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## SOLICITATION AMENDMENT MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

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Montréal  
Québec  
H5A 1L6

<b>Title - Sujet</b> Ice lantern design Purchase the services to design an ice lantern	
<b>Solicitation No. - N° de l'invitation</b> F7047-200102/A	<b>Amendment No. - N° modif.</b> 004
<b>Client Reference No. - N° de référence du client</b> F7047-200102	<b>Date</b> 2021-05-20
<b>GETS Reference No. - N° de référence de SEAG</b> PW-SMTB-309-16120	
<b>File No. - N° de dossier</b> MTB-0-43240 (309)	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> Eastern Daylight Saving Time EDT <b>on - le 2021-05-28</b> Heure Avancée de l'Est HAE	
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<b>Address Enquiries to: - Adresser toutes questions à:</b> Paradis, Mary	<b>Buyer Id - Id de l'acheteur</b> mtb309
<b>Telephone No. - N° de téléphone</b> (514) 702-8173 ( )	<b>FAX No. - N° de FAX</b> ( ) -
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> Canadian Coast Guard 101 Boulevard Champlain Québec, PQ G1K 7Y7	

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**TITLE : PURCHASE OF AN ICE LANTERN DESIGN**

**THE ABOVE MENTIONED REQUEST FOR PROPOSAL HAS BEEN AMENDED AS FOLLOWS:**

**AT ANNEX 'A' – STATEMENT OF WORK**

**DELETE:** Annex 'A' in its entirety

**INSERT:** Annex 'A' – Revision no. 2

(See enclosed)

**AT ANNEX 'E' – MANDATORY TECHNICAL CRITERIA**

**DELETE :** Annex 'E' in its entirety

**INSERT:** Annex 'E' – Revision no. 2

(See enclosed)

**AT ANNEX "F" – POINT RATED MANDATORY TECHNICAL CRITERIA**

**DELETE :** Annex 'F' in its entirety

**INSERT:** Annex 'F' – Revision no. 1

(See enclosed)

**AT ANNEX "G" – CERTIFICATIONS**

**DELETE :** Annex 'G' in its entirety

**INSERT:** Annex 'G' – Revision no. 2

(See enclosed)

\*All other terms and conditions remain the same



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## Integrated Technical Services



Safety First, Service Always



# Ice Lantern Design

## ANNEX A

***Statement of Work–Revision no. 2***

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## Section 1 MANDATE DESCRIPTION

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### 1.1 PURPOSE

The Canadian Coast Guard (CCG) is responsible for ensuring the safety of mariners on Canada's waterways. To achieve this, the CCG has put in place several aids to navigation systems, including buoys equipped with lanterns. These lanterns must offer different levels of service, including minimum visual range, specific colors, and specific flashing characteristics.

### 1.2 SPECIFIC OBJECTIVES

The specific objectives of this mandate are:

- Create a new lantern design for CCG based on the tasks and technical requirements of Section 2 and 3 respectively;
- Ensure that the lanterns meet the requirements or more specifically the level of service required by the CCG, namely:
  - A light range of at least 4 nm (**effective luminous intensity of 37 candelas**);
  - Meet the colorimetry standards established by the International Association of Marine Aids to Navigation and Lighthouse Authorities (Reference 1.6.5);
  - Produce common signals (flashes) as listed in the CCG List of Lights.

### 1.3 CONTRACTOR'S RESPONSIBILITY

The contractor must provide all services necessary to complete the tasks detailed in **Section 2** and undertakes to deliver the work as described in this document on time. In addition, the contractor must design the lantern while respecting the technical statements of requirements detailed in **Section 3**.

The Contractor's Quality Management System must be ISO 9001: 2008 (or ISO 9001: 2015) - Quality Management Systems certified.

### 1.4 CCG'S RESPONSIBILITY

The CCG will provide the following:

1. Technical support;
2. Reference works (Section 1.6);
3. Any other documentation necessary for the performance of the mandate deemed relevant by the CCG or by the Contractor.

The contractor is responsible for identifying any other additional documentation that would be necessary to carry out his mandate. In this case, the contractor must inform the CCG as soon as possible, so that arrangements can be made to help meet the needs of the contractor.

In addition, the CCG is responsible for the lantern housing design (Section 5), i.e. the following components:

- Design and dimensions
- Materials
- Bolts and their respective torques

- Sealing of the lantern, including the seal design
- Protection against birds

Note that the CCG is not responsible for the development of the lens, it is shown in Section 5 for guidance only.

## 1.5 OTHER RESOURCES

All work is to be performed at the Contractor's normal workplace. The contractor must provide the necessary manpower, administration software, supervision, tools, measuring devices and equipment, supplies and other accessories, services and facilities necessary to meet the defined requirements. in this statement of work.

The Contractor must provide a Main Project Team that has the knowledge and required experience to perform the work described in Table 1 (section 2 – Task List). This team must include at least the following four (4) people.

**Project Manager:** The Project Manager of the team must have successfully managed at least four projects with a minimum value of \$ 250,000 in the past 5 years. In addition, the project manager must have a minimum of years in project management related to similar projects in field of optics.

**Project Engineer:** The Project Engineer of the team must be an active member of the *Ordre des Ingénieurs du Québec* (or an equivalent in other provinces within Canada) *and* have a bachelor's degree in Engineering in a relevant field of study. The project engineer must have work experience on similar projects within the past years.

**Principal Investigator:** The Principal Investigator of the team must have a University degree in the field of optics. The Principal Investigator must have work experience on similar projects within the past 5 years.

**Principal Technologist:** The Principal Technologist should have a post-secondary degree in a relevant field of study and have a minimum of years of work experience in optical analysis and laboratory testing.

In order to support the Main Project Team, whether at the research, technical or management level, the Contractor also has the option of employing the following job categories:

- Senior Engineer/Investigator (more than 15 years of experience)
- Intermediate Engineer/Investigator (between 3 and 15 years of experience)
- Junior Engineer/Investigator (less than 3 years of experience)
- Technician (high school degree)
- Technologist (post-secondary degree)
- Production Engineering Specialist \*

The Contractor must explain the relevance of the participation of each optional person and present proof of competence (CV, diploma) related to the project. Note: contractor has the possibility to hire more than one (1) person in the same employee category.

*\* The Production Engineering Specialist is responsible for work related to manufacturing programs, scheduling, logistics, maintenance, procurement and planning. He is responsible for production on an industrial scale in terms of quantity, quality and lead time.*

## **1.6 REFERENCE MANUALS**

The Contractor must declare in its bid that he will perform all the work requested (Table 1) according to the following reference manuals:

- 1.6.1** IEC 60529:1989+AMD1:1999+AMD2:2013 and CSV/COR2:2015 *Degrees of protection provided by enclosures (IP Code).*
- 1.6.2** MIL-STD-202H, *Department of Defense Test Method Standard: Electronic and Electrical Component Parts.*
- 1.6.3** MIL-STD-810G, *Environmental Engineering Considerations and Laboratory Tests.*
- 1.6.4** Canadian Coast Guard, Notice to Mariners (NOTMAR) List of Lights, Buoys and Fog Signals (4 Volumes) – <https://www.notmar.gc.ca/list-livre-en.php>
- 1.6.5** IALA. 2008a. IALA Recommendation E-200-1 On Marine Signal Lights. Part 1 – Colours. Edition 1. December 2008. 17 p.
- 1.6.6** IALA. 2008b. IALA Recommendation E-200-2 On Marine Signal Lights. Part 2 - Calculation, Definition and Notation of Luminous Range. Edition 1. December 2008. 21 p.
- 1.6.7** IALA. 2008c. IALA Recommendation E-200-3 On Marine Signal Lights. Part 3 - Measurement. Edition 1. December 2008. 21 p.
- 1.6.8** IALA. 2008d. IALA Recommendation E-200-4 On Marine Signal Lights. Part 4 - Determination and Calculation of Effective Intensity. Edition 1. December 2008. 21 p.
- 1.6.9** IALA. 2008e. IALA Recommendation E-200-5 On Marine Signal Lights. Part 5 - Estimation of the Performance of Optical Apparatus. Edition 1. December 2008. 21 p.
- 1.6.10** IALA. 2005. IALA Recommendation E-200-110 for the Rhythmic Characters of Lights on Aids to Navigation. Edition 2. December 2005. 14 p.

## Section 2 TASK LIST

At the request of the CCG, the contractor must provide all services necessary to complete the tasks detailed in Table 1.

**Table 1 Task Descriptions.**

Task #	Description
<b>0</b>	<b>Project planning</b>
0.1	Perform a detailed task analysis to identify the needs of each.
0.2	Define the potential difficulties and problems of each task.
0.3	Plan the order of priority in which the tasks should be completed in order to be as efficient as possible throughout the project.
0.4	Prepare an initial report detailing the procedure for developing the project.
<b>1</b>	<b>LED Design</b>
1.1	Select <b>red</b> LED light to meet color requirements (Section 3.2.3.1) and power consumption (Section 3.3.1).
1.2	Select <b>green</b> LED light to meet color requirements (Section 3.2.3.1) and power consumption (Section 3.3.1).
1.3	Select <b>yellow</b> LED light to meet color requirements (Section 3.2.3.1) and power consumption (Section 3.3.1).
1.4	Select <b>white</b> LED light to meet color requirements (Section 3.2.3.1) and power consumption (Section 3.3.1).
1.5	Prepare a progress report as described in task 9.1.
1.6	Block of 20 hours of work to make adjustments, at the request of the CCG.
<b>2</b>	<b>Lens Design</b>
2.1	Design the lens to meet dimension requirements (Section 3.1.4.1), vertical divergence (Section 3.2.1.2) and environment (Section 3.4) requirements.
2.2	Prepare a progress report as described in task 9.1.
2.3	Block of 20 hours of work to make adjustments, at the request of the CCG.
<b>3</b>	<b>Electrical System Design</b>
3.1	Design the mounting of the LED lights on a PCB, while respecting the dimensions requirements (Section 3.1.4.1) and the lantern requirements (Section 3).
3.2	Design the electrical system of the lantern (including Bluetooth, inclinometer, photocell, GPS, etc.).
3.3	Prepare a progress report as described in task 9.1.



Task #	Description
3.4	Block of 20 hours of work to make adjustments, at the request of the CCG.
<b>4</b>	<b>Lantern Programming</b>
4.1	Using Bluetooth technology, design an application, which can be used on <b>Windows</b> developed by Microsoft, allowing the control and programming of the functions (Section 3.3.3) of the lantern.
4.2	Using Bluetooth technology, design an application, which can be used on <b>Android</b> system developed by Google, allowing the control and programming of the functions (Section 3.3.3) of the lantern.
4.3	Using Bluetooth technology, design an application, which can be used on <b>iOS</b> developed by Apple, allowing the control and programming of the functions (Section 3.3.3) of the lantern.
4.4	Prepare a progress report as described in task 9.1.
4.5	Block of 20 hours of work to make adjustments, at the request of the CCG.
<b>5</b>	<b>Prototyping</b>
5.1	Produce 1 prototype of the lantern with <b>red</b> colored LEDs.
5.2	Produce 1 prototype of the lantern with <b>green</b> colored LEDs.
5.3	Produce 1 prototype of the lantern with <b>yellow</b> colored LEDs.
5.4	Produce 1 prototype of the lantern with <b>white</b> colored LEDs.
5.5	Prepare a progress report as described in task 9.1.
5.6	Block of 20 hours of work to make adjustments, at the request of the CCG.
<b>6</b>	<b>Electrical Performance Analysis</b>
6.1	<p>Measure the lantern consumption (in Watt) using the following programming:</p> <ol style="list-style-type: none"> <li>1. Type <i>Quick</i> of 1 second (0.3 s ON et 0.7 s OFF)</li> <li>2. Type <i>Flash</i> of 4 seconds (0.5 s ON et 3.5 s OFF)</li> </ol> <p>Mesure la consommation de la lanterne (en Watt) de toute les autres composantes/fonction de la lanterne</p> <p>Mesurer la consommation journalière à l'aide des mesures de tension (Volt) et de courant (Ampère).</p>
6.2	Prepare a progress report as described in task 9.1.
<b>7</b>	<b>Optical Performance Analysis</b>
7.1	<p>Measure the <b>effective</b> luminous intensity (in candela) of the lantern at an angle of <b>0 degree</b> (vertical and horizontal axes) according to the following light cycles:</p> <ol style="list-style-type: none"> <li>1. Type <i>Quick</i> of 1 second (0.3 s ON et 0.7 s OFF)</li> <li>2. Type <i>Flash</i> of 4 seconds (0.5 s ON et 3.5 s OFF)</li> </ol> <p>The power of the lantern must be programmed for 4 nm.</p>

Task #	Description
	The calculation of the effective intensity must be performed using the Schmidt-Clausen and Modified Allard methods, as described by Reference 1.6.8. Measure the duration of the lantern flash periods for Flash and Quick modes. Measure the frequency of the light signal (pulse width modulation – PWM).
7.2	Establish the horizontal scanning intensity photometric output (azimuth). Measure the intensity (in candela) every 15° (at least 24 measurements).
7.3	Establish the photometric intensity curve in vertical scanning (elevation). Measure the intensity (in candela) at each degree between -15 ° and 15 ° (at least 31 measurements).
7.4	Perform a colorimetry test (emission spectrum). Measure the x, y and Z coordinates established according to the CIE (International Commission on Illumination) 1931 standard. Check if the results obtained are located within the optimal color regions (Table 4) recommended at Reference 1.6.5.
7.5	Prepare a progress report as described in task 9.1.
<b>8</b>	<b>Shock Test</b>
8.1	Perform a shock test as described in MIL-STD-202H (Method 213 - Test condition H). Check the functioning of the lantern after the shock test and describe its condition.
8.2	Prepare a progress report as described in task 9.1.
<b>9</b>	<b>Progress Report</b>
9.1	Without limitation, prepare a report (written in French) containing the following aspects: <ul style="list-style-type: none"> <li>• Methodology (measuring instruments, assembly, photos, etc.);</li> <li>• Results from the task (according to the request), including figures and tables;</li> <li>• Discussion of results and compliance with CCG requirements;</li> <li>• Conclusion and recommendations.</li> </ul>
9.2	At the request of the CCG, translate the report into English.
<b>10</b>	<b>User's Manual</b>
10.1	Prepare a user's manual on the operation of the lantern, taking care to cover the following aspects: <ul style="list-style-type: none"> <li>• Introduction</li> <li>• General (connectivity, technical specifications, etc.)</li> <li>• Installation / maintenance of electronics and optics</li> <li>• Information on the mobile application</li> <li>• Programming the lantern</li> </ul>

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Task #	Description
10.2	Block of 20 hours of work to make adjustments, at the request of the CCG.
<b>11</b>	<b>Drawings and Specifications</b>
11.1	Prepare the drawings and specification for the lantern in order to produce the lantern in large quantities.
11.2	Block of 20 hours of work to make adjustments, at the request of the CCG.

## Section 3 PERFORMANCE SPECIFICATIONS

### 3.1 GENERAL

#### 3.1.1 Fundamental Design

- 3.1.1.1 The Lantern must use Light Emitting Diodes (LED) as a light source. LEDs must be affordable and energy efficient.
- 3.1.1.2 The complete electronic circuit (except the power source) must be integrated inside the lantern housing and must be located to provide a good wireless communication without any interference.

#### 3.1.2 Material

- 3.1.2.1 The Lantern must be made of materials which will not be subject to damage due to corrosion or rust during the life expectancy of the Lanterne.
- 3.1.2.2 The Lantern must not contain any toxic or radioactive materials.
- 3.1.2.3 The material used for the manufacture of the lens must be transparent, hard (Rockwell hardness scale of R118-R121 or M50-M72), and must withstand a minimum pressure of 62 MPa (9,000 PSI).

#### 3.1.3 Finish

- 3.1.3.1 External components must have a smooth finish and be uniform in colour and appearance.
- 3.1.3.2 The lens must not affect the transmission of IALA colours for no less than the service life of the Lantern outlined in 3.5.1.
- 3.1.3.3 Ultraviolet exposure must not cause material breakdown of the lens or its decoloration; the lens must maintain structural integrity for no less than the service life of the Lantern outlined in 3.5.1.
- 3.1.3.4 All components of the Lantern must be free of cracks, burrs, sharp edges, and other defects and blemishes that could affect their life, appearance, and serviceability.

#### 3.1.4 Physical Characteristics

- 3.1.4.1 The lens and optical hardware must not exceed the dimensions and weight in Table 2.

**Table 2 Lens and Optical Hardware Physical Characteristics.**

Maximum Diameter of the lens (mm)	Maximum Height of the lens (mm)	Maximum Weight
110	50	1.5

#### 3.1.5 Identification Nameplate

- 3.1.5.1 The Lantern must have an identification nameplate with the following information:
  - a) Name of manufacturer;

- b) Model number;
- c) Serial Number;
- d) Date of Manufacture (YYYY-MM-DD); and
- e) Lantern colour.

3.1.5.2 The identification nameplate must be indelible.

3.1.5.3 The identification nameplate must be located on the exterior of the unit.

## 3.2 OPTICAL PERFORMANCE

### 3.2.1 General Considerations

3.2.1.1 The Lantern must use pulse-width modulation and must operate at frequencies no less than 100 Hz.

3.2.1.2 The Lantern must meet the optical characteristics outlined in Table 3. Luminous intensity must be calculated using the Modified Allard Method, with an atmospheric transmissivity coefficient of 0.741 (in accordance with IALA E-200-3, Marine Signal Lights).

**Table 3 Optical Performance Requirements.**

Min. Nominal Range (nm)	Min. Effective Intensity (cd)	Min. Vertical Divergence	Acceptable Horizontal Divergence Variability
4	37	7.5 (above) 7.5 (below)	±10

Note, the vertical divergence is measured from the point where the peak intensity falls below 50%.

### 3.2.2 Flash Characteristics

3.2.2.1 The Lantern must be capable of producing the common signals (flashes) as listed in the Canadian Coast Guard List of Lights, Buoys and Fog Signals (references 1.6.4 and 1.6.10).

### 3.2.3 Signal Colours

3.2.3.1 The light signal provided by green, red, white, and yellow Lanterns must fall within the boundaries of the **optimum regions** (Figure 1 and Table 4) and satisfy the chromaticity requirements of IALA E-200 (reference 1.6.5).

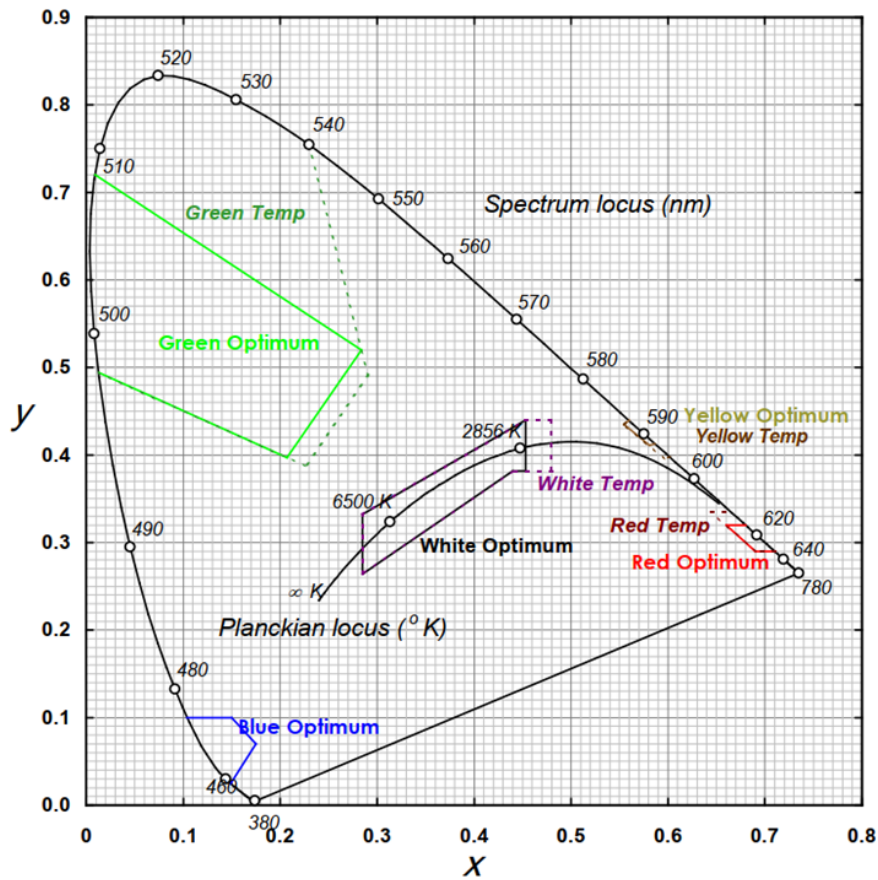


Figure 1 Optimum Chromaticity Regions

Table 4 x and y coordinates of the optimum chromaticity regions.

Colour	1		2		3		4		5	
	x	y	x	y	x	y	x	y	x	y
Red	0.71	0.29	0.69	0.29	0.66	0.32	0.68	0.32		
Yellow	0.5865	0.413	0.581	0.411	0.555	0.435	0.56	0.44		
Green	0.009	0.720	0.284	0.520	0.207	0.397	0.013	0.494		
White	0.44	0.382	0.285	0.264	0.285	0.332	0.453	0.44	0.453	0.382
Blue	0.104	0.1	0.15	0.1	0.175	0.07	0.149	0.025		

### 3.3 ELECTRICAL REQUIREMENTS

#### 3.3.1 Energy Consumption

3.3.1.1 Calculated autonomy values must meet the following requirements and parameters:

- Nominal range, as described in Section 3.2.1.2
- Duty cycle: Quick 1 s (0.3s ON; 0.7s OFF) - 30%
- 1.5 W max (average power during 0.3s ON)
- Lantern hours of operation per day: 14 h/day
- Signal colours: red, green, yellow and white
- Max daily consumption, including any other electronic component: 6.5 Wh / day

#### 3.3.2 Power Supply

3.3.2.1 The Lantern must be able to be powered by two separate energy sources.

3.3.2.2 The Lantern must be powered by a DC energy source varying between 8 and 30 Volts.

3.3.2.3 The lantern electronic system must be equipped with a button type battery which will **only** power the internal clock if a failure of the main power supply occurs **only**. This battery must be able to power the internal clock for the **entire** life of the lantern.

#### 3.3.3 Control

3.3.3.1 The Lantern must be able to be programmed by a computer or a smart phone (using Bluetooth technology).

3.3.3.2 The Lantern must be equipped with a GPS so it can be geolocated.

3.3.3.3 Regardless of the lantern color, the lantern signals must be synchronized with identical signals from nearby lanterns, all done using, per example, GPS technology.

3.3.3.4 The Lantern must be able to be equipped with a GSM (Global System for Mobile Communications) in order to establish remote communication.

3.3.3.5 The Lantern must be capable of being manually or automatically turned off without disassembling the housing or removing the battery. Turned off is defined as a very-low-power sleep state intended for long-term storage.

3.3.3.6 The Lantern must be capable of switching on whenever ambient illumination, measured on the horizontal plane, falls below **50 lux** for a period of at least 5 minutes. This value must be adjustable within the range of 25 to 150 lux, using an increment of 25 lux.

3.3.3.7 The Lantern must be capable of switching off whenever ambient illumination, measured on the horizontal plane, rises above **150 lux** for a period of at least 5 minutes. This value must be adjustable within the range of 25 to 150 lux, using an increment of 25 lux.

3.3.3.8 The Lantern must have the functionality to automatically switch into “OFF” mode at a user-configurable, preprogrammed date, and automatically turn on again at a later,

user-configurable, preprogrammed date. This functionality must be enabled or disabled by the user.

- 3.3.3.9 The Lantern must be able to turn off automatically when its heeling angle exceeds 50 degrees (from vertical) for 30 seconds, and turn on when the angle returns below that value. This value must be adjustable within the range of 45 to 70 degrees, using an increment of 5 degrees.
- 3.3.3.10 The lantern must switch off after 24 hours of continuous operating and switching back on when the photocell sees the sun. The date clock according to section 3.3.3.8 must not be affected.
- 3.3.3.11 The lantern must have the possibility of being turned on or off according to the hours of average sunshine according to each month of the year, see the data in Table 4. When the lantern is managed by the calendar, the luminosity sensor must be **turned off** to prevent any interference during the lantern ON/OFF management.

Table 4\*

Month	Sunrise (hour)	Sunset (hour)
January	07:23	16:24
February	06:48	17:08
March	05:54	17:52
April	04:55	18:34
May	04:09	19:14
June	03:51	19:39
July	04:08	19:32
August	04:44	18:52
September	05:23	17:54
October	06:05	16:55
November	06:48	16:11
December	07:22	15:59

### 3.3.4 App Display

- 3.3.4.1 The lantern App must display the following parameters:
- Lantern Status;
  - Battery status;
  - Temperature;
  - GPS Position;
  - Counters: Lantern Operating Time;
  - Detailed Lantern Configuration;
  - Detailed Lantern information (model number, color, serial number);
  - Detailed App information (version);



- Warning code in the event of a malfunction / error of the the electrical system and sensors.

3.3.4.2 The application must be available in both French and English.

### **3.3.5 Protection**

3.3.5.1 The Lantern must be provided with a low voltage disconnect to protect the battery from damage. This voltage value must be user programmable.

3.3.5.2 The Lantern must have reverse polarity protection to preclude inadvertent electrical system damage. The lantern must resume correct operation as soon as the correct polarity is provided.

3.3.5.3 The Lantern must have short-circuit protection and remain fully functional after a short-circuit situation.

3.3.5.4 The Lantern must have over-pressure protection to prevent the build-up of gas within the Lantern. This device must also prevent moisture intake.

### **3.3.6 Electrical Cable**

3.3.6.1 The Lantern must be equipped with a submersible cable (1 m  $\pm$  0.05 m long) that has an **RMG-2-MP connector**.

3.3.6.2 The cable must be CSA certified, UL listed, or CE certified and RoHS or ISO 14001 compliant and meet the following specifications:

- RMG connectors moulded with cable;
- SOOW cable type;
- Number of conductors: 2;
- Wire gauge: AWG 18; and
- Nominal outer diameter of cable: 9 mm [0.345"].

## **3.4 ENVIRONMENT**

### **3.4.1 Temperature**

3.4.1.1 The Lantern must be capable of operating in temperatures ranging from -30 °C to +40 °C.

### **3.4.2 Environmental Resistance**

3.4.2.1 The lens material must be outdoor use approved (UV resistance and abrasion resistance).

### **3.4.3 Electromagnetic Interference**

3.4.3.1 The Lantern must not be susceptible to interference from radiating devices normally found in the marine environment when tested in accordance with IEC 60945.

#### **3.4.4 Static Discharge**

- 3.4.4.1 The Lantern must incorporate protection from static discharges and induced transient voltages on power leads that may occur. Testing must be in accordance with the standard IEC 61000-4-2:2008.

#### **3.4.5 Shock**

- 3.4.5.1 The Lantern must remain operational after a shock event as outlined in MIL-STD-810G Method 516.6 Procedure I – Functional Shock or MIL-STD-202H (Method 213 - Test condition H).

#### **3.4.6 Immersion Protection**

- 3.4.6.1 The Lantern must meet ingress protection IP68, in accordance with IEC 60529:1989+AMD1:1999+AMD2:2013 and CSV/COR2:2015.

### **3.5 SERVICE LIFE**

#### **3.5.1 General Considerations**

- 3.5.1.1 The Lantern must have an expected service life of no less than 10 years.

## **Section 4 DELIVERABLES AND SCHEDULE**

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### **4.1 CONDUCT OF WORK AND COMMUNICATION**

During the completion of the mandate, communications between CCG and the Contractor may be oral or by email.

Any communication that requires a decision must be directed to the Technical Authority. All deliverables listed in Section 2 must be sent to the Technical Authority. Acceptance of this work will be ensured by the Technical Authority.

### **4.2 SCHEDULE**

The contractor must provide the CCG with a typical schedule for completing each task listed in Section 2. The completion of a task must not be more than 4 weeks.

### **4.3 WORK PROGRESSION**

The contractor must inform the CCG by email of the progress of the work.

### **4.4 CCG BASE ACCESS**

No work will take place at the CCG Quebec Base.

### **4.5 TRAVEL**

No travel is anticipated under this mandate.

### **4.6 LANGUAGE**

All communication, both orally and in writing, must be held in French or in English. Technical documents prepared within this mandate, such as reports, must be written in French.

## **Section 5    CONCEPT – SMART ICE LANTERN**

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There are no changes to Section 5.

**ANNEX "E" –Revision no. 2**

**MANDATORY TECHNICAL CRITERIA**

The information that figures in the tables below must be duly completed and submitted at the closing date and hour of the solicitation document.

All the criteria identified below are MANDATORY. Each criteria must be met and documentation provided in order to demonstrate the degree to which it is met.

Please identify where the substantial document is located in your proposition.

Canada will not evaluate information such as references to a website address where supplementary information can be found.

Only those proposals that meet all the mandatory technical criteria in the table below will be subject to further evaluation.

**The offers that fail to meet all these conditions will be rejected.**

MANDATORY EVALUATION CRITERIA	DESCRIPTION	CONFORMANCE METHOD
1	<p>The Contractor must provide a Main Project Team that has the knowledge and required experience to perform the work described in Table 1 of the Statement of Work (section 2 – Task List). This team must include at least the following four (4) people.</p> <ul style="list-style-type: none"><li>• Project manager</li><li>• Project engineer</li><li>• Principal investigator</li><li>• Principal Technologist</li></ul> <p>In order to support the Main Project Team, whether at the research, technical or management level, the Contractor also has the option of employing the following job categories:</p> <ul style="list-style-type: none"><li>• Senior Engineer/Investigator (more than 15 years of experience)</li><li>• Intermediate Engineer/Investigator (between 3 and 15 years of experience)</li><li>• Junior Engineer/Investigator (less than 3 years of experience)</li><li>• Technician (high school degree)</li><li>• Technologist (post-secondary degree)</li><li>• Production Engineering Specialist *</li></ul> <p>The Contractor must explain the relevance of the participation of each optional person and present</p>	Team Description and Curriculum vitæ

	<p>proof of competence (CV, diploma) related to the project. Note: contractor has the possibility to hire more than one (1) person in the same employee category.</p> <p><i>* The Production Engineering Specialist is responsible for work related to manufacturing programs, scheduling, logistics, maintenance, procurement and planning. He is responsible for production on an industrial scale in terms of quantity, quality and lead time.</i></p>	
2	The Project Manager of the team must have successfully managed at least four projects with a minimum value of \$ 250,000 in the past 5 years. In addition, the project manager must have a minimum of years in project management related to similar projects in field of optics.	Curriculum vitae
3	The Project Engineer of the team must be an active member of the Ordre des Ingénieurs du Québec (or an equivalent in other provinces within Canada) and have a bachelor's degree in Engineering in a relevant field of study. The project engineer must have work experience on similar projects in the field of optics within the past years.	Curriculum vitae AND Engineer's Permit
4	The Principal Investigator of the team must have a university degree in the field of optics. The Principal Investigator must have work experiences of similar projects in the last 5 years.	Curriculum vitae AND University Degree
5	The Principal Technologist must have a post-secondary degree in a relevant field of study and have a minimum of years of work experience in optical analysis and laboratory testing.	Curriculum vitae AND post-secondary degree
6.	The Contractor's Quality Management System must be ISO 9001: 2008 (or ISO 9001: 2015) - Quality Management Systems certified.	Certification

**ANNEX "F" –Revision no. 1**

**POINT RATED MANDATORY TECHNICAL CRITERIA**

**POINT RATED EVALUATION CRITERIA**

1. Technical proposals will be assessed for a total of **85 points** based on the grid below.  
The minimum rating required for each point-rated criteria is 5 Points, with the exception of the point-rated criteria #5 (which can be 0). Except for the point-rated criteria #5, all proposals which obtain a rating of less than 5 points for one of the first four point rated criteria will be declared non responsive.

1. At bid closing time, the bidder must comply with the following point-rated criteria at the table 1 below and provide the necessary documentation to support compliance. Any proposal that fails to obtain the minimum passing mark (that is to say a rating of less than 5 points per criteria, except for the point-rated criteria #5) will be declared non-responsive and will be given no further consideration.

Each criteria must be addressed separately.

2. For the evaluation of point-rated criteria, Canada will evaluate the résumés and the projects presented in the mandatory criteria evaluation framework.

Resource categories	Number of resources to evaluate
Project Manager	1
Project Engineer	1
Principal Investigator	1
Principal technologist	1

**TABLE 1**

POINT RATED CRITERIA		EVALUATION SCALE	MINIMUM Overall Score Required (for all the point rated criteria)	MAXIMUM Overall Score
			20 points	85 points
1	<b>Project Manager</b> The Project Manager must have ____ years of experience in project management related to	10 years = 5 points 15 years = 15 points 20 years = 20 points		

POINT RATED CRITERIA		EVALUATION SCALE	MINIMUM Overall Score Required (for all the point rated criteria)	MAXIMUM Overall Score
	similar projects in the field of optics.			
2	<b>Project Engineer</b> The Project Engineer must have work experiences on similar projects in the field of optics within the past ____ years.	5 years = 5 points 10 years = 15 points 15 years = 20 points		
3	<b>Principal Investigator</b> The Principal Investigator of the team must have a ____ degree in the field of optics.	Bachelor's degree = 5 points Master's degree = 15 points Ph. Degree = 20 points		
4	<b>Principal technologist</b> The Principal technologist must have work experiences on similar projects in optical analysis and laboratory testing within the past ____ years.	10 years = 5 points 15 years = 15 points 20 years = 20 points		
5	The following people must be employees of the Contractor: • Project manager • Project engineer • Principal investigator • Principal Technologist	Less than 4 employees = 0 point 4 employees = 5 points		
		<b>Total points :</b>		



**ANNEX "G" – Revision no. 2**

**CERTIFICATIONS**

**AT THE CLOSING DATE AND HOUR OF THE INVITATION OR BEFORE THE ISSUANCE OF THE CONTRACT, THE OFFERORS MUST PROVIDE THE FOLLOWING CERTIFICATIONS.**

All the criteria identified below are MANDATORY. Each criteria must be met and documentation provided in order to demonstrate the degree to which it is met.

Please identify where the substantial document is located in your offer.

If these documents have not been provided at bid closing, Public services and procurement Canada (PSPC) will notify the bidder that they are required to provide them within **two (2) business days** following a written notification by the PSPC's contracting officer.

(Note: this time requirement reflects PWGSC's expectation that these documents ought to be readily available to a bidder, offeror or supplier.)

The offers that fail to meet all these conditions will be rejected and will be given no further consideration.

MANDATORY EVALUATION CRITERIA	DESCRIPTION	CONFORMANCE METHOD	SUPPORTING DOCUMENTS REQUIRED  Please identify where the substantial document is located in your proposal.
1	<p>The Contractor must provide a Main Project Team that has the knowledge and required experience to perform the work described in Table 1 (section 2 – Task List). This team must include at least the following four (4) people.</p> <ul style="list-style-type: none"><li>• Project manager</li><li>• Project engineer</li><li>• Principal investigator</li><li>• Principal Technologist</li></ul> <p>In order to support the Main Project Team, whether at the research, technical or management level, the Contractor also has</p>	Team Description and Curriculum vitae	

	<p>the option of employing the following job categories:</p> <ul style="list-style-type: none"> <li>• Senior Engineer/Investigator (more than 15 years of experience)</li> <li>• Intermediate Engineer/Investigator (between 3 and 15 years of experience)</li> <li>• Junior Engineer/Investigator (less than 3 years of experience)</li> <li>• Technician (high school degree)</li> <li>• Technologist (post-secondary degree)</li> <li>• Production Engineering Specialist *</li> </ul> <p>The Contractor must explain the relevance of the participation of each optional person and present proof of competence (CV, diploma) related to the project. Note: contractor has the possibility to hire more than one (1) person in the same employee category.</p> <p><i>* The Production Engineering Specialist is responsible for work related to manufacturing programs, scheduling, logistics, maintenance, procurement and planning. He is responsible for production on an industrial scale in terms of quantity, quality and lead time.</i></p>		
2	<p>The Project Manager of the team must have successfully managed at least four projects with a minimum value of \$ 250,000 in the past 5 years. In addition, the project manager must have a minimum of years in project management related to similar projects in field of optics</p>	Curriculum vitæ	
3	<p>The Project Engineer of the team must be an active member of the Ordre des Ingénieurs du Québec(or an equivalent in other provinces within Canada) and have a bachelor's degree in Engineering in a relevant field of study. The project engineer must have work experience on similar projects in the field of optics within the past years.</p>	Curriculum vitæ AND Engineer's Permit.	
4	<p>The Principal Investigator of the team must have a university degree in the field of optics. The Principal Investigator must have work experiences of similar projects in the last 5 years.</p>	Curriculum vitæ AND University Degree.	

Solicitation No. - N° de l'invitation  
F7047-200102/A  
Client Ref. No. - N° de réf. du client  
F7047-200102

Amd. No. - N° de la modif.  
**004**  
File No. - N° du dossier  
MTB-0-43240

Buyer ID - Id de l'acheteur  
MTB309  
CCC No./N° CCC - FMS No./N° VME

5	The Principal Technologist must have a post-secondary degree in a relevant field of study and have a minimum of years of work experience in optical analysis and laboratory testing.	Curriculum vitae AND post-secondary degree	
6.	The Contractor's Quality Management System must be ISO 9001: 2008 (or ISO 9001: 2015) - Quality Management Systems certified.	Certification	