Marine Services International (2008) Ltd.

CCGS Ann Harvey
Port Side Fresh Water Tank Repairs
Specification

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Revision 1

Section 1

1.1 Introduction

This document provides specification information covering the permanent repairs/renewals of steel structures in way of the port side fresh water tank between frames 30 - 41. Damage to the tank consists of bowed plating and buckled/deflected stiffeners on the tank boundary bulkheads. The necessary repairs shall include the cropping and renewal of the applicable sections of bulkhead stiffeners and plating.

MSI did attend on site to inspect the tank when damage first occurred. It must be noted that stiffening members on the aft tank bulkhead and the bottom bulkhead could not be inspected as they were covered with insulation and paneling. However, the same approach for repairs shall be applied to these areas since there was apparent bowing to areas of plating on these bulkheads as well.

The following areas are intended to be repaired/renewed:

- Renewal of stiffening members on affected tank top, tank bottom, fwd and aft tank bulkheads.
- Renewal of plating on above noted tank top/bottom, fwd/aft tank bulkheads where the level of plate deformation is deemed to be to excessive to be adequately set back into place.
- Renewal of welds in areas where cracking is evident in way of stiffeners to plate and plate to plate weld seams.

The above noted repairs will be in addition to the repairs that were completed for the tank in October 2013 which included the renewal of a section of the tank top/deck plate where a small hole was evident and also the renewal of a section of the tank top/main deck transverse deep beam in which the previous beam incurred buckling damage.

1.2 Supplied Drawings and Information

Attached for use is the following MSI drawing covering this repair;

- 2518-01-00 CCGS Ann Harvey Repairs to Port Side Fresh Water Tank

The contractor is also encouraged to obtain the complete copies of the original profile and decks structural drawing(s) as well as the section drawing(s) for the applicable area.

1.3 Owners Requirements

The vessel owners will not supply any materials or labour. All materials and labour will be contractor supplied. It is the owner's intention that the successful contractor will be responsible to complete all aspects of this repair. The owner will provide the contractor with vessel access 24 hours per day for the purpose of completing the repair.

1.4 Contractor's Responsibility

It is the contractor's responsibility to follow all applicable federal, provincial and local regulations. The contractor is to adhere to all DFO-Coast Guard / PWGS work requirements and must complete the work to the satisfaction of both the Chief Engineer and the attending TCMS Surveyor.

The contractor is also responsible to provide all materials, labour, lighting, ventilation, staging and lifting capacity to complete the required tasks. The contractor is also responsible for all temporary enclosures to facilitate the work, and finally, all clean up and disposal of debris generated due to the work.

Section 2

2.1 Materials

All materials are the contractor's responsibility. The contractor is to use new and clean Lloyds Grade "A" or equivalent (44W) plate and stiffening members.

All stiffeners and any possible plate sections are to be clean and primed with a weldable primer prior to welding. Material certificates for the steel to be provided. Any substitution of stiffeners or plating is to be made by written request and must be accepted by owner prior to fabrication.

2.2 Welding

Only CWB approved welders are to complete the welding. All welds shall be completed as per approved CWB weld procedures. Documentation to show welder qualifications and weld procedures will be supplied to the owner. The contractor's welding inspector will complete a visual inspection of all welds prior to arranging an inspection with TCMS or class.

The welding details are to be as the current installation. All plate seams are to be full penetration. All stiffeners to plate connection are to be double continuous fillet. All welding on exterior structures are to be double continuous.

All inserts are to have corners with a minimum radius of 4". No parallel plate seams shall be closer than 12" apart.

The contractor shall remove weld splatter and smooth weld seams and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP 1. All welds shall be power tool cleaned to SSPC-SP 3 and primer applied by hand brush.

2.3 Coatings and Paint Work

The contractor will be responsible to prepare and coat both the new and the heat affected steel in the repair area. The heat affected paint is to be hand tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings. All coatings are to be in accordance with the ships painting system. The contractor is to complete the coating and all associated machine tooling to feather back the affected areas. All coatings must be supplied with acceptable WHIMS data sheets and correctly marked. The contractor is responsible to

remove all containers of paint and solvents from the work place daily. Upon completion of repairs to the tank, the contractor shall be responsible to supply a suitable tank coating as per the vessels coatings schedule.

2.4 Inspection, Testing

The work is to be completed to the satisfaction of the attending TCMS inspector and owner's representative. The completed steel work is to be visually inspected after welding is completed. All full penetration welds are to receive 100% UT by approved testing personnel. This testing is to be carried out in the presence of the attending TCMS surveyor and owner's representative. Upon completion of repairs, the tank shall be pressure tested to 3 PSI and held to duration satisfactory to the attending TCMS surveyor. During the pressure test, all welding in way of the repairs will be tested with a dye penetrate. All costs associated with the inspection to be included in the contractor's price for known steel work.

The contractor is responsible for all air quality testing to ensure hot work and entry is permitted. The contractor shall issue and post hot work permits and shall maintain a fire watch.

2.5 Documentation

Three copies of the following documentation are to be supplied upon completion of work scope:

- Material Certificates for Plate & Sections
- CWB Certificates for Welders
- CWB Certificates for Weld Supervisor
- CWB Weld Procedures
- CWB Weld Data Sheets
- NDT Documentation

2.6 Protection of Area from Damage and Disruption

The contractor is responsible to protect the vessel's engine room from physical damage and contamination due to the removal of linings/insulation, various fittings on the exterior surface of tank to allow for access to affected areas and the smoke generated from tank renewals. This protection will include the provision of suitable extraction fans. Also, the contractor must cover the floors, deck heads, bulkheads and outfit as required to limit additional damages.

Section 3

3.1 Removals and Relocation

The contractor is to include for all required permanent and temporary removals to complete the steel renewals in way of the fresh water tank. All permanent removals are to be disposed of by the contractor unless otherwise specified.

The shipbuilder will be responsible for the removal of the following items:

- All paneling and insulation in way of the tank aft and forward bulkheads. All paneling and insulation in way of the tank bottom. All flooring and fittings in the crew cabins located on the tank top/deck that are in way of the tank renewals.

- All electrical components (wiring, junctions, lights and panels) located on the aft and forward tank bulkheads as well as tank bottom that will interfere with renewals are to be removed and stored for reinstallation.
- All piping and valves in way of the areas to be repaired/renewed areas.
- The fire supression system in the engine room just ahead of the forward tank bulkhead must be disconnected and any/all bottles in vicinity of bulkhead must be temporally relocated until hot work is completed.

The contractor will ultimately be responsible for the removal of any unidentified interference items to permit steel removals and installation.

Upon completion of steel renewal work, all temporarily removed items are to be reinstated in good order to the satisfaction of the Chief Engineer.

3.2 Hot Working on Existing Ship's Structure

Hot work will be completed by the shipbuilder in a number of areas of existing ships structure. The shipbuilder is to ensure that all combustibles are removed from these areas and that the areas are suitable for hot work.

Upon completion of steel work within the port fresh water tank, the tank shall be thoroughly cleaned to ensure all debris caused by welding has been removed and all coatings reapplied to the new and heat affected steel as per the vessels current tank coating system.

Section 4 – Steel Renewals

4.1 Scope of Work

The fresh water tank is located on the port side above the main engine compartment from frames 30 – 41. Access to the tank can be obtained through a manhole located outboard on the after tank bulkhead.

The extent of steel work will revolve around the renewal of buckled or bent tank stiffeners and tripped brackets in way of the affected tank surfaces. Other than the small section of tank top plate that was renewed in October 2013, it is the intention to only renew any additional tank bulkheads, tank bottom and tank top plating that is deemed to be deflected beyond a reasonable level that cannot be properly restored to a state prior to damage occurring. Also due to the type of damage which has occurred, all plate seam welds and stiffener welds will require 100% MPI testing when all applicable stiffeners have been renewed.

The primary areas of tank where damage is evident include the aft tank bulkhead on frame 30, the tank bottom at 4850 A.B., tank top(i.e. main deck plate) at 7900 A.B. and the forward tank bulkhead on frame 41. Deflection in plating and buckled or bent stiffeners where visible is evident on these surfaces. It must be noted that during the initial survey no visible signs of deflection in plating or deformation of stiffeners was evident on either the inboard longitudinal tank bulkhead at 2100 off center or the outboard longitudinal bulkhead. It is also noted that stiffeners on the aft tank bulkhead and the tank bottom could not be inspected as these members are located on the exterior surface of tank and are at the present time covered in insulation and paneling. However it is assumed that these stiffeners have incurred similar damage as those on the remaining damaged tank surfaces indicated. See supplied drawing for details on steel renewal work.

The supplied drawing indicates the following areas that will require steel renewal work:

Aft Tank Bulkhead on Frame 30;

- There are a total of four(4) 6" x 3 1/2" X 5/16" bulkhead stiffeners(Note: These stiffeners have not yet been inspected as they are covered with insulation and paneling). Include replacement of all stiffeners. However upon inspection, replace damaged stiffeners only that are buckled or bent.
- All brackets at tank bottom and tank top that are tripped.

Forward Tank Bulkhead on Frame 41;

- There are a total of five(5) 6" x 3 1/2" X 5/16" bulkhead stiffeners. Include replacement of all stiffeners.
- All brackets at tank bottom and tank top that are tripped.

Tank Top at Main Deck level;

- There are a total of five(5) 4" x 3" x 5/16" longitudinal tank top stiffeners. Include replacement of all stiffeners.
- The 350 x 9W/125 F.F. deep beam at frame 37 to remain in place as this was renewed in October 2013.
- All tripped brackets.

Tank Bottom at E.R. Flat level;

- There are a total of five(5) 6" x 3 1/2" X 5/16" longitudinal tank bottom stiffeners. Include replacement of all stiffeners. However upon inspection, replace damaged stiffeners only that are buckled or bent.
- All tripped brackets.

Although the inboard longitudinal bulkhead shows no apparent signs of damage to either the stiffeners or plating, there may still be cracks in the welds specifically in the after section of the bulkhead. Therefore all panels, insulation, fittings aft of the ship shore transformer will have to be removed in order to inspect steel. The outboard longitudinal tank bulkhead also shows no apparent signs of damage although weld seams will have to be tested. Inspection of all plate weld seams and stiffener to plate welds on all tank bulkheads will require inspection after completion of steel renewals

Scantling Sizes & bulkhead/tank top/bottom plate are as per original. The welding requirements for the steel renewals are to be as per the current installation.

Section 5

7.0 Arising Work

If, during the completion of this work, it is evident that additional work items are required to complete the general scope of work, the contractor is to immediately notify the owner's representative or the Chief Engineer.

The arising work will be defined and agreed to by the owners before such work is undertaken.

End of Specification

Forward Bulkhead

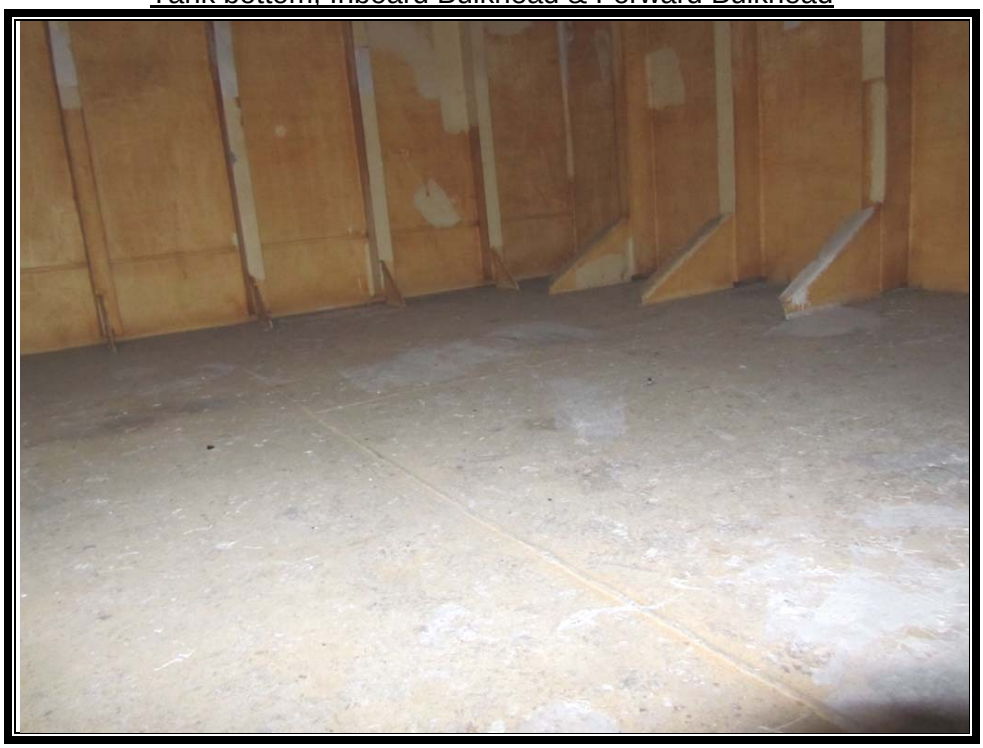
Forward Bulkhead

Tank Top

Tank Top - Section of Plating & Transverse Deep Beam Renewed(See attached Dwg.)

Tank Top, Inboard Bulkhead & Forward Bulkhead

Tank bottom, Inboard Bulkhead & Forward Bulkhead



Access to tank from Manhole on Aft Bulkhead

View of Tank Exterior from Engine Room. Looking Aft/Port.

Main Deck Cabins above Fresh Water Tank - Bulkheads/Flooring Removed for Inspection

Main Deck Cabins above Fresh Water Tank - Bulkheads/Flooring Removed for Inspection