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Place du Portage , Phase III
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Gatineau
Québec
K1A 0S5
Bid Fax: (819) 997-9776

LETTER OF INTEREST
LETTRE D'INTÉRÊT

Title - Sujet Radar Equipment remplacement at CCG	
Solicitation No. - N° de l'invitation F7048-160039/A	**Date** 2016-12-01
Client Reference No. - N° de référence du client F7048-160039	**GETS Ref. No. - N° de réf. de SEAG** PW-$$QF-103-26082
File No. - N° de dossier 103qf.F7048-160039	**CCC No./N° CCC - FMS No./N° VME**
Solicitation Closes - L'invitation prend fin **at - à 02:00 PM** **on - le 2017-01-17**	**Time Zone** **Fuseau horaire** Eastern Standard Time EST
F.O.B. - F.A.B. Specified Herein - Précisé dans les présentes **Plant-Usine:** ☐ **Destination:** ☐ **Other-Autre:** ☑	
Address Enquiries to: - Adresser toutes questions à: Eddy, Kathie	**Buyer Id - Id de l'acheteur** 103qf
Telephone No. - N° de téléphone (819) 956-0768 ( )	**FAX No. - N° de FAX** (819) 956-5650
Destination - of Goods, Services, and Construction: **Destination - des biens, services et construction:** Specified Herein Précisé dans les présentes	

Comments - Commentaires

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur

Delivery Required - Livraison exigée See Herein	**Delivery Offered - Livraison proposée**

Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur

Telephone No. - N°de téléphone
Facsimile No. - N° de télécopieur

Name and title of person authorized to sign on behalf of Vendor/Firm (type or print)
Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)

Signature **Date**

Issuing Office - Bureau de distribution

Electronics, Simulators and Defence Systems Div.
/Division des systèmes électroniques et des systèmes de simulation et de défense
11 Laurier St. / 11, rue Laurier
8C2, Place du Portage
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Canada

LETTER OF INTENT
FOR
CANADIAN COAST GUARD
RADAR EQUIPMENT REPLACEMENTS

1. Objectives

The Government of Canada is investigating the procurement of shore-based radar equipment replacements and related services for the Canadian Coast Guard (CCG). As part of the process, the Government of Canada is providing suppliers with this Letter of Intent (LOI) to solicit information and feedback. Responses will be used to assist in finalizing the requirements. The intent is to procure Commercial Off The Shelf (COTS) equipment through a competitive bidding process.

2. Background and Definitions

The mandate of the CCG's Marine Communications and Traffic Services (MCTS) is to ensure the safe movement of marine traffic through Canadian waters. The mission of MCTS is to provide communications and traffic services for the marine community and for the benefit of the public at large to ensure:

- Safety of life at sea in response to international agreements.
- Protection of the environment through traffic management.
- Relay of information for business and national interest.

To support the MCTS mission, the CCG operates a number of marine radar sites. CCG Radar sites operate on a continuous 24/7 basis 365 days a year. High rates of equipment availability and operational reliability are critical for the operation of the Radar System. Any new Radar Equipment delivered by a Supplier shall be fully supported by the manufacturer with respect to availability and access to parts, documentation and knowledge for a minimum of ten (10) years after contract award. The anticipated Radar Equipment service life is twenty (20) years.

The scope of the radar equipment replacements includes the acquisition and deployment of coastal radar equipment to replace aging marine radar equipment currently used at:

- twenty-three (23) operational CCG radar sites across Canada;
- one (1) training site at the CCG College, Sydney, NS;
- to add radar equipment to the CCG operational network integration laboratory at Québec City, QC; and
- to interface with three (3) recently installed radar systems at Prince Rupert, BC.

The following definitions are provided:

a. A radar system is comprised of the following major radar equipment components: Radar Transceivers, Radar Extractor, Radar Antenna System, Radar Antenna Tower, and miscellaneous components including cabling, waveguides, active dehydrators, power supplies, remote control equipment, etc.

b. The main radar equipment required includes solid-state radar transceivers, radar extractors, and antennas and turning units. Collective reference shall hereinafter be referred to as "Radar Equipment".

c. COTS: Radar equipment that is currently in production and which can be offered without changing the original design or manufacturing environment;
d. Field-proven: Interviews conducted with other customers, including a review of failure incident reports, indicate that they are operating the same radar equipment models in similar operating environments without any failures or signs of reduced operational life that may be attributed to defective design or manufacturing processes for at least three (3) or more years, or that it can be demonstrated that early failures in the production life have been addressed and the equipment is now performing satisfactorily without any failure indications leading to reduced life expectancy;
e. Operator Control Position (OCP): The workstation console with which MCTS Operators monitors and communicates with mariners. OCPs are Government Furnished Equipment (GFE) Information System on Marine Navigation (INNAV) workstations to which the radar equipment shall interface;
f. Maintenance Control Position (MCP): The workstation console with which technologists monitor and perform maintenance and repair functions on MCTS communication systems and equipment.

3. General Requirements

The Radar Equipment deliverables shall be capable of:

1) integration with radar equipment that has not yet reached its' end of life and is being retained by the CCG; and
2) interfacing with the INNAV, and the CCG's Vessel Traffic Management Information System (VTMIS) via OCPs and with technical support remote services via networked MCPs.

A number of Radar Antenna Systems have not reached their end of life and are being retained at five (5) sites within the Central and Arctic (C&A) region. Three (3) radar systems acquired in a joint partnership between the Prince Rupert Port Authority and the Royal Canadian Mounted Police (RCMP) are being administered technically by the CCG and interfaced with the CCG's VTMIS. All equipment delivered shall be able to operate with the equipment being retained as a complete radar system

The Vendor shall deliver Radar Equipment as defined in the following Specifications:

1. Work shall be conducted according to the Annex A - Radar Equipment Replacement Statement of Work (SOW);
2. Radar transceiver and radar antenna equipment in accordance with the Annex B - Solid-State Radar System Technical Statement of Requirements (TSOR);
3. Radar extractor equipment in accordance with the Annex C - Radar Extractor/Tracker TSOR; and
4. The Radar Equipment and system configuration shall be in compliance with the Information Technology Security Guidance (ITSG) controls in accordance with the Annex D - Radar Equipment ITSG-33 Requirements.

The Vendor shall be responsible for delivering the new Radar Equipment and services to the CCG over an anticipated time period of not more than eight (8) years.

The Radar Equipment procured within this project shall not be developmental units. Only COTS, field-proven Radar Equipment shall be acceptable.

4. Schedule

The anticipated schedule is as follows:

a. LOI final submissions due to PWGSC Contracting Authority – December 2016.
b. Potential RFP – January 2017.
c. Potential Contract Award – April 2017.

5. Security

There is no security requirement associated with this LOI, however a potential future solicitation could include a security requirement.

6. LOI Instructions

Respondents are requested to provide an overall narrative regarding their system in response to the general requirements found in Section 3 above. Further to this, respondents are requested to complete Appendix 1 to this LOI. It is requested that respondents provide as much detail as possible.

7. Disclaimer

This is neither a call for tender nor a Request for Proposal (RFP), and no agreement or contract for the procurement of the Work stated herein will be entered into as a result of this LOI. This announcement does not constitute a commitment by Canada.
Canada does not intend to award a contract on the basis of the notice or otherwise pay for the information solicited. Any and all expenses incurred by companies in pursuing this opportunity are at the vendor's sole expense.

Although the documents/information/data collected may be provided as commercial-in confidence and will not be provided to a third party outside of Canada, Canada reserves the right to use the information to assist them in drafting performance specifications. Requirements are subject to change, which maybe a result of information provided in response to this LOI. Vendors are advised that any information submitted to Canada in response to this LOI may, or may not, be used by Canada in the development of the potential subsequent RFP. The issuance of this LOI does not create an obligation for Canada to issue a subsequent RFP, and does not bind Canada legally or otherwise, to enter into any agreement or to accept or reject any suggestions.

Any discussions on this subject with project staff representing CCG or PWGSC or any other Government of Canada representative shall not be construed as an offer to purchase or commitment by CCG, PWGSC, or the Government of Canada as a whole.

Participation in this LOI is not a condition or prerequisite for the participation to any RFP.

8. PWGSC Contracting Authority

Kathie Eddy, A/Supply Team Leader
Land and Aerospace Equipment Procurement and Support Sector
11 Laurier Street, Place du Portage, Phase III, 8C2,
Gatineau QC K1A 0S5
Telephone: 819-420-1747
Facsimile: 819-956-5650
E-mail: kathie.eddy@tpsgc-pwgsc.gc.ca

9. Additional Information Request

After review of all the information packages, the CCG project staff may request additional information, briefings, and/or demonstrations from the respondents. The Government of Canada, through the PWGSC Contracting Authority identified in Section 8, may contact respondents for further information.

10. Enquiries

All enquiries and other communications related to this LOI shall be directed exclusively to the Contract Authority. All enquires must be submitted to the PWGSC Contract Authority identified in Section 8 no later than five (5) calendar days before the closing date. Enquires received after that time may not be answered.
Care should be taken by vendors to explain each question in Appendix 1 in detail. Technical enquiries that are of proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified, as "proprietary" will be treated as such except where Canada determines that the enquiry is not of proprietary nature. Canada may edit the questions or may request the vendor to do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to the other vendors. Enquiries not submitted in a form that can be distributed to all vendors may not be answered by Canada.

11. Notes to Vendors

Suppliers wishing to submit a response are requested to respond in writing by the closing date on Page 1 of this notice.

Five (5) hard copies and two (2) soft copies of the information packages are requested.

Appendix 1 – QUESTION AND ANSWER

Note: Respondents are encouraged to provide a response to the LOI for both staggered equipment deployments and complete equipment configuration replacements. Respondents have the opportunity to comment on the adequacy and clarity of the requirement as currently expressed, and may offer suggestions regarding potential alternative solutions that would meet the general requirements in Section 3 above.

1. Please provide a point of contact, if further questions or clarifications are required.

2. Brief description of your company. Are you a manufacturer, supplier/distributor, or contractor / system integrator?

3. List of related radar equipment and services offered by your company.

4. Are you able to deliver equipment configurations that can be tailored for each site / life cycle stage and deployment services or are you proposing a singular or partial solution?

5. Provide a general overview of your radar equipment configurations sized to address CCG's various site requirements. Are the individually proposed radar transceiver, antenna system or extractor/tracker equipment capable of being deployed within CCG's existing equipment configurations in a one for one replacement? If you are proposing a partial solution, how would you propose it be integrated with the various site configurations?

6. CCG's Operational Network deployment for its Radar Systems has been assessed to have an ITSG-33 Confidentiality, Integrity and Availability (CIA) rating of 'Protected A, Low, Low'. Is the radar equipment or equipment configurations proposed currently capable of a CIA rating of Protected A, Low, Low or higher rating? Are there development plans to extend the ITSG-33 CIA capability rating of the proposed radar equipment or equipment configuration to a CIA of Protected A, Low, Low or higher? Provide a development roadmap to demonstrate this.

7. Provide other relevant information, including data sheets and other technical documents.

Fisheries and Oceans Canada | Pêches et Océans Canada

Coast Guard | Garde côtière

Radar Equipment Replacements

Canadian Coast Guard

STATEMENT OF WORK

Canada

Published under the Authority of:
Integrated Technical Services Directorate
Fisheries and Oceans Canada
Canadian Coast Guard
Ottawa, Ontario

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EKME Document No. 3468591v.9A
RADAR EQUIPMENT REPLACEMENTS
STATEMENT OF WORK

SECOND EDITION AUGUST 22, 2016

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Record of Amendments

N°	Date	Description	Initials
6	September 10, 2015	Final Document for Approval	TL
7	December 8, 2015	First Edition	TL
8	May 20, 2016	Revised Draft for Approval	TL
9	August 22, 2016	Second Edition	TL

Approvals

Office of Primary Interest (OPI) National Project Manager (PM) Project Authority (PA)	Thomas Lane	Approved:	
		Date:	
Life Cycle Manager (LCM) Technical Authority (TA) (Acting)	André Châteauvert	Approved:	
		Date:	
Project Leader Asset Class Manager (ACM)	Paul Chefurka	Approved:	
		Date:	
Director (Acting), ITS E&I Engineering Services	Benoit Guyon	Approved:	
		Date:	
Director (Acting), ITS Integrated Logistics Support	Stephen Mahoney	Approved:	
		Date:	
Director General, ITS	Sam Ryan	Approved:	
		Date:	

TABLE OF CONTENTS

1 DOCUMENT MANAGEMENT

1.1 AUTHORITY

1.1.1 This document is issued by the Director General Integrated Technical Services (ITS), Canadian Coast Guard's (CCG's) National Technical Authority (TA) under delegation from the Deputy Minister Fisheries and Oceans, and the Commissioner of the CCG.

1.2 RESPONSIBILITY

1.2.1 The Project Manager for the procurement of Radar Equipment, who resides in ITS E&I Engineering Services, is responsible for:

- Creation and promulgation of the document;
- Validity and accuracy of the content;
- Availability of this information;
- Updates as needed;
- Periodical revision; and
- Follow-up of all requests, comments and/or suggestions received to the originator.

1.3 INQUIRIES AND/OR REVISION REQUESTS

1.3.1 All inquiries regarding this document, including suggestions for revision and requests for interpretation shall be addressed to the OPI.

Position Title: National Project Manager

Address: Canadian Coast Guard,
Department of Fisheries and Oceans,
200 Kent Street, Mail Stop 7S036
Ottawa, Ontario
K1A 0E6

1.3.2 All requests should:

- Be clear and concise.
- Reference the specific Chapter, Section, Figure, Table or Appendices.

2 SCOPE

2.1 PURPOSE

2.1.1 The main purpose of this Statement of Work (SOW) is to define the work that shall be performed by the Contractor for the CCG requirement to acquire and deploy coastal radar equipment to replace aging marine radar equipment currently used at twenty-three (23) operational CCG radar sites across Canada, one (1) training site at the CCG College, Sydney, NS, to add radar equipment to the CCG operational network integration laboratory at Québec City, QC and to interface with three (3) recently installed radar systems at Prince Rupert, BC.

2.1.2 A radar system is comprised of the following major radar equipment components: Radar Transceivers, Radar Extractor/Tracker, Radar Antenna System, Radar Antenna Tower, and miscellaneous components including cabling, waveguides, active dehydrators, power supplies, remote control equipment, etc.

2.1.3 The main radar equipment to be delivered under this SOW includes solid-state radar transceivers, radar extractors/trackers, and antennas and turning units. Collective reference shall hereinafter be referred to as “Radar Equipment”.

2.1.4 The Radar Equipment deliverables shall be capable of 1) integration with radar equipment that has not yet reached its' end of life and is being retained and 2) interfacing with the Information System on Marine Navigation (INNAV) the CCG’s Vessel Traffic Management Information System (VTMIS). Radar Antenna Systems are being retained at five (5) sites within the Central and Arctic (C&A) region. Three (3) radar systems acquired in a joint partnership between the Prince Rupert Port Authority and the Royal Canadian Mounted Police (RCMP) are being administered technically by the CCG and interfaced with the CCG’s VTMIS. All equipment delivered shall be able to work with the equipment being retained as a complete radar system.

2.1.5 This SOW details the requirements for the provision of new marine radar equipment, to be located at various CCG sites across Canada, and the associated tasks to be performed by the Contractor including, but not limited to project management, engineering, manufacture and/or acquisition of equipment, acceptance testing, packaging and delivery, installation and interface support, training, and documentation.

2.1.6 This SOW is organized into the following sections:

a. Document Management (Section 1)

b. Scope (Section 2)

c. Applicable Documentation (Section 3)

d. Deliverables (Section 4)

e. Optional Items (Section 5)

f. Appendices

2.1.7 Under this SOW, the Contractor shall deliver Radar Equipment as defined in the following Specifications: Radar transceiver and radar antenna equipment in accordance with the Solid-State Radar System Technical Statement of Requirements (TSOR) and Radar extractor equipment in

accordance with the Radar Extractor/Tracker TSOR. The Radar Equipment and system configuration shall be in compliance with the Information Technology Security Guidance (ITSG) controls in accordance with the Radar Equipment ITSG-33 Requirements.

2.1.8 The Radar Equipment delivered by the Contractor shall be required to operate with the existing antenna systems at five (5) CCG installations located in the C&A region and the three (3) radar systems located in the Western region at Prince Rupert. The assembly of Radar Equipment and Government Furnished Equipment (GFE) at each site will then be referred to as a "Radar System".

2.2 GENERAL OPERATIONAL CONCEPT AND INTENDED USE OF EQUIPMENT

2.2.1 The mandate of the CCG's Marine Communications and Traffic Services (MCTS) is to ensure the safe movement of marine traffic through Canadian waters. The mission of MCTS is to provide communications and traffic services for the marine community and for the benefit of the public at large to ensure:

- Safety of life at sea in response to international agreements.
- Protection of the environment through traffic management.
- Relay of information for business and national interest.

2.2.2 To support the MCTS mission, the CCG operates a number of marine radar sites. CCG Radar sites operate on a continuous 24/7 basis 365 days a year. High rates of equipment availability and operational reliability are critical for the operation of the Radar System. Any new Radar Equipment delivered by the Contractor in response to this SOW shall be fully supported by the manufacturer with respect to availability and access to parts, documentation and knowledge for a minimum of ten (10) years after contract award. The anticipated Radar Equipment service life is twenty (20) years.

2.3 ACQUISITION APPROACH

2.3.1 The Contractor shall be responsible for delivering Radar Equipment to the CCG Regional Headquarter locations across Canada over an anticipated time period of not more than eight (8) years. Schedule details shall be finalized after contract award. A tentative radar equipment delivery – replacement schedule is included in section 4.6.4.4.

2.3.2 This SOW details the parameters associated with the purchase, support and all other associated requirements as defined herein.

2.3.3 The Radar Equipment shall comply with the requirements in the Radar Equipment Specifications.

2.3.4 The Radar Equipment procured within this project shall not be developmental units. Only Commercial off the Shelf (COTS), field-proven Radar Equipment shall be acceptable.

2.4 TERMINOLOGY

2.4.1 The following terms are used in this SOW and in the associated specifications. Their meaning shall be defined as below:

a. COTS: Radar equipment that is currently in production and which can be offered without changing the original design or manufacturing environment.

b. Field-proven: Interviews conducted with other customers, including a review of failure incident reports, indicate that they are operating the same radar equipment models in similar operating environments without any failures or signs of reduced operational life that may be attributed to defective design or manufacturing processes for at least three (3) or more years, or that it can be demonstrated that early failures in the production life have been addressed and the equipment is now performing satisfactorily without any failure indications leading to reduced life expectancy.

c. Operator Control Position (OCP): The workstation console with which MCTS Operators monitors and communicates with mariners. OCPs are GFE INNAV workstations to which the radar equipment shall interface.

d. Maintenance Control Position (MCP): The workstation console with which technologists monitor and perform maintenance and repair functions on MCTS communication systems and equipment.

e. Days: Refers to working days of the week, not including Canadian holidays or weekends.

3 APPLICABLE DOCUMENTATION

3.1 The following identifies the documents that shall be used to stipulate the work required of the Contractor.

3.1.1 Radar Equipment Replacements Statement of Work. EKME Document No. 3468591 (English). This document.

3.1.2 Solid-State Radar System TSOR, EKME Document No. 3614054 (English).

3.1.3 Radar Extractor TSOR, EKME Document No. 3614056 (English).

3.1.4 Radar Equipment ITSG-33 Requirements, EKME Document No. 3649079 (English).

3.1.5 ITSG-33 – Canadian Government IT Security Guidelines. https://www.cse-cst.gc.ca/en/publication/itsg-33

3.1.6 Quality Management - 1) Guidelines for Configuration Management, ISO 10007:2003. http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=36644 . 2) Consensus Standard for Configuration Management, ANSI/EIA-649 b. http://standards.sae.org/eia649b/ 3) Test Equipment Calibration Requirements, ISO 9001:2008 c. 7.6 or ISO 9001:2015 c.7.1.5 http://www.iso.org/iso/.

3.1.7 Canadian Environmental Protection Act and all applicable Regulations, Environment Canada; Health Canada, CEPA 1999. This document is available at: http://laws-lois.justice.gc.ca/eng/acts/c-15.31/.

3.1.8 Environmental Management Systems, ISO 14001:2015. http://www.iso.org/iso/catalogue_detail?csnumber=60857

3.1.9 Hazardous Products Act and all applicable Regulations, Health Canada, R.S., 1985, c.H-3. http://laws-lois.justice.gc.ca/eng/acts/H-3/

3.1.10 Transportation of Dangerous Goods Act and Regulations, Transport Canada, 1992 c34. https://www.tc.gc.ca/eng/acts-regulations/acts-1992c34.htm

3.1.11 Nuclear Safety and Control Act and all applicable Regulations, Natural Resources Canada, Canadian Nuclear Safety Commission, 1997 c.9. http://laws-lois.justice.gc.ca/eng/acts/N-28.3/index.html

3.1.12 Health Canada's Radiofrequency Exposure Guidelines, Safety Code 6. http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct/index-eng.php

3.1.13 Pest Control Products Act and all applicable Regulations, Health Canada, S.C. 2002. c.28 P-9. http://laws-lois.justice.gc.ca/eng/acts/P-9.01/

4 DELIVERABLES

The Contractor shall perform work to provide the following deliverables, as per the attached Deliverables List, Appendix B.

4.1 DOCUMENTATION AND DATA

4.1.1 General

4.1.1.1 The Contractor shall provide all project and technical documentation as specified in this SOW. The Contractor shall provide all documentation in a format as outlined in the Data & Documentation Formats, Appendix C. The Contractor shall provide the documentation identified in the Contract Data Requirements List (CDRL), Appendix D, in accordance with the corresponding Data Item Descriptions (DID), Appendix D.

4.1.1.2 Unless specified differently in each section, all documentation developed as a part of the work performed in this SOW shall be submitted to the CCG for acceptance purposes in two phases: draft and final.

4.1.1.3 Initial documentation shall be submitted for review and identified as draft. The Contractor shall submit one (1) soft copy of all draft documents to CCG Headquarters, Appendix C.5. Draft documentation submission dates and language requirements are specified in each section and summarized in the CDRL.

4.1.1.4 The CCG will review all draft documentation within thirty (30) days after receipt from the Contractor and verify its contents, identifying errors and required changes. The CCG will provide the Contractor with a marked up version of the draft with errors and required changes identified.

4.1.1.5 The Contractor shall correct all errors/changes identified by the CCG, as well as any that it has identified itself in the updated documentation, within ten (10) days after receipt of the marked up draft documentation from CCG.

4.1.1.6 Unless specified differently in each section, the Contractor shall submit one (1) draft soft copy of all documentation in French thirty (30) days after the CCG has accepted the English versions. The CCG will have twenty (20) days to review the drafts and provide a marked up version of the draft with errors/changes identified. The Contractor shall correct all errors and required changes identified by CCG, as well as any that it has identified itself in the updated documentation, within ten (10) days after receipt of the marked up draft documentation from the CCG. The Contractor shall supply one (1) final soft copy in French to CCG Headquarters.

4.1.1.7 The Contractor shall supply the final documentation in accordance with the quantities and language requirements within each section and summarized in the CDRL, Appendix D. A list of the project deliverables by regional destination is identified in the Deliverables List, Appendix B.

4.1.1.8 The final documentation shall become the basis for configuration control. The Contractor shall follow approved configuration control processes as per the Contractor's configuration management program for any changes made to the hardware, firmware, software or supplied items

that take place after final documentation has been accepted by CCG and inform the CCG of any changes throughout the Radar Equipment's service life.

4.1.2 Project Management Plan

4.1.2.1 The Contractor shall provide and maintain a Project Management Plan (PMP) in accordance with Project Management Institute's Project Management Body of Knowledge (PMBOK®) Guide or equivalent practices and include the information contained in DID PM-01 – *Project Management Plan* and submit it to the CCG Project Authority (PA) for acceptance, including a Work Breakdown Structure (WBS) and a Master Project Schedule (MPS). The starting plan baseline shall: identify all necessary activities needed to conduct the project; identify the resources that shall be allocated to conduct the activities; include a Gantt chart with dependencies showing how and when project objectives will be met; and, provide a schedule for the completion of appropriate milestones, starting from contract award and ending with the completion of the project.

4.1.2.2 The Contractor shall prepare a Risk Management Plan in accordance with DID PM-03 – *Risk Management Plan* and shall submit it to the CCG for acceptance. The Risk Management Plan may be a subset of the PMP. The Contractor shall report and manage project risks in accordance with its Risk Management Plan.

4.1.2.3 The Contractor shall implement a Risk Register (as described in the Risk Management Plan) to track the status of project risks. The Risk Register is a table providing essential information about each identified risk. An initial Risk Register, extracted from a Risk Mitigation Matrix (based on probability/impact) and included with the Risk Management Plan shall identify and describe identified risks and shall state the planned risk mitigation for each risk. The Contractor shall continuously update this information, and shall attach the current Risk Register to the Contractor's progress and status reports.

4.1.2.4 Within ten (10) days after the Project Kick-Off Meeting, the Contractor shall update the draft PMP and Risk Management Plan submitted with the bid, showing the critical path, near critical path and high risk items. This shall become the baseline PMP, including the Risk Management Plan, and it shall be submitted in English for acceptance by the CCG PA, along with one (1) hard copy for the Contract Authority (CA). The Contractor shall manage the project in accordance with this baseline PMP, as accepted by the CCG PA. All changes shall be recorded relative to this starting baseline and the PMP updated.

4.1.2.5 All changes to key project elements, such as scope and schedule, shall be controlled using a disciplined change management process. A Configuration Management Plan (CMP) in accordance with DID CM-01 – *Configuration Management Plan* shall be included as a separate section in the Contractor's PMP. Regardless of the origin of the change, the Contractor shall ensure that a Change Request is submitted and tracked to completion in accordance with DID CM-04 – *Change Request*. The configuration management of the Radar Equipment, see section 4.4.9, shall take effect following successful completion and sign-off of the Factory Acceptance Test (FAT) and continue through-out the manufacturer's product support life cycle.

4.1.2.6 In the event that there is substantive concern with the wording of any contractual/project document, the Contractor shall submit a request for clarification in accordance with DID CM-03 – *Request for Clarification*.

4.1.3 Project Progress Reports

4.1.3.1 Monthly written Project Progress Reports (PPRs) in accordance with DID PM-02 – *Contractor Progress and Status Report* shall be delivered to the CCG Project Manager starting one (1) month after the Project Kick-Off Meeting, and shall be provided for the duration of the contract. The CCG retains the right to alter the progress reporting schedule.

4.1.3.2 The reports shall include target start and completion dates and the percentage completion for each deliverable identified in the Deliverables List, Appendix B. Delays and forecasted problems shall be justified and fully explained, with solutions to minimize these delays.

4.1.3.3 The monthly written PPRs shall also include: progress status, actions, deliverables, deficiencies, issues, risks, risk mitigation strategies, upcoming steps, dependencies and concerns. The format of this report shall be approved by the CCG and include an updated MPS.

4.1.4 Technical Publications

4.1.4.1 The Contractor shall provide with the bid the supplier COTS technical publications required for description, operation, software user instructions, communication control interface development and commands usage, installation, troubleshooting, maintenance and repair of the Radar Equipment including sub-systems. Technical Publications include, but are not limited to the supplier COTS: installation drawings and instructions, system manuals, equipment manuals, software user manuals and interface specifications.

4.1.4.2 The Contractor shall provide one (1) soft copy in English of the manufacturer's Radar Equipment interface specifications and guidelines in accordance with DID SE-11 – *Interface Specification* and the Radar Equipment communications control commands and user guide for the purpose of interfacing the Radar Equipment with INNAV.

4.1.4.3 The Contractor shall supply a drawing and technical data package containing: all engineering drawings applicable to the CCG's defined level of maintenance, installation wiring connection diagrams, product/hardware/firmware/software specifications, associated lists such as provisioning parts list, recommended spares parts list, special tools and test equipment list, acceptance test report, and information necessary to support asset installation, configuration management, parts provisioning, technical investigations and development of repair schemes. Repair schemes shall be based on the CCG maintenance philosophy, which is to repair by line unit replacement. Drawings and Technical Data includes, but is not limited to: equipment technical specifications, asset drawings and installation drawings.

4.1.5 Maintenance Plan

4.1.5.1 The Contractor shall provide drafts of the Maintenance Plan in accordance with DID MM-04 – *Maintenance Plan,* DID MM-05 – *Preventive Maintenance Program* and DID MM-06 – *Calibration Requirements Report*, one (1) soft copy in English and French fifteen (15) days prior to the Spares Provisioning Meeting (SPM).

4.1.5.2 The Contractor shall supply a Maintenance Plan that shall identify any necessary corrective and preventive maintenance tasks based on the Contractor's Radar Equipment maintenance and repair procedures, and the Radar Equipment Mean Time Between Failures (MTBF) calculations and

reliability records, as per the Technical Specifications.

4.1.5.3 The Maintenance Plan shall be of sufficient detail to ensure that CCG-trained Technologists shall be able to troubleshoot, diagnose and replace any defective Radar Equipment, to the Line-Replaceable Unit (LRU) level, and restore the Radar System to its performance baseline condition detailed in the Specifications.

4.1.5.4 The Maintenance Plan shall identify the technical publications, spares, tools and special test equipment needed to perform the appropriate maintenance tasks in alignment with the Supply Plan, Appendix F.

4.1.5.5 The Maintenance Plan shall include a section on sparing including equipment reliability and system availability analysis as specified in the TSOR in alignment with DID SE-09 – *Reliability Data*, CCG's National Spares Management Strategy, Appendix E, and Supply Plan, Appendix F.

4.1.6 Equipment Manual

4.1.6.1 The Contractor shall provide an Equipment Manual in accordance with DID TDM-06 – *Equipment Manuals*. This manual is to be used for preventive and corrective maintenance, firmware and software updates and version control, quality assurance audits and commissioning of new Radar Equipment installations. It shall include a brief description of the equipment, components, features, parameters, standards, tolerances, maintenance schedules/procedures, and check lists. This manual is intended to be a concise guide for maintenance of Radar Equipment by a skilled technologist.

4.1.7 System Manual

4.1.7.1 The Contractor shall provide a System Manual in accordance with DID TDM-05 – *System Manuals*. This manual shall provide a complete description of the System from an operational point of view, provide a basic description of the functions of each sub-system, and identify and describe the controls that are used to control the operation of the Radar Equipment.

4.1.8 Software Documentation

4.1.8.1 The Contractor shall provide documentation in accordance with DID TDM-08 – *Software User Manual* on the operational software and firmware used in the system including instructions for upgrading or installing patches should this be necessary. This documentation may be incorporated into the System and Equipment Manuals, as appropriate.

4.1.8.2 The Contractor shall provide documentation of software version controls in accordance with DID TDM-07 – *Software Version Description Document*. This documentation may be incorporated into the System and Equipment Manuals, as appropriate.

4.1.9 Training Plan

4.1.9.1 The Contractor shall provide a Training Plan which includes both the technical and operational training courses. The Training Plan shall use the INNAV display as the OCP interface to the Radar Equipment.

4.1.9.2 The Contractor shall provide a draft Training Plan no later than twenty (20) days after

contract award.

4.1.9.3 The Contractor shall provide to the CCG the Training Plan draft, including outlines of the training courseware and instructor package in accordance with DID TT-03 – *Training Manuals* and the list of equipment required for training in accordance with DID TT-02 – *Training Devices Requirements List*. The Training Plan shall define and outline the course objectives, lesson plans, course syllabus, training aids, instructor manual, student manual, evaluation guide, schedule of proposed courses and the training equipment required.

4.1.9.4 Following approval by the CCG of the Training Plan, the Contractor shall also:

a. Develop the final training courseware and instructor packages;

b. Supply Training Packages for each of the Operational and Technical training courses; and

c. Supply one (1) student package for each student, plus one (1) spare, for each of the Operational and Technical training courses.

4.1.10 Training Course Material

4.1.10.1 The Technical and Operational Training Packages shall be approved by CCG prior to the start of the first training course. The documentation shall conform to DID TT-03 – *Training Manuals.*

a. The Contractor shall include/address the following objectives in the Technical Training Package:

i. Basic use of the Radar System
ii. General Radar Theory
iii. Frequency Diversity Theory
iv. Operational use of Radar for different weather conditions
v. Description of purpose of software and services related to radar functionalities and/or part of the Radar System design, which functionalities of the Radar System are provided by which software/services
vi. Description and demonstration with exercise (hands-on) upon stop and start/restart of essential services (Main & Backup, heartbeat and such)
vii. Description and demonstration with exercise (hands-on) of procedure to gracefully shutdown a radar server and restart it
viii. Procedures to upload/upgrade firmware/software in Radar Equipment
ix. Description and demonstration with exercise (hands-on) of the procedure to rebuild any workstation or server provided with the Radar System
x. Installation of the Radar Equipment
xi. Calibration and performance optimization of the Radar System
xii. Maintenance of the Radar Equipment to the manufacturer's specifications
xiii. Troubleshoot and diagnose problems with the Radar Equipment:
    - Diagnose equipment problems to the LRU
    - Remove and replace LRU with relevant spares
xiv. Remote provisioning, monitoring, health and security status checks and reports, diagnostics, version updates, resets, etc.
xv. Radar Equipment integration in CCG OpNet (IP addresses and naming convention)

xvi. Support roles and responsibilities, warranty process, in service-support plan, LRU list, Return Material Authorization (RMA) procedure, support related information
xvii. Components remote monitoring functionalities and interface (SNMP, etc)
xviii. Monitoring of backup processes and restores

b. The Contractor shall include/address the following objectives in the Operational Training Package:

i. Basic use of the Radar System
ii. General Radar Theory
iii. Frequency Diversity Theory
iv. Operational use of Radar for different weather conditions

4.1.10.2 The Contractor shall provide draft Technical and Operational Training Packages (in English) within forty (40) days of the Training Plan approval.

4.1.10.3 The Contractor shall provide one (1) hard copy of each of the CCG approved Training Packages to each student at the beginning of each course. The Contractor shall provide English and French training packages in accordance with the Deliverables List, Appendix B.

4.1.11 Test Plans and Procedures

4.1.11.1 The Contractor shall develop Test Plans in accordance with DID TE-02 – *Test Plan and Reports*, which details the methodology for the equipment level FATs and equipment and system level INNAV interface verification testing and Site Acceptance Tests (SATs). The Test Plan shall include the use of the INNAV display as the operational interface to the Radar Equipment.

4.1.11.2 The Contractor shall develop Test Procedures for the FAT and SATs in accordance with DID TE-03 – *Acceptance Test Procedures*.

4.1.11.3 The Test Procedures shall be designed to demonstrate that the Radar Equipment meets or exceeds all requirements of the TSORs, ITSG-33 and this SOW.

4.1.11.4 The FAT Configuration Document and the FAT Test Plan and Procedures shall be provided to the CCG for review as part of the FAT Readiness Review (FRR).

4.1.11.5 The SAT Test Plan and Procedures shall be provided to the CCG for review as part of the Installation Readiness Review (IRR).

4.1.11.6 The test schedules shall form part of the MPS.

4.1.12 Installation Drawings and Instructions

4.1.12.1 The Contractor shall provide Installation Drawings and Instructions for the configuration, integration and interface of the complete Radar System at twenty six (26) remote sites, the CCG Test Lab and the CCG College identified in section 4.7.3.1.

4.1.12.2 As a part of the installation instructions the Contractor shall provide a System Optimization Plan for each operation site.

4.1.12.3 The Contractor shall provide to the CCG three (3) printed copies and one (1) electronic

copy of the preliminary Installation Drawings and Instructions as part of each IRR package. The Installation Drawings and Instructions for Les Escoumins, île Charron, Pont Jacques Cartier, and Lévis, and the CCG Test Lab shall be in French.

4.1.12.4 In addition to being in accordance with DIDs TDM-02 – *Drawings and Associated Lists* and TDM-03 – *Equipment Installation Data Package*, the Installation Drawings and Instructions shall include the following:

a. Overall work plan and method of procedure;

b. Identification of all equipment and materials required;

c. Installation tasks and schedule;

d. Identification of special requirements needed from the CCG;

e. The agreed responsibility assignment matrix relating to use of CCG personnel; and

f. Equipment transport and travel logistics to all sites.

4.1.12.5 Following the IRRs the Contractor shall update the Installation Drawings and Instructions as required, including the appropriate drawings, and submit the Installation Ready Drawings and Instructions to the CCG fifteen (15) working days following the IRR.

4.1.12.6 Following successful completion of the SATs the Contractor shall provide final as-built equipment configuration drawings, including updating the Installation Drawings and Instructions for site specific deviations, to the CCG, ten (10) working days following the approved SAT.

4.1.13 ITSG-33 Security Compliance

4.1.13.1 CCG networks and information systems including the Radar Equipment provided by the Contractor shall be compliant with ITSG-33. The Radar System has been assessed to have a Confidentiality, Integrity and Availability (CIA) rating of 'Protected A, Low, Low'.

4.1.13.2 The Contractor shall describe and provide with the bid what capabilities the Radar Equipment and system configuration have that address the controls identified in and in accordance with the Radar Equipment ITSG-33 Requirements and how each requirement can be met.

4.1.13.3 Where capabilities do not currently exist within the proposed Radar Equipment and system configuration, the Contractor shall provide a development plan and complete the work as part of the overall project delivery to incorporate the missing capabilities.

4.1.13.4 The CCG will review and inform the Contractor of any non-compliances at the Project Kick-Off meeting.

4.1.13.5 The Contractor shall present resolutions to any non-compliances at the Preliminary Design Review (PDR) meeting.

4.1.13.6 The Contractor shall incorporate related ITSG-33 Requirements in the SAT to be performed at the CCG Test Lab and the CCG will observe completion of SAT related to ITSG-33 compliance performed at CCG Test Lab.

4.2 PROJECT MANAGEMENT

4.2.1 General

4.2.1.1 The Contractor shall utilize a formal organization of project management disciplines, including methods and procedures for directing, coordinating and controlling all contract efforts necessary to produce, test, deliver and support training and installation of the Radar Equipment, and to provide all other work, material, services and data as detailed in this SOW. The methodology shall be based on a recognized industry standard such as PMBOK®, Projects in a Controlled Environment (PRINCE2®) or similar internationally recognized standard for managing project delivery.

4.2.1.2 The Contractor shall establish this internal organization, headed by a single project manager, to carry out the work required for the project. The project manager shall have sufficient authority to plan, direct, control and make decisions for the project and to ensure that all contracted requirements are met in terms of tasks, specifications, schedules, quality and budget. The project manager shall be the main point of contact with the CCG.

4.2.2 Subcontract Management

4.2.2.1 The same controls and requirements placed on the Contractor's project team shall also be applicable to all Subcontractors.

4.2.2.2 If any of the work is subcontracted to another company or another division of the Contractor’s organization, all requirements of this SOW shall remain in force for the subcontracted work. The Contractor shall monitor and report on each subcontract to ensure that the subcontracted work progresses as required.

4.2.3 Problem Reporting/Design Changes

4.2.3.1 The Contractor shall advise the CCG by phone and email immediately on identifying a problem or issue that may result in a non-conformance to the Contract. Upon such notification, the CCG shall advise whether an unscheduled meeting or other action is required. The Contractor shall record all issues/problems and their resolution/disposition in an Issues Log, regardless of their severity, for review by the CCG. New and changes to issues/problems shall be referenced in the monthly progress report.

4.2.3.2 The Contractor shall report to the CCG PM and document any project changes, requirements changes, or design changes that may occur during the contract in accordance with DID CM-04 – *Change Request*.

4.2.4 Security

4.2.4.1 The Contractor’s staff conducting the work shall adhere to the provisions of the Contract Security Requirements Check List (SRCL).

4.2.4.2 The Contractor’s staff, when on a CCG site, shall be escorted by CCG personnel at all times.

4.2.5 Project Meetings

4.2.5.1 The following meetings and reviews shall be conducted by the Contractor:

a. Project Kick-Off (at Contractor's facility, Chair CA and PM);
b. Project Progress Review Meetings (PRM) (Chair CA and PM);
c. Project Preliminary Design Review (PDR) (Chair CA and TA);
d. Project Critical Design Review (CDR) (Chair CA and TA);
e. INNAV Interface Readiness Review (IIRR) (Chair TA and PM);
f. INNAV Interface Testing (IIT) (at CCG Test Lab, Québec City, Chair PM and Test Lab PM/TA);
g. Spares Provisioning Meeting (SPM) (Chair TA and PM);
h. In-Service Support Review Meeting (ISSR) (at CCG HQ, Chair CA and PM);
i. Factory Acceptance Test Readiness Review (FRR) (Chair TA and PM);
j. Factory Acceptance Testing (FAT) (at Contractor's Manufacturing Facility, Chair TA and PM);
k. Post Factory Acceptance Test Review (PFR) (Chair TA and PM);
l. Training Readiness Review (TRR) (Chair PM and TA);
m. Installation Readiness Reviews (IRR) (Chair PM and TA);
n. Site Installation (At CCG Sites, Chair TA and regional PM/TA);
o. Site Acceptance Testing (SAT) (at CCG Sites, Chair TA and regional PM/TA); and
p. Final Project Review (Chair CA and PM).

4.2.5.2 Where practical, reviews and meetings shall be scheduled to be held in conjunction with a regular PRM.

4.2.5.3 At CCG's discretion some or all meetings shall be conducted via teleconferences. Meetings conducted by teleconference may utilize video and web hosting capabilities, if required to support the intent of the meeting.

4.2.6 Conduct of Meetings

4.2.6.1 The Chair for each review meeting shall be as described in section 4.2.5.1 unless otherwise agreed to by the Contractor, PWGSC and the CCG.

4.2.6.2 The Contractor shall be responsible for the following in preparing for, and conduct of, these reviews and meetings:

a. Host and convene the reviews and meetings unless otherwise agreed by PWGSC and the CCG;
b. Co-ordinate, with PWGSC and the CCG, the agenda. The CCG shall approve the agenda prior to the review or meeting;
c. Ensure appropriate participation by Subcontractors, suppliers, and subject matter experts;
d. Organize and present briefings as necessary;

e. Provide appropriate facilities and administrative services;

f. Provide test data, design data, and analysis supporting the review;

g. Record, publish, and distribute minutes with Action Items and due dates documented in the reviews and meetings; and

h. Maintain files of records, an Action Item database, and documentation from all reviews and meetings.

4.2.6.3 One (1) electronic copy of the agenda, for approval, and the related documents for these meetings shall be provided to PWGSC CA and the CCG PM, five (5) working days prior to the meeting.

4.2.6.4 The Contractor shall maintain historical, chronological, and an up-to-date list of Action Items in accordance with DID PM-02 – *Contractor Progress and Status Report*. Outstanding Action Items shall be an attachment to all meeting agendas, as tracked in the Progress and Status Report. Minutes shall be distributed within five (5) days of the corresponding meeting. The CCG shall have final approval over the content of the minutes.

4.2.6.5 The reviews and meetings may be cancelled at the discretion of the CCG with a minimum of ten (10) days' notice. Rescheduling of reviews and meetings by the Contractor shall be done only with the approval of the PWGSC CA and the CCG PM.

4.2.7 Project Kick-Off Meeting

4.2.7.1 A Project Kick-Off Meeting shall take place between the Contractor, PWGSC and the CCG at the Contractor's manufacturing facility, within twenty (20) days after contract award at the mutual agreement of the Contractor, PWGSC and the CCG, to:

a. Introduce the CCG, PWGSC and Contractor management teams;

b. Review the PMP, including work processes, the project schedule, milestones, and deliverables;

c. Discuss project risks and any other issues that may affect the project or equipment performance or delivery;

d. Clarify any outstanding questions related to the requirements, contract and Contractor's proposal;

e. Discuss any other business; and

f. Tour Contractor and Subcontractor facilities.

4.2.7.2 The Contractor shall provide all meeting materials with sufficient detail to permit review and discussion by the CCG as to intended content and project strategy, delivery schedule and milestones. This early, mutual review shall clarify understanding and expectations of the project.

4.2.8 Project Progress Review Meetings

4.2.8.1 The Contractor shall conduct monthly Project Progress Review Meetings (PRMs) with the CCG Project Team members and/or appointed representatives in attendance. At the CCG's discretion the monthly meetings may be cancelled during periods of inactivity.

4.2.8.2 The Contractor shall host and attend PRMs as directed by the CCG PM and the PWGSC CA. Hosting includes: scheduling the meeting, providing/arranging the facilities, preparing the agenda in advance, preparing briefing materials and other documentation for all attendees, and recording and distributing minutes.

4.2.8.3 The PRM shall encompass the complete project status as of the review date. During PRMs, the Contractor shall review the current PPR DID PM-02 - *Contractor Progress and Status Report*. During this review the Contractor shall also focus on:

a. Variations from planned progress and the corrective action to be taken during the next reporting period;

b. An explanation of foreseeable issues and proposed resolutions, including an assessment of their impact on the contract in terms of scope, schedule, and risk; and

c. Other business as mutually agreed to by the CCG, CA, and Contractor.

4.2.9 Project Preliminary Design Review Meeting

4.2.9.1 The Contractor shall conduct a Project Preliminary Design Review (PDR) meeting with the CCG Project Team members and/or appointed representatives in attendance. The PDR may be combined with the Kick-Off meeting for efficiency, as mutually agreed to by the CCG, PWGSC and the Contractor.

4.2.9.2 The Contractor shall develop a preliminary system concept covering all hardware and software units in the system. The design approach to all problems and a complete technical solution in schematic form shall be presented. The concept shall be documented as stated below:

a. System block diagram;

b. Detailed description of system concept;

c. Preliminary screen shots for the Contractor supplied Human Machine Interface (HMI); and

d. Temporary status/control menus.

4.2.9.3 For pre-programmed software, the Contractor shall deliver the documentation to the CCG fifteen (15) days prior to PDR.

4.2.9.4 The preliminary design information shall be documented in accordance with DID SE-10 – *Technical Review Preparation* and reviewed at the PDR. The design and the methodology used by the Contractor shall be reviewed in detail. On receipt of approval at the PDR the Contractor shall be expected to complete the detailed design of all hardware and software in preparation for presentation at the CDR.

4.2.9.5 The Contactor shall provide any ITSG-33 non-compliance resolutions in English for review and approval at the PDR.

4.2.10 Project Critical Design Review Meeting

4.2.10.1 The Contractor shall conduct a Critical Design Review (CDR) within thirty (30) working days after PDR. The Contractor shall prepare documentation for the CDR in accordance with DID SE-10 – *Technical Review Preparation* and deliver the detailed system design to the CCG fifteen (15) days prior

to the CDR. The documentation shall include, but not be limited to the following:

a. Detailed system and equipment block diagrams;

b. Production drawings and schematics;

c. LRU Parts lists for all equipment;

d. Information of equipment specifications (such as but not limited to, performance parameters, etc.);

e. Final HMI designs;

f. IV&V Test Report;

g. Final status/control menu designs;

h. Final Technical Data Management Documents as described in Appendix D;

i. FAT Configuration Documentation as described in section 4.4.9; and

j. Final Engineering Documents as described in Appendix D.

4.2.10.2 The Contractor shall provide updated responses to the Radar Equipment ITSG-33 Requirements template with any changes to the Radar System Configuration identified in the PDR in preparation for presentation at the CDR.

4.2.11 INNAV Interface Readiness Review

4.2.11.1 The Contractor shall conduct an INNAV Interface Readiness Review (IIRR) and complete INNAV interface testing at the CCG Test Lab to review and demonstrate seamless operation of the Radar Equipment with the INNAV display. The IIRR shall be a collaborative effort between the INNAV team, the Contractor, and the INNAV interface developer to review and demonstrate that the INNAV control software is ready for remote site installation with the Radar Equipment. The INNAV interface developer will provide CCG and the Contractor the relevant technical data and documentation related to the INNAV interface development and proof of performance to support preparation for the IIRR.

4.2.11.2 Fifteen (15) days prior to the review, the Contractor shall provide one (1) electronic copy of all relevant technical data and documentation for the review in accordance with DID SE-10 – *Technical Review Preparation* to prepare for the IIRR. In coordination with the CCG and the 3rd Party INNAV Interface Developer, the Contractor shall supply to the CCG all technical data and documentation configuration for the Test Lab in Québec City in French and English related to the INNAV interface development testing and test results, Radar Equipment installation, system testing, operation and optimization of the overall Radar Equipment system.

4.2.12 Spares Provisioning Meeting

4.2.12.1 The Contractor shall conduct a Spares Provisioning Meeting (SPM). The SPM shall be a collaborative effort between the CCG and the Contractor to review the reliability and availability analysis, sparing strategy, maintenance plan and recommended spares. The SPM may be combined with the CDR meeting for efficiency, as mutually agreed to by the CCG, PWGSC and the Contractor. The SPM shall be conducted in conjunction with the In-Service Support Review (ISSR) to address interdependencies between sparing, maintenance and In-Service Support planning.

4.2.12.2 Fifteen (15) days prior to this review, the Contractor shall supply to the CCG one (1) electronic copy of all relevant materials, SPM Package - reliability and availability analysis, sparing strategy, maintenance plan and recommended spares in accordance with the TSOR, DID SE-09 – *Reliability Data,* CCG's National Spares Management Strategy, Appendix E and Recommended Spare Parts List (RSPL) data elements as in the Supply Plan, Appendix F.

4.2.13 FAT Readiness Review

4.2.13.1 At the CCG's discretion, the Contractor shall conduct a FAT Readiness Review (FRR) meeting. The FRR may be combined with the CDR meeting for efficiency, as mutually agreed to by the CCG and the Contractor.

4.2.13.2 Fifteen (15) days prior to this review, the Contractor shall supply to the CCG one (1) electronic copy of all relevant materials (FAT Test Plans and Procedures drafts) in accordance with DID TE-02 – *Test Plan and Report* and DID TE-03 – *Acceptance Test Procedures* in French for the Les Escoumins, Ile Charron, Pont Jacques Cartier, and Lévis, and in French and English for the Test Lab in Québec City, and in English for the remainder of the sites.

4.2.14 Post FAT Review

4.2.14.1 Following the FAT, at the CCG's discretion, the Contractor shall conduct a Post FAT Review (PFR) meeting. This meeting shall ensure that any issues identified during the FAT are clearly defined and that any remedial activities required are clearly defined and agreed to by the CCG. This may include a complete repeat of the FAT, a repeat of specific tests within the FAT, or certification by other means that the Radar Equipment is compliant with all requirements of the FAT.

4.2.15 Training Readiness Review

4.2.15.1 A Training Readiness Review (TRR) shall be conducted to ensure that all plans, materials, and resources are ready for the training. The TRR shall be a collaborative effort between the CCG and the Contractor to review the training plans and responsibilities of each party and to identify any outstanding items or issues before resources are deployed to the CCG College to begin training. The timing of the TRR shall be mutually agreed between the CCG and the Contractor. At CCG's discretion, separate TTRs shall take place for operational and technical training.

4.2.15.2 Fifteen (15) days prior to this review, the Contractor shall supply to the CCG one (1) electronic copy of all relevant training materials (TRR Package) in accordance with DID TT-03 – *Training Manuals* for TRR preparation purposes. This shall include DID TT-02 – *Training Devices Requirements List*.

4.2.16 Installation Readiness Reviews

4.2.16.1 The Contractor shall conduct an Installation Readiness Review (IRR) for each of the twenty-six (26) radar remote sites, the CCG Test Lab and the College to ensure that all plans, materials, and resources are ready for the installation. The IRRs shall be a collaborative effort between the CCG and the Contractor to review the installation plans and responsibilities of each party and to identify any outstanding items or issues before resources are deployed to each site to begin installation. The timing of the IRRs shall be mutually agreed between the CCG and the Contractor.

4.2.16.2 Fifteen (15) days prior to each review, the Contractor shall supply to the CCG all relevant technical data and documentation (IRR Packages) for IRR preparation purposes. This shall include Installation Drawings and Instructions in accordance with DIDs TDM-02 – *Drawings and Associated Lists* and TDM-03 – *Equipment Installation Data Package* and SAT Test Plans and Procedures drafts in accordance with DID TE-02 – *Test Plan and Report*, and DID TE-03 – *Acceptance Test Procedures* in French for Les Escoumins, Ile Charron, Pont Jacques Cartier, and Lévis, in French and English for Test Lab in Québec City, and in English for the remainder of the sites.

4.2.17 In-Service Support Review Meeting

4.2.17.1 The Contractor shall conduct an In-Service Support Review (ISSR) in the first year of the contract. The ISSR shall be a collaborative effort between PWGSC, the CCG and the Contractor to review the In-Service Support Plan. The ISSR shall be conducted in conjunction with the SPM to address interdependencies between sparing, maintenance and In-Service Support planning.

4.2.17.2 Fifteen (15) days prior to this review, the Contractor shall supply to the CCG one (1) electronic copy of the tailored In-Service Support Plan in accordance with section 4.9.2.

4.2.18 Final Project Review Meeting

4.2.18.1 The Contractor shall conduct a Final Project Review meeting at a time to be agreed to by the CCG, PWGSC and the Contractor.

4.2.18.2 The Final Project Review meeting shall address all remaining issues.

4.2.18.3 The Final Project Review shall confirm that the following are complete:

a. All installations are complete;
b. The SATs are complete and all tests results are accepted;
c. The SAT Reports are correct and complete and delivered;
d. All documentation and deliverables have been delivered and accepted;
e. All outstanding project issues have been dealt with; and
f. All milestones are met including all scope changes.

4.2.19 Additional – Extraordinary Meetings

4.2.19.1 At the CCG's discretion, the Contractor shall conduct additional PRMs to resolve specific issues.

4.2.19.2 The Contractor shall provide suitable representation at extraordinary meetings (teleconference or in person), as agreed. Such meetings shall be scheduled by the CCG in the event of delays in achieving the work schedule, or if major problems of a technical or contractual significance occur that cannot wait for the next scheduled PRM.

4.3 ENVIRONMENTAL REQUIREMENTS

4.3.1 General

4.3.1.1 The Government of Canada (GOC) is taking the initiative with respect to dealing with electronic equipment, either directly or indirectly, through programs promoting green procurement and product stewardship. As a result, the Contractor shall adhere to the applicable environmental protection standards pertaining to the CCG Radar and interface equipment as outlined in this section. In addition, the installation and construction practices and materials shall use best practices to mitigate negative impacts on the environment.

4.3.2 Contractor Environmental Commitment

4.3.2.1 Environmental Management System – The Contractor shall have a documented Environmental Management System in accordance with the requirements of ISO 14001, or equivalent.

4.3.2.2 Environmental Policy – The Contractor shall have an up-to-date, documented Environmental Policy including commitment to environmental protection, prevention of pollution, compliance with environmental legislation and continuous improvement. The policy shall be effectively communicated to and understood by the whole organization. The Contractor shall also be able to provide evidence of implementing the policy.

4.3.2.3 The Contractor shall prepare and submit an emergency response plan as well as an environmental protection plan that reflect the Environmental Management System and Policy of the company. Both plans are to be submitted in Contractor format with the bid.

4.3.3 Power Consumption

4.3.3.1 The Contractor shall disclose the average, minimum and maximum power consumption information of their products for each mode of operation as a part of the bid.

4.3.4 Promote Materials Reduction

4.3.4.1 The Contractor shall document and quantify any use of recycled material in the plastic housing or other components of the equipment being submitted under this Contract.

4.3.4.2 The Contractor shall identify whether its packaging uses reduced and/or recycled packaging for shipping; e.g., boxes that contain 35% post-consumer fibre for corrugated cardboard.

4.3.4.3 The Contractor shall minimize quantity and weight of any non-recyclable packaging and shipping material; e.g., use of moulded paper or cardboard substitutes for polystyrene and styrofoam.

4.3.5 Recycling

4.3.5.1 Contractor shall document whether components are embossed with their material contents to facilitate end-of-life recycling.

4.3.6 Hazardous Materials

4.3.6.1 The Contractor shall disclose all hazardous materials and their amounts included in the equipment under this procurement.

4.3.6.2 The Contractor shall provide Material Safety Data Sheets (MSDS) for all hazardous materials included in the equipment under this procurement.

4.3.6.3 The Contractor shall ensure minimum use of all hazardous materials in their product.

4.3.6.4 The Contractor shall disclose all regulated substances and their amounts included in the equipment under this procurement; e.g., Polychlorinated biphenyls (PCB's).

4.3.7 On-Site Activities

4.3.7.1 The Contractor shall not disturb any habitat or sensitive ecology on-site. If any damage occurs, the Contractor shall be responsible to restore the site(s) to its original state. The Contractor shall remain at all times on established pathways, walking areas, driving and parking areas.

4.4 TESTING AND ACCEPTANCE

4.4.1 Testing General

4.4.1.1 The FAT, IIT and SAT are formal tests which demonstrate to the CCG that the Contractor's Radar Equipment is compliant with all requirements included in the TSORs, ITSG-33 requirements, and SOW.

4.4.1.2 The CCG shall reserve the right to waive the requirement for any test called up by Contractor's Test Plan or to call up additional tests to demonstrate that the Radar Equipment is compliant with the requirements.

4.4.1.3 The CCG or its representative, at its discretion, shall witness any or all tests.

4.4.2 Test Failures

4.4.2.1 The Contractor shall be responsible for the resolution of all failures reported during all test phases, which include, but are not limited to, equipment repair or re-design necessary to correct the failures and perform partial or complete system re-tests subject to the CCG TA's discretion and approval.

4.4.3 Test Diagnostic Routines

4.4.3.1 Any local and remote test diagnostic routines useful for trouble-shooting hardware and software problems shall be documented and a description of their use provided to the CCG fifteen (15) days prior to the IIRR.

4.4.3.2 Diagnostic tests for remote sites shall be available from the MCTS Centre by remote communication interface, as defined in the TSOsR.

4.4.4 Unit Production Tests

4.4.4.1 The Contractor shall conduct Unit Production Tests on each piece of equipment being delivered as it leaves the production line and prior to integration in the CCG environment, in accordance with the Contractor's published Testing Procedures. A copy of such test results shall be included as part of the shipping documents to CCG. In addition, CCG reserves the right to attend and witness a Unit Production Test as it is conducted. Planning of such tests would be discussed and scheduled into the PMP.

4.4.5 Radar System Independent Verification and Validation Tests

4.4.5.1 The equipment shall be fully pre-tested by the Contractor before the formally witnessed FAT. The Contractor shall perform Independent Verification and Validation (IV&V) tests to verify that each different Radar System configuration and the various sub-systems meet all technical and operational design parameters and requirements, including the control software and Graphical User Interface.

4.4.5.2 Radar System IV&V tests shall be conducted in accordance with the Contractor's system integration proof of performance test plans. The timing of these tests shall be discussed at the Project Kick-Off meeting.

4.4.5.3 Upon successful completion of the Radar System IV&V tests, the Contractor shall provide to the CCG one (1) electronic and one (1) printed copy of the Verification Test Report, signed by the Contractor's IV&V authority. The report shall include a copy of the completed test sheets.

4.4.6 Factory Acceptance Test

4.4.6.1 The Contractor shall prove, through test and evaluation, that all Radar Equipment meets all technical and functional requirements as defined in the TSORs, as follows:

a. The Contractor shall provide a draft FAT Plan (DID TE-02 – *Test Plan and Report*) and Procedures (DID TE-03 – *Acceptance Test Procedures*) including the FAT Configuration Document, as follows: one (1) soft copy within fifteen (15) days before the FRR.

b. The FAT Plan and Procedures shall be reviewed at the FRR. The Contractor shall submit to the CCG one (1) electronic copy of the final FAT Test Procedures prior to the scheduled test. The FAT Plan and Procedures shall have been approved by the CCG TA before any FAT is performed. Printed copies of the Test Procedures shall be supplied to the CCG witnesses during tests.

c. The Contractor shall submit a copy of the full, annotated FAT dry run results and findings for CCG's review at least twenty (20) days prior to the actual planned FAT.

d. The Contractor shall conduct FATs on all Radar Equipment.

e. The First Article FATs shall be witnessed by CCG representative(s), at the option of CCG. CCG reserves the right to attend subsequent Recurring Article FAT's if needed. CCG reserves the right to perform any portion of, or the complete FAT at its own discretion. Ten (10) working days after the completion of the First Article FAT, the Contractor shall submit to the CCG three (3) printed copies, and one (1) electronic copy of the FAT report for final approval and acceptance.

f. The FAT shall be conducted at the Contractor's manufacturing facility with calibrated test equipment with valid calibration dates.

g. The Contractor shall have all of its test equipment calibrated in accordance with ISO 9001:2008 or equivalent. CCG shall be entitled to reject the FAT due to use of non-conforming, non-calibrated equipment.

h. The Contractor shall conduct a burn-in as part of the FAT. The method shall be 48 hours continuous, failure free, at a minimum elevated ambient temperature of +30° C. Alternatively, CCG may choose to accept a burn-in test of 24 hours continuous, failure free, if the temperature is cycled from -10° C to +30° C. CCG shall be advised of the cause of any failure, and the corrective action taken. In the event that equipment fails to pass all or any portion of the testing program, the problems shall be rectified and appropriate re-testing shall occur.

i. The Contractor shall provide an approved FAT Report for each piece of Radar Equipment, in a format that correlates with the previously submitted detailed FAT Procedure(s) and clearly demonstrates how the equipment has met the contract requirements. One (1) soft copy of each FAT Report shall be submitted to the CCG PM and TA for approval before the equipment can be shipped to the CCG.

j. The Contractor shall provide one (1) soft copy and one (1) hard copy of the CCG-approved FAT Report with the respective equipment. The FAT reports that are destined for C&A – St. Laurent sector shall be in French. The FAT reports that are destined for the CCG Test Lab shall be in French and English. All other reports for equipment destined for the Atlantic, Western regions, the C&A – Great Lakes sector and the CCG College shall be in English. A summary of the locations and quantities are listed in the Deliverables List, Appendix B.

4.4.7 INNAV Interface Test

4.4.7.1 The INNAV Interface Test (IIT) shall be held in combination with the IIRR. The IIT shall take place at least six (6) months prior to the first remote site installation.

4.4.7.2 The IIT shall take place at the CCG Test Lab, it shall be a full system test with the INNAV interface and OCP, and consist of a full SAT including compliance with the Radar Equipment ITSG-33 Requirements.

4.4.8 Site Acceptance Tests

4.4.8.1 The Contractor shall perform Site Acceptance Tests (SATs) in order to demonstrate to the CCG that the Radar Equipment meets all of the operational and technical requirements, in accordance with the TSOR, ITSG-33 requirements and SOW.

4.4.8.2 The SAT shall be conducted directly after each of the twenty six (26) remote site installations identified in section 4.7.3.

4.4.8.3 The Contractor shall develop test methods and procedures in order to demonstrate that the Radar Equipment meet all of the operational and technical requirements in accordance with the Specifications, as follows:

a. The SAT procedure shall include initial Radar System optimization for each installation. The Contractor shall supply theoretical calculations according to the site specific parameters

as per the Technical Specifications. The Contractor shall make any necessary corrections, adjustments, alignments or parameter changes needed to ensure that the integrated pieces of new Radar Equipment functions optimally as a Radar System.

b. Once optimized, the Contractor shall conduct preliminary operational tests prior to the formal SAT. The results of these tests shall be presented to CCG and shall be the basis upon which CCG provides approval for the Contractor to conduct a formal SAT. If the stated operational requirements are not met, CCG may require improvements in the performance before providing approval to conduct a formal SAT.

c. The SAT procedure shall include a set of operational tests that shall demonstrate to Operations that the radar is service ready. Each SAT shall include operational and system verification locally at the remote equipment site and via the INNAV operator console at the associated MCTS Centre.

d. The Contractor shall provide a draft SAT Plan (DID TE-02 – *Test Plan and Report*) and Procedure (DID TE-03 – *Acceptance Test Procedures*) which shall include all optimization parameters in accordance with the requirements, one (1) soft copy in English to CCG TA within forty (40) days after successful FAT.

e. The site specific SAT Plan and Procedures shall be reviewed at the IRR for each installation. The Contractor shall submit to the CCG one (1) electronic copy of the final SAT Test Procedures prior to the scheduled test.

f. The SAT Plan and Procedures shall be accepted by the CCG TA and PM before any SAT is performed. Printed copies of the Test Procedures shall be supplied to the CCG witnesses during tests.

g. As part of the SAT, the system shall be submitted to a burn-in test of 48 continuous hours of operation. The Burn-In test shall succeed only if there is no failure and no degradation during the period.

h. If a failure occurs during the SAT, the Contractor shall correct or replace defective Radar Equipment at their expense. A fully completed SAT, which includes a burn-in test, shall be repeated with the corrected units.

i. The Contractor shall provide a SAT report for each Radar System within fifteen (15) days after completion. This report shall contain the test conditions, results and optimization parameter values. For any SAT failure(s) at any site, CCG shall be advised and the Contractor shall take the necessary steps to assist in resolving any issue(s) in order to successfully conduct a new SAT. The Contractor shall supply the SAT report for each installation. The Contractor shall submit one (1) soft copy of the SAT report for each regional installation to CCG TA and provide one (1) soft copy and two (2) hard copies of the SAT report for each installation to the respective regional center. Reports that are destined for locations within the St. Laurent sector shall be in French. Reports for the CCG Test Lab shall be in French and English.

j. Approval of the SAT at the twenty six (26) remote site locations identified in section 4.7.3 represent the CCG's official acceptance of the Radar Equipment. CCG Acceptance will be evidenced by a signed Acceptance Certificate for each location.

4.4.8.4 CCG will supply the test ships for each SAT as required.

4.4.9 Configuration Management

4.4.9.1 The following shall be implemented as part of the Contractor's configuration management procedures:

a. The Contractor shall maintain an established configuration management program in accordance with ISO 10007:2003, Quality Management – Guidelines for Configuration Management, or equivalent. The Configuration Management Plan (CMP) in accordance with DID CM-01 – *Configuration Management Plan* shall be included as a separate section in the Contractor's PMP.

b. The Contractor shall develop a FAT Configuration Document in English to detail the configuration of the equipment that shall be used during the FAT to execute the test plan and procedures. The FAT Configuration Document shall include software parameters used, a diagram of the radar equipment configuration and the list of assumptions made to simulate the GFE in the Contractor's environment. The FAT Configuration Document shall be referenced in the FAT Plan and Procedures and included as an appendix to the FAT Procedures.

c. The Radars shall be under configuration control following FAT.

d. The Contractor shall notify the CCG PA of any changes to the CCG Radar Equipment baseline, (established during the initial FAT), in accordance with the contract Design Change/Deviation procedure DID CM-04 – *Change Requests*.

e. The Contractor shall assume all costs associated with any modification to the Radar Equipment baseline that is required to ensure the Radar Equipment's safety or fitness for intended use or rectify the Radar Equipment's failure to perform according to the Technical Specifications.

f. PWGSC and the CCG shall approve any changes before they can be implemented by the Contractor.

g. All Configuration Control Notices shall identify all affected documentation as well as other impacted areas of concern, including but not limited to: costs, sparing, electromagnetic interference/compatibility issues, equipment interfacing and equipment/system integration issues.

h. A soft-copy of all modified documentation shall be distributed to the CCG PA in English and French where applicable in accordance with the requirements outlined in Appendix C 8.5 – Media of Delivery.

4.5 TRAINING

4.5.1 Training Courses

4.5.1.1 The Contractor shall provide course materials and training for both the technical and operational training courses.

4.5.1.2 The Contractor shall prepare training materials and courseware that identifies all necessary data and procedures in sufficient detail for normal operation and maintenance of the Radar

Equipment in accordance with DID TT-03 – *Training Manuals*.

4.5.1.3 The Contractor shall include the use of INNAV display as the interface to Radar Equipment in preparation of training materials and course instructions.

4.5.1.4 The Contractor shall provide separate training courses for Operators and Technologists. There are separate training philosophies for Operators and Technologists.

4.5.1.5 Operator training shall follow a "Train the Trainer" approach. The Contractor shall provide Operational training at the CCG College, Sydney, NS. Operational leads from each MCTS Center will take part in training at the CCG College. These Operation leads will then provide training for their colleagues at each MCTS Center.

4.5.1.6 Two (2) "Train the Trainer" Operator's course in English and two (2) "Train the Trainer" Operator's course in French shall be required. The corresponding training materials shall be in both English and French. The estimated duration of the Operator's course is one (1) day.

4.5.1.7 The technical training philosophy shall be to the LRU with a Mean Time to Repair (MTTR) of less than an hour for technical staff to replace LRU and return the Radar Equipment to full operation. The Contractor shall assume that all CCG Maintenance Technologists: are graduated Electronic Technologists with backgrounds in electronics theory; have related field experience; and, possess comprehensive knowledge of the theories and principles of electronics, communication, informatics and basic electronic engineering techniques. Technologists training shall be instructor led training delivered by the Contractor.

4.5.1.8 The Contractor shall provide technical training at each of the following five (5) locations: St. John's – Newfoundland; Dartmouth – Nova Scotia (NS); Québec City – Québec (QC); Sarnia – Ontario (ON); and Richmond or Victoria – British Columbia (BC).

4.5.1.9 The technical training shall include eight (8) Technical courses conducted in English and two (2) Technical courses conducted in French. These courses are summarized as follows:

a. Ten (10) - Technical courses (estimated 10 courses x 5 business day duration)

   i. Eight (8) courses in English, two (2) each located at Atlantic (North sector) – St John's – Newfoundland; Atlantic (South sector) – Dartmouth – Nova Scotia; C&A (Great Lakes sector) – Sarnia – Ontario; and Western – Richmond or Victoria – British Columbia.
   ii. Two (2) courses in French, to be held at C&A (St. Laurent sector) – Québec City – Québec.

4.5.1.10 The training courses shall accommodate the following numbers of CCG personnel:

a. Each Operational course up to 6 Operators

b. Each Technical course up to 8 Technologists

4.5.1.11 The Contractor shall provide training to the Technologists six (6) months prior to the Radar Equipment installations and to the Operators within three (3) months prior to the Radar Equipment commissioning.

4.5.1.12 The Contractor shall ensure that at least one (1) radar training equipment setup is available for each pair of students during each training course for practical use and familiarization with the Radar Equipment's functions and features. For initial technical training courses, the Radars intended for CCG destinations may be utilized during the Contractor provided training courses, provided arrangements can be coordinated between the Contractor and the local CCG representative for their use. The Contractor shall remain responsible for providing the Radar Equipment to be used during the training courses if arrangements with CCG cannot be made.

4.6 EQUIPMENT DELIVERY

4.6.1 Radar Equipment Quantities

4.6.1.1 Quantity of forty-six (46) Radar Transceivers, in a dual redundant configuration, for deployment at the operational sites complete with all instructions, materials, parts and assemblies necessary for its installation and integration.

4.6.1.2 Quantity of three (3) Radar Transceivers, in order to reconfigure the single transceiver configurations at Mt. Hays, Dundas and Prince Rupert Grain Terminals into dual redundant configurations, complete with all instructions, materials, parts and assemblies necessary for its installation and integration.

4.6.1.3 Quantity of two (2) Radar Transceivers for the test setup at the CCG Test Laboratory, complete with all instructions, materials, parts and assemblies necessary for its installation.

4.6.1.4 Quantity of two (2) Radar Transceivers, in a dual redundant configuration, for the training setup at the CCG College, complete with all instructions, materials, parts and assemblies necessary for its installation.

4.6.1.5 An estimated quantity of four (4) Spare Radar Transceivers, complete with all instructions, materials, parts and assemblies necessary for its installation. The Contractor shall determine sparing requirements and recommend sparing quantities as per section 4.6.2.

4.6.1.6 Quantity of twenty-six (26) Radar Extractors for the operational sites, complete with all instructions, materials, parts and assemblies necessary for its installation and integration.

4.6.1.7 Quantity of one (1) Radar Extractor for the test setup at the CCG Test Laboratory, complete with all instructions, materials, parts and assemblies necessary for its installation.

4.6.1.8 Quantity of one (1) Radar Extractor for the CCG College training setup, complete with all instructions, materials, parts and assemblies necessary for its installation.

4.6.1.9 An estimate quantity of three (3) Radar Extractor spares, complete with all instructions, materials, parts and assemblies necessary for its installation. The Contractor shall determine sparing requirements and recommend sparing quantities as section 4.6.2.

4.6.1.10 Quantity twenty (20) Radar Antenna Systems of various sizes as per TSOR, complete with all instructions, materials, parts, assemblies, cables and power cords necessary for its installation and integration.

4.6.1.11 An estimated Quantity of eight (8) Spare Radar Antenna Systems, complete with all instructions, materials, parts and assemblies necessary for its installation. The Contractor shall determine sparing requirements and recommend sparing quantities as per section 4.6.2.

4.6.2 Radar Equipment Maintenance, Sparing and Spares

4.6.2.1 The CCG will maintain and operate the Radar Equipment for a period of at least twenty (20) years.

4.6.2.2 The CCG will use a combination of on-hand spares and Level Three (factory) repairs or replacements.

4.6.2.3 The Contractor shall provide a list of recommended spares in accordance with the Supply Plan, Appendix F to maintain the Radar Equipment in accordance with the CCG's maintenance philosophy, which is to repair by replacement down to the LRU. The Contractor shall provide an RSPL identifying spares needed and a schedule to support the system for twenty (20) years.

4.6.2.4 It is intended that the CCG will support the Radar Systems as follows:

a. Preventive maintenance will consist primarily of remote performance monitoring of key System parameters with a minimal requirement for on-site time-based maintenance;

b. Restoration of out-of-tolerance sub-systems to within tolerance conditions will be primarily by adjustment and/or replacement of modules, major components or equipment;

c. All repairs performed by the CCG staff should be accomplished using plug-in/modular assemblies and parts using common tools;

d. The CCG uses the following Lines of Support:

   i. Level One support will be provided by CCG ITS personnel, typically at the MCTS MCP;

      a. Level One support is routine monitoring and maintenance of the Radar System components or assemblies from the MCTS MCP. Many functions can also be accessed from the local panel of equipment. It may include corrective, preventive, and/or predictive maintenance. It may also involve data gathering, preliminary diagnosis of faults, or actions, such as running a Built-In Self-Test (BIST), or resetting hardware or software. Typically, Level One tasks can be performed relatively quickly, are not service affecting, and do not require specialized tools or test equipment.

   ii. Level Two support will be provided by CCG ITS personnel, typically at the Radar site;

      a. Level Two support is corrective or preventative maintenance by repair or replacement of assemblies or parts to the LRU level. It also includes software and firmware upgrades to the Radars, and diagnostics of problems. Typically, Level Two tasks can be performed in less than an hour (not including time to respond to site, some exceptions may occur for the replacement of major mechanical assemblies or parts) and may require some specialized training, tools or test equipment.

   iii. Level Three support will be provided by the Radar Equipment Supplier, or a designated alternate repair organisation;

      a. Level Three support is repair of LRUs by the Radar Equipment Supplier. If an LRU has failed and been replaced at the Radar site, CCG personnel will ship the

LRU to the Radar Equipment Supplier repair facility or depot. The Radar Equipment Supplier shall then repair the LRU and return it to the CCG.

4.6.2.5 The Contractor shall provide system and equipment availability and reliability analysis in accordance with DID SE-09 – *Reliability Data*, taking into consideration the configuration of the Radar Equipment within the Radar System deployments, and recommend and draft a maintenance plan, national sparing strategy and spares list, based on projected equipment outages over a twenty (20) year operational life span taking into consideration CCG's *National Spares Management Strategy,* Appendix E and RSPL data elements in the *Supply Plan* Appendix F. For the purpose of completing the reliability and availability analysis, the Radar System is considered to include the rack, power, dual configured radar transceivers, antenna systems including turning units, extractors, related communication controls, and interfaces.

4.6.2.6 The Contractor shall present a draft of the system and equipment reliability and availability analysis report, recommended maintenance plan, sparing strategy and sparing list at the SPM which is to be scheduled within sixty (60) days after contract award.

4.6.2.7 CCG shall review and decide subsequent to the SPM, what spares will be purchased.

4.6.2.8 The Contractor shall deliver the spare Radar Equipment, spare parts, specialized test equipment, tools, and software as agreed, subsequent to the CCG's decision.

4.6.2.9 Section 4.6.1 includes estimated quantities for Radar Equipment sparing as a placeholder, complete with all, hardware and software specification(s)/version description document(s), packaging, storage instructions, installation instructions, service manuals, materials, parts and assemblies necessary for installation and operation throughout the equipment's expected life as defined in section 2.2. The actual quantities to be delivered may be determined to be more or less than estimated.

4.6.2.10 The Contractor shall notify the CCG one (1) year prior to discontinuing supply or support of the Radar Equipment to allow the CCG to purchase sufficient spares as determined by the CCG.

4.6.3 Preservation, Packaging, Packing, Marking

4.6.3.1 The Contractor shall deliver all equipment according to the *Supply Plan*, Appendix F.

4.6.4 Asset Management System Data

4.6.4.1 An Asset Management System (AMS) has been implemented in the CCG. The AMS provides users with a tool to plan, execute, track, and analyze activities such as procurement, preventive and corrective maintenance, inventory, and maintenance history, etc. The AMS also provides access to an electronic documentation system including technical manuals, diagrams and schematics, system documentation, and maintenance service agreements.

4.6.4.2 For data entry purposes, the Contractor shall supply all required information in accordance with the following:

a. Data down to the smallest removable sub-assembly level – Lower Line-Replaceable Unit (LLRU);

b. Data submitted in electronic format (Microsoft Excel®);

c. Data supplied using the conventions and standards for descriptions of AMS, in accordance with the *Supply Plan* Appendix F; and

d. The contents of the data submission, as discussed during the Project Kick-Off Meeting.

4.6.4.3 An electronic copy of Microsoft Excel® template file will be provided to the Contractor during the Project Kick-Off Meeting. The Excel file shall be completed and populated by the Contractor and returned to the CCG prior to the initial shipment of the equipment.

4.6.4.4 Projected Radar System Replacement Schedule

		6 months prior to first remote site	Mar- Apr 2018	Mar- Apr 2019	Mar- Apr 2020	Mar- Apr 2021	Mar- Apr 2022	Mar- Apr 2023
Total	32	2	5	5	4	5	6	5
CCG Test Lab		1						
CCG College		1						
ATLANTIC								
Arnolds Cove			1					
Cuslett			1					
Pearce Peak			1					
Port aux Basques						1		
Chebucto Head						1		
Georges Island						1		
Shannon Hill						1		
Partridge Island						1		
Red Head			1					
Tiverton				1				
Eddy Point				1				
CENTRAL & ARCTIC								
Les Escoumins					1			
Ile Charron				1				
Pont Jacques Cartier					1			
Lévis				1				
Point Edward					1			
WESTERN								
Mt. Ozzard								1
Berry Point								1
Kap 100								1
Bowen Island								1
Mt. Helmcken								1
Mt. Newton							1	
Mt. Parke							1	
Mt. Hays (RCMP1)							1	
Ridley Island (RCMP2)							1	
Dundas Island (RCMP3)							1	
SPARE UNITS (Estimated)			1	1	1		1	

4.7 INTEGRATION AND INSTALLATION

4.7.1 System Configuration

4.7.1.1 The Radar Equipment deliverables shall be capable of integration with Radar Equipment that has not yet reached its' end of life and is being retained. Radar Antenna Systems are being retained at five (5) sites within the C&A region. Radar Antenna Systems, Radar Transceivers and Radar Extractors are being retained at the three (3) Western Sites operated in conjunction with the Prince Rupert Port Authority. All equipment delivered shall be able to work with the equipment being retained as a complete Radar System. The Contractor shall supply all installation instructions, service manuals, materials, parts and assemblies necessary for equipment installation and interfacing.

4.7.2 INNAV Interface Development Support

4.7.2.1 The Contractor shall plan for up to twenty (20) days for interface development support and provide a per diem rate for additional days. This number of days is to be adjusted up or down, as required.

4.7.2.2 The interface support for the INNAV interface development shall consist of, but not be limited to, the following:

a. Provide Radar Equipment interface and communication control specifications and user guide to a CCG designated third party INNAV Developer;

b. Respond to queries by the INNAV Developer to support interface development;

c. Prepare a test plan in coordination with the INNAV Developer and perform tests to demonstrate that the Radar Equipment operates fully with the INNAV control functions prior to installation;

d. Report issues identified during the test in advance of the IIRR;

e. During IIT and SATs verify Radar Equipment is operating correctly with the INNAV control commands; and

f. Prepare a test report identifying any issues raised during the tests.

4.7.3 Installation Service Support

4.7.3.1 Bidders shall plan for up to five (5) days for on-site installation support at each of the following locations, 140 days in total. This number days may be adjusted up or down, as required.

RADAR SITE DATA				
REGION	**MCTS CENTRE**	**SITE NAME**	**LATITUDE**	**LONGITUDE**
ATLANTIC North Sector	Placentia	Arnolds Cove	47° 46' 22.9" N	53° 59' 58.7" W
	Placentia	Cuslett	46° 58' 28.1" N	54° 09' 15.3" W
	Placentia	Pearce Peak	47° 17' 28.6" N	53° 58' 8.6" W
	Port Aux Basques	Port aux Basques	47° 34' 19.0" N	59° 07' 56.9" W
ATLANTIC South Sector	Halifax	Chebucto Head	44° 30' 26.5" N	63° 31' 22.5" W
	Halifax	Georges Island	44° 38' 26.05" N	63° 33' 31.47" W
	Halifax	Shannon Hill	44° 41' 2.79" N	63° 36' 35.99" W
	Halifax	Partridge Island	45° 14' 12.9" N	66° 3' 13.6" W
	Halifax	Red Head	45° 14' 0.6" N	65° 59' 02.11" W
	Halifax	Tiverton	44° 23' 23.30" N	66° 13' 22.05" W
	Sydney	Eddy Point	45° 30' 47.7" N	61° 15' 10.9" W
C&A St. Laurent Sector	Les Escoumins	Les Escoumins	48° 19' 03.00" N	69° 25' 14.00" W
	Québec	Ile Charron	45° 35' 03.36" N	73° 29' 40.5" W
	Québec	Pont Jacques Cartier	45° 31' 16.23" N	73° 32' 20.39" W
	Québec	Lévis	46° 49' 09.54" N	71° 10' 59.76" W
C&A Great Lakes Sector	Sarnia	Point Edward	43° 00' 04.2" N	82° 25' 05.7" W
WESTERN	Prince Rupert	Mt. Ozzard	48° 57' 33.7" N	125° 29' 35.0" W
	Victoria	Berry Point	49° 17' 42.8" N	122° 59' 13.1" W
	Victoria	Kap 100	49° 19' 31.0" N	123° 08' 0.9" W
	Victoria	Bowen Island	49° 20' 41.0" N	123° 23' 17.0" W
	Victoria	Mt. Helmcken	48° 24' 7.1" N	123° 34' 21.7" W
	Victoria	Mt. Newton	48° 36' 47.4" N	123° 26' 35.8" W
	Victoria	Mt. Parke	48° 50' 23.1" N	123° 17' 45.6" W
RCMP	Prince Rupert	Mt. Hays	54° 17' 2.0" N	130° 18' 56.7" W
	Prince Rupert	Ridley Island	54° 14' 3.0" N	130° 19' 38.3" W
	Prince Rupert	Dundas Island	54° 31' 15.2" N	130° 55' 1.5" W
CCG Test Lab	Québec	Ville de Québec	46° 48' 36.9" N	71° 12' 9.94" W
CCG College	Nova Scotia	Sydney	46° 08' 52.2" N	60° 13' 25.9" W

4.7.3.2 The project schedule baseline including placeholders for site installations shall be reviewed and finalized during the Project Kick-Off Meeting. The installation service support for the installation/SAT for each site shall consist of, but not limited to, the following:

a. Preparation of an Installation Plan;

b. Verification of the physical installation and system configuration;

c. Pre-testing of all functionalities and key parameters;

d. System turn-on, and pre-commissioning;

e. Preliminary system optimization; and

f. SAT and commissioning.

4.7.3.3 In order to minimize downtime the Contractor shall provide installation service support - within three (3) days following the physical installation of the Radar Equipment.

4.7.4 CCG Test Laboratory Installation

4.7.4.1 Forty (40) days or more prior to the IIT, the Radar Equipment shall be delivered and installed by the Contractor in the CCG Test Laboratory.

4.7.4.2 The Radar Equipment shall be connected to the CCG OpNet network. CCG will provide IP addresses. The CCG machine naming convention shall be respected. The CCG Network Time Protocol (NTP) server shall be used. CCG will install Sophos anti-virus on all computers and servers, hence the equipment shall be provisioned accordingly so that the anti-virus shall not affect performance to the extent that it would no longer be compliant with the TSORs, ITSG-33 requirements or SOW.

4.7.5 CCG College Installation

4.7.5.1 Within four (4) months following successful completion of the IIT, the Radar Equipment shall be delivered and installed by the Contractor at the CCG College according to the Contractor-supplied installation drawings and instructions.

4.7.6 Remote Site Installation, On-Site Inspections, and SATs

4.7.6.1 The CCG will complete the physical installation of the Radar Equipment including items such as but not limited to: waveguide, dehydrator, cabling, and AC power, based on the Contractor-supplied installation drawings and instructions.

4.7.6.2 The Contractor shall conduct on-site inspections of the Radar Equipment installations associated with the sites identified in section 4.7.3. An installation schedule shall be finalized during the IRRs. As part of the on-site inspections:

a. The Contractor shall verify the physical installation and system configuration;

b. The Contractor shall perform pre-testing of all functionalities and key parameters; and

c. The Contractor shall complete any preliminary system optimization and equipment calibration.

4.7.6.3 The SATs shall be performed immediately following successful completion of the on-site inspections.

4.7.6.4 The Contractor shall be responsible for providing final “as-built” drawings within ten (10) days following successful completion of the SAT.

4.7.7 System Optimization

4.7.7.1 Following successful SAT the CCG will observe and operate each Radar System for one (1) year and the Contractor shall use the CCG observations of real weather conditions to fine tune and optimize each Radar System according to the Technical Specifications. This system optimization activity shall be done remotely or on site.

4.7.7.2 The Contractor shall provide a draft System Optimization Plan and Procedures for each installation site, one (1) soft copy in English to the CCG as a part of the Installation Instructions. The draft System Optimization Plans for sites located in the St. Laurent sector shall be submitted in French.

4.7.7.3 The draft System Optimization Plan and Procedures shall be reviewed as a part of the IRRs.

4.7.7.4 The Contractor shall supply one (1) final soft copy of the System Optimization Plan and Procedures to CCG Headquarters and provide one (1) soft copy and two (2) hard copies of the System Optimization Plan for each installation to the respective regional center.

4.7.7.5 Each System Optimization Plan shall include recommended optimization parameters for each possible environmental condition as identified in section 5.1.1 of the Solid-State Radar System TSOR.

4.7.7.6 The Contractors shall allow for up to five (5) days for on-site optimization support at each of the following regional locations:

a. Atlantic North - Arnolds Cove, Cuslett, Pearce Peak, and Port aux Basques;

b. Atlantic South - Chebucto Head, Georges Island, Shannon Hill, Partridge Island, Red Head, Tiverton, and Eddy Point; and

c. Western - Mt. Ozzard, Berry Point, Kap 100, Bowen Island, Mt. Helmcken, Mt. Newton, Mt. Parke, Mt. Hays, Ridley Island, and Dundas Island.

4.7.7.7 It is anticipated that additional time may be required to tune the extractor to address ice conditions specific to the Great Lakes and St. Lawrence Seaway. The Contractor shall allow for up to ten (10) days for on-site optimization support at each of the following regional locations:

a. C&A St. Laurent - Les Escoumins, Ile Charron, Pont Jacques Cartier, and Lévis; and

b. C&A Great Lakes - Point Edward.

4.7.7.8 Based on the above scenarios, CCG estimates that a total of 155 days may be required for the on-site optimization support. This number of 155 days is to be adjusted up or down, as required. The project schedule baseline including placeholders for site by site radar system optimization shall be reviewed and established during the Project Kick-Off Meeting. The schedule shall be refined during the IRRs.

4.7.8 Site Access

4.7.8.1 The Contractor shall advise the CCG PM of the expected working hours of its personnel and all Subcontractors before commencing on-site work.

4.7.8.2 It is the CCG's responsibility to arrange for the Contractor to have on-site access and to

escort the Contractor's personnel at all times.

4.7.8.3 The CCG will provide adequate work space for work benches, tools, and equipment storage. The Contractor shall be responsible for maintaining these designated areas in a clean and orderly fashion.

4.7.9 Field Support Services

4.7.9.1 The Contractor shall provide Field Support services, as required, for a period that commences after SAT, covers the period for deliveries and ends after the first year of the warranty period, to further optimize and support the installations and operation of Radar Equipment, either on site and/or remotely. The work to be performed will be defined and approved by the TA and shall be at CCG's expense.

4.7.9.2 The Contractor shall provide Field Support Service Trip Reports for each call up of Field Support Services within ten (10) days after completed service.

4.8 WARRANTY

4.8.1 Warranty Repairs

4.8.1.1 The warranty period is on a per Radar System basis and commences following the successful completion of the SAT of each individual Radar System.

4.8.1.2 During the warranty period the Contractor shall have the following responsibilities:

a. Return to the originating CCG destination the repaired or replaced Radar Equipment submitted by the CCG within four (4) weeks of receipt of defective equipment;

b. Provide a single point of contact, within Canada, to handle all defective equipment returns;

c. Maintain a telephone support access line during normal Monday-Friday (non-holiday) working hours (10am to 3pm Eastern Standard Time (EST)) for call-ups for Radar Equipment engineering support;

d. Maintain an established Radar Equipment repair facility(s) and technical support resources capable of supporting all equipment procured under this contract;

e. Provide software and firmware upgrades as they become available;

f. Provide for and communicate configuration control for any changes made to the hardware, firmware, software or supplied items and related documentation; and

g. Provide a failure report indicating what the failed unit, module, or component was. This report shall include: RMA number; part number; serial number; quantity (if applicable); site location; description of failure; and most likely cause.

4.8.2 Non-Warranty Repairs

4.8.2.1 If the repair or replacement of any piece of defective equipment returned by the CCG is not covered under the warranty, the Contractor shall obtain the authorization of the CCG or authorized representative and the PWGSC CA before performing the repair or replacement. This work shall be

requested using a PWGSC-TPSGC 572 – Task Authorization Form. For any authorized repair not covered by the warranty, the CCG shall be invoiced for the repair.

4.9 POST-WARRANTY CONTRACTOR SUPPORT

4.9.1 General

4.9.1.1 The Contractor shall provide support, after the warranty period, for all Radar Equipment procured under this Contract, during the anticipated service life as defined in section 2.2.

4.9.1.2 The Contractor shall provide a single point of contact for problem resolution.

4.9.2 In-Service Support Plan

4.9.2.1 The Contractor shall provide a costed In-Service Support Plan proposal with the bid for a duration of ten (10) years after the warranty period. This plan shall address the following:

a. A description of its Customer Service Policy;

b. Cost Policy for repair or replacement of failed units, sub-units, or system components;

c. Labour rates for support activities required by CCG during the In-Service Support agreement;

d. Procedures for handling and returning defective equipment and accessories;

e. The provision of software and firmware upgrades as they become available;

f. The provision for and communication of configuration control for any changes made to the hardware, firmware, software or supplied items and related documentation during the Radar Equipment's service life;

g. The turnaround time to repair or replace and ship to the CCG any module or equipment sent to the Contractor by the CCG;

h. Provision of a failure report as described in section 4.8.1.2.e;

i. Provision of an itemized list of repairable assemblies, sub-units and major system components and their cost to repair or replace;

j. Provision of regular repair status reports on a quarterly basis. This report shall be a summary of item (h.) above;

k. The Contractor shall include, as an option, the maintenance of a Canadian Representative as a single point of contact to whom the CCG shall forward defective or failed equipment for processing, where the Contractor does not maintain an existing single point of contact, within Canada, to handle all defective equipment returns; and

l. The Contractor shall include, as an option, field support service calls to remote sites to replace defective or failed equipment, identifying response times.

4.9.2.2 The Contractor shall provide a cost model for demonstrating and optimizing the requirement for equipment spares for the twenty (20) year expected operational life versus, and in conjunction with, an In-Service Support Plan. For the purpose of developing the cost model, it shall

be assumed that an In-Service Support Plan is renewable after the first ten (10) years in five (5) year increments.

4.9.3 End of Product Life

4.9.3.1 The Contractor shall ensure that the Radar Equipment manufacturer maintains access to sufficient hardware manufacturing capability to provide long-term availability of parts for maintenance and repair.

4.9.3.2 The Contractor shall ensure that when the Radar Equipment manufacturer becomes aware that continued availability of spare parts is, or becomes, in jeopardy, the manufacturer shall inform CCG. This availability information shall be supplied a year in advance of end production runs so that CCG has time to purchase enough spares in the calculated quantity required for support until end-of-life. If CCG does not receive such notification and the required spare parts are no longer available from the manufacturer, the Contractor shall be responsible to source alternate solutions.

4.9.4 Maintenance

4.9.4.1 The CCG's maintenance philosophy for the equipment procured under this Contract is to ensure that CCG Technologists will be able to diagnose and replace any defective Radar Equipment to the LRU, and restore Radar Systems to their performance baseline condition as detailed in the associated specification.

4.9.4.2 The Contractor shall maintain an established Radar Equipment repair facility(s) and technical support resources capable of supporting all equipment procured under this Contract.

4.9.4.3 The Contractor shall establish and provide the procedures for handling and returning defective Radar Equipment.

4.9.4.4 The Contractor shall repair or replace equipment returned by the CCG within four (4) weeks of receipt at the Contractor's designated facility.

4.9.4.5 The Contractor shall ship repaired or replaced equipment to the originating CCG regional maintenance center complete with a detailed failure and repair report.

4.9.4.6 When requested by CCG, the Contractor shall provide reports of all maintenance records for any delivered or repaired Radar Equipment.

5 OPTIONAL ITEMS

5.1 The Contractor shall provide the optional items identified below if ordered by CCG.

5.1.1 Optional Technical and Operational Training

5.1.1.1 In addition to the training specified in section 4.5, the Contractor shall provide an option for additional training to be delivered by the Contractor at any or all of the following five (5) locations: St. John's – Newfoundland; Dartmouth – Nova Scotia; Québec City – Québec; Sarnia – Ontario; and Richmond or Victoria – British Columbia.

5.1.1.2 The additional training shall include eight (8) Technical and eight (8) Operational courses conducted in English; and two (2) Technical and two (2) Operational courses conducted in French. These additional courses are summarized as follows:

a. Ten (10) - Technical courses (estimated 10 courses x 5 business day duration)

   i. Eight (8) courses in English, two (2) each located at Atlantic (North sector) – St John's – Newfoundland; Atlantic (South sector) – Dartmouth – Nova Scotia; C&A (Great Lakes sector) – Sarnia – Ontario; and Western – Richmond or Victoria – British Columbia.
   ii. Two (2) courses in French, to be held at C&A (St. Laurent sector) – Québec City – Québec.

b. Ten (10) - Operational courses (estimated 10 courses x 1 day duration)

   i. Eight (8) courses in English, two (2) each located at Atlantic (North sector) – St John's – Newfoundland; Atlantic (South sector) – Dartmouth – Nova Scotia; C&A (Great Lakes sector) – Sarnia – Ontario; and Western – Victoria – British Columbia.
   ii. Two (2) courses in French, to be held at C&A (St. Laurent sector) – Québec City – Québec.

5.1.1.3 The training material and curriculum shall be the same as described under Training, section 4.5.

5.1.2 Optional Radar Equipment

5.1.2.1 The Contractor shall provide an option to purchase up to twenty (20) Radar Transceivers, ten (10) Radar Extractors and up to ten (10) Radar Antenna systems, as detailed in the applicable TSORs. The Contractor shall deliver all optional Radar Equipment to properly document, spare, FAT, install, optimize and SAT as per the other sites and in accordance with the *Supply Plan*, Appendix F.

5.1.3 Optional Services Support

5.1.3.1 The Contractor shall provide an option for up to an additional 140 days of field service support as detailed in section 4.7.9.

5.1.3.2 The work to be performed shall be defined and approved by the CCG PA. The Contractor shall provide Field Support Service Trip Reports for each call up of Field Support Services within ten (10) days after the service has been completed.

5.1.3.3 In addition to the Integration/Installation Service Support specified in section 4.7, the Contractor shall provide an additional Integration/Installation Service Support up of to ten (10) days per installation (or 270 days total), if requested by the CCG.

5.1.3.4 As a part of the additional Integration/Installation Service Support the Contractor shall deliver installation, system and communication controls integration and optimization, system verification testing and issues resolution of the Radar System assuming available and pre-existing rack space and power, and communications control system, if requested by CCG. The Radar System is considered to include the rack, power, dual configured Radar Equipment units, related communication controls and interfaces. There is a relatively low likelihood that this service shall be required. It shall be used on a site-by-site basis and only in the circumstances where CCG may lack the interim internal staffing capacity to perform these sets of activities.

5.1.4 Optional Warranty

5.1.4.1 In addition to the Warranty period specified in the Contract for each Radar Equipment unit, the Contractor shall provide an option for seven (7) years of additional warranty with the same level of coverage as per section 4.8 in one (1) year increments.

5.1.5 Optional Canadian Point of Contact

5.1.5.1 The CCG desires that the Contractor provides access to a Canadian point of contact to which the CCG can send items for repair. If this capacity doesn't exist, the Contractor shall provide, as an option, a single point of contact within Canada to which the CCG will forward defective or failed equipment for repair, for the duration of the expected in-service life of the deployed Radar Equipment.

APPENDIX A LIST OF ACRONYMS

ACM	Asset Class Manager
AMS	Asset Management System
BIST	Built-In Self-Test
C&A	Central and Arctic
CA	Contract Authority
CCG	Canadian Coast Guard
CCITT	International Telegraph and Telephone Consultative Committee
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CD-ROM	Compact Disc, Read Only Memory
CIA	Confidentiality, Integrity, Availability
CM	Configuration Management
CMP	Configuration Management Plan
COS	Concept of Support
COTS	Commercial off the Shelf
CSA	Canadian Standards Association
DFO	Department of Fisheries and Oceans
DID	Data Item Description
E&I	Electronics and Informatics
EKME	Electronic Knowledge Management Environment
EST	Eastern Standard Time
FAT	Factory Acceptance Test
FRR	FAT Readiness Review
GOC	Government of Canada
GFE	Government Furnished Equipment
HMI	Human Machine Interface
HQ	Headquarters
IIRR	INNAV Interface Readiness Review
IIT	INNAV Interface Test
INNAV	Information System on Marine Navigation
IRR	Installation Readiness Review
ISSR	In-Service Support Review
ITS	Integrated Technical Services
ITSG	Information Technology Security Guidance
IV&V	Independent Verification and Validation

LCM	Life Cycle Manager
LLRU	Lower Line-Replaceable Unit
LRU	Line-Replaceable Unit
MCP	Maintenance Control Position
MCTS	Marine Communications and Traffic Services
MM	Maintenance Management
MMET	Marine Maintenance Equipment Training
MPS	Master Project Schedule
MSDS	Material Safety Data Sheets
MTBF	Mean Time Between Failures
MTTR	Mean Time to Repair
NAVTEX	Navigational Telex
NSM	National Spares Management
NTP	Network Time Protocol
OCP	Operator Control Position
OEM	Original Equipment Manufacturer
OPI	Office of Primary Interest
OpNet	CCG's Operational Network
PA	Project Authority
PCB	Polychlorinated biphenyl
PDF	Portable Document Format
PDR	Preliminary Design Review
PFR	Post FAT Review
PM	Project Manager
PMBOK®	Project Management Body of Knowledge Guide
PMP	Project Management Plan
PRINCE2®	Projects In a Controlled Environment
PRM	Project Progress Review Meeting
PPR	Project Progress Report
PWGSC	Public Works and Government Services Canada
RCMP	Royal Canadian Mounted Police
RMA	Return Material Authorization
RML	Recommended Material List
ROI	Return on Investment
RSPL	Recommended Spare Parts List
SAT	Site Acceptance Test
SE	Safety Engineering
SRCL	Security Requirements Check List
SOW	Statement of Work
SNMP	Simple Network Management Protocol

SPM	Spares Provisioning Meeting
STTEL	Special Tools and Test Equipment List
TA	Technical Authority
TDM	Technical Data Management
TE	Test Engineering
TIFF	Tagged Image File Format
TRR	Training Readiness Review
TSOR	Technical Statement of Requirements
TT	Technical Training
VTMIS	Vessel Traffic Management Information System
WBS	Work Breakdown Structure

APPENDIX B DELIVERABLES LIST

Language Requirements	REGION	HEADQUARTERS	CCG TEST LAB	CCG COLLEGE	ATLANTIC REGION		CENTRAL and ARCTIC REGION		WESTERN REGION
	SECTOR / DELIVERABLES	Canadian Coast Guard 200 Kent Street Ottawa, ON K1A 0E6	Garde Cotiere Canadienne 101 Blvd Champlain Quebec, QC G1K 7Y7	Canadian Coast Guard Telecom Engineering Workshop Sydney, NS B1R 2L6	Sector North Canadian Coast Guard c/o Technical Stores 280 Southside Road St. John's, NL A1C 5X1	Sector South Canadian Coast Guard Telecom Engineering Workshop 13 Akerly Blvd., Door 2 Dartmouth, NS B3B 1S6	St. Laurent Garde Cotiere Canadienne 101 Blvd Champlain Quebec, QC G1K 7Y7	Great Lakes and Arctic Canadian Coast Guard 1355 Confederation Street, Unit 8 Sarnia, Ontario, N7S 4T2	DFO Coast Guard 5980 #6 Road Richmond, BC V6V 1Z1
		QUANTITIES							
	EQUIPMENT	XCVR – 1 + 1 Redundant Transceivers, SWA – Slotted Waveguide Antenna, VL - Very Large (Approx. 25' Parabolic), L - Large (Approx. 18' – 21' SWA), M – Medium (Approx. 8'-9' SWA), S – Small (Approx. 7'-8' SWA)							
	Radar Transceiver (Redundant Configuration)		1 XCVR		4 XCVR	7 XCVR	4 XCVR	1 XCVR	7 XCVR + 3 single XCVRs
	Radar Transceiver Spares (Individual Units)			1 XCVR min. (1 of ea.)	1 (½+ XCVR) min.	1 (½+ XCVR) min.	1 (½+ XCVR) min.		1 (½+ XCVR) min.
	Extractor		1		4	7	4	1	7 + 3
	Extractor Spares			1 min.		1 min.	1 min.		1 min.
	Antenna System (Combined Antenna and Turning Unit)		1 S	1 S	3 L, 1 M	3 L, 3 M, 1 S			1 VL, 6 L
	Antenna Spares				1 L, 1 M(min.)	1 L, 1 M, 1 S (min.)			3 L min.
	Turning Unit Spares				1 L, 1 M (min.)	1 L, 1 M, 1 S (min.)			1 VL, 3 L (min.)
ENGLISH	DOCUMENTATION* (S = SOFT COPY, H = HARD COPY)	S = SOFT COPY(Unlimited replication and printing licence for internal distribution.), H = HARD COPY							
	Project Management Plan, Schedule and Configuration Management Plan	S							
	Project Risk Management Plan	S							
	Monthly Project Progress Reports	S / Month							
	Supplier COTS - as is technical documentation supplied with bid.								
	Drawings and Technical Data (NOTE 1)	S							
	Equipment Technical Publications (NOTE 2)	S							
	System Manuals	S							
	Equipment Manuals	S							
	Software User Manual	S							
	Equipment/System Interface Specifications	S							
	Equipment Manual (Tailored for CCG)	S							
	System Manual (Tailored for CCG)	S							
	Software Documentation (Tailored for CCG)	S							
	Maintenance Plan	S							
	Special Tools and Test Equipment (STTE)	S							
	Recommended Spares, Tools and Test Equipment List	S							
	In-Service Support Plan and Sparing Optimization Analysis Cost Model	S							
	Technical Review Materials								
	PDR	S							
	CDR	S							
	FAT Plan & Procedures	1 S							
	Factory Acceptance Testing (FAT)	Conduct as per section 4.4.6							
	First Article FAT	Conduct as per section 4.4.6							
	FAT Results Reports								
	Radar Transceiver Equipment	1 S for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit
	Extractor	1 S for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit
	Antenna System	1 S for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit			1 S, 1 H for each unit
	Turning Unit	1 S for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit	1 S, 1 H for each unit			1 S, 1 H for each unit
	IIRR (Test Lab)	S							
	Drawings and Associated Lists	1 S, 1 H	1 S, 2 H						
	Installation Drawings and Instructions	1 S	1 S						

Language Requirements	REGION	HEADQUARTERS	CCG TEST LAB	CCG COLLEGE	ATLANTIC REGION		CENTRAL and ARCTIC REGION		WESTERN REGION
	SECTOR / DELIVERABLES	Canadian Coast Guard 200 Kent Street Ottawa, ON K1A 0E6	Garde Cotiere Canadienne 101 Blvd Champlain Quebec, QC G1K 7Y7	Canadian Coast Guard Telecom Engineering Workshop Sydney, NS B1R 2L6	Sector North Canadian Coast Guard c/o Technical Stores 280 Southside Road St. John's, NL A1C 5X1	Sector South Canadian Coast Guard Telecom Engineering Workshop 13 Akerly Blvd., Door 2 Dartmouth, NS B3B 1S6	St. Laurent Garde Cotiere Canadienne 101 Blvd Champlain Quebec, QC G1K 7Y7	Great Lakes and Arctic Canadian Coast Guard 1355 Confederation Street, Unit 8 Sarnia, Ontario, N7S 4T2	DFO Coast Guard 5980 #6 Road Richmond, BC V6V 1Z1
		QUANTITIES							
	INNAV Interface Test Results Report (CCG Test Lab)	System acceptance test, full SAT performed including ITSG-33, INNAV interface and OCP							
	IIT Results Report	1 S	1 S, 2 H						
	AMS (Complete MAXIMO Data List)	Electronic Data as per section 4.6.4							
	Training Plan	1 S		1 S, 2 H					
	Technical Training Package	1 S		1 S, 2 H					
	Operational Training Package	1 S		1 S, 2 H					
	Training Course Material	1 S	1 S, 1 H for each student	1 S, 2 H	1 S, 1 H for each student	1 S, 1 H for each student	1 S, 1 H for each student	1 S, 1 H for each student	1 S, 1 H for each student
	IRRs (24 + 3 sites)	S							
	Drawings and Associated Lists	1 S		1 S	1 S for each regional site (4)	1 S for each regional site (7)	1 S for each regional site (4)	1 S for each regional site (1)	1 S for each regional site (7) + (3)
	Installation Drawings and Instructions	1 S for each site		1 S	1 S for each regional site (4)	1 S for each regional site (7)	1 S for each regional site (4)	1 S for each regional site (1)	1 S for each regional site (7) + (3)
	System Optimization	Estimated up to 155 days total as per section 4.7.5							
	SAT Plan & Procedures	1 S							
	Site Acceptance Test (SAT) (All 25 + 3 Sites)	Conducted at respective regional sites after each installation as per section 4.4.8 & 4.7.4							
	SAT Results Reports								
	CCG College (1 separate SAT)	1 S of each site(1)		1 S, 2 H					
	Atlantic - North (4 separate SATs)	1 S of each site(4)			(1 S, 2 H) / Reg. site(4)				
	Atlantic - South (7 separate SATs)	1 S of each site(7)				(1 S, 2 H) / Reg. site(7)			
	C&A - St. Laurent (4 separate SATs)	1 S of each site(4)					(1 S, 2 H) / Reg. site(4)		
	C&A - Great Lakes (1 separate SAT)	1 S of each site(1)						1 S, 2H	
	Western (7 + 3 separate SATs)	1 S of each site(7) + (3)							(1 S, 2 H) / Reg. site(7) + (3)
	System Optimization Plan	1 S for each site			1 S for each regional site (4)	1 S for each regional site (7)	1 S for each regional site (4)	1 S for each regional site (1)	1 S for each regional site (7+3)
	SERVICES								
	Project Management	As per Section 4.2							
	Training	As per Section 4.5							
	Technical Training Course (Instructor Led)		1 at the Test Lab		2 for each regional Sector	2 for each regional Sector		2 for each regional Sector	2 for each regional Sector
	Operational Training Course (Train the Trainer)			2 at the College					
	INNAV Interface Development Support		As per Section 4.7.2						
	Installation Service Support	Estimated up to 140 days total as per section 4.7.3							
	System Optimization	Estimated up to 155 days total as per section 4.7.7							
	Warranty (first year) - Including RMA costs	As per Section 4.8							
	Field Support Services	As per Section 4.7.9							
	OPTIONAL ITEMS								
	Technical and Operational Training	As per Section 5.1.1							
	Transmitter Equipment	As per Section 5.1.2							
	Services Support								
	Field Service Support	As per Section 5.1.3							
	Installation/Intergration Services Support	As per Section 5.1.3							

Language Requirements	REGION	HEADQUARTERS	CCG TEST LAB	CCG COLLEGE	ATLANTIC REGION		CENTRAL and ARCTIC REGION		WESTERN REGION
	SECTOR / DELIVERABLES	Canadian Coast Guard 200 Kent Street Ottawa, ON K1A 0E6	Garde Cotiere Canadienne 101 Blvd Champlain Quebec, QC G1K 7Y7	Canadian Coast Guard Telecom Engineering Workshop Sydney, NS B1R 2L6	Sector North Canadian Coast Guard c/o Technical Stores 280 Southside Road St. John's, NL A1C 5X1	Sector South Canadian Coast Guard Telecom Engineering Workshop 13 Akerly Blvd., Door 2 Dartmouth, NS B3B 1S6	St. Laurent Garde Cotiere Canadienne 101 Blvd Champlain Quebec, QC G1K 7Y7	Great Lakes and Arctic Canadian Coast Guard 1355 Confederation Street, Unit 8 Sarnia, Ontario, N7S 4T2	DFO Coast Guard 5980 #6 Road Richmond, BC V6V 1Z1
		QUANTITIES							
	Warranty	As per Section 5.1.4							
	Canadian Point of Contact	As per Section 5.1.5							
FRENCH	***Documentation***	**S = SOFT COPY(Unlimited replication and printing licence for internal distribution.), H = HARD COPY**							
	Equipment Manual (Tailored for CCG)	S							
	System Manual (Tailored for CCG)	S							
	Software Documentation (Tailored for CCG)	S							
	Maintenance Plan	S							
	Special Tools and Test Equipment (STTE)	S							
	Recommended Spares, Tools and Test Equipment List	S							
	In-Service Support Plan and Sparing Optimization Analysis Cost Model	S							
	Technical Review Materials								
	IRRs (4 systems in St. Laurent Sector)	S	S						
	FAT Plan & Procedures	S							
	Factory Acceptance Testing (FAT)	Conducted on each piece of equipment shipped. CCG to be present at Contractor facility for the first FAT session.							
	FAT Results Reports								
	Radar Transceiver Equipment	S for each unit	S for each unit rec'v'd.				S for each unit rec'v'd.		
	Extractor	S for each unit	S for each unit rec'v'd.				S for each unit rec'v'd.		
	Antenna System	S for each unit	S for each unit rec'v'd.				S for each unit rec'v'd.		
	Turning Unit	S for each unit	S for each unit rec'v'd.				S for each unit rec'v'd.		
	IIRR (Test Lab)	S							
	Drawings and Associated Lists	S, 1 H	S, 2 H						
	Installation Drawings and Instructions	S	S						
	INNAV Interface Testing (IIT) (CCG Test Lab)	System acceptance test, full SAT performed including ITSG-33, INNAV interface and OCP							
	IIT Results Report	S	S, 1 H						
	AMS (Maximo)	Electronic Data as per section 4.6.4							
	Training Plan	S		S, 2 H					
	Technical Training Package	S		S, 2 H					
	Operational Training Package	S		S, 2 H					
	Training Course Material	S		S, 1 H per student					
	IRRs (4 systems in St. Laurent Sector)								
	Drawings and Associated Lists	S					S for each regional site (4)		
	Installation Drawings and Instructions	S for each site					S for each regional site (4)		
	SAT Plan & Procedures	S	S				S		

Language Requirements	REGION	HEADQUARTERS	CCG TEST LAB	CCG COLLEGE	ATLANTIC REGION		CENTRAL and ARCTIC REGION		WESTERN REGION
	SECTOR / DELIVERABLES	Canadian Coast Guard 200 Kent Street Ottawa, ON K1A 0E6	Garde Cotiere Canadienne 101 Blvd Champlain Quebec, QC G1K 7Y7	Canadian Coast Guard Telecom Engineering Workshop Sydney, NS B1R 2L6	Sector North Canadian Coast Guard c/o Technical Stores 280 Southside Road St. John's, NL A1C 5X1	Sector South Canadian Coast Guard Telecom Engineering Workshop 13 Akerly Blvd., Door 2 Dartmouth, NS B3B 1S6	St. Laurent Garde Cotiere Canadienne 101 Blvd Champlain Quebec, QC G1K 7Y7	Great Lakes and Arctic Canadian Coast Guard 1355 Confederation Street, Unit 8 Sarnia, Ontario, N7S 4T2	DFO Coast Guard 5980 #6 Road Richmond, BC V6V 1Z1
		QUANTITIES							
	Site Acceptance Test (SAT)	Conducted at respective regional sites after each installation as per section 4.4.8 & 4.7.4							
	SAT Results Reports								
	C&A - St. Laurent (4 separate SATs)	S of each site(4)					(S, 2 H) for each regional site(4)		
	System Optimization Plan	S for each unit					S for each regional site (4)		
	SERVICES								
	Training	As per Section 4.5							
	Technical Training Course (Instructor Led)						2 for each regional Sector		
	Operational Training Course (Train the Trainer)			2 at the College					
	INNAV Interface Development Support		As per Section 4.7.2						
	Installation Service Support	Estimated up to 140 days total as per section 4.7.3							
	System Optimization	Estimated up to 155 days total as per section 4.7.7							
	Warranty (first year) - Including RMA costs	As per Section 4.8							
	Field Support Services	As per Section 4.7.9							
	OPTIONAL ITEMS								
	Technical and Operational Training	as per section 5.1.1							
	Services Support								
	Field Service Support	As per Section 5.1.3							
	Installation/Intergration Services Support	As per Section 5.1.3							
	Canadian Point of Contact	As per Section 5.1.5							
	NOTES								
	NOTE 1: Drawings and Technical Data includes but is not limited to: Equipment technical specifications, asset drawings, & Installation Drawings.								
	NOTE 2: Equipment Technical Publications includes but is not limited to: equipment description, installation instructions, operating instructions, preventative maintenance, corrective maintenance, illustrated parts list, software user instructions, & software maintenance manual.								
	* Unlimited Reproduction Licence for internal distribution only (E-version)								

APPENDIX C DATA & DOCUMENTATION FORMATS

C.1 LANGUAGE

All technical publications pertaining to the asset, its equipment and systems shall be provided in English and in French, the official languages of Canada. Where the original documentation is only available in one of the official language, the Contractor shall make arrangements for the translation of the documents. The Contractor shall certify that qualified personnel other than the original translator have checked the accuracy and adequacy of translation(s). The Contractor shall correct any errors or omissions in the translated documents at its own cost.

C.2 PUBLICATION ACCEPTANCE

The use of existing commercial publications is acceptable providing that they meet the requirements listed herein, and that the existing manuals are complete and in evidence at the time of the contract award. Existing manuals shall be subject to review and acceptance by the CCG Technical Authority. If the Publications and Lists cannot be accepted, for reasons of either legibility, technical content or format, the Contractor may be asked to resubmit hardcopy publication sets with the necessary changes or create additional documentation to be deemed acceptable.

C.3 DATA RIGHTS

Canada shall have rights to use the data delivered as required by this SOW per the terms contained in the Contract.

C.4 ACCEPTANCE AND QUALITY ASSURANCE

C.4.1 In Process Reviews

All data deliverables shall be reviewed for acceptance by the Project Authority.

C.4.2 Quality Assurance

Acceptance of the data by Canada shall in no way relieve the Contractor of his/her responsibility for data quality and the correction of data should deficiencies be detected within the contract and warranty period.

C.5 MAIL DELIVERY

Deliverables shall be forwarded to:

Canadian Coast Guard,
200 Kent Street, Mail Stop 7S036
OTTAWA, ON
K1A 0E6

Attention: CCG Project Manager – National Radar Equipment Replacements Project

C.6 MEDIUM

Data shall be acquired in hard copy and soft copy form and in the quantities as specified in Appendix B – Deliverable List.

C.7 HARD COPY

Hard copy data and documents shall be acquired, such that CCG shall not be required to reproduce the data and documents to meet its immediate in-service needs.

C.8 SOFT COPY

Each hardcopy publication submitted by the Contractor shall be provided in soft copy and shall be formatted in accordance with the following requirements.

C.8.1 Master Document Files

The Master Document Files are the electronic master of the completed publication and lists. Master document files shall be delivered in their native file format (e.g. MS Word, MS Excel, MS PowerPoint). All blank pages, figures, illustrations and foldouts shall be imbedded within the file(s). These files are considered the "Master Document" files for present and future revision, changes and/or re-use. The Master Document files may be broken down into a number of folders and sub-files in order to ensure the file sizes can be managed on the normal office word processor. Files should be broken at logical page locations to ensure future ease of use. This would normally occur at the end of a part/chapter or section.

C.8.2 Master Image Files

All illustrations (Figures) shall be delivered as separate individual Tagged Image File Format (TIFF) images in accordance with Adobe Systems Inc. specification "TIFF Revision 6", compressed to International Telegraph and Telephone Consultative Committee (CCITT) Group 4. Files shall be UNTILED and shall be wholly raster (hybrid files shall not be delivered).

Image sizes as outlined in C.8.10 are provided as a guide and sizes may vary slightly, but no more than plus or minus one inch (25 mm) in either width or length.

C.8.3 Master Read Only Files

Using the completed Master Document file(s), the Contractor shall generate and provide a Portable Document Format (PDF) file that shall contain the complete publication. This file(s) is considered the "Master Read Only" file for printing/reproduction/viewing purposes. All pages contained in the PDF file shall be oriented such that they do not require rotation when viewing. This file shall contain "thumbnails" of each of the pages. The Master Read Only File is not a replacement for the Master Document files or the Master Image files. The Contractor shall ensure that a quality check is done on the Read Only (such as PDF) file to verify that the content reflects the same content/formatting as the Master Document file and the Reproducible copy. As a minimum the table of content shall be hyperlinked to the applicable section, paragraph or sub paragraph as applicable.

C.8.4 Metadata (Capture of Related Information)

Metadata (the data that describes data objects) shall be provided for all publication and list deliverables. Metadata records shall contain the information in the order shown in C.8.7 and C.8.9. Metadata shall be delivered as a Microsoft Access data base table (preferred) or as a single delimited ASCII text file. Sample Metadata record entries are shown in C.8.8 and C.8.11.

C.8.5 Media of Delivery

The media form for final delivery of electronic data (soft-copy) shall be agreed to between CCG and the Contractor.

C.8.6 Format of Data

Each delivered technical document, diagram or parts list shall have a corresponding Metadata database record. All records shall be entered into a single Microsoft Excel 2010 workbook. Fields without corresponding information shall remain blank. The Microsoft Excel 2010 database file shall be named "CCG radar documentation metadata.xlsx".

C.8.7 Index Fields for Document Data Records

Order	Field Name	Field Definition / Description	Example Entry
1	**File Name**	Name of electronic file - unique filename for uploading in database.	**MZ000235.PDF**
2	**Document No**	This field shall contain the document number.	**MZ235**
3	**Page Number**	This field is used when documents have multiple Pages that are stored as separate files (e.g. multi-page illustrated parts list). Page number x of y. Enter the value of x.	**1**
4	**Number of Pages**	The total number of pages	**25**
5	**Revision**	Letter or number indicating the revision level. If there is no rev, indicate with dash ("-")	**B**
6	**Publication Date/Date of Issue**	This field is used to capture version information when version or revision identifiers are not recorded on the document (DD/MM/YYYY)	**22/02/2012**
7	**NSCM**	This field shall contain the NATO Supply Code for Manufacturers (NSCM) of the Owner of the data. (Also known as FSCM, CAGE or NCAGE code.)	**36219**
8	**Data Rights**	The data rights as specified in the contract. "L" for "LIMITED" or "U" for	**U**

		"UNLIMITED"	
9	**Document Name or Title (English)**	English Title of document.	**Antenna Installation and Repair Manual**
10	**Document Name or Title (French)**	French Title of document	

C.8.8 Sample Record Entries

(The following table is shown on two lines to suit page width.)

Metadata (in database table)

FILE NAME	DOCUMENT NO	Page Number	Number of Pages	Revision	Publication Date/Date of Issue
MZ000235.PDF	MZ235	1	25	B	22/02/2012

NSCM	DATA RIGHTS	Document Name or Title (English)	Document Name or Title (French)
36219	U	Antenna Installation and Repair Manual	

C.8.9 Index Fields for Diagram/Parts List Data Records

Order	Field Name	Max Field Length	Field Definition / Description	Example Entry
1	**FILE NAME**	25	Name of electronic file – unique filename for uploading in database.	**MZ000235.TIF**
2	**DOCUMENT NO**	25	This field shall contain the document number.	**9775458**
3	**REVISION**	3	Letter or number indicating the revision level. If there is no rev, indicate with dash ("-")	**B**
4	**SHEET NO**	3	Sheet number x of y. Enter the value of x.	**1**
5	**NO OF SHEETS**	3	Sheet number x of y. Enter the value of y.	**1**
6	**FRAME NO**	3	Frame number x of y. Enter the value of x. (This field is applicable only when capturing data from aperture cards.) When field is not applicable, leave blank.	**1**
7	**NO OF FRAMES**	3	Frame number x of y. Enter the value of y. (This field is applicable only when capturing data from aperture cards.) When field is not applicable, leave blank.	**1**
8	**NSCM**	5	This field shall contain the NATO Supply Code for Manufacturers (NSCM) of the Owner of the data. (Also known as FSCM, CAGE or NCAGE code.)	**36219**
9	**SIZE**	2	This field contains the document size. -For imperial sizes use A, B, C, D, E, F, G, H, J, K and LE (for legal) -For metric sizes use A4, A3, A2, A1, A0 and B1.	**A2**
10	**ADDITIONAL IDENTIFIER**	10	This open field shall be used when two (2) or more documents have the same document number but are different documents. e.g. Document 12345, Document 12345 DCR 001, then "DCR 001" would be entered in this field. When field is not applicable, leave blank.	**DCR 001**
11	**DATA RIGHTS**	1	The data rights as specified in the contract. "L" for "LIMITED" or "U" for "UNLIMITED"	**U**
12	**DOCUMENT TITLE**	240	Title of document. (i.e. Drawing title)	**BRACKET ASSY**

C.8.10 DRAWING SIZES

METRIC DRAWING SIZES			
Drawing Size	**W x L (max) (mm)**	**Pels Per Line**	**Number of Lines**
A4	210 X 297	1656	2344
A3	297 X 420	2344	3312
A2	420 X 594	3312	4680
A1	594 X 841	4680	6624
A0	841 X 1189	6624	9368
B1	707 X 1000	5567	7875
NORTH AMERICAN / IMPERIAL DRAWING SIZES			
Drawing Size	**W x L (max) (inches)**	**Pels Per Line**	**Number of Lines**
A	8.5 x 11	1704	2200
B	11 x 17	2200	3400
C	17 x 22	3400	4400
D	22 x 34	4400	6800
E	34 x 44	6800	8800
F	28 x 40	5600	8000
G	11 x 90	2200	18000
H	28 x 143	5600	28600
J	34 x 176	6800	35200
K	40 x 143	8000	28600
Legal	8.5 x 14	1704	2800

C.8.11 Sample Drawing Record Entries

(The following table is shown on two lines to suit page width.)

Metadata (in database table)

FILE NAME	DOCUMENT NO	REVISION	SHEET NO	NO OF SHEETS	FRAME NO	NO OF FRAMES
MZ000235.TIF	9775458	B	1	1	1	1
MZ000236.TIF	9775457	-	1	1		

NSCM	SIZE	ADDITIONAL IDENTIFIER	DATA RIGHTS	DOCUMENT TITLE
36219	A2	DCR 001	U	BRACKET ASSY
36219	A1		U	BRACKET

APPENDIX D CONTRACT DATA REQUIREMENTS LIST AND DATA ITEM DESCRIPTIONS

Contractor (after contract award)**:**	**RFP/Contract:**	**Original/Amendment:** Original
CCG Project / Technical Authority:	**Asset:**	**Dated:**

DID #	Title	SOW Ref.	How Often	Lang.	Submissions		R or I	Remarks
					Initial	Later		
Project Management								
PM-01	Project Management Plan	4.1.2.1	Twice + updates	Eng	With bid	Kick-Off +10 days	R	Maintained on an ongoing basis
PM-02	Contractor Progress and Status Report	4.1.3.1 4.2.6.4 4.2.8.3	M	Eng			I	Submitted five (5) days prior to Monthly Project Progress Review meeting
PM-03	Risk Management Plan	4.1.2.2	Twice + updates	Eng	With bid	Kick-Off +10 days	R	Maintained on an ongoing and monthly basis
Technical Data Management								
As Is Format	Drawings and Associated Lists - Supplier COTS	4.1.4.1	Once	Eng/Fre	With bid			Successive submissions shall document the:

TDM-02	- CCG Tailored	4.1.12.4 4.2.16.2	Thrice	Eng & Fre	IRR -15 days	Working copies for installation -30 days	R	• Installation specifications • 3rd time as fitted configuration post installation.
TDM-03	Equipment Installation Data Package - Site Specific (x28 sites)	4.1.12.4 4.2.16.2	Twice	Eng & Fre	IRR -15 days	IRR +15 days	R	A data package is required for each differently configured equipment installation.
As Is Format	System Manuals - Supplier COTS	4.1.4.1	Once	Eng/Fre	With bid			
TDM-05	- CCG Tailored	4.1.7.1	Twice	B	PDR -15 days	CDR -15 days	R	
As Is Format	Equipment Manuals - Supplier COTS	4.1.4.1	Once	Eng/Fre	With bid			
TDM-06	- CCG Tailored	4.1.6.1	Twice	B	PDR -15 days	CDR -15 days	R	
As Is Format	Software Version Description Document - Supplier COTS	4.1.4.1	Once	Eng/Fre	With bid			
TDM-07	- CCG Tailored	4.1.8.2	Twice	B	PDR -15 days	CDR -15 days	R	

As Is Format	Software User Manuals - Supplier COTS	4.1.4.1	Once	Eng/Fre	With bid			
TDM-08	- Tailored	4.1.8.1	Twice	B	PDR -15 days	B for IIRR -15 days	R	
Configuration Management								
CM-01	Configuration Management Plan	4.1.2.5 4.4.9.1	Twice	B	Eng with bid	Kick-Off +10 days	I	
CM-03	Request for Clarification	4.1.2.6	AR	Eng			I	
CM-04	Change Request	4.1.2.5 4.2.3.2 4.4.9.1	AR	Eng			I	
Engineering								
SE-09	Reliability Data	4.1.5.5 4.2.12.2 4.6.2.5	Twice	B	SPM -15 days	SPM +15 days	R	Data set for each different system configuration.
SE-10	Technical Review Preparations (PDR)	4.2.9.4	Once	Eng	PDR -15 days		R	
	Technical Review Preparations (CDR)	4.2.10.1	Once	Eng	CDR -15 days			
	Technical Review Preparations (IIRR)	4.2.11.2	Once	B	IIRR -15 days			

As Is Format	Interface Specification - Supplier COTS	4.1.4.1	Once	Eng/Fre	With bid			
SE-11	- CCG Tailored	4.1.4.2	Twice	B	Eng at PDR -15 days	B for IIRR - 15 days	R	
Test and Evaluation								
TE-02	Test Plan and Reports (FATs)	4.1.11.1 4.2.13.2 4.4.6.1	Twice	Eng & Fre	FRR -15 days,	FRR +15 days,	R	FAT Test Reports is due Test +10 days, French for equipment going to St. Laurent Sector
	Test Plan and Reports (SATs)	4.2.16.2 4.4.8.3	Twice	Eng & Fre	IRR -15 days	IRR +15 days	R	SATs Test Reports are due Test/ea. +10 days
TE-03	Acceptance Test Procedures (FAT)	4.1.11.2 4.2.13.2 4.4.6.1	Twice	Eng, & Fre	FRR -15 days,	FRR +15 days,	R	
	Acceptance Test Procedures (SAT)	4.2.16.2 4.4.8.3	Twice	Eng & Fre	IRR -15 days	IRR +15 days	R	
Maintenance Management								
MM-04	Maintenance Plans	4.1.5.1	Twice	B	SPM -15 days	SPM +15 days	R	
MM-05	Preventive Maintenance Program	4.1.5.1	Twice	B	SPM -15	SPM +15	I	

					days	days		
MM-06	Calibration Requirements Report	4.1.5.1	Once	B	SPM -15 days		I	
Training								
TT-02	Training Devices Requirements List	4.1.9.3 4.2.15.2	Twice	Eng & Fre	TRR -15 days	TRR +40 days	R	
TT-03	Training Manuals	4.1.9.3 4.1.10.1 4.2.15.2 4.5.1.2	Twice	Eng & Fre	TRR -15 days	TRR +40 days	R	

A = Annually	FRR = FAT Readiness Review	IIRR = INNAV Integration Readiness Review
AR = As Required	SPM = Spares Provisioning Meeting	TRR = Training Readiness Review
B = Final version shall be provided in both English and French language	I = Submitted for Information	R = Review and Acceptance Required
	IRR = Installation Readiness Review	PDR = Preliminary Design Review
Eng / Fre = English only or French only	M = Monthly	CDR = Critical Design Review
FAT = Factory Acceptance Test	SAT = Site Acceptance Test	COTS = Commercial Off-the-Shelf
Lang. = Language	Note: Frequency requirements do not include post-meeting revision requirements.	

NOTE: Submission requirements in this table do not include the revised submissions that may be required after submissions have been reviewed.

PM-01 PROJECT MANAGEMENT PLAN

DATA ITEM DESCRIPTION	
1. TITLE Project Management Plan	**2. IDENTIFICATION NUMBER** PM-01

3. PURPOSE

To describe the Contractor's project management methods and resources in accordance with PMBOK® Guide practices (or equivalent). This DID is to be used in conjunction with DIDs PM-02 and PM-03.

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and may be tailored by the Contractor.

4.2 The resulting document may be prepared in the Contractor's format and shall contain sufficient detail to fully address the information requirements herein.

4.3 The Project Management Plan shall include the following information ***as a minimum***:

4.3.1 Introduction, including purpose, scope, references, definitions, acronyms, and plan update process.

4.3.1.2 List of project deliverables

4.3.2 Project Organization

4.3.2.1 Project Manager

4.3.2.2 Team Organization Chart, along with roles and responsibilities

4.3.2.3 Coordination, with the CCG Project Authority and PWGSC CA (ensuring an effective working relationship)

4.3.2.4 Project Sub-Contract Management Plan

4.3.3 Work Plan

4.3.3.1 Work Breakdown Structure (WBS)

4.3.3.2 Master Schedule, including milestones and summary level

DATA ITEM DESCRIPTION	
1. TITLE Project Management Plan	**2. IDENTIFICATION NUMBER** PM-01

modified Gantt chart, with all task dependencies

Note: Once the baseline schedule is submitted it shall be retained intact with all subsequent amendments sequentially numbered

4.3.4 Project Control Methods

4.3.4.1 Scope Control

4.3.4.2 Integrated Change Control (internal processes to support requirements of DID PM-02)

4.3.4.2 Work Progress Monitoring and Control

4.3.4.3 Schedule Control

4.3.4.4 Quality Management, including description of Integration and Test Plan

4.3.4.5 Risk Management Plan (in accordance with DID PM-03)

4.3.4.5 Project Document Control

4.3.5 Issue Management, including escalation process (See DID PM-02)

4.3.6 Project Close Out

4.3.6.1 Final Project Review

PM-02 CONTRACTOR PROGRESS AND STATUS REPORT

DATA ITEM DESCRIPTION	
1. TITLE Contractor Progress and Status Report	**2. IDENTIFICATION NUMBER** PM-02

3. PURPOSE

To evaluate progress and remain cognizant of the project's status. This report shall be used as an input to regular Project Progress Review meetings.

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive and, with prior written agreement from the CCG TA named in the Contract, may be tailored by the Contractor.

4.2 The resulting document may be prepared in a format acceptable to the CCG and shall contain sufficient detail to fully address the information requirements. Any parts that are not relevant to the current reporting period may be left blank.

4.3 The report shall include the following information:

4.3.1 Report Identification

4.3.1.1 Report title, sequence number, date, Contractor

4.3.2 Project Status

4.3.2.1 Period covered

4.3.2.2 Status with respect to schedule

4.3.2.3 Significant events during the reporting period

4.3.2.4 Reporting period Project Risk Update (attach current Risk Matrix)

4.3.3 Project Changes

4.3.3.1 Changes (if any) in project scope (since the previous report)

4.3.3.2 Authorized changes (if any) to agreed schedule, technical objectives or deliverables

4.3.3.3 Significant changes (if any) to the Contractor's organization or method of operation

DATA ITEM DESCRIPTION	
1. TITLE Contractor Progress and Status Report	**2. IDENTIFICATION NUMBER** PM-02

Note: Change Requests and status shall be tracked in the Issue Log/Action Items List

4.3.4 Planned Next Period Activities

4.3.4.1 Plans for activities during the following period (review Master Schedule)

Note: If the Master Schedule has been amended since last report it shall be attached to this report

4.3.5 Issue Log/Action Items List (Spreadsheet)

4.3.5.1 Significant problems encountered, including recommendations (if any) for CCG action

4.3.5.2 Status of previously identified problems (not previously reported resolved)

4.3.5.3 Any other action items arising from reviews, meetings, or correspondence between the CCG, CA, and the Contractor

4.3.5.3 Change Request Tracking

Note: This list shall retain any closed items as an ongoing historical record. Action responsibility and due date are to be included as appropriate

PM-03 RISK MANAGEMENT PLAN

DATA ITEM DESCRIPTION	
1. TITLE Risk Management Plan	**2. IDENTIFICATION NUMBER** PM-03

3. PURPOSE

To establish a risk management methodology, organizational responsibility, and reporting requirements in accordance with PMBOK® Guide practices. This plan may be incorporated into DID PM-01 *Project Management Plan.*

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and may be tailored by the Contractor.

4.2 The resulting document may be prepared in the Contractor's format and shall contain sufficient detail to fully address the information requirements.

4.3 The report shall include the following information:

4.3.1 **Introduction**, including purpose, scope, related plans, references, definitions, acronyms, and plan update process.

4.3.2 **Risk Management Policy**

4.3.2.1 Overall Approach to Risk Management

4.3.3 **Organizational Responsibility**

4.3.3.1 Risk Management Responsibilities

4.3.3.2 Risk Management Meetings

4.3.4 **Scheduled Milestones and Reviews**

4.3.4.1 Project Review Meetings, including Risk Management

4.3.4.2 Technical Reviews and Audits, including Risk Management

4.3.5 **Risk Management System**

4.3.5.1 Risk Register

4.3.6 **Risk Management Process**

DATA ITEM DESCRIPTION	
1. TITLE Risk Management Plan	**2. IDENTIFICATION NUMBER** PM-03

4.3.6.1 Risk Identification, including number and description.

4.3.6.2 Risk Analysis, including domain, impact/severity, probability, timeframe, and priority

4.3.6.3 Risk Mitigation Plan, including risk "owner"

4.3.6.4 Risk Tracking, including reporting back date and risk status

4.3.6.5 Risk Resolution/Control

4.3.6.6 Risk Communication

4.3.7 Risk Mitigation Matrix (Note: to be appended to DID PM-02)

4.3.7.1 Management Risks

4.3.7.2 Technical Risks

4.3.7.3 Schedule Risks

4.3.7.4 Cost Risks

4.3.7.5 Logistic Support Risks

TDM-02 DRAWINGS AND ASSOCIATED LISTS

DATA ITEM DESCRIPTION	
1. TITLE Drawings and Associated Lists	**2. IDENTIFICATION NUMBER** TDM-02

3. PURPOSE

To prescribe the format, content and scope requirements relating to preparation and submission of Drawings and Associated Lists.

4. DATA PREPARATION INSTRUCTIONS

4.1 Drawings and associated lists shall be compliant with the CCG Specification for Electronic Technical Data Deliverables[1], Chapter 2. This Chapter prescribes:

- Raster Format
- Vector Format
- Folder and File Names
- Metadata
- Medium of Delivery
- Data Rights (Unlimited and Limited)

4.2 A family tree or equipment block diagram drawing shall be provided that depicts, in a top-down breakdown block diagram, the parent–child relationships of the items in the drawing package.

4.3 Equipment drawings shall include, ***but not be limited to***, the following:

- Mechanical drawings
- Equipment rack layouts
- Signal and connection block diagrams
- Schematic drawings, except as otherwise included in the equipment technical manuals
- Cable layouts
- Assembly drawings
- System interconnection diagrams
- Wire lists

4.4 Parts Lists / Bills of Material shall be provided in accordance with ASME Y14.34M-1996.

[1] Note. Reference (CA-014-000-NU-TD-001).

4.5	The drawing package shall provide full design disclosure and shall include the drawing types as prescribed in the attached Drawing Types List example.
4.6	Floor plan (may be marked up copies of the CCG-supplied floor plan).

Drawing Types List

Item Description	**Preliminary Design**	**Detailed Design**	**Final Design**	**As Fitted**
-- to be completed for the particular acquisition --	- adapt columns as necessary			
Example:				
General Arrangement – Including floor plan and rack location	X	X	X	X

TDM-03 EQUIPMENT INSTALLATION DATA PACKAGE

DATA ITEM DESCRIPTION	
1. TITLE Equipment Installation Data Package	**2. IDENTIFICATION NUMBER** TDM-03

3. PURPOSE

To provide sufficient data to enable proper installation of equipment at CCG Radar Sites. Information provided in this DID shall be in accordance with the TSOR.

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive and, with prior written agreement from the CCG TA named in the Contract, may be tailored by the Contractor.

4.2 The data submission may be prepared in the Contractor's format, and shall contain sufficient detail to fully address the information requirements.

4.3 The Equipment Installation Data Package shall include the following:

4.3.1 **Equipment Identification**, including nomenclature, make, and model

4.3.2 **Purpose of the equipment**

4.3.3 **Equipment dimensions**, including length, width, and height (metric)

4.3.4 **Equipment weight** in kilograms

4.3.5 **Utility specifications**

- Power requirements including size and type of cabling, fusing and distribution, voltage requirements and tolerances

4.3.6 **Mounting specifications and requirements**

- Placement limitations between sub-systems;
- Physical description of all equipment including mounting details, clearance requirements, cable entries, etc.;
- Overhead cable support and cable ducting requirements, including interconnection cable requirements, types of cable, lengths, etc.; and
- Equipment separation and recommended maintenance

DATA ITEM DESCRIPTION	
1. TITLE Equipment Installation Data Package	**2. IDENTIFICATION NUMBER** TDM-03

envelope.

4.3.7 **Environmental controls (storage and operational)**, including temperature, humidity, and dust.

4.3.8 **Safety provisions** (as applicable)

- Site and equipment grounding requirements
- Areas of potential danger
- Exhaust ventilation
- Fire detection and suppression

TDM-05 SYSTEM MANUALS

DATA ITEM DESCRIPTION	
1. TITLE System Manuals	**2. IDENTIFICATION NUMBER** TDM-05

3. PURPOSE

To provide manuals at the system level that provides an overview, performance characteristics, and operations and maintenance instructions.

4. PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG TA named in the Contract, may be tailored by the Contractor.

4.2 The data submission may be prepared in the Contractor's format, and shall contain sufficient detail to fully address the information requirements. The System Operations Manual and System Maintenance Manual may be included in a single publication.

4.3 The System Maintenance Manual shall be augmented with OEM equipment manuals.

4.4 System Operations and System Maintenance Manuals shall not be generic in nature, but be specifically written for the Radar System.

4.5 The System Manual shall include the following information:

4.5.1 GENERAL INFORMATION

- **About This Manual**, including its purpose and structure.
- **System Overview**, including a description of the overall system with supporting diagrams.
- **Performance Characteristics**, including system capabilities and characteristics.

4.5.2 Provide a separate chapter for each system including:

- **System Description**. including narrative description, system block diagram, equipment breakdown structure, and supporting data (for example, line drawings, photographs, data tables, etc.), as well as the theory of operation for the system.
- **System Operation information** shall be provided for each piece of equipment that requires MCTS Officer

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action.

- Describe control layouts and menus and how the performance can be changed and optimized through the use of operator controls and the actions to be taken when an error has been detected by the System or an operator.
- **System Maintenance information** shall be provided for all equipment units and sub-systems and shall, ***as a minimum***:
  a) Include equipment-level OEM manuals with direct reference to the applicable section. Conceptually the Maintenance Manual and OEM manuals are to be used in tandem with direct references from the Maintenance Manual;
  b) Describe the theory of operation of each type of equipment to the level needed for the maintenance and troubleshooting of the equipment by technical staff;
  c) Provide functional block diagrams, mechanical drawings, and electrical schematics;
  d) Include equipment rack layouts, system interconnect diagrams, wire lists and cable layouts;
  e) Contain maintenance instructions and fault diagnostic information, including:
    - Fault trees and diagnostic data, including possible malfunctions, causes, effects, fault isolation techniques and solutions.
    - Safety considerations.
    - Disassembling, repairing/replacing sub-assemblies and re-assembling the equipment.
    - Use of special tools and test equipment.
    - Preventive maintenance schedules.
    - Test and adjustment (including test sheets, as applicable).
    - Allowable service limits, wear limits for replacement, end play limits, balance data, torque values, cleaning information, etc.
  f) Include illustrated Parts List:
    - Line drawing of the system/equipment (schematic or exploded view), with parts assigned sequence numbers to provide a link to the parts list.
    - Indented parts list, identifying every component which may be replaced, in accordance with the planned depth of maintenance.

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g) Describe how the performance of the equipment can be changed and optimized through the use of all controls and describe, in detail, the procedures for the maintenance and repair of the equipment; and

h) Include a section in which all changes to original equipment manufacturer manuals are identified and documented.

TDM-06 EQUIPMENT MANUALS

DATA ITEM DESCRIPTION	
1. TITLE Equipment Manuals	**2. IDENTIFICATION NUMBER** TDM-06

3. PURPOSE

To provide system/equipment level operation, maintenance and repair instructions, and an illustrated parts list.

4. PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG Technical Authority (TA) named in the Contract, may be tailored by the contractor.

4.2 The data submission may be prepared in the contractor's format, and shall contain sufficient detail to fully address the information requirements.

4.3 The Original Equipment Manufacturer (OEM) Manual shall be provided in electronic PDF form (if at all possible), as well as in hard copy.

4.4 If the OEM Manual discusses several different models of equipment, then a Difference Data Sheet shall be provided to help the user understand which instructions apply to the model provided to the CCG, or preferably, the OEM Manual shall be edited so that it contains only relevant data.

4.5 The OEM Manual shall include the following information:

- System/Equipment Data and Description
- Theory of Operation (supported by system block diagrams)
- Installation Instructions (if applicable)
- Operating Instructions
- Maintenance Instructions
  - Preventive maintenance schedules
  - Disassembling, repairing/replacing and re-assembling the equipment
  - Use of special tools and test equipment
  - Test, adjustment, check-out data (including test sheets, as applicable)
  - Allowable service limits, wear limits for replacement, end play

DATA ITEM DESCRIPTION	
1. TITLE Equipment Manuals	**2. IDENTIFICATION NUMBER** TDM-06

limits, balance data, torque values, cleaning information, etc.

– Diagnostic Data

- Possible malfunctions, causes, affects, fault isolation techniques and solutions, electrical schematics

– Illustrated Parts List

- Line drawing of the system/equipment (schematic or exploded view), with parts assigned sequence numbers to provide a link to the parts list
- Indented parts list, identifying every component which may be replaced (in accordance with the planned depth of maintenance)

TDM-07 SOFTWARE VERSION DESCRIPTION DOCUMENT

DATA ITEM DESCRIPTION	
1. TITLE Software Version Description Document	**2. IDENTIFICATION NUMBER** TDM-07

3. PURPOSE

To describe the software installed initially and to enable the release, tracking and control of software upgrades over the asset life cycle. It also describes any site-specific variants of the software.

4. PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG Technical Authority (TA) named in the Contract, may be tailored by the contractor.

4.2 The data submission may be prepared in the contractor's format, and shall contain sufficient detail to fully address the information requirements.

4.3 The Software Version Description Document shall include the following information:

4.3.1 IDENTIFICATION

- **Software System Title and Version**
- **Variant ID** – If this is a variant (for example site specific), identify the software variant
- **Release Number or Block Change** – Identify the software release number (or block change)
- **Release Date**
- **Replaces** – Fully identify the software being replaced

4.3.2 APPLICABILITY – Identify the system to which the software version applies.

- **Applicable System**
- **Target Platform** – Identify the specific computing platform to which the relevant version (or block change) is applicable

4.3.3 VERSION DESCRIPTION

- **Inventory of Materials Released** – List all physical distribution media and associated documentation for the software being released. Use titles,

DATA ITEM DESCRIPTION	
1. TITLE Software Version Description Document	**2. IDENTIFICATION NUMBER** TDM-07

identifying numbers, dates, version numbers, and release numbers, as applicable. Indicate any applicable restrictions regarding licensing, duplication, and security considerations.

– **Inventory of Software Contents** – For each physical distribution medium, list the computer files contained thereon. Include the file names, versions, dates, and any other pertinent information.

– **Target Platform Configuration** – Specify the required configuration of the target platform before this software version can be installed and executed, or attach a hardware specification document

– **Adaptation Data** – For the initial software release, describe the site-specific data or customizations featured in this version of the software, corresponding to the target platform above. For subsequent releases, describe any changes to the site-specific data.

– **Installation and Check-out Instructions** – Give detailed instructions on:

- How to install this software release on the target platform
- Test procedure to ensure that the installed software is working properly
- Point-of-contact in case difficulties are encountered with the software installation
- Applicable security, privacy or safety precautions

– **Disposal Instructions** – If applicable, what to do with the previously released software version after this version has been successfully installed. (Include security considerations if applicable.)

– **Changes Installed** – If applicable, describe the changes, which have been implemented in the current software version, as compared to the previous one. This may include both enhancements as well as fault fixes. This paragraph is not applicable to the initial release of software.

– **Possible Problems and Known Errors** – Identify any possible problems or known errors in the software version including:

- How to avoid the relevant errors
- How to recognize and recover from the consequences of the errors
- What is being done to correct the problems permanently, and when a resolution can be expected

– **Related Documents** – List any other documents, which are applicable to

DATA ITEM DESCRIPTION	
1. TITLE Software Version Description Document	**2. IDENTIFICATION NUMBER** TDM-07
the software version being released, but which are physically not included in this release. Indicate the document titles, document numbers, version numbers, version dates, and publication source. **4.3.4 SUPPLEMENTARY NOTES** – Any additional information about the software version, which may facilitate installer or user understanding (e.g. acronyms, definitions, background information, and rationale).	

TDM-08 SOFTWARE USER MANUAL

DATA ITEM DESCRIPTION	
1. TITLE Software User Manual	**2. IDENTIFICATION NUMBER** TDM-08

3. PURPOSE

To explain how to install computer system software and to properly operate a software-based system.

4. PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG Technical Authority (TA) named in the Contract, may be tailored by the contractor.

4.2 The data submission may be prepared in the contractor's format, and shall contain sufficient detail to fully address the information requirements.

4.3 The Software User Manual shall include the following information:

4.3.1 **SYSTEM OVERVIEW** – Present a high-level overview of the system – its purpose, required hardware and software architecture.

4.3.2 **APPLICABLE DOCUMENTS** – List all applicable product support documents pertaining to the system.

4.3.3 **TARGET COMPUTER SYSTEM HARDWARE**

- **Hardware Overview** – Describe the target computer system hardware, including peripherals
- **Hardware Configuration** – Describe how the hardware should be configured for operation. Discuss the following topics:
- **Installation Requirements** – List the prerequisites such as physical installation space (e.g. 19" rack mount), electrical power type and capacity, air conditioning or special cooling provisions, etc.
- **Environmental Considerations** – Discuss any environmental conditions, which must be satisfied for the system to operate properly. Some examples are: office or computer room environment only, isolation from shock and vibration.
- **Nominal Configuration** – Describe the baseline system hardware configuration
- **Special Variants** – Describe any site or application-specific variants in hardware configuration, which may have an impact on the system

DATA ITEM DESCRIPTION	
1. TITLE Software User Manual	**2. IDENTIFICATION NUMBER** TDM-08

software

– **Hardware Operating Procedures** – Describe how the hardware should be properly operated.

– **Start-up** – Describe how to start up the system from a power-off state

– **Normal Operation** – Describe all of the routine operating procedures (e.g. Swap-out of storage media, sanitization of the system after use)

– **Forbidden Actions** – List and describe operator hardware-related actions, which can result in undesirable consequences such as computer hardware damage, loss of data, or improper operation of other equipment

– **Diagnostics** – Describe any automatic built-in test functions and user-initiated diagnostics

– **Shut-Down** – Describe how to properly shut down the system hardware

– **Emergency Procedures** – Describe any applicable emergency procedures

4.3.4 COMPUTER SYSTEM SOFTWARE

– **Software Overview** – Describe the architecture of the computer system software and explain the purpose and functionality of all of the elements.

– **Software Installation** – Describe how to install or reinstall the computer system software on the target computer addressing issues such as:

- Hardware prerequisites – List the baseline hardware requirements that are prerequisites for the execution of the software
- Software prerequisites – List any dependencies of the computer system software on other software. For example: the host platform's operating system (including version), embedded firmware, software tools such as a database management system, or terminal emulator software
- Site Adaptations – Describe any computer system hardware variants and the corresponding site adaptations of the computer system software. Describe how the software must be configured to operate at these sites
- Installation procedure – Describe the step-by-step procedure for the initial installation or reinstallation of the computer system software

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1. TITLE Software User Manual	**2. IDENTIFICATION NUMBER** TDM-08

- Installation check-out – Describe how the user can ascertain whether the installed computer system software is operating correctly on the target hardware

– **Software Operating Procedures – Describe how the software should be properly operated including:**

- Start-up – Describe how to initiate software execution
- Normal Operation – Describe all of the routine operating procedures (e.g. system initialization, operator task sequences, data back up and recovery, etc.). Show the relevant operator-machine interactions, data entry screens, hard and soft copy reports generated, etc.
- Shut-Down – Describe how to properly terminate software execution prior to powering off the computer system hardware
- Forbidden Actions – List and describe operator software-related actions, which can result in undesirable consequences such as computer hardware damage, loss of data, or improper operation of other equipment
- Back up and Recovery – Describe routine procedures to back-up system data, and in the event of data loss, how to recover and resume operations using the back up media
- Emergency Procedures – Describe any software-related procedures, which must be performed in case of specific emergencies.

– **Messages** – List and describe the meaning of all messages generated by the system software. This includes:

- Operating status messages
- Diagnostic messages
- - Error messages

– **Quick Reference Guide** – Provide a succinct summary of operator software commands.

4.3.5 SECURITY AND PRIVACY – Identify any security or information privacy issues which may exist in the system, and describe how they should be addressed during system operation. This should include such things as user log-in procedures, user privileges, and physical security.

4.3.6 SUPPORT – Identify sources of support available to the system users in the

DATA ITEM DESCRIPTION	
1. TITLE Software User Manual	**2. IDENTIFICATION NUMBER** TDM-08

event that they experience difficulties that are beyond their capabilities. The topics may include:

- **Hardware Support** – Indicate how to contact extended hardware support for problems, which are beyond the capabilities of local resources
- **Network Support** – For network-based systems, indicate how to contact communications network support for problems, which are beyond the capabilities of local resources
- **Software Support** – Indicate how to contact software support for problems, which are beyond the capabilities of local resources
- **Reporting Problems** – Describe the procedure for documenting and reporting system problems, and for suggesting system enhancements

CM-01 CONFIGURATION MANAGEMENT PLAN

DATA ITEM DESCRIPTION	
1. TITLE Configuration Management Plan	**2. IDENTIFICATION NUMBER** CM-01

3. PURPOSE

To describe the contractor's Configuration Management Program, which describes how the configuration baseline(s) be documented and addresses both CCG directed and contractor initiated configuration changes.

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG Technical Authority (TA) named in the Contract, may be tailored by the contractor.

4.2 The resulting document may be prepared in the contractor's format and shall contain sufficient detail to fully address the information requirements.

4.3 The Configuration Management Plan shall include the following information:

4.3.1 **Introduction** – purpose, scope, related plans, standards, definitions, acronyms

4.3.2 **Organization and Management** – project CM organization, Configuration Manager, the contractor's Configuration Management Control Board

4.3.3 **Interfaces** – with other disciplines/functions, especially engineering, procurement, integrated logistic support, production/construction, tests and trials, quality assurance, planning and scheduling

4.3.4 **Flow Down of Configuration Management requirements** – to subcontractors and suppliers

4.3.5 **Conduct of Configuration Management:**

- Configuration Identification
- Configuration Identification Function
- Selection of Configuration Items
- Drawings and Parts List
- Master Equipment List
- System Block Diagrams
- Baseline Management

DATA ITEM DESCRIPTION	
1. TITLE Configuration Management Plan	**2. IDENTIFICATION NUMBER** CM-01

- Configuration Control
- Configuration Control Function
- Design Change Request Procedure
- Drawing Revision Notice Procedure
- Software Change Request Procedure
- Request for Variance Procedure
- Configuration Status Accounting
- Tracking Configuration Changes
- CSA Reports
- Configuration Audits
- Functional Configuration Audit
- Physical Configuration Audit

4.3.6 Transfer of Configuration Data to the CCG

CM-03 REQUEST FOR CLARIFICATION

DATA ITEM DESCRIPTION	
1. TITLE Request for Clarification	**2. IDENTIFICATION NUMBER** CM-03

3. PURPOSE

To recommend clarification in the wording of project documentation including TSOR or SOW.

4. DATA PREPARATION INSTRUCTIONS

4.1 The Request for Clarification may be prepared in the Contractor's format and shall contain sufficient detail to fully address the following information requirements:

4.1.1 Identification of affected document

4.1.2 Identification of affected Configuration Item

4.1.3 Existing Wording

4.1.4 Proposed Wording

4.1.5 Reason For Change

4.1.6 Record of Decision (to be completed by the CCG)

CM-04 CHANGE REQUEST

DATA ITEM DESCRIPTION	
1. TITLE Change Request	**2. IDENTIFICATION NUMBER** CM-04

3. PURPOSE

To seek a change to the TSOR, scope of deliverables, design change or any other significant change (e.g. a schedule change that impacts the overall project), which is typically desired by the Contractor.

4. DATA PREPARATION INSTRUCTIONS

4.1 The Change Request may be prepared in the Contractor's format.

4.2 The data provided in the Change Request shall be adequate to establish that the contemplated change is justified, is a good technical solution to the problem being addressed, and that the risk, engineering, and logistic support implications have been adequately assessed.

4.3 Change Requests shall include the following elements as applicable:

4.3.1 Project Title;

4.3.2 WBS Element(s);

4.3.3 Requested By;

4.3.4 Date;

4.3.5 Change Title;

4.3.6 Description of the proposed change;

4.3.7 Justification for the proposed change;

4.3.8 Type of Change: Arising or New Work. Minor or Major;

4.3.9 Change Priority: (Medium/Low/High);

4.3.10 Cost to the CCG for the proposed change;

4.3.11 Impact(s) to:

- Project baseline;
- TSOR;
- System performance;
- Schedule;

DATA ITEM DESCRIPTION	
1. TITLE Change Request	**2. IDENTIFICATION NUMBER** CM-04

- Delivered equipment, software, documentation or training;
- Guarantees or warranties;

4.3.12 Signature and name of the Contractor's authorized official;

4.3.13 A block for the CCG TA to indicate recommendation or non-recommendation of the Change Request;

4.3.14 A block for the PWGSC CA to indicate approval or disapproval of the Change Request; and

4.3.15 Supporting data necessary to understand and evaluate the complete scope of the change and its impact.

4.4 A block for Change Complete Certification (see note)

Note: If the Change Request is approved, then the Contractor implement the change (normally on the basis of a contract amendment) and bring the technical data, Quality Management inspection requirements, test and trial requirements, and logistic support into line with the change. The Change Request form shall include a section to confirm to the CCG that this has been accomplished. In addition the PMP and Master Schedule shall be amended as required within five (5) days.

SE-09 RELIABILITY DATA

DATA ITEM DESCRIPTION	
1. TITLE Reliability Data	**2. IDENTIFICATION NUMBER** SE-09

3. PURPOSE

To describe the Contractor's approach to achieving TSOR requirements and ensuring adequate asset reliability and availability.

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG TA, may be tailored by the Contractor.

4.2 The data submission may be prepared in Contractor's format, and shall contain sufficient detail to fully address the information requirements.

4.3 The Reliability Data shall include the following information:

4.3.1 **General Guidance**

4.3.1.1 The reliability analysis shall be to the module level, showing how the System Availability and Mean-time-between-Failures is derived.

4.3.1.2 A detailed availability and reliability model shall be developed for the complete System including the remote site sub-systems and the MCTS Officer Workstation.

4.3.1.3 The model shall identify critical items or paths whose failure cause System or sub-system failure, major performance degradation or marginal operation.

4.3.1.4 The model shall be included in the availability and reliability predictions.

4.3.1.5 The Mean-time-between-Failures and the Mean-time-to-Repair for each module in the System shall be presented with the analysis.

4.3.1.6 Reliability and Maintainability Data shall be provided.

4.3.1.7 Design Implications of the CCG-provided Data.

4.3.1.8 This include gathering and Assessment of Sub-

DATA ITEM DESCRIPTION	
1. TITLE Reliability Data	**2. IDENTIFICATION NUMBER** SE-09
Contractor / Supplier R&M Data.	

SE-10 TECHNICAL REVIEW PREPARATIONS

DATA ITEM DESCRIPTION	
1. TITLE Technical Review Preparations	**2. IDENTIFICATION NUMBER** SE-10

3. PURPOSE

To plan for technical reviews, provide the technical data required for each review, and document the reviews.

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG Technical Authority (TA) named in the Contract, may be tailored by the contractor.

4.2 Each data submission may be prepared in contractor's format, and shall contain sufficient detail to fully address the information requirements.

4.3 The required information may be delivered progressively:

- The 'Technical Review Plan and Arrangements' is required with the first submission
- The 'Technical Review Preparations' is required at least one month prior to each review
- The 'Technical Review Data Package" is required at least two weeks prior to each review
- The 'Technical Review Minutes' shall be prepared during the Technical Review

4.4 The Technical Review Preparations, Data and Minutes submissions shall include the following information:

4.4.1 Technical Review Plan and Arrangements

4.4.1.1 Project Phases, Baselines and Technical Reviews

4.4.1.2 Technical Review Schedule

4.4.1.3 Location of Each Technical Review

4.4.1.3 Overview of Technical Review Roles and Responsibilities

4.4.2 Technical Review Preparations – provide the required information for each Technical Review

4.4.2.1 Technical Review Objective

DATA ITEM DESCRIPTION	
1. TITLE Technical Review Preparations	**2. IDENTIFICATION NUMBER** SE-10

4.4.2.2 Technical Review Pre-requisites – what work must have been accomplished prior to the review

4.4.2.3 Technical Documents to be Reviewed – list of documents and whether outline, draft or final

4.4.2.4 Organizations and Individuals Involved in the Review – and their specific review responsibilities

4.4.2.5 Detailed Arrangements – transportation, accommodation, conference room booking, equipment displays, access to work site

4.4.3 Technical Review Data Package

4.4.3.1 Status of Action Items from Previous Reviews – applicable from the 2nd review onwards

4.4.3.2 Presentation Material – including status of primary technical objectives

4.4.3.3 Configuration Status – list of active Design Change Requests, Drawing Revision Notices and Requests for Variance

4.4.3.4 Technical Documentation – a copy of each document (not previously delivered) needed to show that the objectives of the completed phase of work have been accomplished

4.4.4 Technical Review Minutes

Note: The minutes shall be prepared by the Contractor, signed by both the Contractor and the CCG Technical Authority, and provided to participants at the conclusion of the Technical Review

4.4.4.1 Technical Review Conclusions

4.4.4.2 Action Items – and assigned responsibility and due date

4.4.4.3 Technical Review Status – acceptance, conditional acceptance, rejection

SE-11 INTERFACE SPECIFICATION

DATA ITEM DESCRIPTION	
1. TITLE Interface Specification	2. IDENTIFICATION NUMBER SE-11

3. PURPOSE

To precisely define and control the interface between the asset being acquired and other CCG systems or equipment.

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG Technical Authority (TA) named in the Contract, may be tailored by the contractor.

4.2 Each data submission may be prepared in contractor's format, and shall contain sufficient detail to fully address the information requirements.

4.3 The Interface Specification, and each update of it, must be agreed upon by the technical person responsible for each side of the interface.

4.4 The Interface Specification shall include the following types information, with the data provided being suitable for the technology involved and the particular interface.

Note: The following list is indicative. Select appropriate topics; add topics to the list that are needed to define the particular interface.

- System / equipment identification
- Size and shape limitations
- Installation mounting details
- Installation and wiring drawings
- Maximum weight allocation
- Movement restrictions
- Space requirements, including access space for maintenance
- Flow of signals across the boundary
- Software to hardware interface
- Software to software interface

DATA ITEM DESCRIPTION	
1. TITLE Interface Specification	2. IDENTIFICATION NUMBER SE-11
– Power type, source and consumption rate – Need for regulated power; uninterrupted power – Heating requirements – Heat dissipation and cooling requirements – Electromagnetic compatibility concerns – Contact of dissimilar metals – Safety and health considerations	

TE-02 TEST PLAN AND REPORT

DATA ITEM DESCRIPTION	
1. TITLE Test Plan and Report	**2. IDENTIFICATION NUMBER** TE-02

3. PURPOSE

To provide a plan for system testing.

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG TA named in the Contract, may be tailored by the Contractor.

4.2 The data submission may be prepared in Contractor's format, and shall contain sufficient detail to fully address the information requirements.

4.3 The Test Plan shall include, but not be limited to, the following information:

4.3.1 **Introduction,** including purpose, scope, references, definitions, and acronyms.

4.3.2 **Organization and Management**

4.3.2.1 Organization, including key personnel.

4.3.2.2 Terms of Reference, including responsibilities for preparation, internal/external test permissions, development of acceptance tests, conduct of the tests, witnessing, report preparation, and results follow-up.

4.3.2.3 Methodology for the equipment and system level FATs and SATs.

4.3.3 **Test Report**

4.3.3.1 The report shall include a complete overview of the results covering ***as a minimum***:

4.3.3.2 Problems Encountered, including problems and action taken

4.3.3.3 Test Results, including details of all of the test data and summary of the data reduction and analysis. Reference

DATA ITEM DESCRIPTION	
1. TITLE Test Plan and Report	**2. IDENTIFICATION NUMBER** TE-02
in this section can be made to attached annexes (which shall include TE-03). 4.3.3.4 Conclusions, including: • Identify the pass/fail result and provide a brief analysis of the test results in narrative form; and • Identify the action plan to resolve any outstanding issues.	

TE-03 ACCEPTANCE TEST PROCEDURES

DATA ITEM DESCRIPTION	
1. TITLE Acceptance Test Procedures	**2. IDENTIFICATION NUMBER** TE-03

3. PURPOSE

To provide the procedures to be followed for the Factory Acceptance Test and Site Acceptance Test.

4. DATA PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive and, with prior written agreement from the CCG TA named in the Contract, may be tailored by the Contractor.

4.2 The data submission may be prepared in Contractor's format, and shall contain sufficient detail to fully address the information requirements. The Tests shall capture all requirements in the TSOR, SOR and SOW, and shall provide the appropriate contract reference (see example Test Sheet below)

4.3 The Test Procedure shall include the following information as applicable:

4.3.1 Test Purpose

- Asset / item to be tested
- Test objective
- Test witnessing
- Schedule of Events

4.3.2 Testing Conditions

- Test Facility
- Environmental Conditions
- Test Equipment, Recording Equipment
- Set-up, Calibration, Pre-test Checks
- Operating Conditions of Test Item
- Safety Precautions and Warnings

4.3.3 Test Procedure

- Description of requirement to be tested;
- Reference to the section(s) in TSOR, SOR, SOW and/or other applicable documents;

DATA ITEM DESCRIPTION	
1. TITLE Acceptance Test Procedures	**2. IDENTIFICATION NUMBER** TE-03

- Test Configuration;
- Test method to be used to test the requirement;
- Expected result;
- Obtained result; and
- Pass/Fail Condition(s).

4.3.4 Recording and Reporting

- Format for Recording Test Results (see example Test Sheet below)
- Data Collection and Analysis
- Quality Assurance Certification

4.3.5 Signature of Participating Organizations on Test Results

TE-03 Example Test Sheet

Test #	Ref	Aim/Description	VM	Procedure/Pass-Fail Criteria	Result	Init
1	T 3.1.6.2.1	All the transmitters shall be configured such that in the event of a failure of any one transmitter, the standby transmitter can take the place of the failed unit.	D	Step: Two transmitters transmitting, introduce fault into one Expected result: the warm-standby transmitter is immediately available	P/F	

Test Completion Signatures	
CCG Signatory Name: Signature: Date:	**Contractor Engineering Signatory** Name: Signature: Date:

Verification Method (VM): I – Inspection, D – Demonstration, A – Analysis, T – Test

Reference: T – TSOR, O – Statement of Operational Requirements, S – Statement of Work

MM-04 MAINTENANCE PLANS

DATA ITEM DESCRIPTION	
1. TITLE Maintenance Plans	**2. IDENTIFICATION NUMBER** MM-04

3. PURPOSE

To provide a complete set of maintenance plans that identify the required maintenance tasks, indicate organizational responsibility for the tasks, and identify the logistics support resources needed to perform the tasks.

4. DATA PREPARATION INSTRUCTIONS

4.1 The data submission may be prepared in contractor's format, and shall contain sufficient detail to fully address the information requirements

4.2 The submission shall include a maintenance plan for each system/equipment. These shall be consolidated into one document.

4.3 **Asset Breakdown Structure** – The Maintenance Plan shall include the Asset Breakdown Structure (in a separate section), which be used to index/number the individual maintenance task data sheets.

4.4 **Technical Data** – It shall also include a section listing all manuals, drawings, regulations and other technical data used in the development of the maintenance plans.

4.5 **Maintenance Tasks** – The Maintenance Plan shall include a section presenting maintenance task data sheets that contain the following information for each maintenance task:

- Task identification
- Task organizational responsibility
- Task origin
- Task interval or frequency
- Reference technical documents
- Task precautions and comments
- Instructions in manuals (if applicable)
- Safety considerations
- Job plan steps

DATA ITEM DESCRIPTION	
1. TITLE Maintenance Plans	**2. IDENTIFICATION NUMBER** MM-04

– Work allocation – occupations and estimated hours

– Material Safety Data Sheet – if any applicable to task

– Required maintenance resources – material, parts, tools and test equipment

4.6 **Parts Summary** – The required spares and repair parts needed for each task shall be aggregated and rationalized and presented in a Parts Summary Report. This report shall relate the parts requirements to the equipment and maintenance task(s) being supported.

4.7 **Material Summary** – The required material (lubricants, glues, paints, etc.) needed for each task shall be aggregated and rationalized and presented in a Material Summary Report. This report shall relate the material requirements to the equipment and maintenance task(s) being supported.

4.8 **Tools and Test Equipment Summary** – The required tools and test equipment needed for each task shall be aggregated and rationalized and presented in a Parts Summary Report. This report shall relate the tools and test equipment to the equipment and maintenance task(s) being supported.

MM-05 PREVENTIVE MAINTENANCE PROGRAM

DATA ITEM DESCRIPTION

1. TITLE	2. IDENTIFICATION NUMBER
Preventive Maintenance Program	MM-05

3. PURPOSE

To provide a complete list of preventive maintenance tasks organized in various ways that be helpful during the in-service phase in scheduling the work.

4. DATA PREPARATION INSTRUCTIONS

4.1 The data submission may be prepared in contractor's format, and shall contain sufficient detail to fully address the information requirements

4.2 The submission shall identify the required preventive maintenance for each system/equipment. The data shall be consolidated into one document.

4.3 The timing of the preventive maintenance tasks shall be as expressed in the maintenance plans.

4.4 The data shall grouped into tables listing routine, calendar based and operating hour based tasks. An example breakout is shown below. Each interval within a category be a column in its respective table.

Scheduled Task	Interval
Routine Technologist Tasks	Daily or Weekly
Monthly Preventive Maintenance Tasks	e.g. 1, 3, 4, 6, 12, 18, 24, 36, 48 or 60 months
Usage-Based Preventive Maintenance Tasks	e.g. 100, 200, 250, 400, 500, 800, 1000, 2000, 3000, 4000, 5000 or 6000 hours

4.5 The data shall also be organized by the Asset Structure, so that the required preventive maintenance for any system/equipment can be easily determined.

MM-06 CALIBRATION REQUIREMENTS REPORT

DATA ITEM DESCRIPTION	
1. TITLE Calibration Requirements Report	**2. IDENTIFICATION NUMBER** MM-06

3. PURPOSE

To identify special tools and test equipment that require calibration and to specify the calibration requirement.

4. DATA PREPARATION INSTRUCTIONS

4.1 The data submission may be prepared in contractor's format, and shall contain sufficient detail to fully address the information requirements

4.2 The Calibration Requirements Report shall provide the following information for each item requiring calibration.

- Item Sequence Number
- Item Description
- Manufacturer
- Manufacturer's Part Number
- CAGE Code (Manufacturer) – see 4.3
- Calibration Interval (months)
- Calibration Procedure (attach if necessary)
- Calibration Standard (the standard against which the item must be calibrated)

4.3 **Company Contact Data** – If the plant where the item is made does not have a CAGE code, then provide the company address, telephone number and email address in a separate Manufacturer Contact Data list.

Note: *The CAGE Code is known by several acronyms: CAGE, NCAGE, FSCM, NSCM*

TT-02 TRAINING DEVICES REQUIREMENTS LIST

DATA ITEM DESCRIPTION	
1. TITLE Training Devices Requirements List	**2. IDENTIFICATION NUMBER** TT-02

3. PURPOSE

To provide a list of training devices needed to conduct training.

4. DATA PREPARATION INSTRUCTIONS

4.1 The data submission may be prepared in contractor's format, and shall contain sufficient detail to fully address the information requirements

4.2 A separate Training Devices Requirements List (TDRL) shall be prepared for each course.

4.3 **Item Data** – The TDRL shall provide the following data for each recommended item:

- Item Sequence Number
- Item Description
- Manufacturer
- Manufacturer's Part Number
- CAGE Code (Manufacturer) – see 4.4
- NATO Stock Number (if assigned)
- Local Commercial Purchase (Y/N) – see 4.5
- Unit Price – see 4.6
- Recommended Buy Quantity

4.4 **Manufacturer Contact Data** – If the plant where the item is made does not have a CAGE code, then provide the manufacturer's address, telephone number and e-mail address in an associated Manufacturer Contact Data list.

Note: *The CAGE Code is known by several acronyms: CAGE, NCAGE, FSCM, NSCM.*

4.5 **Local Commercial Purchase** – If the item is best obtained through Local Commercial Purchase then indicate yes (Y) in the indicated data field, and leave the Manufacturer and CAGE Code fields blank.

4.6 **Unit Price** – is the price in effect when the TDRL was submitted, consistent with the Recommended Buy Quantity. This data be used for budgeting and inventory

management purposes. It is understood that a future price quote for the item reflect circumstances at the time.

TT-03 TRAINING MANUALS

DATA ITEM DESCRIPTION	
1. TITLE Training Manuals	**2. IDENTIFICATION NUMBER** TT-03

3. PURPOSE

To provide manuals to be used in training the CCG personnel.

4. PREPARATION INSTRUCTIONS

4.1 This DID is not meant to be restrictive, and with prior written agreement from the CCG TA named in the Contract, may be tailored by the Contractor.

4.2 The data submission may be prepared in the Contractor's format, and shall contain sufficient detail to fully address the information requirements.

4.3 The Technical Student Manual shall, ***as a minimum***, include the following information:

a) Theory of operation of overall system and all sub-systems;
b) Installation of the system;
c) Fault locating and diagnostic techniques, both remotely and locally, using fault trees, built-in testing features and/or the use of external test and measurement equipment;
d) Removal and replacement any LRUs with relevant spares;
e) Complete assembly and disassembly procedures applicable to level of maintenance, including any adjustments or set-up procedures required to establish full operational performance of the equipment;
f) Optimization of the Radar System, including remote Radar site optimization;
g) Remote provisioning, monitoring, technical parameter performance checks and reports, version updates, resets;
h) All Preventive/Periodic Maintenance routines, such as cleaning, health testing or component replacement such as filters or batteries;
i) Procedures to back-up and restore the Radar Equipment software using external non-volatile storage media, including saved presets and configuration data; and
j) Procedures to load and configure new updates to the Radar Equipment software and firmware.

4.4 The Operational Student Manual shall, ***as a minimum***, include the

following information:

a) The purpose, functions and capabilities of each device and sub-system comprising the overall system;

b) The ability to demonstrate the correct operation of each system function;

c) The ability to recognize equipment faults and take appropriate action to protect the equipment involved and to reconfigure remaining equipment to minimize the effect on overall System availability; and

d) A quick reference fault finding check list shall be provided as part of the training package.

4.4.1 The operational controls and functions which should be emphasized in the course include the Workstation display, menus, graphics, controls, alarms, as well as information logging, storage, retrieval, processing and printing.

4.5 **Training Documentation**: A standardized approach for the development of key training documentation to support formal technical training is essential to ensure effective and efficient Technical Training Management. Key documents required to conduct formal training are outlined below.

4.5.1 **Training Objectives**: set tasks in context and describe learning outcomes in observable and measurable terms. It is a behavioural statement of the task to be performed in the operational environment, the standard or performance desired, and the constraints or conditions under which the student is expected to complete the activity. Each training objective should include the following components:

a) The skill or activity to be learned;

b) The constraints or conditions under which the learner is expected to complete the activity;

c) The standard or performance desired; and

d) Related references.

4.5.1.1 Training Objectives are further broken down into terminal and enabling objectives:

a) **Terminal Objectives**, the action, knowledge, or skills the learner is expected to have acquired at the end of instruction;

b) **Enabling Objectives**, the experiences, ways and means of achieving the Terminal Objective.

4.5.2 Course Syllabus: an outline or summary of the details of a course for students including training objectives, target and enabling objectives, course duration, language of training, course schedule, classroom facilities, course material and student evaluation. A course syllabus should be divided into three parts:

4.5.2.1 Task Analysis. A list of all duties and tasks that make up the training requirement.

4.5.2.2 Course Information, including the following:

a) General information;
b) Scope of training;
c) Course management;
d) Prerequisites;
e) Student evaluations;
f) Course reports; and
g) Training objectives.

4.5.2.3 Course Training Plan, identifying the following for each terminal objective:

a) Enabling objective;
b) Level of learning – knowledge and skill;
c) Time required for each enabling objective;
d) Points to be covered for each enabling objective;
e) Type of training – knowledge or skill;
f) Required training aids and references; and
g) Evaluation process.

4.5.3 Lesson Plans: the development and use of a lesson plan assist the instructor in providing an effective learning experience. The lesson plan ensures that the instructor follows a specific, training objective plan. Each lesson begin on a new page and follow the same format:

a) Lesson number and title;
b) Date prepared;
c) Total training time;
d) Methodology;
e) Terminal and enabling objectives;
f) Relevance;
g) Aim;
h) Lesson content;

i) Equipment and training aids; and
j) References.

4.5.4 Training Aids: provide a list of all training equipment that must be supplied to support the training, including reference material, training simulators, training systems or test equipment. These aids also include the installation, maintenance, and training plan for the equipment. Training aids and equipment for the entire course (and where they can be found) are the following:

a) Projectors;
b) Videos;
c) Block diagrams;
d) Flipcharts;
e) Whiteboards;
f) Simulators;
g) Tools;
h) Computers;
i) Test equipment; and
j) Laboratory or workshop equipment

4.5.5 Instructor Manual: provides the instructor all the information required to teach the course, including general course information, lesson plans, a description of training aids, a student manual and an evaluation guide. The Instructor Manual should include the following sections:

4.5.5.1 General Information:

a) Title;
b) Description;
c) Duration;
d) Target group;
e) Number of students;
f) Prerequisite knowledge;
g) Instructor requirements;
h) Course location;
i) Student evaluations; and
j) Course reporting.

4.5.5.2 Master Lesson Plans divided into a series of lessons, each of which begin on a new page and follow the same format:

a) Lesson number, title and date prepared;
b) Total training time;
c) Methodology;
d) Terminal and enabling objectives;
e) Relevance;
f) Aim;
g) Lesson content;
h) Equipment and training aids; and
i) References.

4.5.6 Student Manual: provides the student with all the information required for the course, including general course information, lesson plans, and evaluation guides. The student manual include the following sections:

4.5.6.1 Administration

a) Course information;
b) Course timetable;
c) Course materials; and
d) Course objectives.

4.5.6.2 Equipment safety procedures

4.5.6.3 Lesson Plans (same format as instructor manual)

4.5.6.5 References

4.5.7 Evaluation Guide: explains the testing process used for the course. The evaluation guide contain the evaluation methodology and the tests and evaluations for the course, including:

a) Blank student copy; and
b) Instructor's copy with the correct answers.

APPENDIX E NATIONAL SPARES MANAGEMENT STRATEGY

E.1 INTRODUCTION

E.1.1 The purpose of this appendix is to describe the National Spares Management (NSM) Strategy aimed at improving:

- life-cycle management of national spares in support of operations;
- visibility of national spares across the CCG;
- inventory management of spares and;
- CCG's return on investment (ROI).

E.1.2 When fully implemented NSM will provide the ability to locate and account for designated national spares throughout their life cycle and provide visibility in the Maximo application (system of record) of CCG's Asset Management System (AMS). This should lead to a reduction of equipment downtime by providing the technical community a consistent method of identifying available inventory of spares across the organization enabling them to get the right spares to the right place when required

E.2 OBJECITIVE

E.2.1 The objectives of this strategy are to:

- Identify, define and validate the business elements required for the effective and efficient management of national spares to ensure that assets are available, reliable and cost-effectively supported throughout their life cycle.
- Ensure that costs associated with acquiring, distributing, transporting, storing, maintaining, and disposing of national spares are properly processed and accurately recorded in the AMS(Maximo).
- Reduce complexity and variability of supply chain business transactions by adopting standardized transaction and business rules.
- Integrate where possible maintenance and materiel planning leading to a reduction of obsolete and duplicate spares.
- Ensure that business processes are properly defined and documented and that roles and responsibilities related to national spares management are well understood.

E.3 SCOPE

E.3.1 National spares management shall apply to shore-based spares described as "rotating assets" in CCG's AMS(Maximo). These types of assets can be tracked individually by asset number or serial number or both.

E.3.2 All other spares including repair parts and consumables that do not meet the criteria for

national spares management shall continue to be managed in accordance with current inventory management practices.

E.3.3 In either situation the Technical Community is responsible for managing materiel used in support of maintenance activities. Materiel shall be properly identified, managed and tracked in CCG's AMS(Maximo).

E.3.4 In addition, the CCG is required as are all Government of Canada (GOC) departments to manage materiel in accordance with GOC Treasury Board's Policy on Management of Materiel and its associated Directives, including any related DFO policies or directives.

E.4 IDENTIFICATION OF NATIONAL SPARES

E.4.1 Some factors that should be considered in defining and managing national spares are:

- Identify, define and validate the business elements required for the effective and efficient management of national spares to ensure that assets are available, reliable and cost-effectively supported throughout their life cycle
- program risk (level of service)
- system criticality (unsafe condition, personal risk to safety etc..)
- failure rate (frequency)
- value / cost (investment)
- availability of spares (lead time)
- end of life (obsolescence)
- storage location(s) (positioning and ease of access)

E.5 EXPECTED OUTCOMES

- LCM's should have timely and accurate access to national spares data (current and historical) for analysis and decision making.
- The technical community should have real time visibility of national spares that are in service, in storage, under repair, in transit or on order including cost, quantity, location, condition and warranty details.
- Reliable and accurate item master and company master data.

APPENDIX F SUPPLY PLAN

F.1 PACKAGING AND PRESERVATION

F.1.1 All spares and repair parts supplied by Contractor shall be packaged and clearly marked and identified with manufacturer's name, item name and description, and part number on the package. Spare parts required for specific equipment or assemblies shall be kitted, separately packaged, and identified accordingly.

F.1.2 The Contractor shall be responsible (if applicable) for proper preservation and packaging of the parts for long-term storage by ensuring they are coated with an approved preservative and sealed in an approved wrapping or pack as determined by the equipment or item manufacturer. Suitable boxes may be used to package an item in accordance with standard commercial practice; however, if a box is used, each one shall contain a non-fading content list that shall be protected against damage and staining. Spare parts weighing in excess of 20 kgs shall be packed in wooden crates with lifting handles.

F.1.3 In determining packaging the Contractor shall take into consideration the nature of the item, known logistics requirements, and quantity. The selection of packaging materials shall include consideration of disposability, reuse, recycling, and conservation. The Contractor shall also outline all special storage requirements, conditions and maintenance that may apply to spares and repair parts while in storage.

F.1.4 The Contractor shall provide reusable packaging containers for materiel that shall be routinely returned for rebuilding or servicing.

F.1.5 The Contractor shall package and mark hazardous materials in accordance with applicable Federal, Provincial and international regulations.

F.1.6 The Contractor shall provide packaging that is designed to withstand logistics conditions and is of quality to ensure the protection and preservation for the safe delivery of the item to its destination. Safe delivery shall be deemed to mean no damage to the contents of the package.

F.1.7 The Contractor shall provide a Packing List that clearly identifies the contents of each shipment including the applicable Contract or Purchase Order number.

F.2 CATALOGING AND PROVISIONING DATA

F.2.1 All information associated with the RSPL, STTEL and RML shall be submitted and formatted in accordance with the Cataloguing & Provisioning Data Template (EKME # 3303118) which complies with the Item Master requirements of CCG's Asset Management System (Maximo). The corresponding Cataloguing & Provisioning Data Template field headers are described as follows:

New Assets and Materiel - Cataloguing & Provisioning Data Template

- **Recommended Spares (RSPL)**
  - CATALOGUING / MATERIEL IDENTIFICATION DATA
    - Unique Line Item

        - NATO Stock Number (13 Digit)
        - MFG. Name
        - MFG. Part Number
        - MFG. Model Number
        - MFG. Part Name (Short Description)
        - MFG. Part Name (Long Description)
        - OnLine Manual Weblink
        - Authorized Vendor(s)
        - Vendor Part Reference Number
        - Repairable / Rotating Item (yes / no)
    - PROVISIONING DATA
        - Asset (equipment) Breakdown Structure Code
        - Source, Maintenance & Recoverability Code (if applicable)
        - Unit Weight (kg)
        - Size (L,W,H in mm)
        - Fitted Quantity (number installed)
        - Anticipated Demands Per Year
        - Lead Time
        - Unit of Purchase
        - Price Per Unit of Purchase
        - Recommended Quantity - On Board
        - Recommended Quantity - Shore Based
        - Recommended Buy Quantity
    - CCG INTERNAL USE
        - Provisioning Decision
        - Spares Mgmt (national / regional)
        - Maximo Item Number
        - Next Higher Assembly (if applicable)

- **Recommended Materiel (Consumables & Parts) (RML)**
    - CATALOGUING / MATERIEL IDENTIFICATION DATA
        - Unique Line Item
        - NATO Stock Number (13 Digit)
        - MFG. Name
        - MFG. Part Number
        - MFG. Model Number
        - MFG. Part Name (Short Description)
        - MFG. Part Name (Long Description)
        - OnLine Manual Weblink
        - Authorized Vendor(s)
        - Vendor Part Reference Number
    - PROVISIONING DATA
        - Unit Weight (kg)
        - Size (L,W,H in mm)
        - Shelf Life (in months) If Applicable
        - Storage Characteristic Handling Code

        - Hazardous Material / Dangerous Goods Code
        - MSDS Required
        - Anticipated Demands Per Year
        - Lifetime Buy (of items facing obsolescence)
        - Lead Time
        - Unit of Purchase
        - Price Per Unit of Purchase
        - Recommended Quantity - On Board
        - Recommended Quantity - Shore Based
        - Recommended Buy Quantity
    - CCG INTERNAL USE
        - Provisioning Decision
        - Spares Mgmt (national / regional)
        - Maximo Item Number
        - Next Higher Assembly (if applicable)

- **Recommended Special Tools & Test Equipment (STTEL)**
    - CATALOGUING / MATERIEL IDENTIFICATION DATA
        - Unique Line Item
        - NATO Stock Number (13 Digit)
        - MFG. Name
        - MFG. Part Number
        - MFG. Model Number
        - MFG. Part Name (Short Description)
        - MFG. Part Name (Long Description)
        - OnLine Manual Weblink
        - Authorized Vendor(s)
        - Vendor Part Reference Number
    - PROVISIONING DATA
        - Unit Weight (kg)
        - Size (L,W,H in mm)
        - Calibration Required Yes / No
        - Recommended Quantity - On Board
        - Recommended Quantity - Shore Based
        - Unit Price
        - Recommended Buy Quantity
    - CCG INTERNAL USE
        - Provisioning Decision
        - Maximo Item Number

- **Manufacturer Information**
    - This section to be completed by Contractor
        - Match to RSPL Unique Line Item
        - Manufacturer Name
        - CAGE Code
        - Address

        - Website
        - Phone
        - Fax
        - Email
    - To be completed by MICOE
        - Maximo Mfg #

- **Vendor Information**
    - This section to be completed by Contractor
        - Match to RSPL Unique Line Item
        - Vendor Name
        - CAGE Code
        - Address
        - Website
        - Phone
        - Fax
        - Email
    - To be completed by MICOE
        - Maximo Mfg #

F.3 RECOMMENDED SPARE PARTS LIST (RSPL)

F.3.1 The Contractor shall prepare and submit to CCG a Recommended Spare Parts List (RSPL) in accordance with requirements identified in the maintenance plans and rationalized to indicate appropriate quantities.

F.4 SPECIAL TOOLS AND TEST EQUIPMENT LIST (STTEL)

F.4.1 The Contractor shall prepare and submit to Canada a Recommended Special Tools and Test Equipment List (STTEL) in accordance with requirements identified in the maintenance plans and rationalized to indicate appropriate quantities.

F.5 RECOMMENDED MATERIAL LIST (RML)

F.5.1 The Contractor shall prepare and submit to Canada a Recommended Material List of consumable and bulk materiel in accordance with requirements identified in the maintenance plans. The RML shall be rationalized to indicate appropriate quantities required to support the system for 20 years.

Fisheries and Oceans Canada | Pêches et Océans Canada

Canadian Coast Guard | Garde côtière canadienne

EKME# 3614054

Solid-State Radar System

Canadian Coast Guard

Technical Statement of Requirements

Canada

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Approvals

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Document Management

1. Authority

This document is issued by the Director General Integrated Technical Services, Canadian Coast Guard (CCG) National Technical Authority under the authority of the Deputy Minister Fisheries and Oceans and the Commissioner of the CCG, hereinafter known as "Canada."

2. Responsibility

a) The Technical Authority for the National Radar Replacement Project, who resides in Electronics and Informatics (E&I) is responsible for:

- the creation and promulgation of the document; and
- the identification of an Office of Primary Interest (OPI) who is responsible for the coordination and the content of the document.

b) The OPI is responsible for:

- the validity and accuracy of the content;
- the availability of this information;
- the update(s) as needed;
- the periodical revision; and
- the follow-up of all requests, comments and/or suggestions received to the originator.

3. Inquires and/or Revisions

a) All inquiries, including this document, including suggestions for revision and requests for interpretation ***shall*** be addressed to the OPI.

Position Title: National Project Manager

Address: Canadian Coast Guard,
Department of Fisheries and Oceans,
200 Kent Street, Mail Stop 7S036
Ottawa, Ontario
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b) All requests should:

- Be clear and concise.
- Reference the specific Chapter, Section, or Table.

Foreword

1. Purpose

This document describes the technical requirements that ***shall*** be met as a fundamental part of the normal procurement process documentation. The contents of this specification, when included by reference in any contract, ***shall*** govern the acceptance of the system, through embodiment of the specification elements in proof-of-performance tests.

2. Scope

This Technical Statement of Requirements (TSOR) establishes the technical requirements for the Solid-State Radar System.

1.0 INTRODUCTION

Canada has a requirement to replace Radar System Equipment (Antenna Systems, Radar Transceiver Equipment, Remote Control facility, and Maintenance Displays) at most of its Marine Communications and Traffic Services (MCTS) radar sites.

The Solid-State Radar Systems, to be supplied, ***shall*** be required to interface with certain retained components such as existing AIL Parabolic Reflector type antennas in Western Region, new Antenna Systems, existing and new Radar Extractor/Trackers and the Information System on Marine Navigation (INNAV). In some cases, there ***shall*** be complete systems supplied, which includes the antenna systems, and in other cases, just the radar transceiver portion ***shall*** be supplied. These will be indicated in subsequent Tables.

The requirement is for a Solid-State Radar System with the following configuration:

1) Antenna System (which include: antennas, turning units, dual azimuth encoders, 3-phase motors, motor controllers and/or inverters and active dehydrators where required);

2) Radar Transceiver Equipment (which includes: dual Solid-State X-Band radar transceivers, waveguide switches, dummy loads and Radar Signal Distribution unit, e.g., Ethernet Switch/Router); and

3) Radar Extractor/Trackers.

In support of these goals, this specification defines the essential characteristics that are required for the new Radar Systems, in particular the Antenna Systems and the Radar Transceiver. The detailed technical specification for the Radar Extractor/Tracker is contained in a separate document EKME# 3614056.

1.1 EXISTING RADAR SYSTEMS

The existing Radar Systems at the MCTS sites are a mix of makes and models. With the exception of three (3) new radars in Western Region, the majority of the radar transceivers are 25 kW units, with five (5) being 50 kW units. All are magnetron based, pulse-type, radar transceivers which date as far back as 1989 and as recent as 2004/2005.

New and existing Antenna Systems including new slotted waveguide antennas, a new parabolic reflector-type antenna and turning units will be used with the new Transceivers. Project timing will determine the logistics of the use of new transceivers with obsolete antennas. All antennas will be identified in subsequent sections.

Even though all existing radar transceivers are non-coherent, pulse type, and magnetron based, this specification is for all solid-state coherent radars with advanced receiver signal processing.

The solid-state transceivers are new to the Canadian MCTS surveillance environment, as such, any equipment supplied under this Technical Statement of Requirements (TSOR) ***could*** be subject to more stringent approval, testing and demonstration requirements, as detailed herein and in the Radar Equipment Replacements Statement of Work (SOW) EKME# 3468591.

1.1.1 Radar Transceiver Equipment

One standard configuration of the Radar Transceiver equipment ***shall*** be supplied. This configuration assumes redundant (i.e., main and backup) Solid-State Radar Transceivers all operating in the Frequency Diversity mode.

The configuration of the supplied Transceiver Equipment ***shall*** include:

1) Redundant Solid-State X-Band Radar Transceivers;
2) Waveguide switch, dummy loads;
3) Radar Signal Distribution (provides interface between the redundant transceivers and one or more Extractor/Tracker using Ethernet connectivity);
4) Remote Control facility (software package); and
5) Maintenance display monitors or maintenance display software application.

1.1.2 Summary of Existing Radar System Equipment

There are 23 operational radar sites requiring replacement, plus one radar system for the Coast Guard College and one radar system for the CCG Test Lab for a total of 25 radar systems. Some of the current antenna systems and/or radar transceivers will be retained and some will be replaced as noted in Table 1-1 below. **(Note: Items with notes 1, 3, 4 and 6 will be retained, the rest will be replaced with new equipment).**

Table 1-1 Configuration of Existing Equipment per Site

Regions	Sites	Dual Radars (Main & Backup)	Peak Power	Antenna Systems			
				≥ 21’	18’	8’	7’
ATLANTIC (North)	Arnolds Cove	Raytheon R50	50 kW	CHL 21’			
	Cuslett	Raytheon R50	50 kW	CHL 21’			
	Pearce Peak	Raytheon R50	50 kW	CHL 21’			
	Port Aux Basques	Decca Bridgemaster	25 kW			1	
ATLANTIC (South)	Chebucto Head	Decca Bridgemaster	25 kW			1	
	Georges Island	Decca Bridgemaster	25 kW			1	
	Shannon Hill	Decca Bridgemaster	25 kW			1	
	Partridge Island	Decca Bridgemaster	25 kW			1	
	Red Head	CMC CMR-91 Marconi	25 kW	EASAT 22’			
	Tiverton	CMC CMR-91 Marconi	25 kW	EASAT 22’			
	Eddy Point[2]	Decca Bridgemaster	25 kW			1	
CENTRAL & ARCTIC (C&A) (St. Laurent)	Les Escoumins[3]	Scanter 2001 F1 + F2	25 kW	21’ Terma			
	Île Charron[1]	Raytheon R50	50 kW	CHL 21’			
	Pont Jacques	Scanter 2001	4-5 kW				Terma

	Cartier[4]						7’
Regions	**Sites**	**Dual Radars (Main & Backup)**	**Peak Power**	**Antenna Systems**			
				≥ 21’	**18’**	**8’**	**7’**
C&A (St. Laurent)	Lévis[1]	Raytheon R50	50 kW	CHL 21’			
C&A (Great Lakes)	Point Edward[1]	Early Scanter 2001	25 kW	CHL 21’			
WESTERN	Mt. Ozzard[5]	Scanter 2001 F1 + F2	25 kW	AIL 25’			
	Berry Point	Scanter 2001 F1 + F2	25 kW		1		
	Kap 100	Scanter 2001 F1 + F2	25 kW		1		
	Bowen Island[2]	Scanter 2001 F1 + F2	25 kW	AIL 25’			
	Mt. Helmcken[2]	Scanter 2001 F1 + F2	25 kW	AIL 25’			
	Mt. Newton[2]	Scanter 2001 F1 + F2	25 kW	AIL 32’			
	Mt. Parke[2]	Scanter 2001 F1 + F2	25 kW	AIL 25’			
	Mt. Hays	Scanter 5202[6]	200 W	1			
	Dundas	Scanter 5202[6]	200 W	1			
	Ridley Island	Scanter 5102[6]	50 W	1			
Sydney, Nova Scotia (NS)	Coast Guard College	1					1
CCG Test Site	Québec City	1					1

Notes:

1) Existing 21’ CHL SGX38.0H2-IC2 Antenna to be retained.

2) Suggested replacement with 21’ slotted waveguide type.

3) Existing Terma 21' HG-HP-I-37 Antenna to be retained.

4) Existing Terma 7' CO-HP-F-31 Antenna to be retained.

5) Suggested replacement 25' Dual Feed Horn, Parabolic Reflector type antenna.

6) New Terma Scanter solid-state radars to be retained.

1.1.3 Quantities of Radar Transceiver Equipment to be Delivered

The quantities of redundant Radar Transceivers Equipment are shown in Table 1-2.1 below.

Table 1-2.1 Quantities of Dual Radar Transceiver Equipment to be Delivered

Region	Site	Redundant Radar Transceiver Equipment
ATLANTIC (North)	Arnolds Cove	1
	Cuslett	1
	Pearce Peak	1
	Port aux Basques	1
ATLANTIC (South)	Chebucto Head	1
	Georges Island	1
	Shannon Hill	1
	Partridge Island	1
	Red Head	1
	Tiverton	1
	Eddy Point	1
C&A (St. Lawrence)	Île Charron	1
	Lévis	1
	Les Escoumins	1
	Pont Jacques Cartier	1
C&A (Great Lakes)	Point Edward	1
WESTERN REGION	Mt. Ozzard	1
	Berry Point	1
	Kap 100	1
	Bowen Island	1
	Mt. Helmcken	1
	Mt. Newton	1

Region	Site	Redundant Radar Transceiver Equipment
	Mt. Parke	1
	Mt. Hays	1
	Dundas	1
	Ridley Island	1
Coast Guard College	Sydney, NS	1
CCG Test Lab	Québec City, Québec (QC)	1
Spare Redundant Transceivers		2
	TOTALS	30

1.1.4 Quantities of Radar Antenna Systems to be Delivered

The quantities of Radar Antenna Systems are shown in Table 1-2.2 below.

Table 1-2.2 Quantities of Radar Antenna Systems to be Delivered

Region	Site	Radar Antenna Systems
ATLANTIC (North)	Arnolds Cove	1
	Cuslett	1
	Pearce Peak	1
	Port aux Basques	1
ATLANTIC (South)	Chebucto Head	1
	Georges Island	1
	Shannon Hill	1
	Partridge Island	1
	Red Head	1
	Tiverton	1
	Eddy Point	1
C&A (St. Lawrence)	Île Charron	0
	Lévis	0
	Les Escoumins	0
	Pont Jacques Cartier	0

Region	Site	Radar Antenna Systems
C&A (Great Lakes)	Point Edward	0
WESTERN REGION	Mt. Ozzard	1
	Berry Point	1
	Kap 100	1
	Bowen Island	1
	Mt. Helmcken	1
	Mt. Newton	1
	Mt. Parke	1
	Mt. Hays	0
	Dundas	0
	Ridley Island	0
Coast Guard College	Sydney, NS	1
CCG Test Lab	Québec City, (QC)	1
Spare Antenna Systems		8 assorted sizes
	TOTALS	28

1.2 FULL TECHNICAL DESCRIPTION

For any radar system equipment offered, a full technical description ***shall*** be provided for all of the major sub-system.

1.3 RADAR SITE LOCATIONS AND ELEVATIONS

The twenty-eight (28) CCG radar sites, relevant to this specification, are listed in Table 1-3. The list includes the radar site names, antenna elevation above mean sea level (AMSL), and antenna height above ground level (AGL). A radar system is included for training purposes at the Coast Guard College in Sydney, NS, and one for the Test Lab.

Table 1-3 Locations of the Radar Sites and Elevations

Regions	Sites	Latitude	Longitude	Antenna Elevation AMSL (m)	Ht. Above Ground AGL (m)
ATLANTIC (North)	Arnolds Cove	47-46-22.9 N	54-59-58.7 W	95.4	24.4
	Cuslett	46-58-28.1 N	54-09-15.3 W	158.7	24.4
	Pearce Peak	47-17-28.6 N	53-58-8.6 W	148.2	15.2
	Port aux Basques	47-34-19.0 N	59-07-56.9 W	58.4	24.4
ATLANTIC (South)	Chebucto Head	44-30-26.5 N	63-31-22.5 W	31.0	16.0
	Georges Island	44-38-26.05 N	63-33-31.47 W	17.0	13.0
	Shannon Hill	44-41-2.79 N	63-36-35.99 W	23.0	19.0
	Partridge Island	45-14-12.9 N	66-03-13.6 W	32.0	14.0
	Red Head	45-14-0.6 N	66-59-3.3 W	139.0	16.0
	Tiverton	44-23-23.3 N	66-13-22.05 W	76.0	25.0
	Eddy Point	45-30-47.7 N	61-15-10.9 W	58.0	25.0
C&A (St. Lawrence)	Les Escoumins	48-19-3.00 N	69-25-14.00 W	85.0	32.0
	Île Charron	45-35-3.73 N	73-29-38.82 W	51.0	49.0
	Pont Jacques Cartier	45-31-16.23 N	73-32-20.39 W	49.5	40.5
	Lévis	46-49-9.54 N	71-10-59.76 W	57.0	34.0
C&A (Great	Point Edward **(Note)**	43-00-04.2 N	82-25-05.7 W	20.0	16.0

Lakes)					
Regions	**Sites**	**Latitude**	**Longitude**	**Antenna Elevation AMSL (m)**	**Ht. Above Ground AGL (m)**
WESTERN	Mt. Ozzard	48-57-33.7 N	125-29-35.0 W	697.0	10.0
	Berry Point	49-17-42.8 N	122-59-13.1 W	12.2	12.2
	Kap 100	49-19-31.0 N	123-08-0.9 W	64.0	**Note**
	Bowen Island	49-20-41.0 N	123-23-17.0 W	340.5	18.3
	Mt. Helmcken	48-24-07.1 N	123-34-21.7 W	111.3	18.3
	Mt. Newton	48-36-47.4 N	123-26-35.8 W	118.0	24.4
	Mt. Parke	48-50-23.1 N	123-17-45.6 W	284.5	24.4
	Mt. Hays	54-17-2.0 N	130-18-56.7 W	730.5	30.5
	Dundas	54-31-15.2 N	130-55-1.5 W	484.4	24.4
	Ridley Island	54-14-3.0 N	130-19-38.3 W	102	7.0
College	Sydney, NS	N/A	N/A	N/A	N/A
Test Lab	Québec City, (QC)	N/A	N/A	N/A	N/A

Note: In the case of Point Edward, the antenna elevation is referenced to lake level.
In the case of Kap 100, the radar antenna is on the top of a building.

2.0 APPLICABLE DOCUMENTATION

The following documents are applicable to this specification. In the case of a conflict between the wording elsewhere in this specification and the applicable documents, the CCG specification wording ***shall*** take precedence.

1) Radar Equipment Replacements Statement of Work (SOW), EKME# 3468591.

2) Radar Extractor/Tracker TSOR EKME# 3614056

3) IALA Recommendation V-128, Edition 4 on "Technical Performance Requirements for VTS Equipment". This document is available at:
http://www.e-navigation.nl/sites/default/files/V-128%20Operational%20and%20Technical%20Performance%20Requirement%20for%20VTS%20Equipment.pdf

4) IALA Guideline 1111, Edition 1, May 2015, on "Preparation of Operational and Technical Performance Requirements for VTS Systems"
http://www.iala-aism.org/products/publications/category.html?category=c13896403bc3beca86ad0a2a76032055

5) Health Canada's – Safety Code 6 (2009) "Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz." This document is available at:
http://www.thermoguy.com/pdfs/Safety_Code_6.pdf

6) Electrical Safety Authority – Electrical Product Approval Requirements. This document is available at:
https://www.esasafe.com/assets/files/esasafe/pdf/Electrical_Product_Safety/ESA-ProductApprovalCard-Final-web.pdf

7) Department of Defence – MIL-HDBK-217F, "Reliability Prediction of Electronic Equipment. This document is available at:
http://www.sre.org/pubs/

8) ITU-R SM.329-10, "Unwanted Emissions in the Spurious Domain." This document is available at:
https://www.itu.int/dms_pubrec/itu-r/rec/sm/R-REC-SM.329-10-200302-S!!PDF-E.pdf

9) ITU-R SM.1541-2, Annex 8, "Unwanted Emissions in the out-of-band Domain." This document is available at:
https://www.itu.int/rec/R-REC-SM.1541-2-200605-S/en

3.0 LIST OF ACRONYMS

ACP	Azimuth Change Pulse
AFC	Automatic Frequency Control
AFT	Automatic Fine Tuning
AGL	Above Ground Level
AMSL	Above Mean Sea Level
Ant.	Antenna
ARP	Azimuth Reference Pulse
ASC	Auto-adaptive Sensitivity Control
ASL	Above Sea Level
AtoN	Aids to Navigation
BITE	Built-In Test Equipment
C&A	Central & Arctic Region
CARPET	Computer-Aided Radar Performance Evaluation Tool
CCG	Canadian Coast Guard
CHL	Name of antenna manufacturer
CRF	Chirp Repetition Frequency
D	Desirable
dB	Decibel
dBi	Gain in dB relative to an isotropic antenna
dBm	Gain in dB milliwatts
E&I	Electronics & Informatics
ESA	Electrical Safety Authority

FM	Frequency Modulation
FMCW	Frequency Modulated Continuous Wave
FTC	Fast Time Constant
GFE	Government Furnished Equipment
GIT	Georgia Institute of Technology
GHz	Giga Hertz
H	Horizontal
H&V	Horizontal and Vertical
Hr	Hour
Ht.	Height
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
INNAV	Information System on Marine Navigation
IP	Internet Protocol
kg	Kilogram
km/hr	Kilometre per Hour
kW	kilowatt
LCD	Liquid Crystal Display
M	Mandatory
Max	Maximum
MBits	Mega Bits
MCTS	Marine Communications and Traffic Services
MDR	Minimum Detected Range
MDS	Minimum Discernible Signal
Min	Minimum

MHz	Mega Hertz
MTI	Moving Target Indicator
m	Meters
mm	Millimetre
MPLS	Multiprotocol Label Switching
m/s	Meters per second
Mt.	Mount
MTBF	Mean Time Between Failure
MTTR	Mean Time to Repair
N	North
N/A	Not applicable
NB	Nota Bene
NM	Nautical Miles
ns	Nano Second
NS	Nova Scotia
OPI	Office of Primary Interest
PA	Power Amplifier
PC	Personal Computer
P_D	Probability of Detection
P_{FA}	Probability of False Alarm
PRF	Pulse Repetition Frequency
PPS	Pulses per Second
PW	Pulse Width
QC	Québec
RC	Right-hand Circular polarization

RCS	Radar Cross Section
RF	Radio Frequency
RPM	Revolution Per Minute
RSS	Radio Standard Specification
Rx	Receive or Receiver
SAT	Site Acceptance Test
S/N	Signal to Noise ratio
SNMP	Simple Network Management Protocol
SOW	Statement of Work
SS	Sea State
SSPA	Solid State Power Amplifier
STC	Sensitivity Time Control
TCP	Transmission Control Protocol
TSOR	Technical Statement of Requirements
TTL	Transistor-Transistor-Logic
Tx	Transmitter or Transmit
TX1 & TX2	Transmitter No. 1 & Transmitter No. 2
UBR	A type of rectangular waveguide mounting flange
UDP	User Datagram Protocol (and alternative to TCP)
VAC	Volts Alternating Current
VSWR	Voltage Standing Wave Ratio
VTS	Vessel Traffic Services
W	West
WR90	A particular size of rectangular waveguide

4.0 RADAR SYSTEM PERFORMANCE GUIDELINES

The Radar range performance specifications ***shall*** meet the guidelines outlined in the IALA Extended Recommendation from IALA Guideline 1111 on "Preparation of Operational and Technical Performance Requirements for Vessel Traffic Services (VTS) Systems," except as modified by CCG Radar range parameters listed in Section 5.

The parameters for rain rate, sea-state, ice conditions, target size, and range have site-specific variations allowing for differing operational requirements and local weather conditions.

The site-specific requirements listed in Tables 5-3 to 5-7 below have been grouped into five (5) categories based on sites with similar operational requirements. These include range capabilities as a function of antenna height, target size, rain rates, sea-states and other geographical and site limitations. The categories are:

- Very Long Range Radar (up to 57 Nautical Miles (NM)) Antenna height: 697 m AMSL;
- Long Range Radar (up to 35 NM) Average antenna height: 133 m AMSL;
- Medium Range Radar (up to 24 NM) Average antenna height: 128 m AMSL;
- Short Range Radar (up to 16 NM) Average antenna height: 32 m AMSL; and
- Short Range Wide Beamwidth Radar (Antenna: 7' – 8') (up to 16 NM) Average antenna height: 44 m AMSL.

NOTE: Depending on site-specific conditions, individual results will vary from the specified range requirements.

Target detection requirements versus weather and sea-state conditions vary from IALA Type 3 (10 m^2) to IALA Type 7 (100,000 m^2) as shown in Table 5-1 and 5-2.

The Radar System Performance with the new Radar Transceivers, when used with the existing Radar antennas and related subsystems, ***shall*** meet or exceed the performance of the existing Radar system.

5.0 RADAR SYSTEM OPERATIONAL AND SURVEILLANCE REQUIREMENTS

The primary operational purpose of the Radar system is to provide independent detection of vessels, various watercrafts and aids to navigation (AtoN), with specific target environmental parameters and ranges shown in Tables 5-3 to 5-7.

5.1 DETECTION RANGE PERFORMANCE

The delivered Radar system, whether used with the existing antenna systems, or with the new antenna system, ***shall*** in all cases meet or exceed the detection performance of the existing Radar system at each site, and ***shall*** also meet any new detection criteria specified herein.

The Radar system ***shall*** be able to detect all moving and stationary targets meeting the specified detection criteria within the coverage area (excluding obstructed coverage). The target detection criteria are based on a Probability of Detection (P_D) of 0.7 to 0.9, with a Probability of False Alarm P_{FA} of 10^{-6}, including the effects of Signal to Noise (S/N) improvements through signal processing.

Table 5-1 shows the lists of targets used in specifying the Radar performance criteria according to IALA Guideline 1111 for Technical Performance Requirements for VTS Equipment.

Table 5-2 shows the lists to standardized Sea-States used in specifying the Radar system performance requirements.

Table 5-1 IALA Standardized Targets

Target		Recommendation level			Corresponding target model		
		Relaxed	Standard	Extended	Radar Cross Section (RCS)		Height
					S-band	X-Band	
1	AtoN without radar reflector. Small open boats, fibreglass, wood or rubber with outboard motor and, at least, 4 metres long. Small speedboats, small fishing vessels, and small sailing boats.			√		1 m^2	1 m ASL
2	Inshore fishing vessels, sailing boats, speedboats and similar vessels.		√	√		3 m^2	2 m ASL
3	Buoys and beacons with radar reflector	√	√	√	4 m^2	10 m^2	3 m ASL
4	Small metal ships, fishing vessels, patrol vessels and similar vessels	√	√	√	40 m^2	100 m^2	5 m ASL
5	Coasters and similar vessels	√	√	√	400 m^2	1 000 m^2	8 m ASL

6	Large coasters, Bulk carriers, cargo ships similar vessels.	√	√	√	4 000 m^2	10 000 m^2	12 m ASL
7	Container carriers, tankers etc.	√	√	√	40 000 m^2	100 000 m^2	18 m ASL

The Sea-State (SS) has a direct impact on the Radar performance as it affects the Sea Clutter level. The IALA Guideline 1111 uses the GIT (Georgia Institute of Technology) model for Sea-State. The Sea-State scale, with the corresponding wind speeds and average wave heights, is shown in Table 5-2.

Table 5-2 Sea-State Scale

Sea-State	Descriptive term	Wind speed		Wave height
		m/s	knots	meters
0	Calm	0.00	0.00	0.00
1	Smooth	3.16	6.14	0.08
2	Slight	5.50	10.69	0.32
3	Moderate	7.61	14.79	0.72
4	Rough	9.58	18.62	1.28
5	Very Rough	11.45	22.26	2.01
6	High	13.25	25.76	2.89
7	Very High	14.99	29.14	3.93
8	Precipitous	16.68	32.42	5.14

5.1.1 Site-Specific Radar System Performance Requirements

The Radar Transceiver ***shall*** meet the requirements specified in the following tables, which indicate the minimum standards for vessel detection by the replacement VTS Radar, disregarding the limitations of the site-specific Radar horizon. However, Radar coverage to longer ranges or for smaller targets is a benefit to the surveillance of the region. The Radar range performance ***shall*** also, as a minimum, meet or exceed the performance of the existing systems. The detection ranges listed below are based on using a Swerling Case 1.

In order to establish required detection ranges, specified in the subsequent tables below, the site requirements were analyzed using Computer-Aided Radar Performance Evaluation Tool (CARPET) software which allows pulse compression simulation.

The following requirements are based on a nominal 80% P_D.

Very Long Range Radar Sites: The Radar targets of interest ***shall*** be detectable under the following Radar environmental conditions for Very Long Range Radar Sites. The actual results ***shall*** be limited to the requirements below.

Table 5-3 Very Long Range Radar Sites

VERY LONG RANGE RADAR (Height 697 m AMSL)	NB: Mt. Ozzard Radar Site	
Function	**Requirement**	**M/D**
Frame update rate (antenna rotation)	9 seconds max; 3 seconds min	M
Minimum Detection Range in the clear	57 NM, IALA type 7 target	M
	40 NM, IALA type 6 target	M
	40 NM, IALA type 4 target	M
	18 NM, IALA type 3 target	M
	20 NM, IALA type 3 target	D
Minimum Detection Range in 4 millimetre (mm)/hour (hr) rain	57 NM, IALA type 7 target	M
	40 NM, IALA type 6 target	M
	37 NM, IALA type 4 target	M
	39 NM, IALA type 4 target	D
	23 NM, IALA type 3 target	M
	27 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm/hr rain	36 NM, IALA type 7 target	M
	30 NM, IALA type 6 target	M
	16 NM, IALA type 4 target	M
	18 NM, IALA type 4 target	D
	13 NM, IALA type 3 target	M
	15 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm rain, SS 3	34 NM, IALA type 7 target	M
	28 NM, IALA type 6 target	M
	16 NM, IALA type 4 target	M
	18 NM, IALA type 4 target	D
	12 NM, IALA type 3 target	M
	13 NM, IALA type 3 target	D
Minimum Range	250 feet	M
Minimum Range Resolution	25 feet on 50 nanosecond Pulse Width (PW)	M
Minimum Range Resolution	100 feet on 200 nanosecond PW	M
Minimum Range Accuracy	90 feet	M
Minimum Azimuth Resolution	210 feet at 6 NM	M
(Antenna beam width = 0.33 degrees)	560 feet at 16 NM	M
	1400 feet at 40 NM	D
Minimum Azimuth Accuracy	0.019 degrees (64 feet at 32 NM)	M

Note: The table above lists site-specific operational requirements.
M/D = Mandatory or Desirable

Long Range Radar Sites: The Radar targets of interest ***shall*** be detectable under the following Radar environmental conditions for Long Range Radar Sites. The actual results ***shall*** be limited to the requirements below.

Table 5-4 Long Range Radar Sites

LONG RANGE RADAR (Average Height 133 m AMSL)	NB: This category includes: Mount Helmcken, Mount Newton, Red Head, Tiverton, Arnold's Cove, Cuslett and Pearce Peak sites.	
Function	**Requirement**	**M/D**
Frame update rate (antenna rotation)	9 seconds max; 3 seconds min	M
Minimum Detection Range in the clear	35 NM, IALA type 7 target	M
	33 NM, IALA type 6 target	M
	28 NM, IALA type 4 target	M
	11 NM, IALA type 3 target	M
	13 NM, IALA type 3 target	D
Minimum Detection Range in 4 mm/hr rain	35 NM, IALA type 7 target	M
	33 NM, IALA type 6 target	M
	18 NM, IALA type 4 target	M
	20 NM, IALA type 4 target	D
	10 NM, IALA type 3 target	M
	12 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm/hr rain	26 NM, IALA type 7 target	M
	20 NM, IALA type 6 target	M
	11 NM, IALA type 4 target	M
	13 NM, IALA type 4 target	D
	6 NM, IALA type 3 target	M
	8 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm rain, SS 3	26 NM, IALA type 7 target	M
	20 NM, IALA type 6 target	M
	10 NM, IALA type 4 target	M
	11 NM, IALA type 4 target	D
	6 NM, IALA type 3 target	M
	8 NM, IALA type 3 target	D
Minimum Range	250 feet	M
Minimum Range Resolution	25 feet on 50 nanosecond PW	M
Minimum Range Resolution	100 feet on 200 nanosecond PW	M
Minimum Range Accuracy	90 feet	M
Minimum Azimuth Resolution	230 feet at 6 NM	M
(Antenna beam width = 0.36 degrees	620 feet at 16 NM	M
	1530 feet at 40 NM	D
Minimum Azimuth Accuracy	0.019 degrees (64 feet at 32 NM)	M

Note: The table above lists site-specific operational requirements.
M/D = Mandatory or Desirable

Medium Range Radar Sites: The Radar targets of interest ***shall*** be detectable under the following Radar environmental conditions for Medium Range Radar Sites. The actual results ***shall*** be limited to the requirements below.

Table 5-5 Medium Range Radar Sites

MEDIUM RANGE RADAR (Average Height 128 m AMSL)	NB: This category includes Mount Parke, Bowen Island, Lévis, Île Charron, Eddy Point, Chebucto Head, Les Escoumins and Port aux Basques sites.	
Function	**Requirement**	**M/D**
Frame update rate (antenna rotation)	5 seconds max; 3 seconds min	M
Minimum Detection Range in the clear	24 NM, IALA type 7 target	M
	24 NM, IALA type 6 target	M
	20 NM, IALA type 4 target	M
	18 NM, IALA type 3 target	M
Minimum Detection Range in 4 mm/hr rain	24 NM, IALA type 7 target	M
	24 NM, IALA type 6 target	M
	17 NM, IALA type 4 target	M
	10 NM, IALA type 3 target	M
	16 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm/hr rain	22 NM, IALA type 7 target	M
	20 NM, IALA type 6 target	M
	22 NM, IALA type 6 target	D
	10 NM, IALA type 4 target	M
	16 NM, IALA type 4 target	D
	6 NM, IALA type 3 target	M
	10 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm rain, SS 3	22 NM, IALA type 7 target	M
	20 NM, IALA type 6 target	M
	22 NM, IALA type 6 target	D
	10 NM, IALA type 4 target	M
	16 NM, IALA type 4 target	D
	5 NM, IALA type 3 target	M
	10 NM, IALA type 3 target	D
Minimum Range	100 feet	M
Minimum Range Resolution	25 feet on 50 nanosecond PW	M
	100 feet on 200 nanosecond PW	M
Minimum Range Accuracy	90 feet	M
Minimum Azimuth Resolution	230 feet at 6 NM	M
(Antenna beam width = 0.36 degrees)	940 feet at 24 NM, minimum	D
Minimum Azimuth Accuracy	0.018 degrees (34 feet at 18 NM)	M

Note: The table above lists site-specific operational requirements.
M/D = Mandatory or Desirable

Short Range Radar Sites: The Radar targets of interest ***shall*** be detectable under the following Radar environmental conditions for Short Range Radar Sites. The actual results ***shall*** be limited to the requirements below.

Table 5-6 Short Range Radar Sites

SHORT RANGE RADAR (Average Height 32 m AMSL)	NB: This category includes Kap 100, Berry Point and Point Edward[(Note)] Sites.	
Function	**Requirement**	**M/D**
Frame update rate (antenna rotation)	3 seconds max; 2 seconds min	M or D
Minimum Detection Range in the clear	16 NM, IALA type 7 target	M
	16 NM, IALA type 6 target	M
	16 NM, IALA type 4 target	M
	10 NM, IALA type 3 target	M
	16 NM, IALA type 3 target	D
Minimum Detection Range in 4 mm/hr rain	16 NM, IALA type 7 target	M
	16 NM, IALA type 6 target	M
	16 NM, IALA type 4 target	M
	8 NM, IALA type 3 target	M
	12 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm/hr rain	16 NM, IALA type 7 target	M
	16 NM, IALA type 6 target	M
	10 NM, IALA type 4 target	M
	16 NM, IALA type 4 target	D
	4 NM, IALA type 3 target	M
	10 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm rain, SS 3	16 NM, IALA type 7 target	M
	16 NM, IALA type 6 target	M
	10 NM, IALA type 4 target	M
	16 NM, IALA type 4 target	D
	4 NM, IALA type 3 target	M
	10 NM, IALA type 3 target	D
Minimum Range	100 feet	M
Minimum Range Resolution	25 feet on 50 nanosecond PW	M
	100 feet on 200 nanosecond PW	M
Minimum Range Accuracy	90 feet	M
Minimum Azimuth Resolution	92 feet at 2 NM	M
(Antenna beam width = 0.36 degrees)	184 feet at 4 NM	D
Minimum Azimuth Accuracy	0.023 degrees (10 feet at 4 NM)	M

Note: The table above lists site-specific operational requirements.
The Point Edward site is 20 m above lake level.
M/D = Mandatory or Desirable

Wide Beamwidth Short Range Radar Sites: The Radar targets of interest ***shall*** be detectable under the following Radar environmental conditions for Short Range Radar Sites with wide beamwidth antennas. The actual results ***shall*** be limited to the requirements below.

Table 5-7 Wide Beamwidth Short Range Radar Sites

SHORT RANGE, WIDE BEAMWIDTH RADAR (Average Height 44 m AMSL)	NB: This category include Georges Island, Shannon Hill, Partridge Island and Pont Jacques Cartier sites.	
Note: these sites are constrained by tower physical limitations to use smaller, wide-beam-width (lower resolution) antennas.		
Function	**Requirement**	**M/D**
Frame update rate (antenna rotation)	3 seconds max; 2 seconds min	M or D
Minimum Detection Range in the clear	16 NM, IALA type 7 target	M
	16 NM, IALA type 6 target	M
	16 NM, IALA type 4 target	M
	4 NM, IALA type 3 target	M
	10 NM, IALA type 3 target	D
Minimum Detection Range in 4 mm/hr rain	16 NM, IALA type 7 target	M
	16 NM, IALA type 6 target	M
	16 NM, IALA type 4 target	M
	4 NM, IALA type 3 target	M
	10 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm/hr rain	16 NM, IALA type 7 target	M
	16 NM, IALA type 6 target	M
	8 NM, IALA type 4 target	M
	10 NM, IALA type 4 target	D
	2 NM, IALA type 3 target	M
	6 NM, IALA type 3 target	D
Minimum Detection Range in 16 mm rain, SS 3	16 NM, IALA type 7 target	M
	16 NM, IALA type 6 target	M
	7 NM, IALA type 4 target	M
	10 NM, IALA type 4 target	D
	2 NM, IALA type 3 target	M
	6 NM, IALA type 3 target	D
Minimum Range	100 feet	M
Minimum Range Resolution	25 feet on 50 nanosecond PW	M
	100 feet on 200 nanosecond PW	M
Minimum Range Accuracy	90 feet	M
Minimum Azimuth Resolution	214 feet at 2 NM	M
(Antenna beam width = 1.0 degrees)	640 feet at 6 NM	D
Minimum Azimuth Accuracy	0.05 degrees (33 feet at 6 NM)	M

Note: The table above lists site-specific operational requirements.
M/D = Mandatory or Desirable

5.2 PERFORMANCE AGAINST CURRENT RADAR SYSTEMS

The delivered Radar systems performance ***shall*** be equal or better than the existing CCG systems at each site.

In order to verify this, calculations ***shall*** be done, on a per site basis, indicating the simulation parameters. The Simulations ***shall*** be done using the software simulation package for Radar prediction known as CARPET. The Contractor ***shall*** list the CARPET setup parameters used for calculating the new radar system performance.

5.3 EXISTING SYSTEM DETAILS

The existing radar transceivers and existing antennas are listed to establish the baseline performance of the existing radar systems. Table 5-8 is a summary of the radar transceivers per site and Table 5-9 lists the existing antennas per site.

Table 5-8 Existing X-Band Radar Transceivers

Site	Radar Model	Tx Power	Rx Noise Figure
Arnolds Cove Cuslett Pearce Peak Île Charron Lévis	Raytheon Pathfinder R50	50 kW	6.5 dB
Port aux Basques Chebucto Head Georges Island Partridge Island Shannon Hill Eddy Point	Sperry Marine Decca Bridgemaster E 65608/A-E6	25 kW	5.0 dB
Tiverton Red Head	Canadian Marconi CMC CMR91	25 kW	5.0 dB
Pont Jacques Cartier	Terma Scanter 2001	4-5 kW	3.5 dB
Point Edward	(Early) Terma Scanter 2001	25 kW	3.5 dB
Les Escoumins Mt. Ozzard Berry Point Kap 100 Bowen Island Mt. Helmcken	Terma Scanter 2001 F1 + F2	25 kW	3.5 dB

Site	Radar Model	Tx Power	Rx Noise Figure
Mt. Newton Mt. Parke			
Mt. Hays Dundas	Terma Scanter 5202	200W	2.5 dB
Ridley Island	Terma Scanter 5102	50W	2.5 dB

Table 5-9 Existing Antennas (All operating with **horizontal** polarization)

Site	Antenna Model (Note 1)	Gain (Size)	Antenna -3 dB H&V Beamwidth	Beam Shape
Arnolds Cove Cuslett Pearce Peak Île Charron Lévis Point Edward	CHL SGX38.0H21-IC2	38 dBi (21')	0.36° Horizontal 11° Vertical	Inverse Cosecant^2
Red Head Tiverton	EA 2526-67-DL	43.4 dBi (22')	0.36° Horizontal 2° Vertical	Fan
Port aux Basques Chebucto Head Georges Island Shannon Hill Partridge Island Eddy Point	Sperry Marine Decca Bridgemaster	31 dBi (8')	1.0° Horizontal 24° Vertical	Fan
Les Escoumins	Terma 21' HG-HP-I-37	37 dBi (21')	0.36° Horizontal 11° Vertical	Inverse Cosecant^2
Pont Jacques Cartier	Terma 7' CO-HP-F-31	31 dBi (7')	1.10° Horizontal 16° Vertical	Fan
Mt. Ozzard Bowen Island	AIL Parabolic Reflector	42 dBi (25')	0.29° Horizontal 5° Vertical	Inverse Cosecant^2

Site	Antenna Model (Note 1)	Gain (Size)	Antenna -3 dB H&V Beamwidth	Beam Shape
Mt. Helmcken Mt. Parke				(Note 2)
Mt. Newton	AIL Parabolic Reflector	43 dBi (32')	0.24° Horizontal 5° Vertical	Inverse Cosecant^2 (Note 2)
Berry Point Kap 100	Decca (Model Unknown)	35 dBi (18')	0.42° Horizontal 16° Vertical	Fan
Mt. Hays Dundas Ridley Island	Terma 21' HGHP-I-37	37 dBi (21')	0.36° Horizontal 11° Vertical	Inverse Cosecant^2

Notes:
1. X-Band frequency range 9.14 – 9.5 GHz
2. The AIL antennas are mounted with a -3° tilt angle.

5.4 CLOSE-IN DETECTION & MINIMUM DETECTED RANGE

Several Radars are mounted on towers close to the shore, as such, this will affect the Radar performance close in. In addition to the specific range criteria listed in Tables 5-3 to 5-7 above, those "shore mounted" Radars ***shall*** be able to meet the following:

a) A Minimum Detected Range (MDR) of $\leq$ 30 m;

b) To a distance of 6 NM continuously for Long Range Radars, and 2 NM for Medium and Short Range Radars, without dropouts caused by nulls in the antenna vertical beam pattern (assumes an Inverse Cosecant Squared vertical antenna pattern);

c) With range corrected for antenna slant range so that target range is recorded accurately over the ground with respect to the tower base; and

d) Without waveguide induced interference.

5.5 RESOLUTION AND ACCURACIES

5.5.1 Range Resolution and Bearing Resolution

Range and bearing resolution pertain to the overall Radar system itself. These parameters will be tested as part of Site Acceptance Testing (SAT) at the site Maintenance Display and verified at the MCTS Centre.

The target separation in the range, based on maximum range scales from 16 to 40 NM, ***shall*** be less than or equal to 18 m. In other words, the target separation of two similar targets will be possible when they are separated radially by a distance of 18 m minimum.

The bearing resolution is based on the antenna -3 dB horizontal beamwidth which is a nominal 0.36°, except where wide beamwidth (1.0°) antennas are used for short ranges. Therefore nominal bearing discrimination ***shall*** be at least 50 m or better at 4 NM, 100 m or better at 8 NM, 280 m at 24 NM and 470 m at 40 NM. Bearing resolution for wider beamwidth antennas will therefore be proportionally greater.

5.5.2 Range and Bearing Accuracy in Track Position

Range and bearing accuracy specifications apply only to the Radar equipment itself. The contributions of existing equipment (where applicable) to accuracy degradation will be taken into account by Canada when these parameters are tested at the SAT.

The Radar range accuracy (relative to sensor location) for tracking[(1)] ***shall*** be the greater of:

- $\leq$ 0.5 % to 0.75 % of range covered by the individual radar; or
- $\leq$ 5 m to 10 m + selected effective pulse length; or
- half the target extent in range.

Radar System equipment offered, that can generate and detect Doppler shifts, range inaccuracies due to this effect ***shall*** be corrected for by the equipment.

The bearing accuracy (relative to sensor location) for tracking[(1)], ***shall*** be $\leq$ 0.5°

Note:

1. Based on Table 22, IALA Guideline 1111, "Preparation of Operational and Technical Performance Requirements for VTS Systems", Edition 1 May 2015.

6.0 REPLACEMENT RADAR ANTENNA SYSTEMS

The Antenna Systems, as a minimum, ***shall*** consist of the following units:

- Antenna;
- Turning Unit;
- Waveguide adaptors;
- Motor;
- Motor Starter;
- Frequency Inverter;
- Dual azimuth encoders; and
- Various sensors and safety interlocks.

To meet the requirements of the overall specification for the antennas supplied, Canada is suggesting standard replacement antennas as shown in Table 6-1 below as a reference. The Contractor ***shall*** use these suggestions as a guideline and verify that the Contractor selected antennas enable the Radar System to meet the performance requirements in section 5.1.1.

Table 6-1 Replacement Radar Antenna Systems Summary

Site	Ant. Size	Gain (dBi)	Horz Beam Width (-3 dB)	Polarization	Beam Shape	Vert. Beam Width (-3 dB)
Mt. Ozzard	25’	$\geq$ 42	$\leq$ 0.33°	H/RC	Inverse Cosecant^2	$\leq$ 4°
Arnolds Cove **Cuslett** **Pearce Peak** **Red Head** **Tiverton** **Eddy Point** **Bowen Island** **Mt. Helmcken** **Mt. Newton** **Mt. Parke**	21’	$\geq$ 37	$\leq$ 0.36°	Horizontal	Inverse Cosecant^2	$\leq$ 11°

Site	Ant. Size	Gain (dBi)	Horz Beam Width (-3 dB)	Polarization	Beam Shape	Vert. Beam Width (-3 dB)
Berry Point **Kap 100**	18’	≥ 35	≤ 0.42°	Horizontal	Fan	≤ 16°
Port aux Basques **Chebucto Head** **Shannon Hill** **Partridge Island**	9’	≥ 32	≤ 0.8°	Horizontal	Fan	≤ 16°
Georges Island[1] **CCG College** **Test Lab**	7’	≥ 31	≤ 1.1°	Horizontal	Fan	≤ 16°

General Note:

1. Cannot exceed 8’ due to physical restrictions.

7.0 DETAILED ANTENNA SYSTEM SPECIFICATIONS

7.1 RADAR ANTENNA SYSTEMS

There are five (5) different antennas sizes to be supplied for this contract. These are: 25' (6.7 m), 21' (6.4 m), 18' (5.5 m), 9' (2.74 m) and 7' (2.13 m). (Refer to Tables 7-1 to 7-5). The X-Band antennas and their turning units ***shall*** meet the following requirements:

7.1.1 25' Antenna

Table 7-1 25' X-Band Antenna requirements

Parameters	Value
Antenna Type	25 foot, parabolic reflector
Frequency Band	$\leq$ 9140 to 9500 MHz
Power – Peak / Average	$\leq$ 50 kW / $\leq$ 50 W
Gain	$\geq$ 42 dBi
Polarisation Switchable	Horizontal / Circular
Horizontal beam width @ -3 dB	$\leq$ 0.33°
Horizontal side lobes	Within 10° $\leq$ -26 dB Backlobes $\leq$ -40 dB
Vertical Pattern	Inverse Cosecant^2
Vertical beamwidth @ -3 dB	Maximum 5°
VSWR	Better than 1.2:1
Waveguide input	Standard UBR100 flanges preferred for WR90 waveguide; alternative flanges as required depending on specific design
Motor power requirement	3 phase, 208 VAC 60 Hz
Gearbox rotation (@ 60Hz)	6 to 22 Revolution Per Minute (RPM)
Dual Azimuth Encoders	The azimuth encoder ***shall*** produce 4096 Azimuth Change Pulses (ACP), and one Azimuth Reference Pulse (ARP), per antenna revolution. The ARP accuracy ***shall*** be 0,044 degree or better.
Mechanical lock of the antenna	A mechanical lock for maintenance safety is required.
Safety switch interlock	Required at the transmitter end, and at the antenna end, to shut-down the motor and the transceivers for maintenance safety.
Lightning protection	Lightning protection ***shall*** be included in the antenna design.

Parameters	Value
Temperature of operation	-30° C to +55° C
Antenna heating element	***Shall*** be included if required to meet the temperature and ice specification.
Wind	Operational: to 160 km/hr Survival: 240 km/hr free rotating
Ice Loading	Operational: ***Shall*** start up rotating without structural damage with up to 20 mm ice. Survival: 40 mm (not in operation)
Salt Fog	Survival: ***Shall*** meet MIL-STD-810G, Method 509.5 at 35°C, **OR** IEC-60068-2-52 as a minimum.
Weight	Approximately 3000 kg

7.1.2 21' Antenna

Table 7-2 21' X-Band Antenna requirements

Parameters	Value
Antenna Type	21 foot, slotted wave guide
Frequency Band	≤ 9140 to 9500 MHz
Power – Peak / Average	≤ 50 kW / ≤ 50 W
Gain	≥ 37 dBi
Polarisation	Horizontal
Horizontal beam width @ -3 dB	≤ 0.36°
Horizontal side lobes	Within 5° ≤ -28 dB From 5° to 10° ≤ -30 dB Greater than 10° degrees ≤ -35 dB
Vertical Pattern	Inverse Cosecant^2
Vertical beam width @ -3 dB	Maximum 11°
VSWR	Better than 1.2:1
Waveguide input	Standard UBR100 flanges preferred for WR90 waveguide; alternative flanges as required depending on specific design.
Motor power requirement	3 phase, 208 VAC 60 Hz
Gearbox rotation (@ 60Hz)	6 to 24 RPM

Parameters	Value
Dual Azimuth Encoders	The azimuth encoder ***shall*** produce 4096 Azimuth Change Pulses (ACP), and one Azimuth Reference Pulse (ARP), per antenna revolution. The ARP accuracy ***shall*** be 0,044 degree or better.
Mechanical lock of the antenna	A mechanical lock for maintenance safety is required.
Safety switch interlock	Required at the transmitter end, and at the antenna end, to shut-down the motor and the transceivers for maintenance safety.
Lightning protection	Lightning protection ***shall*** be included in the antenna design.
Temperature of operation	-40° C to +55° C
Antenna heating element	***Shall*** be included if required to meet the temperature and ice specification.
Wind	Operational: to 190 km/hr Survival: 260 km/hr free rotating
Ice Loading	Operational: ***Shall*** start up rotating without structural damage with up to 20 mm ice. Survival: 30 mm (not in operation)
Salt Fog	Survival: ***Shall*** meet MIL-STD-810G, Method 509.5 at 35°C, **OR** IEC-60068-2-52 as a minimum.
Weight	Approximately 500 kilogram (kg).

7.1.3 18’ Antenna

Table 7-3 18’ X-Band Antenna requirements

Parameters	Value
Antenna Type	18 foot, slotted wave guide
Frequency Band	≤ 9140 to 9500 MHz
Power – Peak / Average	≤ 50 kW / ≤ 50 W
Gain	≥ 35 dBi
Polarisation	Horizontal
Horizontal beam width @ -3 dB	≤ 0.42°
Horizontal side lobes	Within 5° ≤ -28 dB From 5° to 10° ≤ -30 dB
	Greater than 10° degrees ≤ -35 dB
Vertical Pattern	Fan

Parameters	Value
Vertical beam width @ -3 dB Vertical beam width @ -20 dB	≤ 16° ≤ 55° (Typical)
VSWR	Better than 1.2:1
Waveguide input	Standard UBR100 flanges preferred for WR90 waveguide; alternative flanges as required depending on specific design
Motor power requirement	3 phase, 208 VAC 60 Hz
Gearbox rotation (@ 60Hz)	10 to 24 RPM
Dual Azimuth Encoders	The azimuth encoder ***shall*** produce 4096 Azimuth Change Pulses (ACP), and one Azimuth Reference Pulse (ARP), per antenna revolution. The ARP accuracy ***shall*** be 0,044 degree or better.
Mechanical lock of the antenna	A mechanical lock for maintenance safety is required.
Safety switch interlock	Required at the transmitter end, and at the antenna end, to shut-down the motor and the transceivers for maintenance safety.
Lightning protection	Lightning protection ***shall*** be included in the antenna design.
Temperature of operation	-40° C to +55° C
Antenna heating element	***Shall*** be included if required to meet the temperature and ice specification.
Wind	Operational: to 160 km/hr Survival: 250 km/hr free rotating
Ice Loading	Operational: ***Shall*** start up rotating without structural damage with up to 13 mm ice. Survival: 26 mm of ice (not in operation)
Salt Fog	Survival: ***Shall*** meet MIL-STD-810G, Method 509.5 at 35°C, **OR** IEC-60068-2-52 as a minimum.
Weight	Approximately 200 kg.

7.1.4 9’ Antenna

Table 7-4 9’ X-Band Antenna requirements

Parameters	Value
Antenna Type	9 foot, slotted wave guide
Frequency Band	≤ 9140 to 9500 MHz
Power – Peak / Average	≤ 50 kW / ≤ 50 W

Parameters	Value	
Gain	≥ 32.5 dBi	
Polarisation	Horizontal	
Horizontal beam width @ -3 dB	≤ 0.81°	
Horizontal side lobes	Within 5°	< -28 dB
	From 5° to 10°	< -30 dB
	Greater than 10° degrees	< -35 dB
Vertical Pattern	Fan	
Vertical beam width @ -3 dB Vertical beam width @ -20 dB	≤ 16° ≤ 55° (Typical)	
VSWR	Better than 1.2:1	
Waveguide input	Standard UBR100 flanges preferred for WR90 waveguide; alternative flanges as required depending on specific design.	
Motor power requirement	3 phase, 208 VAC 60 Hz	
Gearbox rotation (@ 60Hz)	10 to 24 RPM	
Dual Azimuth Encoders	The azimuth encoder ***shall*** produce 4096 Azimuth Change Pulses (ACP), and one Azimuth Reference Pulse (ARP), per antenna revolution. The ARP accuracy ***shall*** be 0,044 degree or better.	
Mechanical lock of the antenna	A mechanical lock for maintenance safety is required.	
Safety switch interlock	Required at the transmitter end, and at the antenna end, to shut-down the motor and the transceivers for maintenance safety.	
Lightning protection	Lightning protection ***shall*** be included in the antenna design.	
Temperature of operation	-40° C to +55° C	
Antenna heating element	***Shall*** be included if required to meet the temperature and ice specification.	
Wind	Operational:	to 160 km/h
	Survival:	250 km/hr free rotating
Ice Load	Operational:	***Shall*** start up rotating without structural damage with up to 13 mm ice.
	Survival:	26 mm of ice (not in operation)
Salt Fog	Survival:	***Shall*** meet MIL-STD-810G, Method 509.5 at 35°C, **OR** IEC-60068-2-52 as a minimum.
Weight	Approximately 200 kg.	

7.1.5 7' Antenna

Table 7-5 7' X-Band Antenna requirements

Parameters	Value
Antenna Type	7 foot, slotted wave guide
Frequency Band	≤ 9140 to 9500 MHz
Power – Peak / Average	≤ 30 kW / ≤ 50 W
Gain	≥ 31 dBi
Polarisation	Horizontal
Horizontal beam width @ -3 dB	≤ 1.10°
Horizontal side lobes	3° to 10° < -24 dB 10° to 20° < -30 dB > 30° degrees < -34 dB
Vertical Pattern	Fan
Vertical beam width @ -3 dB Vertical beam width @ -20 dB	≤ 16° ≤ 55° (Typical)
VSWR	Better than 1.2:1
Waveguide input	Standard UBR100 flanges preferred for WR90 waveguide; alternative flanges as required depending on specific design.
Motor power requirement	3 phase, 208 VAC 60 Hz
Gearbox rotation (@ 60Hz)	10 to 24 RPM
Dual Azimuth Encoders	The azimuth encoder ***shall*** produce 4096 Azimuth Change Pulses (ACP), and one Azimuth Reference Pulse (ARP), per antenna revolution. The ARP accuracy ***shall*** be 0,044 degree or better.
Mechanical lock of the antenna	A mechanical lock for maintenance safety is required.
Safety switch interlock	Required at the transmitter end, and at the antenna end, to shut-down the motor and the transceivers for maintenance safety.
Lightning protection	Lightning protection ***shall*** be included in the antenna design.
Temperature of operation	-40° C to +55° C
Antenna heating element	***Shall*** be included if required to meet the temperature and ice specification.
Wind	Operational: to 160 km/hr Survival: 250 km/hr free rotating
Ice Loading	Operational: ***Shall*** start up rotating without structural damage with up to 13 mm ice.

Parameters	Value
	26 mm of ice (not in operation) Survival:
Salt Fog	Survival: ***Shall*** meet MIL-STD-810G, Method 509.5 at 35°C, **OR** IEC-60068-2-52 as a minimum.
Weight	Approximately 100 kg.

7.1.6 Wind Loading Shutdown

The Antenna System ***shall*** have an automatic shutdown feature under excessive wind loading. A wind loading shut down ***shall*** generate an appropriate alarm or contact closure, which ***shall*** be used to automatically inhibit the Radar transmission. The remote control facility ***shall*** be capable of remotely restarting the Radar system once the wind loading conditions have subsided.

7.2 BUILT-IN TEST EQUIPMENT

Integrated Built-In Test Equipment (BITE) functions for performance and operational monitoring will be a part of the Radar System. The antenna system ***shall*** be compatible with the BITE from the existing radar systems.

Typically, BITE ***shall*** operate independently in the background and ***shall*** initiate appropriate alarms when nominal operating parameters are determined to be beyond acceptable limits. The following capabilities are typical of the level of monitoring that is expected. The Bidder ***shall*** detail the minimum capabilities and options available with the equipment offered.

BITE data ***shall*** be available via remote interface to the operator's INNAV (Integrated navigational display console position) and to the Maintenance display monitor.

7.2.1 Antenna System Status and Monitoring Points

The specific read back signals available from existing antennas will be similar, but vary by make and manufacturer, so flexibility ***shall*** be required in order to accept and report on the variety of possible signals. The Antenna System ***should*** provide:

- Status of motor, gear and auxiliary inputs providing antenna states;
- Status of operation (on, off, low, high speed);
- Safety switch status;
- Encoder power supply status;
- Oil heater on or off;
- High temperature alarm (if available);
- Low temperature alarm (if available); and
- Low oil level (if available).

7.2.2 Simple Network Management Protocol

A Simple Network Management Protocol (SNMP) protocol ***shall*** be provided for status and alarm condition in order to work seamlessly with existing CCG automated system monitoring.

7.3 RELIABILITY AND MAINTAINABILITY

High reliability is required for these radar sites, and it ***shall*** be presumed that a fast maintenance response to the site may not always be possible.

7.3.1 Mean Time Between Failure and Availability

The Antenna System ***shall*** operate 24hr/day, 365 days/year. Its availability ***shall*** be of 99.99% or better.

CCG defines reliability as:

➢ the probability that an item will perform its intended function for a specified interval under stated conditions.

CCG defines Mean Time Between Failures (MTBF) as:

For a particular interval, the total functioning life of a population of an item divided by the total number of failures within the population during the measurement interval.

h) The Contractor ***shall*** provide a radar Antenna System that has an overall MTBF of at least 120,000 hours, though higher figures are preferred. This figure includes the antenna, rotary joint, drive motor, encoders, controllers, inverters, etc.

i) The Contractor ***shall*** state the Mean Time to Repair (MTTR) of all equipment being proposed.

j) The Contractor ***shall*** provide an explanation, (such as: empirical failure data, stress analysis, reliability test data, prediction calculation), of how their MTBF values were determined. (Note: MTBF calculations ***shall*** be in accordance with MIL-HDBK-217D.

k) For explanations based on empirical data, the Contractor ***shall*** state the number of units used in the calculation, the number of hours of reliable service, the number of different types of failures recorded, the total number of failures, and any other information which can be used to evaluate the reliability claim of the equipment being offered.

l) The Antenna System ***should*** be capable of a minimum of 8,000 hrs of continuous operation without maintenance adjustments, lubrication or servicing. Major maintenance activities such as replacement of bearings, gears, oil seal, ***shall*** not be required until after a minimum of 72,000 hours of continuous operation.

8.0 RADAR TRANSCEIVER SPECIFICATIONS

8.1 INTERFACE TO EXISTING EXTERNAL SYSTEMS

The new Radar transceivers ***shall*** interface with, and ***shall*** be compatible with, the existing Radar Antenna Systems (where indicated), and Radar Extractors/Trackers (Norcontrol VET 5070, CSET v.3 and Signalis SYTAR). They ***shall*** also interface with, and ***shall*** be compatible with, the INNAV System (which supports the Radar display requirement). See Section 8.10 for interface details.

8.2 CONFIGURATION

The Radar transceivers ***shall*** maintain continuous surveillance in the Frequency Diversity mode.

The Radar transceivers ***shall*** be supplied as wall mounted units including, waveguide switches, dummy loads, bi-directional couplers, maintenance displays and interconnection cables between units ***shall*** be supplied.

Each X-Band transceiver ***shall*** be able to operate independently from the other in case of a failure or during the maintenance. Each system ***shall*** have its own circuitry and power supply.

The Radars ***shall*** be configured in redundant pairs such that in the event of a failure of the main radar, the back-up radar can be remotely switched on-line by the MCTS Centre.

8.3 FREQUENCY DIVERSITY

The Radar transceiver ***shall*** operate with frequency diversity, and ***shall*** have appropriate algorithms for improving S/N by correlating the Radar returns at the two frequencies. The two frequencies ***shall*** be separated by at least 200 MHz. The frequency diversity processing unit ***shall*** be included as part of the Radar transceiver so the processed output signal will include the Frequency Diversity improvement and ***shall*** allow for a continuous simultaneous operation of both frequencies. Squint compensation ***shall*** be included, and the compensation strategy ***shall*** be detailed.

8.4 TARGET TO CLUTTER IMPROVEMENT

With reference to Section 8.2 above, the new Radar transceiver will be fully coherent, utilizing such techniques as pulse compression with Phase-Coded Pulses or Linear FM (Chirp) techniques, as an example, and advanced receiver and video processing, e.g., Doppler Processing.

8.5 FEATURES AND CONFIGURABLE PARAMETERS

For comparison purposes, the following pulse-type radar parameters are assumed:

- Pulse Width (PW): 50 nano second (ns), 200 ns and 1000 ns (equivalent to short, medium and long pulses)

- Pulse Repetition Frequency (PRF): 400 to 8000 pps.

For the pulse compression type of radar, the modulated main pulse and the compression ratio ***shall*** be such that a range resolution is achieved that would be equivalent to a range of pulse widths and PRFs as listed above within the limitation of the methods used. Operationally, pulse compression settings may also be changed when clutter presents a performance limitation. Optimum values of Chirp Duration and Chirp Repetition Frequency (CRF) ***shall*** be calculated and implemented based on the site specific operating parameters.

The Radar transceivers ***shall*** be able to compensate for second time around returns in their processing.

Radar signal digitization, ***shall*** have a sampling rate sufficient to satisfy the Nyquist criteria, with the signal spectrum presumed to fully occupy the bandwidth criteria. The amplitude resolution ***shall*** be 8-bit or better.

8.5.1 Auto-Adaptive Sensitivity Control

An Auto-Adaptive Sensitivity Control (ASC) or its equivalent ***shall*** be included in order to improve the system capability in the areas of unequal distributed sea clutter. It ***shall*** be possible to turn-off this function with the Radar controls, at the operator's workstation.

8.5.2 Programmable Power Output Levels

The solid-state power amplifier (SSPA) output power ***shall*** be sector gated such that the output power can be programmed for different power levels in different sectors from 0 (off) to maximum power.

8.5.3 Sea Clutter Discriminator

A Sea Clutter Discriminator capability ***shall*** be included, in order to enhance the detection of extremely slow moving targets in clutter environments.

8.5.4 Logarithmic Video Output and Automatic Fine Tuning

In addition to the specifications described in Section 8.5, the following requirements ***shall*** apply:

a) Logarithmic video ***shall*** be in raw form except for Sensitivity Time Control (STC) processing in the preamplifier Radio Frequency (RF) section of the receiver;

b) Automatic Fine Tuning (AFT) ***shall*** be initiated without operator intervention; and

c) Dynamic range: logarithmic response within 2 dB from a signal level 10 dBm below peak-to-peak noise to input levels of at least 0 dBm as measured from the waveguide flange of the transceiver.

8.5.5 Spurious Artefacts

The Radar receiver video output ***shall*** be free of spurious artefacts caused by elements of the transceiver and its signal processing techniques. In particular, range sidelobes or other self-

generated clutter due to the use of pulse-compression techniques ***shall*** be suppressed by suitable filtering so that they do not compete with bona-fide targets nearby.

8.5.6 Safety Interlocks

Safety interlocks on the Radar transceiver cabinets are required. The interlock ***shall*** automatically inhibit RF transmission following the opening of the cabinet door or access panel.

The interlock may be overridden by appropriate action of service personnel, but ***shall*** return to its previous automatic function when the door or access panel is restored to the original position.

The waveguide switch required for the dual X-Band configuration ***shall*** inhibit the RF transmission during travel from one position to the other.

A safety switch interfaced to the antenna control circuits ***shall*** interrupt electrical power to the antenna motor and also inhibit RF transmissions. The system ***shall*** have one safety switch at the antenna end and another one at the transceiver end.

8.6 RADAR TRANSCEIVER PERFORMANCE CHARACTERISTICS

The X-Band Radar transceiver ***shall*** meet the performance/function requirements provided in the following table:

Table 8-1 Radar Transceiver Performance

Parameter	Value
Frequency	9.0 GHz – 9.5 GHz
Peak Power	$\geq$ 50 W
Pulse Compression Ratio	$\geq$ 500:1
Duty Cycle (percentage)	$\leq$ 20 %
RF Power Spectrum	The radar transmitters ***shall*** meet the requirements of referenced documents: ITU-R SM.329-10 and SM.1541-2, Annex 8
Chirp Duration	$\leq$ 80 ns – $\geq$ 100 µs
Chirp Repetition Frequency (CRF)	1 – $\geq$ 10 kHz
Sectorized Transmission	Transmitter blanking and sectorized power levels ***shall*** be programmable from 0 (off) to the maximum power stated above.
Profiles	$\geq$ 10 user defined profiles
Receiver Noise Figure (@ 25^{o} C)	$\leq$ 3 dB maximum referenced from input flange of the

Parameter	Value
	transceiver.
Minimum Discernible Signal (MDS) figure	Better than -120 dBm equivalent after pulse compression.
Overall Dynamic Range	> 100 dB
Receiver Bandwidth	The Receiver bandwidth ***shall*** be such that it accommodates extended pulses with frequency or phase modulation of various types.
Automatic Frequency Control	Automatic without operator intervention
Sensitivity Time Control (STC)	Provided
Sectorized transmission	Number of sectors: $\geq$ 12
Power supply	120/240 VAC, 60 Hz (single phase).
Mechanical	Wall mounted cabinet design.
RF Connector	WR90 (UBR100)

8.7 RADAR TRANSCEIVER INTERFACE REQUIREMENTS

The new Radar transceiver ***shall*** be interfaced with the following equipment:

Antenna System utilizing dual azimuth encoders;

Radar Extractor/Tracker NorControl CSET V3, VET5070 and Signalis SYTAR;

Maintenance Display Monitor facility as described in Section 8.8;

Generate a trigger signal selectable output to inhibit the local RACON transponder. There are two (2) RACONS in Fundy region one on Grand Manan and the other in Saint John harbour. (See Section 8.9); and

INNAV operator's workstations, on which the remote control software (see Section 8.10) will be installed.

The Radar transceiver ***shall*** be capable of providing a minimum of two (2) simultaneous sets of Frequency diversity Radar output signals, where applicable, with independently configurable output formats.

The Radar transceiver remote control ***shall*** allow for the selection of the ARP which corresponds to True North, independently of the optical encoder mechanical position. This is also called a remote alignment feature.

To interface with the equipment specified above, the Radar ***shall*** have the following general input/output interfaces:

8.7.1 Radar Analog Video Output

- Amplitude: 1 - 5 Volts
- Polarity: Positive
- Impedance: 50/75 ohms

8.7.2 Radar Digital Video Output

- Amplitude Resolution: 8-bits
- Format: Differential data lines compliant with EIA-644 (LVDS)
- Data Rate: up to 50 MHz

8.7.3 Network Video Output

- Format: 8 bit UDP/IP Network Video

8.7.4 Ethernet Interface

- IEEE 802.3 10/100/1000 MBits/s Base-T, Ethernet for IP Network video (Streaming) and radar control:

8.7.5 Radar Trigger Output

- PRF: up to 8 kHz

- Amplitude: 8 Volts ± 1 Volt
- Polarity: Positive
- Impedance: 75 ohms
- Pulse Width: ≥ 100 ns, mark-to-space ratio < 1:10
- Rise Time: < 100 ns

8.7.6 Antenna Azimuth Data Input / Output

- Interface Types: Single-ended – RS232C/RS423/TTL
  Balanced – RS422
- Azimuth Clock Pulses: 4,096 Pulses per revolution
- Azimuth Reference Pulse: 1 Pulse per revolution
- Rotation Rate: 6 - 24 RPM

8.8 MAINTENANCE DISPLAY MONITOR

There ***shall*** be a Radar maintenance display at each Radar site, and in the equipment room at each MCTS Centre. The Radar maintenance displays at the MCTS Centres ***shall*** be capable of controlling and monitoring each of the Radar sites associated with that Centre, subject to available Government Furnished Equipment (GFE) communications links. The GFE communications ***shall*** be presumed to be one of either a T1, Ethernet link, MPLS link or DS0 circuit. The system ***shall*** supply the appropriate interface(s) for its operation. The Maintenance Display Monitor ***shall*** give a remote access to the technician using a GFE network connection. This remote access ***shall*** give access to the technician to all the functionalities of the Maintenance Display Monitor. The remote control ***shall*** be available from a GFE network connection.

Network connection:

- Physical interface: Ethernet IEEE 802.3
- Link Protocol: TCP/IP
- Optional IP Network video e.g., 8 bit UDP/IP

The maintenance display monitor ***shall*** be used for configuration, installation and/or maintenance purposes and be co-located with the Radar transceivers in the equipment room in the existing buildings, and in equipment rooms co-located with MCTS Centres.

The maintenance monitor ***shall*** be capable of displaying the Radar video presentation, give access to the system parameters for its configuration, and also give access to the Radar controls and BITE alarms (as described in Section 8.0).

The Maintenance Display Monitor ***shall*** take the form of a conventional PC with at least a 17-inch LCD display and include an Ethernet port and all required software and ancillary equipment for the Monitor to perform as required.

8.9 TRIGGER SIGNAL TO INHIBIT A LOCAL RACON

The radar system ***shall*** be capable of generating a trigger output to inhibit a local RACON transponder. There are 2 RACONS in Fundy region, one on Grand Manan and the other in Saint John harbour, and RACONS in other regions as well. The RACONS and Fundy VTS Radars do not mutually interfere and RACON signals are used by maintenance for alignment purposes. However the ability to suppress RACON transmission for short periods on request will enable operational crews to check the RACON signal area for small targets. This trigger signal will be sent over link which is not part of this specification. The requirements for the trigger signal are as follows:

- The trigger signal ***shall*** be generated (active) in a predefined azimuth sector. This sector ***shall*** be configurable.
- The trigger signal ***shall*** stay active during all the scan period of the predefined azimuth sector.
- A TTL level output or a logic level from 0 to 15 Volts is acceptable.

8.10 INNAV OPERATOR'S WORKSTATIONS

The INNAV System accepts IP Network radar video (Streaming), radar control, radar status and BITE information using IEEE 802.3 10/100/1000 MBits/s Base-T, Ethernet format.

The new Radars ***shall*** provide the Radar Operator with the following control and feedback capabilities.

8.10.1 Radar Controls

- Radar Select: Main/Back-up
- Mode: On/Off/Standby (as applicable)
- Pulse Width (PW): Or equivalent
- Antenna Polarization: Horizontal/Circular (If available)
- Doppler/MIT: Select/Deselect
- Gain:
- Fast Time Constant (FTC):
- Sensitivity Time Control (STC):

8.10.2 Radar Feedback

- Mode: On/Off/Standby (as applicable)
- Pulse Width (PW): Or equivalent
- Minimum Range Alarm: PW too large for minimum range
- Pulse Repetition Frequency (PRF):
- Radar Output Power:

- Transceiver Failure:

8.10.3 Radar Redundancy Controls

- Hot/Cold/Standby Operation: Standby as applicable
- Manual switchover to standby transceiver:
- Automatic Switchover: Upon primary unit failure

8.11 BUILT-IN TEST EQUIPMENT (BITE)

Integrated Built-In Test Equipment (BITE) functions for performance and operational monitoring of the X-Band Radar transceivers are required with the new Radar system.

Typically, BITE ***shall*** operate independently in the background and ***shall*** initiate appropriate alarms when nominal operating parameters are sensed to be beyond acceptable limits. The following capabilities are typical of the level of monitoring that is expected.

BITE data ***shall*** be available via remote interface to operator's INNAV position and to the Maintenance display monitor.

8.12 RADAR TRANSCEIVER BITE

The BITE for the Radar Transceivers ***shall*** include:

- Status of operation (TX1, TX2, on, off, standby, configuration parameters);
- Radar-on Time and Solid State Power Amplifier Time-on;
- Monitoring of internal power supply voltages;
- Transceiver operating time;
- Low transmit power alarm (-1.5 dB is suggested as lower limit);
- Internal temperatures;
- RF power sensing;
- Remote interface status;
- Cabinet door status (normal/service);
- Cabinet functions (fans, high temperature);
- Internal voltages and temperature of the receivers;
- Noise figure alarm;
- Automatic Frequency Control (AFC) lock alarm;
- Signal activity on trigger and video signals; and
- Video signal level out of tolerance alarm.

8.13 SIMPLE NETWORK MANAGEMENT PROTOCOL

A Simple Network Management Protocol (SNMP) protocol ***shall*** be available for status and alarm conditions to be available over an Ethernet connection. This is to take benefit of existing CCG automated system monitoring.

9.0 RELIABILITY AND MAINTAINABILITY

High reliability is required for these radar sites, and it ***shall*** be presumed that a fast maintenance response to the site may not always be possible.

9.1 MEAN TIME BETWEEN FAILURE AND AVAILABILITY

The Radar Transceiver ***shall*** operate 24hr/day, 365 days/year. The availability of the Radar Transceiver ***shall*** be 99.98% or better.

Note: *Here, the associated availability model defines the system as a redundant (i.e., main and back-up) transceiver configuration.*

CCG defines reliability as:

- the probability that an item will perform its intended function for a specified interval under stated conditions.

CCG defines Mean Time Between Failures (MTBF) as:

For a particular interval, the total functioning life of a population of an item divided by the total number of failures within the population during the measurement interval.

m) The Radar system ***shall*** have an overall Mean Time Between Failures (MTBF) of at least 18 000 hours for a single transceiver, though higher figures are preferred. This figure includes the radar transceivers, waveguide switch, controllers, SSPAs, etc. The Contractor ***shall*** also state the MTBF of the redundant system as being proposed.

n) The Contractor ***shall*** provide an explanation, (such as: empirical failure data, stress analysis, reliability test data, prediction calculation), of how their MTBF values were determined. (Note: MTBF calculations ***shall*** be in accordance with MIL-HDBK-217F for a Ground Benign Environment of 25° C.)

o) For explanations based on empirical data, the Contractor ***shall*** state the number of units used in the calculation, the number of hours of reliable service, the number of different types of failures recorded, the total number of failures, and any other information which can be used to evaluate the reliability claim of the equipment being offered.

Where an equipment is offered that has a soft-failure mode (as in the SSPA circuitry) this ***shall*** be described, particularly as it affects the definition and calculation of MTBF.

9.2 RELIABILITY TEST

Radar transceivers that do not have an adequately extensive in-service history must provide Reliability Analysis using MIL-HDBK-217Fand provide accelerated Reliability Test Results for Radar Transceivers.

9.3 MAINTAINABILITY

The Radar transceiver ***shall*** allow the maintenance and repair of one unit while the other unit is in operation, in order to prevent a complete outage of the System. The design and the assembly ***shall*** allow an easy access to the various modules and their fast replacement.

An automated and quick tool ***shall*** be provided to enable Canada to reload all the software components in the system.

If any parameters are stored in the Radar component itself (memory, disk), a simple and/or automated backup/restore mechanism ***shall*** be provided.

10.0 SAFETY, ENVIRONMENTAL AND APPROVAL OF EQUIPMENT

10.1 RADIATED EMISSIONS

The indoor equipment ***shall*** meet the levels specified in Health and Welfare Canada – Safety Code 6 (2009) "Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz," for a person located beside the equipment for an infinite period. The manufacturer ***shall*** provide evidence (i.e., a test report) that the radiated emissions do not exceed the limits set out in Safety Code 6 (2009), Table 5, "Exposure Limits for Controlled Environments," for the frequency band of 1,500-15,000 MHz.

10.2 ELECTRICAL SAFETY

10.2.1 Safety Certification

In accordance with Paragraph 10.2.2 below, all Radar transceivers ***shall*** bear the appropriate certifying organization's mark at the time of delivery to Canada.

10.2.2 Electrical Safety Authority

The Electrical Safety Authority (ESA) recognizes certification bodies and field evaluation agencies, accredited by the Standards Council of Canada, to certify or evaluate electrical products or devices. Only equipment bearing a recognized mark or label is deemed to be approved for use in Canada. Information regarding recognized marks and labels approved for use in Canada can be found at: https://www.esasafe.com/assets/files/esasafe/pdf/Electrical_Product_Safety/ESA-ProductApprovalCard-Final-web.pdf

10.2.3 Personnel Safety Requirements

The Radar transceiver equipment ***shall*** incorporate the requirements specified above to provide for the safety of personnel engaged in installing, operating, and maintaining the equipment. It is recognized that equipment may include hazards. It is imperative that hazards be clearly identified and that measures be provided to protect personnel. In addition, the equipment ***shall*** incorporate the following safety measures:

- Electrical: The Transmitter Equipment ***shall*** be designed to protect personnel from accidental contact with voltages in excess of 30 Volts, RMS or DC, during equipment operation.

- Ground Potential: The Transmitter Equipment ***shall*** be designed that all external parts, surfaces and shields are at ground potential during normal operation.

- Grounding: The Transmitter Equipment grounding requirements ***shall*** be supplied in accordance with the Electrical Safety Council and associated references, prior to delivery.

- Guards and Barriers: The Transmitter Equipment contacts, terminals, and similar devices having voltages in excess of 70 Volts RMS or DC, with respect to ground, ***shall*** have barrier guards to minimize accidental contact by personnel.

- The Transmitter Equipment assemblies operating at potentials in excess of 300 Volts RMS or DC ***shall*** be completely enclosed.

- Interlock Switches: Interlock switches ***shall*** be used in Transmitter Equipment cabinets that employ doors or cover plates to protect areas where lethal voltages, in excess of 300 Volts RMS or DC, are widely used or where the risk of exposure to high levels of non-ionizing radiation is present.

10.3 Environmental Conditions

10.3.1 Operational Conditions

All Radar transceivers ***shall*** meet all technical and functional requirements while operating under the following environmental conditions:

a) Ambient Temperature: -10° C to + 50° C
b) Relative Humidity: 95 % maximum (non-condensing)

10.3.2 Storage and Transportation

All Radar transceivers ***shall*** meet all technical and functional requirements following temporary storage or transportation under the following environmental conditions:

a) Ambient Temperature: - 40° C to + 70° C
b) Relative Humidity: 95 % maximum (non-condensing)

10.4 AC Power Transients and Interruptions

10.4.1 AC Power Transients

All Radar transceivers ***shall*** be designed to withstand voltage transients of ± 25 % of nominal line voltage for a duration of 500 milliseconds.

10.4.2 Voltage Spikes

All Radar transceivers ***shall*** be designed to withstand voltage spikes of 1,000 Volts Peak for 10 µseconds.

10.4.3 AC Power Restoration

Upon AC power restoration, all Radar transceivers ***shall*** return to their previous configurations and modes of operation, prior to any power interruption.

Fisheries and Oceans Canada | Pêches et Océans Canada

Canadian Coast Guard | Garde côtière canadienne

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Radar Extractor/Tracker

Canadian Coast Guard

Technical Statement of Requirements

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This document is issued by the Director General Integrated Technical Services, Canadian Coast Guard (CCG) National Technical Authority under the authority of the Deputy Minister Fisheries and Oceans and the Commissioner of the CCG, hereinafter known as "Canada."

2. Responsibility

a) The Technical Authority for the National Radar Replacement Project, who resides in Electronics and Informatics (E&I) is responsible for:

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a) All inquiries, including this document, including suggestions for revision and requests for interpretation ***shall*** be addressed to the OPI.

Position Title: National Project Manager

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Department of Fisheries and Oceans,
200 Kent Street, Mail Stop 7S036
Ottawa, Ontario
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b) All requests should:

- Be clear and concise.
- Reference the specific Chapter, Section, or Table.

Foreword

1. Purpose

This document describes the technical requirements that ***shall*** be met as a fundamental part of the normal procurement process documentation. The contents of this specification, when included by reference in any contract, ***shall*** govern the acceptance of the system, through embodiment of the specification elements in proof-of-performance tests.

2. Scope

This Technical Statement of Requirements (TSOR) establishes the technical requirements for the Radar Extractor/Tracker.

1.0 INTRODUCTION

Canada has a requirement to replace Radar System Equipment including its Radar Extractor/Trackers at its Marine Communications and Traffic Services (MCTS) radar sites. The Radar Extractor/Trackers to be supplied ***shall*** be required to interface, and be compatible, with all existing Canadian Coast Guard (CCG) radar systems currently in use and (eventually) with new solid-state radar transceivers.

The new Extractor/Trackers will be replacing the end-of-life extractors that are currently in use. The new Radar Extractor/Trackers ***shall*** also be required to interface with and provide radar data through the Information System on Marine Navigation (INNAV), the existing CCG - Vessel Traffic Management Information System (VTMIS).

In support of these goals, this specification defines the essential characteristics that are required for the new Radar Extractor/Trackers.

For the purposes of this TSOR, the new Radar Extractor/Trackers ***shall*** be known as the "Extractors".

1.1 EXISTING RADAR SYSTEMS

The existing Radar Transceiver equipment, at the MCTS radar sites, are a mix of makes and models of 25 or 50 kW, magnetron based, pulse-type radars, which date as far back as 1989 and as recent as 2004/2005. The vast majority of radar transceivers are the Terma Scanter 2001, 25 kW radar transceivers. There are also a number of Raytheon Pathfinder R50, 50 kW radar transceivers and Canadian Marconi Corporation (CMC) CMR-91, 25 kW radar transceivers in use. There are three (3) new sites in Western Region utilizing Terma Scanter 5202 (200 W) and 5102 (50 W) solid-state radar transceivers. The existing VTMIS (INNAV), at the MCTS Centres, has radar sensors to communicate with the current Norcontrol VET5070, CSET v3, and Signalis SYTAR extractors. Available panels are used to control and monitor extractors and radars. The new Extractors ***shall*** interface with the Radar Transceivers and INNAV.

2.0 APPLICABLE DOCUMENTATION

The following documents are applicable to this specification. In the case of a conflict between the wording elsewhere in this specification and the applicable documents, the CCG specification wording ***shall*** take precedence.

1) Radar Equipment Replacements Statement of Work (SOW), EKME# 3468591.

2) IALA Recommendation V-128, Edition 4 on "Technical Performance Requirements for VTS Equipment". This document is available at: http://www.e-navigation.nl/sites/default/files/V-128%20Operational%20and%20Technical%20Performance%20Requirement%20for%20VTS%20Equipment.pdf

IALA Guideline 1111, Edition 1, May 2015, on "Preparation of Operational and Technical Performance Requirements for VTS Systems" This document is available at:

http://www.iala-aism.org/products/publications/category.html?category=c13896403bc3beca86ad0a2a76032055

3) IALA Recommendation V-125 in "The use and presentation of symbology at a VTS Centre (including AIS)", Edition 3, June 2012. This document is available at: http://start.nnvo.nl/uploadfiles/file/publicaties/IALA%20recommendation%20V-125.pdf

4) Department of Defence – MIL-HDBK-217F, "Reliability Prediction of Electronic Equipment. This document is available at: http://www.sre.org/pubs/

5) Electrical Safety Authority – Electrical Product Approval Requirements. This document is available at: https://www.esasafe.com/assets/files/esasafe/pdf/Electrical_Product_Safety/ESA-ProductApprovalCard-Final-web.pdf

3.0 LIST OF ACRONYMS

ACP	Azimuth Change Pulse
AFC	Automatic Frequency Control
API	Application Programming Interface
ARP	Azimuth Reference Pulse
AtoN	Aids to Navigation
BITE	Built-In Test Equipment
CCG	Canadian Coast Guard
CFAR	Constant False Alarm Rate
COTS	Commercial Off the Shelf
DFO	Department of Fisheries and Oceans Canada
ESA	Electrical Safety Authority
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ID	Identification
INNAV	Information System on Marine Navigation
IP	Internet Protocol
LVDS	Low Voltage Differential Signaling
KN or kts	knots
MCTS	Marine Communications and Traffic Services
MDS	Minimum Discernible Signal
MTBF	Mean Time Between Failure
ns	Nano Second
OPI	Office of Primary Interest
P_D	Probability of Detection
P_{FA}	Probability of False Alarm
PRF	Pulse Repetition Frequency
PW	Pulse Width
RPM	Revolution Per Minute
STC	Sensitivity Time Constant

USB	Universal Serial Bus
VGA	
VTMIS	Vessel Traffic Management Information System
VTS	Vessel Traffic Services

4.0 EXTRACTOR PERFORMANCE AND FUNCTIONALITY

4.1 PLOT EXTRACTION

Plot extraction ***shall*** be automatic. The plot extraction process ***shall*** be able to handle the minimum number of plots per rotation as shown in Table 4-1 below.

4.2 TRACK INITIATION

Track initiation ***shall*** be automatic, except in selected areas, track initiation ***shall*** be automatic ***or*** manual depending upon the MCTS operating procedures.

In **automatic track initiation modes**, all plots in a scan are considered potential targets. Some of the plots will be associated with previously established tracks, with the remaining plots considered as candidates for new tracks, i.e., tentative tracks.

Tentative tracks ***shall*** become confirmed tracks if plots from consecutive scans "fit into the picture" within reasonable physical manoeuvrability limits. Otherwise the tentative tracks ***shall*** be discarded.

The tracking system ***should*** be able to handle the tentative tracks, as detailed in Table 4-1. The tracking system ***shall*** initiate tracks and subsequently confirm tracks under certain conditions of Probability of Detection (P_D) and Probability of False Alarm (P_{FA}).

It ***shall*** also be possible to initiate a track manually. In manual track initiation, a plot on the radar display is selected by the operator using a graphical tool. When selected, this plot ***should*** form the starting point for a tentative track which eventually ***should*** be confirmed or discarded, as in the automatic case described above.

4.3 MAINTAINING TRACKS

If automatically or manually created tentative tracks persist over a certain length of time, the tracks ***shall*** be promoted to confirmed tracks. Confirmed tracks ***shall*** be shown on the display. The tracking system ***shall*** handle the number of confirmed tracks (Table 4-1) and to maintain tracks under certain conditions of P_D (Table 4-2) and $P_{FA} \leq 0.01$.

4.4 TRACK TERMINATION

A confirmed track ***shall*** be terminated if:

a) it moves outside a user defined maximum range;

b) it moves into a user defined non-tracking area;

c) the quality of the track falls below a predefined minimum; or

d) the track cannot be updated with new plots over a certain length of time.

4.5 PLOT EXTRACTION AND TRACKING PERFORMANCE

The requirements in respect of plot extraction and tracking are defined by the individual MCTS authority, on the basis of local conditions, number of radar sensors in a system, etc.

The Extractor performance ***shall*** meet the guidelines outlined in the IALA Recommendation V-128 on "Technical Performance Requirements for VTS Equipment", as shown in Table 4-1 below.

Table 4-1 Radar Tracking Performance Parameters[1]

Parameter		Recommendation Level
		Advanced
Number of plots per antenna rotation		≥ 5000
Number of confirmed tracks per tracker		≥ 1000
Time for confirmation of tentative track		≤ 40 sec
Time from track confirmation to achievement of specific accuracy		≤ 2 minutes
Time from data loss to automatic track termination		≥ 10 seconds
Speed of tracked objects		0 to 70 KN
Turning rate of tracked objects		30°/second at 4 KN 20°/second at 10 KN 10°/second at 50 KN 5°/second at 70 KN
Accuracy in track position	Range[2]	≤ 0.5 % of range or 10 m
	Bearing[2]	≤ 0.5° (X-Band)
Accuracy of track data	Speed[2]	≤ 1 knot
	Course[2]	≤ 2°

Note 1: Based on IALA Guideline 1111, "Preparation of Operational and Technical Performance Requirements for VTS Systems," Table 17, Target Position Accuracies, Advanced Recommendation Level.

Note 2: Within one standard deviation (Gaussian distribution) when sailing on a straight course. Note that verification may require simulated tracks or other methods due to the fact that it may be impossible to direct a test target to sail with sufficient accuracy.

4.5.1 Track Initiation and Track Maintenance

The radar P_D ***should*** be adapted to the role of MCTS. The automatic track initiation and track maintenance is optimised accordingly. Based on preliminary modeling of the radar sites, the Canadian Coast Guard is estimating a P_D of 80% for all sites.

4.5.2 False Tracks

False tracks may appear as a result of noise, clutter (including wakes) and ghost echoes. However, the number should not be significant, if the recommended values given in Table 4-1, with an availability of 99.9 %, are respected.

The maximum number of false tracks allowed is dependent upon role of the MCTS authority. False tracks ***shall*** be avoided in safety critical areas and occasionally accepted in areas where surveillance and traffic monitoring is the priority.

There is a trade-off between the time for confirmation of tentative track and the number of false tracks. A longer confirmation time implies less false tracks and it ***should*** be possible to balance this trade-off in the radar setup of the MCTS Centre.

4.5.3 Track Loss

Track loss may occur as a result of $P_D < 1$ in combination with targets manoeuvring, especially in the vicinity of obstructions such as bridges.

A level generally accepted is that each MCTS Operator ***should*** correct up to one track loss per hour in all areas where the recommended values given in Table 4-1 are respected.

4.5.4 Track Swap

Swapping of track identity may occur as a result of targets moving close together or even merging for a period of time, especially if targets are overtaking with small difference in speed and course.

A simple method of manual correction ***shall*** be employed.

In the case of AIS information being available for the radar track(s) in question, automatic correction ***should*** be performed.

The problem may also be addressed by implementing operational procedures to separate targets or to prevent overtaking in critical areas

4.5.5 Track Handover

Communications ***shall*** exist between Extractors for targets handover. Tracks ***shall*** continue on an adjacent Extractor, with the same Identification (ID) or from a message to indicate a change of ID.

5.0 INTERFACES TO EXTERNAL SYSTEMS

The new Extractors ***shall*** be interfaced and compatible with existing and new Radar transceivers. They ***shall*** also interface and be compatible with the INNAV System (which supports the Radar display requirements).

An API (Application Programming Interface) and/or communication protocol ***shall*** be provided to communicate between the INNAV Sensor and the Extractor.

5.1 RADAR TRANSCEIVER OUTPUTS

To interface with the existing and new Radar systems, the Extractor ***shall*** meet the following specifications where applicable. (Notes 1 and 2 below apply):

5.1.1 Radar Analog Video Output

- Amplitude: 4 – 6 Volts **Note 1**
- Polarity: Support for Positive and Negative
- Impedance: 75 ohms
- DC Offset: up to ±25 % of peak amplitude

5.1.2 Radar Digital Video Output **Note 2**

- Amplitude Resolution: 8-bits
- Format: Differential data lines compliant with EIA-644 (LVDS)
- Data Rate: $\leq$ 40 MHz

5.1.3 Network Video Output **Note 2**

- Format: not specified

5.1.4 Ethernet Interface **Note 2**

- IEEE 802.3 10/100/1000 MBits/s Base-T, Ethernet for IP Network video (Streaming) and radar control:

5.1.5 Radar Trigger Output **Note 1**

- PRF: $\leq$ 10,000 Hz
- Amplitude: 8 Volts ± 1 Volt
- Polarity: Support for Positive and Negative
- Impedance: 75 ohms
- Pulse Width: $\geq$ 100 ns, mark-to-space ratio < 1:10
- Rise Time: $\leq$ 100 ns

- Overshoot: ≤ 1 volt on baseline

5.1.6 Antenna Azimuth Data Output

- Interface Types: Single-ended – RS232C/RS423/TTL
  Balanced – RS422
- Azimuth Clock Pulses: ≤ 16384
- Azimuth Reference Pulse: 1 Pulse per revolution
- Rotation Rate: 6 - 60 RPM

Note 1. The manufacturer of the Extractor ***shall*** supply appropriate attenuators or equipment settings to accommodate older radar transceivers with higher analog video and trigger output signal levels as specified in 5.1.1 and 5.1.5 above.

Note 2. To interface with new solid-state radar systems where applicable.

5.2 INNAV OPERATOR'S WORKSTATIONS

The Radar video and tracking information will come from the new Extractors. This information ***shall*** consist of IP Network video (Streaming), radar control, radar status and Built-In Test Equipment (BITE) information in IEEE 802.3 10/100/1000 MBits/s Base-T, Ethernet format.

The new Extractors ***shall*** provide an interface for INNAV with the following control and feedback capabilities, subject to the availability of the radar's control functions themselves. (**Note:** Subject to the MCTS operational procedures, all of these functions might not be utilized.)

5.2.1 Radar Controls

- Radar Select: Main/Back-up
- Mode: On/Off/Standby (as applicable)
- Pulse Width (PW): Or equivalent
- Antenna Polarization: Horizontal/Circular (If available)
- Doppler/MIT: Select/Deselect
- Gain:
- Fast Time Constant (FTC):
- Sensitivity Time Control (STC):
- Automatic Frequency Control (AFC):
- Manual Tuning:

5.2.2 Radar Feedback

- Mode: On/Off/Standby (as applicable)
- Pulse Width (PW) indicator (Short, Medium, Long): Or equivalent
- Minimum Range Alarm: PW too large for minimum range
- Pulse Repetition Frequency (PRF):
- Radar Output Power:
- Transceiver Failure:
- Automatic Frequency Control (AFC) and Manual Tuning level indicator:
- Scanner on:
- Scanner failed:
- Magnetron Current (If applicable):
- LVPS (Low Voltage Power Supply) (If applicable):
- HVPS (High Voltage Power Supply) (If applicable):

5.2.3 Radar Redundancy Controls

- Hot/Cold/Standby Operation: Standby as applicable
- Manual switchover to standby transceiver:
- Automatic Switchover: Upon primary unit failure

5.2.4 Tracker Controls

- Initialisation and acquire masks
- Acquire target
- Release target
- Auto Acquire (ON/OFF, min size, max speed (kts))
- Gain control
- Auto Tune Sensitivity Control
- Clutter Control
- Tracks swap

5.2.5 Tracker Feedback

- Mode: On/Off
- Acquire target status indicator
- Auto Tune Sensitivity level indicator
- Clutter Control level indicator
- Number of fragments indicator
- Number of targets indicator
- Number of Aids to Navigation (AtoN) indicator (Optional)

6.0 EXTRACTOR DETAILED SPECIFICATION

6.1 GENERAL FEATURES

6.1.1 Modular Design

The Extractor ***shall*** use modular design in both the hardware and software. Hardware shall consist of Commercial Off the Shelf (COTS) hardware modules.

The Extractor and the transceiver ***shall*** be separate units, such that the extractor can be upgraded/replaced without upgrading/replacing the other radar system components.

6.1.2 Radar Inputs

The Extractor ***shall*** have two (2) radar channel inputs, one (1) for analog and one (1) for digital, diversity capable.

6.1.3 Antenna Inputs

The Extractor ***shall*** have digital ACP/ARP antenna azimuth inputs that ***shall*** be accommodated.

6.1.4 Ethernet Ports

The Extractor ***shall*** have at least two (2) 10/100/1000 MBits/s Base-T Ethernet ports.

6.1.5 Local Display and Keyboard

The Extractor ***shall*** have connectors for a VGA display and USB keyboard to allow local radar control and Extractor setup.

6.1.6 Target Representation

The Extractor ***shall*** reproduce the approximate shape of the radar target showing the outline and geometrical centre of the target.

6.1.7 Digital Video Generation

The Extractor shall utilize two different formats for digital video generation, i.e., using Polygons and Fragments, to represent targets as close as possible to “raw video” quality.

6.1.8 Video Processing

The Extractor ***shall*** maximize the signal-to-noise and signal-to-clutter ratio using such techniques as: Constant False Alarm Rate (CFAR); geographical masks, sweep integration, scan-to-scan correlation, Sensitivity Time Constraints (STC), for example.

6.1.9 Tracking in Clutter & Noise

The Extractor ***shall*** be able to track reliability with a 2:1 target to noise ratio.

6.1.10 Target Colours and Trails

The Extractor ***shall*** be able to assign colours to targets and also be able to vary the length and intensity of the target trail.

6.1.11 Geographical Processing

As a minimum, the Extractor ***shall*** be able to generate

- detailed land masks,
- clutter mapping,
- auto/manual acquisition areas,
- shadow areas,
- littoral masks,
- video generation masks, and
- object masks and handover masks.

6.1.12 Communication

The Extractor ***shall*** be capable to work at baud rates $\geq$ 64 kbps. Update time ***shall*** be $\leq$ 300 ms.

6.1.13 Built-In Test Equipment (BITE)

The Extractor ***shall*** have BITE capability for internal diagnostics, error warnings and remote control, as a minimum.

6.1.14 MTBF

The Extractor ***shall*** have an MTBF of: > 35,000 hours

6.1.15 MTTR

The Extractor ***shall*** have an MTTR of: $\leq$ 1 hour

6.1.16 Rack Mountable

The Extractor ***shall*** be capable of being mounted in a standard 19” equipment rack.

6.1.17 Redundancy

The Extractor ***shall*** have built-in redundancy of major or critical units, e.g., power supplies. The Extractor ***shall*** also be capable of being configured for main/back-up applications.

6.2 TECHNICAL DETAILS

The Extractor ***Shall*** meet the following requirements:

6.2.1 Target Tracking

Shall meet the requirements in Table 4-1

6.2.2 Target Accuracy

Shall meet the requirements in Table 4-1

6.2.3 Video Processing

- Two separate video inputs: both Analog and digital
- Frequency Diversity: as a built-in option
- Digital Sampling Rate: ≥ 50 MHz
- Amplitude Resolution: ≥ 14-bit
- Radar Recording: Capability to record raw video, fragments and track data to NAS and/or local disk

6.2.4 Digital Video Generation

- Detection Sensitivity: 2 dB degradation in MDS as measured at Operator's display
- Video Delay: ≤ 300 ms from detection to transmission
- Video Shape - Polygons: up to 8-sides circumscribing correlated echo groups;
- Video Shape – Fragments: sector segments formed by the intersection of two radial lines and two concentric circles centred on the radar position;
- Video Range Resolution: equal to sampling resolution;
- Video Azimuth Resolution: equal to antenna resolution in units of 0.088° (4,096 ACPs)
- Video Amplitude: ≥ 8-bits
- Number of video levels ≥ 16

6.2.5 Radar Video Analog Interface

- Number of Channels: two (2)
- Amplitude: between -0.45 to +0.45 Volts **Note 1**
- Polarity: support for positive and negative
- Impedance: 75 ohms
- DC Offset: Must be within input range

6.2.6 Radar Video Digital Interface

- Number of Channels: two (2)
- Amplitude Resolution: up to 14-bits
- Format: differential data lines EIA-644 (LVDS) compliant
- Data Rate: up to 100 MHz

6.2.7 Radar Trigger Interface

- Common to both video inputs
- PRF: up to 10,000 Hz
- Amplitude: between -0.45 to +0.45 Volts [Note 1]
- Polarity: support for positive and negative
- Impedance: 75 ohms
- Pulse Width: $\geq$ 100 ns
- Sync Delay: programmable ± delay for each channel

6.2.8 Network Interface

The Extractor ***shall*** interface with the MCTS Center through the use of an Ethernet connection.

- IP Network video (Streaming) & Control: IEEE 802.3 10/100/1000 MBits/s Base-T

6.2.9 Antenna Azimuth Interface

- Interface Types: Single-ended – RS232C/RS423/TTL
  Balanced – RS422
- Azimuth Clock Pulses: 4,096/8,192/16,384 Pulses per revolution
- Azimuth Reference Pulse: 1 Pulse per revolution
- Pulse Duration: $\geq$ 100 ns (for both ACP and ARP)
- Rotation Rate: up to 60 RPM

Note 1: The manufacturer ***shall*** supply appropriate attenuators or equipment settings to accommodate older radar transceivers with higher video and trigger output signal levels as specified in 6.2.5 and 6.2.7 above.

7.0 SAFETY, ENVIRONMENTAL AND APPROVAL OF EQUIPMENT

7.1 ELECTRICAL SAFETY

7.1.1 Safety Certification

In accordance with Paragraph 7.1.2 below, all Extractors ***shall*** bear the appropriate certifying organization's mark at the time of delivery to Canada.

7.1.2 Electrical Safety Authority

The Electrical Safety Authority (ESA) recognizes certification bodies and field evaluation agencies, accredited by the Standards Council of Canada, to certify or evaluate electrical products or devices. Only equipment bearing a recognized mark or label is deemed to be approved for use in Canada. Information regarding recognized marks and labels approved for use in Canada can be found at: https://www.esasafe.com/assets/files/esasafe/pdf/Electrical_Product_Safety/ESA-ProductApprovalCard-Final-web.pdf

7.1.3 Personnel Safety Requirements

The Extractor ***shall*** incorporate the requirements specified above to provide for the safety of personnel engaged in installing, operating, and maintaining the equipment. It is recognized that equipment may include hazards. It is imperative that hazards be clearly identified and that measures be provided to protect personnel. In addition, the equipment ***shall*** incorporate the following safety measures:

- Electrical: The Extractor ***shall*** be designed to protect personnel from accidental contact with voltages in excess of 30 Volts, RMS or DC, during equipment operation.
- Ground Potential: The Extractor ***shall*** be designed that all external parts, surfaces and shields are at ground potential during normal operation.
- Guards and Barriers: The Extractor contacts, terminals, and similar devices having voltages in excess of 70 Volts RMS or DC, with respect to ground, ***shall*** have barrier guards to minimize accidental contact by personnel.

7.2 ENVIRONMENTAL CONDITIONS

7.2.1 Operational Temperature and Humidity

The Extractors ***shall*** be able to operate in a continuous unattended mode under the following sheltered environmental conditions:

a) Ambient Temperature: 0° C to +35° C
b) Relative Humidity: 80 % maximum at 40° C (non-condensing)

7.2.2 Storage and Transportation

The Extractors ***shall*** meet all technical and functional requirements following temporary storage or transportation under the following environmental conditions:

a) Ambient Temperature: -20° C to +60° C
b) Relative Humidity: 90 % maximum (non-condensing)
c) Altitude: 0 to 8,000 m (non-operating)

7.3 AC POWER TRANSIENTS AND INTERRUPTIONS

7.3.1 Voltage Transients

The Extractors ***shall*** be designed to withstand voltage transients of ±25 % of nominal line voltage for a duration of 500 milliseconds.

7.3.2 Voltage Spikes

The Extractors ***shall*** be designed to withstand voltage spikes of 1,000 Volts Peak for 10 µseconds.

7.3.3 AC Power Restoration

Upon AC power restoration, all the Extractors ***shall*** return to their previous configurations and modes of operation, prior to any power interruption.

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EKME 3649079

Integrated Technical Services

Radar Equipment ITSG-33 Requirements

September 2016

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
1	AC 02	Account Management	Does the system: **a)** Automatically terminate temporary and emergency accounts? If so, after what period of time? **b)** Automatically disable inactive accounts? If so, after what period of time? **c)** Automatically audit account creation, modification, disabling, and termination actions and notify appropriate individuals?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
2	AC 03	Access Enforcement	Does the system enforce approved authorizations for access to the system?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
3	AC 06	Least Privilege	Does the system support the principle of least privilege, allowing only authorized accesses for users (or processes acting on behalf of users) which are necessary to accomplish assigned tasks?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
4	AC 07	Unsuccessful Login Attempts Content	Does the system enforce a limit of consecutive invalid login attempts by a user?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system automatically lock the account /node for a period of time or lock the account /node until released by an administrator when the maximum number of unsuccessful attempts is exceeded? (This control applies for both local or network connection attempts)		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			If Yes, specify which method is used? If the first method is used for what period of time does the account remain locked?"		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
5	AC 08	System Use Notification	Can the system display an approved system use notification message or banner before granting access to the system? This message should provide privacy and security notices to the user.		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			If Yes, does the system retain the notification message or banner on the screen until users take explicit actions to log on to or further access the system?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
6	AC 09	Previous Logon/Access Notification	Does the system notify the user, upon successful logon/access, of the date and time of the last logon/access?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system notify the user, upon successful logon/access, of the number of unsuccessful logon/access attempts since the last successful logon/access?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system notify the user of the most recent successful or unsuccessful login/access attempts?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system notify the user of any security-related changes to the user's account since the last successful login?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
7	AC 11	Session Lock	Does the system prevent further access to the system by initiating a session lock after period of inactivity or upon receiving a request from a user?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system retain the session lock until the user re-establishes access using established identification and authentication procedures?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system session lock mechanism (when activated on a device with a display screen) place a publicly viewable pattern onto the associated display, hiding what was previously visible on the screen?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
8	AC 14	Permitted Actions without Identification or Authentication	Does the system support actions/tasks without identification or authentication? If Yes, which actions/tasks are permitted?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
9	AC 17	Remote Access	Does the system support remote access? If Yes, how?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
10	AU 03	Content Of Audit Records	Does the system produce audit records that contain sufficient information to, at a minimum, establish what type of event occurred, when (date and time) the event occurred, where the event occurred, the source of the event, the outcome (success or failure) of the event, and the identity of any user/subject associated with the event?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
11	AU 05	Response To Audit Processing Failures	Does the system alert designated organizational officials in the event of an audit processing failure? Does the system take the following additional actions: shut down system, overwrite oldest audit records, and stop generating audit records? Does the system provide a warning when allocated audit record storage volume reaches 90% of maximum audit record storage capacity?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
12	AU 06	Audit Review, Analysis, And Reporting	Does the system integrate audit review, analysis, and reporting processes to support organizational processes for investigation and response to suspicious activities?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
13	AU 07	Audit Reduction and Report Generation	Does the system provide an audit reduction and report generation capability? Does the system provide the capability to automatically process audit records for events of interest based on selectable event criteria?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
14	AU 08	Time Stamps	Does the system use internal system clocks to generate time stamps for audit records? Does the system synchronize internal system clock at least daily with an authoritative time source?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
15	AU 09	Protection of Audit Information	Are there processes and procedures in place to protect audit information and audit tools from unauthorized access, modification, and deletion?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system back up audit records daily onto a different system or media than the system being audited?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor – reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
16	AU 10	Non-Repudiation	Does the system protect against an individual falsely denying having performed a particular action?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
17	AU 11	Audit Record Retention	Does the system provide audit record retention capability to provide support for after-the-fact investigations of security incidents?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
18	AU 12	Audit Generation	Does the system provide audit record generation capability for a list of auditable events, such as time stamps, source and destination addresses, user/process identifiers, event descriptions, success/fail indications, filenames involved, and access control or flow control rules invoked? Does the system allow designated organizational personnel to select which auditable events are to be audited by specific components of the system?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
19	IA 02	Identification And Authentication (Organizational Users)	Does the system uniquely identify and authenticate the users (or processes acting on behalf of users)?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system use approved replay-resistant authentication mechanisms for network access to privileged accounts?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
			Does the system uniquely identify and authenticate devices before establishing a connection?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system use multifactor authentication for remote access to privileged accounts?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
20	IA 05	Authenticator Management	Does the system, for password-based authentication: **a)** Enforce minimum password complexity of at least 8 characters with a mix of upper and lower-case letters, numbers, and special		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
			characters? **b)** Enforce at least a 50% change of characters when new passwords are created? **c)** Encrypts passwords in storage and in transmission? **d)** Enforces password minimum and maximum lifetime restrictions of 30 days for lifetime minimum, and 180 days for lifetime maximum? **e)** Prohibits password reuse for 10 generations?		Explanation:
			Does the system, for PKI-based authentication: **a)** Validate certificates by constructing a certification path with status information to an accepted trust anchor? **b)** Enforce authorized access to the corresponding private key? **c)** (c) Maps the authenticated identity to the user account?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
21	IA 06	Authenticator Feedback	Does the system obscure feedback of authentication information during the authentication process to protect the information from possible exploitation/use by unauthorized individuals?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
22	IA 07	Cryptographic Module Authentication	Does the system use mechanisms for authentication to a cryptographic module?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
23	IA 08	Identification and Authentication Non-Organizational Users)	Does the system uniquely identify and authenticate non-organizational users (or processes acting on behalf of non-organizational users)?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
24	SA 05	Information System Documentation	Does documentation exist for the system that describes the following administrator information: **a)** Secure configuration, installation, and operation of the information system; **b)** Effective use and maintenance of security features/functions; **c)** Known vulnerabilities regarding configuration and use of administrative (i.e, privileged) functions.		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does documentation exist for the system that describes the following user information: **a)** User-accessible security features/functions and how to effectively use those security features/functions; **b)** Methods for user interaction with the information system, which enables individuals to use the system in a more secure manner; **c)** User responsibilities in maintaining the security of the information and information system.		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
			Does vendor/manufacturer documentation exist for the system that describes the functional properties of the security controls employed within the information system with sufficient detail to permit analysis and testing?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does vendor/manufacturer documentation exist for the system that describes the security-relevant external interfaces to the information system with sufficient detail to permit analysis and testing?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does vendor/manufacturer documentation exist for the system that describes the high-level design of the information system in terms of subsystems and implementation details of the security controls employed within the system with sufficient detail to permit analysis and testing?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
			Are there procedures and processes in place to correct verifiable flaws, weaknesses and deficiencies identified during the security testing and evaluation process?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Are there procedures and processes in place to document the results of the security testing/evaluation and flaw remediation processes?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Is a regular vulnerability analysis performed and are any vulnerabilities, exploitation potential, and risk mitigations documented?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
25	SA 08	Security Engineering Principles	Do you apply information system security engineering principles in the specification, design, development, implementation, and modification of the information system?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
26	SC 24	Fail in Known State	Does the system fail to a known state in the event of a failure?		☐ Compliant ☐ Partially Compliant ☐ Non-Compliant ☐ Not Applicable Explanation:
27	SI 04	Information System Monitoring	Does the system provide mechanisms for information system monitoring?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
			Does the system generate a unique session identifier for each session and recognize only session identifiers that are system-generated?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
			Does the system generate unique, random session identifiers?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
28	SC 24	Fail In Known State	Does the system fail to a known state preserving system state information in failure?		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:

Security Audit Controls for Protected A, Low and Low (PALL) Profile for Radar Equipment					
	ID	**Control Name**	**What needs to be demonstrated**	**Response\Evidence from Vendor– reference capability where it exists and describe how proposed radar equipment and system configuration provides or supports this requirement**	**"For CCG Security Analysts Only"**
29	SC 28	Protection Of Information At Rest	Does the system protect the confidentiality and integrity of information at rest? This control is intended to address the confidentiality and integrity of information at rest in non-mobile devices and covers user information and system information. Information at rest refers to the state of information when it is located on a secondary storage device (e.g., disk drive, tape drive) within an organizational system. Configurations and/or rule sets for firewalls, gateways, intrusion detection/prevention systems, and filtering routers and authenticator content are examples of system information likely requiring protection.		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation:
30	SI 10	Information Input Validation	Does the system check the validity of information input? Rules for checking the valid syntax and semantics of system inputs (e.g., character set, length, numerical range, acceptable values) are in place to verify that inputs match specified definitions for format and content. Inputs passed to interpreters are pre-screened to prevent the content from being unintentionally interpreted as commands		☐ Compliant ☐ Partially Compliant ☐ Non Compliant ☐ Not Applicable Explanation: