

Attachment B
FVF Fairweather Condition Report



2018 - 2019 FLEET CONDITION SURVEY
FVF FAIRWEATHER

PREPARED FOR
ALASKA MARINE HIGHWAY SYSTEM

29 APRIL 2019
FILE NO.19041.01
REV.-

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Revision History

Section	Rev	Description	Date	Approved
All	-	Initial release	29 April 2019	DWL

References

1. *Engineers Operating Manual*, Alaska Marine Highway System, Rev. A, June 2016.
2. *High Speed Craft Operating Manual*, Alaska Marine Highway System, Rev. A, 30 June 2016.
3. *FVF System Upgrades 2014: Work Item Specifications*, Glosten, Rev.-, 15 August 2014.
4. *General Arrangement 71.75m Catamaran Ferry*, Derecktor Shipyards, Drawing No. NG432-650-01-1, 15 December 2003.

Section 1 Executive Summary

1.1 Background

This report on the FVF *Fairweather* is a deliverable under the AMHS Term Agreement — PSA 02553011B, NTP No. 6 AMHS FVF Survey and Valuation. The purpose of the project is to:

- Summarize the current vessel condition from our survey investigation.
- Reflect construction or significant refurbishments performed during and after the 2014 Shipyard Period.

This report is based in part on actual ship surveys, and in part on studies and discussions with AMHS engineering and shipboard personnel on the *Fairweather*. While every effort has been made to verify the information used in developing this report, it has not been possible in every instance, and there are potentially some factual errors. For example, there may be items reported as original equipment which have been replaced at some time during the vessel's history. The opinions of the crew present at the time of the survey or those that submitted comments on the draft report may differ from those of other crew members assigned to the vessel.

Table 1 describes the adjectives used throughout the report to indicate the condition of equipment or systems. It is provided as a guideline to accurately depict the condition description.

Table 1 Evaluation criteria

Rating	Description
Excellent	Item is in like new condition.
Good	Item is not significantly damaged, but repair/replacement would improve functionality of the system/component.
Fair	Item is damaged. Improvements should be considered as soon as possible.
Poor	Item is damaged. Improvements should be considered immediately.
Obsolete	Item is no longer supported by manufacturer or vendors. Replacement parts are scarcely available or are not available.

1.2 Ferry Description

The FVF *Fairweather* generally serves the Southern Panhandle ports of Southeast Alaska with Juneau as home port. The *Fairweather* is considered a day boat and has no overnight accommodations for passengers. Typically, the *Fairweather* overnights in Juneau.

Table 2 summarizes key vessel particulars of the *Fairweather*.

Table 2 FVF *Fairweather* particulars

Year Built	2004
Year Repowered	2014
Length	235'-5"
Draft	8'-6"
Beam	59'-1"
Speed	35 knots
Power	19,310 HP
Passenger Capacity	250 passengers
Vehicle Capacity	620 lane feet
USCG Official Number	1148175
USCG Classification	SOLAS/HSC Code Category B
DNV Classification	+1A1 HSLC R3 Passenger Car Ferry A E0
Call Sign	WDB 5604

1.3 Vessel Condition

The FVF *Fairweather* is in near excellent condition overall. The structure of the vessel is in very good condition, with well-maintained coatings, minimal damage incidents, and sufficient maintenance and repair over the vessel’s 15-year age. There is some minor cracking at welds and seams on the housetop.

The passenger spaces are in excellent condition overall. Very few items were found in fair condition, and no items were found in poor condition. On the Passenger Deck, additional outlets are recommended in the Quiet Work Area. Minor holes in the bulkhead of the Storage/Preparation Area should be repaired. Increased lighting is recommended in the Food Court, and deck covering replacement is recommended in the Passenger Service Office. The hole in the overhead of the Solarium should be repaired, or the overhead replaced. The Solarium would also benefit from furniture replacement. Finally, lighting diffusers should be replaced in the Crew Locker Room and Amidships Passenger Heads,

Crew spaces are in good condition with few exceptions. On the Bridge Deck, the Crew Day Room would benefit from cleaning or replacing the carpet. The House Top deck covering should also be significantly repaired or replaced to eliminate white caulking and warping.

No problems were reported with the electrical and mechanical systems, or with the communication systems. In particular, no problems were reported with the new propulsion engines and steering system, and the generators are in excellent condition. The Hull Strain System is not currently functional, but not required for a first-of-class vessel.

The heating, air conditioning, and ventilation system is generally in good condition. Audible hums from the HVAC system are apparent in the Forward Observation Lounge, Crew Locker Room, Amidships Passenger Heads, and Passenger Service Office.

Section 2 Regulatory Compliance Determination

2.1 United States Coast Guard (USCG)

The vessel meets the requirements for USCG Inspection per Safety of Life at Sea/High Speed Craft Code (SOLAS/HSC Code) Category B as an equivalent to 46 CFR Subchapter H for domestic voyages.

There were no outstanding USCG 835's at the time of the survey.

2.2 Safety of Life at Sea (SOLAS)

The vessel meets SOLAS/HSC Code Category B for international voyages.

2.3 Det Norske Veritas (DNV)

The vessel was designed and built in accordance with the DET NORSKE VERITAS (DNV) Rules for High Speed Light Craft with the following notation:

- +1A1 HSLC R3 Passenger Car Ferry A E0
 - +1A1 HSLC Passenger designates that this vessel is a craft of light weight displacement and is a high speed craft in compliance with the High Speed Craft Code as well as the DNV High Speed Light Craft Parts 1-5.
 - The R3 is a Coastal service restriction limiting the range of the vessel to 20 nm in the winter, 50nm in the summer and 100nm in tropical conditions from safe anchorage.
 - Car Ferry A designates that the craft is arranged for carriage of vehicles in enclosed spaces with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access, including spaces intended for the carriage of cargo vehicles.
 - EO designates that the craft has periodically unattended machinery spaces.

2.4 Other Regulations

Americans with Disabilities Act (ADA) Compliance. The vessel is ADA compliant and has a passenger elevator and other dedicated public access areas such as the food court, passenger lounges, and restrooms.

Section 3 Structural Condition Reports

3.1 Hull Plating and Appendages

All hull compartments are clean, and structure appears in sound condition throughout. cursory inspection of the double bottom spaces showed no damage. There has been no reported fatigue cracking in areas of the jet foundations or transom and brackets. All structure appears sound upon cursory visual inspection.

The underwater hull coating system is made up of the following major components:

- Intergard 264 (two coats)
- Intersleek 731 (tie coat)
- Intersleek 979 (one coat)

Underwater coatings were renewed during the fall/winter 2015/2016.

3.2 Tanks and Voids

The forepeak suffered wave damage during the first year of operation. This incident resulted in significant deformation of the bottom plating and supporting structure in the vicinity of the centerline, Frames 52 through 58. This damage has been repaired, including redesign and structural modifications to the area. The modifications included adding stanchion connections of bottom structure to deck structure, webframe enhancements, and shell stiffener straightening (Figure 1). Evidence of the repairs is observable. Operating procedures have been modified since the incident and no further damage has resulted.

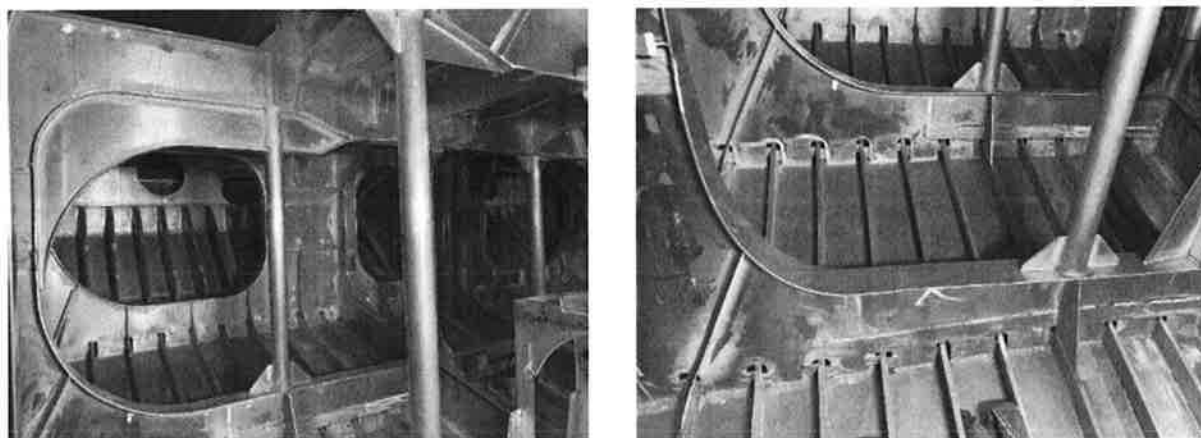


Figure 1 Additional stanchions (left) and shell stiffeners (right) in region of earlier forepeak damage

There is evident repair of starboard sideshell plating in the forepeak just forward of the collision bulkhead that occurred during a docking. That area has been repaired with replacement of a section of shell stiffener and straightening of the damaged plating. Deckguard top plating and straking at the transom shows some pitting.

There was a report by crew of an upper deck repair on the port side forward, but that repair was not observed. The upper deck amidships had some deck cracking evidenced by repair with elastomeric sealant (5200), primarily in the vicinity of the skylight and just aft of the pilothouse.

3.3 Vehicle Space

The vehicle deck bulkheads and overhead are entirely covered by insulation (Figure 2). In lower corners and within the scuppers there is no evidence of corrosion or cracking.



Figure 2 Vehicle deck view from stern door looking forward; insulation visible at sides and overhead

3.4 Superstructure (Vehicle Deck and Above)

Topside and deckhouse exterior coatings are almost exclusively vinyl and are in good condition. At plate boundaries and deck seams there is typically noticeable damage to coatings due to weathering and wear. In some cases, there is underlying plating corrosion causing deformation of the vinyl. The hull is painted from the deckguard down to the keels.

3.5 Summary

Overall the structure of the vessel appears in very good condition, especially considering the 15-year age. The coatings have been well maintained. Reported damage incidents have been minimal and repaired in accordance with regulatory requirements and oversight in every instance.

Section 4 Fire and Life Safety Equipment Reports

4.1 Sprinkler Systems

4.1.1 Automatic Sprinkler System and Piping

The sprinkler system servicing the passenger spaces on this vessel is a dry type system broken into two zones separated by the smoke tight doors located between Frames 26-27. The heads are fusible element type so that in the case of a fire, only the head(s) in the area of the fire will open and extinguish it. The fusible link opens when the temperature exceeds 155° F.

Seawater is supplied to the system by a self-priming centrifugal pump with a flowrate of 549 US gpm at a pressure of 73 psi. This pump is located in Compartment 2 (Figure 3).

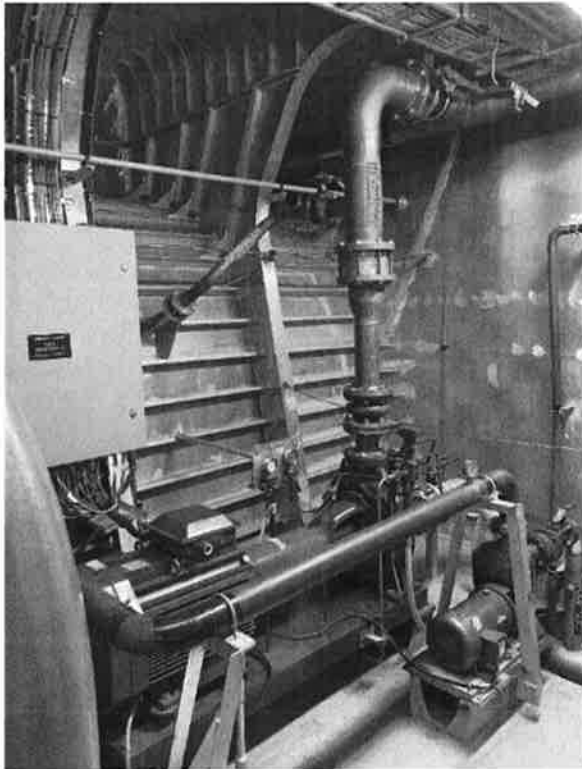


Figure 3 Sprinkler pump in Compartment 2

The sprinkler pump is provided with power from two separate sources. In case the sprinkler pump fails to operate, the deluge pump can provide manual backup through a crossover pump in the wet deck.

If remote pump start fails, either the deluge pump could be manually started to flow water to the sprinkler system, or the sprinkler pump could be started locally in Compartment 2.

The accommodation spaces sprinkler piping is 90:10 CuNi and is in excellent condition.

4.1.2 Manual Deluge Sprinkler System and Piping

A manual deluge type sprinkling system serves the vehicle space. The deluge system is a dry type system broken into three zones. The sprinkler heads on the vehicle deck are open heads so that all the heads in the entire zone will spray water if the control valve to that zone is opened.

Seawater is supplied to the system by a self-priming centrifugal pump with a flowrate of 1128 US gpm at a pressure of 58psi. This pump is located in Compartment 1 (Figure 4). This pump is sized to provide enough water to the two largest adjacent zones on the vehicle deck.

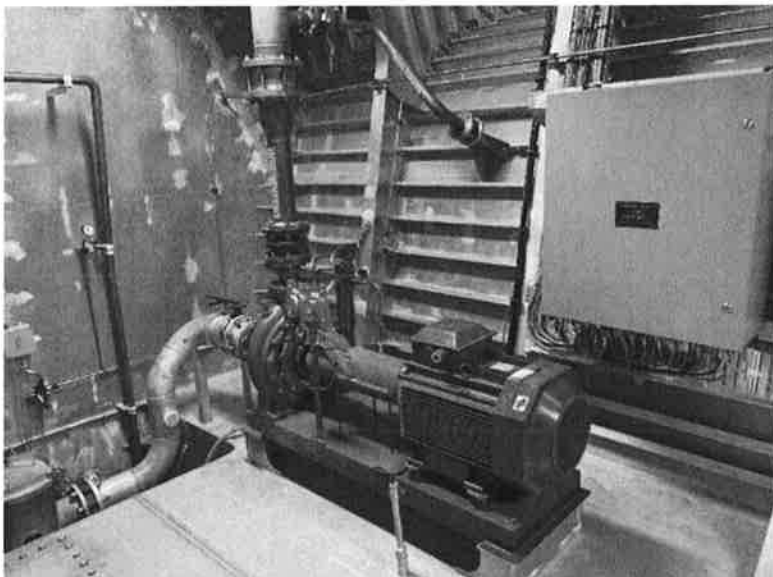


Figure 4 Deluge pump in Compartment 1

Each of the three zones has a control valve. The control valves are located in the landing of the stairwell on the vehicle deck starboard side amidships. Remote control of the deluge pump and the control valves is from the Pilothouse through the IMACS system. A second location for control of the valves and the deluge pump is the stairwell landing itself. If necessary, the control valves can be manually opened by a crewmember.

The deluge pump is provided with electrical power from two independent sources. In the case where the deluge pump fails to start, the sprinkler pump serving the passenger spaces can be used as a backup to the deluge system. The sprinkler and deluge pumps are the same size.

The deluge piping is 90:10 CuNi and is in excellent condition.

4.2 Firemain System and Piping

The firemain system consists of two centrifugal pumps, one in each engine room. In addition to feeding the fire main, the system also provides water to the sea water flush system via pneumatic cutout valve and the sprinkler/deluge system via a separate pneumatic cutout valve. The cross connect to the sprinkler/deluge is an emergency backup.

The firemain is 90:10 CuNi and is in excellent condition.

4.3 Fire Doors and Fire Screen Doors

Fire doors are found at various locations throughout the vessel. Fire doors are steel with A60 protection, providing 60 minutes of protection against fire without failing.

Fire doors were not tested during this survey but are assumed to be in excellent condition.

4.4 Fire Boundaries and Structural Insulation

When constructed in 2004, the vessel was fully compliant with all current regulatory and classification society fire boundary requirements. Structural fire protection insulation is typically

mineral wool. The structural fire protection insulation in the accommodation spaces is generally protected by joiner linings and is in excellent condition. The structural fire protection insulation in the vehicle space and machinery spaces is more exposed and has been damaged, repaired and/or patched in some places.

4.5 Fire Suppression Systems and Piping

4.5.1 Engine Room Fixed Fire Suppression System

Fixed gas fire suppression is provided in both engine rooms. The agent used for this system is FM-200, which is a non-harmful active extinguishing agent. The FM-200 is stored in two 900-pound cylinders located in the port Switchboard Room on the Vehicle Deck. The agent is stored as a liquid and vaporized upon release. The amount of agent available is sufficient to provide for two releases into either space, or one release into both spaces.

Fire suppression was not tested during this survey but is assumed in excellent condition.

4.6 Alarm Monitoring Systems

4.6.1 Centralized Fire Detection/Alarm System

Fire detection on the vessel is through an Ansul IQ-301 fire detection system. This Ansul IQ-301 is a fully addressable system that monitors the smoke and heat detectors as well as all of the manual pull stations located throughout the vessel. The fire detection system was not tested during this survey but is assumed in excellent condition.

4.6.2 Vehicle Space Alarm/Monitoring Systems

Smoke detectors are used throughout the vessel in the Pilothouse, Crew Day Room, Air Handler Rooms, Passenger Deck, Vehicle Deck, Forepeak, Bow Thruster Rooms and Compartments 1, 2, 3, 4, 5 and 6 and both port and starboard Aft Peaks.

In the engine rooms, heat detectors rated for 190°F are fitted directly above the main propulsion engines, while smoke detectors are fitted as well. Manual fire pull stations are located at the exit from each space and are spaced not more than 20m apart throughout the vessel.

Smoke detectors were not tested during this survey but are assumed to be in excellent condition.

Section 5 Lifesaving Equipment Reports

5.1 Rescue Boats and Davits

This vessel comes equipped with a rescue boat designed and built by Willard Marine, Inc. The Sea Force 490® SOLAS O/B Rescue Boat is a 16 ft Rigid Hull Inflatable Boat consisting of an inflatable tube attached mechanically attached to a rigid hull. It is powered by a USCG approved gasoline outboard engine. All walking surfaces on the vessel are covered with non-skid. The craft is equipped with a manually controlled self-righting system.

The davit is a fixed radius, single arm, slewing type by Welin Lambie. It rotates on a ball bearing type slew ring that is fixed between the post and the pedestal. Slewing is achieved by a geared drive, powered by an electric motor, backed up by a manual crankshaft.

An electric winch is used to power hoist the boat. The winch will hoist a safe working load of 2,381 lbs (1080kg) at 59ft/min (18m/min). A main brake is automatically applied to hold the load when hoisting stops. Lowering is by gravity and is controlled by lifting the main brake lever.

The rescue boat and davit are located on the House Top, port side, and are in excellent condition (Figure 5).



Figure 5 Rescue boat and davit on House Top

5.2 Life Rafts and Evacuation Slides

The vessel is equipped with the following Marine Evacuation System (MES) equipment:

- *Two 100-person self-righting life raft units.* The Life Raft units are located on the House Top, aft of amidships. Each life raft is comprised of two superimposed buoyancy tubes divided along the center into left and right chambers. Four integral arch and thwart tubes support the life raft canopy. Personnel can deploy and position the life rafts from a rescue boat at another slide/life raft unit or boarding point prior to inflation.
- *Two evacuation slide / 100-person self-righting life raft units* (Figure 6). The Slide / Life Raft units are located amidships on the Passenger Deck, port and starboard. The 45.9 ft (14m) slides within these units are twin track evacuation slides designed for transferring people from the vessel to the life rafts. Trained crew can deploy the slides either locally at the muster stations, or by use of remote control from either the Bridge or Operating Station (Figure 7).

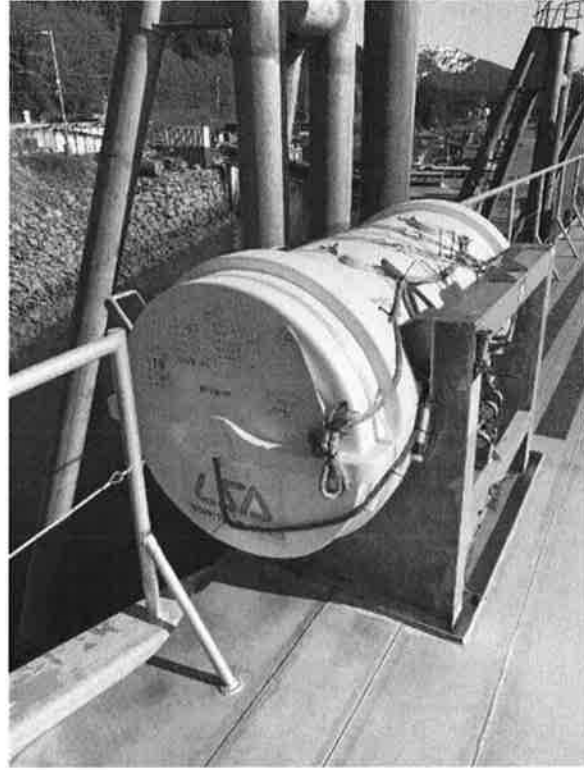


Figure 6 (Left) Slide/Life Raft unit in Starboard MES; (Right) Life Raft unit on House Top, Port



Figure 7 Remote deploying of MES, in Pilothouse

The MES equipment is manufactured and serviced by Liferaft Systems Australia. The equipment is in excellent condition.

Section 6 Spaces Report

The spaces onboard the FVF *Fairweather* were surveyed, although many locations were protected with floor and furnishing coverings. The intent of the space survey was to capture major aesthetic or damaged items in the passenger and crew areas.

The condition of each item in the list below was evaluated for each space.

- Overhead.
- Lighting.
- Deck covering.
- Furniture.
- Windows and doors.
- Bulkheads.
- Plumbing and HVAC fixtures.

Table 3 describes the evaluation criteria.

Table 3 Evaluation Criteria

Rating	Description
Excellent	Item is in like new condition.
Good	Item is not significantly damaged, but repair/replacement would improve functionality of the system/component.
Fair	Item is damaged. Improvements should be considered as soon as possible.
Poor	Item is damaged. Improvements should be considered immediately.
Obsolete	Item is no longer supported by manufacturer or vendors. Replacement parts are scarcely available or are not available.

Passenger and crew spaces are described for each deck. Generally, only areas rated as “Good” or worse will be identified in the individual sections.

6.1 Bridge Deck

6.1.1 Pilothouse

The Pilothouse is generally in excellent condition (Figure 8). The 2014 survey recommended carpet replacement throughout the Bridge Deck. The carpet was replaced and is now in excellent condition.



Figure 8 Pilothouse is in excellent condition

6.1.2 Crew Day Room

The Crew Day Room is in good condition. Stains, wear, and deformation are evident on the carpet; it should be cleaned or replaced (Figure 9).



Figure 9 Crew Day Room (left) with minor stains and deformation on carpet (right)

The furniture, bulkhead, and sink show some wear but are generally in good condition.

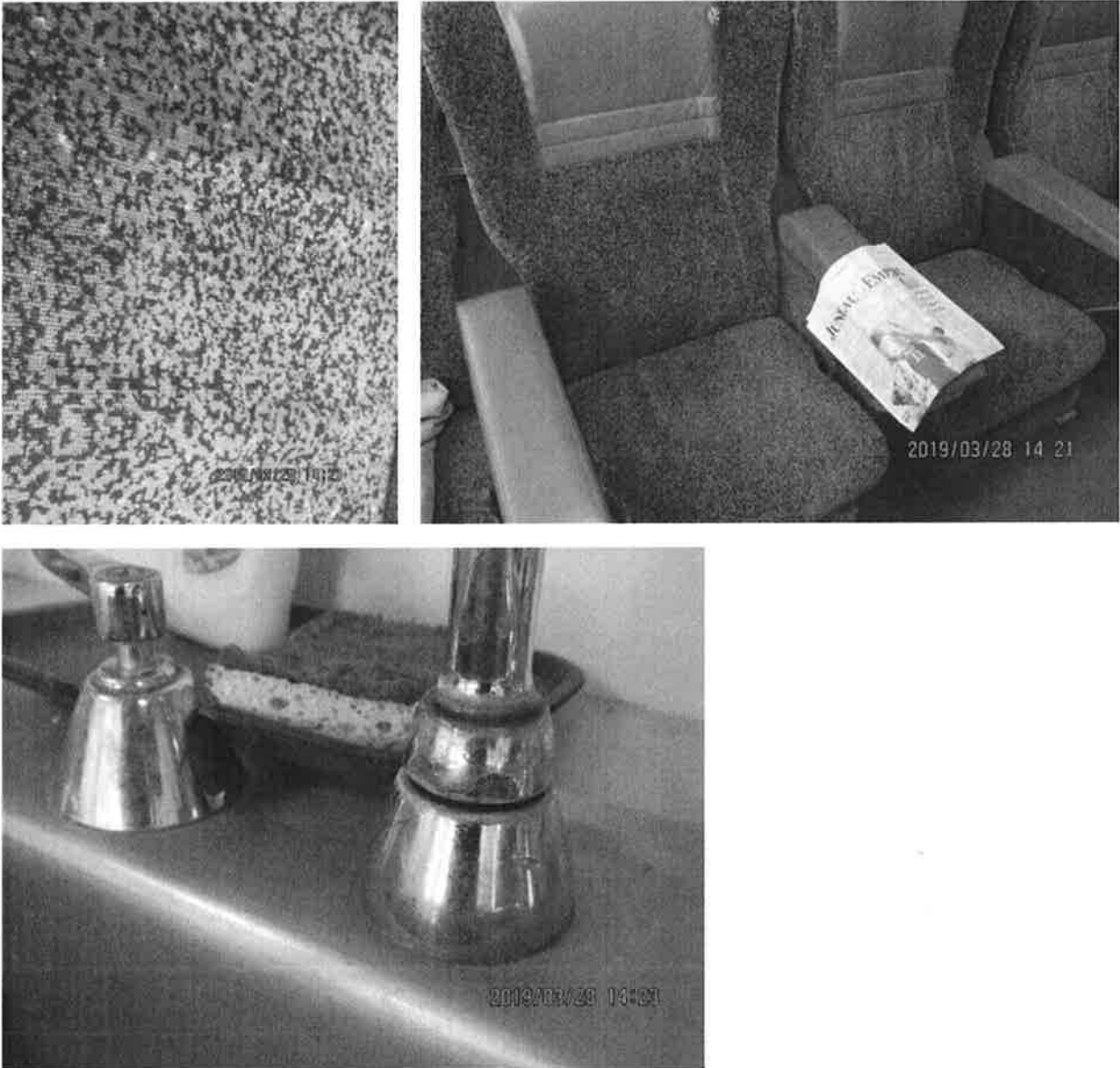


Figure 10 Minor wear on furniture (top) and sink (bottom) in Crew Day Room

6.1.3 Ship's Office

The Ship's Office is in good condition with lightly worn deck covering.

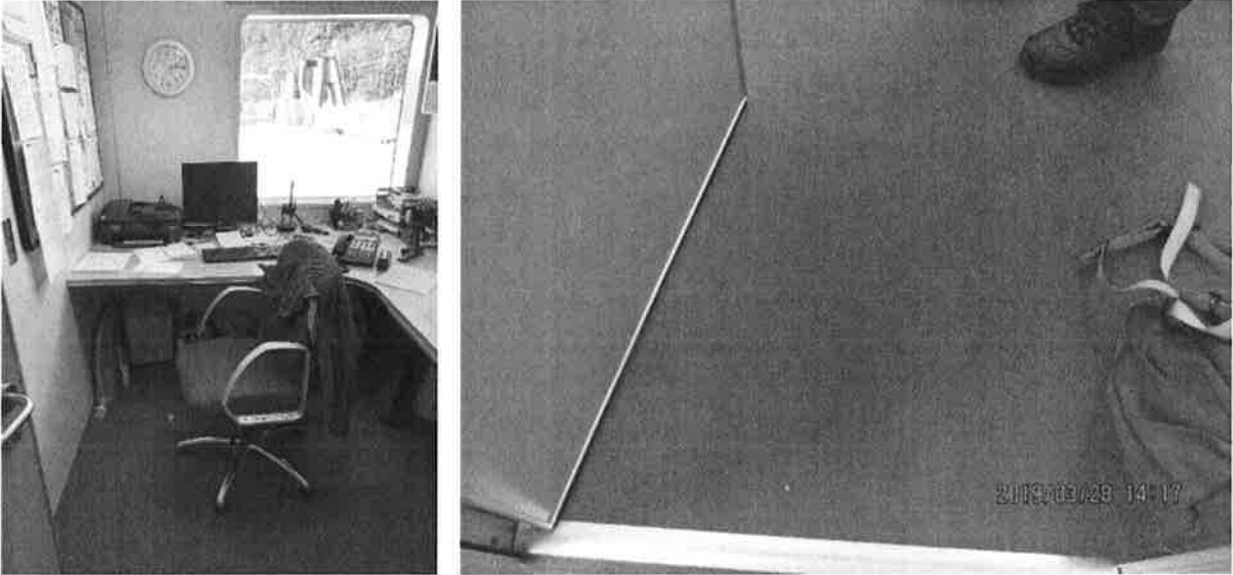


Figure 11 Ship's Office (left) and carpet (right) in good condition

6.1.4 Head

The Crew Head is generally in excellent condition. Penetration misalignment was noted underneath the sink (Figure 12).



Figure 12 Penetration misalignment under sink in Crew Head

6.1.5 Bridge Electrical Room

The Bridge Electrical Room is in good condition (Figure 13).

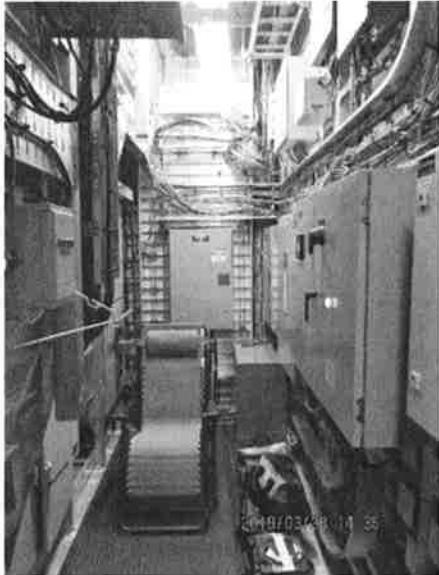


Figure 13 Bridge Electrical Room

6.1.6 House Top

The House Top is in fair condition. The deck covering shows significant wear. Warping, cracking or flexing of the deck covering is very noticeable in some regions. Large regions of white caulking to repair leaks are evident in approximately a dozen areas (Figure 14).

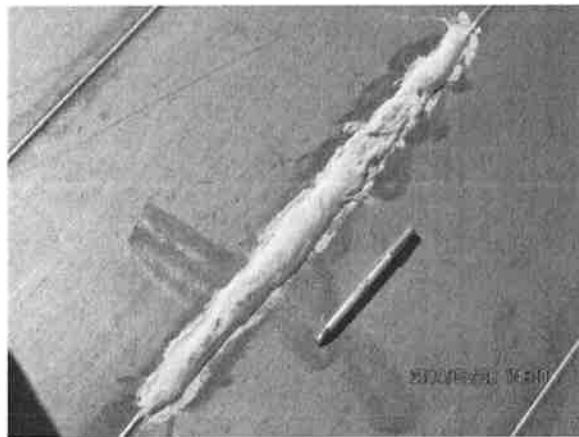
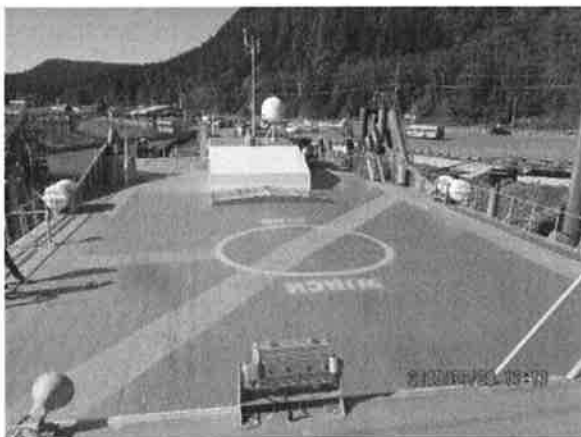


Figure 14 House Top (left) with caulking evident in many regions (right)

6.2 Passenger Deck

6.2.1 Forward Observation Lounge

The Forward Observation Lounge is in good condition. In 2014, the carpeting and faux wood flooring was recommended to be replaced. Both deck covering types were replaced, but some warping or bubbling is now apparent in the replacement flooring. The armrest pads and seat cushions were also recommended for replacement in 2014. The replacement seats are in excellent condition. Minor dents and scratches are apparent in the bulkhead (Figure 15).



Figure 15 Bubbling in faux wood flooring (left), replacement seats (middle), and minor dents in bulkhead (right) in Forward Observation Lounge

Additionally, the HVAC system produces an audible hum in the lounge.

Lifejacket Locker and Phone Booth Space

The lifejacket locker is in good condition. Next to the lifejacket locker, bracing leftover from a previous phone booth is still evident, above a recently installed bookshelf (Figure 16).



Figure 16 Lifejacket locker (left) and bracing from former phone booth (right)

6.2.2 Crew Locker Room

The Crew Locker Room is in good condition. Only minor wear is apparent on the furniture and bulkheads. Some lighting diffusers should be replaced (Figure 17).

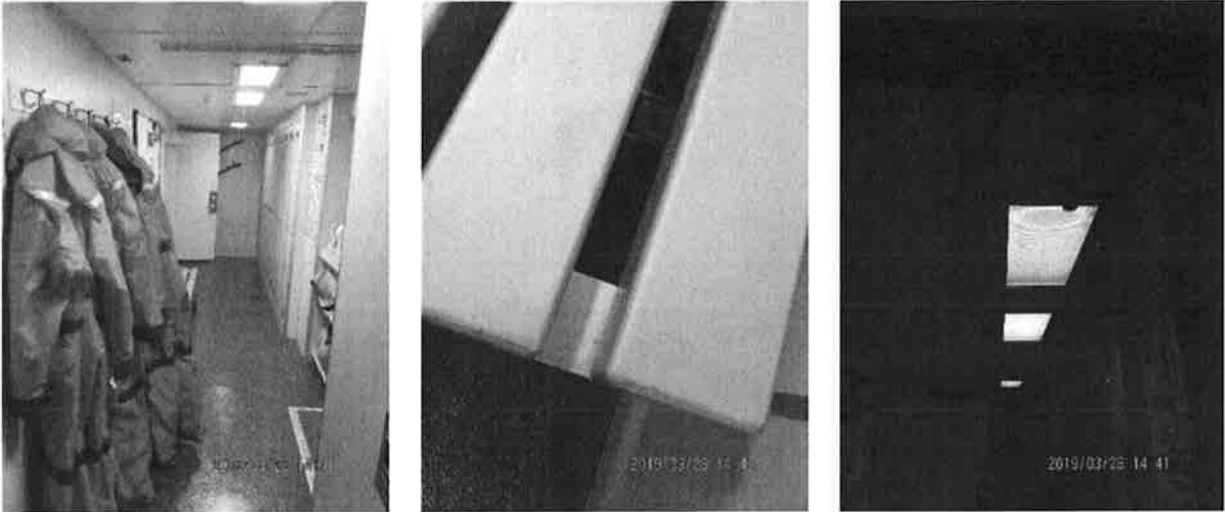


Figure 17 Crew Locker (left) with some wear on bench (middle) and diffusers in need of replacement (right)

6.2.3 Quiet Work Area

The Quiet Work Area is in excellent condition (Figure 18). During the survey, the crew noted that this space receives minimal use due to lack of outlets for purposes such as charging phones and plugging in laptops. It is recommended to add more outlets to this space.



Figure 18 Quiet Work Area

6.2.4 Amidships Passenger Heads

The Amidships Passenger Heads Area is in good condition (Figure 19).



Figure 19 Men's (Port) Amidships Passenger Head

Minor diffuser discoloration is apparent in both the Men's (Port) and Women's (Starboard) Amidships Passenger Heads. There is minor wear around the base of some fixtures, and penetration misalignment is apparent at the base of the sink (Figure 20).

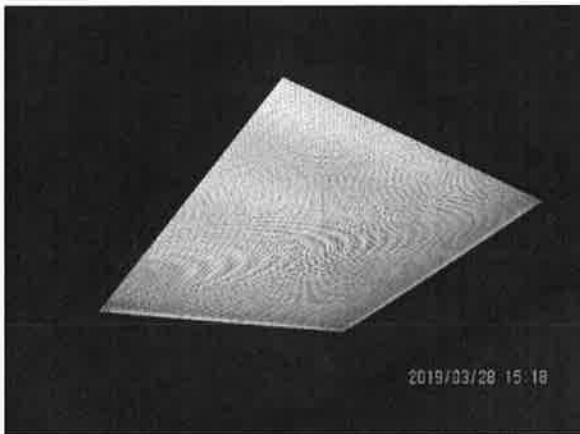


Figure 20 Diffuser discoloration (left) and penetration misalignment (right) in Men's (Port) Amidships Passenger Head

6.2.5 Storage/Preparation Area

The Storage/Preparation Area is in good condition. Minor holes in the bulkhead are visible from previously moved equipment (Figure 21).

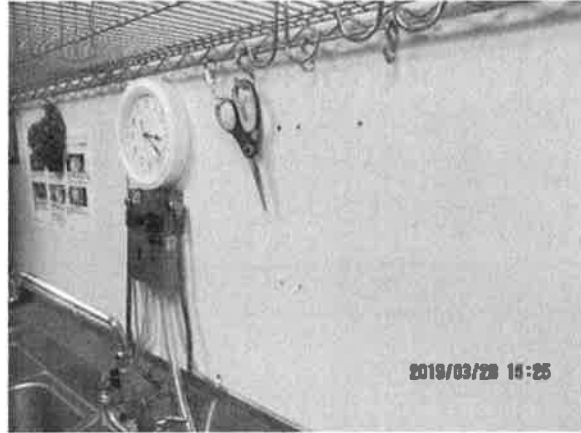


Figure 21 Storage/Preparation Area (left) with minor holes in bulkhead (right)

6.2.6 Food Court

The Food Court is in fair condition. The deck covering is worn and deforming in some areas. Increased lighting would improve visibility in the space (Figure 22).

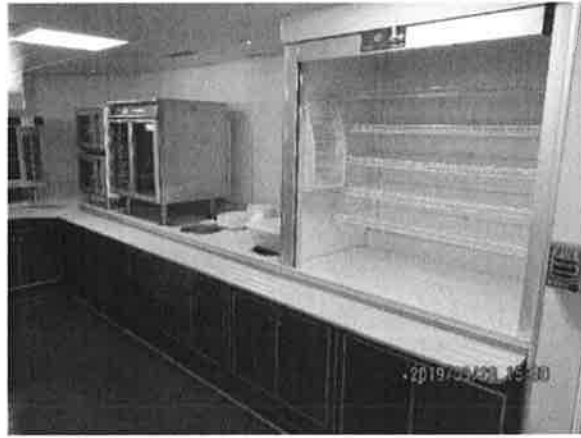


Figure 22 Worn deck covering (left) and low lighting levels (right) in Food Court

6.2.7 Snack Bar and Seating

The Snack Bar and seating are in good condition. The deck covering shows minor stains and wear, and minor dents are apparent in the bulkhead. Wear is visible on the seats. Gaps in the bulkhead liner between windows are apparent (Figure 23).

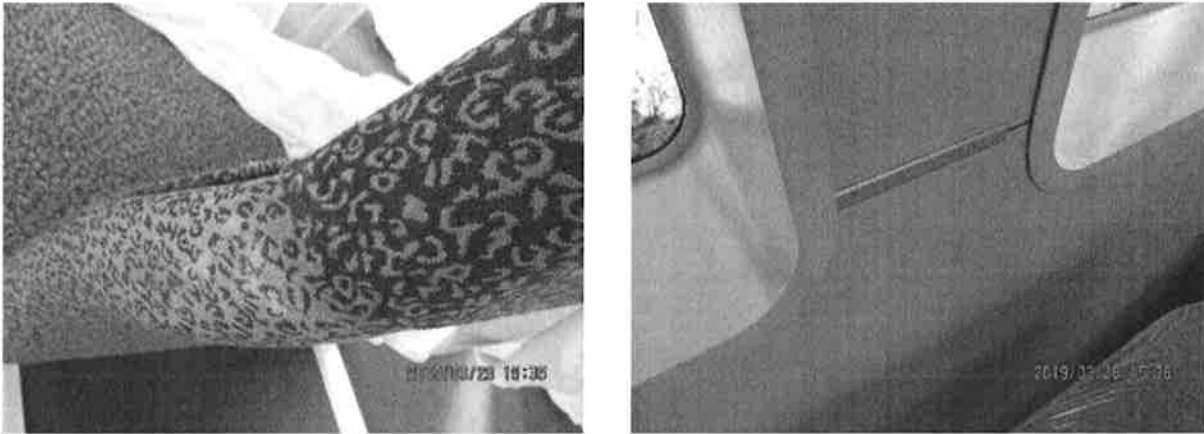


Figure 23 Wear on seats (left) and gaps in bulkhead lining (right) in Snack Bar and seating

6.2.8 Information

The Information Area is in good condition. The deck covering shows minor stains and wear, and minor dents are apparent in the bulkhead (Figure 24).

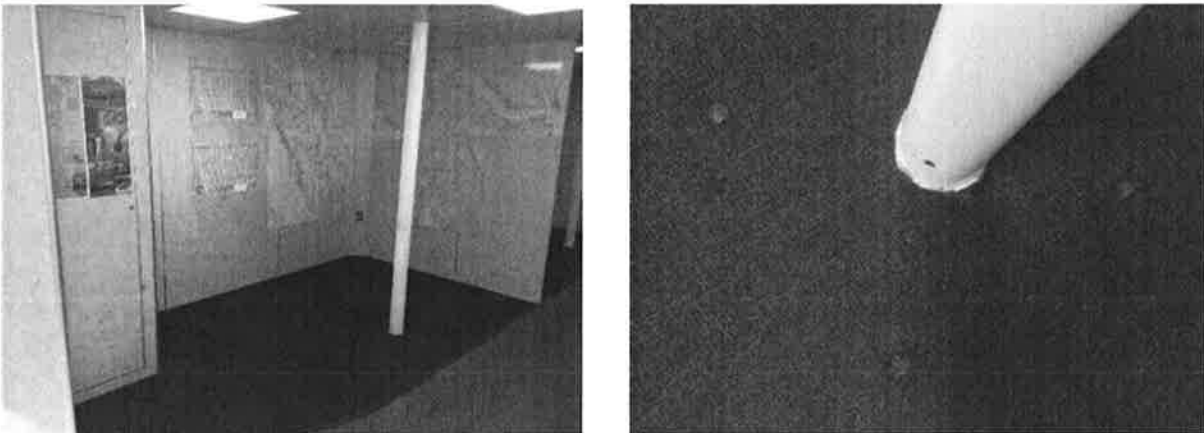


Figure 24 Information Area (left) with minor wear in carpet (right)

6.2.9 Passenger Service Office

The Passenger Service Office is in fair condition. The deck covering is damaged by holes and should be replaced (Figure 25).

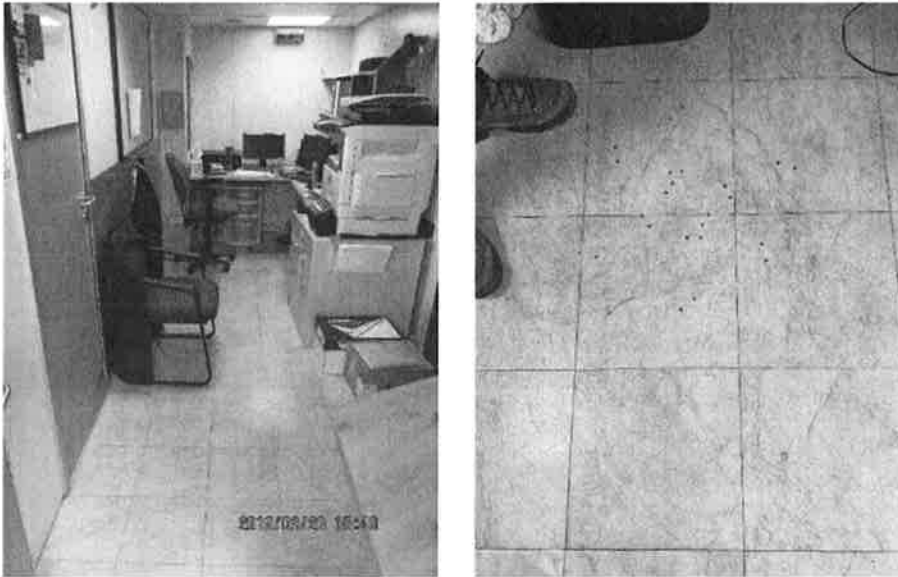


Figure 25 Passenger Service Office (left) with holes in deck covering (right)

The overhead, lighting, furniture, and bulkheads are all in good condition. The HVAC produces an audible hum in the space.

6.2.10 First Aid Room

The First Aid Room is in good condition (Figure 26).



Figure 26 First Aid Room

6.2.11 Children's Play Area

The Children's Play Area is in good condition. Seams are evident in the carpet, and the furnishings are lightly worn (Figure 27).



Figure 27 Apparent seams (left) and lightly worn furnishings (right) in Children's Play Area

6.2.12 Aft Passenger Heads

The Aft Passenger Heads are in good condition. Minor dents and wear are evident in the bulkhead partitions in the Women's (Stbd) Aft Passenger Head (Figure 28).

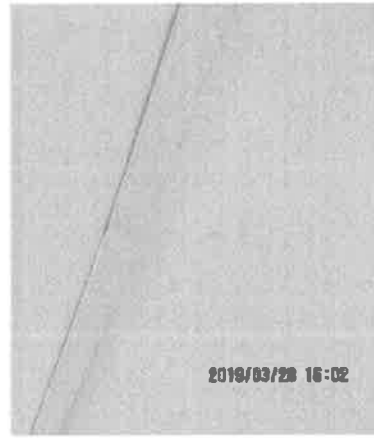


Figure 28 Women's (Starboard) Aft Passenger Head (left) and minor dent in partitions (right)

6.2.13 Solarium

The Solarium is in fair condition. A hole has worn through the overhead. Either this hole should be repaired, or the overhead should be replaced (Figure 29).



Figure 29 Solarium (left) and hole in Solarium overhead (right)

Stains and deck deformation are evident in the deck covering, and it is uneven in places. Paint is peeling on the bulkhead in some places, such as the overhead windows (Figure 30).

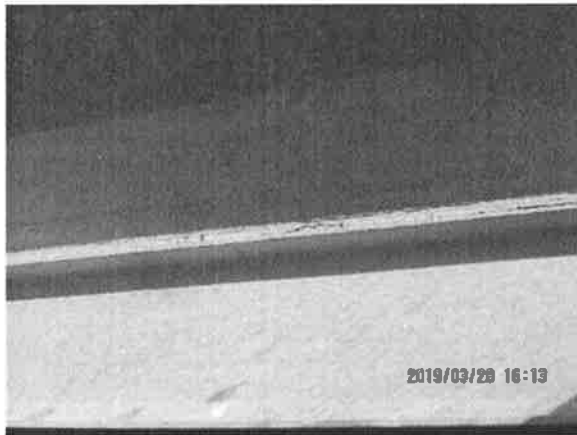


Figure 30 Deck deformation (left) and overhead window paint peeling (right) in Solarium

The furniture shows wear. The space would benefit from replacing the furniture with heartier, more robust furniture suited to the ferry route climates (Figure 31).



Figure 31 Furniture in Solarium

6.3 Vehicle Deck

The Vehicle Deck is generally in good condition. The bulkheads, lighting, overhead, and structural fire protection appear to be in good condition. Figure 32 shows well maintained bulkheads and lane lines.



Figure 32 Vehicle Deck, looking aft

During the survey, the crew recommended adding a dedicated passenger gangway to streamline loading/unloading operations (passengers currently load intermittently with the vehicles via the vehicle doors).

6.3.1 Switchboard Rooms

The Switchboard Rooms are in good condition (Figure 33).



Figure 33 Starboard Switch Room on Vehicle Deck

6.4 Crew-Only Spaces

Crew -Only spaces include:

- Hulls
- Thruster Room
- Engine Room
- Forepeak
- Compartments

These spaces are in good condition. Lighting in these spaces tends to be very good, and most spaces are clean (Figure 34).



Figure 34 Starboard Engine Room (left) and Port Compartment 2 (right)

Section 7 Electrical Equipment Condition Report

7.1 Overview

Electrical equipment is summarized in this section. No problems have been reported with any electrical equipment on the *Fairweather*; all electrical equipment is assumed in good to excellent condition.

7.2 Ship Service Power Generation

Electrical power is provided by four 185kW Northern Lights M6125T generators (specifications in Table 4).

Table 4 Diesel generator specifications

Manufacturer	Northern Lights
Model	M6125T
Quantity	4
Number of Cylinders	6
Generator	Marathon Electric
Power Produced	185kW each
Supply Voltage	480V / 3 phase / 60hz

Generators 1 and 3 are located in the starboard Engine Room, and feed the switchboard located in the starboard Switchboard Room on the Vehicle Deck (Figure 35).

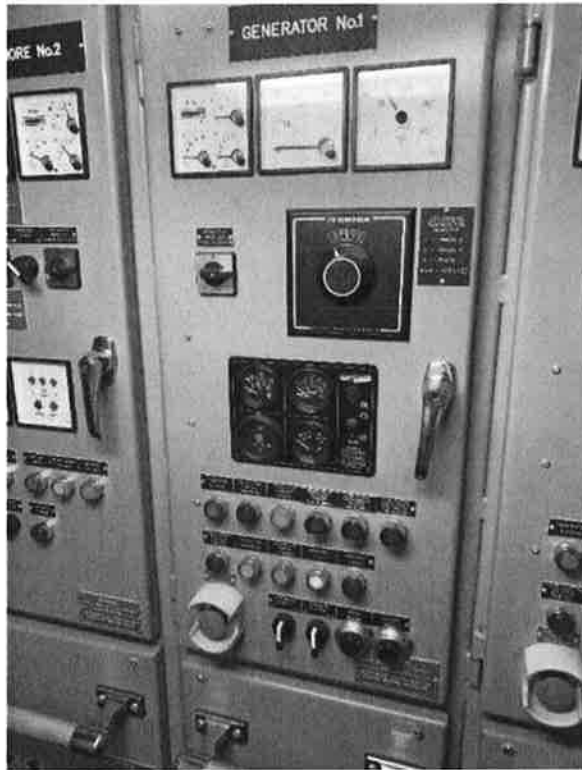


Figure 35 Generator 1 Switchboard in the starboard Switchboard Room

Generators 2 and 4 are located in the port Engine Room, and feed the switchboard located in the port Switchboard Room on the vehicle deck.

The generators are 3 phase, 480 volts, with the Y-configuration. Each generator set includes the voltage regulator, a load sharing module, a synchronizer, and governor. Table 5 lists generator operating hours as of March 2019.

Table 5 Generator operating hours at time of survey

Generator Number	Operating Hours
1	18,242 hrs
2	19,060 hrs
3	18,102 hrs
4	17,369 hrs

The 480 VAC switchboards, via step down transformers, feed the 208Y/120 3 phase circuits. The 24 VDC is fed from 120 VAC single phase circuit battery chargers. The 24 VDC feeds the 12 VDC circuit via a DC converter.

The generators are in excellent condition.

7.3 Ship Service Electrical Power Distribution

AC power is distributed throughout the vessel by two 480VAC switchboards located in the port and starboard Switchboard Rooms. The port switchboard houses Generator 2 and 4 control panels and 300 amp generator circuit breakers, 480VAC distribution, and a panel section for monitoring and controlling Generators 1 and 3. The starboard switchboard houses Generator 1

and 3 control panels and 300 amp generator circuit breakers, 480VAC distribution, a panel section for monitoring and controlling Generators 2 and 4, and a section for 208VAC distribution.

Two 85kva transformers are fitted to supply power to the 208V section of the starboard switchboard and 208V distribution panel in the electric room. Ground detection lamps are located in both switchboards and 208V distribution panels.

208V and 120V power is distributed throughout the vessel through power and lighting panels located in accordance with the electric one-line diagram.

7.4 Emergency Electrical Power Generation

Since two complete generator sets are located in each hull, any generator can act as the emergency generator. Normally, when three generators are operating, the stand-by generator will be the emergency generator. All generators are sized for the required emergency load. In the case where there is an emergency or failure in one or more diesel generators, the electrical load management system controls backup and diverting power.

UPS's and DC battery banks provide emergency power to communications and monitoring systems.

7.5 Emergency Electrical Power Distribution

Vital emergency pumps, including fire, sprinkler, deluge, and bilge controllers are fitted with two independent power feeders from each switchboard. Both feeds are fitted with motor operated circuit breakers. A loss of voltage in the supplying feeder will automatically cause transfer to the standby feeder via automatic operation of the circuit-breakers. Direct current (DC) power for vital control and navigation circuits is supplied by several battery banks and power supplies.

Two battery banks, one operating and one standby located on the House Top, supply power to the bridge consoles for navigation, communication and propulsion control.

Uninterrupted power supplies are fitted for the following services:

- Fire detection system
- Hull monitoring system
- Ship's computer and network (independent of any other network system)
- IMAC System in each engine room

7.6 Communication Systems

The vessel is equipped with a Hose-McCann Telephone Company Intelligent Digital Controlhead, a modern programmable microprocessor-controlled master station providing users with centralized access to telephone, public address, loudhailer, and talkback systems.

Docking Intercom System

The docking intercom system consists of stations at the vehicle deck doors, mooring stations, MES, Fast Rescue Boat davit and operating compartment.

Public Address (PA) System / General Alarm (GA) System

The Public Address / General Alarm (PA/GA) System is a Hose McCann Intelligent Digital Controlhead (Figure 36). This programmable microprocessor-controlled master station provides centralized access to telephone, public address, loudhailer, and talkback systems. Control of alarm signals as well as other functions is also possible.

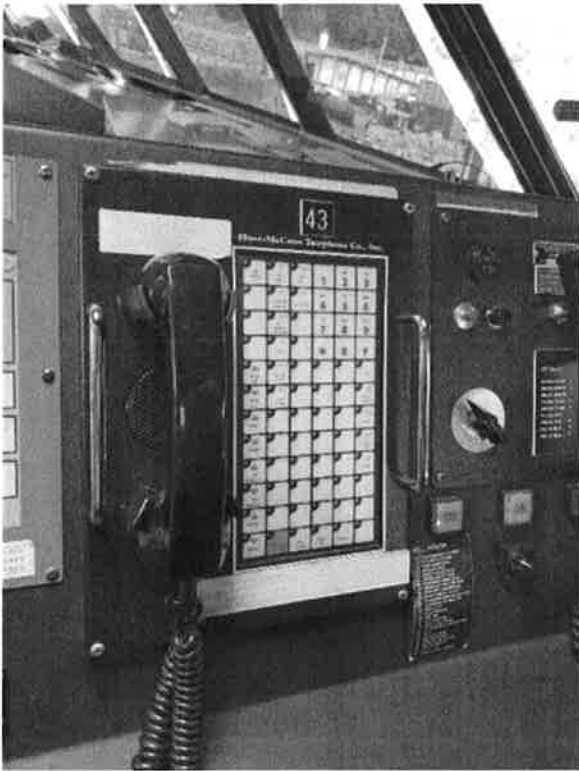


Figure 36 PA/GA System in Pilothouse

The only PA/GA System talkback zone is between the IMAC control head and the elevator. The system is turned on and off at the control head. There is a call button inside the elevator.

Sound-Powered Telephone and EOT

The vessel is equipped with a United Marine Sound Powered Telephone system and with a PMC-United Marine Automatic Dial Telephone System.

Vessel Tracking Monitors

The vessel is equipped with a video information system with monitors located around the passenger spaces (Figure 37). The system displays safety messages and other information and allows the passengers to track the position of the vessel.



Figure 37 Video information system monitor in Observation Lounge (image from 2014 vessel survey)

CCTV Cameras

The CCTV system consists of 26 remote cameras located throughout the vessel and four 18” monitors located on the Bridge. The cameras are located throughout the machinery spaces, vehicle space and exterior of the vessel. No cameras are installed in the passenger spaces.

Satellite Communications

This vessel is fitted with a remote tank level indicator (TLI) system that allows tank levels to be monitored at various locations throughout the vessel. The remote TLI system is controlled through the IMAC system. Through the remote TLI system, tank levels for port and starboard fuel tanks, the sewage tank, and the potable water tank are displayed at each of the two fill/discharge stations located on the starboard side of the vehicle deck, one at Frame 38 and one at Frame 1 (Figure 38).

The vessel is fitted a Weir-Jones ADIS Model 8240 Draft & Trim Monitoring system (Figure 38). This system works by measuring the freeboard at 6 locations around the perimeter of the vessel. The system is also capable of measuring the significant wave height of seas through which the vessel is sailing.

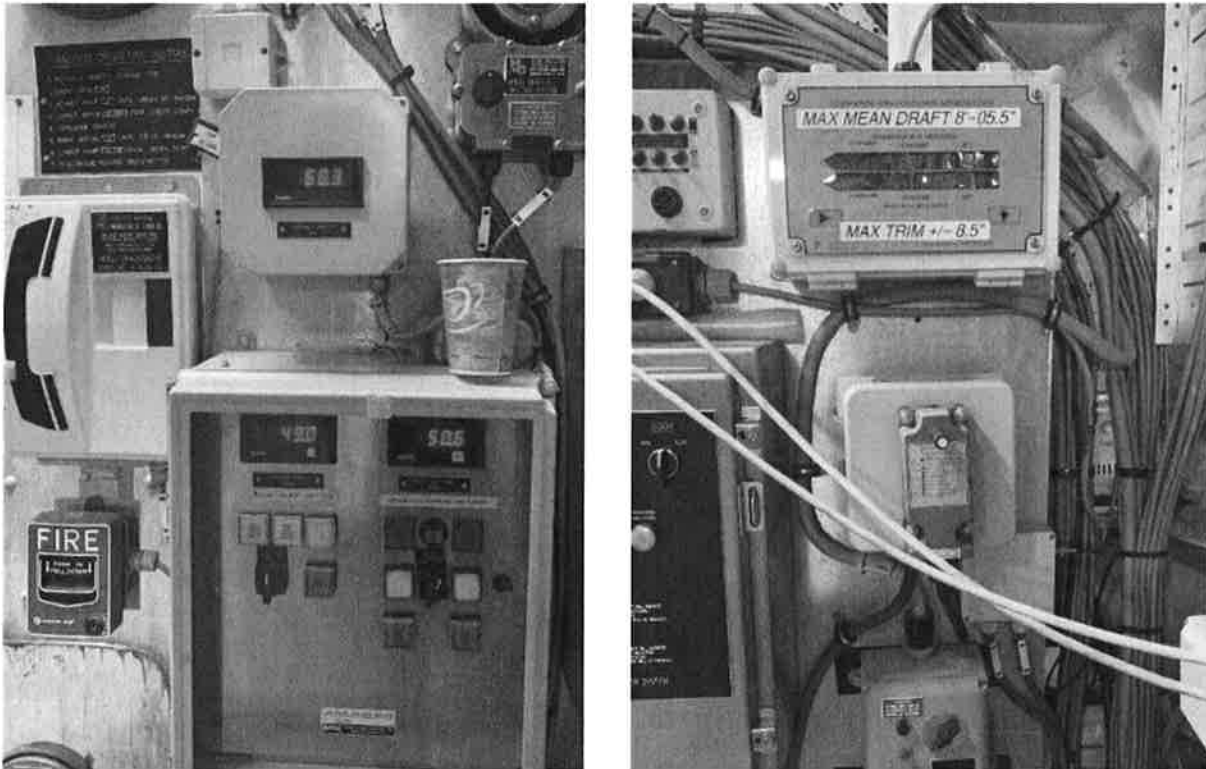


Figure 38 (Left) Tank Level Indicator and (Right) Draft & Trim Monitoring System, at Frame 1 on Vehicle Deck

The vessel is fitted with a Weir-Jones Hull Strain System. It was reported that this system is not currently working and is not required for a first of class vessel.

Section 8 Machinery and Equipment Condition Reports

8.1 Overview

Machinery and equipment are summarized in this section. No problems have been reported with machinery and equipment on the *Fairweather*; all is assumed in good to excellent condition.

8.2 Main Propulsion

8.2.1 General

The *Fairweather* is powered by four waterjets via four high speed diesel engines and reduction gears. There are two waterjets, main engines, and reduction gears in each hull.

8.2.2 Main Engines

This ferry is powered by four MTU 20V 4000 M73L high-speed diesel engines. Each engine has 20 cylinders arranged in the V configuration (Figure 39).

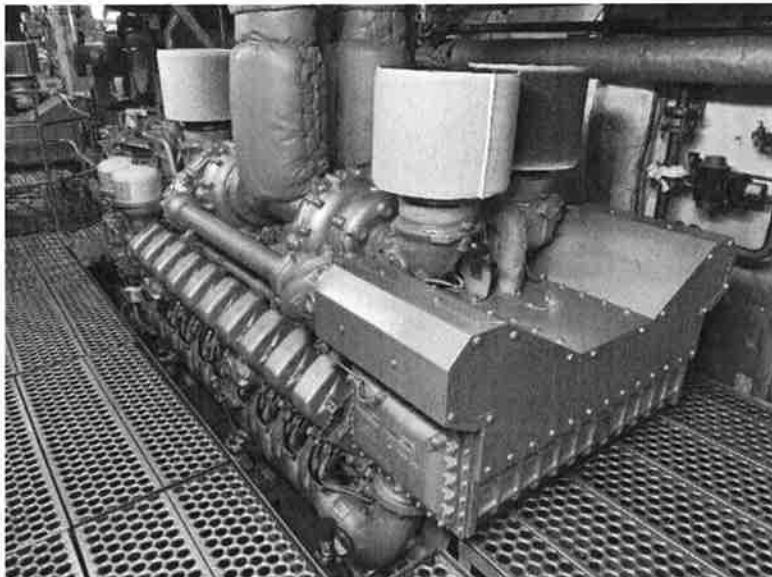


Figure 39 Engine in Starboard Engine Room

This engine is a basic liquid-cooled, four-stroke diesel engine with direct fuel injection, sequential exhaust gas turbocharging, and charge air cooling. The maximum continuous rating of each engine is 4830 hp at 2050 rpm. Table 6 lists the operating hours for each engine.

Table 6 Engine operating hours at time of survey

Engine Number	Operating Hours
1	6,307 hrs
2	6,271 hrs
3	5,970 hrs
4	6,301 hrs

8.2.3 Reduction Gears

The gearboxes fitted on this vessel are Reintjes marine reduction gearboxes with a hydraulically operated clutch for waterjet propulsion. The reduction ratio of the gearbox is 2.828 to 1. Each gearbox is fitted with two Rexroth AV10SO variable displacement hydraulic pumps (see section 8.1.4). The Number 1 & 2 gearboxes have two take-offs, each with an individual pump and Number 3 & 4 gearboxes are fitted with one tandem or dual pump take-off.

8.2.4 Waterjets and Shafting

The waterjets are KaMeWa 90SII units with six-blade impeller (Figure 40).



Figure 40 KaMeWa waterjet on starboard hull

A flanged Cooper Bearing, supplied by Centa, supports the impeller shaft at bulkhead 3. Where the impeller shaft exits the waterjet inlet duct, there is a KaMeWa supplied mechanical water seal. Each waterjet's output is 3,600kW providing a net thrust of 380kN at cruise speed (36.5 knots) and a maximum of 420 kN. Maneuvering time from 30 degrees port to 30 degrees starboard is 7 seconds. The time to go from full ahead to full reverse is 7 seconds as well.

Each water jet consists of a hydraulic (biodegradable oil) power pack and a lube oil (mineral oil) pack. The hydraulic power pack consists of (2) PTO pumps driven by the reduction gear and (1) electric pump. One PTO pump operates the two steering cylinders on the bucket for each water jet and one PTO pump operates the reversing cylinder on the bucket for each waterjet. The electric pump circulates the system oil through a filter and can act as a backup to one of the PTO pumps in an emergency. The PTO pumps are Rexroth AV10SO variable displacement pumps. The lube oil pack consists of (1) electric pump. The pump circulates oil through the water jet bearing. The (2) Port lube oil packs share a circulation pump filter pack and the (2) starboard lube oil packs share a circulation pump filter pack. The filter packs separate water and filter the lube oil.

8.3 Bow Thruster

The vessel is fitted with two bow thrusters, one in each hull located in Thruster Rooms 1 & 2. The bow thrusters are used to aid in maneuvering the vessel during mooring procedures. The bow thrusters are electrically driven by 100 hp motors, with a set of counter-rotating 20" Kaplan style propellers (specifications in Table 7). The maximum thrust generated by each bow thruster is 2716 pounds force.

Table 7 Bow Thruster specifications

Manufacturer	Quantum Marine (Wesmar)
Model	V2-20
Quantity	2
Motor Power	100 HP
Power Supply	480V/60hz/3 phase through Variable Frequency Drive Propeller Material: NiBrAl
Tunnel Material	½" Aluminum
Shafting Material	Stainless Steel

8.4 Heating Plant

The vessel is heated by a combination of hot water heating and electric heating. Hot water is heated electrically by a 200kW inline water heater and circulated via an electric pump to preheaters in the air handling units for heating the passenger and crew spaces. Supplemental electric reheaters are installed in the HVAC ductwork for the accommodation spaces.

Electric unit heaters are installed in the machinery spaces for heating those compartments.

8.5 Steering Systems

The steering system for the waterjets is hydraulic. The system piping is stainless steel tubing and is in excellent condition. No problems were reported with the system.

8.6 Sewage Collection and Treatment Systems

The sewage system is a USCG Type 3 (holding) system. All plumbing and sewage drains are gravity feed into the sewage holding tank. The sewage holding tank is located in compartment #3 and has a capacity of 3,600 gallons. On a daily basis, after route has been completed, the holding tank is emptied using the installed centrifugal macerating pump, to a shore-based disposal location.

8.7 Seawater Piping Systems

8.7.1 Deck Drains and Scuppers

The vessel is fitted with aluminum deck drains, scuppers and piping.

8.7.2 Bilge and Ballast System

The vessel is fitted with twelve electric motor driven submersible bilge pumps. The forepeaks are fitted with hand pumps. A portable submersible pump is located in the starboard Bosun Locker, on the vehicle deck. This pump can be used to assist the other pumps in dewatering, should the need arise. Also, each engine room is provided with emergency bilge suction from the fire main pump.

Bilge piping is 90:10 CuNi and is in excellent condition.

Each compartment served by a bilge pump includes a level switch (alarm) monitored by the IMAC system.

8.7.3 Flushing System

The sanitary flushing system uses seawater supplied by the fire main system.

8.7.4 Seachests

The vessel is fitted with six Seachests, two in each main engine room and one in Compartment 1, and one in Compartment 2. Each Engine Room Seachest provides cooling water to one main engine/reduction gear/shaft seal and one generator, with the aft Seachest in each engine room also supplying water to the fire pumps. The Compartment 1 Seachest serves the deluge pump and Compartment 2 Seachest serves the sprinkler pump and the A/C chiller unit's salt water pump.

8.7.5 Seawater Cooling System

Each main engine and diesel generator are provided with a sea water cooling pump. The discharge side of the main engine sea water cooling pump branches into two lines, one supplying water to the main engine heat exchanger and the other supplying sea water to the reduction gears, water jet shaft seal, and the water jet hydraulic oil power pack, prior to discharging overboard. The generator sea water pump circulates water to the generator heat exchanger and then discharges overboard.

8.8 Freshwater Piping Systems

8.8.1 Freshwater Cooling Systems

Dedicated freshwater cooling systems are provided on each of the four main engines and four generators on the vessel. Systems are supplied via engine attached pumps.

8.8.2 Potable Water System

The potable water system on the *Fairweather* consists of a 1000-gallon potable water tank and two centrifugal pumps to circulate potable water to consumers throughout the vessel. The potable water tank and pumps are located on the port side of the vessel (Figure 41).

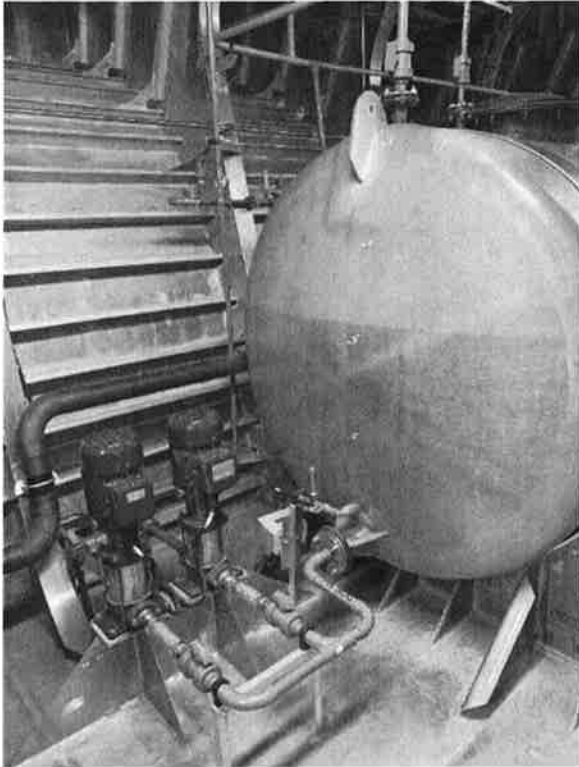


Figure 41 Potable water tank and pumps in Compartment 2

8.9 Fuel and Lube Oil Systems

8.9.1 Fuel Oil System

The fuel system consists of two independent tanks, located in Double Bottom 3 & 4, both port and starboard. The capacity of each tank is 6,900 US gallons. There are two FO Service Pumps in each hull. The FO Service Pump takes suction from the storage tank via a strainer and pumps fuel through the NFV filter to the service tank with a capacity of 265 US gallons. Excess fuel in the service tank returns to the fuel storage tank via overflow piping.

Each Engine has an electro-pneumatic controlled supply valve from the service tank. The fuel passes through a 10-micron pre-filter then connects to the main engine fuel inlet. The two generators in each hull are supplied by a single electro pneumatic controlled supply valve from the service tank.

8.9.2 Lube Oil Systems

8.9.3 Waste Oil Systems

Each engine room and jet room is capable of being serviced by the waste oil/oily bilge system. The waste oil/oily bilge system consists of an air driven diaphragm pump that serves to clean up oily bilge water in the bottom of the engine room and jet room through suction hoses fitted in each space. In addition, the waste oil/oily bilge pump serves to discharge waste oil from the main engines, generators, reduction gears, and water jet hydraulic and lube oil systems.

The discharge of the waste oil/oily bilge pump is to a portable tank cart through fittings on the vehicle deck both port and starboard side where it is taken ashore for disposal.

8.10 Compressed Air Systems

The compressed air system consists of two compressor/receiver units, one in each engine room (Figure 42).

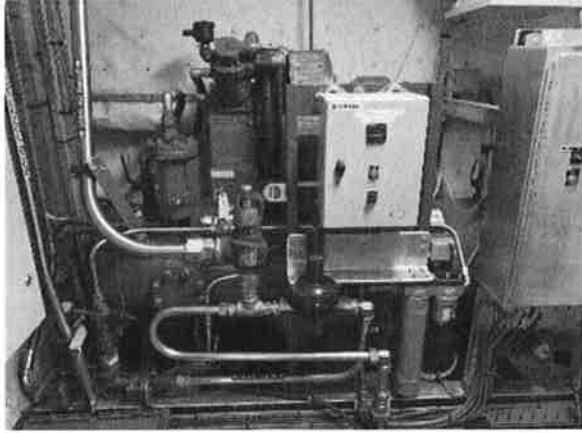


Figure 42 Compressed Air System in Port Engine Room

The compressors operate between 460 psi and 580 psi. The high-pressure air is used to start the main engines. Each compressor unit has a pressure reducing valve set at 120 psi for ship service air. A cross connect pipe, with two cutout valves (one in each engine room) is available if needed.

Receiver capacity is 132 gallons at 580 psi (specifications in Table 8). Compressor operation is controlled and monitored through the IMAC system.

Table 8 Compressed Air Receiver specifications

Manufacturer	Sperre
Model	HL2/90 with 132-gallon high pressure receiver
Quantity	2

8.11 Heating, Ventilation, and Air Conditioning Systems

The vessel is equipped with a central air conditioning system for all normally occupied passenger and crew spaces. This system is centrally monitored and controlled. The Vehicle Deck of this vessel is provided with ventilation to eliminate exhaust fumes, while engine rooms and auxiliary machinery spaces are provided with heating and ventilation to ensure safe and comfortable conditions.

8.11.1 Vehicle Space Ventilation

Four single speed, explosion proof exhaust fans have been installed. Supply air is provided via the open vehicle space doors. The system is not operated while the vessel is underway.

8.11.2 Engine Room Ventilation

Both Engine Rooms (Port and Starboard) are provided with two two-speed supply fans. These fans and their fire dampers are controlled by IMACS. Excess air from each engine room is naturally exhausted via louvres installed on the exhaust pipe trunks at the Bridge Deck level. Again, trunks are protected with fire dampers.

Within the engine rooms, electric blast heaters are provided to maintain temperature above freezing to protect the equipment and piping.

8.11.3 Accommodation Space Ventilation

Three Air Handling Units (AHU) serve the passenger and crew areas:

- **AHU # 1** provides air to the Operating Compartment and crew areas at the Bridge Deck level.
- **AHU # 2** serves fwd part of the vessel (Observation Deck) together with all spaces located within the fwd part of the vessel (electrical spaces, washrooms, etc.).
- **AHU #3** serves aft part of the vessel (Food Court) together with offices, first aid area and food court. This unit also provides air to stairwells and elevator shaft leading to the car deck.

A single pipe system provides cold or hot water to AHU's in order to condition the air. A control system based on outside temperature decides whether to use boiler, chiller, or neither. All units are additionally provided with electric preheaters to eliminate ice formation in the extreme cold weather. To reduce the demand for power, economizer cycle is used on all units. Rate of recirculation will change from full to zero depending on inside and outside conditions. Minimum fresh air supply is ensured by exhaust fans.

8.12 Refrigeration Systems

The food court equipment is fitted with appliances with self-contained refrigeration systems.

8.13 Ride Control System

The Maritime Dynamics, Inc. (MDI) ride control system (RCS) consists of two interceptors, a hydraulic power system, and the ride control system electronics. The system is operated at the system display and control unit and the manual control panel located in the pilothouse (Figure 43).



Figure 43 Ride Control System in Pilothouse

Each interceptor is a movable structure mounted at the transom of each hull. Hydraulic actuators installed on the transom raise and lower the interceptors on command.

The RCS will automatically stow the interceptors when the ahead thrust is reduced to below 30% or when the ship's speed falls below 8 knots. Should the automatic stowing function fail to raise the interceptors to the fully up position, an Emergency Interceptor Stow Switch can be used.

8.14 Elevator Systems

8.14.1 Passenger Elevator

The passenger elevator is a Macgregor MC3000. It is located near midships on the starboard side of the vessel. The elevator serves the Vehicle Deck and the Passenger Deck (Figure 44).



Figure 44 Passenger elevator on Passenger Deck

The Passenger Elevator is in good condition and functions normally. Minor spots and stains are evident on the deck covering and overhead, and minor scratches are evident on the bulkhead (Figure 45). The lighting diffuser is discolored and should be replaced.



Figure 45 Minor spots in overhead of Passenger Elevator

Section 9 Deck Machinery Condition Reports

9.1 Overview

Deck machinery equipment is summarized in this section. No problems have been reported with the deck machinery equipment on the *Fairweather*; all equipment is assumed to be in good to excellent condition.

9.2 Anchor Windlass and Chain

The anchor windlass and chain are in good condition and function normally (Figure 46).

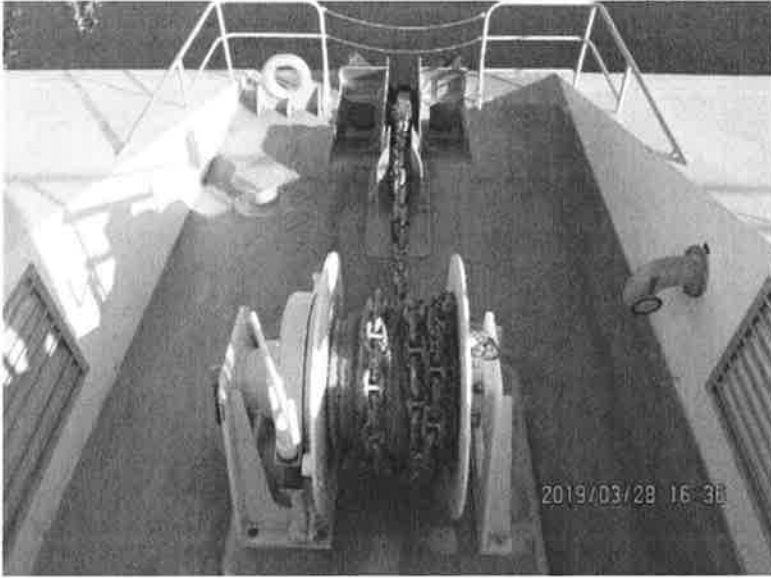


Figure 46 Anchor windlass and chain from Forward Mooring Deck

9.3 Mooring Capstans and Fairleads

Mooring capstans and fairleads in the Solarium (Figure 47) and on the Forward Mooring Deck (Figure 48) are in good condition and function normally. Some paint peeling is evident.

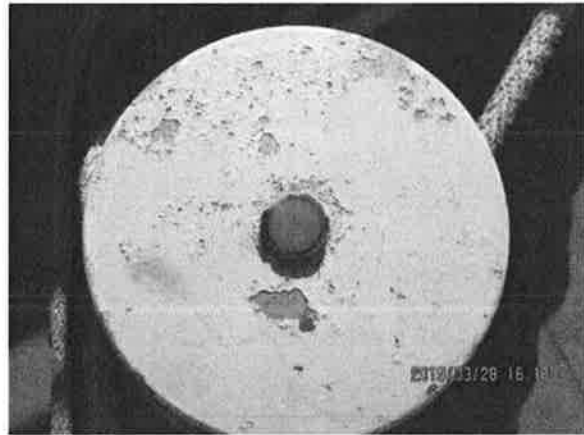


Figure 47 Paint peeling on mooring capstan on Solarium Deck

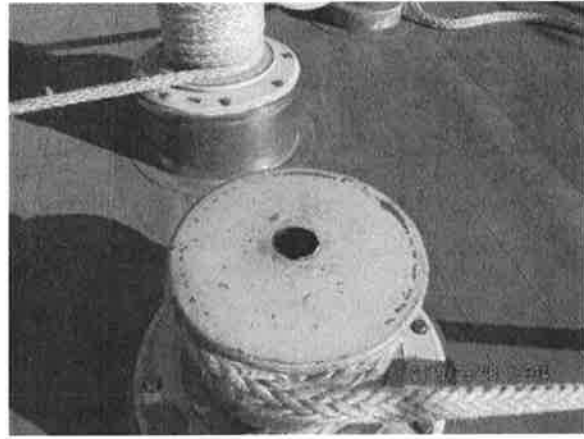
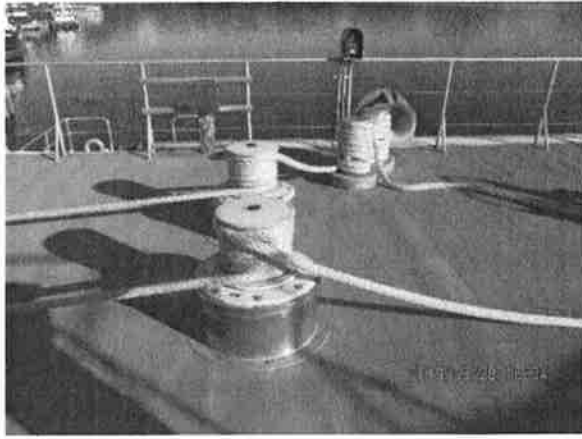


Figure 48 Paint peeling on mooring capstan on Forward Mooring Deck

9.4 Vehicle Loading Doors and Stern Ramp

The vehicle deck cargo doors are both in excellent condition with no visual or reported damage. The stern door system functioned as intended (Figure 49).



Figure 49 Vehicle Deck stern door and controls

Side door operation was not witnessed, but there were no reported issues by the crew regarding function (Figure 50).

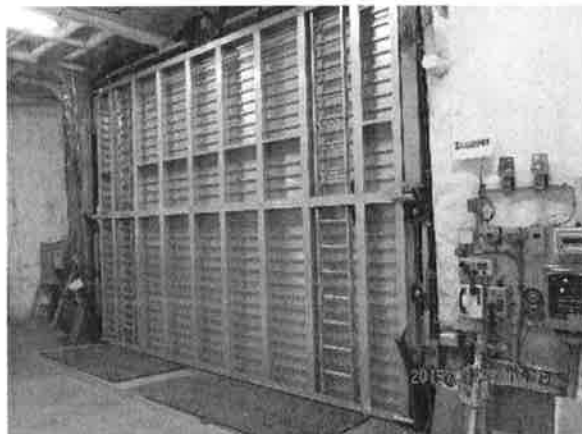


Figure 50 Vehicle deck side door and controls

Section 10 Navigation Equipment Condition Report

10.1 Overview

Navigation equipment is summarized in this section. No problems have been reported with any navigation equipment on the *Fairweather*; all equipment is assumed in good to excellent condition.

10.2 Night Vision System

The vessel is equipped with an FLIR Night Vision System.

10.3 Gyro Compass

The vessel is equipped with an Anschütz Gyro Compass System (Figure 51). This compass is equipped with automatic speed and latitude error correction.



Figure 51 Gyro Compass control in Pilothouse

The ship's magnetic compass is installed in the Operating Compartment on the starboard chart table.

10.4 Voyage Data Recorder (VDR)

The vessel is equipped with a Rutter VDR 100G3/G3S Recorder.

10.5 Display

The vessel is equipped with a Nauticonning-Raytheon Marine Conning Display (Figure 52). The system reads in and adapts navigation and sensor data, performs sensor monitoring and selecting, manages alarms, and displays data.



Figure 52 Nauticonning-Raytheon Marine Conning Display and controls in Pilothouse

10.6 Radar

The vessel is equipped with an NSC Chartradar, ARPA equipped 25kW X-band with 40rpm antenna and two 29" monitors.

10.7 Electronic Charting System (ECDIS)

The vessel is equipped with a Raytheon NSC ECDIS (Figure 53).



Figure 53 ECDIS and controls in Pilothouse

10.8 NAVTEX

The vessel is equipped with a NAVTEX Receiver for the broadcast and automatic receipt of Maritime Safety Information (MSI).

10.9 Autopilot System

The vessel is equipped with the NP2015/2025 Autopilot System. Standard operating features include heading control, track control, rate-of-turn control, and remote operation.

10.10 Weather System

The vessel is equipped with Weather Facsimile Model JAX-9.

10.11 Clocks

The vessel is equipped with one master and five slave clocks manufactured by Franklin. The master is located at the chart table in the Pilothouse. Circuit Breaker L11-5 in the Passenger Service Office supplies power.

10.12 Speed Log

The vessel is equipped with the Walker 7070 Speed Log. This system provides true ship's speed, wind speed, and direction by combining ship speed through water with wind speed and direction along gyro heading data.

10.13 Global Positioning System

The vessel is equipped with a JRC JLR-7800 Global Positioning System (Figure 54).

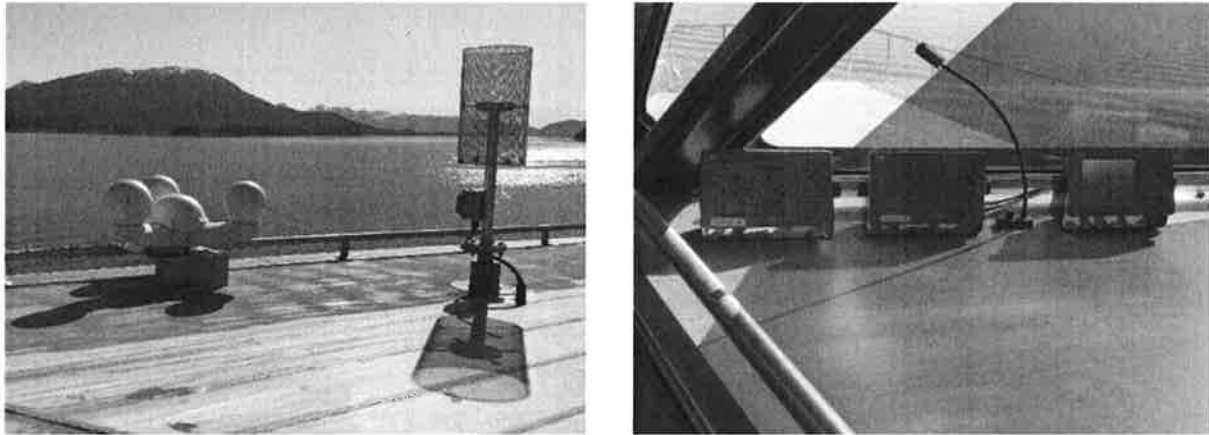


Figure 54 GPS transmitter on top of Pilothouse (left) and GPS systems in Pilothouse (right)

10.14 Echo Sounder

The vessel is equipped with a Raytheon GDS 101 (Graphic Depth Sounder). The system provides inputs for speedlog, compass, navigation receiver, and outputs for repeaters, VDR, printer, alarm panel, and computer system. It features a backlit LC-display and high-resolution dot-matrix screen.

10.15 Searchlights and Navigation Lights

The vessel is equipped with Carlisle & Finch MXE 5111 Searchlight Model XE 9666-ARFV. There are two 1000w Xenon Searchlights located on top of the Pilothouse facing forward. The searchlights are controlled on the bridge at a single station with joystick (Figure 55).



Figure 55 Searchlights on Pilothouse (left); searchlight controls in Pilothouse (right)