast hole.

.6 Initiation sequence for blast holes including delay pattern and delay times.

.7 Manufacturer's data sheets for all explosive and non-explosive products, delays and initiation systems to be used.

.8 Proposed time and date of blast(s).

.4 Submit records to Departmental Representative at end of each shift. Maintain complete and accurate record of drilling and blasting operations.

.5 No blasting to proceed without written approval of Departmental Representative.

.3 **Qualifications:**

.1 Retain licensed explosives blaster holding valid Blaster's Certificate to supervise and program blasting work, and to determine precautions, preparations, and operations technique.

.2 Submit documentation verifying explosives expert's qualifications.

.4 Contractor to notify CCG Representative 7 days in advance of blasting activities. Notification to include when and where the blasting will occur and for how long.

.5 The Contractor shall be completely responsible for all liaison and coordination with respect to blasting and notification to all applicable authorities having jurisdiction.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions and specifications.

1.5 MEASUREMENT AND PAYMENT

.1 Cost of blasting, drilling, monitoring, and rock removal will be paid by contractor.

.2 Unauthorized rock removed i.e. rock removed prior to examination and measurement by Departmental Representative, will not be classified as rock excavation.

.3 No payment will be made for removal of rock, including all subsequent remedial backfilling in excess of limits shown on Contract Drawings unless written authorization is given by Departmental Representative.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used

PART 3 EXECUTION

3.1 ROCK REMOVAL

.1 Co-ordinate this section with Section 01 35 29.06 – Health and Safety.

.2 Remove rock to alignments, profiles, and cross sections as indicated.

.3 Do blasting operations in accordance with requirements of authority having jurisdiction.

.4 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.

.1 Excavate rock to horizontal surfaces with slope not exceeding 4% grade from edge to edge of blasted surface.

.2 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.

.3 Finished surface must not have irregularities exceeding 150mm when checked with a 3m straight edge placed in any direction.

.4 In areas where tolerances are not met the contractor may use approved granular fill from the blasted rock surface at no cost to Canada. The granular fill must be maximum 75 minus and be suitable for the area to be filled.

.5 Remove boulders and fragments which may slide or roll into excavated areas.

.6 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 00 99 – Earthworks for Minor Works.

3.2 CLEANING

.1 Rock disposal:

.1 Dispose of removed rock as indicated on Contract Drawings.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 03 30 00 – Concrete Work

.2 13 36 13.13 – Steel Towers

.3 26 05 27 – Grounding

1.2 REFERENCE STANDARDS

.1 Work under this section to be in compliance with all listed references. In the case of conflict or discrepancy, the more stringent must apply:

.1 CSA S37-18, Antenna, Towers, and Antenna Supporting Structures;

.2 CSA G40.20, General Requirements for Rolled or Welded Structural Quality Steel;

.3 CSA G40.21, Structural Quality Steel;

.4 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures;

.5 CSA W59, Welded Steel Construction (Metal-Arc Welding);

.6 ASTM A123 / A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products;

.7 Canada Labour Code Part II;

.8 WorkSafeBC Occupational Health and Safety Regulation;

.9 National Building Code of Canada;

.10 SSPC-SP 1, Solvent Cleaning;

.11 SSPC-SP 7/NACE No. 4, Brush-Off Blast Cleaning.

1.3 SCOPE OF WORK

.1 **Denny Island**

.1 Work in this section includes the supply of all labour, material, and equipment necessary to complete the following activities:

.1 Design and construct one (1) new waveguide bridge to span from the proposed new communication tower to the proposed building location.

.2 The waveguide bridges must align with the location of the future building ports as indicated on CCG Drawings.

.2 **Safety Mountain**

.1 Work in this section includes the supply of all labour, material, and equipment necessary to complete the following activities:

.1 Design and construct one (1) new waveguide bridge to span from the proposed new communication tower to the proposed building location.

.2 The waveguide bridges must align with the location of the future building ports as indicated on CCG Drawings.

1.4 PERFORMANCE REQUIREMENTS

.1 The Work must be designed to perform as reasonably expected for a life of 50 years.

1.5 GUARANTEE

.1 The Contractor must guarantee that all material and workmanship used in the fabrication and construction is in accordance with all applicable specifications listed in the Section.

.2 For a period of one year from the date of the installation, the Contractor must replace, free of charge, all defective component. A failure of 10% or more of a particular item to be interpreted as failure in all similar units. All these items must be replaced by units of a superior design at no cost to CCG.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit Waveguide Bridge Design as part of the Design Drawings. Submission to include:

.1 Plan, section, and elevation views of the waveguide bridge; and

.2 Other requirements identified in this section.

.3 Other information listed in Section 01 33 00 – Submittal Procedures.

.3 Submit Waveguide Bridge Shop Drawings.

.4 Submit Waveguide Bridge As-Built Documentation.

1.7 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 – Quality Control.

1.8 DESIGN REQUIREMENTS

.1 Waveguide bridge must be designed to resist: all loads specified in CSA S37-18, maximum loads caused by all immediate and future equipment installed on the bridge, and site specific wind pressure supplied in Site Specific Wind Loading for each site.

.2 Waveguide bridges must be designed in consideration with the Geotechnical Report provided.

.3 The waveguide bridge and cable support deflections must be within the transmission line manufacturer's flexibility tolerances when subjected to the design loads while considering the cable support rigidity differences between the tower, bridges, and building.

.4 Waveguide bridges must provide support for cabling and complete protection for the antenna and power cabling running from the equipment building to the tower and must provide easy access to all cables.

.5 Each waveguide bridge tray must be constructed of steel channel with a minimum width of 457mm (18”).

.6 Waveguide bridges must be independent of and not directly connected to the tower structure or building.

.7 Waveguide bridges must support cables at intervals to prevent sagging and to meet manufacturer’s specifications.

.8 Provide suitable adjustable flair plate extensions to the waveguide bridges to protect the cables. The plates must provide optimum coverage for cables transitioning from the waveguide bridge to the tower or building.

.9 Waveguide bridges must run from the tower to the equipment building following the general alignment provided in Contract Drawings.

.10 Waveguide bridges must allow a minimum 2.4m vertical clearance from grade.

.11 Provide concrete foundations such that all steel not encased in concrete is above finished grade.

PART 2 PRODUCTS

2.1 GENERAL

.1 Structural steel must be grade 300W or better.

.2 All mounts, mount hardware, and line hangers must be heavy-duty hot-dip galvanized.

.3 Bolts must be hot-dip galvanized with hexagonal heads and be supplied with hexagonal nuts.

PART 3 EXECUTION

3.1 FABRICATION

.1 Provide to CCG a copy of Canadian Welding Bureau (CWB) certification for the fabricating company and for each worker assigned to the project.

.2 Fabricate all members in accordance with the Engineered Drawings and the referenced codes and standards.

.3 All like parts to be interchangeable. All like parts to have the same number.

.4 In any bending or reworking of any material, methods employed must ensure that the physical properties of the material are not impaired.

.5 Provide electrical continuity between all sections.

3.2 GALVANIZING

.1 All materials, structural steel, pipe and fittings, including bolts, nuts and washers must be hot-dip galvanized to the requirement of CSA S37-18 and CSA-G164 and as otherwise specified therein.

.2 All materials must be completely fabricated before galvanizing (except the tapping of nuts).

.3 Before galvanizing, the steel must be thoroughly cleaned of all paint, grease, rust, scale or other materials that will interfere with proper binding of the zinc with the steel.

.4 Tests for thickness and uniformity of coating must be made as considered necessary by CCG. Tests must be conducted in full accordance with the requirements of CSA S37-18. If required, contractor must pay for testing, all costs to be included in the tender price.

.5 Clean damaged galvanized surfaces in the field with wire brush removing loose and cracked coatings and apply three (3) coats of zinc-enriched paint in accordance with the manufacturer's specifications.

.6 Contractor must warranty all galvanizing work for a period of not less than 3 years.

3.3 HANDLING OF MATERIAL AND TRANSPORTATION

.1 The parts are to be built so they may be safely transported to the site from the manufacturer's premises.

.2 Materials must be handled and stored in the plant and on the job site in such a manner that no damage is done to the materials of any existing building or structure.

.3 Special care must be taken to ensure that galvanizing is not damaged during handling and erection of materials.

.4 All material to be transported and handled in accordance with Manufacturer's specifications and recommendations.

.5 Storage of materials on the site will be the responsibility of the Contractor. CCG will collaborate to provide guidance on site storage and construction layout areas to be included in the Construction Plan.

3.4 INSTALLATION

.1 Obtain written authorization from CCG prior to site mobilization.

.2 The waveguide bridges must be erected in a manner that will not bend, scrape, distort, or injure the component parts of the galvanizing.

.3 Upon completion of erection, the waveguide bridge must be inspected by the Contractor for damage. Any damaged or missing items, including nuts, bolts, etc., must be replaced. The tightness of all bolts must be rechecked at this time.

.4 The Contractor must be responsible to ensure that no members of the waveguide bridge are over stressed during erection.

.5 Any members damaged during erection must be replaced at the Contractor's cost.

.6 The Contractor must be responsible for any damages done to the work of others, or to adjoining structures and property during erection.

END OF SECTION