



Pêches et Océans  
Canada

Garde côtière  
canadienne

Fisheries and Oceans  
Canada

Canadian  
Coast Guard

## **CONSTRUCTION SPECIFICATIONS**

TELECOMMUNICATIONS TOWER BUOYAGE LIGHTING SYSTEM  
REPLACEMENT WORK

**MARCONI & ÉTANG-DU-NORD**

CANADIAN COAST GUARD  
CENTRAL AND ARCTIC REGION

April 2017

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## **GENERAL CONDITIONS – SECTION 01010**

### **1. Background**

- 1.1. In order to meet the requirements of TC Standard 621 (2nd edition), the Canadian Coast Guard (CCG) wishes to modernize its facilities and replace the buoyage lighting system in its telecommunication towers with a new LED system, including the remote monitoring system.

### **2. Work description**

- 2.1. The work covered by these specifications consists of replacing the existing daytime and nighttime buoyage system with a new LED lighting system on two (2) Canadian Coast Guard (CCG) telecommunication sites, including three (3) infrastructures (listed in **Appendix A**), and the supply and installation of new safety rails in the structures.
- 2.2. Specifically, the work to be completed includes, but is not limited to, the following:
  - 2.2.1. Supply of all labour, transportation, accommodation, handling, materials, hardware, accessories, equipment, and tools necessary to perform the work in accordance with the requirements of the technical specifications;
  - 2.2.2. Dismantling of cables, electrical outlet boxes, existing buoyage lights to be replaced, and other elements of the system that are no longer required, including transportation off-site of all materials and equipment;
  - 2.2.3. Supply and installation of new LED buoyage lighting system, including the cables, electrical outlet boxes, buoyage lights, control panels, and other equipment required for proper operation of the system (see details in Section 16500 as well as in Appendix A);
  - 2.2.4. When required, preparation of the trenches required for installation of the cables, and ensuring the site is in good condition afterward (see details in section 16106 as well as in Appendix A);
  - 2.2.5. When required, supply and installation of a galvanized steel iceguard to protect the buoyage lights halfway up and control panels at the bottom of the towers. The iceguard must be the width of the tower and attached to the structure with four (4) U-bolts;
  - 2.2.6. Dismantling and disposal of tower's existing safety rail, and the supply and complete installation of a new Trylon aluminum guardrail (use with the Cougar 3.0 Trolley w/Karibiner). Follow the manufacturer's recommendations (See Appendix A for the concerned structures).
- 2.3. The costs of clearing snow between the road and the towers, if necessary, will be the responsibility of the Contractor and shall be included in the bid as needed.

### **3. Photographs**

- 3.1. The Contractor shall take and colour photographs at each work phase, including photos of the installed lanterns, and submit them to the CCG. A minimum of five (5) photos per tower shall be submitted to the CCG Representative prior to final acceptance of the work.
- 3.2. Photos must be delivered as digital files. Each photograph shall be identified as follows: site name, infrastructure name, date of the photo.

### **4. Localization and site access**

- 4.1. Site access and the latitude/longitude coordinates (NAD83) are listed in **Appendix A**.
- 4.2. All sites are accessible by road.
- 4.3. The Consultant must coordinate the work completion dates with the CCG and give the CCG Representative at least two (2) weeks' advance notice for site access.
- 4.4. No site visits will be organized by the Department during the tendering period. However, bidders are authorized to visit the sites to better prepare their bids. The Departmental Representative shall be notified to facilitate and supervise access to sites.

### **5. Maintenance and service interruption**

- 5.1. Required service interruptions must be coordinated, authorized, and planned with the CCG Representative. They must take place during the week, from Monday to Friday, between 8:00 a.m. and 4:00 p.m. A CCG Representative must absolutely be present on the sites during the interruptions.
- 5.2. For infrastructure where it is possible to maintain service during the work, the use of appropriate protective equipment is mandatory (e.g. clothing protecting against harmful waves). The CCG would like service interruptions to be limited. Compliance with health and safety measures for workers during service downtime is mandatory (see section 14.10).
- 5.3. However, for infrastructure where service interruptions are inevitable, the company must coordinate any service interruption on work sites with the CCG Representative. The schedule submitted with the bid will act as the request for service interruptions. After that, changes must be exceptional. The CCG Representative will confirm the possibility of service interruption for specific equipment at the submitted date.

### **6. Management and coordination**

- 6.1. Telephone and electronic communications will be necessary throughout the work. The various communications with the CCG Representative must be in French.
- 6.2. The person responsible for the electrical work must attend the project start-up meeting.
- 6.3. The CCG Representative may be assisted by a local representative who will facilitate the coordination of work for tower and equipment service interruptions, among other things.

**7. Cost breakdown**

- 7.1. The firm shall provide costs broken down by site and by infrastructure according to the requirements. The amounts must include, in addition to the work, administrative costs and profits, as well as costs for travel, accommodations, and any other incidental expenses.
- 7.2. Fisheries and Oceans Canada reserves the right to award the contract in whole or in part with respect to the components specified in the cost breakdown. In other words, the contract awarded may exclude one or several sites or site assets in this mandate. The value of the contract awarded will be equal to the sum of subtotals of the cost breakdown for the selected sites.

**8. Work schedule**

- 8.1. All work shall be completed **before September 29, 2017**.
- 8.2. The Contractor shall provide a work schedule within five (5) working days after the contract is awarded. This schedule shall be updated by the Contractor in accordance with the progress of the work and must be approved by the CCG Representative.
- 8.3. The Contractor shall be informed that the CCG will do all it can to follow the work schedule, but that only certain dates can be discussed and modified based on the coordination of service interruptions required.

**9. Materials supplied by the Canadian Coast Guard**

- 9.1. The CCG will supply the stainless steel buoyage light supports and mechanical fasteners. However, the Contractor shall provide the threaded ½" diameter stainless steel rods for installation and upgrading of the lights.
- 9.2. The CCG shall not supply any materials, equipment, accommodations, or transportation regardless of whether a clause in the contract suggests otherwise.

**10. Protection of structures**

- 10.1. Protect the existing structures. During the work, if the structures are damaged by the Contractor or any of its representatives, immediately make the necessary replacements and repairs to the satisfaction of the CCG at no additional costs.
- 10.2. No splicing of coaxial cables will be accepted.
- 10.3. At no time shall a load be set on any part of a structure that could compromise anyone's safety or cause permanent deformations.
- 10.4. If, for any reason, extension or repairs on an electrical power buoyage supply cable are necessary, the work shall be authorized in writing by the manufacturer.
- 10.5. If the Contractor damages an electric cable, a coaxial cable, Internet cable, telephone cable or any other cables, it is responsible for repairs or replacements at its own expense.

## **11. Contractor use of premises**

- 11.1. The Contractor shall work solely within the confines of the land owned by the CCG.
- 11.2. The CCG is not liable for any damage to property caused by the performance of the work.
- 11.3. The Contractor shall not accumulate unnecessary materials, equipment, or residue on the premises.
- 11.4. Access to the sites is restricted by locked fences. A CCG Representative will be present on site at all times.
- 11.5. The buildings housing the electronic equipment are remotely monitored by an alarm system against intruders; coordination with the CCG Representative is required and a CCG Representative must be present when these buildings are accessed.
- 11.6. The Contractor shall clean the premises and return them to their original condition before the work.

## **12. Safety measures**

- 12.1. The Contractor must apply the safety measures prescribed by federal, provincial, and municipal laws and regulations, in particular the Canada Labour Code and the Commission de la santé et de la sécurité du travail du Québec. In the case of differences or contradictions, comply with the strictest requirements.
- 12.2. The Contractor is fully responsible for occupational health and safety compliance during the execution of the work described in these specifications.
- 12.3. The Contractor shall ensure that all its employees have and use safety and fall-arresting equipment when working at heights. The Contractor shall also ensure that a height rescue kit is available on site. Note that a CCG safety advisory is currently in effect and the Contractor must comply with it: **it prohibits the use of safety rails installed on any guyed tower.** Use the double-hook climbing method at all times.
- 12.4. Only individuals who have taken training on protection against the risks of falls and tower rescue are authorized to climb up the towers. **The Contractor must first**

**provide employee certification cards; otherwise climbing on infrastructure will be prohibited.**

- 12.5. The Contractor shall provide a safety plan for the work to be done on the sites before work begins.
- 12.6. The Contractor shall take the necessary measures to eliminate the risk of accidents during the work.
- 12.7. At all times on the work site, the Contractor shall have a specialized first aid kit for this kind of work and a person with first-aid certification among the staff carrying out the work.
- 12.8. Some towers are transmitters (FM guyed towers) and pose a health risk. There must be a safety perimeter indicating areas where people can only remain for brief periods, and signage indicating these areas must be complied with. No individual shall enter the enclosed area around these towers when they are in operation.
- 12.9. Non-transmitter towers (VHF guyed towers) also present a risk to individuals climbing towers located near antennas. No individual shall climb these towers when antennas are active without appropriate protective clothing.
- 12.10. Clothing that protects against radiation is available on the market and can be used to avoid service interruptions (VHF guyed towers and GPS masts). The use of this clothing may be subject to approval from the CCG Representative.

## **BUOYAGE INFRASTRUCTURE – SECTION 16500**

### **1. Engineering work**

- 1.1. The Contractor shall submit complete engineering drawings of the tower buoyage lighting system, including detail drawings, a list of equipment, a connection diagram, and interconnection and identification drawings for each structure. The drawings shall be prepared in accordance with the applicable standards and shall be signed and sealed by a recognized professional engineer in Canada.
- 1.2. Provide the required buoyage lights, control panels and remote monitoring panels, wiring, junction boxes, fasteners, hardware, iceguards, and other accessories, without limitation.
- 1.3. The Contractor shall ensure that the temporary buoyage installed during the work comply with the regulations in force.

### **2. Codes and standards**

- 2.1. The buoyage system shall comply with the most recent version of Transport Canada Standard 621, "Obstruction Marking and Lighting."
- 2.2. Unless otherwise indicated, all installations shall be performed in accordance with standards CSA C22.10-04 and CSA C22.2, and the most recent version of the Quebec Electrical Code.
- 2.3. Unless otherwise indicated, install overhead and underground networks in accordance with the most recent version of standard CSA C22.3.
- 2.4. Comply with all other applicable codes and standards not mentioned in the preceding paragraphs.

### **3. System and equipment**

- 3.1. All system components shall be weatherproof for outdoor installation on the towers or other infrastructure. The housing/remote control panel must be at least NEMA 4X plastic or composite material.
- 3.2. In order to reduce the maintenance and upkeep of buoyage lights and ensure greater reliability, they should have no moving parts, including but not limited to motors, gears or belts.
- 3.3. The control / remote monitoring panel for the buoyage lights shall permit all lights on the tower to be powered and remotely monitored. In case of failure or malfunction of the buoyage system, it will determine which light is down and signal the problem with an alarm. Alarms will be issued to the CCG system via dry contact only. The panel shall be the Technostrobe brand, model LCMWRO-48V. However, if more than one controller is necessary, they must be installed in a single housing.
- 3.4. For VHF-type towers, the control / remote monitoring panel will be installed inside the shelter.



- 3.5. For DGPS- or FM-type towers, the control / remote monitoring panel shall be installed at the base of the tower, just above the insulator. In this case, the control / remote monitoring panel shall have an interface that uses fibre optics to transmit information to another interface located inside the shelter and redirect the signals to the CCG system. It must be made of NEMA 4X plastic or composite material to withstand the elements. The 1" diameter PVC conduit shall be connected to this panel. The box containing the fibre-optic interface inside the shelter shall be made of NEMA 12 plastic or composite material and measure at least 10" x 10" x 6". It must also be located as close as possible to the CCG telecommunications buildings.
- 3.6. For the DGPS or FM towers, an additional 2" diameter duct shall be installed between the tower and the shelter. The duct shall be equipped with a ¼" cable puller. The duct shall be located at the foot of the concrete tower base, near the conduit for the fibre optics, and exceed the ground level by a minimum of 18". It shall also be located near the shelter at least 18" off the ground. The pipe shall be equipped with a cap. The duct shall be installed in the same trench as the conduit for the fibre optics.
- 3.7. Buried cables shall be in accordance with CCG specifications. The CCG Representative shall be informed of any non-compliance with these specifications and must authorize any non-compliant instances.
- 3.8. Depending on the site, fibre-optic cable shall be installed in an overhead cable shelf, in 1" diameter PVC underground ducts or in Plastibeton gutters at ground level.
- 3.9. Depending on the site, power supply cables shall be installed in an overhead cable shelf, in 2" diameter PVC underground ducts, or in Plastibeton gutters at ground level. For TECK cables, the 2" diameter duct is not mandatory. However, the CCG cable-burying procedure shall be respected.
- 3.10. Power supply cables shall comply with the manufacturer's specifications (type determined by Technostrobe).

#### **4. Buoyage lighting system on towers lower than 61 m (200 ft.)**

- 4.1. Towers lower than 61 m, including devices at the top and depending on the type of antenna used, have a buoyage system composed of one or two combined omni-directional red and white LED top lights, CL-864/L-865 type (40 flashes a minute) Technostrobe brand, model LED-B-HYBRID-48V (see **Appendix A**).

#### **5. Buoyage lighting system on towers between 61 m (200 ft.) and 107 m (351 ft.)**

- 5.1. Towers between 61 m and 107 m, including devices at the top and depending on the type of antenna used, have a buoyage system composed of one or two combined omni-directional red and white LED top lights, CL-864/L-865 type (40 flashes a minute) Technostrobe brand, model LED-B-HYBRID-48V (see **Appendix A**).
- 5.2. Halfway up, the buoyage lighting system will consist of two permanent red lights, double, CL\_810 type, Technostrobe brand, model OL2B-DEL 120-2 (see **Appendix A**).

## **6. Installation details**

- 6.1. All installations shall be performed according to the manufacturer's recommendations.
- 6.2. Each buoyage light is to be mounted on a stainless steel support securely attached to the tower without any drilling. The support and fasteners will be supplied by the CCG with the exception of the threaded stainless steel ½" diameter rods. The Contractor shall pick them up them at 101 Boul. Champlain, Quebec, QC, G1K 7Y7.
- 6.3. Buoyage lights for upgrading shall be installed with three or four stainless steel threaded rods with a diameter of ½" and length of 6" at most.
- 6.4. The light support currently used for the VHF-DF Marconi site buoyage light can be reused. The 13¼". diameter bolt circle for the Hughey & Phillips KG114 lantern is the same as the LED-B-Hybride lantern from Technostrobe. Simply add the ½" diameter threaded rods for adjustment.
- 6.5. All hardware, fasteners, connectors, and other parts shall be stainless steel.
- 6.6. Install the buoyage light power cables along the cable shelf in the tower or on the infrastructure at one end to avoid mixing these cables with the coaxial cables for the antennas. Plan to use a retaining braid at the cable ends. No Ty-Rap bands will be accepted.
- 6.7. All exterior connections are to be weatherproof. Connections in the junction boxes shall be made with new collapsed seals or connectors filled with silicone or a similar product.
- 6.8. Cables entering and leaving junction boxes are to have anti-drip loops.
- 6.9. All existing supports (cableways) may be reused to attach the new buoyage light cables to the infrastructure and up to the building.
- 6.10. Each level of lights will be powered by an independent cable or according to the manufacturer's recommendations.
- 6.11. All cables shall be supported at regular intervals in accordance with the standards and supported by appropriate equipment during the installation. The use of self-locking fasteners made of plastic, metal or other materials shall be prohibited (example: TY-RAP or pipe collar). Only Andrew-type stainless steel (or equivalent) fasteners and supports are authorized.
- 6.12. Cables shall be mounted outside of the tower. The site must be approved by a Departmental Representative.
- 6.13. The Contractor is responsible for providing a temporary system of identification of obstacles during the work period, in accordance with Transport Canada Standard 621, as needed.
- 6.14. Unless otherwise specified, all cables shall be specified by Technostrobe.
- 6.15. All cables shall be equipped with a grounding kit installed every 30 metres or based on CCG criteria. There must be at least one ground at the top of the tower, at the base of the tower (before the cable shelf), and at the entrance to the building.
- 6.16. Photocell:

- 6.16.1. Install the photocell supplied by the manufacturer.
- 6.16.2. The start/stop device will be adjusted to order the start-up when the Northern sky lighting is between 300 and 600 lux (28 and 56 fc) in accordance with Standard 621 from Transport Canada. The photocell will be installed facing North without any obstruction.

## **INSTALLATION OF CABLES IN TRENCHES – SECTION 16106**

### **1. Cable protection**

- 1.1. See drawing attached in **Appendix D** for trench details and the protection of cables.
- 1.2. Use planks treated with a water-repellent preservative made of a 5% pentachlorophenol solution.
- 1.3. Use indicator tapes for underground cables.

### **2. Cable markers**

- 2.1. Cable markers shall be composed of a galvanized steel post and a round fibreglass sign screwed into the post.
- 2.2. The inscription on the sign shall be as follows: "WARNING: UNDERGROUND CABLES."
- 2.3. Firmly sink the markers in at 15 m intervals along the run of cables and at each change in direction.
- 2.4. If, during trenching, an existing coaxial cable is broken, indicate the exact location of the splice with a temporary marker, and before completion of the work, replace the entire length of the cable. This shall be done at the Contractor's expense. This applies to all types of existing cables on the site.

### **3. Protection of existing structures**

- 3.1. Underground structures and networks:
  - 3.1.1. The details of the dimensions, the position and the burial depth for structures and networks are given for information purposes only and are not necessarily accurate or complete.
  - 3.1.2. Before beginning trenching, advise Fisheries and Oceans Canada and determine the position and the condition of the underground structures and networks. Clearly locate the positions in order to avoid any service interruption during the work.
  - 3.1.3. Confirm the position of the underground networks with careful test excavations.
  - 3.1.4. Maintain and protect power and communication lines from damage, as well other structures that may exist, as necessary. Before moving or disturbing a structure or network in any way, obtain the appropriate instructions from Fisheries and Oceans Canada.
- 3.2. Buildings and structures on the surface:

- 3.2.1. In the presence of Fisheries and Oceans Canada, check the state of the buildings, fences, posts, cables, benchmarks, and monuments that may be damaged during the work.
- 3.2.2. Protect the markers, benchmarks, and geodetic points indicated on the Fisheries and Oceans Canada plan from damage.
- 3.2.3. The Contractor is responsible for repairing any damage caused to Fisheries and Oceans Canada equipment and installations during construction, without charge and to the satisfaction of Fisheries and Oceans Canada.

#### **4. Site preparation**

- 4.1. Clear the surfaces of the excavation area of any obstacles, snow, ice or wood, within the indicated area.
- 4.2. Remove the topsoil or cut wood from the excavation area and pile it in the areas designated by Fisheries and Oceans Canada.
- 4.3. Protect the backfill material from any contamination.

#### **5. Drying excavations**

- 5.1. Keep the excavations free of water throughout the work.

#### **6. Excavation**

- 6.1. Perform excavation works according to the outlines, levels, and dimensions indicated in the plans and shop drawings approved by Fisheries and Oceans Canada (**Appendix D**).
- 6.2. Temporarily transfer dirty or excess backfill to the approved area on the worksite.
- 6.3. Avoid obstructing the course of surface water or natural streams.
- 6.4. If the earth or sand at the bottom of the excavations seems unfit, advise Fisheries and Oceans Canada and proceed according to their directions.

#### **7. Backfilling**

- 7.1. Do not commence backfilling before the work has been inspected and approved by Fisheries and Oceans Canada.

- 7.2. The areas to be backfilled should be free of debris, snow, ice, water and frozen earth.
- 7.3. Do not use backfill material that is frozen, or that contains snow, ice or debris.

## **8. Surface access**

- 8.1. The surface inside the fence should be prepared with a geotextile membrane and two granular layers, which have the following thicknesses: one 175 mm of GM20 compacted to 95% of the MP and 75 mm of clean 20 mm stones.

## **9. Restoration**

- 9.1. When the work is finished, remove the excess material and debris, grade the slopes and correct the defects identified by Fisheries and Oceans Canada.
- 9.2. Replace the topsoil according to the specifications or DFO instructions.
- 9.3. Clean and restore the areas damaged during construction to their original state, to the satisfaction of Fisheries and Oceans Canada.



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## **APPENDIX A**

### **SITES AND INFRASTRUCTURES DETAILS**

| Priority No.   | N/A  | N/A  | N/A  |
|--|--|--|--|
| Sites names  | <b>Marconi Rx-Mf</b>   | <b>Marconi VHF</b>   | <b>Étang-du-Nord Tx-Mf-Rt</b>                                |
| Position in NAD 83   | lat. : 47°23'13"<br>long. : 61°51'38"                        | lat. : 47°23'13"<br>Length : 61°51'38"                               | lat. : 47°21'27"<br>long. : 61°55'29"                        |
| Type of tower  | Guyed Rx-MF  | Self-supporting VHF  | Guyed TX   |
| Height   | 33 m (110 ft)  | 61 m (200 ft)  | 33 m (110 ft)  |
| VHF-DF antenna   | No   | Yes  | No   |
| Description of the light at the top  | CL-864/L-865. Technostrobe LED-B-Hybride,                    | CL-864/L-865. Technostrobe LED-B-Hybride,                            | CL-864/L-865. Technostrobe LED-B-Hybride,                    |
| Quantity   | 1  | 2  | 1  |
| Description of intermediate light, partway up <u>without exceeding 61 m (200 ft)</u>     | N/A  | Technostrobe, OL2B-LED120-2  | N/A  |
| Voltage  | N/A  | 120 VAC  | N/A  |
| Quantity   | N/A  | 2  | N/A  |
| Description of intermediate light, partway up over 61 m (200 ft)                         | N/A  | N/A  | N/A  |
| Quantity   | N/A  | N/A  | N/A  |
| Type of cable between the tower and building   | <u>Optical Fibre</u> , according to the light manufacturer's | <u>TECK</u> , according to the manufacturer's lights recommendations | <u>Optical Fibre</u> , according to the light manufacturer's |
| Cabling installation between the tower and building                                      | Underground in a PVC conduit in a trench and shelf cable     | Aerial.<br>Existing cable shelf.                                     | Underground in a PVC conduit in a trench                     |
| Controller   | Technostrobe, LCMWRO-48V                                     | Technostrobe, LCMWRO-48V   | Technostrobe, LCMWRO-48V                                     |
| Quantity   | 1  | 2  | 1  |
| Control panel position   | On the tower, at the base, before the insulator              | Building interior  | On the tower, at the base, before the insulator              |
| Interface in the building needed   | Yes  | No   | Yes  |
| Approximate length of aerial or underground cable trays (From shelter to the tower base) | Section underground: 54 m<br>Aerial section: 32 m            | 37 m   | 175 m  |
| Safety rails replacement   | Required   | Not required   | Required   |





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## **ANNEX B**

### **SITE PLANS AND STRUCTURES**



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## **ANNEX C**

### **GEOTECHNICAL STUDIES SITES**



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## **ANNEX D**

### **TRENCH PLAN DETAILS**