TECHNICAL SPECIFICATION FOR
Design, Fabrication and Install of one (1) 24.4m (80ft) Self-Support Radar Tower
Robin Hood Bay, NL

Canadian Coast Guard
Maritime and Civil Infrastructure
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Part 1 General

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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 WORK COVERED BY CONTRACT DOCUMENTS

.1 The work covered under this specification consists of the Design, Fabrication and Installation of a 24.4m self-support Radar Tower located at Robin Hood Bay, Newfoundland and Labrador.

.2 The work to be done under this Specification shall include all labor, materials and equipment necessary to complete the design, fabrication and installation to the full extent of the Specification and Drawings.

.3 Work shall include but not be limited to the following:

.1 Engineering design, fabrication and installation of a 24.4m self-support tower structure for Robin Hood Bay, NL as per site specific environmental and loading conditions including, foundations, waveguide bridge, fencing, lighting system, ice

shields and all other material required to meet the terms of this contract. The antenna mounts (radar pedestal) will be designed and supplied at a later date.

.2 Tower must be knockdown. All-weld sections **must not** be used.

.3 Tower design shall incorporate 4 legs and shall be uniform width throughout the entire height of the tower.

.4 Tower design shall incorporate a metal stairway that leads to a working platform at the top of the tower. Stairway shall be equipped with approved hand railing.

.5 Tower design shall support wind and ice loading requirements for the Radar antenna unit as specified in Appendix E.

.6 Tower shall be designed to support a future Radar Antenna Unit with approximate weight of 1200kg and width of 21ft.

.7 The contractor is also responsible for design and supply of power cables for the lighting (top DOL) and the top platform power outlet receptacle. This includes all junction boxes, tx hangers and an additional 30 meters of each power cable for underside of waveguide bridge.

.8 Tower and waveguide bridge layout shall be in accordance with approved engineering drawings. Such layout shall be subject to the approval of the Engineer.

.9 Supply and installation of all required lines and connectors for all transmission lines.

.10 Design and supply of a tx ladder to accommodate for a minimum of (10) ten transmission lines. The tx ladder shall be mounted on either tower face except on the climb face.

.11 The contractor is responsible for the supply of all mounting brackets to interface appropriately the transmission lines to the tower.

.12 The supply and installation of all line hangers, ground kits and necessary hardware. New hangers and ground kits shall be supplied for all lines. All hangers shall be heavy duty and constructed of material that is compatible with hot dip galvanized steel.

.13 Supply and installation of the grounding systems including connection to the tower and related structures, and the supply of the above and below grade grounding systems (lightning rods, continuous ground to lightning rod buried ground radials and rings, all bus bars etc.). See Appendix F for grounding layout.

.14 Supply and Installation of chain link fence and gate that surrounds tower. Layout shall be subject to the approval of Departmental Representative.

.15 Tower and footing layout in accordance with approved engineering drawings. Actual layout shall be subject to the approval of Departmental Representative prior to commencement of any work.

.16 As indicated in Geotechnical Report Appendix D the subgrade will be prepped prior to contract award.

.17 Transportation of tower, equipment and all materials to Robin Hood Bay site; loading and unloading. The material shall be properly tarped for protection.

.18 The Contractor will be responsible for the review and implementation of all Coast Guard safety requirements and those safety requirements of the Workers Compensation Commission, Canada Labour Code Part 2, CSA Standards, and other applicable Provincial and Federal Regulations.

.19 Contractor will be responsible for arranging all snow clearing requirements.

.20 Clean up of site following completion of all work.

1.4 DEFINITIONS

.1 "Departmental Representative" means: Fisheries & Oceans Canada/Canadian Coast Guard. (CCG)

.2 "(Tower) Design Engineer" means: Contractor's Design Engineer of Record.

1.5 EXISTING SITE CONDITIONS

.1 The contractor should note that this work is to be performed on an active site and must coordinate with Departmental Representative to limit interruption of daily operations. Refer to the site survey and location maps appended to this specification for site details and new tower locations.

.2 Before tendering it is recommended that the Contractor familiarize themselves with the location, scope of work, site restrictions and temporary measures required to complete work as specified. **No after claim will be allowed** for any work or material necessary for proper execution and completion of the contract.

.3 Site is located at 47° 36' 42.8" N (Latitude) and 52° 40' 10.9" W (Longitude), at the Canadian Coast Guard site in Robin Hood Bay, NL. Refer to Appendix A for site location map.

.4 Any dimensions given in this Specification or appended drawings are approximate and are for guidance only. Exact dimensions and layouts to be determined by the Contractor in the field.

.5 The site is accessible by 2WD vehicle using a public road.

.6 Contractors should note that there are restrictions at this location with regard.

.1 The available space
.2 Location of overhead power lines
.3 Location of adjacent towers and guys
.4 Location of waveguide bridging
.5 Location of buried power cables
.6 Location of buildings

.7 It shall be the Contractor's responsibility to locate and protect all buried cables and other underground or overhead structures. Any damage to such structures shall be the responsibility of Contractor. Where unknown services are encountered, Contractor to log location and advise Departmental Representative immediately.

.8 Geotechnical report is attached in Appendix D of this specification. The Contractor is reminded that the intention of these reports is to provide data applicable to frost, seismic, site preparation considerations and test pit locations. Any interpolation or assumptions made relative to any locations other than the test pit locations, is the responsibility of the Contractor. Contractor is to advise the Departmental Representative if any discrepancies exist between the Geotechnical report and actual excavations. Subgrade will be prepped prior to contract award as indicated in Geotechnical report.

.9 Store all materials and equipment to prevent theft or damage. Repair or replace all material or equipment damaged in transit or storage to the satisfaction of and to no cost to the Departmental Representative.

1.6 CODES

.1 Perform work in accordance with the latest edition of CSA S37 Antennas, towers, and antenna-supporting structures and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Meet or exceed requirements of:

.1 Contract documents,

.2 Specified standards, codes and referenced documents.

1.7 REQUIRED DOCUMENTS

.1 Contractor to maintain on job site, one copy of each of the following:

.1 Health and Safety Plan
.2 First Aid Kit
.3 Contract drawings and specifications
.4 Addenda
.5 Reviewed shop drawings
.6 Change orders
.7 Other modifications to contract
.8 Field test reports
.9 Copy of approved work schedule
.10 Manufacturers installation and applications instructions
.11 Contact information for Departmental Representative.
.12 Other items as requested

1.8 WORK SCHEDULE

.1 All work on the project shall be completed within the time indicated in the tender document.

.2 Design and fabrication to be completed within 6 weeks of award. Installation to be completed within 10 weeks of award.

.3 All drawings shall be submitted to Consultant for approval prior to fabrication.

.4 Contractor is to provide an updated detailed schedule and commence work immediately upon award of contract and after review and approval of all submittals.

.5 The Contractor is to make every effort to ensure sufficient material and equipment is delivered to site at the earliest time possible upon award of the contract.

1.9 COST BREAKDOWN

.1 Before submitting first progress claims submit breakdown of Contract price in detail as directed by Engineer. After approval by Engineer, cost breakdown will be used as basis for progress payments.

1.10 CONTRACTOR USE OF PREMISES

.1 Contractor shall follow security procedures as established by Canadian Coast Guard, within existing procedures at the site, and any project – specific requirements as directed by Engineer.

.2 Maintain parking, storage of materials, construction trailers, etc., within the confines directed by the Engineer.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 At completion of work restore area to its original condition. The Contractor must repair damage to ground and property. Remove all construction materials, residue, excess etc., and leave site in a condition acceptable to Engineer.

1.11 PARTIAL OWNER OCCUPANCY

.1 Existing facilities to remain open and fully operational during the course of this project.

.2 Coordinate use of premises under direction of Engineer.

1.12 PROJECT MEETINGS

.1 Departmental Representative will arrange and give notice of all project meetings. Contractor is responsible for any expenses related to attending these meetings.

.2 All project meetings will take place at site of work unless otherwise directed by the Departmental Representative.

.3 Prior to commencement of work there will be a Project “Kick-Off” Meeting. The Contractors Project Manager (at their own expense), the Departmental Representative will be in attendance. The meeting will be held in St. John’s, NL.

.4 Departmental Representative will be responsible for recording minutes and distribution.

.5 Contractor to have a responsible representative present at all job meetings and to the maximum extent possible, this should be the same person.

1.13 PROTECTION OF MATERIALS AND EQUIPMENT

.1 Store all materials and equipment to prevent theft or damage. Repair or replace all material or equipment damaged in transit or storage to the satisfaction of and to no cost to the Engineer.

1.14 EXISTING SERVICES

.1 Where works involves breaking into or connecting to existing services, carry out work at times directed by Engineer, by authorities having jurisdiction, with minimum of disturbance to operation.

.2 Before commencing work, establish location and extent of service lines in area of Work and notify Engineer of findings.

.3 Submit schedule to and obtain approval from Engineer for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.

.4 Where unknown services are encountered, immediately advise Engineer and confirm findings in writing.

1.15 ORAL AGREEMENT

.1 No oral order, objection, claim or notice by any party to the others shall affect or modify any of the terms or obligations contained in any of the Contract Documents and none of the provisions of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or modification thereof in writing, and no evidence shall be introduced in any proceeding of any other waiver or modification.

1.16 TAXES AND PERMITS

.1 Contractor to obtain all Federal, Provincial and Municipal permits and pay all applicable taxes.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspecting and testing by inspecting firms or testing laboratories designated by Engineer.

1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Engineer are specified under various sections.

1.3 APPOINTMENT AND PAYMENT

.1 Engineer will appoint and pay for services of testing laboratory except follows:

- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Tests specified to be carried out by Contractor under the supervision of Engineer.
- .6 Additional tests specified in the following paragraph.

.2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Engineer to verify acceptability of corrected work.

1.4 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:

- .1 Provide access to Work to be inspected and tested.
- .2 Facilitate inspections and tests.
- .3 Make good Work disturbed by inspection and test.
- .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Engineer sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Engineer.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Shop drawings and product data.

.2 Samples.

.3 Certificates and transcripts.

1.2 RELATED SECTIONS

.1 Section 01 45 00 - Quality Control.

.2 Section 01 78 00 - Closeout Submittals.

1.3 ADMINISTRATIVE

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

.2 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.3 Where items or information is not produced in SI Metric units converted values are acceptable.

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

.5 Notify Engineer, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.6 Verify field measurements and affected adjacent Work are coordinated.

.7 Contractor's responsibility for errors and omissions in submission is not relieved by Engineers review of submittals.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Engineers review of submittals.

.9 Keep one reviewed copy of each submission on site.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 The Contractor shall submit for review design and detail drawings in PDF format to the Departmental Representative. The review period by the Departmental Representative shall be two (2) weeks. After successful review, one copy of each submitted drawing will be returned to the Contractor either “Reviewed” or “Reviewed as Noted”. There after no change shall be made to the drawing without the permission of the Departmental

Representative. The Professional Engineer, responsible for the design, shall seal all drawings submitted to the Departmental Representative and must be registered to practice by the Association of Professional Engineers and Geoscientists of Newfoundland.

.2 The Contractor, at no additional cost to the Departmental Representative, shall make any changes in the drawings which may be required, consistent with this Specification and shall submit revised copies for review in the manner herein set out. The review does not relieve the Contractor from responsibility for ensuring that his complete work meets all the requirements for the drawings and Specifications contained herein. Items submitted are to be complete, in final form and ready “for construction”. Incomplete submissions will be returned. The Contractor shall ensure that the tower design, including guy location, does not interfere with the operation of the antenna systems.

.3 Any work done prior to the return of the reviewed drawings shall be at the Contractor’s own risk. The Departmental Representative or his representative may issue a stop work order if any site work is started prior to approval of engineering drawings. Any costs associated with this shall be the Contractor’s responsibility.

.4 Drawings of the work produced by the Contractor and all rights and privileges associated therewith shall become the exclusive property of the Departmental Representative who will be free to make any use or reuse of said drawings which in the opinion of the Departmental Representative is reasonable and/or required in the Departmental Representative’s interest.

1.5 SAMPLES

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

.2 Deliver samples prepaid to Engineer's business address.

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

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Engineer are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Engineer prior to proceeding with Work.

.6 Make changes in samples which Engineer may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 MANDATORY CONSTRUCTION PLAN SUBMITTAL

.1 A construction plan of sufficient detail to demonstrate that the contractor has considered all the challenges of the project and is prepared to undertake the works in a competent and professional manor in accordance with all legislation including:

.1 List of subcontractors proposed for: steel fabrication, galvanizing, painting and tower erection.

.2 Project specific safety program

.3 Project environment protection plan

.4 Detailed demolition plan

.5 Tower Erection plan

.6 Detailed work schedule including all project milestones for design, fabrication, transport and installation

1.7 MANDATORY TECHNICAL SUBMISSION

.1 Copies of all Quality Control and Quality Assurance programs in place relating to, governing and demonstrating the ability to complete the work in question, including but limited to, the tower painting process, steel fabrication process and the tower steel galvanizing process. Details of all material handling procedures are to be included.

.2 Details with regard to the steel supplier and fabrication company and their CWB certification number.

.3 Sealed drawings which include details of the tower base foundation and guy anchors, showing all dimensions and steel reinforcement or rock anchor details. Drawings shall show concrete strength. Where rock bolts are used, installation and testing procedures shall be clearly indicated on the drawings. Generic copies of typical foundations are not adequate

.4 On acceptance of the Tender, the Contractor shall submit for review sealed design calculation report which include

.1 Reference design standard.

.2 All foundation analysis and calculations.

.3 Any other information requested by Departmental Representative

.5 Contractor shall maintain and update the work schedule. Each revision shall be submitted to the Departmental Representative for review.

1.8 AS BUILT DRAWINGS

.1 Upon completion of all work, and prior to release of contract holdback, the Contractor shall issue a full set of As Built drawings, which reflect any and all changes from the original contract drawings. These drawings shall be stamped AS BUILT DRAWINGS and shall be sealed by a Professional Engineer in accordance with the requirements of this specification. Submit a full set of drawings (with Tower Engineer’s stamp) on CD in AutoCAD format and two (2) copies of the stamped paper versions in binders including **ALL** product data on the lighting system and controller, antennas, Tx lines, etc. Binder to have cover page with the Project Name and Location, Departmental Representatives Name (Canadian Coast Guard), design engineer, Manufacturer, Installer and date of completion. A tower profile photo should also be included.

.2 As built drawings shall show actual antenna arrangement including azimuths and elevations, anchor radius and drop, leg azimuth, etc.

.3 As part of the final submission, a set of tension and pulse charts will be submitted for temperature range of –30º C to +30º C in 5ºC increments based on actual guy lengths, radius and anchor elevations.

.4 All As-built submissions to be bound in a binder format.

1.9 INSPECTION REPORTS

.1 The Contractor is to submit a PDF copy of all quality control test reports required by this specification immediately upon completion of testing.

1.10 SAFETY PLAN

.1 The Contractor is to submit two (2) copies of their project and site specific Safety Plan, including, climbing safety, rescue techniques, rigging procedures, equipment maintenance and inspections, general work site safety, hazardous material safety (WHMIS), site security, public safety etc. and emergency response plans, for review prior to commencement of work on site.

1.11 SCHEDULES, PERMITS AND CERTIFICATES

.1 Upon award of contract, submit to Engineer a copy of the Work Schedule and various other schedules, permits, certification documents and project management plans as specified in other sections of the specifications.

.2 Submit copy of permits, notices, compliance certificates received by Regulatory Agencies having jurisdiction and as applicable to work.

1.12 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit transcription of insurance immediately after award of Contract.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Health and safety considerations required to ensure that CCG shows due diligence towards health and safety on construction sites.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.3 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

.2 Province of Newfoundland and Labrador

.1 Occupational Health and Safety Act, R.S.N. 1990.

1.4 SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within seven days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Submit two copies of Contractor's authorized representative's work site health and safety inspection reports to Engineer and authority having jurisdiction, weekly.

.4 Submit copies of reports or directions issued by Federal, Provincial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit Material Safety Data Sheets (MSDS) to Engineer.

.7 Engineer will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within seven days after receipt of plan. Revise plan as appropriate and resubmit plan to Engineer within two days after receipt of comments from Engineer.

.8 Engineer'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.

.9 Medical Surveillance: Where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications during emergency situations.

.10 On-site Contingency and Emergency Response Plan: Address standard operating procedures to be implemented during emergency situations.

1.5 CONSTRUCTION SAFETY

.1 Provide all workers, including sub-trades, with adequate and appropriate safety regulations prior to commencement of their duties. Ensure all workers comply with all safety regulations required by Federal and Provincial Regulations, Worker's Compensation Board and municipal statutes. Take all precautions and provide all required protection to ensure the safety of the general public and the workers in accordance with the current edition of the Occupational Health and Safety Act and Regulations applicable for construction projects and all applicable regulations such as but not limited to The Canada Labour Code, The Provincial Workers Compensation Regulations, Health and Welfare Canada Safety Code 6.

.2 In the event of conflict between any provisions of the above authorities the most stringent shall govern.

.3 Provide health and safety protection required by the manufacturer's printed literature and ensure that all workers are trained in the safe use of health and safety equipment and the handling of materials. Ensure that at least one-person remains on site at all times who is properly trained in the first aid aspects required to deal with emergency situations that may arise. The safety person should be trained in the proper use of climbing harnesses and equipment.

.4 A first aid station must be maintained on site, available to workers at all times.

.5 Protect all utilities and services against damage or interruption. Any claims resulting from damage will be the Contractor's responsibility. The possible location of any underground cables must be established and marked prior to any excavation.

.6 Post "NO SMOKING" signage where flammable materials are being used. Do not allow use of spark producing equipment during application of flammable materials. Ensure that at least one site person is trained to deal with emergency situations that may arise due to fire.

.7 Take all required precautions, including those recommended by the manufacturers printed instructions, to protect persons and property, including vehicles from over-spray of materials.

.8 Contractors' Site/Project specific Safety Plan shall incorporate the following.

.1 Continuous attachment at all times while on the tower. No unattached climbing will be permitted at any time.

.2 Use of CSA approved; full body harness, belts, lanyards, trolleys, safety hats, safety boots, safety vest, and other equipment used to complete the job.

.3 Only experienced personnel with previous training and demonstrated experience working on similar structures and heights to work on the project.

.4 Not allowing personal to use equipment winches for transport of personnel.

.5 The ability for any worker to discuss issues that they feel affects workers safety.

.6 Tailgate/job assessment forms to be completed daily and made available upon request.

.7 Appropriate fall rescue plans and equipment.

.9 The Contractor shall prepare a written **Project/site specific Construction Safety Plan** outlining all procedures and safe work practices which must be followed by all personnel working on the construction site. This plan is to be developed in conjunction with all subcontractors who will be working on site. It is the Contractor's responsibility to become familiar with all safety laws and regulations applicable to the type of work to be undertaken. These safety laws and regulations shall be addressed in the safety plan as clear and specific safety rules, procedures and work practices. The Contractor shall ensure that all of his workers and his sub-contractors, as well as any other authorized persons working or circulating in the construction work area, have been briefed and are familiar with the safety rules and measures indicated in the Safety Plan and understand that these measures are mandatory at the construction site. Regular Site Safety Meetings and daily tailgate/job assessment meetings shall be held and minuted by the Contractor.

1.6 MEETINGS

.1 Schedule and administer Health and Safety meeting with Engineer prior to commencement of Work.

1.7 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

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

.3 Design and construct all falsework as per CSA S269.1 (latest edition) and scaffolding as per SAS 269.2 (latest edition).

.4 Ensure no part of the work is subject to load(s) which endanger safety or will cause permanent deformations.

1.8 SINAGE AND BARRIERS

.1 The contractor is to maintain necessary signage to ensure workers, people accessing the site and the general public are aware of any hazards or potential hazards. Barriers are to be provided as required by regulation to ensure access to work by the general public is restricted.

.2 The Safety Plan must be placed on the Construction Site in a common area visible to all workers and other persons accessing the site. All employees are to be advised of the Safety Plan. The Safety Plan shall also address the means to communicate the intent to all persons.

.3 Submission of a Safety Plan to the Departmental Representative does not relieve the Contractor of any legal obligations for the provision of construction safety as specified by Federal and/or Provincial Safety Acts or Regulations.

.4 Contractor shall ensure compliance with the Safety Plan. The Departmental Representative or authorised representative reserves the right to demand removal of any person(s) not complying. Any person removed shall not be permitted reentry to the site.

.5 Provide Safety Plan immediately upon award of contract. The Safety Plan shall be submitted to the Departmental Representative for review prior to commencement of work. Work shall not be allowed to begin until safety plan has been submitted. Revise Safety Plan as required for changes in work procedures or when directed by Departmental Representative, Safety Officer or authority.

1.9 HAZARDOUS PRODUCTS

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

.2 Deliver copies of WHMIS data sheets to Departmental Representative on delivery of materials.

.3 All data sheets must be posted on site in a common area visible to all workers and subcontractors.

.4 Make all efforts to select and use materials (ie. adhesives, solvents, cleaners etc.) for the type and nature of work being performed which are the least hazardous products available, of low VOC content or low toxicity type products and emitting low noxious odours. Select products known to be friendly to the environment and to human health. Communicate this intent to all subcontractors, suppliers and manufacturers.

.5 Where the use be avoided of hazardous and toxic products cannot be avoided.

.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit WHMIS data sheets as per requirements above.

.2 Schedule in conjunction with the Departmental Representative, to carry out the work during “Off Hours” where workers and employees have left the site.

1.10 RESPONSIBILITY

.1 Inclusion of these safety requirements shall not constitute a relief of the Contractors responsibility but is a precaution against oversight and errors.

.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.

.4 The Contractor is solely responsible for safety procedures necessary to; meet the requirements of these specifications and to ensure the safety of workers and the general public.

1.11 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Act, Occupational Health and Safety Regulations, C. Nfld.

.2 Comply with Occupational Health and Safety Regulations, 1996.

.3 Comply with Canada Labour Code Part II, Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.

.4 Observe and enforce construction safety measures required by:

.1 Latest edition of the National Building Code of Canada.

.2 Provincial Worker's Compensation Board.

.3 Municipal statutes and ordinances.

.5 In the event of conflict between any provisions of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Engineer will advise on the course of action to be followed.

1.12 UNFORESEEN HAZARDS

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

1.13 HEALTH AND SAFETY CO-ORDINATOR

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

.1 Have minimum 2 years' site-related working experience as Health and Safety associated with building 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 under the direction of the supervisor.

1.14 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 Engineer.

1.15 CORRECTION OF NON-COMPLIANCE

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

.2 Provide Engineer with written report of action taken to correct non-compliance of health and safety issues identified.

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

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.

END OF SECTION

Part 1 General

1.1 REPORTING FIRES

.1 Know location of nearest fire alarm box and telephone, including emergency phone number.

.2 Report immediately all fire incidents to Fire Department as follows:

.1 telephone.

.3 When reporting fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

1.2 FIRE EXTINGUISHERS

.1 Supply fire extinguishers necessary to protect work in progress and contractor's physical plant on site.

1.3 SMOKING PRECAUTIONS

.1 Observe smoking regulations at all times.

1.4 RUBBISH AND WASTE MATERIALS

.1 Rubbish and waste materials are to be kept to a minimum.

.2 Burning of rubbish is prohibited.

.3 Removal:

.1 Remove all rubbish from work site at end of work day or shift or as directed.

.4 Storage:

.1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.

.2 Deposit greasy or oily rags and materials subject to spontaneous combustion in approved receptacles and remove as required in 1.8.3.1.

1.5 FLAMMABLE AND COMBUSTIBLE LIQUIDS

.1 Handling, storage and use of flammable and combustible liquids are to be governed by the current National Fire Code of Canada.

.2 Flammable and combustible liquids such as gasoline, kerosene and naphtha will be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing Underwriters' Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires permission of Fire Chief.

.3 Transfer of flammable and combustible liquids is prohibited within buildings or jetties.

.4 Transfer of flammable and combustible liquids will not be carried out in vicinity of open flames or any type of heat-producing devices.

.5 Flammable liquids having a flash point below 38°C, such as naphtha or gasoline, will not be used as solvents or cleaning agents.

.6 Flammable and combustible waste liquids, for disposal, will be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum and Fire Department is to be notified when disposal is required.

1.6 HAZARDOUS SUBSTANCES

.1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, will be in accordance with the latest edition of the National Fire Code of Canada.

.2 Obtain from Fire Chief a "Hot Work" permit for work involving welding, burning or use of blow torches and salamanders, in buildings or facilities.

.3 When Work is carried out in dangerous or hazardous areas involving the use of heat, provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for Fire Watch is at discretion of the Fire Chief. Contractors are responsible for providing fire watch service for work on a scale established and in conjunction with Fire Chief at pre-work conference.

1.7 FIRE INSPECTION

.1 Site inspections by Fire Chief will be coordinated through Engineer.

.2 Co-operate with Fire Chief during routine fire safety inspection of work site.

.3 Immediately remedy all unsafe fire situations observed by Fire Chief.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 The Contractor is solely responsible for all environmental protection procedures deemed necessary by the Contractor to meet the requirements of these Specifications. Contractor shall comply with all applicable Federal, Provincial and Municipal regulatory requirements.

.2 Contractor is fully responsible for all costs associated with required remediation occurring from contractors work on site.

1.2 PRODUCTS

.1 Avoid the use of hazardous products. Use environmentally friendly products where practical.

1.3 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site unless approved by Engineer.

.2 Fires and burning of rubbish on site are not permitted.

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

.4 All wastes materials must be disposed at an approved landfill site. The Contractor is responsible for obtaining permission from the operator of the landfill prior to disposing of wastes. The Contractor shall provide the Engineering with written permission from the operator of the landfill prior to final disposal of wastes.

1.4 POLLUTION CONTROL

.1 Control emissions from equipment and plant to local authorities emission requirements.

.2 Prevent dust and debris from demolition operations and other extraneous materials from contaminating air beyond application area by providing temporary enclosures.

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

.4 Contractor is to ensure all equipment is in good repair and no fuels or fluids are leaking from it. Equipment in disrepair will be removed from site. Basic petroleum spill clean-up equipment should be on site.

.5 No maintenance, beyond that of a required daily routine nature shall be performed on equipment while on site. No refueling to be completed within 30 m of a water body.

.6 No bulk storage of fuel or hazardous products will be permitted on site.

.7 Work should be scheduled to avoid periods of heavy precipitation. Erosion control structures (temporary matting, geotextile filter fabric) are to be used, as appropriate, to prevent erosion and silt runoff during the construction phase.

.8 Construction waste material such as pre-treated wood must be disposed of in an appropriate manner and shall not be incinerated onsite. Construction waste material such as aluminum, steel, iron, etc should be recycled through a metal recycler.

.9 All exposed soil should be minimized by limiting the area that is exposed at any one time and by limiting the time that any one area is exposed. Stockpiled soil must be covered and/or dyked to prevent erosion or silt runoff from leaving the site.

.10 All spills or leaks should be promptly contained, cleaned up and reported to the CCG - Traffic Center at 709-772-2083 and notification given to the Project Officer handling the job.

.11 Any and all stipulations of federal, provincial, or municipal authorities must be strictly followed.

.12 During the constructional and operational phases of the project, limit or prohibit any activities on any of the surrounding wetland/bog (i.e. Heavy Equipment).

.13 During Constructional phase of the project, target areas for excavation should be limited to areas that are not considered a wetland/bog.

1.5 DRAINAGE

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

.2 Don not pump water suspected of containing suspended materials into waterways, sewer or drainage systems.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Equipment and system adjust and balance.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

1.3 INSPECTION

.1 Allow Engineer access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Engineer or by inspection authority having jurisdiction.

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

1.4 THIRD PARTY INSPECTIONS

.1 The Contractor is to insure that all new guy lug welds are tested by a third party NDT inspector before erection of the tower. Testing is to be 100% Magnetic Particle, testing reports to be submitted for review and approval prior to erection.

.2 The Contractor shall have the tower painting inspected by a qualified NACE inspector prior to erection of the tower. Testing reports to be submitted for review and approval prior to erection.

.3 The Contractor shall have a minimum of 3 concrete test cylinders taken by a qualified inspector at the tower base and all 3 anchors. Testing reports to be submitted for review and approval prior to erection.

1.5 FOUNDATION INSPECTION

.1 The foundation placement is subject to inspection during the following project stages.

.1 Testing of rock bolts if applicable.

.2 Pre-pour inspection of rebar prior to concrete placement for gravity anchors and tower base footing.

.3 Concrete placement

.4 Grouting

.2 The Contractor shall advise the Departmental Representative **ONE WEEK** in advance of these activities. Every effort shall be made to allow completion of these activities within one full day on site. The Departmental Representative shall have an independent testing firm obtain and test a minimum of three (3) concrete cylinders, per batch, as per the latest industry standards, for compressive strength for each structural anchor and base footing. An independent CSA certified testing firm shall conduct sampling and testing. This testing by the Departmental Representative does not relieve the Contractor of their responsibility for ensuring concrete quality assurance. Contractor to arrange and pay for the testing. Testing reports to be submitted for review and approval prior to erection.

1.6 COMPLETION INSPECTION

.1 A completion inspection is to be carried out by the Departmental Representative. The purpose of this inspection is to ensure that the work is completed as per the project specifications and industry standards. The completion inspection does not relieve the Contractor of his responsibility to execute the work in a quality fashion as per the project specifications and industry standards. The Contractor must ensure that his quality control personnel perform a complete inspection of the works prior to their crew leaving the site. It is expected that the contractor has made a thorough check of all bolts, hardware, TX lines, tension and alignments as per requirements of CSA S37 01 standard or latest edition and reviewed the contract for full completion. The Contractor is to inform the Departmental Representative by letter that the installation is completed and is ready for inspection by the Departmental Representative. The Contractor shall have sufficient crew on site during the inspection to correct deficiencies noted by the Departmental Representative. Contractor to advise Departmental Representative ONE WEEK in advance to completion of the tower to permit scheduling of this inspection.

.2 The completion inspection will be the Departmental Representative's expense. All costs incurred by the Contractor during the acceptance inspection shall be at the Contractor's expense.

.3 All work must be completed and satisfactory prior to the Departmental Representative's completion inspection. Any deficiencies should be reported prior to the inspection teams' mobilization to site. **The Contractor will be responsible for the costs of all repeat completion inspections necessitated by work, which is considered by the Departmental Representative to be incomplete or deficient.**

.4 Any adjustments to the tension, twist or alignment shall be made by Contractor in consultation with the Departmental Representative to ensure effects on signal coverage can be reviewed and monitored.

.5 After any adjustment measures are carried out to the tower, the Contractor shall, as required, under the direction of the Departmental Representative, re-orient any antennas.

.6 An as-built tension pulse charts with actual measured guy lengths, radii and anchor elevations along with initial design guy tensions, must be provided prior to the inspection.

1.7 POST ERECTION INSPECTION

.1 Not less than six (6) months and not more than one (1) year after the completion inspection, the Departmental Representative shall re-inspect the tower. The purpose of this post erection inspection is to re-inspect the tower alignment and guy tensions, review satisfactory completion of any previously noted deficiencies and to conduct a general review of the tower condition. At this time the Contractor shall have a minimum crew of two present and carry out any adjustments necessary to ensure the structure meets the requirements of CSA S37- 01 standard. The post-erection inspection will be at the Departmental Representative's expense. All costs incurred by the Contractor during the Post Erection Inspection shall be at the Contractor's expense.

.2 Departmental Representative to advise Contractor at least **ONE WEEK** in advance of the post erection check in order to facilitate scheduling.

.3 Any adjustments to the tension, twist or alignment shall be made by the Contractor in consultation with the Departmental Representative to ensure affects on signal coverage can be reviewed and monitored.

.4 After any adjustment measures that are carried out on the tower, the Contractor shall, as required, under the direction of the Departmental Representative, re-orient any antennas.

.5 Upon completion of the installation stage of the project the Contractor is to provide the Departmental Representative with a Conformance Certification Letter stating that the tower has been designed, fabricated and installed as per the Project Specifications.

1.8 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies may be engaged by Engineer for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Engineer.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.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 as advised by Engineer at no cost to Engineer. Pay costs for retesting and re-inspection.

1.9 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.

1.10 PROCEDURES

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

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

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.11 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 Engineer as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Engineer it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Engineer.

1.12 TESTS AND MIX DESIGNS

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

.2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Engineer and may be authorized as recoverable.

1.13 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical systems.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Office and sheds.

.2 Parking.

1.2 INSTALLATION AND REMOVAL

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.3 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.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.

1.4 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.

1.5 SANITARY FACILITIES

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

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

1.6 EXISTING SITE INFRASTRUCTURE

.1 Existing communications site to be protected from construction activities (dust and debris). Site shall remain in continuous operation except that shut down may be considered for periods, up to fifteen minutes, based on prior approval coordinated with Engineer. Exact times of shut down to be predetermined and necessitate Notice to Mariners.

.2 Engineer shall be notified 72 hours in advance of any planned power outages that will effect communications equipment.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Barriers.

1.2 RELATED SECTIONS

.1 Section 01 52 00 - Construction Facilities.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.4 DUST TIGHT SCREENS

.1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

1.5 ACCESS TO SITE

.1 Access to the tower site is available as described in section 011100. When appropriate, maintain this access during the construction period. Contractor is responsible for providing their own site office and accommodations.

.2 The Departmental Representative must approve any temporary roads planned. A plan for remediation must be included.

.3 If authorized to use existing roads for access to the project site, maintain such roads for the duration of the Contract and make good damage resulting from Contractor’s use of roads.

.4 Any damages as a result of Contractor’s activities to existing roadways, property, and adjacent property shall be returned to original condition at Contractors expense.

1.6 POWER

.1 Power supply may not be available during the time of construction. The Contractor must provide and maintain power as required for the construction and temporary obstruction lighting.

.2 Connect to power supply in accordance with Canadian Electrical Code once the building power is provided by Departmental Representative.

1.7 DRAINAGE

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

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

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

1.8 FIRE ROUTES

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

1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.10 PROTECTION OF BUILDING FINISHES

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

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Engineer locations and installation schedule 7 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

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

.2 Manufacturer's instructions.

.3 Quality of Work, coordination and fastenings.

.4 Existing facilities.

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 REFERENCE STANDARDS

.1 Within text of each specifications section, reference may be made to reference standards. List of standards reference writing organizations is contained in Section 01 42 00 - References.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

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

.4 Cost for such testing will be born by Engineer in event of conformance with Contract Documents or by Contractor in event of non-conformance.

.5 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.

1.4 QUALITY

.1 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.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Engineer based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.5 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Engineer of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Engineer at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Engineer reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.6 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

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

.4 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 aluminium siding 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 Engineer.

.9 Touch-up damaged factory finished surfaces to Engineer's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.7 SUBMITTALS

.1 Within five working days of written request by the Departmental Representative, submit following information for <u>any and all</u> materials and products proposed for use:

.1 Name and address of the manufacturer and suppliers.

.2 Trade name, model and catalogue number.

.3 Performance, descriptive and test data.

.4 Manufacturer's installation or application instructions.

.5 Evidence of arrangements to procure.

.6 Conformance to application standards.

1.8 SUPPLY AND USE

.1 Use new material and equipment unless otherwise specified.

.2 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.

.3 Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified.

1.9 MANUFACTURES INSTRUCTIONS

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.2 Prior to use of a product or material, notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.

1.10 CONFORMANCE

.1 When material or equipment is specified by standard or performance specifications, upon request of Departmental Representative, obtain from manufacturer an independent testing laboratory report stating that materials or equipment meets or exceeds specified requirements. Trace-ability of all materials is to be performed

1.11 SUBSTUTUTION

.1 Departmental Representative is not obligated to consider any substitutes or changes after contract award. Contractor is responsible for all costs associated with reviewing requested changes.

.2 Proposals for submission after Contract Award must include all documentation and information required as part of this contract and statements of respective cost differences of items originally specified and proposed substitutions.

.3 Should proposed substitution be accepted either in part or in whole, contractor will assume full responsibility and costs when substitution affects other work on project and pay for design or drawing changes required as result of substitution.

.4 Amounts of credits arising from approval of substitutions will be determined by the Departmental Representative and the Contract Sum will be reduced accordingly. No substitutions will be permitted without prior written approval from Departmental Representative.

1.12 TRANSPORTATION

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

.2 Transportation cost of products supplied by Owner will be paid for by Engineer. Unload, handle and store such products.

1.13 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

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

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

1.14 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Engineer if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Engineer reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Engineer, whose decision is final.

1.15 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.

1.16 CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Engineer if there is interference. Install as directed by Engineer.

1.17 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.

1.18 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Engineer of conflicting installation. Install as directed.

1.19 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

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

1.20 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 316 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.21 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Engineer.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Progressive cleaning.

.2 Final cleaning.

1.2 RELATED SECTION

.1 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.2 Section 01 77 00 - Closeout Procedures.

1.3 PROJECT CLEANLINESS

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

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Engineer. Do not burn waste materials on site, unless approved by Engineer.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

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

.5 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

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

.7 Dispose of waste materials and debris at designated dumping areas on Crown property.

.8 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.

.9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.4 FINAL CLEANING

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

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

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

.4 Remove waste products and debris other than that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Engineer. Do not burn waste materials on site, unless approved by Engineer.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Remove stains, spots, marks and dirt from electrical and mechanical fixtures, walls, ceilings and floors.

.8 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.10 Remove dirt and other disfiguration from exterior surfaces.

.11 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.

.12 Under no circumstances will burning of construction refuse be allowed on the Departmental Representative’s site. Remove all waste materials from the site to an approved dumping area as designated by local authority.

.13 If the Contractor fails to clean up the site and restore to an acceptable condition, the Departmental Representative shall initiate completion of the work and deduct for same from monies due to the Contractor.

END OF SECTION

Part 1 General

1.1 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Engineer.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile and store salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed for demolition from movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Engineer.

.7 Protect surface drainage, mechanical and electrical from damage and blockage.

.8 Separate and store materials produced during dismantling of structures in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

.1 On-site source separation is recommended.

.2 Remove co-mingled materials to off-site processing facility for separation.

.3 Provide waybills for separated materials.

1.2 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

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

.3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

1.3 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Maintain security measures established by existing facility.

1.4 SCHEDULING

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 APPLICATION

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

3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

3.3 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule E - Government Chief Responsibility for the Environment

Province	Address	General Inquires	Fax
Newfoundland	Department of Environment, Confederation Building, Box 8700, St. John's, NF A1B 4J6	(709) 729-2664	(709) 729-1930

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

1.3 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 Engineer in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Consultant's Inspection.

.2 Consultant’s Inspection: Consultant 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 Equipment and systems have been tested, adjusted, balanced and are fully operational.

.4 Operation of systems have been demonstrated to Owner's personnel.

.5 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Owner, and Consultant. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when Owner and Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.

.6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment: When Owner and Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment.

.8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with general conditions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 As-built, samples, and specifications.

.2 Equipment and systems.

.3 Product data, materials and finishes, and related information.

.4 Operation and maintenance data.

.5 Spare parts, special tools and maintenance materials.

.6 Warranties and bonds.

1.2 RELATED SECTIONS

.1 Section 01 45 00 - Quality Control.

.2 Section 01 77 00 - Closeout Procedures.

.3 Section 01 79 00 - Demonstration and Training.

1.3 SUBMISSION

.1 Submit (2) copies of ‘As-Built’ drawings for approval by the Engineer.

.2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.3 Copy will be returned after final inspection, with Engineer's comments.

.4 Revise content of documents as required prior to final submittal.

.5 Two weeks prior to Substantial Performance of the Work, submit to the Engineer, four final copies of operating and maintenance manuals in English.

.6 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.7 If requested, furnish evidence as to type, source and quality of products provided.

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

.9 Pay costs of transportation.

1.4 FORMAT

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.5 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

.1 date of submission; names,

.2 addresses, and telephone numbers of Contractor with name of responsible parties;

.3 schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

.6 Training: Refer to Section [01 79 00 - Demonstration and Training].

1.6 AS-BUILTS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site for Owner 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. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. 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 Engineer.

1.7 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Engineer.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.8 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.12 Additional requirements: As specified in individual specification sections.

1.9 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.10 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Engineer. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.11 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Engineer. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.12 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Engineer. Include approved listings in Maintenance Manual.

1.13 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

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

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Engineer.

1.14 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 principal.

.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

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Approved: 2010-12-31

Part 1 General

1.1 SCOPE

.1 The Contractor shall dismantle and dispose as directed by the Departmental Representative the existing tower and associated components. These components shall include, but not necessarily be limited to tower steel, guys, anchor assemblies to 300 mm below grade, conduit, lights, ladders, waveguide, footings etc. The contractor shall also be responsible for the removal of existing site items. This is to include the old generator buildings footing, the new generator footing and old concrete blocks that are still present on the site. All disposals shall be completed in a manner acceptable to the Federal, Provincial and Municipal authorities having jurisdiction.

.2 The Contractor shall provide a detailed tower demolition plan to the Departmental Representative with regard to the proposed method of dismantling the tower. The detailed plan must be approved and stamped by a Professional Engineer licensed to practice in the Province of Newfoundland and Labrador, prior to submission. Details should include measures to protect other property such as the new tower, guys and transmitter building. This method must be reviewed by the Departmental Representative prior to the start of any work. This review shall not relieve the Contractor of his responsibilities and liabilities with the regard to the dismantling process. The Contractor shall provide these details in writing to the Departmental Representative complete with sketches if required.

.3 Contractor shall provide the Departmental Representative with a minimum notice of **ONE WEEK** prior to the proposed tower dismantling start.

1.2 SITE CONDITIONS

.1 Environmental protection:

.1 Ensure Work is done in accordance with Section 01 35 43- Environmental Procedures.

.2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.3 Fires and burning of waste or materials is not permitted on site.

.4 Do not bury rubbish waste materials.

.5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout project.

.6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

.7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with [authorities having jurisdiction] [as directed by [DCC Representative] [Consultant] [Departmental Representative]].

.8 Protect trees, plants and foliage on site and adjacent properties where indicated.

.9 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 GENERAL

.1 Tower may not be felled.

.2 Coast guard shall disconnect cabling as necessary prior to Contractor commencing demolition activities.

.3 Ensure that demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise.

.4 At end of each day's work, leave work in safe and stable condition.

3.2 DEMOLITION

.1 The tower shall be dismantled in such a manner so as to pose no threat to the new tower, antennas or transmitter buildings. Responsibility for any and all damage to property as a result of the dismantling and disposal of the existing tower shall be the sole responsibility of the Contractor.

.2 Existing tower shall not be demolished until new tower is confirmed to be operational by Coast Guard. Once new tower is confirmed to be operational, existing tower and all attachments shall be safely taken down and removed from site.

.3 Remove tower from its foundation ensuring the tower base plates remain intact.

.4 Demolish all existing concrete foundations to be minimum of 300mm below grade level.

.5 Existing anchors are to be cut off at grade a minimum of 300mm below grade.

.6 Ensure that demolition does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.7 Ensure demolition is undertaken safely. If at any period during demolition the safety of the Contractor's staff cannot be maintained, take preventative measures, stop work and immediately notify Coast Guard.

3.3 SALVAGE

.1 Salvage all of the following:

.1 All antennas

.2 All obstruction lighting

.3 Tower

.4 Recycling of all items

3.4 DISPOSAL

.1 Dispose of:

.1 Old cables.

.2 All guys and guy hardware.

.3 Transmission lines

.4 Existing Wave-guide Bridge.

.5 Foundations.

.2 Dispose of all materials in accordance with applicable provincial regulations. Contractor is responsible for transportation of demolished materials from site to appropriate waste handling facility. See Appendix G.

.3 Contractor shall provide written documentation with regard to where and how material was disposed of. On site disposal is strictly prohibited.

END OF SECTION

Approved: 2011-06-30

Part 1 General

1.1 REFERENCE STANDARDS

.1 The design and installation of concrete shall be in accordance with the latest version of the referenced standards and codes.

.1 Design, install and reinforce foundations and anchors to CAN/CSA 3-A23.1-94 except where specified otherwise.

.2 Perform formwork and cast-in-place concrete work to CAN/CSA 3-A23.1-94, except where specified otherwise.

.3 Perform reinforcing work to CAN/CSA 3-A23.1-94 and welding of reinforcing to CSA W186-1970, except where specified otherwise.

.4 Cure and protect concrete work to CAN/CSA-A23.1-94, except where specified otherwise

1.2 TEST REPORTS

.1 Contractor to facilitate execution to allow testing and sampling procedures to be performed in accordance with CSA A23.2-00 by Departmental Representative. Concrete cylinders shall be tested for each anchor and the tower base.

.2 Confirmation of air content and slump shall be obtained for each load of concrete delivered to the project. The Contractor shall be responsible for the proper completion of the concrete. All costs associated with the testing of concrete supplied to the project shall be the responsibility of the Departmental Representative.

.3 If inspection or test results indicate that concrete materials do not meet the requirements of this specification, such materials shall be rejected and removed from the site. The Contractor shall be responsible for all costs, including testing and additional Engineering inspections associated with concrete removal and replacement.

.4 The Contractor shall notify the Departmental Representative at least **ONE WEEK** prior to placing concrete. Notification shall be in writing with a copy to the Departmental Representative.

.5 Contractor to arrange and pay for all testing. Testing reports to be submitted for review and approval prior to erection.

Part 2 Products

2.1 MATERIALS

.1 Lumber: plywood and wood formwork materials to CSA CAN-A23-94.

.2 Reinforcing steel: Grade 400 MPa, deformed bars to CSA G30.12 unless indicated otherwise.

.3 Cement: to CSA A5-93, normal (type 10), sulphate resistant (type 50).

.4 Water, fine aggregates, normal weight coarse aggregates: CSA A23.

.5 Chemical admixtures: to CSA A266.2-1973.

.6 Non-shrink grout: premixed compound consisting of non-metallic aggregate, cement, and water reducing and plasticizing agents capable of developing minimum compressive strength of 50 Mpa (7000 psi) at 28 days.

2.2 MIXES

.1 Except where indicated or specified otherwise use concrete mix designed to produce minimum compressive cylinder strength at 28 days of 30 Mpa for tower foundation and 25 Mpa for anchors.

.2 Slump, unless noted otherwise, shall be 75mm +/-25mm.

.3 All concrete exposed to exterior temperatures and weather in its final use shall contain an air-entraining agent. Total air content to be as specified in CSA Standard A23, for the particular size of aggregate being used. The air-entraining agent shall be compatible with the water reducing agent.

.4 The maximum size of coarse aggregate shall be 40mm.

.5 If the air temperature is 5 C° or less, the temperature of the concrete, at the time of placing, shall be between 15° C and 30° C.

Part 3 Execution

3.1 WORKMANSHIP

.1 Place all anchors against an undisturbed front face.

.2 Ensure that reinforcement and inserts are not disturbed during concrete placement.

.3 Do nor place concrete against any surface which is less than 5° C. Remove all snow and ice before placing.

3.2 FORMWORK

.1 Design all formwork in accordance with CSA Standard A23.

.2 Withdraw all nails and thoroughly clean and repair all form materials before reusing.

.3 Provide a 20mm chamfer on all exposed corners.

.4 Take all precautions necessary to maintain the safety of the structure before removing th forms. Pedestal forms to remain in place a minimum of 48 hours. **All formwork is to be completely removed.**

3.3 REINFORCEMENT

.1 Clean all reinforcement of any loose scale, dirt, or other coatings which would destroy or reduce the bond. Reject bars with kinks or bends not shown on the drawings. Thoroughly clean all forms before installing reinforcement. Fabricate. Detail and install all reinforcing steel as per Reinforcing Institute of Canada “Manual of Standard Practice” latest edition.

.2 Do not field cut, bend or displace any reinforcement to permit placing weldments or anchor bolts either before or after concrete is placed unless approval is given by the Departmental Representative.

.3 All reinforcement shall have a minimum of 75mm concrete cover.

3.4 JOINTS

.1 Construct all joints as detailed on the drawings.

.2 Clean the face of the joints of dirt and then saturate with water before placing new concrete.

3.5 GROUTING OF BASE PLATES

.1 Use In-Pact pre-blended non-shrink dry pack grout as manufactured by C.C. Chemicals Ltd. or approved equal. All grout should be installed according to the manufacturer's instructions.

.2 Edges of grout should be tapered off at 45° to give a neat transition between base plates and concrete pedestals.

3.6 CURING AND PROTECTIONS OF CONCRETE

.1 Provide effective means of maintaining the temperature of concrete in place at a minimum of 10° C and a maximum of 30° C for three days after placing. When the mean daily temperature is forecasted to be less than 5° C, provide protection for newly placed concrete by means of suitable enclosures or raised coverings, insulation and heat.

.2 Insulation must be protected to prevent loss of effectiveness due to.

.3 The use of calcium chloride to accelerate curing is prohibited.

3.7 PLACEMENT OF CONCRETE

.1 Consolidation of concrete should be performed by internal or immersion type vibration. Consolidation of the concrete by rods or shovels will not be permitted.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 133613 – Steel Towers

1.2 REFERENCE STANDARDS

.1 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)

.1 ANSI/NAAMM MBG 531-[00], Metal Bar Grating Manual.

.2 ASTM International

.1 ASTM A53/A53M-[07], Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A307-[07b], Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A325M-[09], Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength [Metric].

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.40-[97], Anti-corrosive Structural Steel Alkyd Primer.

.2 CAN/CGSB-1.181-[99], Ready-Mixed Organic Zinc-Rich Coating.

.4 CSA International

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

.2 CAN/CSA G164-[M92(R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA W59-[03(R2008)], Welded Steel Construction (Metal Arc Welding).

.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 National Association of Architectural Metal Manufactures (NAAMM)

.1 AMP 510-[92], Metal Stair Manual.

.7 National Research Council Canada (NRC)

.1 National Building Code of Canada [2015](NBC).

.8 The Society for Protective Coatings (SSPC)

.1 Systems and Specifications Manual, Volume 2, 2008 Edition.

Part 2 Products

2.1 SYSTEM DESCRIPTION

.1 Design Requirements: Metal stair system shall wrap around exterior faces of the tower and shall lead to a working platform at the top of the tower. The contractor supplied drawings shall include necessary details for the layout and installation of the metal stairs and handrails. Stairway design and layout will be submitted to Departmental Representative for approval.

.2 Design metal stair, balustrade and landing construction and connections to National Building Code of Canada (NBC) vertical and horizontal live load requirements.

.3 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

2.2 MATERIALS

.1 Steel sections: to CSA G40.20/G40.21 Grade 300 W.

.2 Steel plate: to CSA G40.20/G40.21, Grade 260 W

.3 Floor plate: to CSA G40.20/G40.21, Grade 260 W.

.4 Steel pipe: to ASTM A53/A53M, standard weight, schedule 40 seamless black.

.5 Steel tubing: to CSA G40.20/G40.21

.6 Metal bar grating: to ANSI/NAAMM MBG 531

.7 Welding materials: to CSA W59.

.8 Bolts: to ASTM A307.

.9 High strength bolts: to ASTM A325M.

2.3 FABRICATION

.1 Fabricate in accordance with NAAMM, Metal Stair Manual.

.2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.3 Accurately form connections with exposed faces flush:

- .1 Make mitres and joints tight.
- .2 Make risers of equal height.

.4 Grind or file exposed welds and steel sections smooth.

.5 Shop fabricate stairs in sections as large and complete as practicable.

2.4 PLATE/GRATING STAIRS

.1 Form treads from 6mm thick by 1200mm wide steel plate to profile indicated, and secure to stringers with L 35 x 35 x 5mm supports. Form landings from 6mm thick steel plate, reinforced by L 55 x 55 x 6mm spaced at 1200mm on centre.

.2 Form steel grating treads and landings from metal bar grating to profile indicated and secure to stringers and supports as indicated. Form landings of steel grating and reinforce as required.

.3 Form stringers from MC 310 x 15.8.

2.5 PIPE/TUBING BALUSTRADES

.1 Construct balusters and handrails from steel pipe.

.2 Cap and weld exposed ends of balusters and handrails.

.3 Terminate at abutting wall with end flange.

2.6 BAR BALUSTRADES

.1 Construct bar balustrades as follows:

.1 Balusters: 25 x 25mm bar.
.2 Top rail: 30 x 10mm bar.
.3 Bottom rail: 25 x 10mm bar.
.4 Pickets: 12 x 12mm bar at 100mm on centre.

.2 Fabricate supports for balustrade from 38 x 38mm steel tubing with both ends capped and welded.

.3 Weld balustrades to stringers as indicated.

2.7 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m2to CAN/CSA-G164.

Part 3 Execution

3.1 INSTALLATION OF STAIRS

.1 Install in accordance with NAAMM, Metal Stair Manual.

.2 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs to structure.

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

.4 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.2 INSTALLATION OF HANDRAIL

.1 Apply handrails in accordance with manufacturer's printed instructions, using recommended tools.

.2 Make joints and mitres neat, tight and inconspicuous. Remove surplus material from joint. Provide solid return at exposed ends of handrail.

3.3 CLEANING

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

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

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal stairs and ladders installation.

END OF SECTION

Part 1 General

1.1 CODES AND STANDARDS

.1 Work in this section relates to the design, supply and installation of the new guyed structure.

.2 The design, supply and erection of the tower shall be in accordance with the latest version of the following codes and standards

- CSA-S37-18	Antennas, Towers and Antenna Supporting Structures
- CSA B33.4	Galvanized Steel Tower Bolts and Nuts
- ASTM A325	High Strength Bolts for Structural Steel Joints
- CSA CAN3-A23.3	Design of Concrete Structures
- CSA W59	Welded Steel Construction
- CAN/CSA-G40.20	General Requirements for Rolled or Welded Structural Quality Steel
- CAN/CSA-G40.21	Structural Quality Steels
- CAN/CSA-G164	Hot Dip Galvanizing of Irregularly Shaped Articles
- CAN/CSA-S16.1	Limit States Design of Steel Structures
- CAN/CSA-B72	Installation of Lightning Rods
- CAN/CSA-C22.1	Canadian Electrical Code, Part 1
- CAN/CSA-G4	Steel Wire Rope for General Purpose and Mine Hoisting and Mine Haulage
- CSA-CAN3-G12	Zinc Coated Steel Wire Strand
- CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures
- W47.1S1-M	Supplement No.1-M1989 to W47.1-1983
- W59-	Welded Steel Construction (Metal-Arc Welding)
- Z259.2.-M	Fall Arresting Devices, Personnel Lowering Devices and Life Lines
- Z259.1	Fall Arresting Safety Belts and Lanyards for the Construction and Mining Industries

- Canada Labour Code
- Health and Welfare Canada Limits of Exposure to Radio-Frequency Fields at Frequencies from 10 kHz-300 kHz, Safety Code 6
- Newfoundland and Labrador Occupational Health & Safety Act and Regulations
- National Building Code of Canada – 2010
- Transport Canada Standard TP382 – Standards Obstruction Markings
- Canadian Coast Guard Safety Requirements
- SSPC (The Society of Protective Coatings)
- Transport Canada CAR Standard SOR/96-433

Part 2 Products

2.1 GENERAL REQUIREMENTS

.1 All steel CSA G40.21M – 350W u/n. Preference shall be given to the use of structural steels with improved resistance to brittle fracture. A36 modified steel is not acceptable. All

materials to be used in the tower shall be new and in accordance with the requirements of CSA Standard S37-18.

.2 Use of material sections less than 5 mm in thickness will not be permitted on primary or secondary structural members. Sections used for attachment or support of auxiliary facilities may be permitted subject to review by the Departmental Representative.

.3 Hollow sections will not be permitted on primary or secondary structural members which include tower legs, horizontals and diagonals.

2.2 AUXILLARY FACILITIES

.1 The following facilities shall be considered to be an integral part of the tower contract and shall be supplied and erected as such. In mounting any of these auxiliary facilities, care shall be taken that the structural members of the tower are not weakened by the drilling of holes or any other means.

.2 Stairway – The tower shall be equipped with a stairway system complete with a CSA approved handrails and guards. The stairway shall be a separate assembly bolted to the tower and shall conform to the latest version of NAAMM and NBC 2010. Stairway design and layout will be submitted to Departmental Representative for approval.

.3 Transmission Line Supports – Hangers shall be provided to support the transmission lines at the elevation of all antennas. Lines are to be supported and restrained at centers suitable to the manufacturer's requirements and TX lines are to be installed on the outside face of the tower. Use of wrap lock/ tie wrap devices to secure TX lines is not acceptable. Tx brackets to be spaced as per manufactures recommendations. Location of Transmission lines will be submitted to Departmental Representative for approval.

.4 Ice Protection:

.1 All horizontal runs of transmission lines shall be protected from falling ice in a manner approved by the Departmental Representative.

.2 Three U-Bolt clips are to be spaced 300 mm apart, directly above the grounding connection and guy markers on each guy.

.3 All obstruction lights shall be protected by ice shields if applicable

2.3 WAVEGUIDE BRIDGE

.1 The waveguide bridges shall be supplied and installed as per approved design drawings. Designs must incorporate continuous waveguide bridge ice protection from the tower to the equipment shelter.

.2 This ice protection shall incorporate a peaked roof of solid plate construction located above the standard channel support for the waveguides, cables and conduit. Design must allow easy access to TX lines without removal of bridge hardware.

.3 Transmission lines must be protected by the Waveguide Bridge at all times.

.4 The Waveguide Bridge must be independent of and not directly connected to the tower structure or the building.

.5 The waveguide bridge can be supported on a post located in the center or two sides of the assembly, except the support closest to the building which must consist of two posts located on the outside of the assembly.

.6 The waveguide bridge shall be designed to carry all initial and proposed waveguides, cables and conduits as indicated on the antenna and transmission line schedule.

.7 The waveguide shall be supported on cable hangers connected to a trapeze style support system of stainless steel threaded rod or galvanized bar hangers and two levels of horizontal trapeze angles suitable and elevated to run directly into the waveguide window.

.8 The Contractor shall provide a suitable adjustable plate extension to the bridge to protect the lines between the bridge and the building and the bridge and the tower. This plate must taper to the full width of the waveguide window or waveguide ladder on the tower.

.9 Unistrut or Cantruss sections are not acceptable for use on the waveguide bridge or the tower itself.

Part 3 Execution

3.1 DESIGN

.1 The tower shall be designed in accordance with CSA S37-18 to support all antennas, attachments, etc as indicated.

.2 The tower should have a maximum serviceability response (tilt and/or twist) of less than 2.0 degrees under working loads. Tower to be designed to require no torsion resistors.

.3 The towers guy assembly and foundation shall be designed in accordance with CSA S37-18 to support all antennas, attachments, etc as indicated.

.4 Design Ice Load: the tower shall be designed with loading consideration of 50 mm of radial ice on all exposed surfaces, including members, guys and all attachments, and antenna components. 50mm shall be the valued considered as the reference ice thickness, $\mathbf{t_i}$ as per CSA S37-18.

.5 Design Wind Load: Use Site Specific Wind Data contained in Appendix B.

.6 Radar Loading Requirements: Use Radar Loading requirements contained in Appendix E.

.7 The loading imposed on the tower by transmission lines and auxiliary lines – feeder lines, attached to it shall be based on the actual dimensions of the lines as determined from the manufacturer’s specifications.

.8 Shielding of the transmission lines by the tower members, other feeders or attachments may be considered. When feeder lines are mounted on the inside of one face of the tower, shielding of the leeward lines may be considered, following the procedures outlined in “User’s Guide – NBC 2010 – Structural Commentaries (Part 4 of Division B)” Commentary I, Figure I-28 Poles, rods and wires.

.9 Loading from auxiliary facilities and attachments such as ladders, fall arrest rails, feeder line supports, etc. must be considered in a similar fashion as that of the transmission lines and feeders outlined above.

.10 Design to include a wave guide bridge assembly as required to elevate and protect (from falling Ice etc.) transmission lines from the tower base point to the building transmission line entrance.

.11 The foundation designs shall be based on the conditions contained in the Geotechnical Report contained in Appendix D.

.12 The Design Engineer accepting responsibility for the tower foundations shall:

.1 Have approved a minimum of ten (10) towers of similar nature in the previous three (3) years.

.2 Be registered or eligible for registration with the Association of Professional Engineers and Geoscientists of Newfoundland.

.3 Seal all drawings issued that relate to the tower.

3.2 CONNECTIONS

.1 Connections in the shop may be bolted or welded. All site connections shall be bolted.

.2 Make all welded connections in conformance with CSA Standard W59.1. Use only low hydrogen electrodes or processes of equivalent rating. All weld designs shall be clearly indicated on the design drawings.

.3 Make all bolted connections with high strength bolts clearly marked A325 conforming to A.S.T.M. Standard Specification A325. Place a hardened washer in under the bolt element (nut or bolt head) turned in tightening the bolt. Tighten all bolts by the turn of the nut method as specified in CSA Standard S16.

.4 Power wrenches may be used in installing bolts, provided they are of the adjustable type capable of cutting-out at a pre-selected torque value.

.5 After the tower has been complete, check all bolted connections, including those on miscellaneous metal work, and retighten all loose bolts. Exercise care that bolts adequately tightened are not subjected to additional rotation of the turned element. All damaged nuts or bolts to be replaced.

3.3 WORKMANSHIP

.1 General: Workmanship and finish throughout shall be equal to the best modern practice for this class construction. All members shall be in accordance with the drawings and shall be straight and true as per CSA S37-18. All like parts shall be interchangeable. All punched holes must be accurately located so that the structure can be erected with a minimum of “drifting”. The ends of members shall be clipped as required to facilitate assembly. In any bending or reworking of any material, methods employed shall ensure that the physical properties of the material are not impaired.

.2 Marking: Each separate member has already been distinctly identified by a number assigned to that member. Each member has been clearly marked with its member number to facilitate erection and traceability. All like parts have the same number.

.3 Punching: Punching shall be done by methods designed to ensure accuracy. The center of any hole shall, in no case, be displayed more than1.5mm from its position shown on the drawings. Plugging or welding mis-punched holes will not be allowed. Punches and dyes shall be sharp and true and all punch holes shall be round, true to size, and free from ragged edges and burrs. Where applicable, punching performed on bent members, shall be done after bending to avoid distortion of holes.

.4 Welding: All welding shall be performed in accordance with CSA Standard W59 latest revision and shall be undertaken by a fabricator fully approved by the Canadian Welding Bureau to the requirements to CSA Standard W47, latest revision. Provide copy of CWB Certification to Departmental Representative.

.5 Handling of Material: Materials shall be handled and stored in the plant and on the job site in such a manner that no damage shall be done to the materials of any existing building or structure. Special care shall be taken to ensure that galvanizing, priming, or painting is not damaged during handling and erection of materials. Storage of materials on the site will be the responsibility of the Contractor.

3.4 GALVANIZING

.1 The anchorage system and all a shall be hot dip galvanized to the requirement of CSA S37-18 and the standards specified therein. Galvanizing applied to structural members is to have a minimum mass of Zinc coating of 610 g/m² (2 oz/ft²) equivalent to a thickness of 87 µm (3.40 mils). Galvanizing applied to bolts, nuts and threaded fasteners is to have a minimum mass of Zinc coating of 460 g/m² (1.5 oz/ft²) equivalent to a thickness of 65 µm (2.54 mils).

.2 The Contractor shall field paint all steel members of the tower where the galvanized finish has been scrapped or chipped during erection in the field. This shall be done using Zinkrich paint, as supplied by the Zinkrich Company, 42 Broadway, New York, New York, U.S.A. or Galvicon or an approved equal. Steel members that have a slightly damaged finish shall be given three coats of Zinkrich Paint applied according to the manufacturer’s printed instructions.

.3 Contractor shall warranty all galvanizing work for a period of not less than three (3) years.

3.5 ERECTION

.1 The tower shall be erected in a manner that will not bend, scrape, distort, or injure the component parts of the galvanizing. **Upon award of contract, Contractor is to provide a detailed Erection Plan to include the use of gin poles, winches, cranes and erection equipment.**

.2 The use of iron sledges for hammering or driving any members will not be tolerated. All hammering is to be done with wooden mauls or hammers of plastic, lead or other soft material.

.3 Every failure of the material to join together properly shall be reported to the Departmental Representative.

.4 Upon completion of erection, the tower shall be inspected by the Contractor for member damage. Any damaged or missing items, including nuts, bolts, etc., shall be replaced.

.5 The Contractor shall be responsible to ensure that no members of the tower are over stressed during erection. Any members damaged during erection shall be replaced. The Contractor shall be responsible for any damages done to the work of others, or to adjoining structures and property during erection.

.6 The Contractor shall use a three-transit set up to complete final adjustment of vertical alignment and twist and to ensure it meets the requirements of CSA S37-18 for vertical alignment and twist.

.7 Contractor is responsible for establishing temporary obstruction lighting in accordance with Transport Canada requirements.

3.6 ELECTRICAL ANTENNA, TRANSMISSION LINES AND GROUNDING

.1 Supply and installations of antennas as required.

.2 Supply and installation of new continuous AVA5-50-E1 Heliax transmission cable, or approved equivalent, from the new antennas to the transmitting equipment in the existing equipment building. Terminate into N type female connector both ends. Contractor is responsible for all testing, and reporting for the lines and antennas. All transmission lines shall be new 22mm (7/8″) AVA5-50-E1 Heliax Coaxial Cable or approved equal, with VSWR of 1.13, operating at a frequency of 156 MHz (+/- 5MHz). Written verification of this must be submitted to the Departmental Representative for each line prior to installation. Use of spliced lines is unacceptable.

.3 Supply all grounding material to properly ground all TX lines minimally at the top, tower mid-point, bottom of tower and building entrance.

.4 The tower structure shall be designed for a Radar antenna unit with loading requirements specified in Appendix E. All antennas are leg mounted. All specified future antennas, lines and mounts shall be incorporated into the tower design.

.5 All transmission lines shall be new 22mm (7/8") AVA5-50-E1 Heliax Coaxial Cable or approved equal, with VSWR of 1.13, operating in the frequency of 156 MHz range. All lines shall be supplied complete with connectors, hoisting grips, hangers, ground kits and other necessary hardware.

.6 Transmission line connectors and end terminations (Type N) top and bottom, are to be supplied and installed by the Contractor.

.7 The Contractor shall supply and install all new transmission lines as noted above. All lines will extend into the building three meters.

.8 The Contractor shall be responsible for the installation of all systems as per the manufacturers' recommendations. All antenna / tower interface hardware not supplied by the antenna manufacturers shall be the responsibility of the tower contractor. It shall be the Contractors responsibility to determine any additional material required to mount the antennas to the tower structure. This shall include all antenna struts, mounts, special attachments, bolts, etc. The Contractor shall liaise with the antenna manufacturers or suppliers to obtain adequate information required to design proper mounting interface components.

.9 The contractor shall be responsible for the installation of all lines and antenna systems, including line hangers, ground kits, connectors, power dividers, hoisting grips, threaded rod, and other necessary hardware. Installation shall be in accordance with the manufacturers recommendations. Line hangers shall be heavy duty hot dip galvanized or stainless steel and be placed at a maximum distance of 762 mm centre to centre. All transmission lines shall be grounded with approved non-braided, solid copper grounding kits.

.10 The antenna elevations are referenced from ground level to the bottom of the antenna. Deviations from these centers of radiation greater than 0.5 m must be reported to the Departmental Representative.

.11 Antenna assembly and installation must be completed in accordance with the manufacturers' instructions and acceptable industry standards. Antennas or antenna components damaged accidentally prior to full acceptance by the Departmental Representative shall be replaced at the Contractors expense. Replacement will be completed so as not to delay project completion. Contractor shall ensure that the antennas do not interfere with the guy wires. Final antenna locations to be approved by Departmental Representative prior to installation.

.12 A hoisting grip shall be installed and used to facilitate transmission line installation as recommended by the manufacturer of the transmission line. The connection shall be made using a suitable galvanized connector. Connections may be made to secondary members such as transmission line support brackets, redundant horizontals, antenna mount members, or on primary members where special allowance has been made for such a connection.

.13 Ground kits shall be AVA or approved equivalent and constructed of solid copper wire and meet or exceed the requirements of the transmission line manufacturer. Ground assembly is to be installed with provided tapes and methods included in the ground kits. All transmission lines shall be grounded in accordance with manufacturers recommendations but minimally at the antenna attachment elevation, at 60 m intervals (where applicable), at the tower base and at the building TX line entrance. Connect the terminal end of the ground kit conductor to predrilled purpose specific holes in the tower steel or ground bar as is appropriate to the specific installation. The holes shall be located so as not to weaken the structure. The connection surface must be free of paint providing a good metal-to-metal contact.

.14 The connection point on the tower shall be lower than the connection point on the transmission line. The ground line shall run from the lower end of the taped connection. Ground kit lines are to be installed to eliminate any bends or turns in the grounding wire.

3.7 ELECTRICAL BONDING

.1 Special care shall be taken to ensure continuity of required electrical connections and proper bonding of electrical conduits, etc., upon initial assembly and throughout antenna structure life when subjected to salt spray conditions in coastal installation.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 The Contractor shall be responsible for the design, supply and installation of a complete permanent continuous grounding system for the new Radar tower system. The design shall consider existing site topography and soil/rock conditions and is subject to approval by the Departmental Representative. All rods shall be “Copperclad” or approved equal, 19 mm diameter x 3000 mm long driven vertically. Provide sacrificial anodes at each anchor for soil conditions.

.2 Contractor shall locate and connect the tower grounding system to the main existing underground building perimeter grounding grid.

.3 Contractor shall be responsible for installing all new external grounding for tower, wave guide bridging and cable entry.

.4 The main external buried ground grid impedance to true earth shall be less than 10 ohms.

.5 In rock conditions, the Contractor shall propose products and systems which shall attain the desired protection. This must be clearly shown on design drawings. All above ground runs of conductor must be securely attached to the rock with clips at spaces not more than 3 m, and covered with a berm of soil which is in turn covered with stones.

Part 2 Products

2.1 MATERIALS

.1 Ground and Connecting Conductors:

.1 Use bare copper wire for all below grade applications and tinned copper for all above grade applications.

.2 The main external buried ground grid shall consist of a minimum of 2/0 AWG, 19 strand bare conductors of soft drawn copper.

.3 Connections from the base of the towers to the main external buried ground grid shall be a minimum of 2/0 AWG, 19 strand bare conductors of copper.

.4 Connections from buildings, equipment enclosures, shelters and storage tanks to the main buried ground grid shall be a minimum of 1/0 AWG (8.25 mm), multi-stranded bare conductors of soft drawn copper.

.5 The connection from the waveguide ground bus bar to the main external buried ground grid shall be a minimum of 2/0 AWG multi-stranded conductors of soft drawn copper.

.6 The connection from the main interior ground bus bar to the main external buried ground grid shall be a minimum of 2/0 AWG multi-stranded conductors of soft drawn copper.

.7 Connections from the main interior ground bus bar to secondary bus bars and equipment cabinets shall be a minimum of 2/0 AWG multi-stranded conductors of soft drawn copper.

.8 The combined resistance of the conductors and associated connectors shall not exceed 0.5 ohms.

.2 Ground rods shall be copper-coated steel rods measuring 19 mm in diameter and 3 m in length.

.3 Ground Bus Bars:

.1 Ground bus bars shall be a minimum of 6.4 mm (1/4 in) thick, consisting of soft copper with sets of two non-threaded holes per connection. These holes shall have a diameter of 9.53 mm (3/8 in) and shall be spaced 25.4 mm (1 in) apart. The bus bar length, bus bar width and total number of connections shall be determined by the quantity of ground connections required for the specific site.

.2 Bus bars shall be installed with one ground conductor attached directly to the bus bar with a thermit weld commonly referred to as a pigtail.

.3 All ground bus bars shall be mounted on fiberglass insulators rated at 2700 volts (indoor continuous rating) which shall be mounted on steel stand-off mounting brackets.

.4 All thermit connectors shall be of the exothermic type requiring a mold unless otherwise noted on the drawings.

.5 Compression Connectors:

.1 Tower ground bus bar.

.2 All compression connectors specified in this standard shall be of the type requiring a linesman’s type Y35 hand operated hydraulic compression.

.3 Low-force compression connectors as may be acceptable for the interconnections within an equipment cabinet shall not be covered by this standard.

.4 A compression connection shall be installed as per the manufacturer’s instructions and shall not be used to connect to more than one conductor per compression operation unless specified by the manufacturer.

.5 External ground bus bar.

.6 Bolted Connectors:

.1 The use of bolted connectors shall not normally be acceptable for the connections covered by this standard.

.2 A notable exception shall be where a bolted connector forms an integral part of a compression connector. For example, compression connectors used to connect equipment cabinet ground conductors to flat bus bars incorporate an integral bolted connector.

.7 Earth enhancing compounds shall be considered for use at sites where the main external buried ground grid impedance to true earth cannot be reduced.

.8 Additions to the standard buried grid:

.1 The addition of counterpoises or earth enhancing compounds shall be considered for those sites where the ground impedance cannot be achieved by other means. All such additions shall be approved by the design engineer prior to construction.

.2 Counterpoises shall consist of buried conductors installed radially outward from the site to a maximum length of 30 m and a minimum burial depth of 1.5 m.

.9 All buried ground grid conductors shall be installed at 400 mm below finished grade and shall not be routed in or through cable trough. If this depth is not practical, consideration should be given to encasing the ground grid conductors in concrete.

.10 Buried Ground Connectors:

.1 All buried ground connectors shall be of the thermit type and shall be installed at 400 mm below finished grade

.2 Buried ground connectors shall not be incased in concrete unless required as part of a building foundation or if the depth requirement cannot be achieved.

.11 Connecting to Non-C.C.G. Ground Grids: The main external C.C.G. buried ground grid shall be connected to each and every other buried ground grid on the same site using a minimum of 4/0 AWG (10.16 mm), 19 strand bare conductors of soft drawn copper.

.12 Lightning rods:

.1 A lightning rod shall be installed such that the rod is at least 2 m higher than the structure and any antenna mounted on top of the structure. The base of the lightning rod shall be connected to the tower.

.2 A ground conductor shall be connected to the lightning rod using a thermit connector and to the tower at a minimum spacing of 3 m using bolted connectors. This conductor shall be connected directly to the main external buried ground grid using a thermit connector.

.13 Towers shall be connected to the buried ground grid at each corner of the tower from the lowest point on the tower above any mechanical tower hinge

.14 Ground conductor installation details

.1 All ground conductors shall be installed to avoid sharp bends, excess loops, and shall be routed to minimize the distance to ground

.2 Since lightning surges are composed of a wide spectrum of frequencies, copper braid should be considered for applications requiring short connections to irregular surfaces and because of its superior high frequency characteristics. Copper braid should also be considered for use to connect ground across mechanical hinges and movable joints.

.15 Waveguide grounding:

.1 All waveguide and coaxial cables connecting to antennas on towers shall be connected to the tower and any external horizontal support, such as a waveguide bridge, using the waveguide or cable manufacturer’s ground kit and instructions. These connections shall be installed at the top of the tower, the bottom of the tower and at every 90o bend, with a minimum spacing of 60 m or the manufacturer’s specification, whichever is less.

.2 Hanger kits shall not be used as a substitute for grounding kits.

.3 All waveguide and coaxial cables entering a C.C.G. facility shall also be connected to an external ground immediately before entering the building.

.16 Triax Cable Grounding: The outer and inner shields of triax cables, used for power line carrier (PLC), entering a C.C.G. facility shall not be connected to an external ground immediately before entering the building. The outer and inner shields shall both be grounded at either the entrance to a screen room if used, or the PLC cabinet if a screen

room is not used. If a screen room is used, the triax cable shall be terminated at the screen room wall and coaxial cable shall be used internal to the screen room. In either case, the outer shield for triax cables shall only be grounded at one place as detailed above. This assumes that lightning protection is provided in both the CVT and LMU box and that the triax is routed entirely underground.

.17 Main external ground bus bar:

.1 The main external ground bus bar shall be located on the exterior wall directly below the antenna cable entrance to the building.

.2 It is expected that lightning surges shall be more likely to enter a building through a cable from a tower than from a power distribution line. The objective of the above is to provide the shortest route to ground for any such surge using a combination of shielding and surge arrestors at the building point of entry.

.18 Waveguide ground bus bar:

.1 A waveguide ground bus bar shall be located just below the waveguide bridge on the outside of the building. A dedicated ground shall connect this bus bar to the main external buried ground grid. All connections to this bus bar shall be routed external to the building. There shall be no direct connection between this bus bar and the main ground bus bar.

.2 This bus bar is required to accommodate standard waveguide grounding kits which do not allow a direct thermit connection to the main external buried ground grid. If waveguide grounding kits that allow direct thermit connections become available, these should be considered for use rather than using a bus bar.

Part 3 Execution

3.1 STANDARDS OF ACEPTANCE

.1 Ground rods and lightning rods:

.1 C.L.M DN6CC10

.2 L.C.A. 7510

.3 Slater 9450

.2 Cadweld Thermit connectors manufactured by ERICO Products Inc.

.3 Compression Connectors use Bundy Hyground Compression System.

3.2 GROUND RODS

.1 Grounding layout shall be approved by Departmental Representative prior to installation. Refer to grounding schedule and layout contained in Appendix F.

.2 All ground rods shall be buried vertically at an angle of not more than 30o from vertical such that the top of the rod is installed at 400 mm below finished grade.

.3 All ground rods shall be directly connected to the basic ground grid using thermit connectors.

.4 Ground rods shall not be incased in concrete unless required as part of a building foundation or if the depth requirement cannot be achieved.

.5 The minimum number and spacing of ground rods shall be site specific such as to reduce the ground grid impedance to that specified in section 5.2

.6 Ground rods which cannot be driven vertically shall be placed in a 76 mm diameter drilled hole, filled with a Bentonite and water mixture. The procedure for placing the ground rod in Bentonite is as follows.

.1 Drill 76mm hole in rock, 3m deep.

.2 Pour water 1/3 height of the hole.

.3 Insert ground rod.

.4 Add Bentonite power in hole, alternating with water.

3.3 CONNECTIONS

.1 Before making a ground system connection, remove all paint, foreign matter or dirt.

3.4 MEASUREMENT OF GROUND RESISTANCE

.1 The Contractor shall measure the resistance to ground at a point near all anchors, the tower base and the transmission line entrance to the building. A report with readings shall be submitted to the Departmental Representative.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section covers the design and installation of anchors to rock for transfer of shear and tension foundation loads.

1.2 Design

.1 The minimum number of rock bolts to be installed at one anchor shall not be less than two. Alternatively single rock bolts in certain applications may be approved by the Departmental Representative provided there is a comprehensive testing program implemented by the Contractor in accordance with the requirements of this section.

Part 2 Products

2.1 ROCK BOLTS (ANCHORS)

.1 Rock bolts shall be Williams Rock Bolts with expanding shield or approved equivalent. The shield shall be designed to provide even bearing around the hole and to develop the full ultimate tensile strength of the bolt. The shell type to suit rock conditions indicated in Geotechnical Report. Two nuts shall be supplied and installed to secure the anchor weldment. The second nut shall act as a locking nut and be of adequate quality for that purpose.

2.2 GROUT

.1 Use Grout recommended by Rock Bolt Manufacturer. Grout shall be high early strength expanding type, with expansion of 3% to 4% prior of the gel stage. Grout shall have a minimum compressive strength of 40 MPa.

Part 3 Execution

3.1 HOLES

.1 Drill holes to the diameter and length recommended by the rock bolt manufacturer for the bolt diameter to be used. Take care to ensure diameter is accurate and the hole is straight. Clean the hole before inserting the bolt.

.2 Tap bolt into position taking care not to damage the threaded end. Set expansion shield torquing bolt to value recommended by the manufacturer.

.3 Testing shall be carried out by the Contractor according to the manufacturer's instructions, and in the presence of the Departmental Representative. Establish a test procedure with the Departmental Representative prior to testing. Note that some bolt installations may, as part of the installation process, require tensioning of the bolt. This may constitute the required load test if approved by the Departmental Representative.

.4 The contractor shall accurately record torqueing and tension values for each bolt, along with the duration of the test. This information shall be submitted to the Departmental Representative for review.

.5 Any bolt slippage shall be reported to the Departmental Representative immediately and a plan submitted for resolution.

.6 The Contractor shall provide written confirmation of recent calibration of the jacking system from an independent testing firm.

.7 The Contractor shall provide conversion charts issued by the jack manufacturer to convert pressure indicated to pounds of tension force.

3.2 GROUTING

.1 Insert flexible grout tube to the bottom of the drill hole. Pump in grout (mixed in accordance with the manufacturer's instruction), slowly withdrawing the grout tube while maintaining pressure on the grout pump until grout is visible at the surface. Grouting to be conducted in presence of the Departmental Representative. Adequate notice of at least 5 days to be provided for inspection.

3.3 PROTECTION

.1 Thoroughly protect the rock bolts above and below grade (minimum of 600 mm) by hot dip galvanizing to the requirements of CAN/CSA-S37-13 and the standards specified therein. In addition, when the bolt is backfilled and below grade, apply a heavy bituminous, corrosion resistant compound.

.2 Follow manufacturer's instructions with regard to curing and protection prior to any backfilling of the anchor.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 312310 – Excavation and Backfill

.2 Section 033000 – Concrete Work

1.2 REFERENCE STANDARDS

.1 Install chain link fence in accordance with CAN/CGSB-138.3-13 unless otherwise specified.

Part 2 Products

2.1 MATERIALS

.1 Install chain link fence as indicated by Departmental Representative. The contractor supplied drawings shall include necessary details for the layout and installation of the compound fence.

2.2 FINISHES

.1 Galvanizing:

.1 For chain link fabric: to CAN2-138.13 Grade 2.

.2 For pipe: 550g/m2minimum to ASTM A90-13.

.3 For other fittings: to CSA G164 M92(R2003).

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for fence and gate installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Grading:

.1 Remove debris and correct ground undulations for 1.5m on both sides of fence line to obtain a smooth uniform gradient between posts. Provide clearance

between bottom of fence and ground surface neither less than 40mm not more than 75mm.

3.3 ERECTION OF FENCE

.1 Contractor to supply and install and erect fence in accordance with details as shown on approved design drawings.

.2 Erect fence along lines as indicated on drawings and in accordance with CAB/CGSB-138.3-M80.

.3 Excavate post holes 1000mm depth by 300mm diameter by methods approved by Engineer. Bulb bottom of holes for corner, end at gate posts along fence line.

.4 Space line posts 3m apart, measure parallel to ground surface.

.5 Space straining posts at equal intervals.

.6 Place concrete in post holes then embed posts into concrete to depths indicated. Extend concrete 50mm above ground level and slope to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.7 Do not install fence fabric until concrete has cured in minimum of 5 days.

.8 Install brace (mid-rail) between end and gate posts and nearest line posts, placed in center of panel and parallel to ground surface. Install braces on both sides of corner and staining posts in similar manner.

.9 Install overhang tops and caps.

.10 Install top rail between posts and fasten securely to terminal posts and secure waterproof caps and overhang tops.

.11 Install bottom tension wire, stretch tightly and fasten securely to end, corner, date and straining posts with turnbuckles and tension bar bands.

.12 Lay out fence fabric: Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaces at 300mm intervals. Knuckled selvage at bottom. Twisted selvage at top.

3.4 INSTALLATION OF GATES

.1 Install gates in locations where directed by Departmental Representative.

.2 Level ground between gate posts and set gate bottom approximately 40mm above ground surface.

.3 Install gate stops where directed by Departmental Representive.

3.5 TOUCH UP

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas.

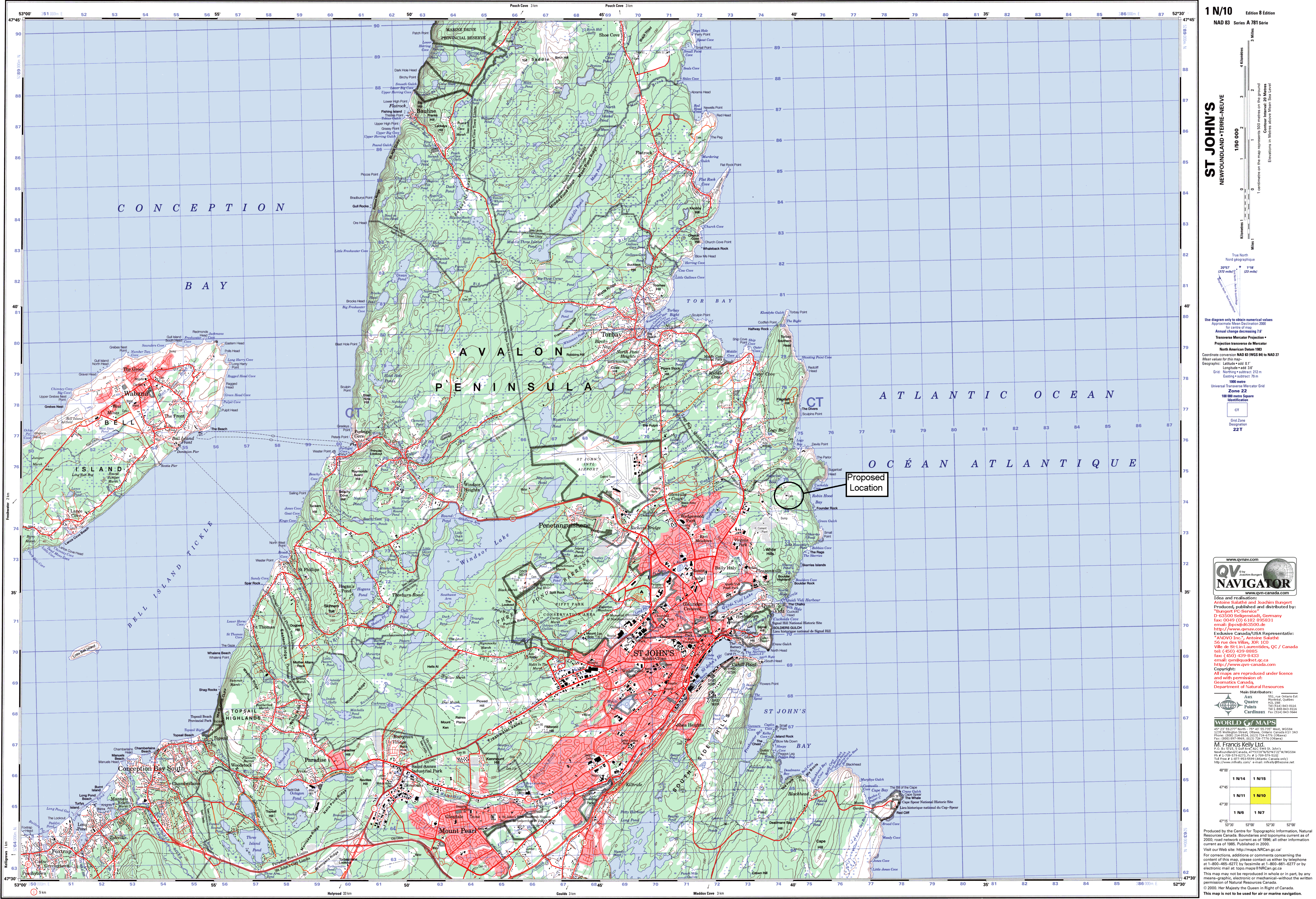
3.6 CLEANING

.1 Clean and trim areas disturbed by operations. Dispense of surplus excavated material and replace damaged sod as directed by Engineer.

END OF SECTION

Appendix A

Site Location Map



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ATLANTIC OCEAN
OCÉAN ATLANTIQUE
ST JOHN'S BAY
Proposed Location
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Mount Pearl
Paradise
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Toll Free # 1-877-953-5599 (Atlantic Canada only)
http://www.mfkelly.com/ e-mail: mfkelly@thezone.net
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Appendix B

Site Specific Wind Pressure Data

Robin Hood Bay, NL 24.38m Tower

Site-Specific 10-yr. Wind Pressure Report (V2.1 2016-01-04 Format)

Site Information:

Name: Robin Hood Bay, NL
Latitude: 47° 36' 41.511" N
Longitude: 52° 40' 13.5624" W
Tower Height (m): 24.38
Elevation MSL (m): 143

Results:

Note: Following direction from the S37 Committee, Qe can no longer be provided.

Q_{nbc} (Pa):	600	$Q_{nbc} = 600(Z/10)^{0.2}$	V_{nbc} = 68.15 mph
Icing:	As per CAN/CSA S37-13		
Q_{Min} (Pa)	250	$Q_{Min} = 250(Z/10)^{0.2}$	V_{Min} = 43.99 mph

Wind Pressure Formula (for z in metres and result in Pa):

$$Q_h = 0.12919 \{[0.3048\, e^{(-0.0055\, z)} + 1.2655\, \ln(z/0.2500) / \ln(z/0.0500)]\, 68.27\}^2\, (z/10)^{0.200}$$

Profile Formula General Form:

$$Q_h = 0.12919 \{[a_1\, e^{(-a2\, z)} + a_3\, \ln(z/z_h) / \ln(z/z_{01})]\, v_{01}\}^2\, (z/10)^{0.200}$$

Site Values of Coefficients:

$$a_1 = 0.3048,\ a_2 = 0.0055,\ a_3 = 1.2655,\ z_h = 0.2500,\ z_{01} = 0.0500,\ v_{01} = 68.27 \text{ mph}$$

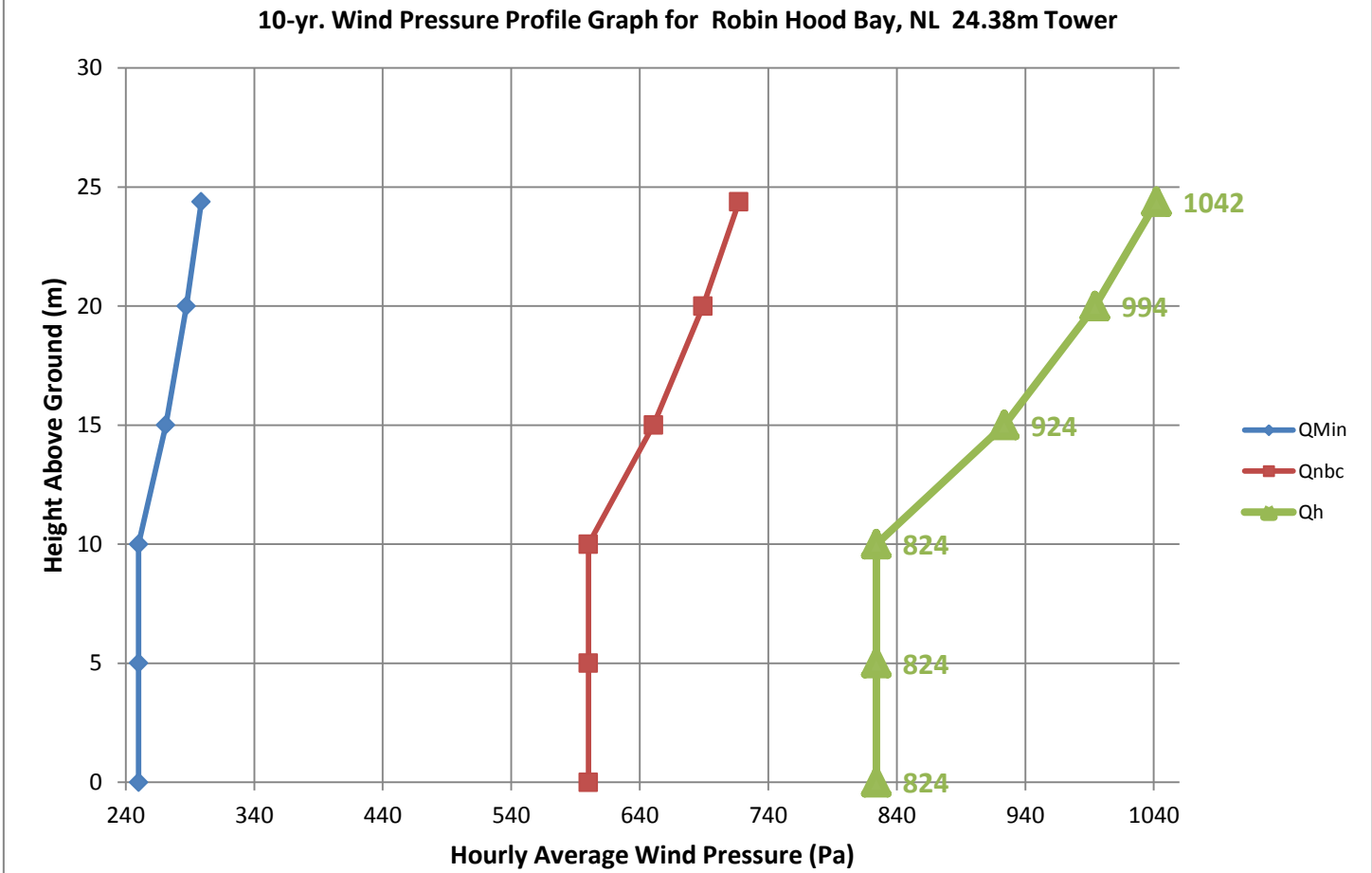
Definitions

Tower Height: Height of the tower from ground level at the base of the tower to the top of the structure.
Q_{nbc}: Regionally representative reference wind pressure at 10 m in the format of the National Building Code of Canada and the Q_{nbc} value is profiled with the $^2/_{10}$ power law.
Q_{Min}: Minimum reference wind pressure (320 Pa, 300 Pa, and 250 Pa for the 50-year, 30-year, and 10-year return periods respectively) profiled with the $^2/_{10}$ power law as per Section 5.4.1 of S37-13.

Wind Pressure Formula: Formula for the design wind pressure as a function of height. (Ref.: S37-13, 5.3.1)
Height (Z): the vertical distance (m) above ground level at the base of the tower.

Note: No wind pressure value less than 90% of the value at 10 m should be used for heights less than 10 m a.g.l.

These wind pressures were evaluated using a version of the methods described by Taylor and Lee (1984) "Simple Guidelines for Estimating Wind Speed Variations Due to Small Scale Topographic Features", Climatological Bulletin 18 2, using the Boyd (1969) analysis of thirty year return period wind speeds (which is also used for the National Building Code of Canada), modified by a technique described by Wieringa (1980) "Representativeness of Wind Observations at Airports" Bulletin of the American Meteorological Society, 61 9, as input data. The uncertainty in NBCC regionally representative reference wind pressures is about [+15%,-15%].



Q_{nbc} Profile: Regionally representative reference wind profiled with the $^2/_{10}$ power law.
Q_{Min} Profile: Minimum site-specific wind pressure (320 Pa, 300 Pa, and 250 Pa for the 50-year, 30-year, and 10-year return periods respectively) profiled with the $^2/_{10}$ power law.
Q_h Profile: The site-specific wind pressure profile directly from the Taylor and Lee (1984) simple guidelines.

Explanatory notes regarding the new report format and changes to calculation methods.

1. The most significant change from the previous versions of the reports is that the exponent used in the Q_h equation is no longer fixed at 0.2. The exponent now varies continuously from 0.2 for open terrain to 0.32 for closed terrain.
2. A new Q_{min} profile has been added to the graphs and it represents the minimum acceptable reference wind pressure profile. It starts with the minimum 10-metre reference wind pressure of 320 Pa for a 50-year return period as per section 5.4.1 of S37-13 and then uses the same $^2/_{10}$ power law formulation as the Q_{NBC} profile to generate the curve. The corresponding 10-metre reference wind pressures for the 10-year and 30-year return periods are 250 Pa and 300 Pa respectively.
3. Q_h will always be plotted even when they are less than Q_{Min}. This will allow designers to see how Q_h varies over the height of the tower. Also, in rough terrain and for taller towers, the Q_h profile might cross the Q_{Min} profile.
4. The coefficients for the Q_h equation will now always be given regardless of the Q_{NBC} or Q_{Min} values.
5. The wind speeds will be given for each of the 4 equations (Q_h, Q_{NBC}, or Q_{Min}) too.

Robin Hood Bay, NL 24.38m Tower

Site-Specific 30-yr. Wind Pressure Report (V2.1 2016-01-04 Format)

Site Information:

Name: Robin Hood Bay, NL
Latitude: 47° 36' 41.511" N
Longitude: 52° 40' 13.5624" W
Tower Height (m): 24.38
Elevation MSL (m): 143

Results:

Note: Following direction from the S37 Committee, Qe can no longer be provided.

Q_{nbc} (Pa):	720	$Q_{nbc} = 720(Z/10)^{0.2}$	V_{nbc} = 74.65 mph
Icing:	As per CAN/CSA S37-13		
Q_{Min} (Pa)	300	$Q_{Min} = 300(Z/10)^{0.2}$	V_{Min} = 48.19 mph

Wind Pressure Formula (for z in metres and result in Pa):

$$Q_h = 0.12919 \{[0.3048\, e^{(-0.0055\, z)} + 1.2655\, \ln(z/0.2500) / \ln(z/0.0500)]\, 74.72\}^2\, (z/10)^{0.200}$$

Profile Formula General Form:

$$Q_h = 0.12919 \{[a_1\, e^{(-a2\, z)} + a_3\, \ln(z/z_h) / \ln(z/z_{01})]\, v_{01}\}^2\, (z/10)^{0.200}$$

Site Values of Coefficients:

$$a_1 = 0.3048,\ a_2 = 0.0055,\ a_3 = 1.2655,\ z_h = 0.2500,\ z_{01} = 0.0500,\ v_{01} = 74.72 \text{ mph}$$

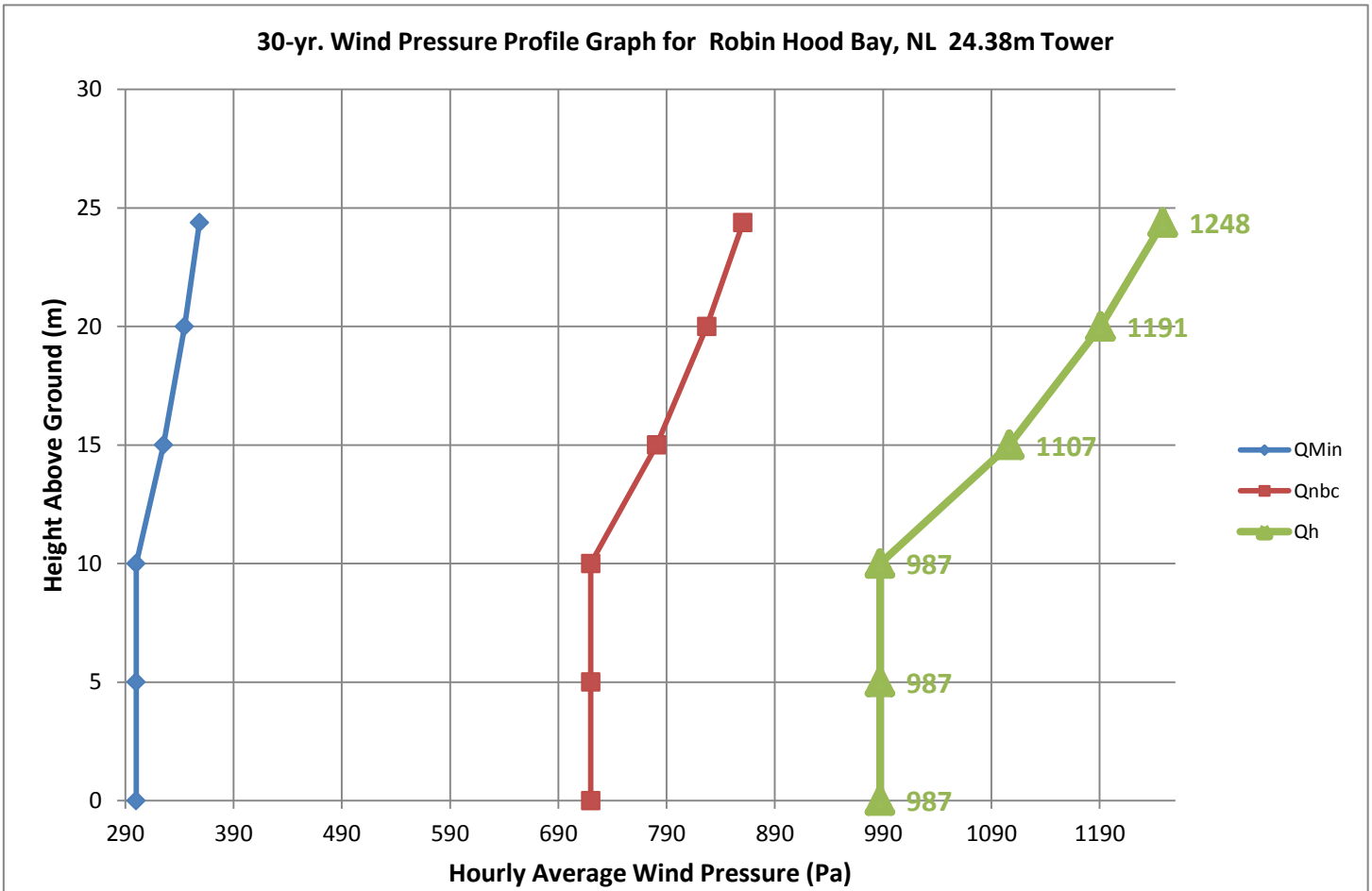
Definitions

Tower Height: Height of the tower from ground level at the base of the tower to the top of the structure.
Q_{nbc}: Regionally representative reference wind pressure at 10 m in the format of the National Building Code of Canada and the Q_{nbc} value is profiled with the $^2/_{10}$ power law.
Q_{Min}: Minimum reference wind pressure (320 Pa, 300 Pa, and 250 Pa for the 50-year, 30-year, and 10-year return periods respectively) profiled with the $^2/_{10}$ power law as per Section 5.4.1 of S37-13.

Wind Pressure Formula: Formula for the design wind pressure as a function of height. (Ref.: S37-13, 5.3.1)
Height (Z): the vertical distance (m) above ground level at the base of the tower.

Note: No wind pressure value less than 90% of the value at 10 m should be used for heights less than 10 m a.g.l.

These wind pressures were evaluated using a version of the methods described by Taylor and Lee (1984) "Simple Guidelines for Estimating Wind Speed Variations Due to Small Scale Topographic Features", Climatological Bulletin 18 2, using the Boyd (1969) analysis of thirty year return period wind speeds (which is also used for the National Building Code of Canada), modified by a technique described by Wieringa (1980) "Representativeness of Wind Observations at Airports" Bulletin of the American Meteorological Society, 61 9, as input data. The uncertainty in NBCC regionally representative reference wind pressures is about [+15%,-15%].



Q_{nbc} Profile: Regionally representative reference wind profiled with the $^2/_{10}$ power law.
Q_{Min} Profile: Minimum site-specific wind pressure (320 Pa, 300 Pa, and 250 Pa for the 50-year, 30-year, and 10-year return periods respectively) profiled with the $^2/_{10}$ power law.
Q_h Profile: The site-specific wind pressure profile directly from the Taylor and Lee (1984) simple guidelines.

Explanatory notes regarding the new report format and changes to calculation methods.

1. The most significant change from the previous versions of the reports is that the exponent used in the Q_h equation is no longer fixed at 0.2. The exponent now varies continuously from 0.2 for open terrain to 0.32 for closed terrain.
2. A new Q_{min} profile has been added to the graphs and it represents the minimum acceptable reference wind pressure profile. It starts with the minimum 10-metre reference wind pressure of 320 Pa for a 50-year return period as per section 5.4.1 of S37-13 and then uses the same $^2/_{10}$ power law formulation as the Q_{NBC} profile to generate the curve. The corresponding 10-metre reference wind pressures for the 10-year and 30-year return periods are 250 Pa and 300 Pa respectively.
3. Q_h will always be plotted even when they are less than Q_{Min}. This will allow designers to see how Q_h varies over the height of the tower. Also, in rough terrain and for taller towers, the Q_h profile might cross the Q_{Min} profile.
4. The coefficients for the Q_h equation will now always be given regardless of the Q_{NBC} or Q_{Min} values.
5. The wind speeds will be given for each of the 4 equations (Q_h, Q_{NBC}, or Q_{Min}) too.

Robin Hood Bay, NL 24.38m Tower

Site-Specific 50-yr. Wind Pressure Report (V2.1 2016-01-04 Format)

Site Information:

Name: Robin Hood Bay, NL
Latitude: 47° 36' 41.511" N
Longitude: 52° 40' 13.5624" W
Tower Height (m): 24.38
Elevation MSL (m): 143

Results:

Note: Following direction from the S37 Committee, Qe can no longer be provided.

Q_{nbc} (Pa):	780	$Q_{nbc} = 780(Z/10)^{0.2}$	V_{nbc} = 77.7 mph
Icing:	As per CAN/CSA S37-13		
Q_{Min} (Pa)	320	$Q_{Min} = 320(Z/10)^{0.2}$	V_{Min} = 49.77 mph

Wind Pressure Formula (for z in metres and result in Pa):

$$Q_h = 0.12919 \{[0.3048\, e^{(-0.0055\, z)} + 1.2655\, \ln(z/0.2500) / \ln(z/0.0500)]\, 77.67\}^2\, (z/10)^{0.200}$$

Profile Formula General Form:

$$Q_h = 0.12919 \{[a_1\, e^{(-a2\, z)} + a_3\, \ln(z/z_h) / \ln(z/z_{01})]\, v_{01}\}^2\, (z/10)^{0.200}$$

Site Values of Coefficients:

$$a_1 = 0.3048,\ a_2 = 0.0055,\ a_3 = 1.2655,\ z_h = 0.2500,\ z_{01} = 0.0500,\ v_{01} = 77.67 \text{ mph}$$

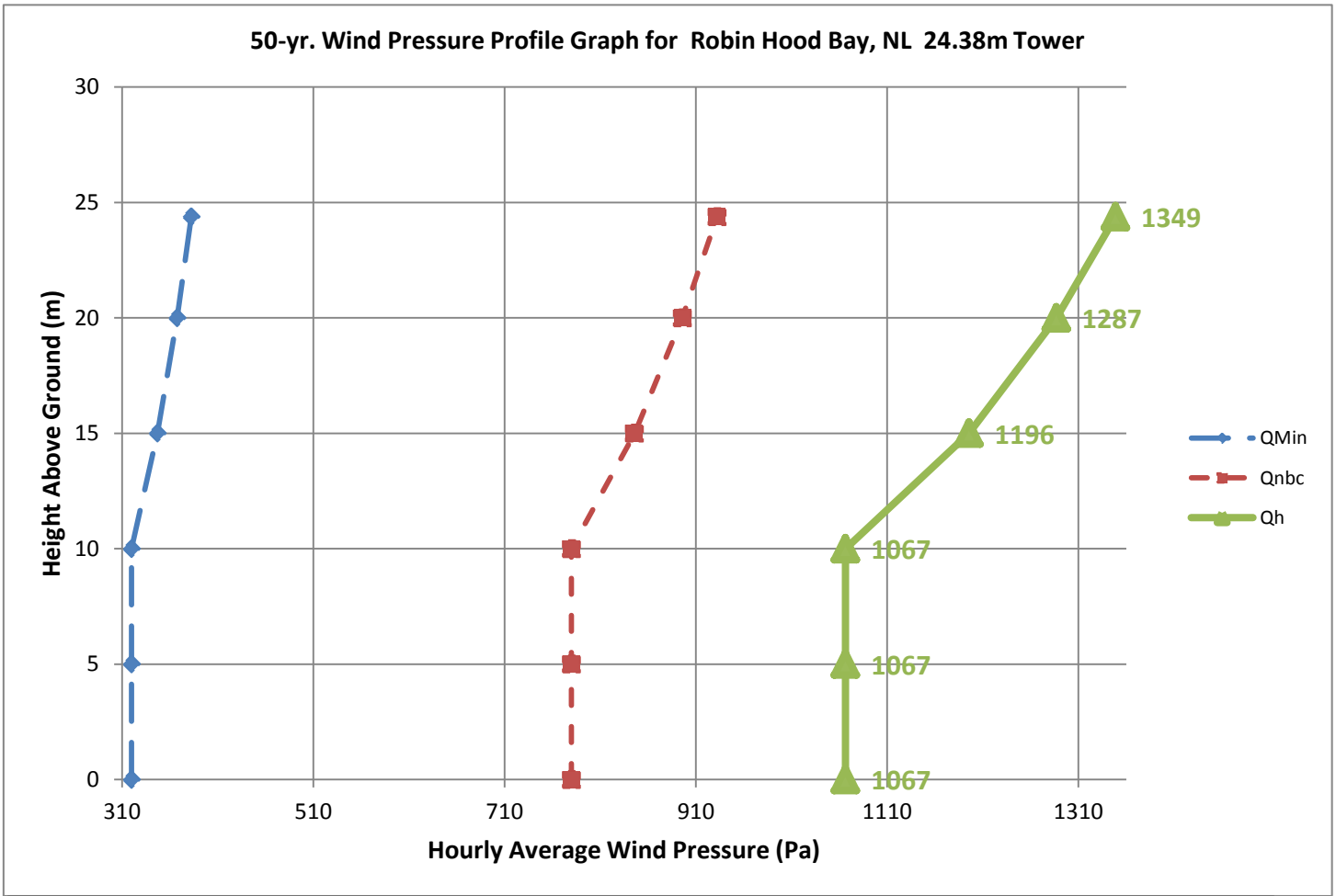
Definitions

Tower Height: Height of the tower from ground level at the base of the tower to the top of the structure.
Q_{nbc}: Regionally representative reference wind pressure at 10 m in the format of the National Building Code of Canada and the Q_{nbc} value is profiled with the $^2/_{10}$ power law.
Q_{Min}: Minimum reference wind pressure (320 Pa, 300 Pa, and 250 Pa for the 50-year, 30-year, and 10-year return periods respectively) profiled with the $^2/_{10}$ power law as per Section 5.4.1 of S37-13.

Wind Pressure Formula: Formula for the design wind pressure as a function of height. (Ref.: S37-13, 5.3.1)
Height (Z): the vertical distance (m) above ground level at the base of the tower.

Note: No wind pressure value less than 90% of the value at 10 m should be used for heights less than 10 m a.g.l.

These wind pressures were evaluated using a version of the methods described by Taylor and Lee (1984) "Simple Guidelines for Estimating Wind Speed Variations Due to Small Scale Topographic Features", Climatological Bulletin 18 2, using the Boyd (1969) analysis of thirty year return period wind speeds (which is also used for the National Building Code of Canada), modified by a technique described by Wieringa (1980) "Representativeness of Wind Observations at Airports" Bulletin of the American Meteorological Society, 61 9, as input data. The uncertainty in NBCC regionally representative reference wind pressures is about [+15%,-15%].



Q_{nbc} Profile: Regionally representative reference wind profiled with the $^2/_{10}$ power law.
Q_{Min} Profile: Minimum site-specific wind pressure (320 Pa, 300 Pa, and 250 Pa for the 50-year, 30-year, and 10-year return periods respectively) profiled with the $^2/_{10}$ power law.
Q_h Profile: The site-specific wind pressure profile directly from the Taylor and Lee (1984) simple guidelines.

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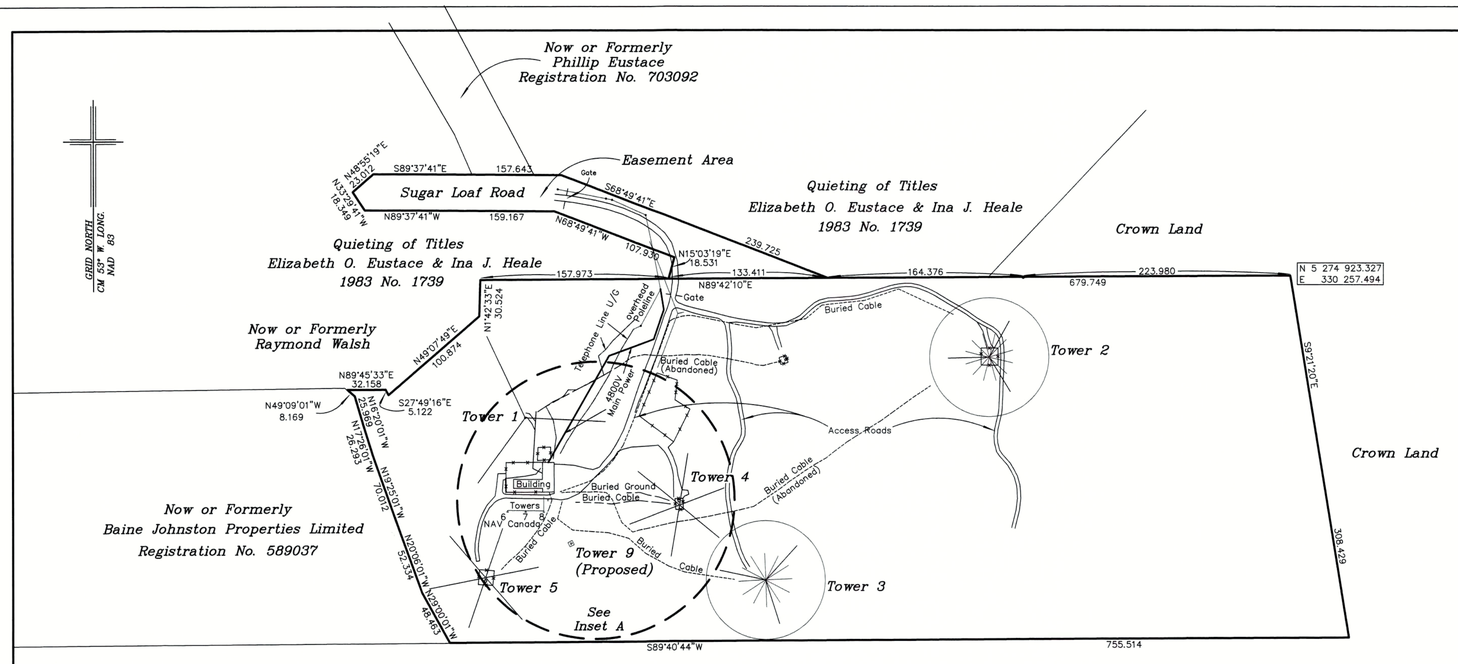
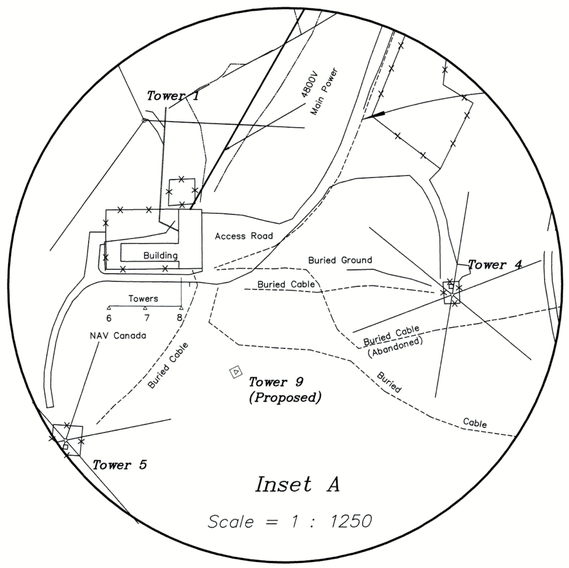
3. Q_h will always be plotted even when they are less than Q_{Min}. This will allow designers to see how Q_h varies over the height of the tower. Also, in rough terrain and for taller towers, the Q_h profile might cross the Q_{Min} profile.
4. The coefficients for the Q_h equation will now always be given regardless of the Q_{NBC} or Q_{Min} values.
5. The wind speeds will be given for each of the 4 equations (Q_h, Q_{NBC}, or Q_{Min}) too.

Appendix C
Site Survey





Inset A

Scale = 1 : 1250

Scale 1 : 2500

Tower Coordinates NAD 83

Tower #	Northing	Easting	Elev.	Latitude (N)	Longitude (W)
Tower 1	5 274 803.985	329 615.284	149.77	47° 36' 42.9248" N	52° 40' 11.6509" W
Tower 2	5 274 854.630	330 004.959	136.01	47° 36' 44.5106" N	52° 39' 52.9801" W
Tower 3	5 274 667.164	329 817.486	140.61	47° 36' 38.4663" N	52° 40' 01.9962" W
Tower 4	5 274 730.240	329 745.015	146.20	47° 36' 40.5189" N	52° 40' 05.4536" W
Tower 5	5 274 669.511	329 582.213	152.64	47° 36' 38.5748" N	52° 40' 13.2620" W
Tower 9 (Proposed)	5 274 697.976	329 653.844	149.59	47° 36' 39.4867" N	52° 40' 09.8261" W

Reference Monument

82G3602
N 5 274 698.133
E 330 026.761
136.780

Fisheries and Oceans Coast Guard / Pêches et Océans Garde côtière

Notes – Notes

Positions of all underground features indicated on this plan have been located from the surface using electronic detection equipment. They have not been exposed, observed and measured using survey grade equipment. Due to limitations inherent in electronic detection equipment, it is possible that some underground features have not been detected. It is also possible that the locations of the underground features are not precisely in the positions indicated on this plan. Accordingly, Allnorth NL Surveyors recommends that the user of this plan exercise all due care and attention in any ground disturbance in this area, commensurate with the type of excavation being conducted and the nature of the underground facilities.

Underground locating performed by Thomas Jardine EIT
Underground locating performed on September 27 & 28, 2012
Underground locating performed using Radiodetection RD4000

Reference survey as shown by Hawco King Renouf dated October 2012, Job# 12NL0482. Coordinates for Towers 1 through 5 are based on previous survey data as determined by Hawco King Renouf, Job#12NL0482.

LEGEND

BURIED CABLE
BOUNDARY
UG TELEPHONE CABLE
FENCE
POLE/POLELINE

Reference Monuments

029045
N 5 274 820.273
E 328 221.248

029044
N 5 274 663.242
E 328 228.073

029046
N 5 275 158.411
E 328 140.862

no. no.	revision revision	date date	by par	approved approuve

Project – projet

Site Plan

Drawing – dessin

CCG DFO
Robin Hood Bay TX Site
St. John's Newfoundland & Labrador

drawn – dessiné: SRB	designed – dessiné par
date – date: FEBRUARY 20, 2018	checked – verifié: Josh D. Mailman NLS
scale – echelle: 1 : 2500	approved – approuvé: Josh D. Mailman NLS
project no. – projet no.: F6839–175609	drawing no. – no du dessin: 18NL0036
	sheet – feuille: 1 of 1

ALLNORTH NL SURVEYORS

Allnorth NL Surveyors
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ST.JOHN'S
PHONE 579-1492 FAX 579-1019

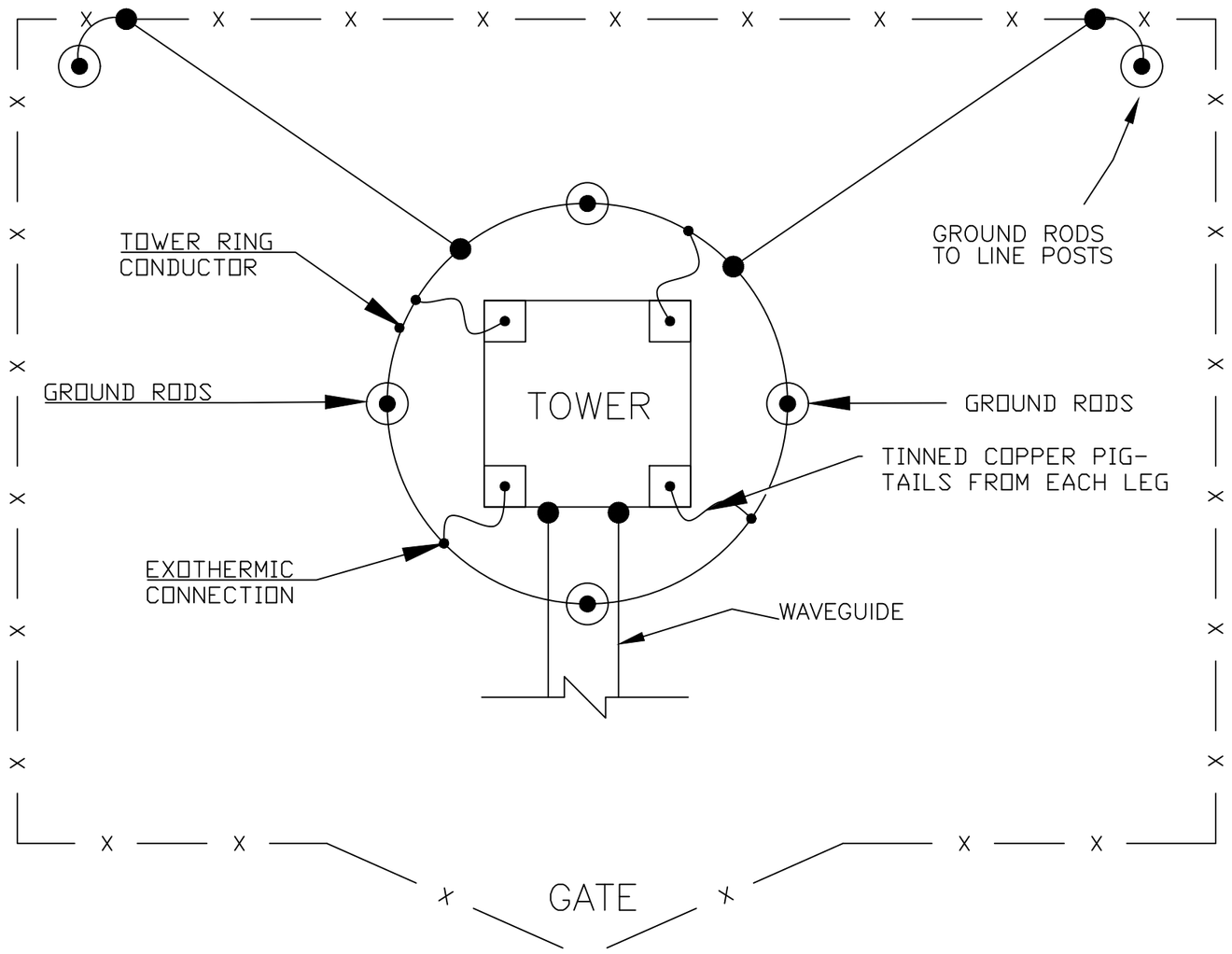
Joshua D. Mailman
NEWFOUNDLAND LAND SURVEYOR
Signature
PROVINCE OF NEWFOUNDLAND

Appendix D
Geotechnical
Report

Appendix E
Radar
Antenna Unit
Loading
Requirements

Wind**	Operational:	- to 160 km/hr (25' and 7' - 18' antennas) - to 190 km/hr (21' antenna)
	Survival (free rotating):	- 240 km/hr (25' antenna) - 250 km/hr (7' – 18' antenna) - 260 km/hr (21' antenna)
Ice Loading**	Operational:	Must start up rotating* and continue operating without structural damage with up to: - 20 mm ice (25' and 21' antennas) - 12.7mm ice (7' – 18' antennas).
	Survival (non-operational):	- 30 mm ice (25' and 21' antennas) - 25.4mm ice (7' – 18' antennas).

Appendix F
Grounding
Schedule and
Layout



EXTERNAL GROUND GRID LAYOUT

N.T.S.

Fisheries and Oceans Canada / Pêches et Océans Canada
Canadian Coast Guard / Garde côtière Canadienne

designed - conception	date	checked - vérifié	date
DESIGNED	2018-10-05	CHECKED	YYYY-MM-DD
drawn - dessiné	date	approved - approuvé	date
DRAWN	2018-11-20	APPROVED	YYYY-MM-DD
CCG ref. no. - no. réf. GCC		scale - échelle	
REF NO / PROJ NO / FILE NO		SCALE	

rev	description	by par	Date
0	DESCRIPTION	BY	yyyy-mm-dd

Asset - Actif

Robin Hood Bay

St. John's Area

Drawing - Dessin

External Grounding
Grid Layout

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DWG NUMBER - NO DESSIN	01/01	0

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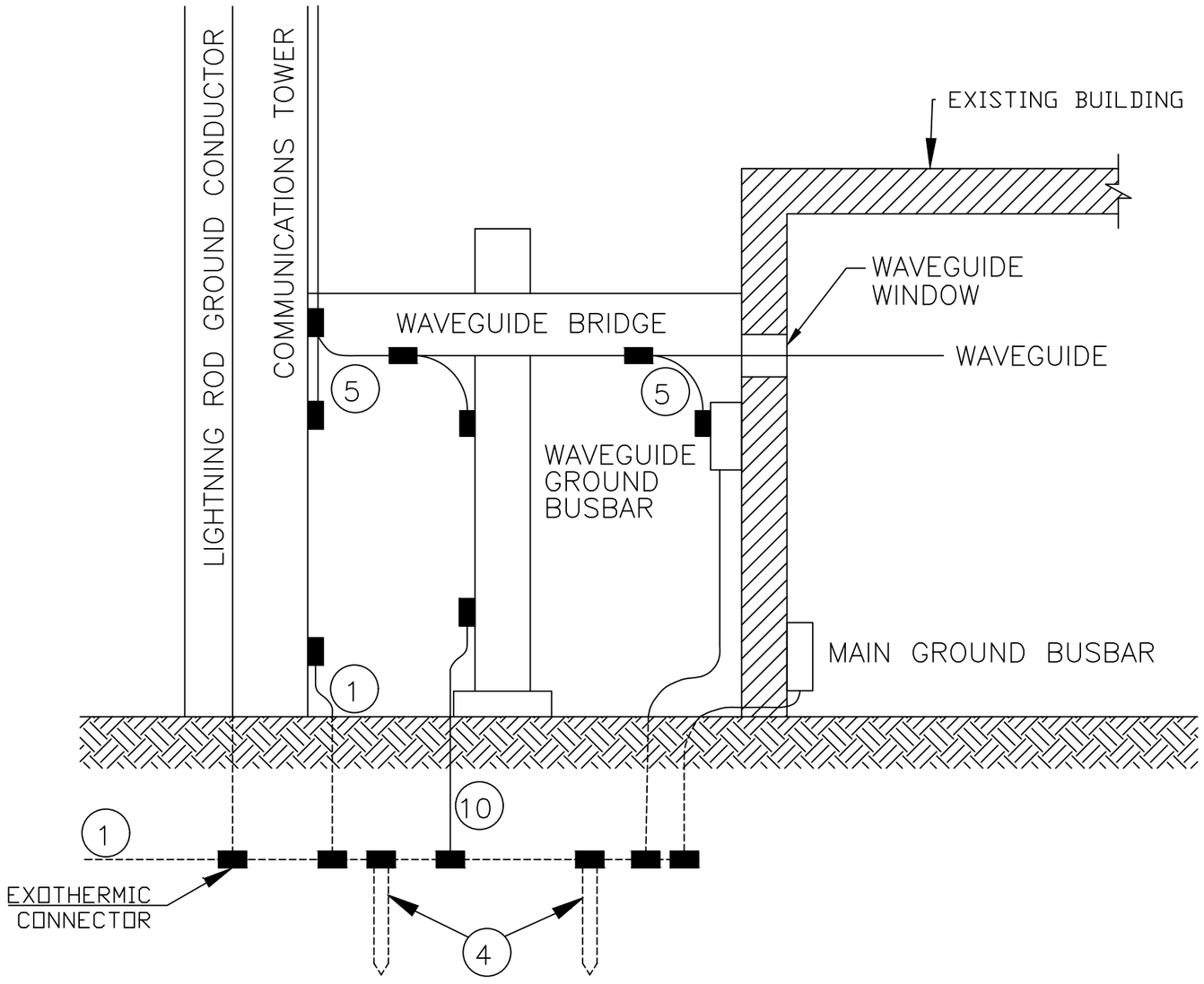

BUILDING GROUND ENTRANCE

N.T.S.

GROUNDING SCHEDULE

ITEM NO.	DESCRIPTION	ITEMS	REQUIREMENTS
1	3 STRANDED COPPER CONDUCTORS, ONE FROM EACH TOWER LEG, BONDED TO THE TOWER GROUND RING BELOW GRADE, CAD WELD BEST. NOTE: ANYTHING ABOVE GRADE MUST BE TINNED COPPER.	TOWER GROUND	2/0 AWG
2	STANDARD COPPER CABLE BURIED AT LEAST 30' BELOW GRADE/BELOW FROST LEVEL, 24" AWAY FROM THE TOWERS FOUNDATION & BONDED TO EACH OF THE 4 DOWN-LEADS FROM TOWER.	BASE RING CONDUCTOR	2/0 AWG
3	THE RING MUST ALSO BE BONDED BY 2 SEPERATE GROUND CONDUCTORS TO THE BUILDING PERIMETER GROUND WHERE POSSIBLE.		(10ft X 3/4in) (3m X 19mm) COPPER CLAD
4	MINIMUM PLACEMENT OF 2 GROUND RODS AT OPPOSITE ENDS OF TOWER FOUNDATION. GROUND RODS TO BE AT TWICE THEIR LENGTH APART FROM EACH OTHER.	GROUND RODS	2/0 AWG
5	TINNED COPPER BAR WITH PRE-DRILLED HOLES AT TOP OF TOWER, EVERY 200FT (60m), NEAR BASE OF TOWER AND JUST BELOW CABLE ENTRY PORTS INTO BUILDING. TGB SHOULD BE INSTALLED JUST BELOW WHERE THE TRANSMISSION LINES MOVE AWAY FROM THE TOWER ON THEIR HORIZONTAL RUN TO THE CABLE ENTRY PORT FOR CABLING GROUNDING KIT CONNECTIONS.	TOWER GROUND BUS BAR	MINIMUM 2.5"X12"x0.25" (63.5 X 304.8 X 6.35mm)
6	JUST BELOW ANTENNA TO GALVANIZED TOWER LEG AND/OR TOWER GROUND BUS BAR, EVERY 200FT NEAR BASE OF TOWER AND AT CABLE ENTRY PORT.	TRANSMISSION LINE GROUNDING	STANDARD COMMERCIAL CABLE GROUND KITS
7	A LIGHTNING ROD SHALL BE INSTALLED SUCH THAT THE ROD IS AT LEAST 2m HIGHER THAN THE STRUCTURE AND ANY ANTENNA MOUNTED ON TOP OF THE STRUCTURE. THE BASE OF THE LIGHTNING ROD SHALL BE CONNECTED TO THE TOWER. A GROUND CONDUCTOR SHALL BE CONNECTED TO THE LIGHTNING ROD USING A THERMITE CONNECTOR AND TO THE TOWER AT A MINIMUM SPACING OF 3m USING BOLTED CONNECTORS. THIS CONDUCTOR SHALL BE CONNECTED DIRECTLY TO THE MAIN EXTERNAL BURIED GROUND GRID USING A THERMITE CONNECTOR.	LIGHTNING ROD AND CONDUCTOR	COPPER CLAD STEEL RODS/ 2/0 AWG
8	BOND NEW TOWER BASE RING CONDUCTOR TO EXISTING FENCE GROUNDING	TOWER GROUND CONDUCTOR	2/0 AWG
9	TO BE BONDED WITH GREEN JACKETED, STRANDED BONDING JUMPER. CABLE BRIDGE TO BE BONDED TO SUPPORT POSTS. BOND TO POST TO BE CAD-WELDED. CABLE BRIDGE TO BE ISOLATED FROM TOWER.	WAVE GUIDE BRIDGE	#6 AWG
10	WAVEGUIDE POSTS TO BE GROUNDED WITH CONDUCTOR AND GROUND RODS AND BONDED TO BOTH TOWER BASE RING CONDUCTOR AND BUILDING PERIMETER RING.	WAVEGUIDE POST CONDUCTORS	2/0 AWG

Fisheries and Oceans Canada / Pêches et Océans Canada
Canadian Coast Guard / Garde côtière Canadienne

designed - conception	date	checked - vérifié	date
DESIGNED	2018-10-05	CHECKED	YYYY-MM-DD
drawn - dessiné	date	approved - approuvé	date
DRAWN	2018-11-20	APPROVED	YYYY-MM-DD
CCG ref. no. - no. réf. GCC		scale - échelle	
REF NO / PROJ NO / FILE NO		SCALE	

rev	description	by par	Date
0	DESCRIPTION	BY	yyyy-mm-dd

Asset - Actif

Robin Hood Bay

St. John's Area

Drawing - Dessin

External Grounding Grid Layout

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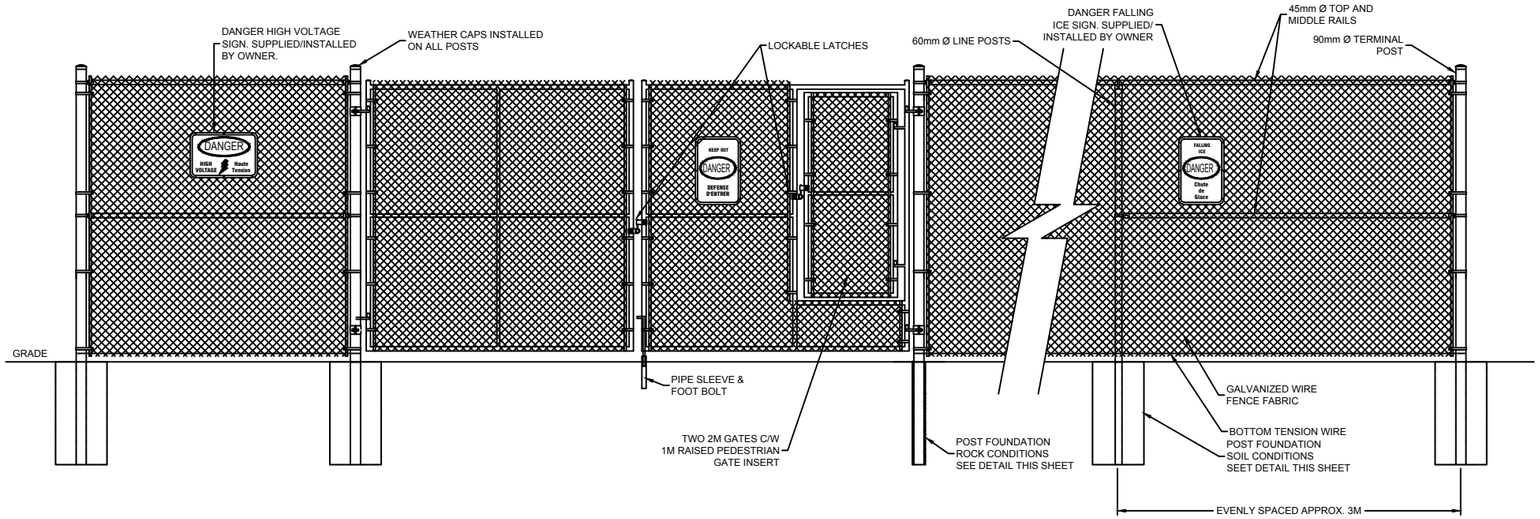
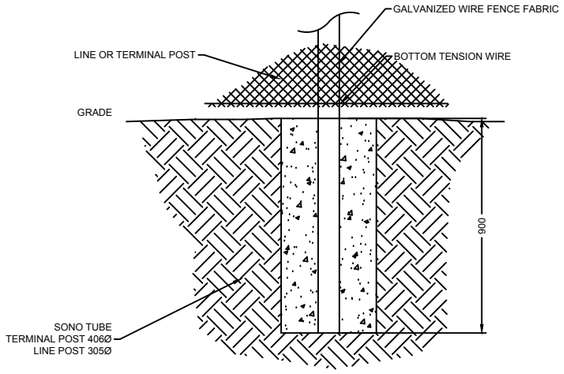
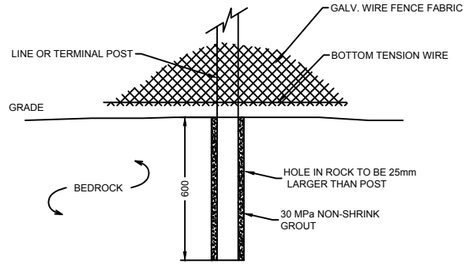


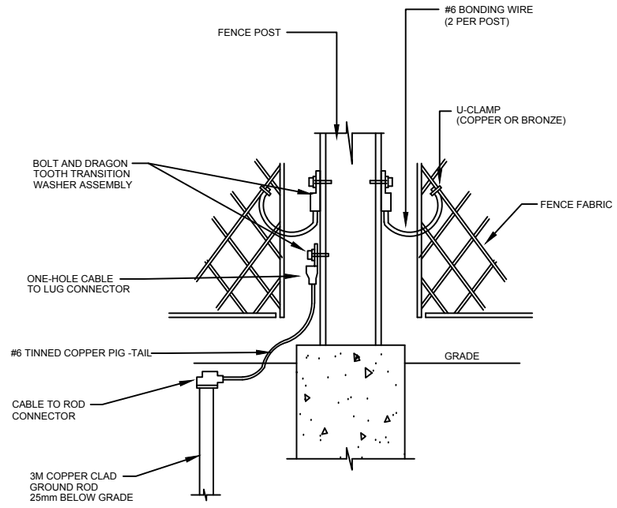
CHAIN LINK FENCE COMPOUND - FRONT ELEVATION



DETAIL - TYPICAL POST FOUNDATION SOIL CONDITIONS
SCALE:
N.T.S



DETAIL - TYPICAL POST FOUNDATION ROCK CONDITIONS
SCALE:
N.T.S



DETAIL - TYPICAL GROUNDING METHOD FOR FENCE POST
SCALE:
N.T.S

Fisheries and Oceans Canada / Pêches et Océans Canada Canadian Coast Guard / Garde côtière Canadienne	designed - conception date: DESIGNED 2018-10-05	checked - vérifié date: CHECKED YYYY-MM-DD					Asset - Actif: Robin Hood Bay, St. John's Area
	drawn - dessiné date: DRAWN 2018-11-20	approved - approuvé date: APPROVED YYYY-MM-DD	0	DESCRIPTION	BY	yyyy-mm-dd	Drawing - Dessin: External Grounding Grid Layout
	CCG ref. no. - no. réf. GCC: REF NO / PROJ NO / FILE NO	scale - échelle: SCALE	rev	description	by par	Date	drawing no. - no. dessin: DWG NUMBER - NO DESSIN; sheet-feuille: 01/01; rev: 0