

# CCGS Harp

## Stbd. Shaft & Bearing Repair

August 17, 2020 – August 21, 2020



## VESSEL CHARACTERISTICS

### SHIP PARTICULARS:

Gross Registered Tonnage	179.2 Tonnes
Net Registered Tonnage	69.2 Tonnes
Displacement at design waterline	225 Tonnes
Length Overall	24.5 meters (80.4 Feet)
Length Between Perpendiculars	21.5 meters (70.5 Feet)
Breadth Molded	7.5 meters (24.6 Feet)
Depth molded at midships	3.4 meters (11.2 Feet)
Draft at design waterline	2.4 meters (7.9 Feet)
Frame spacing	0.5 meters (1.64 Feet)

### 1) FACILITIES

Quotation shall include all of the necessary labor and equipment required for the erection of access staging, rigging, lighting, tugs, pilotage, necessary cranae and line handling. Ice clearing services if so required for ship movements shall form part of the bid price.

### 2) MATERIALS AND SUBSTITUTIONS

All material shall be supplied by the contractor and all materials shall be new and unused unless otherwise specified. All replacement material in the form of jointing, packing, insulation, small hardware, oils, lubricants, cleaning solvents, preservatives, paints, coatings, etc., shall be in accordance with the equipment manufacturer's drawings, manuals or instructions. Where no particular item is specified, or where substitution must be made, the Owner's representative must approve all material offered.

### 3) REMOVALS

Any items of equipment to be removed and subsequently reinstalled in order to carry out work specified or for access to carry out the work specified, shall be jointly inspected for damages prior to removal by both the contractor and Owner's representative.

### 4) EXPOSURE AND PROTECTION OF EQUIPMENT

The contractor shall provide adequate temporary protection for any equipment or areas affected by this refit. The contractor shall take proper precautions to maintain in a proper state of preservation any machinery, equipment, fittings, stores or items of outfit which

might become damaged by exposure, movement of materials, sand grit or shot blasting, airborne particles from sand, grit or shot blasting, welding grinding, burning, gouging, painting or airborne particles of paint. Any damage shall be the responsibility of the contractor. Government furnished equipment and materials shall be received by the contractor and stored in a secure warehouse or storeroom having a controlled environment appropriate to the equipment as per the manufacturer's instructions.

#### **5) LIGHTING AND VENTILATION**

Temporary lighting and/or temporary ventilation required by the contractor to carry out any item of this specification shall be supplied, installed and maintained in a safe working condition by the contractor and removed upon the completion of work.

#### **6) CLEANLINESS**

The contractor shall at all times, maintain the work areas in which his personnel have access in a clean condition and free from debris. Upon completion of this refit, the contractor shall ensure that the vessel is in a clean condition, free from all foreign material in any system or location placed there as a result of this refit. The contractor shall provide adequate temporary protection for any equipment or areas affected by this refit. The contractor shall dispose of any and all oil and water residue, which accumulates in the machinery space bilges as a result of any refit work detailed in this specification.

#### **7) ASBESTOS**

Any and all insulation materials shall be asbestos free and approved for the required application.

#### **8) ENTRY INTO ENCLOSED SPACES**

The contractor shall abide by the Coast Guard Enclosed Space Entry Policy. The policy is listed in the attached Safety Annex as section 7.D.9 and section &.D.9 (N). Entry certificates shall clearly state the type of work permitted and shall renewed as required by the regulations. Additional copies of these certificates shall be posted in conspicuous locations for the information of ship and contractor personnel.

#### **9) HOTWORK**

Any item of work involving the use of heat in its execution requires that the contractor advise the owner's representative prior to starting such heating and upon its completion. The contractor shall be responsible for maintaining a competent and properly equipped fire watch during and for one full hour after all hotwork. The fire watch shall be arranged such that all sides of surfaces being worked on are visible and accessible. The contractor shall provide sufficient suitable fire extinguishers and a fire watch during any such

heating and until the work has cooled. Ship's extinguishers shall not be used except in an emergency. The Contractor shall abide by the Coast Guard Hotwork Policy. The policy is listed in the attached Safety Annex as section 7.D.11 and section 7.D.11 (N). The contractor shall be responsible to ensure the contractor's personnel including any subcontractors shall follow the policy.

## **10) PAINTING**

All new and disturbed steelwork that will not be on the underwater wetted surface of the ship's hull shall be protected with one coat of marine primer.

## **11) WELDING**

Welding shall be in accordance with the Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4.

The Contractor shall be currently certified by the Canadian Welding Bureau (CWB) in accordance with CWB 47.1 latest revision Division I, II or III at the time of bid closing. The Contractor shall provide a current letter of validation from the CWB indicating compliance with standard CSA W47.1, Division I, II or III. (latest revision)

The Contractor may be required to provide approved procedure data sheets for each type of joint and welding position that will be involved in this construction.

The Contractor may be required to supply a current Welders Ticket for each individual welder that will be involved in this construction.

## **12) SMOKING**

The Public Service Smoking Policy forbids smoking in all Government ships in areas inside the ship where shipyard personnel will be working. The contractor shall inform shipyard workers of this policy and ensure that it is complied with.

## **13) RESTRICTED AREAS**

The following areas are out of bounds to shipyard personnel except to perform work as required by the specifications: all cabins, offices, Wheelhouse, Control Room, Engineer's office, public washrooms, cafeteria, dining room and lounge areas.

## **14) ELECTRICAL STANDARDS**

Any electrical installations or renewals shall be in accordance with the latest editions of the following marine standards:

- (a) TP 127E-TC Marine Safety Electrical Standards.
- (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

If any cable installed within this contract is found to be damaged, shorted or opened as a result of the manner of installation, the entire length of cable shall be replaced and

installed at no cost to the Department. Plastic tie-wraps may be used to secure wiring in panels or junction boxes only.

## **15) DRAWINGS**

All drawings and drawing revisions that the contractor is requested to do in the execution of this contract shall be of a quality equal to that of the drawings that are requested to be updated. For example, drawings that have been lettered and dimensioned in a professional manner shall not be updated using freehand. Prints and reproducibles that a contractor is required to provide shall be made on one piece of paper.

## **20) OWNER'S REPRESENTATIVE**

Throughout this document, there is made reference to the Owner's Representative. For the purpose of this document, the Owner's representative is defined as the Chief Engineer of the Vessel.

## **21 SAFETY ANNEX**

The Contractor shall follow the Coast Guard Policies as outlined in the attached Safety Annex. This Annex contains excerpts from the Fisheries and Oceans Canada, Canadian Coast Guard Fleet Safety Manual (DFO 5737) and deals with contractor responsibilities for items such as Hot Work, Confined Space Entry, Diving, Diving Operations and Dry-docking.

An electronic copy of the Fleet Safety Manual (Adobe Acrobat .PDF version) can be found at

[http://142.130.14.20/fleet-flotte/Safety/main\\_e.htm](http://142.130.14.20/fleet-flotte/Safety/main_e.htm)

## **22) SEA TRIALS**

Prior to the completion of the refit, the vessel shall proceed on a one-hour dock trial and a four-hour sea trail with the Contractor's Representative on board. Results of the sea trail shall be documented by the Chief Engineer. Any noted deficiencies during the trial will be addressed.

- **Note to Contractors regarding the possibility of Lead in paint:**

"CCG ships have been painted with lead based paints in the past and as a result some of the Contractor's processes such as welding, burning, grinding, gouging, power tooling, chipping and other work could generate airborne lead hazards. The Contractor is to test the affected work areas for lead content prior to disturbing any paint by engaging a qualified Environmental Consultant to collect samples and have these samples tested by a competent lab . Results of the lead testing shall be provided to the CCG Project Officer as soon as they are available. If lead based coatings are found, measures are to be taken to abate

and contain the lead dust hazard in accordance with applicable regulations. As a minimum, the following precautions are to be taken:

If lead based paint is present, prior to proceeding with work that would disturb any lead based paint, the Contractor is to engage a service provider specializing in lead abatement to remove the paint in the area where steelwork is planned in accordance with applicable Provincial and Federal regulations. As a minimum the Contractor is to:

- perform a risk assessment to identify work site safety hazards and to mitigate associated risks.
- partially or fully contain the areas where lead abatement is taking place, as appropriate to the situation, to reduce the possibility of lead dust being dispersed throughout the ship. Forced air ventilation systems are to be turned off and shipboard vents sealed. Provide full enclosures with HEPA-filtered mechanical ventilation, kept under negative pressure. Check for damage (eg, rips) in the enclosure daily, and repair immediately.
- shut off electricity and lockout electrical systems in the affected areas if water is used in the abatement.
- post warning signs and mark off work area.
- restrict access to essential personnel only.
- prohibit eating and smoking in the work area.
- provide all necessary PPE to workers in way of the affected area and ensure that they use it properly.
- remove coatings using an approved method that minimizes airborne particulates. The Contractor is to use techniques that do not spread lead dust or fumes, such as chemical stripping, laser ablation, induction stripping, vacuum-shrouded hand tools or vacuum blasting. It is noted that alternate methods can have different associated hazards that need to be managed. For example, chemical stripping agents also contain potentially harmful substances and must be used with care. Mechanical removal through sanding or grinding produces more lead dust.
- clean up to prevent dust from spreading at least once each day. Put waste into secure containers or sealed impermeable plastic bags, Bags and containers shall be labelled as lead-containing waste and disposed of following federal, provincial, and local regulations.. Use HEPA vacuum cleaners in the clean-up.

- after completing work, wait at least 1 day to let any dust settle and then do a final clean-up. Wet wipe all surfaces and put the plastic used to contain the area in a sealed plastic bag for disposal.
- provide a means for Contractor employees and CCG personnel to remove protective clothing and footwear whenever they leave the work area.
- provide decontamination measures for Contractor employees and CCG personnel, including a means to wash their hands, face, tools and personal protective equipment once the work is done and before they enter a clean area, eat, drink, and/or use tobacco products. Shower facilities shall also be provided, if deemed necessary.

Measures to be taken by the Contractor to minimize risk of exposure by its employees are to be communicated to the CCG Project Officer so that CCG can take appropriate measures to continue its work. Any impact on schedule is to be communicated to the CCG Project Officer as soon as possible.

There are several methods for removal of lead containing coating including:

- Manual scraping or sanding using non-powered hand tools – practical for small areas only
- Power tools with dust collection systems and HEPA filters
- Chemical gel or paste removal
- Laser ablation
- Induction ablation
- High pressure water jet
- Abrasive blasting
- Dry ice blasting

Notes:

- Heat gun paint removal would be practical for small areas only but is not recommended given a risk of lead vapor with the potential increase of risk to workers.
- Methods of blasting of painted surfaces of more than a limited amount are acceptable, however need to be considered on a vessel by vessel basis in a shipyard setting and are beyond regular CCG shipboard personnel capabilities if small amounts of lead-based paint removal is to be undertaken by CCG employees in house.

## **COVID-19 Screening**

- 1.1. During Shipyard care and custody of the vessel the Contractor is responsible for screening all people entering the CCGS Harp, including CG personnel to the standard described in NSOP 511 Minimum Screening Process for Canadian Coast Guard Personnel Accessing a Contractors Facility During an Infectious Disease Outbreak such as COVID-19. This standard will be included under Services in the Dry-Docking reference package.
  
- 1.2. During Coast Guard care and custody of the vessel, the Shipyard/Contractor must comply with screening requirements described in CCGC-13-2020 COVID-19 – Health Screening Questionnaire for Canadian Coast Guard Personnel and Visitors Accessing Canadian Coast Guard Facilities and Vessels. This standard will be included under Services in the Dry-Docking reference package.

## **HD-1 SERVICES**

### **Scope:**

The contractor shall provide the following services to the vessel, while in dry-dock and afloat during the complete dry-docking period and disconnected on termination of dry-dockport. The Contractor shall supply all material to the point of onboard connection:

### **Technical Description:**

- 1) The Contractor shall supply Shore Power of 575 VAC, 3 PHASE, 100 amp. The Contractor shall supply shore power cable complete with fittings. The Contractor shall quote on supplying 500 KWH and unit cost per kilowatt hour. The 500 KWH will be adjusted up or down at the conclusion of refit. Meter Readings shall be witnessed by the Owner's representative and the Contractor prior to connection and upon disconnection of the service.
- 2) Water connection to ship's fire main: 60 PSI, 1.5" diameter with water pressure being maintained at all times. Contractor to quote for the supply of 1 cubic meters of water as well as a rate for additional cubes if required. Total to be adjusted by 1379 action.
- 3) Potable water connection: 45 PSI, 1.0: diameter to be connected to ship's domestic water system. Contractor to quote for the supply of 2 cubic meters of water as well as a rate for additional cubes if required. Total to be adjusted by 1379 action.
- 4) Labor and services shall be supplied for the rigging of two separate boarding gangways, contractor supplied, complete with safety net and two handrails. Gangway shall be rigged to the satisfaction of the Commanding Officer.
- 5) One 3.0" diameter black water sewage discharge line and two 1.0" diameter grey water discharges are to be connected to the ship's overboard discharges. These connections are to be in place for the duration of the dry-docking period. Contractor to quote for the removal of 2 cubic meters of black water as well as a rate for additional cubes if required. Total to be adjusted by 1379 action.
- 6) A Contractor supplied garbage container shall be placed on the ground close to the vessel. Refuse shall be removed daily from the vessel. The garbage container shall be emptied when 75 % full.
- 7) The interior decks of the vessel are to be covered for protection using "Deck Protection Flooring Mask" or equivalent. This covering is to be installed at the beginning of repair and maintained in good condition throughout the entire repair, The protective floor covering shall be removed at the end of the repair.

## **HD-2 DRY-DOCKING**

**Scope:** The Contractor shall provide all equipment and services necessary to dock and undock the vessel.

**Technical Description:**

- 1) The vessel shall be docked and undocked under the supervision of a Certified Docking Master.
- 2) The contractor shall quote on docking/undocking the vessel in five days and provide a unit cost for additional days. The Quote is to include any tug or pilot service required.
- 3) The contractor shall be responsible for the handling of all ship's lines.

## **E-1 REMOVE STBD. RUDDER, RUDDER STOCK & ALIGNMENT OF SKEG**

1. The STBD rudder stock bearing clearances are to be measured for'd and aft and athwartships, before disassembly. It will be necessary to remove the stock jumping collars.
2. Stbd rudder pintle clearances are to be measured for'd and aft and athwartships, before disassembly.
3. Hydraulic Ram, tiller & tie bar between tiller arms to be removed and secured to prevent damage.
4. The rudder stock is to be supported in steering gear compartment using chainfalls and an eye-both fitted to the rudder stock.
5. Stbd rudder to be disconnected and lowered to the dock bottom. This is accomplished by removing the bolts from the top flange between the rudder & rudder stock. (Note:) These bolts and tack welded. All welding has to be removed before removing bolts.
6. The lower pintle housing is to be removed. (Note) The pintle is bolted to the Skeg and these bolts are tack welded. The lower pintle is also tack welded to the Skeg. All welds will have to be removed before removing lower pintle.
7. The rudder stock to be lowered to the dock after the rudder has been removed. Extreme caution is to be used when lowering and raising the rudder stock as to not damage the seal.
8. Both rudder and rudder stock to be checked for alignment and straightness.
9. The skeg is to be straightened and the alignment checked between the top bearing and the pintle bearing before replacing the rudder. Rudder stock bearing & seal to be inspected. Pintle bearing to be tack welded in place.

10. Upon completion of all work the Stbd. Rudder is to be reinstalled in good working order using new bolts. All fasteners to be suitably locked. (tack welded)  
A full set of clearances are to be taken on the rudder stock bearing and the pintle.  
Jumping collars are to be re-installed using new bolts and all fasteners suitably locked (tack welded).
11. A full set of clearances are to be taken on the **Stbd.** rudder stock bearing and the pintle to verify the alignment of the stbd. rudder.
12. Steering gear and rudder are to be operated fully in both directions to verify correct operation prior to un-docking.
13. All work to be carried out to the satisfaction of the Coast Guard representative (Chief Engineer), PWGSC & ABS Surveyor.

## **E-2 STBD. STERN TUBE THORDON BEARING REPLACEMENT**

### **Part: 1 SCOPE:**

- 1.1 The intent of this specification shall be contractor to remove stbd propeller, propeller shaft and remove propeller hub from shaft and install new owner supplied stern tube Thordon bearings.
- 1.2 n/a

### **Part: 2 REFERENCES:**

#### **2.1 Guidance Drawings/Nameplate Data**

2.1.1 N/A.

#### **2.2 Standards**

2.2.1 N/A.

#### **2.3 Regulations**

2.3.1 N/A

#### **2.4 Owner Furnished Equipment**

2.4.1 The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

### **Part: 3 TECHNICAL DESCRIPTION**

#### **3.1 General**

- 3.1.1 Contractor shall inform Chief Engineer prior to starting work.
- 3.1.2 Contractor shall confirm with Chief Engineer that all affected systems are isolated locked out and tagged prior to starting work.
- 3.1.3 Contractor shall inform and arrange ABS Surveyor for inspection of this work.
- 3.1.4 Contractors shall include in cost the services of providing services of Pacific Star FSR to provide off site consultation and guidance pertaining to the shaft, bearings, propeller hub and propeller, their removal, disassembly, measurement, reassembly and testing. This may include pics, reports and phone calls. The FSR is located in BC, therefore work to be scheduled to allow for time difference. The contractor shall include an allowance of \$20,000.00 for the provision of the to be determined FSR.

The actual amount will be adjusted up or down using PWGSC 1379 action upon proof of invoices.

- 3.1.5** Contractor shall remove the stbd rope guard to measure and record the amount of Tail Shaft Bearing wear down for the stbd shaft prior to shaft disassembly. A Type written copy of measurements to be provided to Chief Engineer and vessel maintenance manager prior to removal of the propeller shaft.
- 3.1.6** Contractor shall remove the stbd rudder to facilitate removal of the propeller shaft assemble and reinstall rudders after work is completed. Rudderstock shall be supported in Steering gear compartment when rudder is removed by chain fall to ensure complete weight not on seal and reinstall when work is completed.
- 3.1.7** Contractor is to remove the stbd propeller shaft to gearbox coupling and disconnect the pitch actuator rod, blades and all other items in order for propeller shaft removal. Measurements shall be taken prior to disconnection.
- 3.1.8** Contractor shall remove the stbd propeller aft cap, propeller hub, blades, and complete tail shaft assembly.
- 3.1.9** When the shaft are removed, contractor shall include in quote that the stern tube shall be high pressure cleaned to have the rust and debris removed from the stern tube.
- 3.1.10** Contractor shall give Chief Engineer a copy of the stbd shaft bearings measurements when the measurements are taken.
- 3.1.11** Contractor shall include in quote the cost to remove the existing shaft Thordon bearing on the stbd side and install new owner supplied propeller shaft Thordon bearings as per attached drawing as per Thordon FSR.
- 3.1.12** Contractor shall include all cost for the machining of the new bearings
- 3.1.13** Contractor shall transport the stbd propeller shaft to machine shop to inspect propeller hub and shaft by FSR. Contractor shall include all transportation and crane charges in quote for propeller shaft to and from Machine shop. Contractor shall include in quote machine shop to rotate the propeller shaft in the lathe to check for trueness.
- 3.1.14** Propeller seals will be contractor supplied. The FSR shall install all components of the propeller and tail shaft using contractor supplied seals.
- 3.1.15** Contractor shall remove the inside bulkhead mounted sealing flange for the Stbd shaft and check the flange for damage and reinstall the flange using a new manufactures approved contractor supplied gasket.
- 3.1.16** Contractor shall include in cost an allowance of \$5000.00 the services of Wartsilla FSR to install new contractor supplied shaft bulk head seals for the stbd shaft. Contractor shall arrange Wartsilla FSR in advance.
- 3.1.17** The contractor shall hook up a pressurized water hose to the inside connection of the stern tube from inside the ship to confirm a sufficient water flow at the outside end of the stern tube from the stbd stern tube and witnessed by Chief Engineer and ABS Surveyor.

- 3.1.18** Contractor shall test steering in conjunction with Bridge, steering gear compartment and looking at rudders for correct operation prior to ship undocked.
- 3.1.19** When propeller shaft is installed prior to coupling up Contractor under remote assistance of FSR and alignment specialist shall take and record measurements to confirm shaft are aligned with gearbox coupling are as per manufactures specifications.
- 3.1.20** When the vessel has been refloated and settled in the water shaft alignment measurements shall be taken by the Contractor and submitted to FSR to determine if shaft alignment procedure is required.
- 3.1.21** If shaft alignment is required, the engine and gearbox are coupled using a flexible coupling, therefore they cannot be aligned to the propeller shaft as a unit. The engine and gearbox must be separated, the old chock-fast broken away, the bed plates are to be cleaned and prepared for new chock-fast.
- 3.1.22** If alignment is required the gearbox chock-fast shall be removed for the alignment of the propeller shaft to the gear box. The chock-fast installation shall be as per manufactures instructions and the alignment checked, if alignment is within manufactures specifications, the same procedure shall be carried out for the engine alignment to the gearbox. Alignment to be performed by Thai Pham from Pennecon. An allowance of 2500 is to e included in bid and will be adjust up or down by 1379 action based on invoice.
- 3.1.23** All work shall be in accordance with the manufacturer's recommendations and to the satisfaction of ABS Surveyor and the Chief Engineer.
- 3.1.24** Contractor shall include in quote an allowance of \$2500.00 for Services of Madsen FSR to set up pitch on stbd side. Madsen FSR shall be on board for the one hour dock trial and 4 hour sea trial.
- 3.1.25** Contractor shall include in cost to carry out one hour dock trial and four hour sea trial.

## **3.2 Location**

### **3.2.1**

## **3.3 Interferences**

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

**Part: 4 PROOF OF PERFORMANCE:**

**4.1 Inspection**

**4.1.1** ABS Surveyor shall carry out inspections as required to acquire credit regarding Division 3 report.

**4.1.2** n/a.

**4.2 Testing**

**4.2.1** 1 hour dock trial and 4 hour sea trial is to be carried out.

**4.2.2** Steering test confirmed via bridge/ steering compartment and outside at rudders to confirm correct operation prior to ship undocking.

**4.2.3** Confirm water flow test is carried out on stern tubes prior to undocking.

**4.3 Certification**

**4.3.1** N/A

**Part: 5 DELIVERABLES:**

**5.1 Drawings/Reports**

**5.1.1** Contractor shall supply Chief Engineer with type written copies and one electronic copy of what work was carried out when the work is complete.

**5.2 Spares**

**5.2.1** N/A

**5.3 Training**

**5.3.1** N/A

**5.4 Manuals**

**5.4.1** N/A