

City of Iqaluit, Nunavut



ATTACHMENT A SPECIFICATIONS FOR THE PROVISION AND INSTALLATION OF A Iqaluit Radio Communication Tower

Prepared by



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1. Project Overview

1.1 Introduction

The City of Iqaluit, Nunavut requires the supply and installation of a new tower at the Iqaluit Fire Training Centre located at Akilliq Drive. The city requires the new tower to be 33 meters in height and support a variety of antennas and small dishes.

1.2 Overview

- A. “Respondent” shall indicate any firm responding to this RFT
- B. “Selected Vendor” shall indicate the firm selected to provide the tower and shelter.
- C. The Selected Vendor shall provide the following:
 - 1. 33 Meter Self-Supported tower
 - 2. 12’ x 24’ Pre-fabricated communications shelter (or suitable alternative)

1.3 Instructions for Respondent

1.3.1 General

- A. Proposals must be received as per the City’s Request for Tender 2022-RFT-0029.

1.3.2 Proposal Format for Technical Response

- A. The Proposer shall adhere to the proposal format provided below, organized by Section:
 - 1. Section 1: Cover letter
 - 2. Section 2: Table of contents
 - 3. Section 3: Executive summary
 - 4. Section 4: Tower site design Information
 - a. Site plan
 - b. Compound plan
 - c. Tower drawing

- d. Antenna mounting details
 - e. Construction details
 - f. Electrical Plan
 - g. Grounding plan
 - h. Grading, erosion, and sediment control details
 - i. Foundation drawings (tower and shelter)
 - j. Shelter drawings
5. Section 5: Project Management plan including preliminary project schedule with detailed Gantt chart, clearly showing City responsibilities
 6. Section 6: Quality Assurance / Quality Control (QA/QC) plan
 7. Section 7: Warranty information
 8. Section 8: Detailed equipment specification sheets for all proposed equipment
 9. Section 9: Total proposal cost and detailed pricing breakdown, including requested options to be shown separately

1.3.3 Evaluation Criteria

- A. The City shall evaluate proposals based on a number of criteria, including:
 1. RFT compliance
 2. Vendor experience
 3. Tower, shelter, and site design
 4. Total costs
 5. Project schedule

1.3.4 Award Procedures

- A. A selection committee shall review the proposals submitted. After each proposal has been evaluated short listing procedures will narrow the list of candidates to the two or more best qualified. Those vendors may be invited to an interview at which time the vendor will be expected to conduct a presentation on its proposal and to answer any questions of the Selection Committee.

- B. Negotiations shall then be conducted beginning with the firm ranked first. If a contract satisfactory and advantageous to the City can be negotiated at a price considered fair and reasonable, the award shall be made to that offeror.
- C. The City reserves the right to accept or reject any or all proposals or any portion thereof.
- D. The City reserves the right to accept all or part of any proposal depending solely upon the requirements of the City.
- E. The City reserves the right to seek clarifications of any proposal submitted or specific aspects of any proposal prior to the award of the contract. After seeking such clarification, the City will allow the Respondent an opportunity to provide the requested clarification.

1.4 Instructions for Selected Vendor

1.4.1 Standards and Guidelines

- A. The Selected Vendor shall comply with the applicable portions of the following standards, rules, regulations, and industry guidelines (order not reflective of priority):
 - 1. CAN/CSA-S37-18
 - 2. Species at Risk Act (SARA)
 - 3. Migratory Birds Convention Act 1994 (MBCA)
 - 4. Royal Canadian Mounted Police (RCMP) Standards and Guidelines for Communications Sites
 - 5. Nav Canada
 - 6. Transport Canada
 - 7. Industry Canada (IC)
 - 8. Institute of Electrical and Electronics Engineers (IEEE)
 - 9. CSA C22.1:21
 - 10. TIA607-D

- B. The Selected Vendor shall comply with the Royal Canadian Mounted Police Standards and Guidelines for Communications Sites for the design, supply, and installation of the self-supporting tower and associated antennas.
- C. The Selected Vendor shall comply with industry best practices for system installation, grounding, bonding, and transient voltage surge suppression (TVSS), as outlined in Motorola's R56 standard.

1.4.2 Governing Codes and Conflicts

- A. If the requirements of this RFT differ with those of the governing codes and regulations, then the more stringent of the two shall apply.
- B. If the requirements of this RFT conflict with those of the governing codes and regulations, the Selected Vendor is responsible for identifying the conflict and resolving to the satisfaction of the City.
- C. If the Respondent cannot meet any of the standards or guidelines listed in Section 1.4.1 the Respondent shall list all deviations in their proposal, for approval by the City.

1.4.3 Project Staffing

- A. The Selected Vendor shall provide the appropriate project staff based on workload and the level of effort required throughout the implementation/installation process.
- B. The staff identified in the Respondent's proposal, shall serve the duration of the project unless the Selected Vendor proposes an alternative plan to the City for consideration and gains approval.
- C. The City reserves the right to accept or reject any proposed staffing changes.
- D. The Selected Vendor's project manager:
 - 1. The Selected Vendor's Project Manager shall be the primary point of contact between the City and the Selected Vendor.
 - 2. The Selected Vendor's Project Manager shall bear full responsibility for supervising and coordinating the installation and deployment of the communications system;

3. The Selected Vendor's Project Manager shall be responsible for:
 - a. Development and acceptance of the project management plan
 - b. Managing the execution of the project against that plan
 - c. Overseeing the day-to-day project activities, deliverables, and milestone completion

- E. The Selected Vendor's project manager shall be responsible for coordinating, and facilitating weekly status meetings.

1.4.4 Scheduling

- A. The Selected Vendor shall develop and maintain a project schedule including tasks, milestones, start and end dates, task predecessors, and task owners based on an approved WBS.
- B. The schedule shall represent tasks associated with completing work on all items identified in the WBS.
- C. The Selected Vendor shall update the project schedule with actual dates as tasks are completed.
- D. The Selected Vendor shall present all schedule updates to the City during the weekly status meetings.
- E. The schedule shall address the following at a minimum:
 1. Site surveys
 2. Detailed design review
 3. Permits
 4. Site preparation
 5. Equipment order and manufacturing
 6. Equipment delivery
 7. Installation
 8. Site acceptance/Inspection

9. Documentation development and delivery
10. Warranty

1.4.5 Project Meetings

- A. The Selected Vendor shall schedule a project kickoff meeting prior to the beginning of the project.
- B. The Selected Vendor shall schedule weekly project status meetings following contract award and the initial kickoff meeting.
- C. Weekly status meetings shall continue throughout the duration of the project until the City issues final site acceptance.
- D. The Selected Vendor shall be responsible for facilitating the weekly status meetings
- E. The Selected Vendor shall prepare and distribute meeting agendas and minutes to the City via e-mail on a weekly basis at least 24-hours prior to each scheduled meeting.
- F. Meeting agenda items shall include, as a minimum, the following items:
 1. Schedule review
 2. Status of deliverables
 3. Risk items and planned responses
 4. Proposed changes
 5. Plans for the next period
 6. Action item assignments
 7. Punch list review

1.4.6 QA/QC Plan

- A. The Selected Vendor shall include a project QA/QC plan.
- B. The QA/QC plan shall address all stages of the project, including, but not limited to:

1. Procurement
 2. Site design
 3. Installation
 4. Implementation
 5. Site Acceptance/Inspection
- C. The QA/QC plan shall specifically describe the plans and procedures that ensure compliance of the proposed system design with the RFT requirements.
- D. The QA/QC plan shall be included in the project management plan developed by the Selected Vendor's project manager.
- E. The QA/QC plan shall be an integral part of the project.
- F. The QA/QC plan shall include the City personnel as part of the review and approval process for all deliverables and submittals.

1.4.7 Project Punch List

- A. The Selected Vendor shall establish and maintain a punch list, as mutually agreed to with the City.
- B. The punch list shall address all open issues including those related to sites, equipment, and site acceptance/inspection.
- C. The Selected Vendor shall maintain the punch list in real time
- D. The Selected Vendor shall distribute the punch list to the City weekly via e-mail.
- E. The punch list shall include the following at a minimum:
1. Sequential punch list item number
 2. Date identified
 3. Item description
 4. The party responsible for resolution
 5. Expected resolution date

6. Resolution date
 7. Details about how each punch list item was resolved and tested
 8. Notes about the item
- F. If the Selected Vendor receives written permission from the City to transfer the responsibility of an item to another person or group, the Selected Vendor shall add a new entry to the punch list and appropriately note the original entry.
- G. The Selected Vendor shall be responsible for reviewing each punch list item and advising the City of any changes.
- H. The Selected Vendor shall update the status of punch list items during each weekly status meeting.

1.4.8 Tower Inspection

- A. Upon completion of the tower installations, the Selected Vendor shall provide documentation detailing final inspection and testing including the following parameters:
1. Steel structure
 2. Vertical alignment and plumbness
 3. All bolts tight and torqued to specification
 4. No damaged or missing structural members
 5. All surface scratches and damage to the galvanization shall be repaired
 6. No signs of stress or vibration
 7. All climbing ladders and other devices installed correctly
 8. Labels and tags properly affixed
- B. Final Inspection shall be conducted by a third-party independent tower engineering firm. Results shall be provided to the City prior to final site acceptance.

2. Infrastructure Development

2.1 Site Locations

A. The name and location of the site is listed in Table 1 below:

Table 1, Site Locations

Site Name	Lat	Long
Iqaluit Fire Training Centre	63.735528	-68.538494

2.2 Site Development

A. Site development task shall include but, not be limited to the following:

1. Survey the site
2. Produce engineered site drawings
3. File applicable permits (dig permits, facility locates, etc.)
4. File for NAVCAN clearance
5. Evacuate for tower foundation
6. Install tower foundation
7. Install site grounding as per Motorola R56 grounding standard
8. Backfill foundations and grounding area
9. Deliver tower to site, assemble and stack
10. Install ice bridge
11. Install any required signage (ASR, Warning, etc)
12. Obtain tower inspection
13. Cleanup site

2.3 Self-Supporting Tower

2.3.1 Design Criteria

- A. The design shall be based on the minimum wind and ice requirements as specified for Class III structures in TIA -222 Standard current revision.
- B. The design shall assume the following design parameters for soil and rock conditions (RCMP Tower Standards and Guidelines).
 1. Soil
 - a. Earth pressure coefficients for normal soil conditions:
 $K_a = 0.33$; $K_p = 3.00$
 - b. Unit weight of soil = 1600kg/m³
 - c. Submerged Unit weight of soil = 1000kg/m³
 - d. Allowable Bearing Pressure on undisturbed glacial till = 200kPa
 - e. Allowable Bearing Pressure on structural fill = 150kPa
 - f. Groundwater level = at surface
 - g. Frost Penetration = 2.0m
 - h. Angle of internal friction (undisturbed till) = 30°
 2. Rock
 - a. Specific gravity = 2.5
 - b. Unconfined compressive strength of intact rock = 65MPa
 - c. Shear Strength = 5.4MPa
 - d. Estimated RQD = 70%
 - e. Design Water level = at surface
 - f. Allowable Bearing Pressure = 1000kPa
 - g. Depth to sound rock = 1.0m

The Selected Vendor shall be responsible for conducting a complete Geotechnical Report and updating the foundation based on actual conditions. A geotechnical investigation report was prepared for this site in August 2020 by: Canadrill Limited Geotechnical Division, 1500 Federal Road, Iqaluit, NU X0A 0H0, (867) 979-1131, under PROJECT NUMBER: IQA-G2014. Vendors are encouraged to contact Canadrill to determine the suitability of the existing report and determine what adjustments (if any) are needed to comply with this requirement.

C. Table 2 below details the tower loading to be considered in tower and foundation design.

Table 2 – Tower Loading

Antenna Manufacturer	Model No.	TX-LINE	Elevation
Sinclair	SD212	LDF5	33.0M
Comprod	872F-70TM	LDF5	33.0M
Cambium Networks	650 Panel	CAT6-OSP	33.0M
Sinclair	SD212	LDF5	29.0M
Cambium Networks	650 Panel	CAT6-OSP	28.0M
Sinclair	SD312HF2P	LDF5	26.5M
Sinclair	SC442D-HF1LDF	LDF5	25M

E. The tower shall be manufactured as a self-supporting lattice.

F. All structural steel and hardware shall be galvanized after fabrication in accordance with the appropriate standards.

1. All tower materials shall be hot dip galvanized after fabrication; with a minimum zinc coating of 2 oz. per sq. ft.
2. Bolts shall be hot dip galvanized.

G. The make, model, serial number, and height of the tower shall be clearly labeled at the base of the tower. Labeling shall be weatherproof and durable such as a stamped metal plate or equivalent.

2.3.2 Waveguide Support

A. There shall be a ladder type support system associated with the tower to mount the transmission cables.



- B. The support system shall accommodate cable or waveguide mounting hardware at the proper intervals.
- C. The support shall be equipped with precision punched or drilled holes to allow installation of snap-in type or bolt-in hangers.
- D. The support system shall be sized for 50% growth beyond initial system implementation.
- E. The support materials will be of similar construction as other tower materials to appear integral to the structure.
- F. The support shall be designed to meet rigidity specifications similar to the tower.

2.3.3 Waveguide Bridge

The tower shall be equipped with a waveguide bridge with support posts spaced at intervals compliant to the wind loading specifications, but not more than 10 feet / 3 metres distant.

- A. There shall be posts placed on both lateral sides of the bridge to fully support the load.
- B. The bridge shall be designed to support all initial antenna transmission lines plus 50% growth capacity.
- C. The structure shall comply with the tower wind and ice requirements as specified in TIA -222 Standard current revision.
- D. The Selected Vendor shall furnish and install the waveguide bridge between the tower and equipment shelter.
- E. The following criteria shall govern the design of the waveguide bridge:
 - 1. Structurally sturdy to support live and dead loads
 - 2. Free standing (i.e., not attached to the shelter or tower)
 - 3. Minimum width of 2 feet / 61 centimetres
 - 4. Length/height as required by the site specifics

5. Bridge/ice shield material shall be fabricated from galvanized bar grating or approved equivalent
 6. All components of the waveguide bridge shall be hot-dipped galvanized after fabrication
 7. Posts shall have galvanized caps
 8. Posts shall be set in concrete foundations.
- F. Each post shall be separately grounded to the site ground system
- G. Waveguide bridge shall be adjustable in height to allow interface with shelter waveguide entry ports

2.3.4 Climbing Equipment

- A. The tower shall be equipped with an approved climbing ladder and safety device.
1. The ladder may be integrated into the structural components of the tower.
 2. An anti-climbing device shall be installed at the base of the climbing equipment
- B. There shall be a climbing safety system compliant to original manufacturer's specifications.
- C. The equipment shall comply with TIA-222 current revision.

2.3.5 Lighting System & Control

- A. The Selected Vendor shall furnish and install an obstruction lighting system approved by NAVCAN and compliant with applicable standards.
- B. The lighting system shall include:
1. Controller
 2. Lamps
 3. Lightning protection
 4. Mounting hardware

5. Service cabling and conduit
 6. Conduit drain-breather system
 7. Wiring
 8. Other material required for a complete installation
- C. The lighting system shall be controlled by a 120-volt or 240-volt AC, single-phase solid-state control unit and power supply.
- D. The control unit shall be installed within a NEMA 3R metal cabinet or a NEMA 4X cabinet. The control unit shall be mounted inside the equipment shelter.
- E. The lights shall be automatically controlled by means of a photoelectric unit. The control unit shall be designed with relays for:
1. ON-OFF status of lights
 2. Control unit failure
 3. Light failure
- F. The lighting system shall automatically revert to back-up power source upon loss of primary power. The lighting system shall automatically reset upon power restoration of primary power.
- G. The controller shall include a test switch allowing simulation of daytime and nighttime modes.
- H. All tower lighting wiring shall be contained within rigid galvanized conduit, junction boxes, and lighting equipment housings.
- I. Vertical conduit runs shall be adjacent to the tower waveguide supports.
- J. All levels of lighting shall be clearly visible from any direction of approach to the tower.
- K. The photoelectric unit shall be installed in a moisture-proof protective metal or high impact plastic housing.
- L. The photoelectric unit shall be installed on the building in an inconspicuous location and adjusted to attain an unobstructed view of the NNE sky.

- M. The photocell shall be mounted such that it is not affected by artificial light.
- N. Photocell wiring shall be installed entirely within rigid galvanized conduit.
- O. Ice shields shall be installed for all lighting system fixtures except for the topmost light.
- P. The controller case shall be grounded to the equipment shelter building ground with #4 AWG or larger copper wire.

2.4 Tower Installation

2.4.1 General

- A. The Selected Vendor shall:
 - 1. Furnish all materials, labor, equipment, and mounting hardware to provide a complete functional tower installation.
 - 2. Perform all operations required for the installation.
 - 3. Be responsible for all concrete work and excavation.
- B. All concrete work shall comply with manufacturer's recommendations, including temperature, slump and air content.
- C. Two sets of fresh field concrete specimens shall be taken for each concrete pour.
 - 1. One set of field-cured concrete specimens shall be tested for weight.
 - 2. One set of specimens shall be tested for compressive strength with the tests to be taken at 7 days and at 28 days.
 - 3. The results of these tests will be presented to Iqaluit.
 - 4. The compressive strength test shall be the average of the two specimens from the same composite sample.
- D. Tower documentation shall include construction, installation, and maintenance drawings.
- E. Cement shall adhere to CSA A23.1, normal (type 10), sulphate resistant (type 50)

- F. Reinforcing steel shall be grade 400 deformed bars to CSA G30.1 unless indicated otherwise
- G. A registered Professional Engineer (P. Eng.) shall approve all drawings.

2.4.2 Erection

- A. The foundation shall be allowed to cure for at least 7 days before erecting the tower.
- B. Manufacturer recommended bolts shall be used for all connections in accordance with the installation documentation.
- C. Bolts should be of such lengths as to protrude beyond the nuts a minimum of 1/4 inch / 0.63 centimetres and a maximum of 1/2 inch / 1.27 centimetres.
- D. All bolts shall be equipped with self-locking nuts.
- E. Field reaming of coated metal components will be acceptable only upon determining there is no structural damage to the tower.
- F. Field remanufactured holes must be hot stick galvanized as specified and completely filled by the use of a larger diameter bolt.
- G. All bolts placed through slotted holes shall be equipped with flat washers.
- H. Mud, dirt, and other foreign matter shall be removed from the tower sections before erection. Special attention shall be given to cleaning the contact surfaces at joints before they are bolted together.
- I. When portions of the tower are ground assembled, such assembly shall be on rigid surfaces or blocking, which will provide support to prevent distortion of tower steel and damage to surface finish.
 - 1. All bolts shall be installed in all connections of ground assembled portions of the tower.
 - 2. Temporary bracing of tower members shall be used to avoid overstressing or distortion.
- J. The structure shall be erected plumb.

- K. The method of assembling and erecting shall be such that no member will be subjected to a load in excess of that for which it was designed.
- L. Extreme care shall be taken to establish and maintain the true geometric shape of the portion of the tower assembled.
 - 1. All connections must lie flat where bolted together.
 - 2. No gaps between butt flanges or connections are acceptable after the bolts are tensioned.
- M. Slings or other equipment used for picking up members or portions of the tower shall be of such material or protected in such a way as to not damage the tower section, the finish, or distort or overstress the tower when lifts are made.
- N. Portions of the tower shall be raised in such a manner that no dragging on the ground or against other hard surfaces occurs.
- O. Damaged tower sections can be used if properly repaired.
 - 1. If a damaged portion cannot be repaired to the satisfaction of the City, it shall be replaced.
 - 2. For any galvanized surfaces, damaged for any reason, zinc-based solder repair shall be used.
 - a. Solders in a rod form or a powder may be used.
 - b. Surfaces must be cleaned using a wire brush or a light grinding action.
 - c. Surface preparation shall extend into the surrounding undamaged galvanized coating.
 - d. The thickness of zinc solder repair shall be equivalent to the originally specified hot dip galvanizing process.
 - e. Repairs shall be performed in accordance with the solder manufacturer's instructions.
- P. Only wrenches of proper size, which will not deform the nuts, nor damage the surface finish, are to be used.

- Q. Standard ironworkers' 12-inch / 31 centimetre spud or 12-inch / 31 centimetre socket wrenches shall be used.
- R. Pipe extenders will not be permitted.
- S. During construction of the tower where required, the obstruction lighting fixtures shall be installed and operated at each required level as each such level is exceeded in height during construction.

2.4.3 Grounding

- A. The tower and all appurtenances shall be installed in accordance with Motorola R56 Standard.
- B. All equipment mounted on the tower shall be properly bonded/grounded to the tower.
- C. All antenna systems shall be effectively grounded and provide surge protection to all equipment.
- D. All antenna transmission lines shall be properly bonded/grounded to the tower.
 - 1. At a minimum, transmission lines shall be bonded/grounded at the antenna base, at the base of the tower, and at the exterior ground bar located at the entry to the building.
 - 2. Additionally, transmission lines shall be bonded/grounded to the tower or cable ladders at intervals recommended by the manufacturer.
 - 3. Antenna transmission line ground conductors shall be bonded to the tower in compliance with standards.
- E. The site installation should have less than 5 ohms resistance between any connected point on the ground bus and earth ground.
- F. The Selected Vendor shall test ground resistivity using the four-point method.
- G. The Selected Vendor shall supply a ground test report that fully describes the testing method used.

2.4.4 Existing Equipment Migration (Option)

Vendor are required to provide a cost to move the existing radio equipment from the radio equipment location at the: 1) City's landfill site location, and 2) the City's water treatment plan, including all disconnections and reconnections of components (power, antenna, etc) to return it to optimal working conditions, in a subsequent phase (following integration of Fire/EMS and Municipal Enforcement radios into the RCMP system), when advised by the City. The City may exercise the option to purchase the Vendor's proposed services.

2.5 Equipment Shelter (Option)

The City wishes to acquire an equipment shelter suitable for the intended purpose of housing and protecting commercial and public safety grade radio and telecommunications equipment. Vendors are required to provide a cost for an equipment shelter for which the City may exercise the option to purchase the Vendor's proposed solution.

2.5.1 Shelter Size

- A. The shelter size shall be nominal 11'6" wide (12' wide with roof overhang) exterior x nominal 24' long exterior x nominal 9'2" high interior, single room concrete shelter. A shelter of similar proportions, if pre-fabricated and of other material, will be considered.

2.5.2 Shelter Construction

- A. The shelter construction shall be concrete or concrete composite.
- B. Vendors ARE STRONGLY ENCOURAGED to provide an alternative construction material / method or finished product to achieve the intent of this shelter requirement at a reasonable cost. However, it must comply as much as possible with the detail and intent of the specifications / requirements shown below. Where it does not meet the requirements listed, the Vendor must indicate this and provide an explanation of how the requirement will be suitably addressed by the alternative. The proposed solution must be suitable for installation in the Arctic and warranted as fit for purpose by the Vendor for a period of 20 years.

2.5.3 Shelter Design and Construction Requirements

- C. In addition to all applicable codes and standards, Selected Vendor shall design the shelter to meet or exceed the following structure requirements:

1. 200 pounds per square foot distributed floor loading while on foundation
2. 125 pounds per square foot distributed floor loading while lifting
3. 200 pounds per square foot minimum roof load
4. 120 Mph wind load
5. Seismic zone 4
6. Vents and entryways shall be constructed to deter vandalism
7. Vents and entryways shall be constructed to prevent entry of rodents
8. Waterproof

2.5.4 Exterior Finish

The exterior finish of the shelter shall be exposed aggregate or suitable alternative.

2.5.5 Bullet Resistance

Shelter walls must be capable of stopping 30.06 rifle fires per UL 752 requirements.

2.5.6 Fire Rating

Shelter walls must provide a two-hour fire rating.

2.5.7 Insulation and Interior Finish

- A. Walls and ceiling must be insulated to a minimum value of R-11.
- B. Interior walls and ceiling must be sheathed with ½ inch white Nu-Poly® or similar board.
- C. Shelter walls must be reinforced as required to support wall mounted equipment.
- D. Floor will be covered with light colored industrial grade vinyl tile floor covering or suitable alternative.

2.5.8 Exterior Door

- A. The shelter shall be equipped with a 42 inch by 84-inch door.
- B. The door shall have a bullet resistance rating that complies with levels 4 of UL 752 ballistic standards.
- C. Door, frame and frame components shall be painted or otherwise treated to be rust-proof.
- D. Each door shall as a minimum be equipped with the following hardware and accessories:
 - 1. A continuous stainless-steel hinge the entire length of the door
 - 2. Neoprene weather strip
 - 3. High security locking cylinder latch set
 - 4. Level 4 Mortised dead bolt
 - 5. Anti-pick plate on strike of door to restrict access to the latch and deadbolt
 - 6. Hydraulic closer
 - 7. An exterior mounted canopy to protect the door entry shall be designed to support a load of 100 pounds per square foot

2.5.9 Power Distribution

Power distribution shall include the following:

- A. Surge protection devices compliant with Motorola R56 and UL1449
- B. One (1) 225 Amp main breaker, 10,000 AIC, 120/240 VAC, single phase, 60 Hz, 42 space, utility power distribution panel, in a NEMA 1 surface mount enclosure
- C. Utility power panel to be supplied with the circuit breakers as required
- D. One (1) 200 Amp, 240 VAC, fused, double pole, single throw safety switch in a NEMA 1 enclosure

- E. One (1) 200 Amp, 240 VAC, non-fused, double pole, double throw manual transfer switch in a NEMA 3R enclosure
- F. One (1) 200 Amp, four pin exterior power receptacle; Appleton Model: AJA20044-200RS
- G. Twelve (12) 20 Amp specification grade duplex receptacles
- H. One (1) 20 Amp specification grade exterior ground fault duplex receptacle
- I. Seven (7) equipment AC circuit drops on individual two pole, 15 Amp, 240 VAC breakers routed in two conduits (four drops will be pulled in one conduit and three in a second) to customer specified locations on the ceiling above customer equipment racks. Flexible conduit including circuit conductors will be coiled and tagged for identification with enough length to reach the floor and an additional four feet (4') of circuit conductors to be cut to length and terminated by the customer

2.5.10 Lighting

- A. Equipment shelter lighting shall be energy efficient and generate low heat levels. Acceptable lighting shall be long lasting energy efficient technologies, such as light emitting diodes (LED)
- B. Equipment shelter lighting shall comply with the U.S. defense standard MIL-STD-461E or most current version for low radio frequency interference (RFI) lighting fixtures.
- C. One - 100-Watt exterior door light with vandal resistant lens.
- D. Placement of equipment shelter lighting shall assure illumination in front of and behind tall equipment racks (within aisle ways; not directly above equipment racks).
- E. Eight – four foot, two tube surface mounted LED light fixtures.
- F. Interior lighting control switches shall be located near the non-hinged side of the entrance door to the equipment shelter. One switch shall control a single lighting fixture and the second switch shall control the remaining lighting fixtures. Refer to NFPA, NEC 70-2011 (or latest edition) Article 410 - Luminaries, Lamp Holders, and Lamps for additional information.

- G. Interior emergency backup lighting units shall be installed and activate immediately upon failure of all AC power. The emergency backup lighting shall also be equipped with an illuminated "Exit" sign mounted above the exit door of the equipment shelter indicating exit locations in the equipment shelter during emergency evacuation.
- H. Each exterior light equipped with a combination photoelectric/motion switch shall also have a photoelectric /motion bypass switch installed at the same location as the interior lighting control switches.

2.5.11 HVAC

- A. HVAC shall be redundant wall mount air conditioning units, with lead/lag controls allowing approximately equal operating time on each unit.
- B. Two (2) nominal 29,600 Btu/hr (2-1/2 tons) wall mount air conditioning units, with low ambient and compressor anti cycle controls, integral 5 kW resistance heat strips and washable dust filters.

2.5.12 Shelter Alarms

- A. The following alarm devices shall be provided with wiring coiled and tagged and attached to a 48" x 72" x 3/4" equipment mounting board:
 - 1. Two-line voltage smoke detectors (One for each room)
 - 2. Two intrusion alarm switches with form "C" contacts rated .1 Amps at 28 VDC
 - 3. One high temperature alarm, which will consist of single pole double throw dry contacts. Adjustment range is 30 - 110 F.
 - 4. One low temperature alarm, which will consist of single pole double throw dry contacts. Adjustment range is 30 - 110 F.
 - 5. One humidity alarm which will consist of single pole, single throw form A or B dry contacts rated at 7.5 Amps (resistive) at 115 Vac, 60 Hz. Adjustment range is 20 TO 80% relative humidity.
 - 6. One air conditioner compressor high and low head pressure lockout switch alarm

7. One utility power failure alarm
8. One set of generator alarms (generator run, fail, warning)

2.5.13 Grounding

- A. The interior ground system shall be installed as per Motorola R56 Standard
- B. One 1" Schedule 40 PVC sleeve installed at 45 degrees through the wall for ground exits
- C. Ground bar kit to include interior and exterior ground buss bars and exterior copper straps located at the entry port

2.5.14 Entry Ports

- A. Cable entry ports shall consist of one waveguide entry panel with 12 - 4-inch / 10 centimetre holes w/sleeves and protective blank covers.

2.5.15 Cable Tray

- A. Shelter shall be equipped 18" / 45 centimetre wide cable tray.

2.5.16 Telco Board

- A. Shelter shall be provided with one 4 foot x 6 foot x ¾ inch Telco board(s).

2.5.17 Accessories

The Selected Vendor shall provide costs for the following accessories:

- A. Two portable 10 pound CO₂ fire extinguishers
- B. One handheld emergency eye wash station
- C. One first aid kit

2.5.18 Drawings

- A. The Selected Vendor shall provide two sets of shelter drawings with each shelter.

- B. The Selected Vendor shall supply typical foundation drawings based on actual soil conditions.
- C. The Selected Vendor shall supply support calculations for recommended building tie down locations.