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K1A 0S5

Title - Sujet Naval Remote Weapon Station	
Solicitation No. - N° de l'invitation W8472-125389/B	Date 2014-12-23
Client Reference No. - N° de référence du client W8472-125389	GETS Ref. No. - N° de réf. de SEAG PW-\$\$QF-101-24870
File No. - N° de dossier 101qf.W8472-125389	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2015-01-30	
Time Zone Fuseau horaire Eastern Standard Time EST	
F.O.B. - F.A.B. Specified Herein - Précisé dans les présentes Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input checked="" type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Rancourt, Michael	Buyer Id - Id de l'acheteur 101qf
Telephone No. - N° de téléphone (819) 956-3930 ()	FAX No. - N° de FAX (819) 956-5650
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Solicitation No. - N° de l'invitation

W8472-125389/B

Amd. No. - N° de la modif.

File No. - N° du dossier

101qfW8472-125389

Buyer ID - Id de l'acheteur

101qf

Client Ref. No. - N° de réf. du client

W8472-125389

CCC No./N° CCC - FMS No/ N° VME

NAVAL REMOTE WEAPON STATION (NRWS)

REQUEST FOR INFORMATION (RFI)

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LIST OF ACRONYMS

AIT	Agreement on Internal Trade
CDRL	Contract Data Requirements List
CFSS	Canadian Forces Supply System
CLCA	Comprehensive Land Claim Agreements
DID	Data Item Description
DMPS	Defence and Major Projects Sector
DND	The Department of National Defence
FAT	Factory Acceptance Test
FSR	Field Service Representative
HAT	Harbour Acceptance Test
HFX	Halifax Class Vessels
ICT	Initial Cadre Training
IP	Initial Provisioning
ITB	Industrial and Technological Benefits
JSS	Joint Support Ship
NRWS	Naval Remote Weapon Station
PWGSC	Public Works and Government Services Canada
QF	Electronics, Simulators, and Defence Systems Division
RCN	Royal Canadian Navy
RFI	Request For Information
RFP	Request For Proposal
SAT	Sea Acceptance Test
SOW	Statement of Work
STW	Set To Work
TSOR	Technical Statement of Requirements
VP	Value Proposition

1. Value Proposition and Industrial Technological Benefits

This requirement is not subject to the international trade agreements and falls within the framework of the Defence Procurement Strategy announced on February 5, 2014, therefore, the Industrial and Technological Benefits (ITB) with Value Proposition (VP) will be applied. ITBs obligations will be equivalent to 100% of the eligible contract value, for both the Acquisition and Repair & Overhaul (R&O) Contracts, whereas VP requirements may be based upon, in part, Industry responses received.

2. Project Background

The Canada First Defence Strategy emphasizes that Canada needs "...core capabilities and flexibility required to successfully address both conventional and asymmetric threats, including terrorism, insurgencies, and cyber-attacks."

Recent national deployments have demonstrated that the Royal Canadian Navy (RCN) is operating in higher threat littoral areas more frequently, and events have proven that the littoral threat can exist in Canada's own harbours and coastlines. The RCN uses a layered defence methodology, and the current manually operated, unstabilized, 0.50 Calibre Heavy Machine Gun is used for force protection, warning fire, boarding party protection, and for the primary defence against short range littoral threats. Deficiencies currently exist with this inner layer of defence regarding threat engagability, crew protection, communications, and effectiveness.

To address these deficiencies, the RCN will invest in Naval Remote Weapon Station (NRWS) systems to provide a short range point defence, and limited area defence capability within the layered defence concept used in the RCN.

3. Project Scope

The Department of National Defence (DND) has identified a requirement for NRWS systems. It is intended to award both an Acquisition and R&O contract to a single successful contractor under a future solicitation process.

1. Acquisition Contract Scope:

The NRWS Contractor would be required to provide:

- a. 40 NRWS to be designed, built, delivered, installed, Set-To-Work (STW) and fully acceptance tested, including Factory Acceptance Test (FAT), Harbour Acceptance Test (HAT) and Sea Acceptance Test (SAT), for the HALIFAX Class ships;

-
- b. 8 NRWS to be designed, built and Acceptance tested via FAT, stored, maintained, and delivered to Canada for the Joint Support Ship (JSS) Class vessels;
 - c. 8 optional NRWS to be designed, built, delivered, installed, STW and fully acceptance tested, including FAT, HAT and SAT, for the HALIFAX Class ships;
 - d. 2 trainer NRWS to be designed, built, delivered, STW, and FAT in two (2) training facilities;
 - e. Initial Cadre Training (ICT) and Initial Provisioning (IP); and
 - f. All associated Deliverables including documents, materiel, and services specified by the Acquisition Statement of Work.

2. Repair and Overhaul Scope:

The NRWS Contractor would be required to provide:

- a. All levels of corrective maintenance for NRWS, sub-systems and components;
- b. Spare parts provision to support the NRWS equipment R&O throughout its service life and spares for Canadian Forces Supply System (CFSS) to respond to tasks;
- c. Provide Technical Investigation and Engineering Study (TIES) services on NRWS, sub-systems, operations, concepts, and other applicable RCN equipment;
- d. Provide Field Service Representative (FSR) services to respond to tasks; and
- e. Provide project management services.

4. Purpose of this Request for Information Process

On September 27, 2011, Canada released a Letter of Interest for the NRWS system requirement in conjunction with an invitation to a non-mandatory Industry Day. The objectives of that process was to advise industry of the anticipated forthcoming requirement, receive information regarding existing NRWS technology, provide industry with a preliminary set of draft high level specifications for review and comment, and to receive detailed, indicative, non-binding cost information for project planning purposes.

The project has evolved to a point where prior to releasing a Request for Proposal (RFP) under a formal solicitation process, a draft RFP package is being presented to Industry. This Request for Information (RFI) process will allow suppliers to submit comments and feedback to help Canada formalize the NRWS specifications, Industrial and Technological Benefits with Value Proposition approach, and the RFP Terms and Conditions and resulting contract clauses.

The Draft RFP package will be released over several subsequent RFI amendments and suppliers are requested to review each release and submit their comments and feedback to Canada by the requested due dates.

The following Draft RFP documents are being released with this initial RFI posting:

- a. Draft RFP Annex B - Acquisition Statement of Work (SOW);
- b. Appendix 3 to Annex B - Technical Statement of Requirements (TSOR);
- c. Appendix 4 to Annex B - Installation Guidance Package; and

A complete list of Draft RFP documents can be found in RFI Section 15.

5. Schedule

In providing responses, the following estimated Project schedule should be utilized as a baseline:

RFI Posting - **Winter 2014 / 2015 (Released)**

RFP Draft Document Release and Industry Engagement Activities - **February 2015**

Potential RFP Issue date - **March 2015**

Potential Contract award date - **February 2016**

Potential Full Capability Delivery date - **2022**

6. Due Dates and Submission of Feedback

* Do not send feedback to the PWGSC Bid Receiving Unit *

- a. For the Draft RFP documents identified in RFI Section 4, Respondents are requested to submit their NRWS feedback to the PWGSC Contracting Authority identified in Section 13 of this RFI document, on or before **Jan 30, 2015.**

-
- b. Four (4) hard copies and four (4) soft copies of the information packages are requested and Respondent point of contact information should be included in the package.
 - c. Due dates for future releases of Draft RFP documents will be provided in the RFI amendments that release the information.

7. Industry Engagement

Canada will offer engagement opportunities during this RFI process in the form of a Web Conference, and individual Industry one-on-one meetings. Participation in the one-one-one meetings will be offered as a conference call, or suppliers may choose to meet in person. All meetings will be held within the Ottawa National Capital Region.

For planning purposes, it is anticipated these activities will take place in mid February 2015. A subsequent RFI amendment will be issued on the www.buyandsell.gc.ca web site to provide specific details on these activities and how interested suppliers can participate.

Attendance at any event or engagement activity is not mandatory and will not prevent any interested suppliers from bidding on a possible future formal solicitation.

Canada will not be responsible for any costs associated with engagement activities.

8. Additional Information Requests

After review of all feedback, additional information / clarifications may be sought from the Public Works and Government Services (PWGSC) Contracting Authority identified in Section 13.

9. Security Requirement

There is no security requirement associated with this RFI, however it is anticipated a security requirement at the level of "Secret" will be required in order to conduct work under the NRWS Acquisition contract, and Repair & Overhaul contract.

10. Trade Agreements

The Agreement on Internal Trade (AIT) applies to this requirement.

11. Comprehensive Land Claim Agreements (CLCA)

This procurement is not subject to the Comprehensive Land Claim Agreements (CLCAs) as the final delivery points of the goods and services required are not within the Comprehensive Land Claims Settlements Areas.

12. Enquiries

All enquiries and other communications related to this RFI shall be directed exclusively to the PWGSC Contracting Authority. All enquiries must be submitted to the Contracting Authority no later than fifteen (15) calendar days before the RFI closing date. Enquiries received after that time may not be answered.

Care should be taken by suppliers to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a 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 a proprietary nature. Canada may edit the questions or may request that the respondent do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to all Suppliers. Enquiries not submitted in a form that can be distributed to all Suppliers may not be answered by Canada.

Changes to this RFI may occur and will be advertised through an RFI amendment on the Government Electronic Tendering System (PWGSC Buy and Sell).

13. PWGSC Contracting Authority

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14. Notes to Interested Suppliers

This is neither a call for tender nor a Request for Proposal (RFP), and no agreement or contract for the procurement of the equipment and / or services stated herein will be

entered into solely as a result of this RFI. 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 industry in pursuing this opportunity, including the provision of information and potential visits, are at industry's sole risk and expense.

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

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 and for budgetary purposes. Requirements are subject to change, which may be as a result of information provided in response to this RFI. Suppliers are advised that any information submitted to Canada in response to this RFI may, or may not, be used by Canada in the development of the potential subsequent RFP. The issuance of this RFI 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.

There will be no short-listing of Suppliers for the purposes of undertaking any future work, as a result of this RFI. Similarly, participation in this RFI is not a condition or prerequisite for the participation to any RFP.

Respondents to this RFI should identify any submitted information that is to be considered as either company confidential, proprietary or if the response contains controlled goods.

15. Draft RFP Document List

Item	Document	Release Status
1	NRWS Draft RFP Solicitation document - Terms & Conditions and Resulting Contract Clauses	
2	Draft RFP Annex A - Security Requirements Check List	(Will not be released with RFI)
3	Draft RFP Annex B - Acquisition Statement of Work	Released with RFI Posting
4	Appendix 1 to Annex B - Contract Data Requirements List (CDRL)	
5	Appendix 2 to Annex B - Data Item Descriptions (DID)	
6	Appendix 3 to Annex B - Technical Statement of Requirements (TSOR)	Released with RFI Posting
7	Appendix 4 to Annex B - Installation Guidance Package	Released with RFI Posting
8	Appendix 5 to Annex B - Computer Based Trainer Specification	
9	Draft RFP Annex C - Repair and Overhaul Technical Statement of Work	
10	Appendix 1 to Annex C - Repair and Overhaul Logistics Statement of Work	
11	Draft RFP Annex D - Bid Evaluation Plan (Including Value Proposition)	
12	Appendix 1 to Annex D - Compliance Matrix	
13	Draft RFP Annex E - Federal Contractors program	
14	Draft RFP Annex F - PWGSC Progress Claim 1111	
15	Industry Canada Package with Questions on Value Proposition	



ANNEX B

Acquisition Statement of Work (SOW)

Naval Remote Weapon Station System

DRAFT

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Appendices

Appendix 1: Contract Data Requirement List (CDRL)

Appendix 2: Data Item Description (DID)

Appendix 3: Technical Statement of Requirements (TSOR)

Appendix 4: Installation Guidance Package

Appendix 5: Computer Based Trainer Specification

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1. SCOPE

1.1 Purpose

- 1.1.1 This Statement of Work (SOW) defines the work to be completed by the Contractor to provide:
- a. Naval Remote Weapon Station (NRWS) Systems designed, built, delivered, installed, Set-To-Work (STW), and Acceptance tested in 12 HALIFAX (HFX) Class ships;
 - b. NRWS Systems designed, built, delivered, STW, and Acceptance tested in two (2) training facilities;
 - c. NRWS Systems Acceptance tested via Factory Acceptance Test (FAT), stored, maintained, and delivered to Canada for the Joint Support Ship (JSS) Class ships;
 - d. Initial Cadre Training (ICT) and Initial Provisioning (IP); and
 - e. All associated deliverables including documents, materiel, and services specified by this SOW.

1.2 Background

- 1.2.1 The Canada First Defence Strategy emphasizes that Canada needs "...core capabilities and flexibility required to successfully address both conventional and asymmetric threats, including terrorism, insurgencies, and cyber-attacks."
- 1.2.2 Recent national deployments have demonstrated that the Royal Canadian Navy (RCN) is operating in higher threat littoral areas more frequently, and events have proven that the littoral threat can exist in Canada's own harbours and coastlines. The RCN uses a layered defence methodology, and the current manually operated, unstabilized, 0.50 Calibre Heavy Machine Gun is used for force protection, warning fire, boarding party protection, and for the primary defence against short range littoral threats. Deficiencies currently exist with this inner layer of defence regarding threat engageability, crew protection, communications, and effectiveness.
- 1.2.3 To address these deficiencies, the RCN will invest in a NRWS System to provide a short range point defence, and limited area defence capability within the layered defence concept used in the RCN.

1.3 Terminology

1.3.1 The following definitions shall apply to this SOW:

- a. Acceptance: Written approval by Canada of the Contractor's Objective Evidence (OE) that a deliverable is compliant with this SOW.
- b. Authorization: Written approval by Canada for the Contractor to proceed based upon plans proposed by the Contractor. Authorization does not imply Acceptance of any Contractor plans, and the Contractor remains responsible for demonstrating compliance with all aspects of the SOW.
- c. Computer Software Configuration Item (CSCI): NRWS System software and its respective modules which are under Configuration Management with respect to the Functional and Product Baselines.
- d. Controlled Material: Materials designated as Controlled Materials by Health Canada.
- e. Design Change: Any change to the physical design of hardware or to the function of software.
- f. Factory Acceptance Test (FAT): Testing and evaluation of the NRWS System at the Contractor's facility to demonstrate compliance with the SOW and TSOR.
- g. First Article: The first NRWS System configuration variant for each of HFX Class, and JSS to undergo production.
- h. Functional Baseline: That deliverable documentation which is necessary to define the functional properties of each First Article NRWS System configuration variant in accordance with the SOW, and how functional properties will be verified. The Functional Baseline is defined following the System Requirement Review.
- i. Functional Audit: Verification and acceptance by Canada that all acceptance test and evaluation results, up to and including FAT, demonstrate compliance of each First Article NRWS System configuration variant with the Functional Baseline.
- j. Government Furnished Resources (GFR): Any resource furnished by Canada under the Contract.
- k. Harbour Acceptance Test (HAT): Testing and evaluation of each NRWS System that demonstrates compliance with this SOW, when installed in ships alongside and shore facilities.

- l. Hardware Configuration Item (HWCI): NRWS System hardware and its respective sub-assemblies and components which are under Configuration Management with respect to the Functional and Product Baselines.
- m. Help Call: An inquiry to the Contractor from Canada's Level 1 NRWS System maintainers, operators, and their support organizations, to acquire assistance with the resolution of a technical or user problem experienced with the NRWS System.
- n. Level 1 Maintenance: In-service maintenance that is to be conducted on the NRWS System by RCN staff employed in the respective ships.
- o. Level 2 Maintenance: In-service maintenance that is to be conducted on the NRWS System by DND staff employed in Canada's shore based support organizations.
- p. NRWS System: The NRWS System consists of four remotely operated NRWS mounts, sensor suites, and NRWS operator consoles integrated together.
- q. Objective Evidence (OE): Factual, repeatable, and documented evidence of NRWS System compliance with the SOW that can be demonstrated to Canada.
- r. Physical Configuration Audit (PCA): The process whereby Canada determines that each First Article NRWS System configuration variant is compliant with its corresponding Product Configuration Documentation and acceptance of proposed HWCIs and CSCIs and their corresponding Product Baselines.
- s. Product Baseline: That deliverable Product Configuration Documentation which has been accepted via the PCA, and that will be the reference for all Configuration Management processes applied to each HWCI and CSCI.
- t. Product Configuration Documentation: That deliverable documentation required to define the functional, physical, and interface properties of each NRWS System configuration variant, and its associated HWCI, and CSCI in accordance with the SOW. Product Configuration Documentation includes, at a minimum the System Design Description of CDRL NRWS-SE-004, the Interface Design Document of CDRL NRWS-SE-005, and the Technical Data Package of CDRL NRWS-TD-002.
- u. Qualification: Factual, repeatable, and documented OE that the design and function of each Configuration Item and CSCI which has been fully integrated into each First Article NRWS System configuration variant, are compliant with SOW requirements.

- v. Qualification Review: The process whereby Canada determines that each First Article NRWS System configuration variant is compliant with the SOW.
- w. Recurring Article: The second and all subsequent articles of a NRWS System configuration variant to undergo production.
- x. Sea Acceptance Test (SAT): Testing and evaluation of each installed NRWS System conducted at sea in order to demonstrate compliance with this SOW.
- y. Set-to-Work (STW): All activities that the Contractor must undertake following installation of each NRWS System to verify correct installation, initialize the system, verify correct function of the system, and to ensure that each NRWS System is at a state of technical readiness for subsequent Acceptance Testing.
- z. System Engineering: Multi-discipline engineering that focuses on design and management over the NRWS System life cycle, involving issues of concern to Canada such as reliability, logistics, evaluation measurements, work-processes, optimization methods, and risk management.

1.4 Acronyms

1.4.1 The following acronyms shall apply to this SOW:

Acronyms	
ATI	Acceptance Test Index
CDR	Critical Design Review
CDRL	Contract Data Requirement List
CFFSE	Canadian Forces Fleet School Esquimalt
CFITES	Canadian Forces Individual Training and Education System
CFNES	Canadian Forces Naval Engineering School
CM	Configuration Management
CI	Configuration Item
CSCI	Computer Software Configuration Item
ECGP	Engineering Change Guidance Package
FAT	Factory Acceptance Test
FSR	Field Service Representative
HAT	Harbour Acceptance Test
HWCI	Hardware Configuration Items
ICT	Initial Cadre Training
ILS	Integrated Logistic Support
IMS	Integrated Master Schedule
IP	Initial Provisioning

Acronyms	
ISS	In Service Support
ITAR	International Traffic in Arms Regulations
LSA	Logistic Support Analysis
LLTIP	Long Lead Time Initial Provisioning
NRWS	Naval Remote Weapon Station
OE	Objective Evidence
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PM	Project Manager
PMP	Project Management Plan
RCN	Royal Canadian Navy
SAT	Sea Acceptance Test
SDE	Shared Data Environment
SE	System Engineering
SOW	Statement of Work
SRR	System Requirements Review
STW	Set to Work
TEMP	Test and Evaluation Master Plan
TDP	Technical Data Package
TRR	Test Readiness Review
TSOR	Technical Statement of Requirements

2. APPLICABLE DOCUMENTS

- 2.1 The following documents are applicable to and shall form part of this SOW:
- a. D-01-002-007/SG-006, Requirements for the Selection of Configuration Items;
 - b. C-03-010-000/MM-001, Canadian Naval Shipboard Techniques for Electromagnetic Compatibility; and
 - c. C-03-010-000/AG-002, EMSEC Design, Installation and Maintenance Guidelines for Naval Ships.
- 2.2 In the event of a conflict between this SOW and an applicable document, this SOW shall take precedence to the extent necessary to resolve such conflict.
- 2.3 The latest approved revision of the documents listed below shall apply unless otherwise specified.

3. PROJECT MANAGEMENT

3.1 Project Manager

- 3.1.1 The Contractor shall implement and maintain a team, headed by a single Project Manager (PM), to carry out the Work required in this SOW.
- 3.1.2 The PM shall be the main point of contact with Canada.

3.2 Project Management Plans

- 3.2.1 The Contractor shall prepare, deliver and maintain a Project Management Plan (PMP) in accordance with Contract Data Requirements List (CDRL) NRWS-PM-001 for Authorization by Canada.
- 3.2.2 The Contractor shall prepare, deliver and maintain an Integrated Master Schedule (IMS) in accordance with CDRL NRWS-PM-002 for Authorization by Canada.

3.3 Scope and Schedule Management

- 3.3.1 The Contractor shall implement the scope of the Work specified in this SOW in accordance with the project management processes of the PMP and IMS Authorized by Canada.
- 3.3.2 The Contractor shall implement all Authorized in scope unforeseen Work to this SOW in accordance with any corresponding schedule and plan changes Authorized by Canada.
- 3.3.3 The Contractor shall supply all resources required to implement the scope of the Work specified in this SOW, except for Government Furnished Resources (GFR) as detailed in this SOW.
- 3.3.4 The Contractor shall manage all resources required to perform the Work.
- 3.3.5 The Contractor shall prepare, deliver and maintain all project deliverables in accordance with:
 - a. The CDRL and associated Data Item Descriptions (DID); and
 - b. Hardware and software deliverables in accordance with the Technical Statement Of Requirements (TSOR).

- 3.3.6 The Contractor shall complete the Event Prerequisite(s) for each event described in Table 1 prior to the event.
- 3.3.7 The Contractor shall use the IMS as a baseline against which project progress shall be controlled and measured, and against which project changes shall be evaluated.
- 3.3.8 The Contractor shall address the following schedule requirements for HFX NRWS Systems in project planning:
- a. Plan long-term schedules for installation and STW as applicable to ships listed in Table 2;
 - b. Plan long-term schedules to accommodate First Article NRWS System installation and STW;
 - c. Plan long-term schedules for subsequent shipboard installations and STW assuming that they will be uniformly distributed throughout the year as indicated by Table 2;
 - d. Consult Canada on the second Monday of April of each year to contract completion to acquire an updated schedule for proposed ship availability;
 - e. Plan and execute all Contractor activities in ships to accommodate a minimum of one month notice from Canada regarding the final availability dates for each ship;
 - f. Plan and execute all Contractor activities in ships to accommodate a minimum of one month notice from Canada, for the substitution of any ship listed in Table 2, with any other ship in the same region; and
 - g. Plan and execute all Contractor activities in Canada's ships in conjunction with existing ship programs.
- 3.3.9 The Contractor shall address the following schedule requirements for JSS NRWS Systems in project planning:
- a. Plan long-term schedules for delivery in accordance with Table 2;
 - b. Consult Canada on the second Monday of April of each year to contract completion to acquire an updated schedule for proposed JSS availability; and
 - c. Deliver each JSS NRWS System no sooner than 60 business days and no later than 40 business days prior to the installation dates specified by Canada on the second Monday of April of each year.

Table 1: NRWS Project Key Events and Prerequisites			
Event	Event Date	Event Prerequisite(s)	SOW Reference
Contract Kick-Off Meeting	30 business days after Contract award	Project Management Plan (PMP) and subsidiary plans complete	Paragraphs 3.2.1, 3.7.1.6.a
		Integrated Master Schedule (IMS) complete	Paragraph 3.2.2
		System Engineering Management Plan complete	Paragraph 4.1.2
		Configuration Management (CM) Plan complete	Paragraph 4.7.1.1
System Requirements Review	30 business days after Contract award	Integrated Logistic Support (ILS) Plan complete	Paragraph 5.2.1.1
Preliminary Design Review (PDR)	120 business days after Contract award	Draft System Specification delivered to Canada	Paragraph 4.2.2
		System Specification Authorization by Canada	Paragraph 4.2.5
		Draft PDR Documentation Package delivered to Canada	Paragraph 4.3.1.2
Commencement of Final System Design	In accordance with Commencement of Final System Design Event Prerequisites	PDR Minutes Authorization by Canada	Paragraph 4.3.1.5
Critical Design Review (CDR)	In accordance with CDR Event Prerequisites	Final PDR Documentation Package Authorization by Canada	Paragraph 4.3.1.5
Integrated Logistic Support (ILS)	In accordance with ILS Event Prerequisites	Draft CDR Documentation Package delivered to Canada	Paragraph 4.3.2.2
		CDR Minutes Authorization by Canada	Paragraph 4.3.2.5

Table 1: NRWS Project Key Events and Prerequisites			
Event	Event Date	Event Prerequisite(s)	SOW Reference
Conference		Final CDR Specification Package Authorization by Canada	Paragraph 4.3.2.5
		Draft ILS Conference Documentation Package delivered to Canada	Paragraph 5.2.3.2
First Article Production	In accordance with First Article Production Event Prerequisites	ILS Conference Minutes Authorization by Canada	Paragraph 5.2.3.6
		IP Conference Documentation Package Authorization by Canada	Paragraph 5.3.3.6
IP Conference	In accordance with IP Conference Event Prerequisites	ILS Conference Minutes Authorization by Canada	Paragraph 5.2.3.6
		ILS Conference Documentation Package Authorization by Canada	Paragraph 5.2.3.6
FAT Test Readiness Review (TRR)	In accordance with TRR Event Prerequisite	Following First Article Production	Paragraph 4.6.5.1
First Article Factory Acceptance Test (FAT)	In accordance with FAT Event Prerequisites	20 business days notice for First Article FAT delivered to Canada	Paragraph 4.6.6.1
		Authorization of FAT TRR Minutes by Canada	Paragraph 4.6.5.5
		All Product Configuration Documentation updates for the First Article delivered to Canada	Paragraphs 4.6.5.4.g, 4.7.4.6

Table 1: NRWS Project Key Events and Prerequisites			
Event	Event Date	Event Prerequisite(s)	SOW Reference
Functional Audit	In accordance with Functional Audit Event Prerequisite	All test reports up to and including First Article FAT Test Report Accepted by Canada	Paragraphs 4.7.3.2, 4.7.3.3
Physical Configuration Audit (PCA)	In accordance with PCA Event Prerequisite	All deviations identified in the Functional Audit corrected and results Accepted by Canada	Paragraphs 4.7.3.2, 4.7.3.3
First Article Training Facility Installation	In accordance with First Article Training Facility Installation Event Prerequisites	All corrections of deviations identified in the Functional Audit and PCA Accepted by Canada	Paragraph 4.7.3.8
		Acceptance of translated equipment labels and safety labels	Paragraphs 4.4.7, 4.4.8.b
		Authorization of the Safety Compliance Assessment	Paragraph 4.4.8.a
First Article Ship Installation	In accordance with First Article Ship Installation Event Prerequisites	Authorization of the particularized HFX Class EC Specification	Paragraph 4.8.1.8
		All corrections of deviations identified in the Functional Audit and PCA Accepted by Canada	Paragraph 4.7.3.8
		Acceptance of translated equipment labels and safety labels	Paragraphs 4.4.7, 4.4.8.b
		Authorization of the Safety Compliance Assessment	Paragraph 4.4.8.a
		Authorization of the particularized HFX Class EC Specification	Paragraph 4.8.1.8

Table 1: NRWS Project Key Events and Prerequisites			
Event	Event Date	Event Prerequisite(s)	SOW Reference
Conduct Initial Cadre Training (ICT)	In accordance with ICT Event Prerequisites	Training Development Program Report Authorized by Canada	Paragraphs 5.2.3.2.b, 5.4.7, 5.5.1
		Level 1 spares for First Article Training Facility, including long lead items received by Canada	Paragraph 5.3.1
Harbour Acceptance Test (HAT) TRR	In accordance with HAT TRR Event Prerequisite	Following Ship Installation	Paragraph 4.6.5.2
First Article HAT	In accordance with First Article HAT Event Prerequisites	Each First Article NRWS System configuration variant required for HAT has been STW and results reported to Canada	Paragraphs 4.5.2.2, 4.5.3.1
		ICT sessions completed	Paragraph 5.5.8
		Authorization of First Article HAT TRR Minutes by Canada	Paragraph 4.6.5.6
		Level 1 spares for each ship, including long lead items, received by Canada	Paragraph 5.3.1
Sea Acceptance Test (SAT) TRR	In accordance with SAT TRR Event Prerequisite	Following First Article HAT	Paragraph 4.6.5.3
First Article Sea Acceptance Test (SAT)	In accordance with First Article SAT Event Prerequisites	First Article HAT Test Report for each First Article NRWS System configuration variant Accepted by Canada	Paragraphs 4.6.7.3

Table 1: NRWS Project Key Events and Prerequisites			
Event	Event Date	Event Prerequisite(s)	SOW Reference
		Authorization of First Article SAT TRR Minutes by Canada	Paragraph 4.6.5.5
First Article Qualification Review	In accordance with First Article Qualification Review Event Prerequisite	All test reports and audits up to and including First Article SAT Test Report for each First Article NRWS System configuration variant Accepted by Canada	Paragraphs 4.6.1.1, 4.6.7.1, 4.6.7.4, 4.6.8.2
Technical Data Package (TDP) Delivery	In accordance with TDP Delivery Event Prerequisite	Authorization of First Article Qualification Review minutes	Paragraph 4.8.2.3
Final In-Service Manuals Delivery	In accordance with Final In-Service Manuals Delivery Event Prerequisite	Authorization of First Article Qualification Review minutes	Paragraph 4.8.2.3
Recurring Production	In accordance with Recurring Production Event Prerequisite	Acceptance of First Article Qualification Review minutes by Canada	Paragraphs 4.6.8.2, 4.6.8.4, 4.6.8.5
Recurring Article NRWS Installation	In accordance with Recurring Article NRWS Installation Event Prerequisites	Recurring FAT Reports Accepted by Canada	Paragraphs 4.6.7.5
		Ship Availability	Table 2

Table 1: NRWS Project Key Events and Prerequisites			
Event	Event Date	Event Prerequisite(s)	SOW Reference
Recurring Article Acceptance	In accordance with Recurring Article Acceptance Event Prerequisites	Level 1 spares, including long lead items, received by Canada prior to each recurring article STW	Paragraphs 4.6.7.5, 5.3.1.1
		Each Recurring Article NRWS configuration variant required for HAT has been successfully STW and results reported to Canada	Paragraphs 4.5.2.2, 4.5.3.1
		Recurring HAT and SAT Test Reports Accepted by Canada	Paragraph 4.6.7.5
Contract Completion Meeting	20 business days prior to Contract Completion	In accordance with Event Date	Paragraph 3.7.1.6.d

Table 2: NRWS Implementation Schedule ³									
HFX Class ship for Installation ¹	Other Units for Delivery ²	Location	2016	2017	2018	2019	2020	2021	
HMCS ST JOHN'S		Halifax, NS				X			
HMCS HALIFAX		Halifax, NS		X					
HMCS CHARLOTTETOWN		Halifax, NS				X			
HMCS FREDERICTON		Halifax, NS			X				
HMCS VILLE DE QUEBEC		Halifax, NS					X		
HMCS MONTREAL		Halifax, NS			X				
HMCS TORONTO		Halifax, NS						X	
HMCS OTTAWA		Esquimalt, BC					X		
HMCS WINNIPEG		Esquimalt, BC			X				
HMCS REGINA		Esquimalt, BC						X	
HMCS CALGARY		Esquimalt, BC		X					
HMCS VANCOUVER		Esquimalt, BC				X			
	JSS Class Units								
	HMCS QUEENSTON	Vancouver, BC		X					
	HMCS CHATEAUGUAY	Vancouver, BC			X				
	Training Facilities Units								
	CFFSE	Esquimalt, BC	X						
	CFNES	Halifax, NS	X						

1. HFX Class ships NRWS System installations indicated by an “X” are planned for the years indicated.

2. Other units for delivery indicated by an “X” are planned for the years indicated.

3. Updated schedules for the HFX and JSS Class ship availabilities will be provided by Canada on the second Monday in April for each Contract year

3.4 Quality Management

- 3.4.1 The Contractor shall implement a Quality Management Program in accordance with the PMP of CDRL NRWS-PM-001 for the Work specified in this SOW.

3.5 Risk Management

- 3.5.1 The Contractor shall implement a Risk Management Program in accordance with the PMP of CDRL NRWS-PM-001 for all Work specified in this SOW.
- 3.5.2 The Contractor shall report risks in accordance with the Project Progress Reports CDRL NRWS-PM-003.

3.6 Documentation Deliverables

3.6.1 Shared Data Environment

- 3.6.1.1 The Contractor shall implement a web-based Shared Data Environment (SDE) that will enable:
- a. Only personnel Authorized by Canada to access the SDE;
 - b. Canada and the Contractor to store, exchange and share information;
 - c. Canada and the Contractor to render documents as read-only, and to edit documents via password protection;
 - d. Canada and the Contractor to amend and add comments to deliverable documentation via password protection;
 - e. Canada and the Contractor to track all amendments and comments to deliverables, including the identification of individual editor or commenters; and
 - f. All data in the SDE to be maintained in accordance with Section 4.7.
- 3.6.1.2 The Contractor shall deliver all documentation to Canada on the SDE in Microsoft Office 2010 or Adobe Portable Document Format.
- 3.6.1.3 The Contractor shall accommodate the periods required for Canada to review all documentation deliverables, in accordance with the CDRL. Canada will issue comments for amendment, or Authorization, or Acceptance as specified by this SOW no later than the next business day following the expiration of applicable review period. Should Canada be unable to return comments as indicated, Canada will advise the Contractor accordingly.

- 3.6.1.4 The Contractor shall amend deliverable documents in accordance with comments received from Canada, and re-submit within 10 business days unless stated otherwise in this SOW and the CDRL.

3.6.2 Progress Reports

- 3.6.2.1 The Contractor shall prepare and deliver Project Progress Reports in accordance with CDRL NRWS-PM-003 10 business days prior to each Project Review Meeting specified Paragraph 3.7.1.6.b.

3.7 Meetings and Meeting Documents

3.7.1 Meetings

- 3.7.1.1 The Contractor shall convene and co-chair all meetings required by this SOW at locations agreed to by the parties with Canada.
- 3.7.1.2 The Contractor shall provide notice of at least 20 business days for the proposed date for all meetings specified in this SOW, for approval by Canada.
- 3.7.1.3 The Contractor shall prepare and deliver all deliverable documentation packages required for meetings in accordance with Section 3.7 of this SOW and the CDRL.
- 3.7.1.4 The Contractor shall include all meetings required by this SOW, and delivery of their associated deliverable documentation packages, in the IMS.
- 3.7.1.5 The Contractor shall ensure that all required data, facilities, and personnel, including the individual(s) having required approval authority regarding meeting topics, are available for each meeting.
- 3.7.1.6 The Contractor shall convene and co-chair the following Project Management meetings with Canada, in accordance with the Event Prerequisites of Table 1:
- a. Contract Kick-Off Meeting - Within 30 business days of Contract award, to identify any amendments required to the PMP and associated plans of Paragraphs 3.2.1, 3.2.2, 3.4.1, 3.5.1, 4.1.2, 4.6.2.1, 4.7.1.1, and 5.2.1.1;
 - b. Project Review Meetings – Monthly, to present and discuss the topics itemized in CDRL NRWS-PM-003 until full compliance of the NRWS System is demonstrated via the First Article Qualification Review, then quarterly to project closure;
 - c. Technical Review Meetings – Quarterly, to present and discuss the topics itemized in CDRL NRWS-PM-003 until First Article Acceptance, then semi-annually to project closure; and

- d. Contract Completion Meeting - At least 20 business days prior to proposed Contract Completion, to identify the deliverables that have been Accepted by Canada, to plan for the Acceptance of all outstanding deliverables, and to identify all actions required to formally close the Contract.

3.7.1.7 The Contractor shall convene and co-chair the following System Engineering and ILS meetings with Canada, in accordance with the Event Prerequisites of Table 1:

- a. System Requirements Review (SRR) – In accordance with paragraph 4.2.1;
- b. Preliminary Design Review (PDR) – In accordance with paragraph 4.3.1.1;
- c. Critical Design Review (CDR) – In accordance with paragraph 4.3.2.1;
- d. Test Readiness Reviews (TRR) – In accordance with paragraph 4.6.5.1, 4.6.5.2, and 4.6.5.3;
- e. Functional Audit – In accordance with paragraph 4.7.3.2 and 4.7.3.3;
- f. Physical Configuration Audit (PCA) – In accordance with paragraph 4.7.3.2;
- g. Qualification Review - In accordance with paragraph 4.6.8.1;
- h. Integrated Logistic Support (ILS) Conference – In accordance with paragraph 5.2.3.1;
- i. Long Lead Time Item Provisioning (LLTIP) Conference – In accordance with paragraph 5.3.2.1; and
- j. Initial Provisioning (IP) Conference – In accordance with paragraph 5.3.3.1.

3.7.2 **Agenda**

- 3.7.2.1 The Contractor shall prepare and deliver draft Meeting Agenda in accordance with CDRL NRWS-PM-004 for approval by Canada at least 10 business days prior to all meetings specified in this SOW.
- 3.7.2.2 The Contractor shall incorporate all agenda items requested by Canada in all meeting agenda.
- 3.7.2.3 The Contractor shall deliver approved Meeting Agenda(s) to all attendees at least 5 business days prior to the scheduled meeting date.

3.7.3 **Minutes**

- 3.7.3.1 The Contractor shall prepare and deliver draft Meeting Minutes in accordance with CDRL NRWS-PM-005 for Authorization by Canada within 5 business days following the completion of the meeting.
- 3.7.3.2 The Contractor shall incorporate all observations made by Canada, and mutually agreed with the Contractor, in the draft Meeting Minutes
- 3.7.3.3 The Contractor shall prepare and deliver the final Meeting Minutes for Authorization by Canada.
- 3.7.3.4 The Contractor shall deliver Authorized Meeting Minutes to all attendees within 10 business days following the completion of the meeting.
- 3.7.3.5 The Contractor shall execute all action items assigned to the Contractor in Authorized Meeting Minutes.

4. SYSTEM ENGINEERING

4.1 General

- 4.1.1 The Contractor shall designate a single Engineering Manager within its organization who will be responsible to the PM for engineering functions related to the NRWS.
- 4.1.2 The Contractor shall prepare and deliver a System Engineering Management Plan in accordance with CDRL NRWS-SE-001.
- 4.1.3 The Contractor shall conduct system engineering in accordance with the System Engineering Management Plan and the requirements of this SOW.
- 4.1.4 The Contractor shall conduct system engineering to ensure that all proper approvals for International Traffic in Arms Regulations (ITAR) are obtained for the NRWS System and all associated deliverables.
- 4.1.5 The Contractor shall conduct system engineering in order to provide an NRWS System which meets all requirements contained in the TSOR.

4.2 Requirement Management

- 4.2.1 The Contractor shall convene one SRR with Canada to coincide with the Contract Kick-Off meeting, in order to ensure that each TSOR requirement has been clarified and reconciled to a common understanding between the Contractor and Canada, so that the Contractor can generate the Functional Baseline.
- 4.2.2 The Contractor shall prepare and deliver a draft System Specification for discussion at the SRR, in accordance with CDRL NRWS-SE-002 to specifically define the Contractor's interpretation and organization of each TSOR requirement for management during the subsequent design and Acceptance processes.
- 4.2.3 The Contractor shall incorporate all observations made by Canada, and mutually agreed with the Contractor, in the draft System Specification.
- 4.2.4 The Contractor shall prepare and deliver a final System Specification in accordance with CDRL NRWS-SE-002 that will become the Functional Baseline when Authorized by Canada.
- 4.2.5 The Contractor shall design the NRWS System following Authorization of the System Specification and SRR Minutes by Canada, and in accordance with all other Event Prerequisites of Table 1.
- 4.2.6 The Contractor shall prepare and deliver a Verification Cross Reference Matrix in accordance with CDRL NRWS-SE-003, that shall identify for each

requirement in the TSOR what verification method(s) will be used by the Contractor to verify compliance of the NRWS System and all associated deliverable material, documents, and services with the TSOR.

4.3 Design Reviews

4.3.1 Preliminary Design Review

- 4.3.1.1 The Contractor shall convene a PDR with Canada to explain and validate the design of the proposed NRWS System with respect to this SOW.
- 4.3.1.2 The Contractor shall prepare and deliver the following draft PDR Documentation Package:
 - a. System Specification in accordance with CDRL NRWS-SE-002;
 - b. Verification Cross Reference Matrix in accordance with CDRL NRWS-SE-003;
 - c. System Design Document in accordance with CDRL NRWS-SE-004;
 - d. Interface Design Document in accordance with CDRL NRWS-SE-005;
 - e. Safety Control Plan in accordance with CDRL NRWS-SE-006;
 - f. Controlled Material Report if applicable, in accordance with CDRL NRWS-SE-007;
 - g. Test and Evaluation Master Plan (TEMP) in accordance with CDRL NRWS-SE-009;
 - h. Acceptance Test Index (ATI) in accordance with CDRL NRWS-SE-010; and
 - i. Request for GFR in accordance with CDRL NRWS-PM-006.
- 4.3.1.3 The Contractor shall incorporate all observations made by Canada, and mutually agreed with the Contractor, in the draft PDR Documentation Package.
- 4.3.1.4 The Contractor shall prepare and deliver a final PDR Documentation Package for Authorization by Canada.
- 4.3.1.5 The Contractor shall customize and develop the NRWS System, following Authorization of the final PDR Documentation Package and PDR Minutes by Canada, and in accordance with all other Event Prerequisites of Table 1.

4.3.2 Critical Design Review

- 4.3.2.1 The Contractor shall convene and co-chair a CDR with Canada to explain and validate the design of the proposed NRWS System with respect to this SOW.
- 4.3.2.2 The Contractor shall prepare and deliver the following draft CDR Documentation Package:
- a. Verification Cross Reference Matrix in accordance with CDRL NRWS-SE-003;
 - b. System Design Document in accordance with CDRL NRWS-SE-004;
 - c. Interface Design Document in accordance with CDRL NRWS-SE-005;
 - d. Controlled Material Report if applicable, in accordance with CDRL NRWS-SE-007;
 - e. Safety Compliance Assessment for the NRWS in accordance with CDRL NRWS-SE-008;
 - f. TEMP in accordance with CDRL NRWS-SE-009;
 - g. ATI in accordance with CDRL NRWS-SE-010;
 - h. Amendments to the Request for GFR in accordance with CDRL NRWS-PM-006;
 - i. ECGP in accordance with CDRL NRWS-TD-001;
 - j. Technical Data Package (TDP) in accordance with CDRL NRWS-TD-002; and
 - k. Equipment Labelling Package in accordance with CDRL NRWS-CM-002.
- 4.3.2.3 The Contractor shall incorporate all observations made by Canada, and mutually agreed with the Contractor, in the draft CDR Documentation Package.
- 4.3.2.4 The Contractor shall prepare and deliver a final CDR Documentation Package for Authorization by Canada.
- 4.3.2.5 The Contractor shall perform ILS activities following Authorization of the final CDR Documentation Package and CDR Minutes by Canada, and in accordance with all other Event Prerequisites of Table 1.

4.4 Safety Management

- 4.4.1 The Contractor shall prepare, deliver, and maintain a Safety Control Plan in accordance with CDRL NRWS-SE-006.
- 4.4.2 The Contractor shall prepare, deliver, and maintain a Controlled Material Report to Canada in accordance with CDRL NRWS-SE-007 if Controlled Materials are used in the NRWS System.
- 4.4.3 The Contractor shall not use Controlled Materials in the NRWS System and associated deliverables without Authorization of the Controlled Material Report by Canada.
- 4.4.4 The Contractor shall evaluate all aspects of NRWS System safety in accordance with the Safety Control Plan to identify and resolve all safety hazards until implementation of the final NRWS System.
- 4.4.5 The Contractor shall evaluate all aspects of the safety requirements for Canadian shipyards, DND dockyards, and corresponding shore facilities in accordance with the Safety Control Plan where Work will be conducted until conclusion of the HAT for the final NRWS System.
- 4.4.6 The Contractor shall prepare, deliver, and maintain a Safety Compliance Assessment in accordance with CDRL NRWS-SE-008, for Authorization by Canada.
- 4.4.7 The Contractor shall prepare, deliver, and maintain NRWS System equipment safety labels for each hazard identified in the Safety Control Plan in accordance with CDRL NRWS-CM-002 for Authorization by Canada.
- 4.4.8 The Contractor shall not install NRWS System equipment without:
 - a. Authorization of the Safety Compliance Assessment by Canada; and
 - b. Authorization of equipment safety labels by Canada.

4.5 Delivery, Installation, and STW

- 4.5.1 **HFX Class NRWS System Delivery**
 - 4.5.1.1 The Contractor shall deliver each NRWS System to the locations specified in Table 2, in accordance with the IMS.
 - 4.5.1.2 The Contractor shall store each NRWS System until each component is installed.

4.5.2 HFX Class NRWS System Installation

- 4.5.2.1 The Contractor's ECGP prepared in accordance with Section 4.8.1 shall include the installation requirements listed in this section.
- 4.5.2.2 The Contractor shall install each NRWS System in each ship listed in Table 2 in accordance with the Authorized NRWS HFX Class Engineering Change (EC) Specification generated from ECGP of CDRL NRWS-TD-001.
- 4.5.2.3 The Contractor shall install four NRWS mounts at the locations outlined in Table 3.
- 4.5.2.4 The Contractor shall install four NRWS operator consoles in the locations outlined in Table 3.

Table 3: NRWS System Component Locations

NRWS System Component	Qty	Location
Mounts	2	Bridge Wings – In proximity to each existing Big Eye binocular location
	2	Quarter Deck – At existing .50 Cal locations
Operator Consoles	2	Chart Room
	2	Radar Room # 2

- 4.5.2.5 The Contractor's installation of each NRWS System shall not cause any physical interference with existing ships weapons and sensors.
- 4.5.2.6 The Contractor's installation of each NRWS System shall not cause any operational interference with existing ships weapons and sensors.
- 4.5.2.7 The Contractor's installation of each NRWS System shall not cause any interference with flight operations.
- 4.5.2.8 The Contractor's installation of each NRWS System shall be in accordance with D-03-003-005/SF-000.
- 4.5.2.9 The Contractor's installation of each NRWS System shall minimize the re-location of existing equipment.
- 4.5.2.10 The Contractor's installation of each NRWS System shall minimize the modifications to the ship.

4.5.2.11 The Contractor shall install the NRWS System according to the equipment separation requirements as specified in C-03-010-000/AG-002, Annex B, Part B2.

4.5.2.12 The Contractor shall install the NRWS System cabling according to the cabling installation requirements as specified in C-03-010-000/MM-001, Part 6, paragraphs 77 to 117.

4.5.3 HFX Class NRWS System STW

4.5.3.1 The Contractor shall conduct all STW activities as specified in the NRWS HFX Class EC Specification upon completion of each ship installation in order to verify that each NRWS System has been installed correctly, is functioning correctly, and is at a state of technical readiness for HAT.

4.5.3.2 The Contractor shall conduct all NRWS System installation and STW activities in accordance with the safety requirements of the Safety Control Plan of CDRL NRWS-SE-006 and Safety Compliance Assessment of CDRL NRWS-SE-008.

4.5.3.3 The Contractor shall prepare and deliver to Canada an Acceptance Test Report in accordance with CDRL NRWS-SE-012 to report the results of STW conducted on each NRWS System.

4.5.4 Training Facilities NRWS System Delivery and STW

4.5.4.1 The Contractor shall conduct all NRWS System STW activities for the Canadian Forces Flier School Esquimalt (CFFSE) NRWS System installation in accordance with the safety requirements of the Safety Control Plan of CDRL NRWS-SE-006 and Safety Compliance Assessment of CDRL NRWS-SE-008.

4.5.4.2 The Contractor shall prepare and deliver to Canada an Acceptance Test Report in accordance with CDRL NRWS-SE-012 to report the results of STW conducted on each NRWS System at CFFSE.

4.5.4.3 The Contractor shall conduct all NRWS System STW activities for the CFNCS NRWS System installations in accordance with the safety requirements of the Safety Control Plan of CDRL NRWS-SE-006 and Safety Compliance Assessment of CDRL NRWS-SE-008.

4.5.4.4 The Contractor shall prepare and deliver to Canada an Acceptance Test Report in accordance with CDRL NRWS-SE-012 to report the results of STW conducted on each NRWS System at CFNCS.

4.5.4.5 The Contractor shall deliver all other NRWS material in accordance with the IMS.

4.6 Acceptance Process

4.6.1 System Acceptance

- 4.6.1.1 The Contractor shall provide Objective Evidence (OE) of NRWS System and associated deliverable compliance with all requirements of this SOW for Acceptance by Canada via the Acceptance Program in accordance with CDRL NRWS-SE-009.

4.6.2 Test and Evaluation Master Plan

- 4.6.2.1 The Contractor shall prepare, deliver, and maintain a TEMP in accordance with CDRL NRWS-SE-009 for Authorization by Canada, to define the entire process by which compliance of the proposed NRWS System and associated deliverables will be demonstrated with respect to this SOW.

- 4.6.2.2 The Contractor shall conduct the tests and evaluations in accordance with the TEMP Authorized by Canada.

4.6.3 Acceptance Test Index

- 4.6.3.1 The Contractor shall prepare, deliver, and maintain an itemized list of each NRWS System tests addressed by the TEMP in an ATI in accordance with CDRL NRWS-SE-010, for Authorization by Canada.

4.6.4 Acceptance Test Procedures

- 4.6.4.1 The Contractor shall prepare, deliver, and maintain Acceptance Test Procedures (ATP) in accordance with CDRL NRWS-SE-011, to define the specific requirements for each test itemized in the ATI, for Authorization by Canada.

4.6.5 Test Readiness Reviews

- 4.6.5.1 The Contractor shall convene a First Article FAT Test Readiness Review (TRR) with Canada at a mutually agreed location:
 - a. Following initial First Article Production; and
 - b. Prior to First Article FAT which will provide that period of time necessary to resolve all expected action items required to conduct the FAT.
- 4.6.5.2 The Contractor shall convene a First Article HAT TRR with Canada at a mutually agreed location:
 - a. Following First Article NRWS System STW; and

- b. Prior to First Article HAT which will provide that period of time necessary to resolve all expected action items required to conduct the HAT.
- 4.6.5.3 The Contractor shall convene a First Article SAT TRR with Canada at a mutually agreed location:
 - a. Upon Authorization of HAT results by Canada, otherwise, only upon Authorization of the First Article HAT Test Report by Canada; and
 - b. Prior to First Article SAT which will provide that period of time necessary to resolve all expected action items required to conduct the SAT.
- 4.6.5.4 The Contractor shall demonstrate the following to Canada at each TRR:
 - a. Required resources have been retained and scheduled for the applicable First Article FAT, HAT, and SAT, and all action items necessary finalize the coordination of outstanding resources;
 - b. All Event Prerequisites required by Table 1 of this SOW for the applicable First Article FAT, HAT, and SAT have been met;
 - c. A review of past testing conducted on the test article, and any known problems;
 - d. All comments from Canada concerning the applicable ATPs have been resolved to the satisfaction of Canada, so as to enable final Authorization of the procedures;
 - e. All conditions, constraints, and procedures necessary for Canada to formally witness the FAT and HAT;
 - f. All conditions, constraints, and procedures necessary for Canada to conduct, and the Contractor to formally witness, the SAT;
 - g. Test articles are compliant with Product and Functional Baselines, including verification all Authorized configuration changes;
 - h. All NRWS System components to be involved in the test have been STW, and are at a state of technical readiness that enables demonstration of the required compliance; and
 - i. Any other issues that impact the test.
- 4.6.5.5 The Contractor shall commence FAT, HAT, and SAT only upon Authorization of TRR results by Canada, or upon Authorization of TRR Minutes by Canada in which resolution of each TRR observation is documented.

4.6.6 Acceptance Testing

- 4.6.6.1 The Contractor shall provide at least 20 business days notice to Canada of:
- a. The dates for all Acceptance testing, audits and reviews in accordance with the Event Prerequisites of Table 1; and
 - b. The dates for First Article FAT, HAT and SAT in accordance with Paragraphs 4.6.5.1.b, 4.6.5.2.b and 4.6.5.3.b.
- 4.6.6.2 The Contractor shall conduct Acceptance Testing in accordance with the:
- a. Current versions of the TEMP, ATI, and ATPs; and
 - b. The outcome of the FAT, HAT, and SAT TRR, as documented in the TRR Minutes.
- 4.6.6.3 The Contractor shall permit Canada or its representatives to witness all NRWS System Acceptance tests, and shall fully support Canada as required in this role at each Acceptance test.
- 4.6.6.4 The Contractor shall formally witness all SATs conducted by Canada.
- 4.6.6.5 The Contractor shall demonstrate to Canada during each Acceptance Test, the OE of System compliance with all requirements of this SOW that are applicable to the test.
- 4.6.6.6 The Contractor shall re-conduct and permit Canada to witness all Acceptance Testing as required to demonstrate that all changes Authorized in accordance with Section 4.7 are compliant with this SOW.

4.6.7 Acceptance Test Reports

- 4.6.7.1 The Contractor shall prepare and deliver an Acceptance Test Report for each Acceptance Test, in accordance with CDRL NRWS-SE-012 to define all OE of SOW and TSOR compliance obtained during the test.
- 4.6.7.2 The Contractor shall obtain Acceptance of the First Article FAT Test Report, and meet all other Event Prerequisites of Table 1, prior to the commencement of the Functional Audit.
- 4.6.7.3 The Contractor shall obtain Acceptance of the First Article HAT Test Report, and meet all other Event Prerequisites of Table 1, prior to the commencement of the First Article SAT.
- 4.6.7.4 The Contractor shall obtain Acceptance of the First Article SAT Test Reports, and meet all other Event Prerequisites of Table 1, prior to the commencement of the Qualification Review.

- 4.6.7.5 The Contractor shall obtain Acceptance of the Recurring Article FAT Test Report, and meet all other Event Prerequisites of Table 1, prior to the installation of the same Recurring Article.
- 4.6.7.6 The Contractor shall identify all Acceptance Test results that are non-compliant in the Test Reports.
- 4.6.7.7 The Contractor shall rectify all non-compliance identified in the Test Reports and:
- a. Conduct all re-testing required to demonstrate full compliance with this SOW;
 - b. Permit Canada to witness all re-testing; and
 - c. Re-submit Test Reports in accordance with the process specified in Section 4.6.7.
- 4.6.8 **Qualification Review**
- 4.6.8.1 The Contractor shall convene an NRWS System Qualification Review with Canada following Acceptance of the SAT Test Report for each HFX Class First Article NRWS System configuration variant.
- 4.6.8.2 The Contractor shall demonstrate to Canada during the Qualification Reviews that all Acceptance tests, evaluation results, and related OE up to and including SAT, verify compliance of each First Article NRWS System configuration variant with the requirements of this SOW.
- 4.6.8.3 The Contractor shall provide all documentation requested by Canada to conduct the Qualification Review.
- 4.6.8.4 The Contractor shall correct all deviations specified by Canada following the Qualification Review that exist between each configuration variant of the NRWS First Article and this SOW.
- 4.6.8.5 The Contractor shall progress to Recurring Production of the NRWS System configuration variant following Acceptance by Canada of the Qualification Review Minutes that address those NRWS System configuration variants.

4.7 Configuration Management

4.7.1 General

- 4.7.1.1 The Contractor shall prepare, deliver for Authorization and maintain a Configuration Management (CM) Plan in accordance with CDRL NRWS-CM-001.

4.7.1.2 The Contractor shall implement the CM Process to manage the configuration of the NRWS System and associated deliverables in accordance with the Authorized CM Plan.

4.7.2 **Configuration Identification**

4.7.2.1 The Contractor shall identify NRWS System Configuration Items (CI) in accordance with D-01-002-007/SG-006.

4.7.2.2 The Contractor shall prepare and deliver Product Configuration Documentation in accordance with CDRL NRWS-TD-002 in order to describe the necessary physical and functional characteristics of each CI and any verification needed to demonstrate the CI's performance.

4.7.2.3 The Contractor shall prepare and deliver the Equipment Labelling Package in accordance with CDRL NRWS-CM-002 for Authorization by Canada.

4.7.2.4 The Contractor shall use the standard configuration nomenclature in the Product Configuration Documentation and the Equipment Labelling Package to identify each NRWS System HWCI and CSCI in accordance with D-01-002-007/SG-006.

4.7.2.5 The Contractor shall maintain the Product Configuration Documentation in accordance with CDRL NRWS-TD-002.

4.7.2.6 The Contractor shall maintain the Equipment Labelling Package in accordance with CDRL NRWS-CM-002.

4.7.3 **Configuration Audits**

4.7.3.1 The Contractor shall support Canada in conducting Functional Audit and PCA following Acceptance of the FAT Test Reports for each First Article NRWS System configuration variant.

4.7.3.2 The Contractor shall provide all documentation requested by Canada to conduct the Functional Audit and the PCA.

4.7.3.3 The Contractor shall support Canada as required in conducting Functional Audit and subsequent PCA to verify that all Acceptance test and evaluation results, up to and including FAT, demonstrate compliance of the currently Authorized configuration of each First Article NRWS System variant with the Functional Baseline.

4.7.3.4 The Contractor shall correct all functional deviations specified by Canada following the Functional Audit that exist between the function of NRWS System First Articles and the Functional Baseline.

- 4.7.3.5 The Contractor shall support Canada as required in conducting PCAs to verify that:
- a. Each currently Authorized First Article NRWS System HWCI and CSCI complies with the latest Product Configuration Documentation; and
 - b. Provisioned items are of the correct configuration, are supportable, and available.
- 4.7.3.6 The Contractor shall correct all functional and physical deviations, specified by Canada following the PCA, that exist between NRWS System First Articles and the Product Configuration Documentation.
- 4.7.3.7 The Contractor shall use the Product Configuration Documentation Accepted by Canada as the Product Baseline.
- 4.7.3.8 The Contractor shall proceed to installation of First Articles only upon Acceptance of Functional and Product Baselines and completion of all other Event Prerequisites of Table 1.
- 4.7.3.9 The Contractor shall maintain the configuration of the Functional and Product Baselines and the corresponding NRWS System HWCI and CSCIs in accordance with the processes as identified in Section 4.7.4.
- 4.7.4 Configuration Control**
- 4.7.4.1 The Contractor shall report to Canada all changes that may be required from the NRWS Functional and Product Baselines via Project Progress Reports in accordance with CDRL NRWS-PM-003.
- 4.7.4.2 The Contractor shall obtain Authorization from Canada prior to issuing a Design Change Package in accordance with CDRL NRWS-CM-003, in order to define any required NRWS System configuration changes and to amend the NRWS System Functional and Product Baselines.
- 4.7.4.3 The Contractor shall prepare and deliver a Design Change Package to Canada in order to define any required NRWS System configuration change and to amend the NRWS System Functional and Product Baselines as previously Authorized by Canada.
- 4.7.4.4 The Contractor shall implement all changes to NRWS System Functional and Product Baselines, CIs and all associated deliverables as defined in Design Change Packages upon Authorization by Canada.
- 4.7.4.5 The Contractor shall re-conduct applicable Acceptance Testing per Section 4.6.6, and submit to all Configuration Audits per Section 4.7.3, as necessary to verify that all Design Changes have been implemented in accordance with this SOW.

- 4.7.4.6 The Contractor shall amend all deliverable documentation specified by this SOW to reflect the implementation of each Design Change Package, and resubmit this documentation to Canada for Authorization.

4.8 Technical Documentation

4.8.1 Engineering Change Guidance Package

- 4.8.1.1 The Contractor shall prepare and deliver an ECGP in accordance with CDRL NRWS-TD-001 to assist in defining all changes required to HFX Class ships to accommodate the NRWS System.
- 4.8.1.2 The Contractor shall prepare the ECGP based on the Hull and Cabling information outlined in the Installation Guidance Package found in Annex B, Appendix 4 .
- 4.8.1.3 The Contractor shall amend the ECGP to reflect comments provided by Canada.
- 4.8.1.4 The Contractor shall maintain the ECGP to reflect all other NRWS System changes Authorized by Canada in accordance with Section 4.7.
- 4.8.1.5 The Contractor shall provide Canada with the latest version of the ECGP prior to conducting the on-site survey of each HFX Class ship. Canada will provide the Contractor with the NRWS HFX Class EC Specification.
- 4.8.1.6 The Contractor shall review the NRWS HFX Class EC Specification.
- 4.8.1.7 The Contractor shall conduct an on-site survey of each HFX Class ship using the NRWS HFX Class EC Specification.
- 4.8.1.8 If configuration deviations are identified during the on-site survey that will impact the NRWS System installation, the Contractor shall particularize the NRWS HFX Class EC Specification, for the surveyed HFX Class ship and deliver it to Canada for Authorization.

4.8.2 Technical Data Package

- 4.8.2.1 The Contractor shall prepare and deliver the TDP in accordance with CDRL NRWS-TD-002 for Authorization by Canada.
- 4.8.2.2 The Contractor shall amend the TDP to reflect comments provided by Canada and resubmit the TDP for Authorization.
- 4.8.2.3 The Contractor shall amend the TDP upon Acceptance by Canada of the First Article NRWS System Qualification Review Minutes.

- 4.8.2.4 The Contractor shall amend the TDP with each of its component documents incorporating Controlled Goods labels as provided by Canada in accordance with Paragraph 4.9.1.d.
- 4.8.2.5 The Contractor shall maintain the TDP to reflect all NRWS System changes Authorized by Canada in accordance with Section 4.7.

4.9 Government Furnished Resources

- 4.9.1 The Contractor shall request the following GFR in accordance with CDRL NRWS-PM-006 to assist in meeting the requirements of this SOW, and Canada will provide this GFR at no cost within 20 business days, subject to the operational requirements of Canada:
 - a. National Defence Index of Documentation (NDID) numbers for in-service manuals;
 - b. In-Service TDP drawing numbers;
 - c. In-Service TDP drawing title block data;
 - d. In-Service Manual and TDP Controlled Goods identification;
 - e. Equipment Identification Plate and Label nomenclature including cable nomenclature;
 - f. Connection points to existing ship's services; and
 - g. Any other GFR that will be necessary to deliver the NRWS System and associated deliverables in accordance with this SOW.

- 4.9.2 The Contractor shall provide all resources required to deliver the NRWS System and associated deliverables in accordance with this SOW, except for the provision of GFR Authorized by Canada.
- 4.9.3 The Contractor shall coordinate all resources required to provide the NRWS System and associated deliverables in accordance with this SOW, except for the operation of RCN ships that are required for NRWS System testing.

5. INTEGRATED LOGISTIC SUPPORT

5.1 General

- 5.1.1 The Contractor shall designate an ILS Manager within its organization who will be responsible to the PM for all ILS functions related to the NRWS.
- 5.1.2 The Contractor shall undertake all ILS that may be required to implement and maintain each NRWS and its associated deliverables until final Acceptance of each NRWS deliverable by Canada.
- 5.1.3 The Contractor shall conduct NRWS ILS to ensure that all implemented NRWS System and all associated deliverables are not subject to ITAR.

5.2 Integrated Logistic Support Planning

5.2.1 Logistic Support Planning

- 5.2.1.1 The Contractor shall prepare and deliver an ILS Plan in accordance with CDRL NRWS-ILS-001 to define how the ILS requirements of this SOW will be addressed for Authorization by Canada.

5.2.2 Logistic Support Analysis

- 5.2.2.1 The Contractor shall conduct a Logistic Support Analysis (LSA) on the NRWS System in accordance with the ILS Plan.
- 5.2.2.2 The Contractor shall report the LSA results in accordance with the CDRL NRWS-ILS-002.
- 5.2.2.3 The Contractor shall use the results of the LSA to determine required spares in accordance with CDRL NRWS-ILS-005.
- 5.2.2.4 The Contractor shall use the results of the LSA and CDRL NRWS-ILS-005 to conduct IP in accordance with Section 5.3.
- 5.2.2.5 The Contractor shall use the results of the LSA to create and deliver an In Service Support (ISS) Plan in accordance with CDRL NRWS-ILS-004 using the expected operational life of the NRWS System.

5.2.2.6 The Contractor shall use the results of the LSA to prepare CDRL NRWS-TD-002, NRWS-TD-003, and NRWS-TD-004.

5.2.3 ILS Conference

5.2.3.1 The Contractor shall convene an NRWS ILS Conference with Canada in order to explain and validate the proposed NRWS ILS process with respect to this SOW and the ILSP.

5.2.3.2 The Contractor shall prepare and deliver a draft ILS Conference Documentation Package for Authorization by Canada, consisting of at least the following documents:

- a. LSA in accordance with CDRL NRWS-ILS-002;
- b. Training Development Program Report in accordance with CDRL NRWS-ILS-003;
- c. Installation and Set-to-Work Manual in accordance with CDRL NRWS-TD-003;
- d. System User Manual in accordance with CDRL NRWS-TD-004;
- e. Illustrated Parts Breakdown in accordance with CDRL NRWS-TD-005;
- f. Maintenance Manual in accordance with CDRL NRWS-TD-006; and
- g. ISS Plan in accordance with CDRL NRWS-ILS-004.

5.2.3.3 The Contractor shall define the proposed NRWS ILS processes at the ILS Conference in accordance with the ILS Conference Documentation Package.

5.2.3.4 The Contractor shall incorporate all observations made by Canada, and mutually agreed with the Contractor, in the draft ILS Conference Documentation Package.

5.2.3.5 The Contractor shall prepare and deliver a final ILS Conference Documentation Package for Authorization by Canada.

5.2.3.6 The Contractor shall progress to production of First Article NRWS System configuration variants following Authorization of the ILS Conference Minutes and ILS Conference Documentation Package by Canada, and in accordance with all other Event Prerequisites of Table 1.

5.3 Initial Provisioning

5.3.1 Sparing

- 5.3.1.1 The Contractor shall provide quantities of initial Level 1 and 2 spares as follows:
- a. To support each NRWS System that will be implemented in the units itemized in Table 2;
 - b. To support each in-service NRWS System for the first two (2) years of operation;
- 5.3.1.2 The Contractor shall deliver each set of Level 1 spares and Special Tools and Test Equipment prior to each NRWS System STW.
- 5.3.1.3 The Contractor shall deliver all Level 2 spares and Special Tools and Test Equipment prior to First Article SAT.

5.3.2 Long Lead Time Initial Provisioning Conference

- 5.3.2.1 The Contractor shall convene a Long Lead Time Initial Provisioning (LLTIP) Conference with Canada in order to explain & validate the proposed LLTIP process and associated materiel with respect to this SOW and the ILSP.
- 5.3.2.2 The Contractor shall convene the LLTIP Conference at a time that will enable delivery of required Long Lead Time spares in accordance with Paragraph 5.3.1.1.
- 5.3.2.3 The Contractor shall prepare and deliver a draft LLTIP Conference Documentation Package for Authorization by Canada consisting of at least the information specified in CDRL NRWS-ILS-005.
- 5.3.2.4 The Contractor shall define the proposed LLTIP processes and each materiel item at the LLTIP Conference in accordance with the LLTIP Conference Documentation Package of Paragraph 5.3.2.3.
- 5.3.2.5 The Contractor shall incorporate all observations made by Canada, and mutually agreed with the Contractor, in the draft LLTIP Conference Documentation Package.
- 5.3.2.6 The Contractor shall prepare and deliver a final LLTIP Conference Documentation Package for Authorization by Canada.
- 5.3.2.7 The Contractor shall progress to provisioning each LLTIP material item Authorized by Canada, following Authorization of the LLTIP Conference Minutes and LLTIP Conference Documentation Package, and in accordance with all other Event Prerequisites of Table 1.

5.3.3 Initial Provisioning Conference

- 5.3.3.1 The Contractor shall convene an IP Conference with Canada in order to explain and validate the proposed IP process and associated materiel with respect to this SOW and the ILS Plan.
- 5.3.3.2 The Contractor shall prepare and deliver a draft IP Conference Documentation Package for Authorization by Canada, consisting of at least the information specified in CDRL NRWS-ILS-005.
- 5.3.3.3 The Contractor shall define the proposed NRWS IP processes and each materiel item at the IP Conference in accordance with the IP Conference Documentation Package of Paragraph 5.3.3.2.
- 5.3.3.4 The Contractor shall incorporate all observations made by Canada, and mutually agreed with the Contractor, in the draft IP Conference Documentation Package.
- 5.3.3.5 The Contractor shall prepare and deliver a final IP Conference Documentation Package for Authorization by Canada.
- 5.3.3.6 The Contractor shall progress to provisioning each IP materiel item Authorized by Canada, following Authorization of the IP Conference Minutes and IP Conference Documentation Package, and in accordance with all other Event Prerequisites of Table 1.

5.3.4 Initial Provisioning Documentation

- 5.3.4.1 The Contractor shall provide the final Provisioning Documentation in accordance with CDRL NRWS-ILS-005 for each item Authorized for provisioning by Canada.

5.4 Training Development Program

- 5.4.1 The Contractor shall create a Training Development Program that addresses each of the requirements specified in this SOW and is consistent with the Canadian Forces Individual Training and Education System (CFITES) principles.
- 5.4.2 The Contractor shall consult Canada for information on occupations, positions, training and work environments that will be affected by the acquisition of the NRWS System.
- 5.4.3 The Contractor shall create a Task List for operators and maintainers, identifying operator and maintenance tasks for system, sub-system, and integrated system.
- 5.4.4 The Contractor shall identify Performance Objectives for each Task List created.
- 5.4.5 The Contractor shall create Enabling Objectives to address the new skills and knowledge required for the Training Development Program.
- 5.4.6 The Contractor shall create a summary of the recommended training materials, aids, and equipment required for the Training Development Program.
- 5.4.7 The Contractor shall prepare and deliver a Training Development Program Report in accordance with CDRL NRWS-ILS-003.

5.5 Initial Cadre Training

- 5.5.1 The Contractor shall prepare and deliver an Operator ICT Package in accordance with CDRL NRWS-ILS-006 that addresses each NRWS System configuration variant, based upon the Authorized Training Development Program Report.
- 5.5.2 The Contractor shall prepare and deliver a Maintainer ICT Package in accordance with CDRL NRWS-ILS-006 that addresses each NRWS System configuration variant, based upon the Authorized Training Development Program Report.
- 5.5.3 The Contractor shall structure Operator and Maintainer training around the conventional, classroom, instructor-led format, with provision for "hands-on" time with an NRWS System to exercise the required Operator and Maintainer skills.
- 5.5.4 The Contractor shall conduct two (2) sessions of Operator ICT, one (1) at CFFSE and one (1) at CFNES, based upon the Authorized ICT package, for a minimum of 10 to a maximum of 15 students, at locations designated by Canada.

- 5.5.5 The Contractor shall conduct two (2) sessions of Maintainer ICT, one (1) on each coast, based upon the Authorized ICT package, for a minimum of 10 to a maximum of 15 students, at locations designated by Canada.
- 5.5.6 The Contractor shall provide the following to support the conduct of Operator ICT:
- a. Instructors that are experienced in teaching NRWS Operation;
 - b. Instructional support equipment as required;
 - c. Personnel capable of maintaining and repairing the instructional support equipment in order to minimize any interruption to training; and
 - d. A copy of all required student documentation specified in the Authorized Operator and Maintainer ICT Packages of CDRL NRWS ILS-006, for each student.
- 5.5.7 The Contractor shall provide the following to support the conduct of Maintainer ICT:
- a. Instructors that are experienced in teaching NRWS Level 1 and Level 2 Maintenance;
 - b. Instructional support equipment, tools and test equipment;
 - c. Maintenance supplies and spare parts applicable to Level 1 and 2 Maintenance instructional activities;
 - d. Personnel capable of maintaining and repairing the instructional support equipment in order to minimize any interruption to training; and
 - e. A copy of all required student documentation specified in the Authorized Maintainer ICT Package of CDRL NRWS-ILS-006 for each student.
- 5.5.8 The Contractor shall complete all sessions of ICT prior to commencement of First Article NRWS System HAT.

5.6 Manuals

- 5.6.1 The Contractor shall prepare, and deliver the following manuals:
- a. Installation and Set-To-Work Manual in accordance with CDRL NRWS-TD-003;
 - b. System User Manual in accordance with CDRL NRWS-TD-004;
 - c. Illustrated Parts Breakdown in accordance with CDRL NRWS-TD-005; and

d. Maintenance Manual in accordance with CDRL NRWS-TD-006.

- 5.6.2 The Contractor shall amend the manuals to reflect and incorporate comments provided by Canada.
- 5.6.3 The Contractor shall amend the manuals, upon Authorization of the Qualification Review Minutes, with each of its component documents incorporating Controlled Goods identification for each manual.
- 5.6.4 The Contractor shall maintain the manuals to reflect all NRWS System changes Authorized by Canada in accordance with Section 4.7.

5.7 Computer Based Trainers

- 5.7.1 The Contractor shall supply Computer Based Trainers to train the NRWS Operators on how to use the NRWS System.
- 5.7.2 The Contractor shall meet all requirements contained in the Computer Based Trainer Specification found in Annex B, Appendix 5.
- 5.7.3 The Contractor shall deliver Computer Based Trainers to CFFSE.
- 5.7.4 The Contractor shall deliver Computer Based Trainers to CFNES.



ANNEX B
Appendix 3

Technical Statement of Requirements (TSOR)

Naval Remote Weapon Station System

DRAFT

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1. INTRODUCTION

1.1 Scope

- 1.1.1 This TSOR contains the performance and technical requirements for the Naval Remote Weapon Station (NRWS) System, which will consist of multiple remotely operated weapon mounts, sensor suites, and Operator Consoles to be designed, manufactured, supported, initially spared and installed for operation in the Royal Canadian Navy.

1.2 Terminology

- 1.2.1 The following definitions shall apply throughout this TSOR:

- a. NRWS: One NRWS Mount and all its auxiliary components being remotely operated by a NRWS Operator Console.
- b. NRWS System: The NRWS System consists of four remotely operated NRWS mounts, sensor suites, and NRWS Operator Consoles integrated together;
- c. NRWS Mount: The above deck component that secures, aims, and fires the mounted weapon, and secures the electro-optical sensor suite;
- d. NRWS Operator Console: The component that provides the primary point for Operator monitoring and control of NRWS Mounts; and
- e. Operator: The individual member of ship's staff who is operating the NRWS.

- 1.2.2 The following acronyms shall apply to this TSOR:

Acronyms	
LRF	Laser Range Finder
LRU	Line Replaceable Unit
NRWS	Naval Remote Weapon Station
Phit	Probability of Hit
Pk	Probability of Kill
TIC	Thermal Imaging Camera
USV(T):	Hammerhead Uninhabited Surface Vessel (Target)

WMO	World Meteorological Organization
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1.3 Intended Application

- 1.3.1 The NRWS System will provide a short range, point defence, and limited area defence capability within the layered defence concept employed in Canada's twelve Halifax Class vessels and two Joint Support Ship Vessels when they are commissioned.
- 1.3.2 The NRWS System will be employed to engage small sea-surface and low-slow air threats while underway, alongside, moored, and at anchor, as well as engage land vehicles when alongside. Within this role, the NRWS System will provide surveillance, threat detection, tracking, warning shots, non-disabling fire, disabling fire, and threat battle damage assessment. Additionally, the NRWS will be used to conduct surface surveillance in support of Search and Rescue, and to acquire information regarding neutral and threat forces during domestic and international operations.
- 1.3.3 NRWS Systems will be supplied to Canada in order to be later fitted on the Joint Support Ship Class vessels. Canada is separately responsible for NRWS System installation on these vessels which will include procurement of cables.

1.4 System Overview

- 1.4.1 The NRWS System will enable Canada to singly mount the Fabrique National (FN) M2 0.50 Calibre Heavy Machine Gun (HMG) or the 7.62 millimetre C6 machine gun. The NRWS System will provide full remote operation of these weapons.
- 1.4.2 The design of the NRWS System will provide the automated weapon mounts and associated equipment in each vessel necessary to provide a 360 degree threat engagement, while significantly enhancing the lethality currently achievable with manually operated pintle mounted HMGs. The design will allow for optimum coverage, lethality (two mount coverage per threat), and ensure redundancy of the NRWS Mounts and NRWS Operator Consoles.
- 1.4.3 There will be one NRWS Operator Console per NRWS Mount. However, an Operator will be able to select any of the mounts from any Operator Console. The mounts will operate independently of each other, with the exception of hand over of target information for tracks leaving one mount coverage area and entering another mount coverage area.
- 1.4.4 The NRWS System will be designed to be capable of future integration into the ship's Combat Management System. The integration capability will include the ability to provide and receive data from the Combat Management System.

- 1.4.5 The NRWS System will support the use of the HMG in the zone between the maximum effective range of small arms teams and the minimum range of the Halifax Class vessel's main gun.
- 1.4.6 The NRWS System will consist of non-developmental military off-the-shelf hardware and software that is customized to meet the requirements of Canada.
- 1.4.7 The NRWS System will provide the required capabilities within all of the environments necessary to support world-wide Canadian naval operations.

2. APPLICABLE DOCUMENTS

- 2.1 The following documents listed are applicable to and shall form part of this TSOR:
 - a. MIL-STD-1472G, Department of Defense Design Criteria Standard, Human Engineering;
 - b. MIL-DTL-24643C, General Specification for Shipboard Use of Low Smoke Electric Cable and Cords;
 - c. C-03-010-000/MM-001, Technical Manual, Canadian Naval Shipboard Techniques for Electromagnetic Compatibility;
 - d. D-03-003-005/SF-000, General Electrical Specification for Canadian Forces Ships;
 - e. MIL-STD-1310H (Navy), Shipboard Bonding, Grounding, and Other Techniques For Electromagnetic Compatibility, Electromagnetic Pulse (EMP) Mitigation, and Safety;
 - f. MIL-STD-167-1A, Mechanical Vibrations of Shipboard Equipment (Type 1 – Environmentally and Type 2 – Internally Excited);
 - g. D-02-002-001/SG-001, Identification Marking of Canadian Military Property;
 - h. MIL-STD-461F, Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment;
 - i. STANAG 2895, MMS Edition 1, Extreme Climate Conditions and Derived Conditions for Use in Defining Design/Test Criteria for NATO Forces Material;
 - j. MIL-STD-108E, Definitions and Basic Requirements for Enclosures for Electric and Electronic Equipment;
 - k. D-03-003-007/SF-000, Specification for Design and Test Criteria for Shock Resistant Equipment in Naval Ships;

- l. C-03-007-181/ME-001, Cable and Cable Termination Data for Shipboard Installation;
 - m. MIL-STD-810F, Environmental Engineering Considerations and Laboratory Tests;
 - n. C-03-010-000/AG-001, EMSEC Control Plan and Procedures for Naval Vessels; and
 - o. STANAG 4569, Protection Levels for Occupants of Armoured Vehicles.
- 2.2 In the event of a conflict between this TSOR and an applicable document, this TSOR at the time of bid closing shall take precedence to the extent necessary to resolve such conflict.
- 2.3 The latest approved revision of the documents listed below shall apply unless otherwise specified.

3. PERFORMANCE REQUIREMENTS

3.1 Threats

- 3.1.1 The NRWS System shall defend against the threats listed in Table 1.

<u>Table 1 – Threats</u>				
<u>Threat Type</u>	<u>Threat Size</u>	<u>Threat Construction</u>	<u>Threat Speed</u>	<u>Threat Manoeuvres</u>
Boats	Length = 2 to 10 metres	Standard civilian Standard military	0 to 25 metres/second	Armed Evasive manoeuvres
Aircraft	L19 Birdog OH6A Cayuse	Light fixed wing Light rotary	0 to 64 metres/second	Suicide missions Not evasive
Land Vehicles	Up to 6350 kilograms	Standard civilian such as trucks, cars, motorcycles		IED Borne Suicide missions Limited evasive manoeuvres
Personnel				IED laden

- 3.1.2 The NRWS System shall perform, at a minimum:

- a. surveillance, day or night, of the threats listed in Table 1 at a range of 2,000 metres;
- b. acquisition, automatic tracking and manual tracking, day or night, of the threats listed in Table 1 at a range of 2,000 metres;
- c. identification, day or night, of the threats listed in Table 1 at a range of 1,800 metres;
- d. computing a fire control solution, day or night, on the threats listed in Table 1 at a range of 1,000 metres;
- e. engagement of the threat, day or night, at a range of 600 metres; and
- f. observation of the effectiveness of the engagement and to observe the fall of shot, day or night.

3.2 Surveillance

- 3.2.1 Each NRWS mount shall be provided with an Electro-Optical (EO) sensor suite that enables surveillance of the threats listed in Table 1 at a range of 2,000 metres.
- 3.2.2 The NRWS EO sensor suite shall enable the Operator to conduct threat battle damage assessment following an engagement on a 2 metre x 1 metre surface target at a range of 1,000 metres.
- 3.2.3 The NRWS EO sensor suite shall enable the Operator to conduct fall of shot observation at a range of 1,000 metres.
- 3.2.4 The NRWS EO sensor suite shall include a Thermal Imaging Camera (TIC).
 - 3.2.4.1 The NRWS TIC shall be located on the NRWS Mount.
 - 3.2.4.2 The NRWS TIC shall have a variable field of view.
 - 3.2.4.3 The NRWS TIC shall have a Wide Horizontal Field of View (FOV) of no less than 10 degrees.
 - 3.2.4.4 The NRWS TIC shall have a Narrow Horizontal FOV of no more than 4 degrees.
- 3.2.5 The NRWS EO sensor suite shall include a low-light camera.
 - 3.2.5.1 The NRWS low-light camera shall be located on NRWS Mount.
 - 3.2.5.2 The NRWS low-light camera shall have a variable optical zoom.
 - 3.2.5.3 The NRWS low-light camera optical zoom shall perform in the ranges of horizontal FOV of no more than 3 degrees to no less than 40 degrees.

- 3.2.5.4 The NRWS low-light camera shall have a colour mode.
- 3.2.5.5 The NRWS low-light camera shall have a black and white mode.
- 3.2.6 The NRWS EO sensor suite shall include a Class 1 laser range finder (LRF).
- 3.2.6.1 The NRWS LRF shall measure range of the threats listed in Table 1 at 2,000 metres.
- 3.2.6.2 The NRWS LRF shall measure range with an accuracy of +/-3 metres against the threats listed in Table 1 when the threats are in the range of 200 metres to 1,000 metres.

3.3 Acquisition and Tracking

- 3.3.1 The NRWS System shall be a real-time system such that the response to a selected function must be at such a rate that there is no delay discernible by the Operator.
- 3.3.2 The NRWS System shall have mount velocities and accelerations, in order to track the threats listed in Table 1 on closing, crossing, and manoeuvring courses at ranges of no more than 50 metres.
- 3.3.3 The NRWS System shall enable the Operator to select a threat for automatic tracking.
- 3.3.4 The NRWS System shall automatically acquire and track the threat that has been designated by the Operator in day conditions.
- 3.3.5 The NRWS System shall automatically acquire and track the threat that has been designated by the Operator in night conditions.
- 3.3.6 The NRWS System shall enable the Operator to manually acquire and track threats.
- 3.3.7 The NRWS System shall stabilize the aiming of the weapon when the Operator is manually tracking threats.
- 3.3.8 The NRWS System shall acquire and track the threats listed in Table 1 at all ranges from 50 metres or less to 1,000 metres.
- 3.3.9 The NRWS System shall acquire and track the targets listed in Table 2.

<u>Table 2 – Targets</u>			
<u>Type of Target</u>	<u>Example of Target</u>	<u>Size of Target</u>	<u>Range of Target</u>

Super structures of ships	Funnels and masts	2 square metre area	No less than 1,000 metres
Sub-structures of commercial vessels	Funnels, steering gear, doors, windows	2 square metre area	Up to and including 1,000 metres
Optically/Thermally discernible features	Doors, windows, hatches, exhaust plumes, markings (lettering/numbering/crests/stripes)	2 square metre area	No less than 1,000 metres

3.3.10 The NRWS System shall automatically re-acquire and track stationary threats, in the event that the threat has been obstructed for up to and including 5 seconds.

3.3.11 The NRWS System shall automatically re-acquire and track dynamic threats, in the event that the threat has been obstructed for up to and including 5 seconds.

3.4 Fire Control and Engagement

3.4.1 The NRWS System shall produce a fire control solution on the threats listed in Table 1 while the threats are stationary at all ranges from 200 metres or less to 1,000 metres.

3.4.2 The NRWS System shall produce a fire control solution on the threats listed in Table 1 while the threats are manoeuvring at all ranges from 200 metres or less to 1,000 metres.

3.4.3 The NRWS System shall produce a fire control solution on the targets listed in Table 2 while the targets are stationary at all ranges from 200 metres or less to 1,000 metres.

3.4.4 The NRWS System shall produce a fire control solution on the targets listed in Table 2 while the targets are manoeuvring at all ranges from 200 metres or less to 1,000 metres.

3.4.5 The NRWS System shall, when provided with a surface threat range and surface threat bearing anywhere within its weapon arc, produce a fire control solution within 16 seconds or less on threats listed in Table 1.

3.4.6 The NRWS System shall automatically adjust the position of the weapon in accordance with the fire control solution.

3.4.7 The NRWS System shall have an Operator input for a warning shot offset of the aim-point of the fire control solution.

3.4.8 The NRWS System warning shot offset shall be visually displayed on the NRWS Operator Console display.

- 3.4.9 The NRWS System warning shot offset shall be adjustable by the Operator.
- 3.4.10 The NRWS System shall remotely charge (cock) the installed weapon when designated by the Operator.
- 3.4.11 The NRWS System shall have remote selectable salvo sizes including 1 round, 3 rounds, and continuous firing.
- 3.4.12 The NRWS Operator Console shall enable the Operator to manually train and elevate the weapon without stabilization.
- 3.4.13 The NRWS Operator Console shall enable the Operator to manually train and elevate the weapon with stabilization.
- 3.4.14 The NRWS System shall remotely fire the weapon when designated by the Operator.
- 3.4.15 The NRWS System shall enable the Operator to override remote functions for full local operation of the gun.
- 3.4.16 The NRWS System shall conduct non-disabling and disabling fire against the targets in Table 2 up to a range of 1,000 metres when designated by the Operator.
- 3.4.17 The NRWS System shall engage the threats listed in Table 1 up to a range of 600 metres when designated by the Operator.
- 3.4.18 The NRWS System shall support direct line-of-sight gun firing.

3.5 Weapon Effectiveness

- 3.5.1 The NRWS System shall achieve a cumulative Probability of Kill (Pk) against a surface target of not less than 0.9 (90%) within 16 seconds or less of obtaining a fire control solution where:
 - a. the Pk given a hit is equal to 0.3 (30%);
 - b. the target presents a vulnerable area of 2 square metres;
 - c. the surface target is closing the NRWS Mount at a speed through the water of 25 metres per second while conducting a continuous narrow weave;
 - d. not more than 50 rounds are expended;
 - e. the engagement starts at 600 metres; and
 - f. the FN M2 0.50 Calibre HMG is mounted.
- 3.5.2 The NRWS System shall achieve a cumulative Pk against an air target of not less than 0.9 (90%) within 16 seconds or less of obtaining a fire control solution where:

- a. the Pk given a hit is equal to 0.3 (30%);
- b. the target presents a vulnerable area of 2 square metres;
- c. the airborne target is closing the NRWS Mount at an airspeed of 64 metres per second, without evasive manoeuvres;
- d. not more than 100 rounds are expended;
- e. the engagement starts at 600 metres; and
- f. the FN M2 0.50 Calibre HMG is mounted.

3.5.3 The NRWS System shall achieve a single shot Probability of Hit (Phit) of not less than 0.5 (50%) where:

- a. the target is a rectangle measuring 1 metre horizontally and 1.5 metres vertically;
- b. the target is perpendicular to the line of fire;
- c. the target is at a constant range of 450 to 550 metres;
- d. the salvo size is 1;
- e. the sample size is not less than 100 rounds;
- f. Phit is defined as the number of hits divided by the number of rounds fired;
- g. rounds fired for alignment/calibration are not scored or counted in the sample; and
- f. the FN M2 0.50 Calibre HMG is mounted.

3.5.4 The NRWS System shall achieve the cumulative Pk requirement by a successful kill where:

- a. the target is a Hammerhead Uninhabited Surface Vessel (Target) (USV (T)) or equivalent;
- b. the target is closing the NRWS Mount at its maximum speed through the water or 25 metres per second, whichever is less;
- c. the target is conducting a continuous narrow weave;
- d. not more than 50 rounds are expended;
- e. the engagement ceases not more than 16 seconds after firing is started or when the target closes to 200 metres of the NRWS Mount, whichever is earlier;
- f. a kill is scored if:

- (1) the USV (T) is rendered inoperable by hits on the fuel, propulsion or control systems;
- (2) the USV (T) is rendered incapable of manoeuvre due to hits on the hull or steering system;
- (3) the USV (T) burns; or
- (4) it can be demonstrated that 3 or more rounds penetrated the hull of the USV (T) forward of the engine and exited the hull or transom aft of the engine (crew/payload kill).

3.6 Power and Stabilization

- 3.6.1 The NRWS System shall be compliant with the electrical system requirements as specified in D-03-003-005/SF-000.
- 3.6.2 The NRWS System shall utilize existing ships power infrastructure to provide power for the NRWS System.
- 3.6.3 The NRWS System shall operate in full compliance with this TSOR for not less than 10 minutes without ships power.
- 3.6.4 The NRWS mount shall be capable of being aimed locally, by physically removing or overriding any drive system and manually firing the weapon.
- 3.6.5 The NRWS System stabilization shall compensate for ship roll, ship pitch and ship yaw in sea conditions up to and including Sea State 5 as defined in the World Meteorological Organization (WMO) code tables.
- 3.6.6 The NRWS System stabilization shall assist in achieving the probability of hit and kill requirements as described in this TSOR.

3.7 Weapon Aiming and Firing Limitation

- 3.7.1 Each NRWS mount shall incorporate two (2) firing veto switches.
 - 3.7.1.1 When activated, the NRWS firing veto switch shall interrupt the physical firing circuit and inhibit firing of the NRWS System mounted weapon.
 - 3.7.1.2 The NRWS firing veto switch shall be installed in close proximity to the existing Weapon Veto Panels on the bridge and in the OPS room.
 - 3.7.1.3 When the NRWS firing veto switch is activated, the NRWS System shall permit the Operator to remotely move the mount and utilize the NRWS EO sensor suite.
 - 3.7.1.4 When the NRWS firing veto switch is activated, the NRWS system shall permit the automatic tracking process.

- 3.7.2 Each NRWS mount shall incorporate a firing enable key.
 - 3.7.2.1 When inserted, the NRWS firing enable key shall enable all NRWS mount firing functions.
 - 3.7.2.2 The NRWS firing enable key shall be installed in close proximity to the NRWS Operator Console.
- 3.7.3 Each NRWS mount shall have a readily accessible manual override function located on the NRWS mount.
 - 3.7.3.1 When activated, the NRWS mount override function shall disable all functions controlled from the NRWS Operator Console.
 - 3.7.3.2 When activated, the NRWS mount override function shall have a two step disengagement process to prevent accidental disengagement of the manual override function.
- 3.7.4 The NRWS System shall have safety interlocks that will disable weapon laying and firing functions in the event that the NRWS mount has not been prepared in a manner necessary to conduct safe firing operations.
- 3.7.5 If the NRWS System has an embedded trainer, the NRWS System embedded trainer shall incorporate software and hardware inhibits to prevent operation of the NRWS mounted weapon.
- 3.7.6 The NRWS System shall have adjustable mechanical firing cut-outs to ensure the weapon cannot be elevated/depressed/trained into the ships contour.
- 3.7.7 The NRWS System shall have adjustable firing cut-outs in software to ensure the weapon cannot be fired within a distance of the ships silhouette (2.5 calibres (32 millimetres) from ship's hard obstructions and more for antennas).

3.8 Ammunition Handling

- 3.8.1 The NRWS mount ammunition box shall accommodate not less than 200 rounds of linked 12.7 millimetre ammunition when FN M2 0.50 Calibre HMG is mounted and not less than 400 rounds of linked 7.62 millimetre ammunition when C6 machine gun is mounted.
- 3.8.2 The NRWS mount shall divert all casings, rounds and links ejected from the weapon to not less than one container of equal or greater size than the ammunition box.
- 3.8.3 The NRWS mount ammunition box shall be located on the NRWS mount, without requiring access below deck.

3.9 Operator Console

- 3.9.1 The NRWS System shall incorporate one NRWS Operator Console for each fitted NRWS mount.
- 3.9.2 The NRWS Operator Console shall control the NRWS mount.
- 3.9.3 The NRWS Operator Console shall provide proportional control for laying the weapon in training and elevation.
- 3.9.4 The NRWS Operator Console shall provide positive and safe control for cocking, firing, and ceasing fire.
- 3.9.5 The NRWS Operator Console shall require two Operator actions to fire the NRWS mounted weapon.
- 3.9.6 The NRWS Operator Console shall incorporate a selector switch to allow operation of any available NRWS mount as designated by the Operator.
- 3.9.7 The NRWS Operator Console shall only control the NRWS mount that has been selected by the selector switch.
- 3.9.8 The NRWS Operator Console shall comply with MIL-STD-1472G section 5.10.3.2, section 5.10.3.4.4, section 5.10.3.7 and section 5.10.4.
- 3.9.9 The NRWS Operator Console shall incorporate an Operator chair.
- 3.9.9.1 The NRWS Operator chair shall comply with MIL-STD-1472G section 5.10.3.2.4.
- 3.9.9.2 The NRWS Operator chair shall accommodate both male and female Operators whose seated body dimensions span between the 5th percentile to the 95th percentile for seated body dimensions as described in the MIL-STD-1742G, Appendix B, Table B-IV.
- 3.9.9.3 The NRWS Operator chair shall provide acceptable comfort to the Operator sitting in the chair continuously for no less than 4 hours.
- 3.9.9.4 The NRWS Operator chair shall have a lap belt to secure the Operator for safe control of the NRWS under conditions up to and including Sea State 5 as defined in the WMO code Tables.
- 3.9.10 The NRWS Operator Console shall have an Operator display.
- 3.9.10.1 The NRWS Operator display shall have a display size of not less than 10 inches and resolution of not less than 1280 x 1024 pixels.
- 3.9.10.2 The NRWS Operator display shall display the fused image containing all imaging information from the NRWS EO sensor suite.
- 3.9.10.3 The NRWS Operator display shall display the fused image containing the range finding measurements.

- 3.9.10.4 The NRWS Operator display shall display the fused image containing all NRWS System operating modes.
- 3.9.10.5 The NRWS Operator display shall display the fused image containing all Operator selectable screen functions.
- 3.9.10.6 The NRWS Operator display shall display the fused image containing current training and elevation status of the NRWS mount, true and relative to the ships head.
- 3.9.10.7 The NRWS Operator display shall display the fused image containing a reticule graduated in degrees and milliradians.
- 3.9.10.8 The NRWS Operator display shall display the fused image containing a visual reference for the zone of engagement.
- 3.9.10.9 The NRWS Operator display shall display the fused image containing the remaining ammunition rounds present in the ammunition box.
- 3.9.10.10 The NRWS Operator display shall display the fused image containing the current NRWS System status and any fault messages associated with the NRWS System.
- 3.9.10.11 The NRWS Operator display shall display the fused image containing a safe to fire indicator.
- 3.9.10.12 The NRWS Operator display shall display the fused image containing a visual reference indicating the amount of time remaining for system operation once the NRWS System is functioning on backup power.
- 3.9.10.13 The NRWS Operator display shall be dimmable by the Operator from complete luminosity to complete shutdown of luminosity.
- 3.9.10.14 The NRWS Operator display shall provide an exact replication of what is being displayed on the Operator display to an output source for viewing from a remote monitor.
- 3.9.10.15 The NRWS Operator display shall be in accordance with MIL-STD-1472G section 5.2.3.
- 3.9.11 The NRWS System Operator Console shall incorporate Operator controls.
 - 3.9.11.1 The NRWS System Operator controls shall incorporate a means to switch each NRWS on and off.
 - 3.9.11.2 The NRWS System Operator controls shall incorporate all controls required to maintain safe control over the NRWS mount.
 - 3.9.11.3 The NRWS System Operator controls shall incorporate a means to wash the EO sensor suite optics.

- 3.9.11.4 The NRWS System Operator controls shall incorporate a means to de-ice EO sensor suite.
- 3.9.11.5 The NRWS System Operator controls shall incorporate all functions required to support surveillance and associated detection, recognition, and identification of threats.
- 3.9.11.6 The NRWS System Operator controls shall incorporate all functions required to designate threats for automatic tracking.
- 3.9.11.7 The NRWS System Operator controls shall incorporate all functions required for stabilization control for manual tracking of threats.
- 3.9.11.8 The NRWS System Operator controls shall incorporate all functions required for stabilization control for manual training and elevating the weapon.
- 3.9.11.9 The NRWS System Operator controls shall incorporate all functions required for selection of salvo sizes.
- 3.9.11.10 The NRWS System Operator controls shall incorporate all functions required to position the weapon in accordance with the fire control solution.
- 3.9.11.11 The NRWS System Operator controls shall incorporate all functions required for full operation of the weapon that is fitted to the mount.
- 3.9.11.12 The NRWS System Operator controls required to fire the NRWS mount in an immediate and urgent operational situation shall be immediately accessible at all times.
- 3.9.11.13 The NRWS System Operator controls shall incorporate all functions required for stabilization control for line-of-sight firing.
- 3.9.11.14 The NRWS System Operator controls shall incorporate all functions required for warning, non-disabling, and disabling fire.
- 3.9.11.15 The NRWS System Operator controls shall incorporate all functions required for monitoring fall-of-shot and threat battle damage.
- 3.9.11.16 The NRWS System Operator controls shall incorporate all functions required for selecting and implementing full range of control over any fitted NRWS mount from any given NRWS Operator Console.
- 3.9.11.17 The NRWS System Operator controls shall incorporate all functions required for selection of NRWS operating modes.
- 3.9.11.18 The NRWS System Operator controls shall incorporate on the screen only the Operator selectable settings for the mode the NRWS mount is functioning in.

- 3.9.11.19 The NRWS System Operator controls shall be co-located with the NRWS Operator display.
- 3.9.11.20 The NRWS System Operator controls shall be readable in all lighting conditions between direct sunlight and complete darkness.
- 3.9.11.21 The NRWS System Operator controls shall be readable under red lighting conditions.
- 3.9.11.22 The NRWS System Operator controls which emit light shall be dimmable by the Operator from complete luminosity to complete shutdown of luminosity.
- 3.9.11.23 The NRWS System Operator controls markings shall be white on a dark background.
- 3.9.11.24 The NRWS System Operator controls shall incorporate all user input devices supplied with the NRWS that are suitable for an Operator subject to a dynamic marine environment.
- 3.9.11.25 The NRWS System Operator controls shall respond to the Operator's input while the Operator is wearing full flash gear including gloves.
- 3.9.12 The NRWS System shall have an event recorder.
- 3.9.12.1 The NRWS System event recorder shall record NRWS System events for not less than 24 hours.
- 3.9.12.2 The NRWS System event recorder shall record NRWS System video for not less than 24 hours.
- 3.9.12.3 The NRWS System event recorder shall record every event with a date/time stamp.
- 3.9.12.4 The NRWS System event recorder shall record the events and video to common commercially available portable media when directed by the Operator.

3.10 Initialization and Built-In Test

- 3.10.1 The NRWS shall initialise from a shutdown state to full functionality in accordance with this TSOR in less than 5 minutes when designated by the Operator.
- 3.10.2 The NRWS shall automatically re-initialise from an abnormal shutdown to full functionality in accordance with this TSOR in less than 8 minutes.
- 3.10.3 The NRWS shall perform a controlled shut down when designated by the Operator.
- 3.10.4 The NRWS System shall gracefully degrade in the event of a critical failure.
- 3.10.5 The NRWS System Built-In Test (BIT) shall automatically detect faults.
- 3.10.6 The NRWS System BIT shall monitor for faults on the TIC.

- 3.10.7 The NRWS System BIT shall monitor for faults on the low light camera.
- 3.10.8 The NRWS System BIT shall monitor for faults on the LRF.
- 3.10.9 The NRWS System BIT shall monitor for faults on the training/elevation system.
- 3.10.10 The NRWS System BIT shall monitor for faults on the weapon control system.
- 3.10.11 The NRWS System BIT shall monitor for faults on the power availability.
- 3.10.12 The NRWS System BIT shall monitor for faults on the processing systems.
- 3.10.13 The NRWS System BIT shall monitor for faults on each Line Replaceable Unit (LRU).
- 3.10.14 The NRWS System BIT shall display corresponding fault alarms to the Operator indicating the nature of systems faults.
- 3.10.15 The NRWS System BIT shall enable the Operator to select an area of interest for the NRWS to perform manual BIT.

3.11 Embedded Trainer

- 3.11.1 If the NRWS System has an embedded trainer, when the NRWS System embedded trainer is active, the NRWS System shall display this mode on the NRWS Operator display.
- 3.11.2 If the NRWS System has an embedded trainer, when the NRWS System embedded trainer is active, the NRWS System shall simulate the firing of the mounted weapon.
- 3.11.3 If the NRWS System has an embedded trainer, the NRWS System embedded trainer shall simulate the firing of NRWS without ammunition being present on the mount.
- 3.11.4 If the NRWS System has an embedded trainer, the NRWS System embedded trainer shall simulate the firing of NRWS without a weapon being present on the mount.
- 3.11.5 If the NRWS System has an embedded trainer, the NRWS System embedded trainer shall include not less than 5 pre-programmed naval combat scenarios.
- 3.11.6 If the NRWS System has an embedded trainer, the NRWS System embedded trainer combat scenarios shall vary in level of complexity.
- 3.11.7 If the NRWS System has an embedded trainer, the NRWS System embedded trainer shall include a control to exit the embedded trainer in not more than two Operator actions.

4. PHYSICAL REQUIREMENTS

4.1 Equipment

- 4.1.1 All NRWS System components internal to the ship shall be capable of being installed in existing ship compartments.
- 4.1.2 The NRWS System shall provide a means to mount one of the FN M2 0.50 Calibre HMG or 7.62 millimetre C6 machine gun.
- 4.1.3 The NRWS System shall provide a means to mount the FN M2 0.50 Calibre HMG and 7.62 millimetre C6 machine gun without modification to the current configuration of these weapons held by Canada.
- 4.1.4 The NRWS System shall have a cover to protect functional components of the mounted weapon.
- 4.1.5 The NRWS System cover shall allow weapon firing at any time without cover removal.
- 4.1.6 The NRWS System shall have a means to align the EO sensor suite and the mounted weapon to a common reference point on the ship.
- 4.1.7 The NRWS System shall have a means to align the EO sensor suite and the mounted weapon to a common reference point at the maximum effective range of the NRWS System.
- 4.1.8 The NRWS EO sensor suite shall incorporate an Operator controlled mechanical wash system to clean any debris impeding functionality of the EO sensor suite optics.
- 4.1.9 The NRWS EO sensor suite shall incorporate an Operator controlled de-icing system to melt any ice accumulation impeding functionality of the EO sensor suite.
- 4.1.10 The NRWS EO sensor suite shall incorporate STANAG 4569 Level 1 ballistic protection.
- 4.1.11 The NRWS System above deck components shall be painted in accordance with MIL-T-704 using topcoat in accordance with MIL-C-22750 and primer in accordance with MIL-P-53022 unless otherwise specified.
- 4.1.12 The NRWS System above deck components exterior painted surfaces shall be painted grey in colour in accordance with FED-STD-595B colour chip 16055, using primer NSN 8010-21-905-8625.
- 4.1.13 The NRWS System above deck components interior painted surfaces shall be painted white in colour in accordance with FED-STD-595B colour chip 17925.
- 4.1.14 The NRWS System equipment handling shall be in accordance with MIL-STD-1472G sections 5.8.6 & 5.9.11.

- 4.1.15 The NRWS System shall not employ existing shipboard hardware to meet the requirements of this TSOR.
- 4.1.16 The NRWS System shall not significantly increase the radar cross section of the ship.

4.2 Equipment Configuration

- 4.2.1 The NRWS System shall have a continuous 360 degree arc of coverage around the ship.
- 4.2.2 Each NRWS mount arc of coverage shall overlap the arc of coverage of adjacent NRWS mounts when unobstructed by the ship's structure.
- 4.2.3 If design considerations preclude overlapping arcs of coverage directly ahead, the NRWS mounts shall be positioned to have a continuous arc of coverage from directly ahead to at least 45 degrees abaft of the beam.
- 4.2.4 If design considerations preclude overlapping arcs of coverage directly astern, the NRWS mounts shall be positioned to have a continuous arc of coverage from directly astern to at least 45 degrees forward of the beam.
- 4.2.5 The NRWS System shall engage the surface threats listed in Table 1 at a minimum range of no more than 50 metres, even when factoring in ship motion.
- 4.2.6 The NRWS System shall engage the air threats listed in Table 1 at a minimum range of no more than 100 metres with an altitude of 60 metres, regardless of ship motion.

4.3 Cables

- 4.3.1 All NRWS System cables shall have low smoke and halogen-free properties as specified in MIL-DTL-24643C.
- 4.3.2 All NRWS System cabling shall be terminated as specified in C-03-007-181/ME-001.
- 4.3.3 All NRWS System cabling shall be marked and labelled as specified in D-02-002-001/SG-001.
- 4.3.4 All NRWS System cabling shall be shielded as specified in C-03-010-000/MM-001, section 6, paragraphs 118-168.
- 4.3.5 All NRWS System cabling shall adhere to C-03-010-000/AG-001, EMSEC Control Plan and Procedures for Naval Vessels.
- 4.3.6 All NRWS System cabling shall adhere to MIL-STD-1310H (Navy), Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility, Electromagnetic Pulse (EMP) Mitigation, and Safety.

5. INTERFACE REQUIREMENTS

5.1 Mechanical Interface Requirements

- 5.1.1 The NRWS System equipment shall incorporate the Contractor supplied seats, retention devices, and fasteners in order to mount them to corresponding seats on ship's structure.
- 5.1.2 The NRWS System shall provide all required mechanical interfaces to existing shipboard systems such as cooling water, conditioned air, compressed air, and condensate drains that may be necessary for full operational capability.
- 5.1.3 The NRWS System shall provide all mechanical interfaces to existing shipboard systems that may be necessary for full operational capability without degrading the performance of any existing shipboard system.
- 5.1.4 The NRWS System shall provide all mechanical interfaces to existing shipboard systems that may be necessary for full operational capability without interfering with the use of these systems for their existing primary functions.

5.2 Electrical Interface Requirements

- 5.2.1 The NRWS System shall provide all required electrical interfaces to existing electrical shipboard systems that may be necessary for full operational capability.
- 5.2.2 The NRWS System shall provide all electrical interfaces to existing shipboard systems that may be necessary for full operational capability without degrading the performance of any existing shipboard system.
- 5.2.3 The NRWS System shall provide all electrical interfaces to existing shipboard systems that may be necessary for full operational capability without interfering with the use of these systems for their existing primary functions.

5.3 Signal Interface Requirements

- 5.3.1 The NRWS System shall provide all signal interfaces to existing shipboard systems that may be necessary for full operational capability without degrading the performance of any existing shipboard system.
- 5.3.2 The NRWS System shall provide all signal interfaces to existing shipboard systems that may be necessary for full operational capability without interfering with the use of these systems for their existing primary functions.
- 5.3.3 The NRWS System shall provide all signal interfaces to existing shipboard systems that may be necessary for full operational capability without jeopardizing existing certifications of these systems.

6. SPECIALTY ENGINEERING REQUIREMENTS

6.1 Health and Safety

- 6.1.1 The NRWS System shall out-gas in a manner that does not pose a health hazard to humans.
- 6.1.2 The NRWS System shall be flame resistant, non-combustible and fire retardant.
- 6.1.3 The NRWS System shall preclude electrical hazards in accordance with MIL-STD-1472G section 5.7.9.1 and D-03-003-005/SF-000 section 1.3.3.
- 6.1.4 The NRWS System shall preclude mechanical hazards in accordance with MIL-STD-1472G section 5.7 and D-03-003-005/SF-000 section 1.3.3.
- 6.1.5 The NRWS System shall generate noise levels that are in accordance with MIL-STD-1472G section 5.5.4.
- 6.1.6 The NRWS System shall be designed for maintenance as described in MIL-STD-1472F section 5.9 and D-03-003-005/SF-000 section 1.3.7, to ensure that all required preventative and corrective maintenance functions may be completed.
- 6.1.7 The NRWS System shall be grounded in accordance with the requirements of D-03-003-005/SF-000 part 4 and MIL-STD-1310H (Navy) section 3.20.

6.2 Availability

- 6.2.1 The NRWS System shall have no less than 98% availability, 24 hours a day, seven days a week, throughout a deployed period of no less than 90 days.
- 6.2.2 The NRWS System shall be available for not less than 250 days per calendar year.
- 6.2.3 Any NRWS System single point of failure shall permit the manual operation of the NRWS mounted weapon.

6.3 Survivability

- 6.3.1 The NRWS System shall withstand exposure to conditions up to and including Sea State 6 as defined in the WMO code tables.

6.4 Maintainability

- 6.4.1 The NRWS System preventive maintenance shall be less than 30 minutes in total in a 24 hour period.
- 6.4.2 The NRWS System mean time to repair shall be less than 1 hour for corrective maintenance repair functions.

- 6.4.3 The NRWS System mean time to repair shall be less than 1 hour for corrective maintenance repair functions which includes combined diagnostic and LRU replacement time but does not include time associated with provisioning the LRU.
- 6.4.4 The NRWS System shall enable an Operator to install the NRWS mountable weapons while standing on the deck beside the NRWS mount or on inboard platforms that are provided with the NRWS System.
- 6.4.5 The NRWS System shall enable an Operator to load the NRWS mounted weapon with ammunition while standing on the deck beside the NRWS mount or on inboard platforms that are provided with the NRWS System.
- 6.4.6 The NRWS System shall enable an Operator to empty the spent cartridges/casings/links container(s) while standing on the deck beside the NRWS mount or on inboard platforms that are provided with the NRWS System.
- 6.4.7 The NRWS System shall enable an Operator to clear ammunition jams while standing on the deck beside the NRWS mount or on inboard platforms that are provided with the NRWS System.
- 6.4.8 The NRWS System shall enable an Operator to change gun barrels while standing on the deck beside the NRWS mount or on inboard platforms that are provided with the NRWS System.

6.5 Software

- 6.5.1 The NRWS System shall use military off-the-shelf software which has been modified to meet the requirements in this TSOR.
- 6.5.2 The NRWS System software language shall be a standard software language.
- 6.5.3 The NRWS System software architecture shall be an open architecture format.

6.6 Nameplates and Product Marking

- 6.6.1 The NRWS System shall be marked and labelled in accordance with D-02-002-001/SG-001.
- 6.6.2 The NRWS System equipment weighing more than 15 kilograms shall be marked to identify its weight.
- 6.6.3 The NRWS System equipment that presents a hazard to personnel shall be labelled in accordance with the requirements of MIL-STD-1472G Section 5.7.2.1.

7. ENVIRONMENTAL REQUIREMENTS

7.1 Ship's Motion and Sea State

- 7.1.1 The NRWS System shall operate in accordance with this TSOR while the ship has a permanent list within the range of -20 to +20 degrees.
- 7.1.2 The NRWS System shall operate in accordance with this TSOR while the ship has a permanent trim of 5 degrees.
- 7.1.3 The NRWS System shall operate in accordance with this TSOR while the ship is rolling within the range of -40 to +40 degrees.
- 7.1.4 The NRWS System above deck equipment shall operate in accordance with this TSOR when immersed in a mean green water load of 42 kilopascals.
- 7.1.5 The NRWS System shall perform in accordance with this TSOR in conditions up to and including Sea State 5 as defined in the WMO code tables.

7.2 Mechanical Shock

- 7.2.1 The NRWS System equipment enclosures, mounts, and retention devices shall prevent equipment deflection that could be hazardous to personnel or other shipboard equipment under exposure to shock conditions specified in D-03-003-007/SF-000 Grade 1 Type A, Section 6.
- 7.2.2 The NRWS System equipment shall have restraints fitted that preclude equipment from becoming projectiles; remain fully intact, and in their normal operational positions, under exposure to shock conditions specified in D-03-003-007/SF-000 Grade 1 Type A, Section 6.
- 7.2.3 The NRWS System equipment shall operate in accordance with this TSOR following exposure to shock conditions specified in D-03-003-007/SF-000 Grade 1 Type A, Section 6.

7.3 Vibration

- 7.3.1 The NRWS System equipment enclosures, mounts, and retention devices shall remain fully intact, and in their normal operational positions, when excited by Type 1 environmental vibration levels up to and including 33Hz as specified in MIL-STD-167-1A.
- 7.3.2 The NRWS System equipment shall operate in accordance with this TSOR when excited by Type 1 environmental vibration levels up to and including 33Hz as specified in MIL-STD-167-1A.

7.4 Electromagnetic Effects

- 7.4.1 The NRWS System shall operate in accordance with this TSOR when subjected to the shipboard electromagnetic environments specified by MIL-STD-461F, Section 5, requirements CE101, CE102, RE101, and RE102.
- 7.4.2 The NRWS System shall not generate an electromagnetic environment that exceeds the standards described in MIL-STD-461F, Section 5, requirements CS101, CS114, CS116, RS101, and RS103.
- 7.4.3 The NRWS System shall not generate radiated electromagnetic interference emissions into other nearby systems as specified in C-03-010-000/MM-001, Part 4.

7.5 Temperature, Humidity, and Solar Radiation

- 7.5.1 The NRWS System equipment not exposed to the weather shall operate in accordance with this TSOR in temperatures ranging from 0 to 40 degrees Celsius.
- 7.5.2 The NRWS System equipment exposed to the weather shall operate in accordance with this TSOR in temperatures ranging from -32 to 40 degrees Celsius.
- 7.5.3 The NRWS System equipment shall withstand the storage and transit conditions specified for Categories M1, M2, and M3 of STANAG 2895.
- 7.5.4 The NRWS System equipment shall operate in accordance with this TSOR in 95% humidity condensing environment.
- 7.5.5 The NRWS System equipment exposed to the weather shall operate in accordance with this TSOR when exposed to the solar environment described in MIL-STD-810F, method 505 Procedure II.

7.6 Wind

- 7.6.1 The NRWS System equipment exposed to the weather shall operate in accordance with this TSOR under the sustained winds, plus gusts as described in STANAG 2895 Table 26.
- 7.6.2 The NRWS System equipment exposed to the weather shall not sustain damage when subjected to sustained winds of 50 metres/second.

7.7 Rainfall, Dust, and Spray

- 7.7.1 The NRWS System equipment exposed to the weather shall operate in accordance with this TSOR under rainfall conditions of 0.8 millimetres/minute.
- 7.7.2 The NRWS System equipment exposed to the weather shall operate in accordance with this TSOR under dust concentrations of 1gram per cubic metre.

7.7.3 The NRWS System equipment located in a sheltered environment shall operate in accordance with this TSOR when in a drip environment as identified in MIL-STD-810, method 506, Procedure III.

7.7.4 The NRWS System electrical equipment exposed to the weather shall be watertight, spraytight, and dust proof in accordance with MIL-STD-108E.

7.8 Ice

7.8.1 The NRWS System equipment exposed to the weather shall operate in accordance with this TSOR when subjected to conditions which produce icing loads of up to and including 20 kilograms per square metre.

7.8.2 The NRWS System equipment exposed to the weather shall not be damaged by an icing load of up to and including 37 kilograms per square metre except as otherwise specified in TSOR requirement 7.8.3.

7.8.3 The NRWS System equipment exposed to the weather shall not be damaged by an icing load of up to and including 180 kilograms per square metre if located in the forward one-third of the ship and below a line parallel to and 12.2 metres above the Halifax Class vessels design waterline.

7.9 Corrosion and Salt Fog

7.9.1 The NRWS System above deck components shall be constructed from galvanic compatible materials.

7.9.2 The NRWS System above deck components exposed to the weather shall be constructed from materials with surface treatments in order to preclude failure due to oxidation and corrosion.

7.9.3 The NRWS System above deck components exposed to the weather shall not corrode when subjected to the tests as described in ASTM G7, ASTM G31, ASTM G50, and ASTM G52.

7.9.4 The NRWS System shall be resistant to the effects of salt deposits on the physical aspects of materiel when subjected to the test described in method 509 of MIL-STD-810.

7.9.5 The NRWS System shall be resistant to the effects of salt deposits on the electrical aspects of materiel when subjected to the test described in method 509 of MIL-STD-810.

8. SUPPORTABILITY

8.1 The NRWS System shall have an operational life expectancy of not less than 15 years.

- 8.2 The NRWS System shall accommodate the facilitation of new technologies, including, but not limited to, the upgrade of individual sensors, without having to replace other components.
- 8.3 The NRWS System hardware architecture shall be an open architecture format.
- 8.4 The NRWS System design shall minimize maintenance procedures and durations.
- 8.5 The NRWS System design shall minimize upgrade costs.
- 8.6 The NRWS System design shall accommodate for the use of corporate security and network infrastructure software and hardware.

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ANNEX B

Appendix 4

Installation Guidance Package

Naval Remote Weapon Station System

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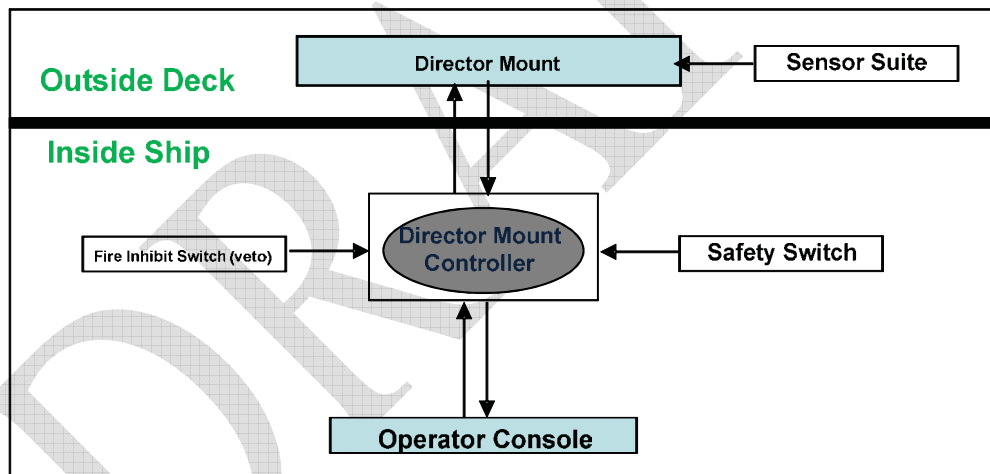
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1. NRWS SYSTEM ENGINEERING BACKGROUND

- 1.1 This Installation Guidance Package provides general guidance to Bidders to assist in determining the level of effort for hull and cabling work required to install the Naval Remote Weapon Station (NRWS) System on Halifax Class Ships.
- 1.2 Throughout the installation of the NRWS System, other ongoing concurrent work will be performed on the ship and in close proximity to the NRWS System installation.
- 1.3 The installation of the NRWS System components shall cease during brief work stoppages which may include ship radiating periods.
- 1.4 The installation of the NRWS System will consist of installing multiple remotely operated weapon director mounts, sensor suites, safety/veto switches, and operator consoles. A block diagram of the functionality of the NRWS is provided below:



2. NRWS SYSTEM INSTALLATION IMPACT ASSESSMENT

- 2.1 The NRWS System will impact the ship's power systems and hull penetrations. Equipment installations will also be required for the following areas of the Halifax Class Ships:
 - a) Chart Room
 - b) Radar Room No 2
 - c) Bridge Wings
 - d) Quarter Deck
 - e) Operations Room
 - f) Bridge

- 2.2 It is anticipated that the NRWS System will have the director mounts and the operator consoles networked together throughout the entire ship. Each director mount will have a dedicated operator console with a dedicated connection as well as redundant network connection. All director mounts will be networked to a central distribution hub for redundancy and to allow passing of mount information between different operator consoles. Each director mount will be connected to a nearby controller and distribution of the connection to the rest of the ship will occur from this controller.

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3. DESCRIPTION OF HULL WORK REQUIRED

3.1 Purpose

3.1.1 This Hull section of the installation package identifies the locations for installation of the Director Mounts and Operator consoles that will have an impact on the Hull of the Halifax Class Ships.

3.2 Equipment/Material Removals (Canada)

3.2.1 All work in section 3.2 is to be performed by Canada.

3.2.2 Chart Room Equipment/Material Removals

3.2.2.1 As shown in the Figures 1 & 2 below, the MET Table along with the MET Table Chair shall be stripped out and surveyed to stores. All foundations and/or fasteners associated with this equipment are also to be removed.

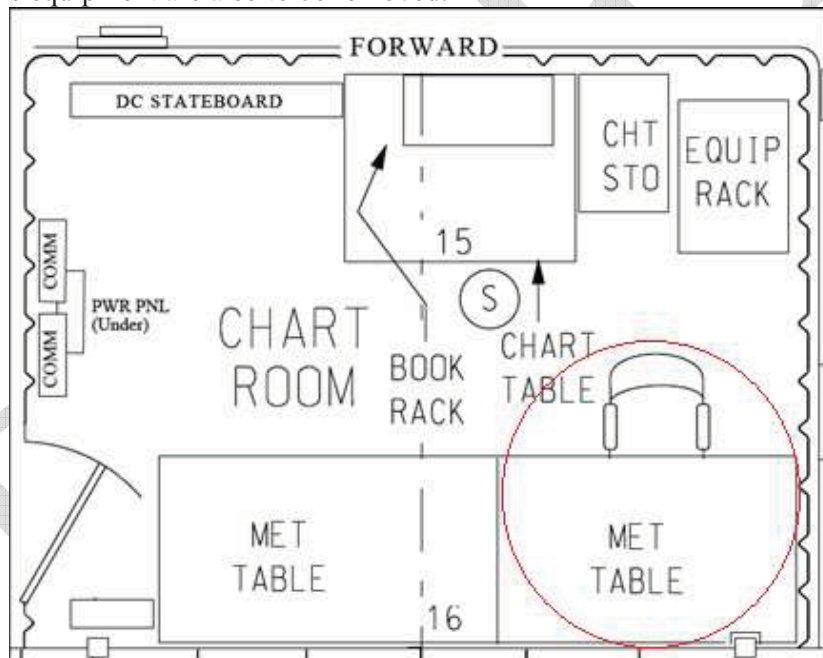


Figure 1: Original Configuration of Chart Room

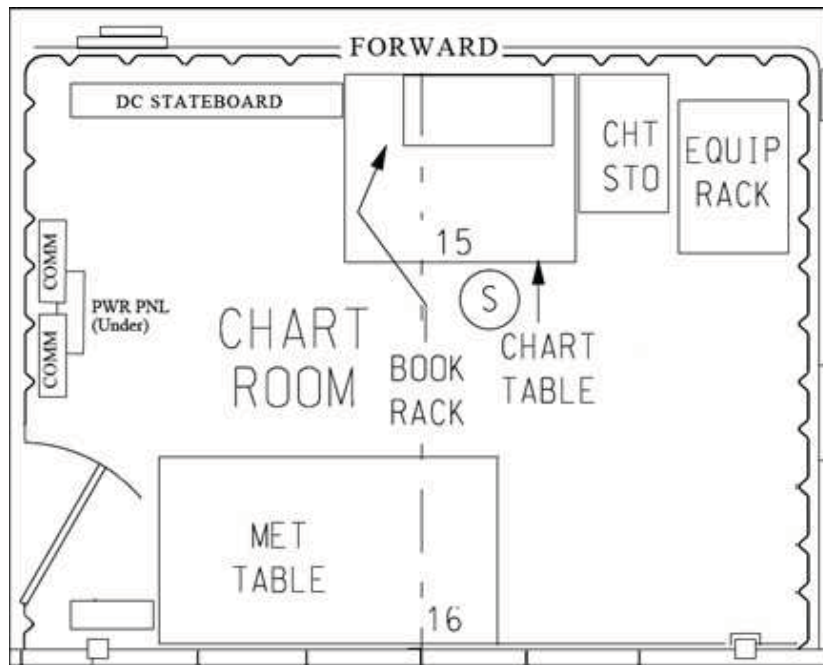


Figure 2: Chart Room with MET Table/Chair Stripped Out

3.2.3 Radar Room Equipment/Material Removals

3.2.3.1 N/A

3.3 Installations (Bidder)

3.3.1 All work in section 3.3 will be performed by the Bidder.

3.3.2 General Installation Procedures

3.3.2.1 All deck penetrations required for the routing of cabling between the director mount and the operator consoles will be the responsibility of the Bidder.

3.3.3 Chart Room Installation Information

- 3.3.3.1 Two (2) NRWS Operator Consoles with operator chairs shall be installed in the stripped out location of the MET Table as indicated in Figure 3. The spacing available for the two mounts with the operator chairs are outlined in red in Figure 3.

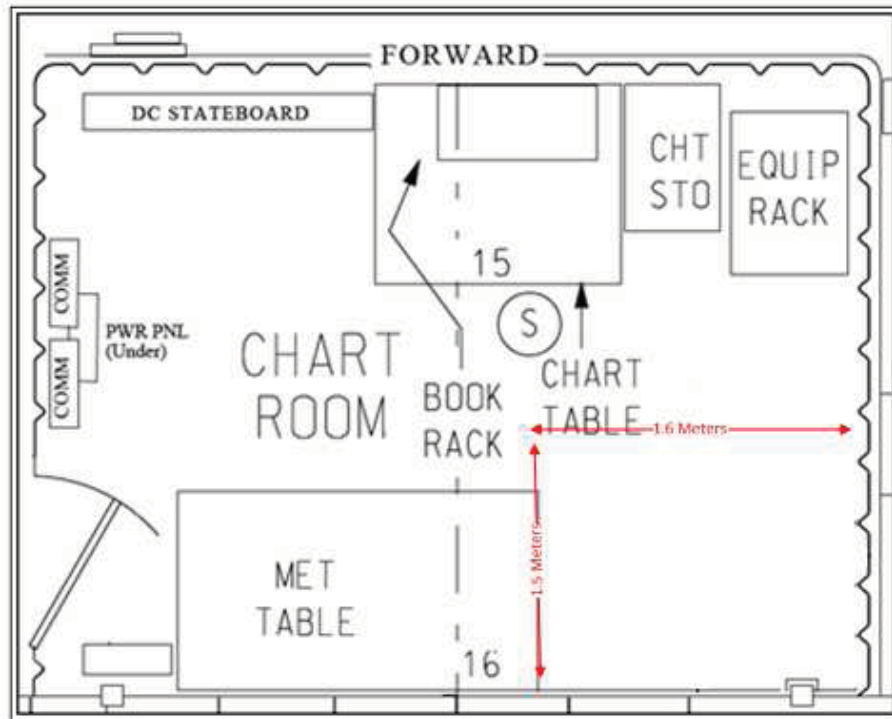


Figure 3: Chart Room Installation Location for Operator Consoles

- 3.3.4 Radar Room No 2 Installation Information

- 3.3.4.1 Two (2) NRWS Operator Consoles with operator chairs shall be installed in the designated open location of Radar Room No 2 as indicated in Figure 4. The spacing available for the two NRWS Operator Consoles with the operator chairs are outlined in Figure 4.

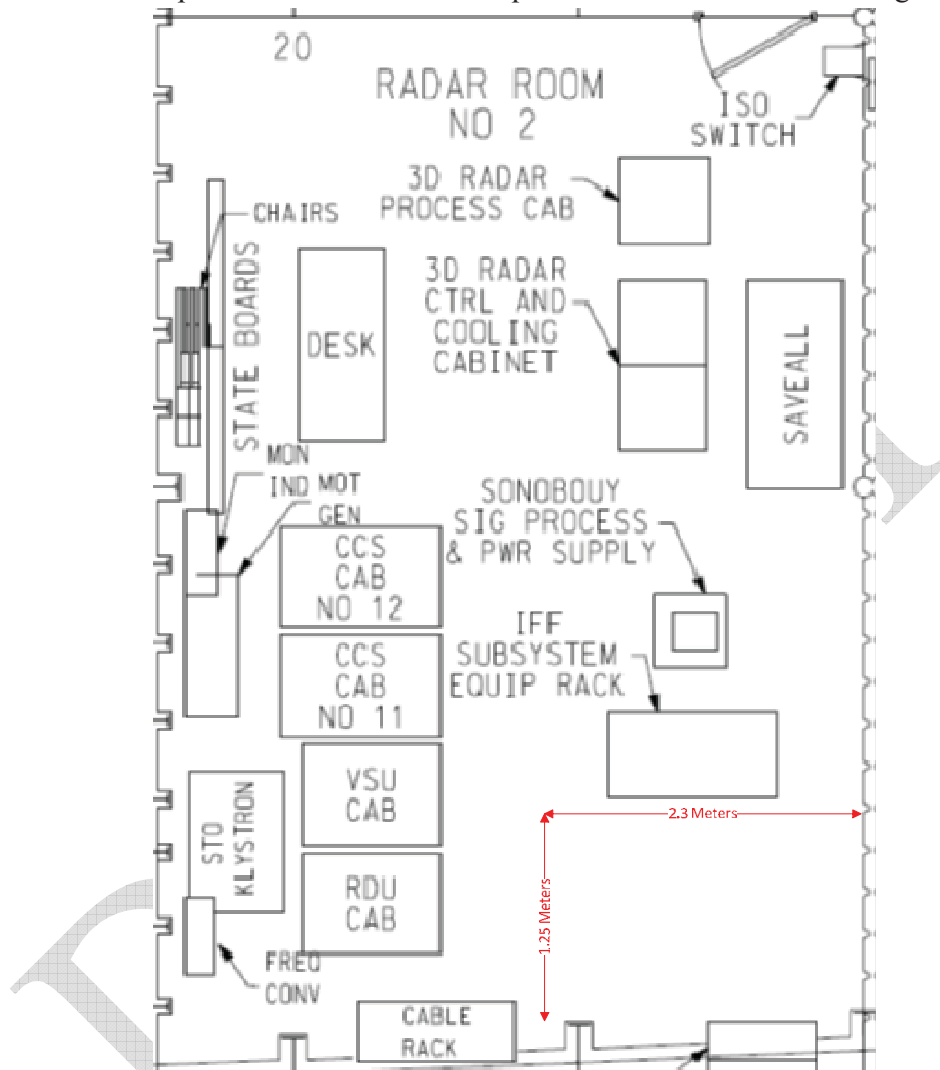


Figure 4: Radar Room No 2 Installation Location for Operator Consoles

3.3.5 Operator Consoles

- 3.3.5.1 Two (2) Operator Consoles shall be installed in the Chart Room within the specified limits defined in Figure 3.
- 3.3.5.2 Two (2) Operator Consoles shall be installed in the Radar Room No 2 within the specified limits defined in Figure 4.

3.3.6 Operator Chairs

3.3.6.1 An operator chair shall be installed for each NRWS Operator Console within the Chart Room with the specified limits defined in Figure 3.

3.3.6.2 An operator chair shall be installed for each NRWS Operator Console within Radar Room No 2 with the specified space limits defined in Figure 4.

3.3.7 Shipboard Internal Communication System (SHINCOM) (Canada's Responsibility)

3.3.7.1 One SHINCOM system shall be installed next to each NRWS Operator Console.

3.3.8 Bridge Wing Director Mount Installation Information

3.3.8.1 The director mounts shall be installed in close proximity to the location of the Big Eye Binoculars with radius of the mount (not including the weapon) not to exceed the footprint outlined in Figure 5. Installations of the NRWS mounts shall occur at both port and starboard locations of the Bridge Wings of the ship.

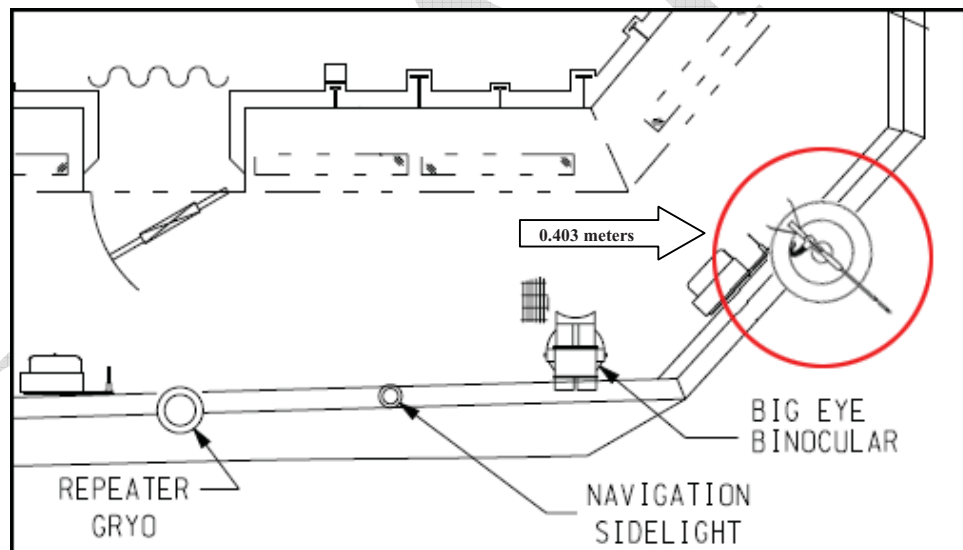


Figure 5: Bridge Wing Installation Location for Director Mounts

3.3.9 Quarterdeck Director Mount Installation Information

3.3.9.1 The director mounts on the Quarterdeck shall be installed at the current locations of the .50 CAL pintle mounts with the given radius not to exceed the footprint outlined in Figure 6. Installations of the director mounts shall occur at both port and starboard locations of the Quarterdeck of the ship.



3.3.10.1 An NRWS firing veto switch for each NRWS Director Mount shall be installed in close proximity to the Weapon Veto Panel found within the Operations Room. The location of the Weapon Veto Panel is displayed in red in Figure 7.

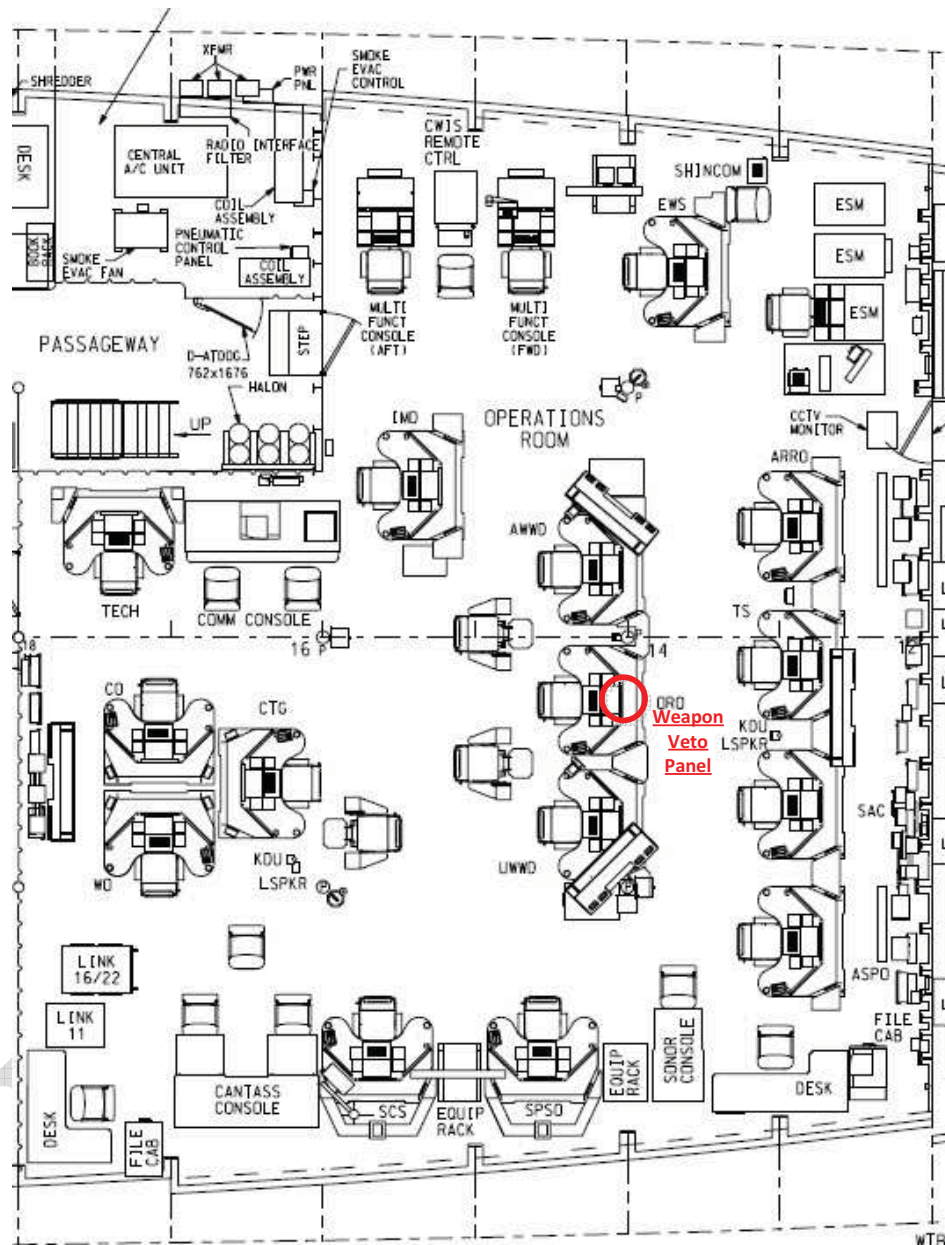


Figure 7: Operations Room Weapon Veto Panel Location

3.3.11 Bridge NRWS Firing Veto Switch

3.3.11.1 An NRWS firing veto switch for each NRWS Director Mount shall be installed in close proximity to the Weapon Veto Panel found within the Bridge. The location of the Weapon Veto Panel is displayed in red in Figure 8.

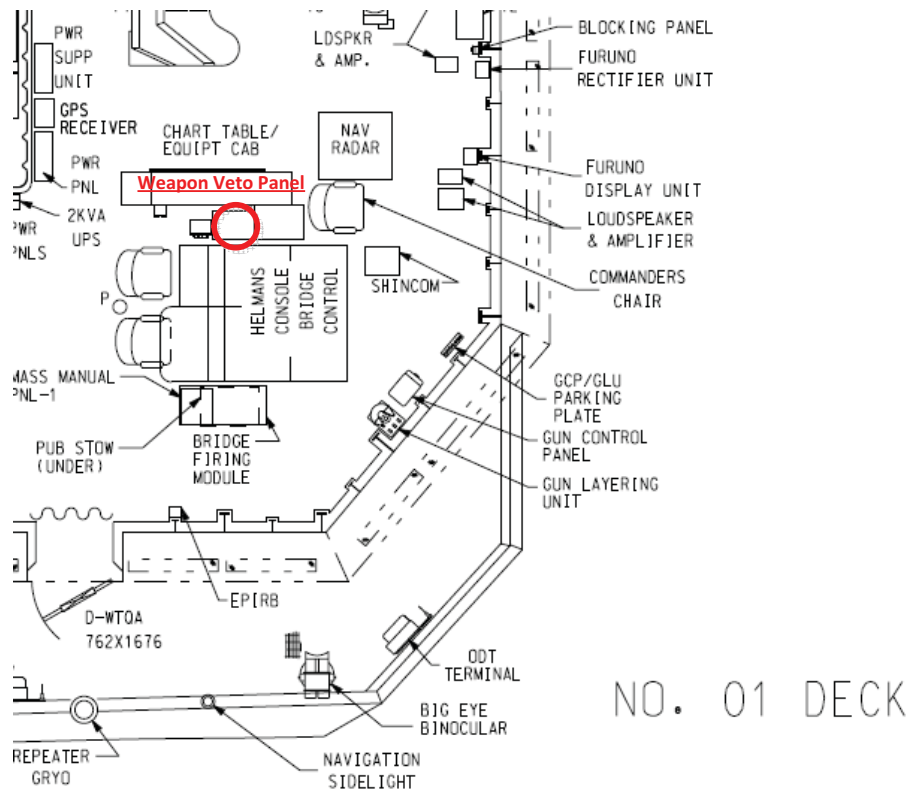


Figure 8: Bridge Weapon Veto Panel Location

4. DESCRIPTION OF CABLE INSTALLATION WORK REQUIRED

4.1 Relevant Documents

- 4.1.1 MIL-STD-1310 Rev H (Navy): Shipboard Bonding, Grounding, and Other Techniques For Electromagnetic Compatibility, Electromagnetic Pulse (EMP) Mitigation, and Safety;
- 4.1.2 C-03-007-181/ME-001 : Cable and Cable Termination Data for Shipboard Installation

4.2 Purpose

- 4.2.1 These instructions specify the proposed cabling requirements necessary to install the NRWS System on the Halifax Class Ships. The proposed NRWS System cable routing is outlined in Figure 9 below:

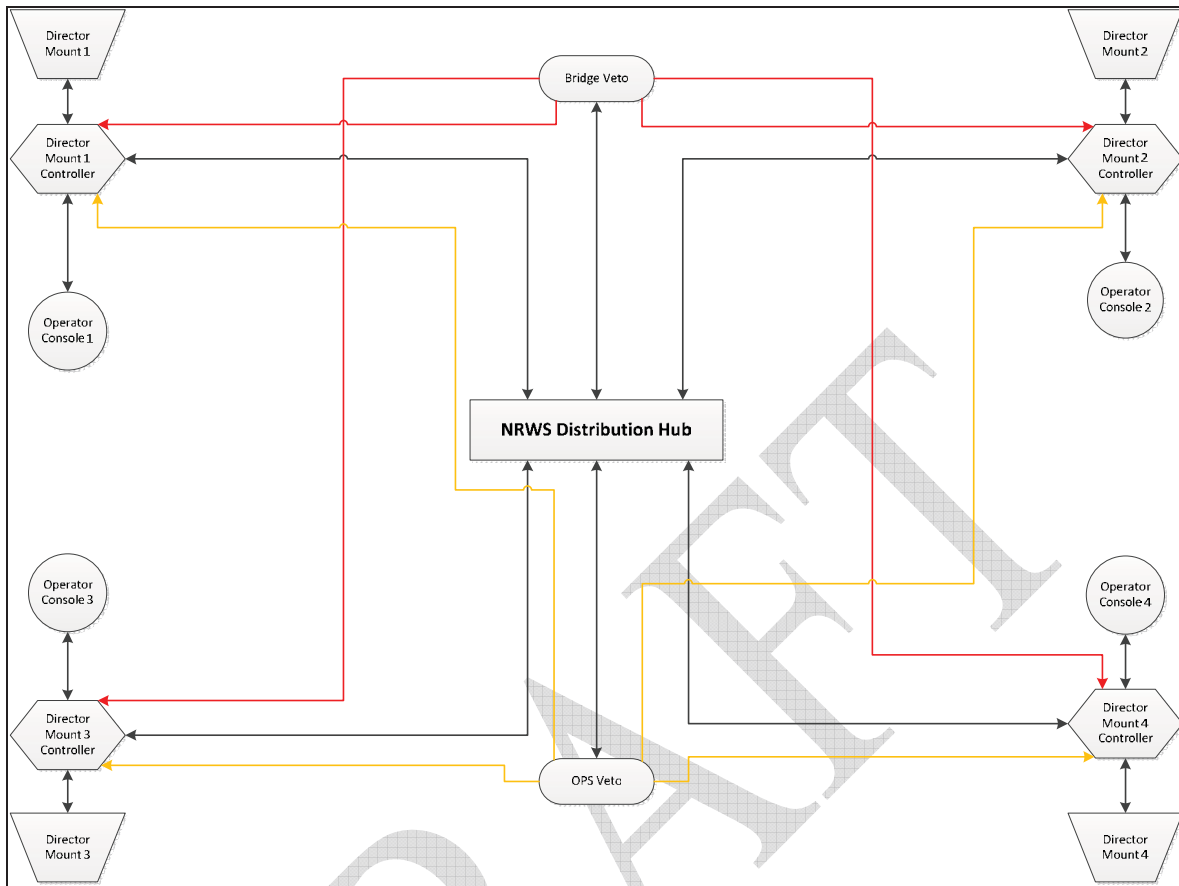


Figure 9: Proposed NRWS System Cable Routing

4.3 Installations

4.3.1 Cabling Installation

4.3.1.1 The estimated cable lengths for the NRWS components may be used to estimate the level of effort required for the installation of the cables for the NRWS System. Table 1 outlines components and component locations of all cabling connections required.

Cable Type	Estimated Cable Length (meters)	From		To	
		Component	Component Location	Component	Component Location
	TBD by Bidder	Director Mount 1 Controller	Port Side Bridge Wing	Director Mount 1	Port Side Bridge Wing
	TBD by Bidder	Director Mount 1 Controller	Port Side Bridge Wing	Power Unit	Port Side Bridge Wing
	30	Director Mount 1 Controller	Port Side Bridge Wing	Distribution Hub	Radar Room No 2

	15	Director Mount 1 Controller	Port Side Bridge Wing	Operator Console	Chart Room
	14	Director Mount 1 Controller	Port Side Bridge Wing	Bridge Veto Switch	Bridge
	15	Director Mount 1 Controller	Port Side Bridge Wing	Ops Veto Switch	Operations Room
	TBD by Bidder	Director Mount 2 Controller	Starboard Side Bridge Wing	Director Mount 2	Starboard Side Bridge Wing
	TBD by Bidder	Director Mount 2 Controller	Starboard Side Bridge Wing	Power Unit	Port Side Bridge Wing
	30	Director Mount 2 Controller	Starboard Side Bridge Wing	Distribution Hub	Radar Room No 2
	20	Director Mount 2 Controller	Starboard Side Bridge Wing	Operator Console	Chart Room
	10	Director Mount 2 Controller	Starboard Side Bridge Wing	Bridge Veto Switch	Bridge
	14	Director Mount 2 Controller	Starboard Side Bridge Wing	Ops Veto Switch	Operations Room
	TBD by Bidder	Director Mount 3 Controller	Port Side Quarter Deck	Director Mount 3	Port Side Quarter Deck
	TBD by Bidder	Director Mount 3 Controller	Port Side Quarter Deck	Power Unit	Port Side Bridge Wing
	103	Director Mount 3 Controller	Port Side Quarter Deck	Distribution Hub	Radar Room No 2
	103	Director Mount 3 Controller	Port Side Quarter Deck	Operator Console	Chart Room
	112	Director Mount 3 Controller	Port Side Quarter Deck	Bridge Veto Switch	Bridge
	104	Director Mount 3 Controller	Port Side Quarter Deck	Ops Veto Switch	Operations Room
	TBD by Bidder	Director Mount 4 Controller	Starboard Side Quarter Deck	Director Mount 4	Starboard Side Quarter Deck
	TBD by Bidder	Director Mount 4 Controller	Starboard Side Quarter Deck	Power Unit	Port Side Bridge Wing
	92	Director Mount 4 Controller	Starboard Side Quarter Deck	Distribution Hub	Radar Room No 2
	92	Director Mount 4 Controller	Starboard Side Quarter Deck	Operator Console	Chart Room
	109	Director Mount 4 Controller	Starboard Side Quarter Deck	Bridge Veto Switch	Bridge
	102	Director Mount 4 Controller	Starboard Side Quarter Deck	Ops Veto Switch	Operations Room

	23	Distribution Hub	Radar Room No 2	Bridge Veto Switch	Bridge
	18	Distribution Hub	Radar Room No 2	Ops Veto Switch	Operations Room

4.3.2 Power Cable Installations

4.3.2.1 Power cabling shall be supplied and installed at each Director Mount from the nearest power panel.

4.3.2.2 Power cabling shall be supplied and installed at each Operator Console from the nearest power panel.

4.3.3 Cable Routing

4.3.3.1 Where possible, all cabling shall be installed on existing wireways, in accordance with the specifications listed in 4.1.1.

4.3.3.2 All indicated cable lengths are estimated. Actual lengths should be measured at ship prior to cutting.

4.3.4 Cabling Requirements

4.3.4.1 Cable terminations shall be in accordance with the specification listed in 4.1.2.

4.3.4.2 Bonding and grounding of electrical equipment and cabling shall be in accordance with the specification listed in 4.1.1.

4.4 Special Instructions

4.4.1 Protection and Cleaning

4.4.1.1 Before beginning and during the performance of any work, equipment adjacent to the work area shall be suitably protected from damage and ingress of foreign material.

4.4.1.2 Upon completion of the installation procedure and prior to the performance of inspections, all debris, foreign materials and protective coverings shall be removed from the work area and the work area cleaned.

4.4.2 Personnel and Equipment Safety Precautions

4.4.2.1 Work areas shall be certified safe for hot-work prior to the performance of any burning or welding activity.

- 4.4.2.2 When burning or welding at the boundary of an adjacent compartment, a Firewatch is to be maintained in the adjacent compartment.

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