

**PREPARATORY SURVEY REPORT  
ON  
THE PROJECT FOR THE IMPROVEMENT  
OF  
DOMESTIC SHIPPING SERVICES  
IN  
THE REPUBLIC OF THE MARSHALL ISLANDS**

**March 2012**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

**FISHERIES ENGINEERING CO.,LTD.**

## PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to Fisheries Engineering Co., Ltd.

The survey team held a series of discussions with the officials concerned of the Government of Marshall Islands, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Marshall Islands for their close cooperation extended to the survey team.

March, 2012

Kiyofumi KONISHI  
Director General,  
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## Summary

### ① Country Profile

The Republic of the Marshall Islands (hereinafter referred to as RMI) is a Pacific island country located between latitude 4° - 14° north, and longitude 160° - 173° east, consisting of widely scattered 5 independent islands and 29 atolls. The total land area is 181 square kilometers, and there are no mountains or rivers, but RMI has a wide exclusive economic zone (EEZ) of 2 million square kilometers. The climate is tropical, with an average temperature around 27°C, which is constant throughout the year.

Almost 60 % of the RMI national revenue is dependent on the economical assistance such as the Compact Grants and the Federal Grant from the United States of America. The GDP grew at a sluggish pace from US\$ 115.8 million in 2001 to US\$ 129.9 million in 2009 and corresponding GDP per capita is US\$ 2,891. The breakdown of GDP shows the government and the public enterprises at 40.7%, the households under the subsistence economy 16.6%, and the private enterprises low at 28.5%.

The population in RMI is 54,310 (2010 projection), almost 70 % of which is concentrated in the urban areas such as the capital, Majuro and the Ebeye in the US Base island Kwajalein and the rest 30 % live in the outer islands. In recent years, effective labor forces in the outer islands have been moving from remote islands to urban areas, leading problems of sustaining island communities and aging society.

The opportunities for earning cash being scarce, copra is only valuable crop for outer islands residents to sell. Copra, which is also the important source of foreign currency revenue of RMI, are transported from outer islands to the processing factory in Majuro by sea transportation and become export products such as coconut oils and copra cake for feedstuff.

### ② Background, history, and basic concept of the requested project

On October 2006, Marshall Islands Shipping Corporation (hereinafter referred to as MISC) was established under the Ministry of Transportation and Communication (hereinafter referred to as MTC) and started to operate vessels of the public sea transportation in RMI waters. Before MISC establishment, MTC had been operating vessels by itself.

MISC currently operates three cargo-passenger vessels named MV Aemman, MV Ribuk Ae and MV Landrik for field trip, which is semi-regular trip between Majuro and outer islands, and the Government of RMI imposes on MISC at least 4 trip services per year to 4 routes, northern,

southern, western and central & eastern routes. MISC cargo-passenger vessels transport passengers and general cargos from Majuro to outer islands, and returns to Majuro carrying passengers and copra. Passengers are mostly Marshallese and their expectations for stable operation of MISC vessels are very high because the public sea transportation is economical way to go back to their home islands, go to businesses and go to boarding schools in outer islands and also the only way to transport copra, which is the main income source for outer islands.

In the fiscal year 2000 (hereinafter referred to as FY, from October 1<sup>st</sup> to September 30<sup>th</sup>), number of boarded passengers were 2,170 persons, and volume of general cargo and copra cargo were 3,053 metric tons and 3,969 metric tons, respectively. Number of passengers varies considerably from year to year, 4,404 persons in FY 2008 and 3,035 persons in FY 2009. In FY 2011, the youth conferences will be held in Majuro and similar number of passengers recorded in FY 2009 is expected. Volume of copra cargo was 4,541 metric tons in FY 2008 and 4,600 metric tons in FY 2009, however, the volume for FY 2010 was 3,969 metric tons, which was down by 14% from FY 2009. MISC vessels transport most of copra from remote islands, about 70% of the RMI, and the transported volume is depending almost on the number of calls to the islands.

It is understood that MISC fleet vessels play an indispensable role to keep the lifelines in their daily life for Marshallese. In spite of the situation, the number of field trips in 2010 decreased due to frequent mechanical troubles on two cargo-passenger vessels, MV Landrik and MV Ribuuk Ae, thereby unstable MISC vessels operations. In the fewer boarding possibility, lesser volume of copra could only be transported and passengers had to be overloaded sometimes.

Recognizing the situation, the Government of the RMI has requested the Japan's Grant aid to procure two cargo-passenger vessels to the Government of Japan in 2008. Japan International Cooperation Agency (hereinafter referred to as JICA) dispatched a survey mission in 2010 to confirm the background of the request such as the necessity of vessels, the conditions of operation, maintenance, etc. The Government of the RMI has resubmitted the application of the project on August, 2010, receiving the result of the mission's study. In response to this request, the Government of Japan decided to implement the survey and JICA dispatched a preparatory survey team to the RMI from January 11th to February 4th, 2011.

MISC had been operating a landing craft named Jeljelat Ae in addition to other three cargo passenger vessels. LC Jeljelat Ae had an important function to transport heavy cargos and bulky

cargoes such as construction equipment and materials from Majuro to the outer islands. Three cargo passenger vessels can only berth at wharves in 3 atolls in the RMI, and, in all other outer islands without any wharves, cargo passenger vessels must anchor away from the shore and transport passengers and cargoes by small workboat with outboard engine between the vessel and seashore, therefore, the RMI side was heavily depending on LC Jeljelat Ae, which can beach ashore and unload heavy cargoes and bulky cargoes direct to the islands. The accident of LC Jeljelat Ae has happened before dawn of January 1st, 2011 and the RMI lost the important means to transport heavy cargoes and bulky cargoes thereby needs immediate help for a new landing craft.

Due to the sudden accident of LC Jeljelat Ae, the RMI side changed their request for Japan's Grant Aid from two MV Aemman type cargo passenger vessels in place of aged two cargo passenger vessels, i.e. MV Landrik and MV Ribuuk Ae, to one cargo passenger vessel and one landing craft.

### ③ Summary of survey results and contents of the project

The Government of Japan decided to implement the preparatory survey and JICA dispatched the preparatory survey team to the RMI from January 11th to February 4th 2011.

From the survey of MV Landrik and MV Ribuuk Ae, which are the vessels originally planned to be replaced by the new vessels under the Japan's grant aid, the survey team found that MV Landrik, 26 years old having many damages, should be replaced as soon as possible, however, MV Ribuuk Ae, 16 years old, can work 10 years or longer if appropriate repair and maintenance are made. As the operation of the three cargo passenger vessels is essential for the island service in the RMI, the three vessel fleet services should be maintained by adding a new cargo passenger vessel to MV Aemman and MV Ribuuk Ae not relying on MV Landrik.

The survey team also surveyed the background of the necessity of a landing craft, and confirmed the urgent need for a landing craft. LC Jeljelat Ae, which can beach from the bow on the sandy beach of outer islands, was the only vessel to be able to transport the heavy construction equipment and materials and the RMI lost this means of transport by the sinking of LC Jeljelat Ae on January, 2011. When LC Jeljelat Ae sunk, she was carrying construction equipment and materials for constructing school in an outer island. The Government of the RMI gives high priority to the public works construction such as school constructions in outer islands for improving social welfare and stressed the urgent need for a new landing craft to restore LC services to the remote islands.

Based on the results of field surveys and analysis after the field surveys, it was concluded that the Japan's Grant Aid cooperation should be for the procurement of a new cargo passenger vessel in place of existing MV Landrik and a new landing craft in place of sunken LC Jeljelat Ae.

In the survey, it was found that all existing MISC vessels have not been docked after the acquisition by MTC and are aging more than normal. The main cause of sinking of LC Jeljelat Ae was found that the hull structure of the bow part bottom had been left damaged. The accident and its cause made the Government of the RMI realizing the importance of regular and proper maintenance for MISC vessels who should undertake public sea transportation safely, and adopted an Act named "the Government Shipping Vessels Maintenance Act, 2011", which establish a fund to ensure the Government's budget support to maintain the MISC vessels. MISC already have received docking fee from the fund, by which MV Landrik and LC Ribuuk Ae have drydocked in Fiji in August 2011. Therefore, it is expected that the new two vessels by the Project will have a proper maintenance by the fund.

Based on the results of the survey, JICA carried out a outline design study in Japan including hull design and specifications, shipbuilding schedule and a estimation of the project cost, and then dispatched a team to the RMI for the explanation of the outline design, procedures of the project implementation including the responsibilities on the RMI side in the Project, for the period from September 3 to September 11. The RMI side was satisfied and agreed with the explanation.

The capacity of the new cargo passenger vessel is decided from the cargo weight of copra transported by MV Landrik adding a future demand increase in 10 years after hand over.

The capacity of the new landing craft is decided from the deadweight of LC Jeljelat Ae adding a future demand increase in 10 years after hand over.

	New cargo passenger type vessel	New landing craft type vessel
Number of vessel	1	1
Length overall (m)	49.85	44.09
Breadth, molded (m)	9.00	10.80
Depth, molded (m)	5.15	3.00
Gross tonnage (international)	580	463
Deadweight (t)	525	300
Cargo hold volume (m <sup>3</sup> )	656	77
Passenger capacity (persons)	150	50

	New cargo passenger type vessel	New landing craft type vessel
Crew (persons)	18	12
Main engine (kW)	441	882 (441×2)

④ Project period and project cost estimation

The schedule and the Project cost to implement the project on the basis of Japan's Grant Aid cooperation will be:

		Cargo passenger type vessel	Landingcraft type vessel
<b>Schedule</b>			
	Detail design phase, From the Exchange of Notes to the tendering/shipbuilding contract	2.5 months	2.5 months
	Building phase, From the contract to the delivery in the RMI, including shipbuilding and transport to the RMI	14.0 months	13.5 months
	Total timeframe	16.5 months	16.0 months
<b>Cost at the RMI side</b>			
	Bank commissions etc.	JPY 1,290,000	

⑤ Project evaluation

Public sea transportation in the RMI is the lifelines in their daily life for Marshallese. To maintain the cargo passenger transportation system in the entire RMI, services by the three cargo passenger vessels are essential. At present MV Landrik is aged and in such a condition that safe and stable operation will not be expected, therefore, the procurement of a new cargo passenger vessel in place of MV Landrik is necessary to maintain safe and stable sea transport services. On the other hand, the procurement of new landing craft in place of sunken LC Jeljelat Ae is also in urgent need because the RMI Government lost their means to transport heavy construction equipment and bulky materials by the sinking of the LC Jeljelat Ae. Public sea transportation also play an important role to transport Copra, which is important source of earning cash for the people in the outer islands. The Project will certainly contribute to promoting "Development of the Outer Islands", an objective raised in the National Development Plan of the RMI.

The Project vessels, which will have to resolve the problems of existing MISC vessels, must be of design and construction for realizing safty, comfort, eco-friendliness and fuel economy. It is concluded, therefore, that the implementation of the Project under the grant aid cooperation

by Japan employing shipbuilding technology and industries of Japan is appropriate.

The aim of the Project is to restore and maintain the sea transport capacity in the RMI. After the commissioning of the new vessels under the Project, all MISC vessels including the new vessels are altogether expected to attain almost same level of transport record in FY 2009, e.g. annual servicing days, annual number of charters and annual copra cargo volume. From a qualitative view, it is expected to improve safety, comfort on board and convenience by increasing number of field trips making island people less anxious in their life through the stable operation of MISC vessels.

Finally, it is concluded that the Project is validated and effective.



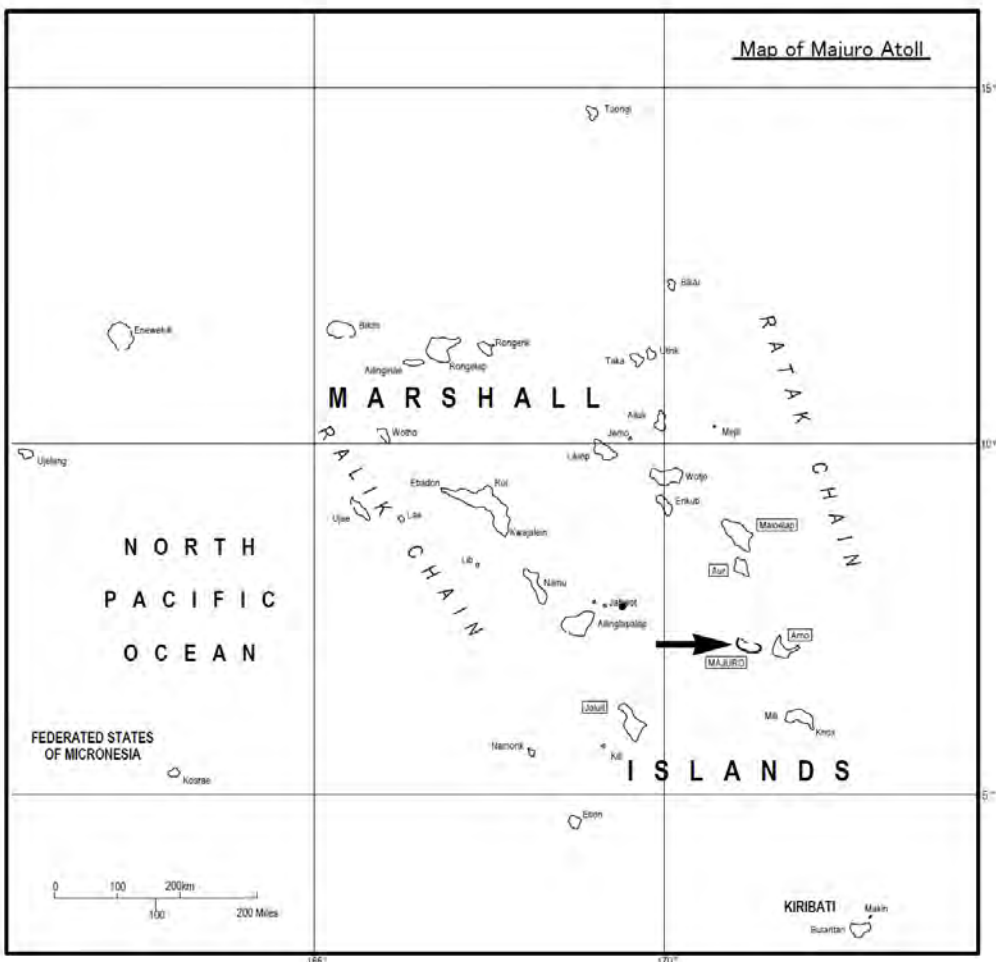
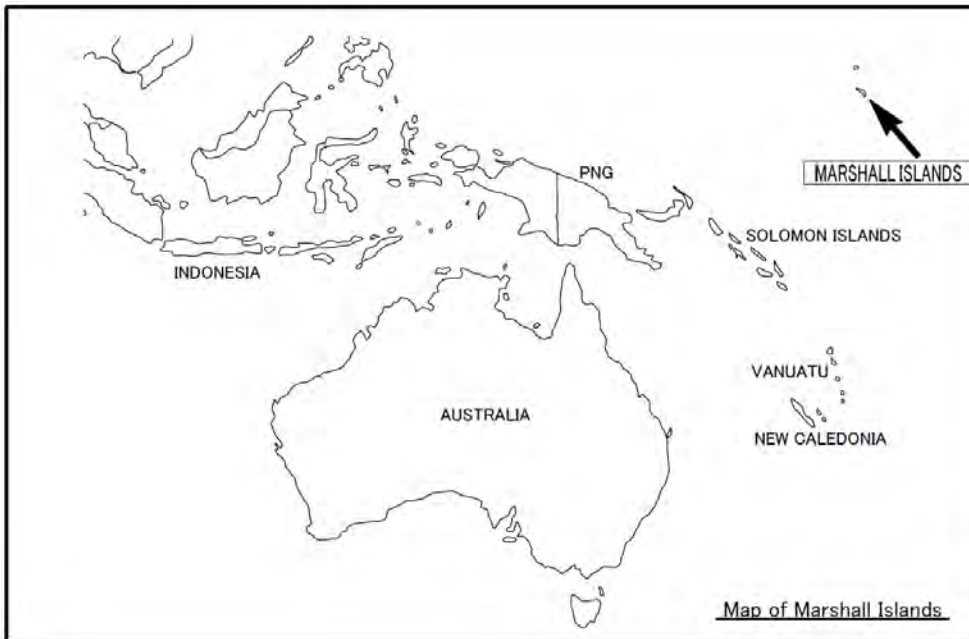
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Perspective (Cargo-Passenger Type Vessel)



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## Abbreviations

AIS	Automatic Identification System
CPax	Cargo-passenger type vessel
DWCR	Domestic Watercraft Regulations
EPIRB	Emergency Position Indicating Radio Beacon
FRP	Fiber Reinforced Plastics
GDP	Gross Domestic Product
GMDSS	Global Maritime Distress and Safety System
GNDI	Gross National Disposable Income
GPS	Global Positioning System
IMO	International Maritime Organization
JICA	Japan International Cooperation Agency
LC	Landing craft type vessel
MF/HF	Medium Frequency/High Frequency
MTC	Ministry of Transportation and Communication
MISC	Marshall Islands Shipping Corporation
NAVTEX	Navigational Telex
NOx	Nitrogen oxide
PMP	Preventive Maintenance Policy
RMI	Republic of Marshall Islands
SART	Search and Rescue Radar Transponder
SOLAS	International Convention for the Safety of Life at Sea
SPC	The Secretariat of the Pacific Community
SRNCV	Safety Regulations for Non-Convention Vessels
VHF	Very High Frequency

## CHAPTER 1. Background of the Project

### 1-1. Background of the Project

Cargo and passenger transport in the Republic of the Marshall Islands as the lifeline for Marshallese is mostly undertaken by the Marshall Islands Shipping Corporation (hereinafter referred to as MISC). However, shipping services to outer islands have decreased in recent years because the mechanical troubles of existing cargo-passenger vessels have frequently occurred and the operation of MISC vessels became unstable. Under the situation, MISC vessels were overloaded with passengers per trip and transported lesser volume of copra cargo (island products) than before and the Government of the Republic of the Marshall Islands recognized that the situation should be improved.

In order to improve such unstable conditions of sea transport by MISC vessels, the Government of the Republic of the Marshall Islands has requested for the Japan's Grant aid to procure two cargo-passenger vessels to the Government of Japan in 2008. Japan International Cooperation Agency (hereinafter referred to as JICA) dispatched a survey mission in 2010 to confirm the background of the request such as the necessity of vessels, the conditions of operation and maintenance, etc. The Government of the Republic of the Marshall Islands has resubmitted the application of the project on August, 2010, receiving the result of the mission. In response to this updated request, the Government of Japan decided to implement the survey and JICA dispatched a preparatory survey team to the Republic of the Marshall Islands for the period from January 11th to February 4th, 2011.

Because of the sinking of LC Jeljelat Ae occurred before the dawn of January 1st, the Government of the Republic of the Marshall Islands changed their request for Japan's Grant Aid from two cargo passenger vessels to one cargo passenger vessel and one landing craft.

From the survey of MV Landrik and MV Ribuuk Ae, which are the vessels originally planned to be replaced by the new vessels under the Japan's grant aid, the survey team found that MV Landrik, 26 years old having many damages, should be replaced as soon as possible, however, MV Ribuuk Ae, 16 years old, can work 10 years or longer if appropriate repair and maintenance are made. As the operation of the three cargo passenger vessels is essential for the island service in the Republic of the Marshall Islands, it was understood that the three vessel fleet services should be maintained by adding a new cargo passenger vessel to MV Aemman and MV Ribuuk Ae not relying on MV Landrik.

The survey team also surveyed the background of the necessity of a landing craft, and confirmed the urgent need for a landing craft.



Three cargo passenger vessels can only berth at wharves in 3 atolls in the Republic of the Marshall Islands, and, in all other outer islands without any wharves, cargo passenger vessels must anchor away from the shore and transport passengers and cargos by small workboat with outboard engine between the vessel and seashore, therefore, the Republic of the Marshall Islands side was heavily depending on LC Jeljelat Ae, which can beach ashore and unload heavy cargoes and bulky cargoes direct to the islands. The accident of LC Jeljelat Ae has happened before dawn of January 1st, 2011 and the Republic of the Marshall Islands lost the important means to transport heavy cargos and bulky cargoes.

When LC Jeljelat Ae sunk, she was carrying construction equipment and materials for constructing school in an outer island. The Government of the Republic of the Marshall Islands gives high priority to the public works construction such as school constructions in outer islands for improving social welfare, and thereby needs of the LC type vessels were important for the purpose. There are LC type vessels belonging to commercial shipping companies but they are mostly used for their own services not sufficient to cover the loss of LC Jeljelat Ae. The Republic of the Marshall Islands is, therefore, in urgent need for a new landing craft to restore LC services to the remote islands.

Following is the summary of the survey results.

#### (1) New cargo passenger vessel

MV Landrik is the vessel to be replaced with the new cargo passenger vessel, which should have a transport capacity and specifications equivalent to MV Aemman, who is the most satisfactory vessel in MISC. Although the design and construction of MV Aemman generally adapts to the cargo passenger services for remote islands, the survey team found that following considerations on the vessel capacity and designs.

- Capacity of the copra cargo hold: about 660 m<sup>3</sup> (greater than MV Landrik by about 10%, i.e. equivalent to that of MV Aemman)
- Passenger capacity: about 150 passengers (greater than MV Landrik by about 10%, i.e. equivalent to that of MV Aemman)
- Improvement of deck passenger space: To secure seating area appropriate to the number of passengers
- Improvement for fuel economy: To adopt hull shape of lesser water resistance
- Improvement of stability: To increase hull breadth by 0.5m for better stability
- Improvement of cargo gear: To adopt auxiliary cargo lifting device to compensate blind areas of the main cargo gears
- Others

	New cargo passenger vessel	MV Aemman (Requested type by the RMI)	MV Landrik
Length overall (m)	49.85	48.5	48.2
Breadth, molded (m)	9.0	8.5	8.0
Depth, molded (m)	5.15	5.20	4.9
Gross tonnage (international)	580	534	500
Deadweight (t)	525	547	467
Cargo hold volume (m <sup>3</sup> )	656	656	600
Passenger capacity (persons)	150	150	140
Crew (persons)	18	18	17
Main engine (kW)	441	440	368

(2) New landing craft type vessel

LC Jeljelat Ae is the vessel to be replaced with the new landing craft type vessel, which should have a transport capacity and specifications equivalent to LC Jeljelat Ae. However, LC Jeljelat Ae was of simple construction built in Majuro, where construction facilities had been limited, and thereby it was recognized that the new landing craft type vessel should be of design and construction employing updated shipbuilding technology. The survey team found that following considerations on the vessel capacity and designs.

- Deadweight capacity: about 300 tons (greater than LC Jeljelat Ae by about 10%)
- Passenger capacity: about 50 persons (same as LC Jeljelat Ae)
- Bow bottom structure subjected to beaching pressure: heavy construction to withstand repeated beaching stress.
- Overall strength: sufficient strength to withstand sea load in deep seas
- Improvement for fuel economy: To adopt hull shape of lesser water resistance and lesser sea impact on the bow
- Improvement of deck passenger space: To secure seating area appropriate to the number of passengers
- Adequate cargo handling gear: to install a crane which covers most of the cargo deck area
- Others

	New landing craft	LC Jeljelat Ae
Length overall (m)	44.09	41.00
Breadth, molded (m)	10.80	10.00
Depth, molded (m)	3.00	2.70
Gross tonnage (international)	463	375
Deadweight (t)	300	270
Cargo hold volume (m <sup>3</sup> )	77	None
Passenger capacity (persons)	50	50
Crew (persons)	12	12
Main engine (kW)	882 (441×2)	936 (312×3)

### (3) Additional procurement of liferafts for existing MISC vessels

On board the MISC vessels are liferafts and life jackets for passengers and crew. Each vessel carries life jackets covering the complement number of each vessel, but the capacity of liferafts, main means of survival at sea in case of accident, is considerably lower than the complement, and besides maintenance of liferafts has not been done for 10 years or longer.

When LC Jeljelat Ae sunk on January 2011, liferafts once inflated but about 5 hours later deflated. People on the liferafts could barely survive grabbing timbers released from the sunken Jeljelat Ae.

Condition of liferafts on board the MISC existing vessels are, as realized above, poor situation, unreliable and insufficient in capacity, which cannot be overlooked as the life saving apparatus for vessels carrying passengers.

Considering the importance of those failures of existing vessels' safety equipment, liferafts of MISC existing vessels should be procured by the Project, not only those for new vessels.

Capacity of liferafts to be procured by the Project should be those corresponding to the aggregate persons including all passengers, for MV Aemman and MV Ribuuk Ae. The liferafts procured for MV Landrik should be of capacity corresponding to the vessel crew only, understanding that the vessel will no longer engage in passenger transport service after the new vessels have come to service.

### (4) Vessel maintenance fund

MISC vessels haven't been drydocked almost at all after acquiring vessel due to lack of the government budget (more than 10 years for MV Landrik and MV Ribuuk Ae), and the survey team realized that corrosion of bottom hull must be considerable and thick seaweed can affect fuel consumption considerably.

From the accident of LC Jeljelat Ae, however, the Government of the RMI realized the importance of the vessel maintenance, and adopted an Act named "the Government Shipping Vessels Maintenance Act, 2011", which establish a fund to ensure the Government' budget support to maintain the MISC vessels. MISC already has received docking fee from the fund, by which MV Landrik have drydocked in Fiji in August 2011. It is understood that the system to give proper maintenance to vessels for the public sea transport services has favorably started.

The Act is shown in the Appendices 5-3.

### 1-2. Natural condition of the project site

Having found no statistical data on wave height in the seas around the RMI because the Government of the RMI does not carry out wave height measurement around the country, the wave height statistics were obtained from the database provided by the National Maritime

Research Institute of Japan. The wave height was measured by the GEOSAT and TOPEX/POSEIDON satellites, which supply wave height statistics around the world.

Domestic vessels of the RMI are sailing deep seas between islands of the RMI, scattered widely in the South Pacific. Distance between islands is within 200 nautical miles, which is equivalent to sea area of “Limited Greater Coasting” in the maritime regulations of Japan.

Wave statistics of sea areas around the RMI and Hachijyo Island in Japan are shown below. The most probable significant wave height in the RMI sea area and Hachijyo Island in Japan are 1.9 m and 2.2 m, respectively. Therefore, compared with the sea areas around Japan, it was assumed that the sea areas around the RMI are a bit calm.

Area No.	Spring	Summer	Autumn	Winter	Year
↑ Wave Height ↓	Appearance rate				
Sum	Number of Sample				
	The most probable significant wave height				

Sea area around the RMI

A71	Spring	Summer	Autumn	Winter	Annual
19.75-	0.0000	0.0000	0.0000	0.0000	0.0000
18.75-	0.0000	0.0000	0.0000	0.0000	0.0000
17.75-	0.0000	0.0000	0.0000	0.0000	0.0000
16.75-	0.0000	0.0000	0.0000	0.0000	0.0000
15.75-	0.0000	0.0000	0.0000	0.0000	0.0000
14.75-	0.0000	0.0000	0.0000	0.0000	0.0000
13.75-	0.0000	0.0001	0.0000	0.0000	0.0000
12.75-	0.0001	0.0002	0.0000	0.0000	0.0001
11.75-	0.0002	0.0004	0.0001	0.0001	0.0002
10.75-	0.0004	0.0009	0.0003	0.0003	0.0005
9.75-	0.0005	0.0007	0.0006	0.0004	0.0005
8.75-	0.0005	0.0006	0.0004	0.0004	0.0005
7.75-	0.0004	0.0006	0.0002	0.0002	0.0004
6.75-	0.0003	0.0009	0.0003	0.0003	0.0005
5.75-	0.0007	0.0026	0.0006	0.0007	0.0011
4.75-	0.0012	0.0030	0.0011	0.0010	0.0015
3.75-	0.0024	0.0121	0.0018	0.0078	0.0060
2.75-	0.0203	0.0863	0.0264	0.0340	0.0403
1.75-	0.5653	0.4686	0.4062	0.6267	0.5279
0.75-	0.4074	0.4227	0.5576	0.3273	0.4194
0-	0.0003	0.0004	0.0044	0.0007	0.0012
TOTAL	72572	54835	47867	64300	239574
	1.8823	2.0020	1.7458	1.9527	1.9013

Sea area around Hachijyo Island in Japan

A29	Spring	Summer	Autumn	Winter	Annual
19.75-	0.0000	0.0000	0.0000	0.0000	0.0000
18.75-	0.0000	0.0000	0.0000	0.0000	0.0000
17.75-	0.0000	0.0000	0.0000	0.0000	0.0000
16.75-	0.0000	0.0000	0.0000	0.0000	0.0000
15.75-	0.0000	0.0000	0.0000	0.0000	0.0000
14.75-	0.0000	0.0000	0.0000	0.0000	0.0000
13.75-	0.0000	0.0000	0.0001	0.0000	0.0000
12.75-	0.0000	0.0000	0.0000	0.0000	0.0000
11.75-	0.0001	0.0000	0.0004	0.0001	0.0001
10.75-	0.0001	0.0002	0.0008	0.0004	0.0003
9.75-	0.0002	0.0004	0.0009	0.0001	0.0003
8.75-	0.0002	0.0011	0.0004	0.0004	0.0004
7.75-	0.0001	0.0008	0.0014	0.0014	0.0009
6.75-	0.0002	0.0005	0.0012	0.0031	0.0013
5.75-	0.0000	0.0012	0.0031	0.0052	0.0024
4.75-	0.0052	0.0027	0.0083	0.0233	0.0110
3.75-	0.0283	0.0072	0.0497	0.0886	0.0479
2.75-	0.1297	0.0559	0.1383	0.2441	0.1552
1.75-	0.5226	0.2503	0.3589	0.4870	0.4362
0.75-	0.3043	0.6026	0.4195	0.1442	0.3246
0-	0.0092	0.0772	0.0172	0.0023	0.0192
TOTAL	18204	8475	10985	16792	54456
	2.1409	1.6072	2.1127	2.6416	2.2066

### 1-3.Environmental and social considerations

#### (1) Measures to prevent marine pollution

The new vessels, which are procured under this project are of size similar to the existing vessels and use same port facilities as they are, will not give any change on the environment.

Regarding vessel system to control marine pollution, refer to 2-20(13) and 2-35(15) for CPax and LC respectively.

#### (2) Measures to reduce exhaust gas emission

The new vessels should be designed considering hull form of low water resistance, highly efficient propellers and fuel efficient diesel engines, so that low fuel oil consumption, operation economy and low exhaust gas emission are achieved.

## CHAPTER 2. Contents of the Project

### 2.1. Basic Concept of the Project

#### (1) Overall goal and Project Purpose

Life of the people of Republic of the Marshall Islands (hereinafter referred to the RMI) depends greatly on the sea transport as the lifeline. The RMI Government takes up development of remote islands as the matters to be dealt with strategically as referred to in their national development plan “VISION2018”, in which improvement of inter-island transport services including sea transport to support improvement of remote island people’s life is placed as the priority task.

In the RMI, inter-island cargo passenger sea transport has been undertaken by the Marshall Islands Shipping Corporation (hereinafter referred to MISC) under the Ministry of Transportation and Communication (hereinafter referred to MTC) from October 2006. MISC has been operating three cargo passenger vessels (CPax vessels: MV Aemman, MV Ribuuk Ae and MV Landrik) and one landing craft (LC vessel: LC Jeljelat Ae) who undertakes transport of construction materials and heavy vehicle, but on January 1<sup>st</sup> 2011 LC Jeljelat Ae sunk and now MISC is operating three cargo passenger vessels only. In those three vessels, MV Landrik is 26 years old, so deteriorated as to be laid up from August 2010 to February 2011 due to machinery breakdown. MV Landrik has not been drydocked since 2000 when MTC procured her as a secondhand vessel.

When MV Landrik has been out of service, other three vessels (MV Aemman, MV Ribuuk Ae and LC Jeljelat Ae) operated as much as possible to cover MV Landrik job, but could not cover well. Consequently island people have suffered from poor sea transport services. Besides, by the loss of LC Jeljelat Ae on January 1<sup>st</sup> 2011, the RMI lost the function to transport construction materials and heavy vehicles. Thus, inter-island sea transport services in the RMI has become quite below the necessary level.

This project intends, considering the abovementioned situation in the RMI, to build one cargo passenger vessel (to be called the “New CPax Vessel”) of appropriate capacity in place of MV Landrik and one landing craft vessel (to be called the “New LC Vessel”) of appropriate capacity in place of sunken LC Jeljelat Ae. The New Vessels will offer safe and reliable means of sea transport to the RMI, and thereby promote improvement of the island life as directed by the “VISION2018”.

#### (2) Outline of the Project

This project is to build a New CPax Vessel and a New LC Vessel and to procure vessel related equipment (to be called the “Equipment”), by which it is expected that the capacity of sea transport services in the RMI be recovered and sustained, that safety of sea transport in the RMI be secured, and that improvement of island life as directed by the “VISION2018” be promoted.

## 2.2. Outline Design of the Japanese Assistance

### 2.2.1. Design Policy

#### 2.2.1.1. Basic Plan (Construction Plan / Equipment Plan)

The New Vessels should be designed, to improve sea transport services in the RMI; to have appropriate passenger and cargo transport capacity; to navigate safely at sea; to be environment friendly; to be economical in operation; to have appropriate passenger facility; to be efficient in cargo operation; to be durable; and to be maintenance friendly, as follows..

##### (1) Passenger and cargo carrying capacity

Studying passenger, general cargo and copra cargo statistics of existing MISC vessels, the capacity for the New Vessels should be determined.

##### (2) Safety Regulations

Any vessels must be designed and built applying safety regulations of the flag administration, or other appropriate safety regulations as recognized by the flag administration. It was decided by the RMI that the Domestic Watercraft Regulations (DWCR) as the RMI maritime regulations and further Safety Regulations for Non-Convention Vessels (SRNCV) in Oceania waters adopted by Oceania countries on 2003, covering stability, fire protection, firefighting, lifesaving, safety radio, etc. should apply to the New Vessels.

##### (3) Environment Friendliness

MARPOL regulations (International Convention for the Prevention of Pollution from Ships, 1973) ratified by the RMI is to apply. An oily water separator to clean oily bilge water in engine room, control of sewage water from toilets, and low NOx emission diesel engines should be installed on board the New Vessels.

##### (4) Operation Economy

In designing the New Vessels, their hull forms should be so optimized as to minimize water resistance, and their propulsion efficiencies should be improved by adopting slower spinning large diameter propeller, thereby lower fuel oil consumption.

The main engines should be selected considering lower fuel oil consumption.

##### (5) Accommodation

Despite long sailing days lasting weeks, no adequate accommodation spaces are being arranged in the existing vessels and it has been common for passengers to sit on cargo deck area. In the New Vessels, the passenger spaces should be improved applying the standard area per passenger specified by the Japanese maritime regulations, i.e. one square meter per passenger.

(6) Durability and Maintenance

Durability of vessels depends on material itself and/or on maintenance.

Rusting of seawater pipes represents the former case. In the New Vessels, all seawater cooling pipes (steel) will be of plastic coated inside to prevent rusting of seawater pipes.

Diesel engine represents the latter case. In the New Vessels, Preventive Maintenance Policy (PMP) will be adopted. PMP calls for overhauling and maintenance regularly notwithstanding breakdown or malfunction, aiming for no sudden machinery breakdown thereby longer life. Machinery parts necessary for PMP will be procured by the Project.

(7) Procurement of Liferrafts for Existing MISC Vessels

Capacity of liferafts to be procured by the Project should be those corresponding to the aggregate persons including all passengers, for MV Aemman and MV Ribuuk Ae. The liferafts procured for MV Landrik should be of capacity corresponding to the vessel crew only, understanding that the vessel will no longer engage in passenger transport service after the new vessels have come to service.

2.2.1.2. Study on the Capacity of the New Vessels

(1) Statistic based study

As shown next Table 1, types of operation are different in the existing three CPax vessels (MV Aemman, MV Ribuuk Ae and MV Landrik) and LC vessel (LC Jeljelat Ae).

Table 1: Number of trips of MISC vessels (FY2007-FY2010)

	Aemman (F)	Aemman (C)	Ribuuk Ae (F)	Ribuuk Ae (C)	Landrik (F)	Landrik (C)	Jeljelat Ae (F)	Jeljelat Ae (C)
FY2007	16	2	15	5	11	1	4	13
FY2008	14	7	18	8	13	5	1	49
FY2009	11	2	16	3	8	0	5	26
FY2010	10	1	12	3	6	0	5	23

F : Field trip, C : Charter trip

Number of Field trips is based on operational report from MISC

Number of Charter trips of each MISC vessels and Number of Field and charter trips in FY2007 are based on MISC accounting data.

Three CPax vessels have been mainly transporting passengers, general cargos and copra cargoes by field trip between Majuro and outer atolls once a month and are chartered irregularly by a charterer a few times a year.

On the other hand, LC Jeljelat Ae has been engaging mainly in charter trips transporting fuel oil of bulky quantity, heavy construction equipment and materials and bulky cargoes twice a month, and engaging in field trips to back up other cargo-passenger vessels five times a year in the last 2 years.

Domestic shipping services in Marshall Islands have been depending almost on the existing MISC vessels. Among them, however, operating days of aged MV Landrik had declined and MISC couldn't keep their transport capacity to maintain field trip services. Additionally, by the loss of LC Jeljelat Ae on January, 2011, MISC has lost the function to transport heavy construction equipment and bulky cargoes to outer Islands.

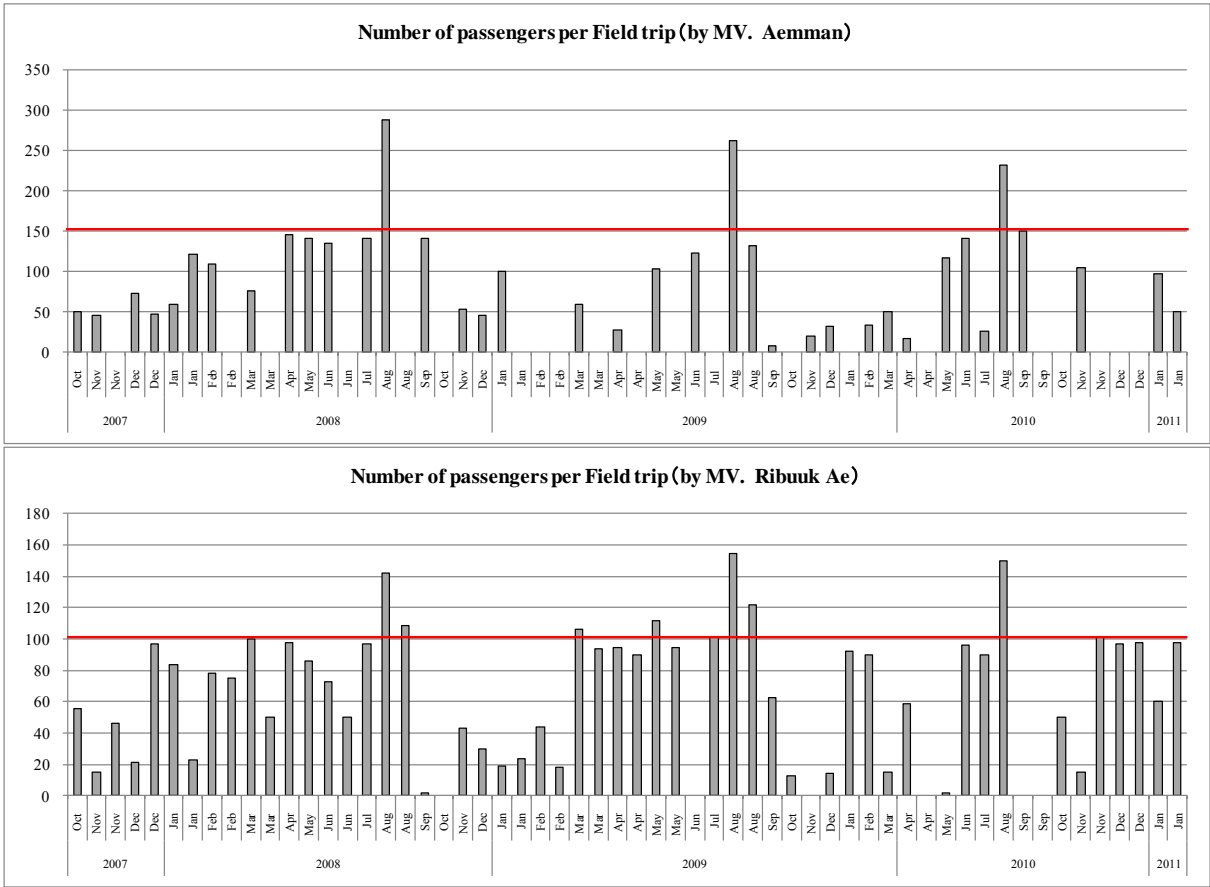


Under the circumstance, aged MV Landrik should be replaced by the New CPax Vessel, whose capacity should be so determined as to cover the transport capacity of MV Landrik, and besides the capacity should cover increase of the transport demand in the appropriate future, which should be about 10 years, when MV Ribuuk Ae will come to an age of retire and capacity of entire MISC fleet will have to be adjusted. Peak demands, e.g. by traveling of students at semester ends and traveling of conference participants, should be coped with by the extra voyages and by the backup of LC vessel. Capacity of the New CPax Vessel should be determined from the transport capacity of copra, i.e. cargo hold volume to carry copra on board as the predominant indicator for the cargo-passenger vessel in field trip services.

Capacity of the New LC Vessel should cover the transport capacity of LC Jeljelat Ae, who had been working well clearing charter demands and occasionally for field trip services, and besides should cover increase of the transport demand in the appropriate future, same as the New CPax Vessel. Though passenger transport is not the main duty of the LC vessel, function to backup passenger transport of CPax vessels is necessary. Minimum facility to carry passengers should be provided for the New LC Vessel.

(2) Passenger transport capacity for the New Vessels

Number of passengers per field trip by each three CPax vessels is as shown below.



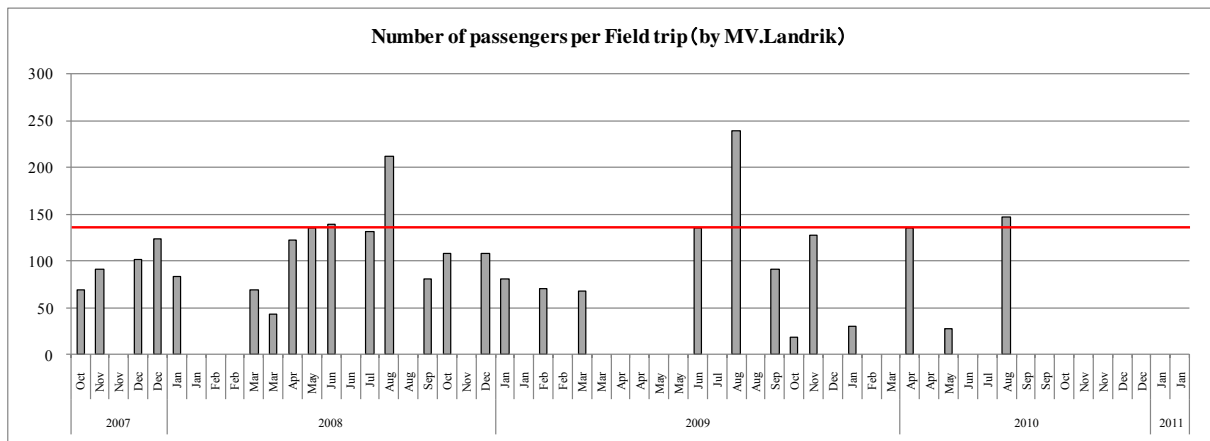


Figure 1 : Number of passengers per Field trip by each MISC vessel

Above passenger transport statistics show number of passengers is low usually, but peaks (red bars) are high, i.e. about 150, 100 and 140 passengers on board MV Aemman, MV Ribuuk Ae and MV Landrik, respectively. High peaks on August are by students returning to school in remote islands for new semester.

It should be concluded, according to above statistics, that the passenger capacity of the New CPax Vessel bases on 140 persons as the indicator which is the capacity of MV Landrik shown by the statistics. The RMI Administration may consider extra passengers on board at peak time e.g. on August by adding safety equipment on board.

Passenger capacity of LC Jeljelat Ae was 50 persons. No detailed passenger statistics exist but she had been carrying 50 ~ 190 passengers in one charter trip in 2008 – 2010. To carry 190 passengers, part of cargo deck had been specially prepared: erecting walls by containers, laying cargo pallets on deck, covering canvas at top, and carrying extra life jackets.

As stated in the preceding section (1) Statistic based study, though the passenger transport is not the main duty of the LC vessel, passenger transport backing up CPax vessel is the important role of LC vessel, and the minimum capacity to carry passengers, i.e. same capacity as sunken LC Jeljelat Ae, should be given to the New LC Vessel. Adding function to carry such small number of passengers for the New LC Vessel does not affect size of the LC vessel hull. Accordingly, it should be concluded that the passenger capacity of the New LC Vessel bases on the indicator of 50 persons same as LC Jeljelat Ae.

### (3) Cargo transport capacity of the new CPax Vessel

#### ① General Cargo Volume statistics

Following figures show general cargo volume per field trip by each MISC vessels for last 3 years.



Table 2 : General cargo volume per field trip by LC Jeljelat Ae

(Unit: Metric ton)

Year. month	'08.8	'09.3	'09.6	'09.11	'10.6	'10.8	'10.9	'10.11	'10.12
Cargo volume	15.1	45.0	16.0	10.3	19.7	12.4	24.6	11.6	196.8

As shown above, LC Jeljelat Ae normally has been carrying 50 t or less, but on December, 2010, she transported about 200 t.

Compared to copra volume per a field trip, shown in the following section, general cargo volumes carried on board CPax vessels are less than the copra volume, and may not be dealt with as a predominant indicator to determine capacity of the new CPax vessel.

## ② Copra transport volume

Annual copra cargo volume by MISC vessels are as shown on the following table.

Table 3 : Annual Copra Cargo Volume by MISC vessels

(Unit: Metric ton)

FY	MV Aemman	MV Ribuuk Ae	MV Landrik	LC Jeljelat Ae	Total	Number of trips
2007	1,948	747	1,018	153	3,866	39
2008	1,956	1,173	1,413	0	4,541	44
2009	1,740	1,087	1,532	241	4,600	38
2010	1,629	948	1,103	289	3,969	28

From 2007 to 2010, annual copra volumes have decreased along with the decrease of number of trips. On the other hand, copra volumes carried in one trip have so increased as to compensate decreased number of trips, and in 2010, transported copra volumes of three MISC CPax vessels in one trip have become almost 100% of cargo hold capacity of each vessel, as shown on the next graph: Average Copra Cargo Volume per trip by each MISC Vessel (FY2007 - FY2010).

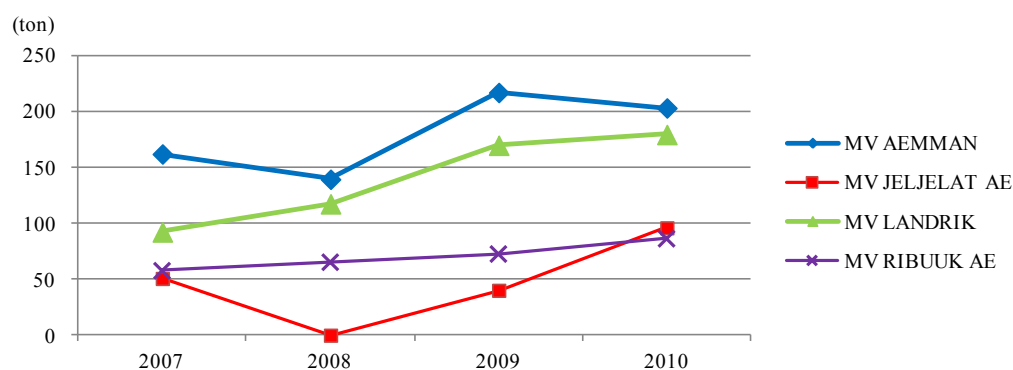


Figure 3 : Average Copra Cargo Volume per trip by each MISC Vessel (FY2007-FY2010)

Annual copra cargo volumes and number of copra trips by each MISC vessel are as shown on the

following graphs.

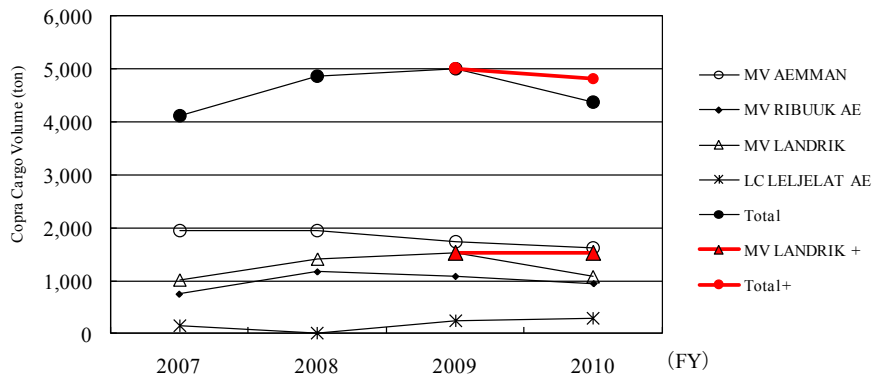


Figure 4: Annual Copra Cargo Volume by each MISC Vessel (FY2007-FY2010)

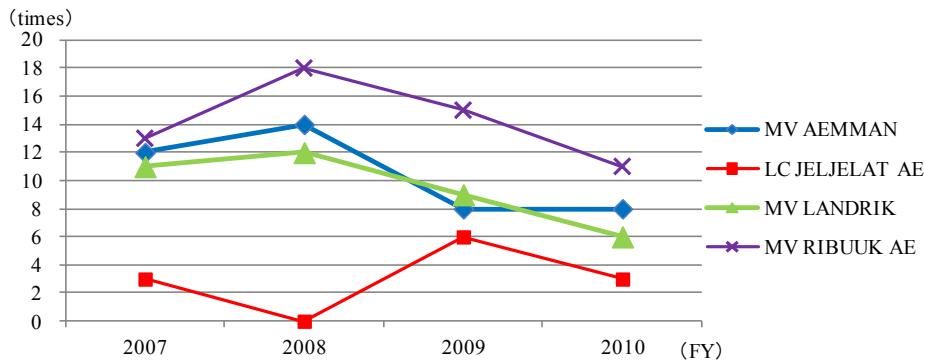


Figure 5: Number of Copra trips by each MISC Vessel

Though CPax vessels have worked fully using their cargo hold capacity, total copra volume in 2010 has decreased. In 2010, stoppage of MV Landrik has become frequent due to breakdowns thereby low copra volume transported by MV Landrik. Other two CPax vessels couldn't well compensate MV Landrik's loss.

If MV Landrik were working well without stoppage in 2010 carrying copra similar to 2009, total copra volume transported by the three CPax vessels in 2010 would have been similar level to that of 2009 (see + line in the graph of Figure 4).

For copra transport, LC Jeljelat Ae was operated as the backup of CPax vessels when demand from islands to collect copra was high or when CPax vessel was in breakdown, sparing time in between charter trip services. As LC Jeljelat Ae had no waterproof cargo hold, copra was carried on the cargo deck covering canvas over the bagged copra.

The following graphs show copra cargo volume per field trip by each MISC vessel.

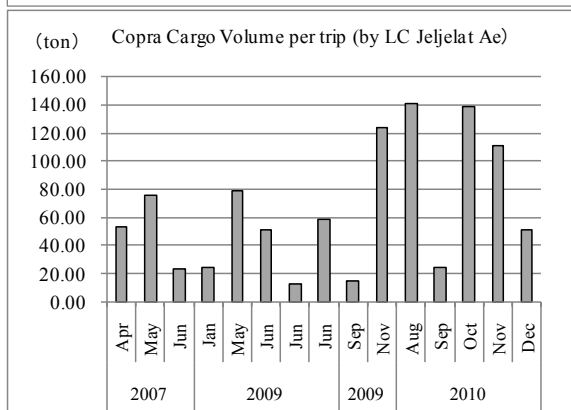
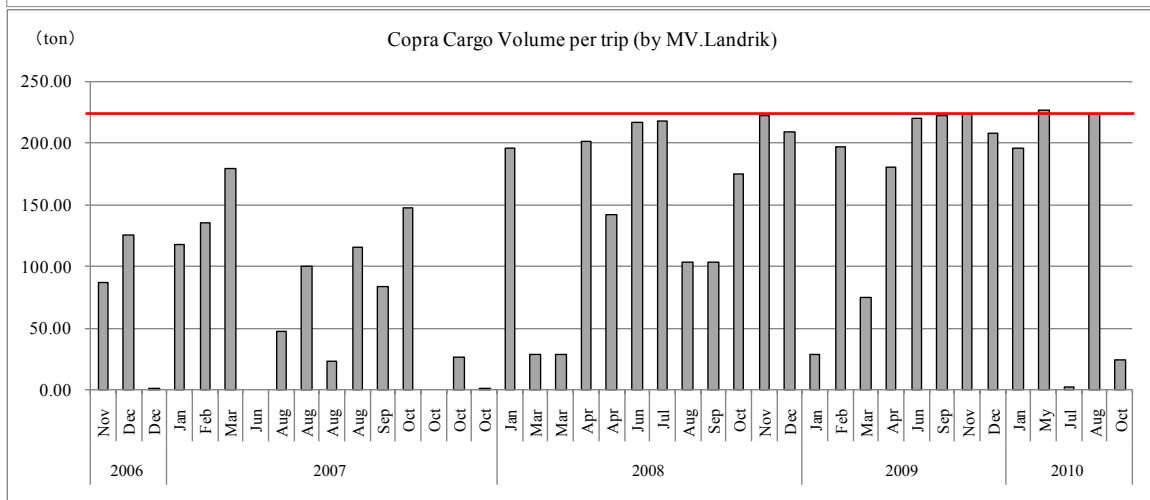
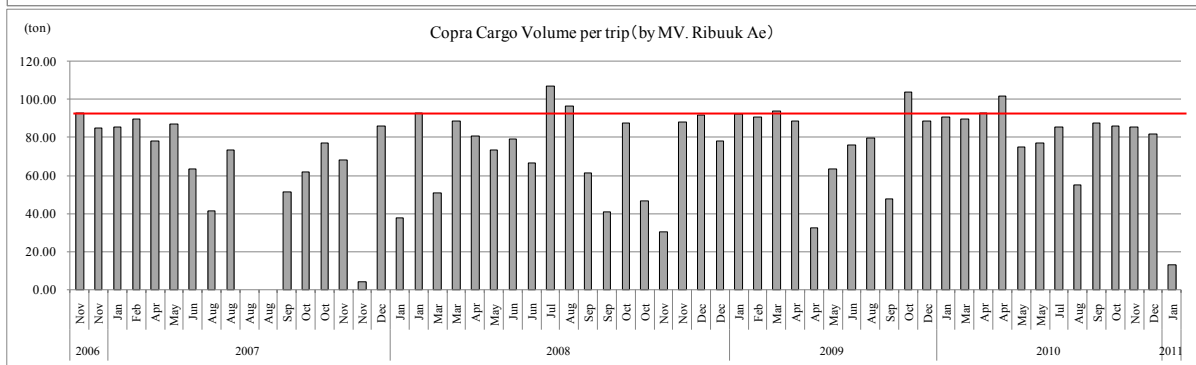
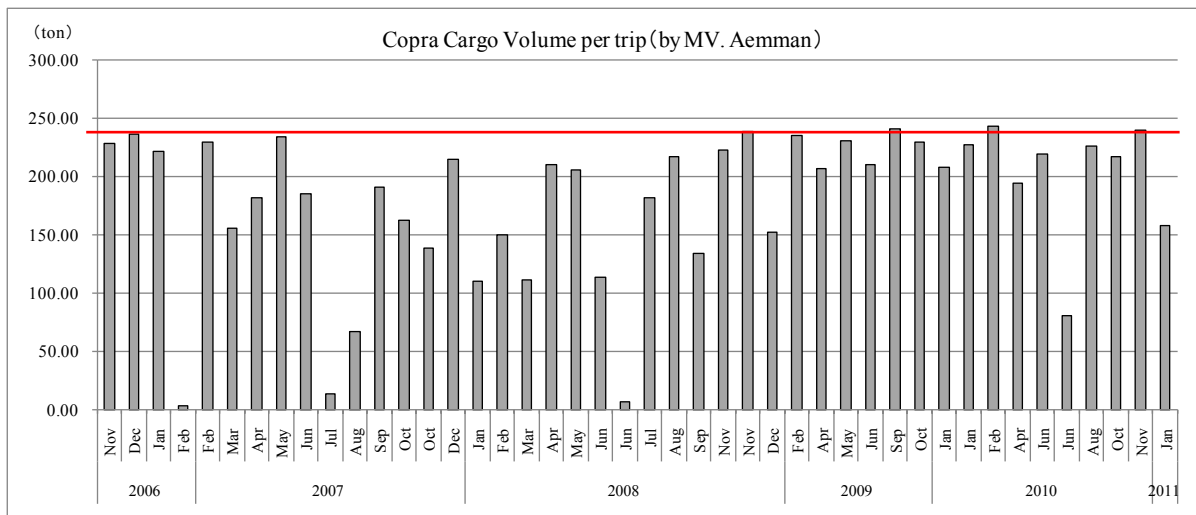


Figure 6: Copra cargo volume per field trip by each MISC vessel

Volume of copra fully stowed on board each CPax vessel (copra weight shown in red in above graphs) and cargo hold volume (design data) are as shown on the following table.

Table 4: Cargo hold capacity of CPax vessels (design data)

Name of Vessel	MV Aemman	MV Ribuuk Ae	MV Landrik
Copra weight, fully stowed (metric tons)	245	95	225
Copra cargo hold capacity (m <sup>3</sup> )	656	250	600

The New CPax Vessel as the replacement of MV Landrik, with cargo hold capacity same as MV Landrik, will undertake ordinary service schedule so that copra transport demand of 2008 and 2009 level will be cleared.

Accordingly, it is concluded that the indicator of cargo transport capacity for the New CPax Vessel should be 600 m<sup>3</sup> copra cargo hold, equivalent to that of MV Landrik.

(4) Indicator of the cargo transport capacity for the New LC Vessel

LC Jeljelat Ae was mostly operated under charter trip services, whereas other three CPax vessels were working mostly on field trip services. In the charter trip, LC Jeljelat Ae was transporting diesel oil (about 60,000 gallons = about 230 m<sup>3</sup>/trip, on 2008 – 2010), building construction materials, heavy vehicles, etc.

When a LC vessel owned by Majuro based general contractor PII (Pacific International Inc.) had been stopping due to breakdown, LC Jeljelat Ae was very busy in 2008 undertaking 49 times of charter trip operations. That year, LC Jeljelat Ae operated maximum by minimizing wharfing days in Majuro and minimizing field trip services.

Also in 2009 and 2010, LC Jeljelat Ae had to work hard undertaking 5 field trip services to compensate stoppage of MV Landrik reducing charter trip services, i.e. 26 and 23 charter trips on 2009 and 2010, respectively, minimizing wharfing days in Majuro similar level as 2008.

Accordingly, it is concluded that the indicator of transport capacity for the New LC Vessel should be 270 ton deadweight<sup>1</sup>, equivalent to the capacity of LC Jeljelat Ae.

(5) Summary of indicators for new vessels capacity

Capacity indicators of the New CPax Vessel and the New LC Vessel are summarized as follows.

① New CPax vessel

Items	Indicator
Number of passengers	140 persons, equivalent to MV Landrik
Cargo hold capacity	600m <sup>3</sup> copra hold to stow 225 t of copra, equivalent to MV Landrik

<sup>1</sup> Deadweight is the total weight possible to be loaded on board a vessel from empty condition up to the maximum load draft, consisting of fuel oil, fresh water, provisions, stores, passengers, cargoes, etc.

② New LC vessel

Items	Indicator
Number of passengers	50 persons, equivalent to LC Jeljelat Ae
Deadweight	270 t, equivalent to LC Jeljelat Ae

(6) Future demand and new vessels capacity

After the new vessels (one CPax vessel and one LC vessel) have entered service, MISC will run three CPax vessels and one LC vessel (excluding MV Landrik), but MV Ribuuk Ae will be an age to retire after about 10 years (26 years old), when MISC fleet capacity will have to be reviewed for adjustment to the new tonnage. In this Project, accordingly, it is considered adequate that variation of sea transport demand up to 10 years should be considered.

Variation of sea transport demand in 10 years will be proportional to the variation of population and economical activity of the RMI. Census data of the RMI shows 10% population increase in 10 years as shown on the graph below. GDP projection data is not available.

Accordingly, it is considered reasonable to adopt 10% increase in the sea transport demand, which should be added to the indicators to determine the capacity of the new vessels finally. Increase of demand from the economic growth may be coped with by extra voyages.

Two existing CPax vessels, MV Aemman and MV Ribuuk Ae, also have to bear 10 % increase, which will be available by the backup of MV Landrik and by trip increase.

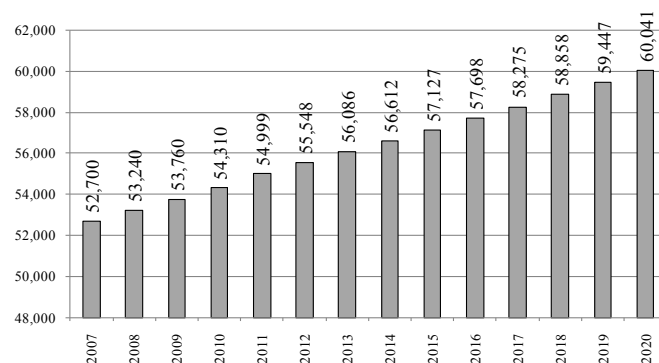


Figure 7: Population projection (2007-2020)

Source: RMI Compact Economic Report – FY 2009, PICT\_Populations\_2000-2015

Necessary transport capacity of the new CPax and LC vessels should then be as follows.

① New CPax vessel

Items	New vessel capacity	Background
Number of passengers	150 persons	Indicator from MV Landrik operation stat 140 p x 1.10 = 154 p say → 150 p
Cargo hold capacity	656 m <sup>3</sup>	Indicator from MV Landrik operation stat 225 t = equivalent copra cargo hold volume 600m <sup>3</sup> x 1.10 = 660 m <sup>3</sup> → 656 m <sup>3</sup>



② New LC vessel

Items	New vessel capacity	Background
Number of passengers	50 persons	Indicator from LC Jeljelat Ae operation stat 50 p
Deadweight	300 t	Indicator from LC Jeljelat Ae operation stat 270 t x 1.10 = 297 t say→ 300 t

2.2.2. Basic Plan

2.2.2.1. Rules to apply and Classification Society

(1) Maritime regulations of the RMI for domestic vessels

In general, safety standard of passenger vessels<sup>2</sup> is more stringent than that of cargo vessels. As passengers are not familiar with the safety behavior on board ships unlike seamen, besides many people are involved in case of sea accident, higher safety standard at vessels' side is required. For passenger vessels and cargo vessels engaging on international services, SOLAS<sup>3</sup> regulations adopted by IMO<sup>4</sup> are imposed, while safety standard for domestic service vessel depends on national regulations.

In the RMI, Domestic Watercraft Regulations (DWCR) is the national regulations for vessels operating within the RMI waters. DWCR is, however, allows carrying passengers on board cargo vessels, as generally seen in the South Pacific actually. On board MV Aemman in fact, many passengers are sitting on the exposed cargo deck area. It is considered difficult to deem present safety standard appropriate for the vessels donated from Japan, and thereby it is important for the Project to apply appropriate standards for passenger safety and comfort.



Passengers on board MV Aemman



Passengers and luggage on board MV Aemman, dangerous in rough seas

<sup>2</sup> Merchant vessel comprises cargo vessel and passenger vessel. Merchant vessels carrying more than 12 passengers fall under passenger vessel category. Vessels carrying cargoes and passengers fall under passenger vessel category.

<sup>3</sup> SOLAS (Safety of Life at Sea): An international convention rule adopted by IMO dealing with vessel safety measures. Without SOLAS certificate, no vessel can call foreign port for trading purpose.

<sup>4</sup> IMO (International Maritime Organization): An organization under UN, to deal with maritime safety matters and marine environment matters, etc.

In the South Pacific, SPC<sup>5</sup> supported by the IMO adopted Safety Regulations for Non-Convention Vessels (SRNCV) 2002, which is the text of safety standard common for the South Pacific countries. The SRNCV introduced the “cargo-passenger vessel” category in addition to the “cargo vessel” and “passenger vessel” categories, considering actual status of passenger transport in the South Pacific.

It is found that SRNCV is of safety standard, systematic in various areas, i.e. construction, stability, fire safety, lifesaving, safety radio, etc., appropriate for the Project.

In this Preparatory Study, application of SRNCV was proposed to the MTC<sup>6</sup>, who found the proposal appropriate and was to take legal steps for SRNCV.

## (2) Classification Society

New vessels must be inspected by the inspector of the flag Administration during construction. For vessels constructed abroad, the flag Administration may entrust the inspection to classification society as a third party authority. When vessel has completed, a classification certificate will be issued by the classification society. The flag Administration will confirm the classification certificate, accept registry in the flag state and issue a certificate of nationality.

Major shipping countries have classification society, i.e. NK classification in Japan, Lloyd’s classification in UK. In this Project, NK classification should be adopted.

Even after completion of the New Vessels under the Project, the classification should be maintained through periodical inspection, to maintain and ensure the safety level of the New Vessels.

### 2.2.2.2. Improvement based on feedback from existing MISC vessels

Studying MISC existing vessels, a number of points to be improved were found. Countermeasures should be taken in the design and construction of the new vessels.

#### (1) Points common for CPax and LC

No.	Points found in MISC vessels	Countermeasures
1.	Poor passenger space with simple roof and surroundings. Insufficient number of toilets. Too narrow passenger areas to accept many passengers. Many passengers sit in the cargo areas, unsafe with risk of shipping water.	Adequate passenger areas on area standard of 1.0 m <sup>2</sup> /person. More toilets.
2.	Only one main generator: risk of blackout at sea.	Two main generators, one serving and the other in standby.
3.	No echo sounder device to measure sea depth: risk of aground.	Install an echo sounder: safe navigation in shallow waters.
4.	Safety equipment on a standard of coastal vessels who rely on shore help, not matching offshore services in the RMI.	Apply Safety Regulations for Non-Convention Vessels (SRNCV) 2002 as the safety standard for the New Vessels: fire safety, lifesaving, safety radio, etc.

<sup>5</sup> SPC (South Pacific Commission): An regional organization formed by the South Pacific countries, dealing with economy and technical development of the South Pacific. Its maritime unit had been working to establish SRNCV.

<sup>6</sup> Refer to “Considerations on the Maritime Regulations” attached.

No.	Points found in MISC vessels	Countermeasures
5.	Liferaft capacity below number of persons on board: 60% in MV Aemman and 80 % in LC Jeljelat Ae.	Sufficient liferaft capacity to cover total number of persons on board.
6.	Repair and maintenance not on regular program.	Apply PMP (Preventive Maintenance Policy) system, on which maintenance is made according to regular program notwithstanding malfunction.

(2) New CPax Vessel

No.	Points found in MV Aemman	Countermeasures
1.	Insufficient stability: low GM value.	Improve stability by widening hull breadth.
2.	Fat hull ( $C_b = 0.747$ ): high water resistance and high fuel oil consumption.	Skinny hull ( $C_b = 0.711$ ) with lower water resistance, efficient propeller design and fuel economy main engine.
3.	Cargo gear of union purchase derrick system: limited hook point requiring labors to handle cargoes.	Add auxiliary cargo gears to compensate limited hook points of derricks.
4.	Gangway between ship and boat, unreliable and dangerous for the elderly.	Reliable gangway, safe for the elderly

(3) New LC Vessel

No.	Points found in LC Jeljelat Ae	Countermeasures
1.	Bow shape of flat and straight: high impact and damage by the sea.	Bow shape slant to the sea to moderate sea impact.
2.	Main engine of three 936kW (312kW x 3) engines three shafts configuration: high fuel oil consumption and laborious maintenance.	Two main engines (441kW x 2) two shafts configuration: lower fuel oil consumption, higher efficiency and easier maintenance.
3.	Small cargo diesel oil pump taking 12 hours to discharge 200 m <sup>3</sup> diesel oil from the vessel to the shore tank.	Powerful pump to discharge 200 m <sup>3</sup> diesel oil in 3 hours.
4.	No enclosed cargo hold fitted: all cargoes had to be stowed on deck and some cargoes needed cover.	Enclosed cargo space utilizing void space under cargo deck, allowing cargoes kept dry there.

2.2.2.3. Vessel design

Capacity of the new vessels was determined, according to the Request of the RMI and Preparatory Study, as follows.

CPax vessel      Being a replacement of MV Landrik, and referring to the design and outfit of MV Aemman, copra cargo hold capacity of 600 m<sup>3</sup> and passenger capacity of 150 persons

LC vessel        Being a replacement of LC Jeljelat Ae, and referring to the design and outfit of LC Jeljelat Ae, deadweight capacity of 300 metric tons and passenger capacity of 50 persons

## Liferafts for existing vessels

Capacity of liferafts to be procured by the Project should be those corresponding to the aggregate persons including all passengers, for MV Aemman and MV Ribuuk Ae. The liferafts procured for MV Landrik should be of capacity corresponding to the vessel crew only, understanding that the vessel will no longer engage in passenger transport service after the new vessels have come to service.

Policy of vessel design follows below.

### 2.2.2.3.1. New CPax Vessel

#### (1) Vessel capacity

The capacity of the New CPax Vessel is represented by 660m<sup>3</sup> copra cargo hold and 150 passengers, those derived from 110% of MV Landrik capacity.

Outfitting and layout of the New CPax Vessel should be in general follow those for MV Aemman, which are functioning well in the cargo passenger transport.

Countermeasures against problems found in the Preparatory Study, as listed in the presiding section, should be reflected on the New CPax Vessel design, including improvement of stability and slim hull for fuel economy.

Weight of the copra cargo transported to Majuro is accurate in weighing and heavier than the general cargo out from Majuro: 225 and 245 metric tons on board MV Landrik and MV Aemman respectively when fully loaded. Copra cargo is bulky cargo, i.e. cargo hold cubic capacity is more important than deadweight capacity. New CPax Vessel's deadweight capacity may, therefore, a little less than that of MV Aemman as shown on the table below.

Items	MV Aemman	New CPax Vessel	Remark
Length overall (m)	48.5	49.85	
Length bp (m)	43.5	44.0	
Breadth (m)	8.5	9.0	improving stability
Depth (m)	5.10/3.35	5.15/3.30	
Deadweight (m)	3.20	3.20	
Cb <sup>7</sup>	0.747	0.711	improving speed and fuel economy
Deadweight (t)	550	525	
Copra hold volume (m <sup>3</sup> )	656	656	Leading design parameter
Pax Capacity (persons)	150	150	Leading design parameter

<sup>7</sup> Cb (block coefficient): A coefficient of hull shape representing full/skinny degree of hull, influencing water resistance. Greater Cb usually makes water resistance greater. Cb is about 0.8 in tanker and about 0.6 in container vessel.

## (2) Stability

From the stability booklet of MV Aemman, GM (indicator of stability) was found low side. On board the actual service of MV Aemman rather long rolling period at sea and a little large inclination during cargo operation were realized. From those facts, it was determined good to improve stability by increasing hull width by 0.5 m in the New CPax Vessel.

## (3) Maneuverability

Passage between open sea and lagoon inside usually being narrow and have no traffic buoy fitted, vessels passing there need good maneuverability. MV Aemman fitted with an efficient Schilling rudder had a good course stability and maneuverability. The New CPax Vessel should have similar efficient rudder to ensure good maneuverability.

## (4) Speed and Main Engine

In the Request from the RMI Government, the service speed of the New CPax Vessel was 10.3 knots by a 441 kW (600 ps) main engine, same as the design of MV Aemman. Actually, however, speed of MV Aemman had dropped down to 8 ~ 9 knots. Reason of such speed drop is estimated being from fat hull and excessive fouling of bottom hull and propeller. It is realized that the improvement of sailing performance is important for speed and fuel economy.

Design of the New CPax Vessel should take into consideration of hull form of low water resistance, highly efficient propeller and fuel efficient main engine. 10% decrease of fuel oil consumption at same speed is expected in the design of the new CPax Vessel as shown on the speed graph Figure-8.

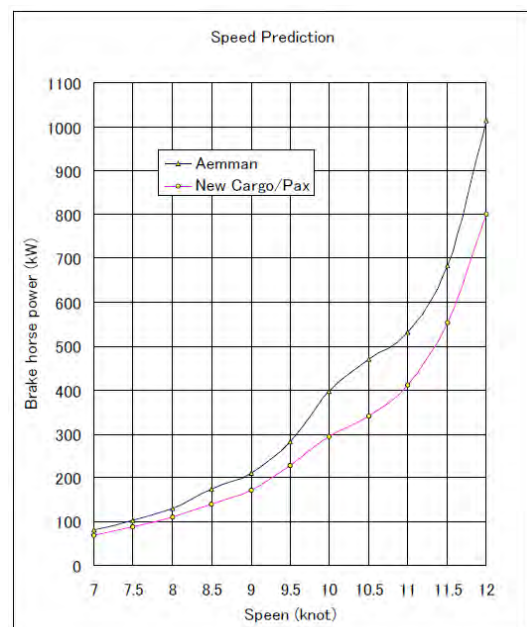


Figure 8: Speed – power curve of CPax vessel

## (5) Accommodation

### 1) Passenger accommodation

Passenger capacity of the New CPax Vessel is 150 persons, 110 % of MV Landrik, comprising 9 cabin passengers and 141 deck passengers.

Spaces of deck passengers on board the existing CPax vessels are not adequate in area for many passengers and the spaces are of construction with simple roof and surroundings, which are not so suitable for many passengers traveling weeks long. Passenger area, toilet facility and surrounding construction should be improved.

## 2) Crew accommodation

CPax vessels need many crew, necessary for navigation and besides cargo operation. Number of crew for the New CPax Vessel should be 18 persons same as that on board MV Aemman.

Regarding participation of women in the shipping, there was no woman crew in the past and unlikely in the near future. On board the New CPax Vessel, no special measures for woman crew will be considered.

## (6) Cargo hold and cargo hatch

Capacity of the new CPax copra cargo hold is 656 m<sup>3</sup>, 110 % of MV Landrik.

Copra will be stowed fully in the cargo hold of 656 m<sup>3</sup> and transported to Majuro. Volumes of general cargoes from Majuro to outer islands are generally not full in the cargo hold.

Cargoes are stowed in the cargo hold, from corner to corner. Wider cargo hatch is convenient for cargo handling and stowage using cargo gear, but wide hatchway width of MV Aemman is found too wide not leaving good passage width on upperdeck hatchway side. The hatchway width of the New CPax Vessel should be decided considering hatchway side passage, and stowage of three workboats on hatchcover top.

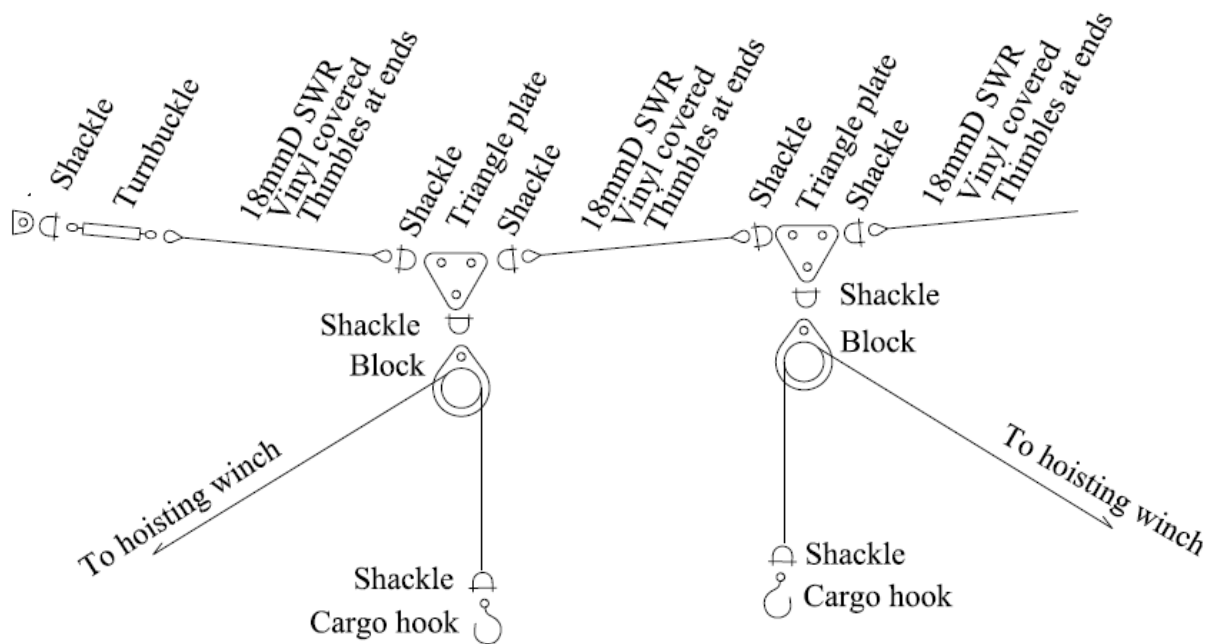
- Side sparring of timber should be fitted under the second deck to protect grain bags and copra bags from damage.
- No hatchcovers should be fitted on the second deck, as cargoes are not separated by the second deck.
- Mechanical forced ventilation should be fitted for cargo holds to carry copra.
- Dangerous goods (petrol drums and LPG cylinders) should be stowed on deck, not in the cargo hold.
- Petrol should be stowed in containers on upperdeck forward.
- Fixed lighting should be fitted in the cargo hold for the cargo operations at night.
- Cargo hatchcovers should be conventional hatch board system consisting of hatch beams, hatch boards, tarpaulins, battens and wedges, same as those of existing CPax vessels. The hatch board system allows partial opening suitable for copra operation, and has no mechanical parts easy to maintain.

## (7) Cargo gear

Workboats, general cargoes on pallet and copra bags are handled by cargo gears of union purchase derrick system on board all MISC CPax vessels.

Hook point of the union purchase derrick system is only along the straight line between two cargo falls, and cannot be far from the hook line. Lifting cargo to/from fore and aft of the cargo holds being not possible, manpower to shift cargoes in cargo holds was always necessary and taking time inefficiently.

To allow lifting cargoes away from the hook line, auxiliary span stay system as sketch below will be fitted.



(8) Fuel oil tank

Round trip distance from Majuro to the farthest islands, Enewetak and Rongelap atolls is about 2,100 nautical miles, for which fuel oil consumption will be about 17.5 klit based on a rate of fuel oil consumption of 2.1 klit/day and sailing speed of 10.5 knots. Fuel oil consumptions of various sailing cases are as follows.

Sailing case	Distance (nautical mile)	Sailing days	Fuel oil consumption (kl)
Round trip between Majuro and Enewetak	2,100	8.3	17.5
One way to Suva, Fiji for dock	1,610	6.7	14.1
Delivery voyage from Japan to Majuro	2,700	10.7	22.5

Capacity of the fuel oil tank should cover above fuel oil consumption with sufficient allowance and also to supply diesel oil to the islands: say, same as MV Aemman 70m<sup>3</sup>.

(9) Fresh water tank and water maker

Drinking water being catered by portable 18 lit drinking water bottles, fresh water consumption is by shower of passenger and crew, washing and laundering, all same condition as MV Aemman.

Consumption of fresh water in one voyage on board MV Aemman is about 100 m<sup>3</sup>, which should be maintained in the New CPax Vessel.

However, MV Aemman has been sometimes facing difficulty to fill necessary quantity in dry season, it is necessary for the New CPax Vessel to install a water maker (desalination plant) on board for self-supporting fresh water. Capacity of the water maker should be 18 crew x 200 lit/day = about 4 tons/day.

The original Request of years ago was referring to a desalination plant powered by a solar system, but as this component had been omitted in the final Request and no further request was made in this Preparatory Study, the Project did not include the solar powered system but just considered a conventional shipboard desalination plant.

#### (10) Navigation equipment

Navigation area of the New CPax Vessel is within 200 sea miles from the nearest land in the territorial waters of the RMI. Accordingly, maritime regulations of “Safety Regulations for Non-Convention Vessels (SRNCV)” can reasonably apply.

According to the said regulations, each one set of satellite GPS compass<sup>8</sup>, magnetic compass and radar (9 GHz) and two sets of GPS receivers should be installed.

No echo sounder being fitted on board MV Aemman, several crews usually stand at bow chock to watch sea bed when passing shallow water and approaching to shore. However, watching sea bed is difficult at night and in a heavy rain. On board the New CPax Vessel an echo sounder equipment should be added for navigation safety.

#### (11) Radio Apparatus

Same as the navigation equipment, radio equipment should also be complete according to SRNCV, which is basing on the international GMDSS<sup>9</sup>.

Navigation area of the New CPax Vessel according to the GMDSS being A2, a MF/AF<sup>10</sup> radiotelephone, a VHF<sup>11</sup> radiotelephone, two EPIRBs<sup>12</sup> and two SARTs<sup>13</sup> should be installed. NAVTEX should be exempted as no NAVTEX broadcasting is available in the RMI waters.

#### (12) Electric generator

Vessels intending to navigate seas over coastal area must be fitted with two or more generators, allowing continuous power supply without blackout even in case of failure of one generator.

The New CPax Vessel should be fitted with two main generators in the engine room, each of which has capacity of 100 kVA to cover normal sea loads. One set can always be in standby.

Onboard electricity should be 220 and 110 Volts on 60Hz AC, same as shore power, and 24 Volt DC for emergency use.

#### (13) Anti-Pollution Measures

The Government of Marshall Islands ratifies MARPOL Convention (International Convention for

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<sup>8</sup> Compass equipment indicating vessel heading by satellite GPS technology, in lieu of gyro compass.

<sup>9</sup> Global Maritime Distress and Safety System: World safety radio network system adopted in IMO, which specifies onboard radio apparatus for different sea areas, A1, A2, A3 and A4, and shore radio stations.

<sup>10</sup> Medium and high frequency radio for long distance radiocommunication.

<sup>11</sup> Very high frequency radio for short distance radiocommunication.

<sup>12</sup> Emergency Position Indicating Radio Beacon to emit alerting signal automatically via satellite when vessel is in distress.

<sup>13</sup> Search and Rescue Transponder to emit 9GHz radar frequency showing distress position on other vessel's radar.



Preventing Pollution from Ships, 1973), thereby the New Vessels should install followings.

- Against oil pollution: Oily water separator to stop discharging oily water
- Against sewage pollution: Sewage collecting tank to stop discharging sewage in the restricted waters
- Against air pollution: NOx emission controlled diesel engines

#### (14) Long life policy

Marshall Islands is remote from industrial countries and it takes long time to get spare parts and engineer servicing. Vessels are obliged to stop working once important machinery is out of order. For stable operation of the Plan Vessel, honest implementation of periodical maintenance is important.

It is proposed that the PMP (Preventive Maintenance Policy) be planned for the New CPax Vessel. The Project will instruct PMP to be conducted daily and periodically on board the vessel and in the workshop. Spare parts necessary to carry out PMP should be procured by this Project.

On the other hand, the vessel hull, machinery and outfitting should be designed and constructed considering robustness, maintenance friendliness, corrosion resistant material, etc., e.g. plastic coated seawater pipes.

#### (15) New CPax Vessel Design

1) Principal particulars	
Type of the vessel	Cargo passenger vessel
Service area	Domestic water of the Marshall Islands
Cargoes	General cargoes and copra
Flag	Republic of the Marshall Islands
Classification	Nippon Kaiji Kyokai (NK)
Rules to apply	Maritime rules of the Marshall Islands (incl. Domestic Watercraft Regulations)
	Safety Regulations for Non-Convention Vessels (SRNCV)
	International Convention on Tonnage Measurement of Ships
	International Convention on Load Line
	International Convention for the Prevention of Collisions at Sea
	International Convention for the Prevention of Pollution from Ships
	Rules of the Classification Society
Length overall	49.85 m
Length bp	44.00 m
Breadth, molded	9.00 m
Depth, molded, upper deck	5.15 m
Depth, molded, 2nd deck	3.30 m
Design draft	3.20 m
Gross tonnage, international	About 580 tons

Deadweight	About 525 t (metric)
Loaded speed	About 10.5 knots
Main engine	441 kW (600 ps) or over x 1
Complement	168 p total
Indoor passenger	9 p
Outdoor passengers	141 p
Crew	18 p
Tank Capacity	
Fuel oil tank	About 70 m <sup>3</sup>
Fresh water tank	About 100 m <sup>3</sup>
Water ballast tank	About 195 m <sup>3</sup>
Copra hold	About 656 m <sup>3</sup>
2) Accommodation	
Indoor passenger room	Single bunk room x 1, four bunk room x 2
Outdoor passenger space	Nos. pax: 141 p Area : 1 m <sup>2</sup> / person Deck: Timber grating Deckhead: Polycarbonate plastic panel Shipside: Plastic plated up to handrail height and roll-up canvas above
Captain's cabin	Single bunk, with toilet facility shared with chief engineer
Chief Engineer's cabin	Single bunk, with toilet facility shared with captain
Crew cabin	8 bunk room x 1, 4 bunk room x 2
Crew mess/ galley	Mess table for 8 crew
Galley equipment	1 x Electric cooking range(3 x hot plate @4 kW) 1 x Hot water boiler (10lit, 1 kW) 1 x Fridge (about 450 lit) 1 x Microwave 1 x Rice cooker (3.6 lit) Furniture, e.g. sink, shelves, storage complete
Washing equipment	1 x Washing machine, about 6 kg
Crew toilet	Common toilet: WC x 2, shower x 1 Share toilet: WC + shower x 1
Pax toilet	WC x 4, shower x 3
Freezing chamber	13m <sup>3</sup> -25°C Ref. compressor 2.2kW x 2
Structural fire protection	According to the SRNCV regulations
3) Cargo hold	

Cargo hatchway	No.1: 7.15mL x 6.0mW No.2: 6.60mL x 6.0mW Hatchcovers: Steel hatch beams + timber hatch boards + tarpaulin (2) + battens and wedges
Cargo hold lining	Tanktop: None Shipside: 30mmT timber sparring (under 2 <sup>nd</sup> deck only) Transverse bulkhead: none
Double bottom tanktop strength	Axle load: not specified Area load: per Rule load
Cargo lashing	Inside cargo hold: none Upper deck: D-rings in the area in front of No.1 hatch and eye plates on steel bulwark
Ventilation	Natural supply from No.1 hold fore > mechanical exhaust from No.1 hold aft Natural supply from No.2 hold aft > mechanical exhaust from No.2 hold fore
4) Fuel oil and fresh water supply system	
Diesel oil supply	Function: To fill oil drums on deck using gas station nozzle taking suction from double bottom tank pumped by the diesel oil supply pump. Filling station: Aft of No.2 hatch Diesel oil supply pump: Centrifugal 15m <sup>3</sup> /h x 1 in engine room Delivery pipe bore: 65A Filling nozzle: Gas station type with flowmeter
Fresh water supply	To be supplied by the engine room general service pump (about 35 m <sup>3</sup> /h).
Petrol supply	Steel tank 1.5m <sup>3</sup> x 2 on upperdeck in front of No.1 hatch Filling station : Gas station type nozzle with about 40 lit/min pump and flowmeter
5) Deck machinery	
Windlass	Hydraulic driven x 1 Chain wheel: 34kN x 9m/min x 2 Hawser drum: 20kN x 15m/min x 2 (rope capacity each 26mmφ x 120m) Warping drum x 2 Local control
Bower anchor	Stockless 780kg x 2 (equipment number 240 - 280)
Anchor chain	φ24 mm grade U2 12 shackle length (330m) x 1

Towing rope	φ22 mm x 180m x 1 SWR (6 x 24)
Rule mooring rope	φ26 mm x 120m x 4 polypropylene class-2
Working mooring rope	φ36 mm x 50m x 4 nylon
Mooring winch	Hydraulic driven x 1 Hawser drum: 20kN x 15m/min x 2 (rope capacity each 26mmφ x 120m) Warping drum x 2 Local control
Cargo derrick	SWL3/(u)2t x 2 gangs with derrick boom x 4 Cargo winch: Hydraulic 19.6/9.8kN x 10/20m/min x 4 Topping winch: Combined with the cargo winch Control on the winch platform
Auxiliary lifting device	Electric winch: 4.9kN x 15m/min x 4
Hydraulic pump unit	To supply hydraulic oil to the cargo derrick winches, the windlass and the mooring winch. Pump unit: 15kW x 2 (50% x 2) Stainless steel pipe on deck and steel pipe inside
Rudder	High lift rudder
Steering gear	Electro hydraulic x 1 Helm angle 35 deg to both sides (70 deg in case of Schilling rudder) Hydraulic oil pump: 2.2 kW x 1 Auxiliary steering: Manual oil pump steering from steering wheel in the wheelhouse
Steering stand	GPS compass autopilot
Sea boarding gangway	Aluminum lift-away gangway x 1
6) Lifesaving apparatus	
Inflatable liferaft	SOLAS A PACK for 25p x 7
Buoyant apparatus	For 22p x 3
Rescueboat	1xAbout 7.5mx2mx0.8m, FRP, with 40ps outboard To use one of workboats as the non-SOLAS rescueboat outfitting as required by the SRNCV rule. Launching and recovery by lifting cargo derrick.
Lifejacket (solid type)	For all complement 168 For duty crew 4 For children 15 Spare 50
Life buoy	4 (1 with self-igniting light, 1 with buoyant line, 2 with self-igniting smoke signal)

	Parachute signal	4
	Red flare	4
	Smoke signal	4
7) Firefighting equipment		
	Fire hydrant	3 (each 1 in engine room, winch house and navigation bridge deck) Type: 40A bore Nakajima type coupling
	Fire hose, nozzle and fire locker	3 sets Nozzle: Fog/jet dual nozzle 12mmφ Hose : 15m 40A bore
	Portable fire extinguisher	10 (engine room x 6, accommodation x 2, galley/mess x 1, wheelhouse x 1) with 100% spare charges
	Emergency fire pump	Diesel driven 25m <sup>3</sup> /h x 0.3MPa x 1 in the steering gear room
	Firefighter's outfit	1 set (breathing apparatus, fire cloths, safety belt, de-smoke helmet, de-smoke mask, safety lamp and fire axe)
8) Ventilation and natural lighting		
	Engine room vent	E. axial flow fan (reversible) 200m <sup>3</sup> /h x 30mmAq x 1.5 kW x 2
	Forward store	E. axial flow fan (supply) 0.2 kW x 1
	Cargo hold	E. axial flow fan (exhaust) 0.75kW x 2
	Galley/mess room	E. axial flow fan (exhaust) 0.4kW x 1
	Toilet	E. pipe fan x 4
	Air conditioning	Served area: Crew and pax cabins, wheelhouse and galley/mess room (passage and toilet are not served) Temp cond.: Outside 32 deg C/80%RH → inside 27 deg C/50%RH 70% recirculation Compressor About 2.2 kW x 2
	Window	Aluminum frame Wheelhouse 1200Wx650H x 3 □700/550Wx650H x 2 650x650x6 (all fixed) Square window 350Wx500H x 12 (all openable) Round scuttle 250φ x 7 (all openable)
9) Machinery		
	Main engine	4 stroke cycle trunk piston marine diesel engine x 1 Rated output > 441 kW (600 ps) Rated rev. < 1,500 rpm Fuel oil Marine diesel oil Starting Electric cell motor Turning Manual ratchet handle Engine seating Rigid mount using chock liner or chockfast resin

Reduction reversing gear	Output rev	About 300 rpm
	Clutch	Wet multi-plate
Propeller and shafting	Propeller	4 blades solid, $\phi$ 1900 mm x 1
	Tailshaft	Forged steel
	Stern tube	Cast iron
	Water seal	Mechanical lip seal
	Bearing	Seawater lubricated EVR
Main generator	Generator	100 kVA (80 kW) x 225V x 3 $\phi$ x 60Hz x 2
	Prime mover	88 kW x 1200rpm or 1,800rpm x 2
	Fuel oil	Marine diesel oil
	Starting	Electric cell motor
M/E standby LO pump	E. horiz. gear	15 m <sup>3</sup> /h x 0.60 MPa x 5.5kW x 1
Gearbox standby LO pump	E. horiz. gear	2.63 m <sup>3</sup> /h x 3.0MPa x 3.7kW x 1
FO transfer pump	E. horiz. gear	2 m <sup>3</sup> /h x 0.2 MPa x 0.75 kW x 2
Fire/bilge/ballast/general service pump	E. horiz. centr.	35/25 m <sup>3</sup> /h x 0.2/0.40 MPa x 7.5 kW x 2
Fresh water pump	E. water pump	2.5 m <sup>3</sup> /h x 0.16 MPa x 0.4kW x 2
Sewage discharge pump	E. horiz. centr.	2.0 m <sup>3</sup> /h x 0.2MPa x 0.4 kW x 1
Sludge discharging pump	E. horiz. screw	1.0 m <sup>3</sup> /h x 0.39 MPa x 1.5kW x 1
Diesel oil supply pump	E. horiz. centr.	15 m <sup>3</sup> /h x 0.12 MPa x 1.5kW x 1
Oily water separator	Gravity	0.25 m <sup>3</sup> /h x <15ppm x 1
Water maker	Reverse osmosis	4 ton/day x 1 nylon module
Flow meter	For main engine x 1 (digital reading and remote monitoring) For gensets x1 (digital reading and remote monitoring)	
Machine tools	E. bench drill	14mm $\phi$ x 0.4 kW x 1
	E. bench grinder	Two heads 225mm $\phi$ x 1
	Horizontal vise	150 mm x 1
	M/E overhaul chain block 0.9 t x 1	
	Gas cut/weld	Small set x 1
	E. arc welder	AC220V x 250A x 1 (with 50m cable x 2)
Engine room tanks	Diesel oil service tank	0.95m <sup>3</sup> x 1
	Lube oil storage tank	0.5m <sup>3</sup> x 1
	Sludge tank (double bottom)	2.0m <sup>3</sup> x 1
	M/E coolant expansion tank	0.1m <sup>3</sup> x 1
	Wash oil tank	50 lit x 1
	Sewage tank	2.0m <sup>3</sup> x 1
Engine control	Local and wheelhouse remote control	

Engine monitor	CPU + monitor + printer set placed in the wheelhouse Machineries monitored: main engine, genset, steering gear, oily water separator, water maker, air conditioning, freezer compressor, hydraulic pump, high level alarm of tank and bilge
10) Electric supply	
Main switchboard	Deadfront Generator panel, feeder panel (AC220V and AC110V), starter panel, earth alarm
Transformer	225/115 V 15 kVA
Charging discharging board	Place on upper deck or above, with rectifier
Storage battery	For general use 200 AH x 2 For radio use supplied by radio maker For main engine and genset starting (with low level alarm): supplied by maker
Shore supply	220V 3φ 40 kVA
11) Inboard communication	
Engine telegraph	1:1
Common battery telephone	1 set: DC24V wheelhouse, mess room, engine room and steering gear room
Public addressor	1 set: AC220V + DC24V amplifier and speakers
General alarm	1 set: AC220V + DC24V
Alarm bell	1 set: DC24V
12) Navigation equipment	
Magnetic compass	1 x desktop type 150mmφ, spare bowl x 1
GPS compass	1
Steering control	1 (GPS autopilot)
Radar	1 x 9GHz, abt 15" LCD, 10 kW
Echo sounder	1 x LCD
GPS	1 x GPS with 10" LCD plotter 1 x simple backup GPS
Electronic horn	1
M/E rev indicator	1
Prop shaft rev indicator	1
Helm indicator	1
Window wiper	1
Wind vane anemometer	1
Floodlight	400W Halogen x 11
Searchlight	500W incandiscent light x1 local control

	Bridge consol	Main engine control and alarm Telephone PA microphone Engine telegraph Engine monitor
13) Radio apparatus (A1 + A2 GMDSS area)		
	VHF radiotelephone	1: with DSC and DSCWR
	MF/HF radio telephone	1: 150W with DSC and DSCWR
	EPIRB	2
	SART	2
	Two-way portable VHF	3
14) Alarms		
	General alarm	1 set
	Engine room bilge alarm	1 set
	Bridge navigation watch alarm system (BNWAS)	1 set
15) Materials		
	Hull	Mild steel
	Pipe material	
	Engine room seawater	Polyester resin lined inside
	Fresh water	Steel in engine room and stainless steel or plastic in accommodation
	Hydraulic oil	Stainless steel (exposed part) and steel (inside)
	Piping installation	Pipe sections with flange connection at suitable interval allowing easy dismantling
	Paint	
	Bottom	Epoxy AC + Tin-free SPC AF at 2 years life
	Ship side	Epoxy
	Cargo hold	Oleoresinous
	Superstructure	Modified epoxy
	Exposed deck	Modified epoxy for deck
	Engine room bottom	Epoxy
	Deckhouse inside	Oleoresinous
	Fresh water tank	Epoxy for drinking water
	Ballast water tank	Epoxy
	Sacrifice anode	Zn plates 300mm x 150 mm x 30 mm x 38 pc
16) PMP exchange parts		1 set

1) PMP exchange parts

The PMP exchange parts are those parts to be used for overhauling regularly regardless of the



condition of machinery (i.e. whether it is in order or out of order) at a time planned in advance according to the PMP program.

Working parts will be removed from the machinery and replaced with stowed spare parts. The removed parts will be cleaned, reconditioned and stowed in the workshop shelf. In the next maintenance for the same part, reconditioned and stowed parts will be used and same work will be repeated. This procedure requires initial investment to procure a set of spare parts, but reduces breakdown due to e.g. wearing and elongates life of parts.

PMP system should apply to the main engine, gearbox, generator engine, etc., for which necessary exchange parts should include following.

Main engine and shafting	
Cylinder head assembly	One engine set
Piston ring	Do.
Main bearing (base and center) and thrust bearing metal	Do.
Crank pin metal	Do.
Connecting rod bolt	Do.
Fuel injection pump complete	Do.
Fuel injection valve	Do.
Nozzle assembly	Do.
Fuel oil injection pipe	Do.
Governor	Do.
Turbocharger	Do.
Gasket for turbocharger	Do.
Engine driven pumps (FW, SW, FO, LO)	Do.
Cooling fresh water thermostat and seal	Do.
Engine attached cooling seawater pipes (steel and rubber)	Do.
O ring and seal packing for special survey overhaul	Do.
LO and FO filter element (in case of paper filter)	Four engine set
Pressure gauge	One engine set
Thermometer	Do.
Pressure switch and temp switch	Do.
Tachometer	Do.
Cooling fresh water chemical and test kit	Do.
Zinc anode	Two engine set
Gearbox	
LO pump	One engine set
Pressure gauge	Do.
O ring, seal packing for special survey overhaul	Do.
Zinc anode	Two engine set

Shafting	
Mechanical seal ring and associated parts	One engine set
Zinc anode	Two engine set
Generator engine	
Cylinder head assembly	One engine set
Piston ring	Do.
Main bearing (base and center) and thrust bearing metal	Do.
Crank pin metal	Do.
Connecting rod bolt	Do.
Fuel injection pump complete	Do.
Fuel injection valve	Do.
Nozzle assembly	Do.
Fuel oil injection pipe	Do.
Governor	Do.
Turbocharger	Do.
Gasket for turbocharger	Do.
Engine driven pumps (FW, SW, FO, LO)	Do.
Cooling fresh water thermostat and seal	Do.
Engine attached cooling seawater pipes (steel and rubber)	Do.
O ring and seal packing for special survey overhaul	Do.
LO and FO filter element (in case of paper filter)	Four engine set
Pressure gauge	One engine set
Thermometer	Do.
Pressure switch and temp switch	Do.
Tachometer	Do.
Cooling fresh water chemical and test kit	Do.
Zinc anode	Two engine set
Generator bearing	Two generator set
Shell and tube coolers (including engine mount coolers)	
Cooler cover	One engine set
Seal packing	One engine set
Zinc anode	Two engine set
Anodes	
Zinc anodes for bottom hull	1 ship set
Reverse osmosis fresh water generator module	1 set

#### 2.2.2.4. Equipment for the New CPax Vessel

Equipment for the New CPax Vessel should be procured as follows.

Workboat	2 x FRP ab.7.5 mL x ab.2.0mB x ab.0.8mD (One rescueboat of same hull and outboard is supplied separately as the vessel's safety gear.)
Outboard motor	3 x 40 ps (1 as spare)
Manual pallet forklift	2 x manual hydraulic

Above equipment should be procured by the shipbuilder of the New CPax Vessel as follows.

- The equipment should be carried on board the New CPax Vessel and transported to Majuro.
- It is considered reasonable that the shipbuilder undertakes all procedures, e.g. procurement of equipment, insurance for shipment, stowage on board the vessel.
- PMP exchange parts should be of same makers' product as those installed on board, therefore working machineries and their exchange parts should not be procured separately by shipbuilder and other purchaser but by the shipbuilder only.

## 2) Workboat

There are only three islands which have wharf for vessels: Majuro, Jaluit and Kwajalein. In all other islands and atolls, vessel anchors in the sea away from the shore and workboats carried on board the CPax vessel go and return between the vessel and the shore to carry cargoes and passengers. Essential points of the workboats are as follows.

- Size: The larger, the more efficient in the island operation carrying more cargoes thereby less times of go and return; the boat size is limited by the vessel's hatchcover size where three workboats must be stowed and also limited by the shallow sea depth; but the boat must have sufficient floor area to accept three cargo pallets. Finally, the boat size similar to existing boats is found good.
- Shape of boat hull: To be V bow section and flat bottom aft, suitable for good course keeping.
- Hull material: To be FRP (Fiberglass Reinforced Plastic) same as the existing boats, which is familiar for MISC workshop to repair.
- Propulsion: To be outboard motor same as the existing boats.
- Number of boats: To be three boats same as MV Aemman. One of three workboats being used also as the rescueboat included in the vessel's safety gear, number of workboats as the equipment is two.

## 3) Outboard motor

Propulsion motor for aforementioned workboat should be of following.

- Horsepower: By 25 ps outboards of existing boats, speed is too slow taking long time to go and return between the vessel and the shore, and besides uneasy to maneuver when the boat is deeply loaded with copra. It is found that the outboard should be up-powered to 40 ps.
- Number: One outboard for each of two workboats and besides one spare in standby for occasional breakdown, i.e. total three outboards should be supplied. (There are four outboards in total for the New CPax Vessel including the one for the rescueboat.)

#### 4) Manual pallet forklift

Manual pallet forklift is the necessary equipment to handle cargoes on pallet in the cargo hold.

- Type: To be manual pallet forklift, same type as the one used on board MV Aemman.
- Number: To be two sets to use separately in the No.1 and No.2 cargo holds.

#### 2.2.2.5. New LC vessel

##### (1) Vessel capacity

The capacity of the New LC Vessel is represented by 300 tons deadweight derived from 110% of LC Jeljelat Ae capacity and 50 passengers.

LC Jeljelat Ae was built in Majuro where available machine tools for shipbuilding were limited, and thereby hull was formed almost by straight lines and flat surfaces. Flat bow of the hull was easy suffering strong wave impact from head seas. Design of the New LC Vessel should consider hull shape of less wave impact with suitable curvature and adequate strength, as well as low water resistance.

##### (2) Stability

Hull of the New LC Vessel being beamy difficult to incline, there is no question on stability on the New LC Vessel.

##### (3) Maneuverability

Two engines, two shafts and two rudder configuration will ensure good maneuverability. Operation of two main engines independently further enhances maneuverability.

##### (4) Speed, main engine and hull form

Design of the New LC Vessel should allow better speed than LC Jeljelat Ae (9.5 knots when new), while allowing deadweight capacity of 300 tons greater than 270 tons of LC Jeljelat Ae, and while main engines are down powered to 882 kW (441 kW x 2) from 936 kW (312 kW x 3) of LC Jeljelat Ae.

Design of the New LC Vessel was made targeting low water resistance even by greater displacement; bow shape suitable for landing sandy beach; bow shape of less wave impact; and stern shape suitable to operate efficient large diameter propellers. Finding that, however, there are uncertain factors in these unconventional LC hull shapes, model tank test was conducted on May 2011 using 1.43 meters precise ship model. Water resistance and water stream was measured for different speeds and on two different drafts.

Model tank test showed good speed: 10.9 knots (on fully loaded draft, with 85% main engine output and with 15% sea margin), and important information was obtained by the test.

Detail of the model tank test is shown on the Appendices 5-2 : Result of Model Tank Test.

(5) Hull structure

1) Overall strength

LC type vessel hull, usually having shallow depth compared with length, has a risk of insufficient longitudinal strength, which can result in a damage on deck plate in way of midship when the vessel has longitudinal bending moment by uneven cargo loading and/or by uneven buoyancy by wave. To avoid such damage, hull structural design should take step to decide hull section modulus considering hull weight distribution, cargo weight distribution and wave buoyancy distribution.

2) Local strength

Wide ramp way fitted at the bow makes bow shape flat, which is liable to have wave impact at sea. Hull shape should be so designed as to ease such sea impact and hull structure should be adequate against such force.

Besides, bottom structure of the bow should be adequate to withstand pressure from the sandy beach.

(6) Accommodation

1) Passenger accommodation

Passenger capacity of the New LC Vessel is 50 persons, same as LC Jeljelat Ae, comprising 4 cabin passengers (2 cabins x 2 persons) and 46 deck passengers.

Spaces of deck passengers on board the sunken LC Jeljelat Ae were not adequate in area for many passengers and the spaces are of construction with simple roof and surroundings, which are not so suitable for many passengers traveling long days. Passenger area, toilet facility and surrounding construction should be improved.

2) Crew accommodation

In the charter operations of LC vessels, work of LC crew is less than that of CPax crew, as LC handles heavy or bulky cargoes which can be operated at once by crane and trucks, and besides LC vessels seldom handle copra cargo which requires many crew labors.

Accordingly number of crew on board the New LC Vessel should be 12 persons same as LC Jeljelat Ae.

(7) Cargo deck

On board LC vessels, all cargoes had to be stowed on the exposed cargo deck, but there were cargoes which preferred enclosed cargo space and thereby enclosed cargo space on board LC vessel was desired.

In the New LC Vessel, space under cargo deck, which was left unused as void space in the other LC vessels, should be used as the enclosed cargo hold. The hatchcover for the cargo hold should be of steel, flush deck type without protrusion on deck and having strength to support weight of heavy vehicle.

(8) Cargo gear

1) Cargo crane

In the midship, a turning jib crane of SWL<sup>14</sup> 5 tons should be installed same as LC Jeljelat Ae. Maximum working radius of the crane jib should be 10 m to cover major part of the cargo deck.

2) Bow ramp

At the bow, ramp way of 5.0 m width should be installed to allow passage of cargo forklift, heavy construction vehicle, etc.

(9) Fuel oil tank

Longest voyage of LC Jeljelat Ae was 2 weeks and maximum fuel oil consumption in one voyage was 45 klit. In the New LC Vessel, fuel oil tank will be about 160m<sup>3</sup> utilizing unused spaces under the cargo deck.

(10) Fuel oil tank for shore supply

Diesel fuel oil supply to power station in remote islands is one of the important duties of LC vessels. The New LC Vessel should have cargo oil tanks same as LC Jeljelat Ae. The capacity of the cargo oil tank should be 199 m<sup>3</sup><sup>15</sup> as the maximum quantity allowed by the safety regulation.

(11) Fresh water tank and water maker

Drinking water being catered by portable 18 lit drinking water bottles, fresh water consumption is by shower of passenger and crew, washing and laundering, all same condition as MV Aemman.

LC vessel also undertakes field trip services to transport general cargoes and copra, though not so frequent as CPax vessel, and thereby the capacity of the fresh water tank should be about 100 m<sup>3</sup>, similar to the New CPax Vessel.

Considering difficulty to fill necessary quantity of fresh water in dry seasons, a water maker (desalination plant) of about 4 tons/day capacity should be installed same as the New CPax Vessel.

(12) Navigation equipment

Navigation area of the New CPax Vessel is within 200 sea miles from the nearest land in the territorial waters of the Marshall Islands. Accordingly, maritime regulations of “Safety Regulations for Non-Convention Vessels (SRNCV)” will be applied.

According to the said regulations, each one set of satellite GPS compass, magnetic compass and radar (9 GHz) and two sets of GPS receivers.

An echo sounder should be fitted to the New LC Vessel for safe passage of shallow water and landing operation.

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<sup>14</sup> Safe Working Load: Mass of cargo which cargo gear can safely lift.

<sup>15</sup> Vessel with cargo oil tank of 200 m<sup>3</sup> or over fall under the category of “Tanker”, to which substantial increase of onboard safety measures are imposed.

(13) Radio apparatus

Same as the navigation equipment, radio equipment should also be complete according to SRNCV, which is basing on the international GMDSS.

Navigation area of the New CPax Vessel according to the GMDSS being A2, a MF/AF radiotelephone, a VHF radiotelephone, two EPIRBs and two SARTs should be installed. NAVTEX should be exempted as no NAVTEX broadcasting is available in the RMI waters.

(14) Electric generator

Vessels intending to navigate seas over coastal area must be fitted with two or more generators, allowing continuous power supply without blackout even in case of failure of one generator.

The New LC Vessel should be fitted with two main generators in the engine room, each of which has capacity of 100 kVA to cover normal sea loads. One set can always be in standby.

Onboard electricity should be 220 and 110 Volts on 60Hz AC, same as shore power, and 24 Volt DC for emergency use.

(15) Anti-Pollution Measures

The Government of Marshall Islands ratifies MARPOL Convention (International Convention for Preventing Pollution from Ships, 1973), thereby the New Vessels should install followings.

- Against oil pollution: Oily water separator to stop discharging oily water
- Against sewage pollution: Sewage collecting tank to stop discharging sewage in the restricted waters
- Against air pollution: NOx emission controlled diesel engines

(16) Long life policy

Marshall Islands is remote from industrial countries and it takes long time to get spare parts and engineer servicing. Vessels are obliged to stop working once important machinery is out of order. For stable operation of the Plan Vessel, honest implementation of periodical maintenance is important.

It is proposed that the PMP (Preventive Maintenance Policy) be planned for the New LC Vessel. The Project will instruct PMP to be conducted daily and periodically on board the vessel and in the workshop. Spare parts necessary to carry out PMP should be procured by this Project.

On the other hand, the vessel hull, machinery and outfitting should be designed and constructed considering robustness, maintenance friendliness, corrosion resistant material, etc., e.g. plastic coated seawater pipes.

(17) New LC Vessel Design

1) Principal particulars	
Type of the vessel	Landing craft type cargo passenger vessel
Service area	Domestic water of the Marshall Islands
Cargoes	General cargo, copra, construction machinery/vehicle/material

Flag	Republic of the Marshall Islands
Classification	Nippon Kaiji Kyokai (NK)
Rules to apply	Maritime rules of the Marshall Islands (incl. Domestic Watercraft Regulations)
	Safety Regulations for Non-Convention Vessels (SRNCV)
	International Convention on Tonnage Measurement of Ships
	International Convention on Load Line
	International Convention for the Prevention of Collisions at Sea
	International Convention for the Prevention of Pollution from Ships
	Rules of the Classification Society
Length overall	44.09m
Length bp	40.00m
Breadth, molded	10.80m
Depth, molded, upper deck	3.00m
Design draft	2.10 m
Gross tonnage, international	About 463 tons
Deadweight	About 300 t
Loaded speed	About 10.9 knots
Main engine	441 kW (600 ps) or over x 2
Complement	62 p total
Indoor passenger	4 p
Outdoor passengers	46 p
Crew	12 p
Tank Capacity	
Fuel oil tank	About 160 m <sup>3</sup>
Cargo oil tank	199 m <sup>3</sup>
Fresh water tank	About 100 m <sup>3</sup>
Seawater ballast tank	About 200 m <sup>3</sup>
Cargo hold capacity	About 77m <sup>3</sup>
2) Accommodation	
Indoor passenger room	Double bunk room x 2
Outdoor passenger space	Nos. pax: 46 p Area : 1 m <sup>2</sup> / person Deck: Timber grating Shipside: Plastic plated up to handrail height and roll-up canvas above
Captain's cabin	Single bunk, with toilet facility shared with chief engineer



Chief Engineer's cabin	Single bunk, with toilet facility shared with captain
Crew cabin	Double bunk room x 1, 4 bunk room x 2
Crew mess/ galley	Mess table for 6 crew
Galley equipment	1 x Electric cooking range(3 x hot plate @4 kW) 1 x Hot water boiler (10lit, 1 kW) 1 x Fridge (about 450 lit) 1 x Microwave 1 x Rice cooker (3.6 lit) Furniture, e.g. sink, shelves, storage complete
Washing equipment	1 x Washing machine, about 6 kg
Crew toilet	Common toilet: WC x 2, shower x 2 Share toilet: WC + shower x 1
Pax toilet	WC x 2
Freezing chamber	9m <sup>3</sup> -25°C Ref. compressor 2.2kW x 2
Structural fire protection	According to the SRNCV regulations
3) Cargo deck and cargo hold	
Cargo deck	Area: 270 m <sup>2</sup> Permissible load: Axle load 60 kN or area load 17.2 kN/m <sup>2</sup> Lashing points: Clover leaf plate at 3m x 3m space total about 40 pcs
Shore ramp	Steel construction 6.5mL x 5mW x 1 Herring bone pattern top Permissible load: Axle load 60 kN or area load 17.2 kN/m <sup>2</sup>
Deck crane	SWL 5 t x 1 max radius 10m, electric driven
Cargo hatch	1.80m x 1.80m Flush deck, with weathertight gasket
Cargo hold	12.0mL x 3.2mW x 2.0mH
4) Fuel oil and fresh water supply	
Diesel oil supply	Transfer pump: Centrifugal 50m <sup>3</sup> /h x 20m x 5.5kW x 2 Delivery pipe: 125A The pump to be placed under the upper deck forward. About 2 hours to transfer 200m <sup>3</sup> diesel oil.
Fresh water supply	To be supplied by the engine room general service pump (about 35 m <sup>3</sup> /h).
Petrol supply	Steel tank 1.5m <sup>3</sup> x 2 on upperdeck Filling station : Gas station type nozzle with about 40 lit/min pump and flow meter

5) Deck machinery	
Windlass/ramp winch	Hydraulic driven x 2 Each with: Chain wheel: 25kN x 9m/min x 1 Ramp drum: 25kN x 9m/min x 1 Drum capacity of 6mmφ SWR x 16m (drum about 500mmφ x 300m W x 1 layer) Warping drum x 1 Local control
Bower anchor	Stockless 780 kg x 2 (equipment number 240 - 280)
Anchor chain	φ24 mm grade U2 12 shackle length (330 m) x 1
Towing rope	φ22 mm x 180 m x 1 SWR (6 x 24)
Rule mooring rope	φ26 mm x 120 m x 4 polypropylene class-2
Working mooring rope	φ36 mm x 50 m x 4 nylon
Capstan	Hydraulic driven x 1 20 kN x 13 m/min Local control
Stern anchor	Danforth type 585 kg x 1
Stern anchor chain and rope	Chain φ24 mm x 1.5m + SWR φ28 mm x 120 m x 1
Stern anchor winch	Hydraulic driven 17 kN x 9 m/min
Hydraulic pump unit	To supply hydraulic oil to the windlasses, capstan and stern anchor winch. Pump unit: 7.5 kW x 2 (50% x 2) Stainless steel pipe on deck and steel pipe inside
Rudder	Hanging spade rudder x 2
Steering gear	Electro hydraulic x 1 2 rudders to work parallel. Helm angle 35 deg to both sides Hydraulic oil pump: 2.2 kW x 1 Auxiliary steering: Manual oil pump steering from steering wheel in the wheelhouse
Steering stand	GPS compass autopilot
6) Lifesaving apparatus	
Inflatable liferaft	SOLAS A PACK for 25p x 3
Buoyant apparatus	For 22p x 3

Rescueboat	1 x FRP ab.7.5 mL x ab.2.0mB x ab.0.8mD 1 x Outboard 40ps Launching and recovery by lifting cargo derrick. Common with workboat.
Lifejacket (solid type)	For all complement 62 For duty crew 4 For children 5 Spare 50
Life buoy	4 (1 with self-igniting light, 1 with buoyant line, 2 with self-igniting smoke signal)
Parachute signal	4
Red flare	4
Smoke signal	4
7) Firefighting equipment	
Fire hydrant	3 (each 1 in engine room, crane post side, on bridge deck) Type: 40A bore Nakajima type coupling
Fire hose, nozzle and fire locker	3 sets Nozzle: Fog/jet dual nozzle 12mmφ Hose : 15m 40A bore
Portable fire extinguisher	10 (engine room x 6, accommodation x 2, galley/mess x 1, wheelhouse x 1) with 100% spare charges
45ℓ foam fire extinguisher	1 in the engine room
6kg dry chemical fire extinguisher	4 in the engine room
Emergency fire pump	Diesel driven 25m <sup>3</sup> /h x 0.3MPa x 1 in the bow part
Firefighter's outfit	1 set (breathing apparatus, fire cloths, safety belt, de-smoke helmet, de-smoke mask, safety lamp and fire axe)
8) Ventilation and natural lighting	
Engine room vent	E. axial flow fan (reversible) 200m <sup>3</sup> /h x 30mmAq x 1.5 kW x 2
Cargo hold	E. axial flow fan (exhaust) 0.4kW x 1
Galley/mess room	E. axial flow fan (exhaust) 0.4kW x 1
Toilet	E. pipe fan x 4
Air conditioning	Served area: Crew and pax cabins, wheelhouse and galley/mess room (passage and toilet are not served) Temp cond.: Outside 32 deg C/80%RH → inside 27 deg C/50%RH 70% recirculation

Window	Aluminum frame Wheelhouse 1200Wx650H x 3 □700/550Wx650H x 2 650x650x6 (all fixed) Square window 350Wx500H x 12 (all openable) Round scuttle 250φ x 7 (all openable)
9) Machinery	
Main engine	4 stroke cycle trunk piston marine diesel engine x 2 Rated output > 441 kW (600 ps) Rated rev. < 1,500 rpm Fuel oil Marine diesel oil Starting Electric cell motor Turning Manual ratchet handle Engine seating Rigid mount using chock line or chockfast resin
Reduction reversing gear	Output rev About 450 rpm Clutch Wet multi-plate
Propeller and shafting	Propeller 4 blades solid, φ1500 mm x 2 Tailshaft Forged steel Stern tube Cast iron Water seal Mechanical lip seal x 2 Bearing Seawater lubricated EVR
Main generator	Generator 100 kVA (80 kW) x 225V x 3φ x 60Hz x 2 Prime mover 88 kW x 1200rpm or 1,800rpm x 2 Fuel oil Marine diesel oil Starting Electric cell motor
FO transfer pump	E. horiz. gear 2 m <sup>3</sup> /h x 0.2 MPa x 0.75 kW x 2
Fire/bilge/ballast/general service pump	E. horiz. centr. 35/25 m <sup>3</sup> /h x 0.2/0.40 MPa x 7.5 kW x 2
Fresh water pump	E. water pump 2.5 m <sup>3</sup> /h x 0.16 MPa x 0.4kW x 2
Sewage discharge pump	E. horiz. centr. 2.0 m <sup>3</sup> /h x 0.2MPa x 0.4 kW x 1
Sludge discharging pump	E. horiz. screw 1.0 m <sup>3</sup> /h x 0.39 MPa x 1.5kW x 1
Oily water separator	Gravity 0.25 m <sup>3</sup> /h x <15ppm x 1
Water maker	Reverse osmosis 4 ton/day x 1 nylon module
Flow meter	For main engines x 1 (digital reading and remote monitoring) For gensets x1 (digital reading and remote monitoring)
Machine tools	E. bench drill 14mmφ x 0.4 kW x 1
	E. bench grinder Two heads 225mmφ x 1
	Horizontal vise 150 mm x 1
	M/E overhaul chain block 0.9 t x 2
	Gas cut/weld Small set x 1

	E. arc welder	AC220V x 250A x 1 (with 50m cable x 2)
Engine room tanks	Diesel oil service tank	1.9m <sup>3</sup> x 1
	Lube oil storage tank	1.0m <sup>3</sup> x 1
	Sludge tank (double bottom)	4.0m <sup>3</sup> x 1
	M/E coolant expansion tank	0.1m <sup>3</sup> x 1
	Wash oil tank	100 lit x 1
	Sewage tank	2.0m <sup>3</sup> x 1
Engine control	Local and wheelhouse remote control	
Engine monitor	CPU + monitor + printer set placed in the wheelhouse Machineries monitored: main engine, genset, steering gear, oily water separator, water maker, air conditioning, freezer compressor, hydraulic pump, high level alarm of tank and bilge	
10) Electric supply		
Main switchboard	Deadfront Generator panel, feeder panel (AC220V and AC110V), starter panel, earth alarm	
Transformer	225/115 V 15 kVA	
Charging discharging board	Place on upper deck or above, with rectifier	
Storage battery	For general use 200 AH x 2 For radio use supplied by radio maker For main engine and genset starting (with low level alarm): supplied by maker	
Shore supply	220V 3φ 40 kVA	
11) Inboard communication		
Engine telegraph	1:1 x 2	
Common battery telephone	1 set: DC24V wheelhouse, mess room, engine room and steering gear room	
Public addressor	1 set: AC220V + DC24V amplifier and speakers	
General alarm	1 set: AC220V + DC24V	
Alarm bell	1 set: DC24V	
12) Navigation equipment		
Magnetic compass	1 x desktop type 150mmφ, spare bowl x 1	
GPS compass	1	
Steering control	1 (GPS autopilot)	
Radar	1 x 9GHz, abt 15" LCD, 10 kW	
Echo sounder	1 x LCD	
GPS	1 x GPS with 10" LCD plotter 1 x simple backup GPS	
Electronic horn	1	

	M/E rev indicator	2
	Prop shaft rev indicator	2
	Helm indicator	1
	Window wiper	1
	Wind vane anemometer	1
	Floodlight	400W Halogen x 8
	Searchlight	500W incandiscent light x1 local control
	Bridge consol	Main engine control and alarm Telephone PA microphone Engine telegraph Engine monitor
13) Radio apparatus (A1 + A2 GMDSS area)		
	VHF radiotelephone	1: with DSC and DSCWR
	MF/HF radio telephone	1: 150W with DSC and DSCWR
	EPIRB	2
	SART	2
	Two-way portable VHF	3
14) Alarms		
	General alarm	1 set
	Engine room bilge alarm	1 set
	Engine room fire detector	1 set
	Bridge navigation watch alarm system (BNWAS)	1 set
15) Materials		
	Hull	Mild steel
	Pipe material	
	Engine room seawater	Polyester resin lined inside
	Fresh water	Steel in engine room and stainless steel or plastic in accommodation
	Hydraulic oil	Stainless steel (exposed part) and steel (inside)
	Piping installation	Pipe sections with flange connection at suitable interval allowing easy dismantling
	Paint	
	Bottom	Epoxy AC + Tin-free SPC AF at 2 years life
	Ship side	Epoxy
	Cargo hold	Oleoresinous
	Superstructure	Modified epoxy
	Exposed deck	Modified epoxy for deck
	Engine room bottom	Epoxy

	Deckhouse inside	Oleoresinous
	Fresh water tank	Epoxy for drinking water
	Ballast water tank	Epoxy
	Sacrifice anode	Zn plates 300mm x 150 mm x 30 mm x 28 pc
16) Spare parts for Preventive Maintenance Policy		
	Zinc anodes for main engines, shafting, gearbox and gensets	Eight engine set
	Zinc anodes for bottom hull	One ship set
	Mechanical seal ring and associated parts for tailshaft seal	Two engine set
	Reverse osmosis fresh water generator module	1 set
17) PMP exchange parts	1 set	

#### 1) PMP exchange parts

The PMP exchange parts are those parts to be used for overhauling regularly regardless of the condition of machinery (i.e. whether it is in order or out of order) at a time planned in advance according to the PMP.

Working parts will be removed from the machinery and replaced with stowed spare parts. The removed parts will be cleaned, reconditioned and stowed in the workshop shelf. In the next maintenance for the same part, reconditioned and stowed parts will be used and same work will be repeated. This procedure requires initial investment to procure a set of spare parts, but reduces breakdown due to e.g. wearing and elongates life of parts.

PMP system should apply to the main engine, gearbox, generator engine, etc., for which necessary PMP program and exchange parts should be prepared by the Project. However, most of the PMP exchange parts will be procured as a part of the New CPax Vessel, whose main engine, etc. are of same type as those for the New LC Vessel. PMP parts procured as the part of the New LC Vessel are as follows.

Zinc anodes for main engines, shafting, gearbox and gensets	Eight engine set
Zinc anodes for bottom hull	One ship set
Mechanical seal ring and associated parts for tailshaft seal	Two engine set
Reverse osmosis fresh water generator module	1 set

#### 2.2.2.6. Equipment for the New LC Vessel

Equipment for the New LC Vessel should be procured as follows.

Workboat	Refer to the specification of the rescueboat in the 2.2.3.3 (16) 6) Lifesaving apparatus
Outboard motor	1 x 40 ps (to be a spare)
Forklift	1 x Propane fueled, 2.5 t capacity

Pallet forklift	2 x manual hydraulic
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Above equipment should be procured by the shipbuilder of the New CPax Vessel as follows.

- The equipment should be carried on board the New CPax Vessel and transported to Majuro.
- It is considered reasonable that the shipbuilder undertakes all procedures, e.g. procurement of equipment, insurance for shipment, stowage on board the vessel.

#### 1) Workboat

LC vessel has to undertake field trip services backing up CPax vessels in busy season, and thereby workboat has to be carried on board to transport cargoes and passengers between the vessel and the shore. Number of the boat to be carried on board should be one same as LC Jeljelat Ae and specification of the workboat for the New LC Vessel may be same as those for the New CPax Vessel. Specification of the workboat is mentioned in the specification of the New LC Vessel as the rescueboat. The New LC Vessel carries a rescueboat, which is common with the workboat same as the New CPax Vessel. In this section, only one spare outboard is mentioned as the Equipment.

#### 2) Outboard motor

One outboard motor for workboat / rescueboat should be supplied.

#### 3) Forklift

To offload heavy cargoes and construction materials from the LC to shore, forklift must be on board the LC vessel. The forklift to be supplied by the project should be of following.

- Capacity: To be 2.5 tons, lifting concrete bricks and cement bags piled on pallet and carrying them to the shore.
- Forklift engine: To be LPG fueled, common in Majuro.
- Number to be procured: To be one, as LC Jeljelat Ae was carrying.

#### 4) Pallet forklift

Manual pallet forklift is the necessary equipment to handle cargoes on pallet on the cargo deck.

- Type: To be manual pallet forklift, same type as the one used on board MV Aemman.
- Number: To be two sets to be used on the cargo holds.

#### 2.2.2.7. Equipment (Liferaft for existing vessels)

This Project should procure liferafts of the MISC existing vessels not only liferafts for the new CPax and LC vessels. The liferafts for the existing vessels should be stowed on board the New CPax Vessel and transported to the homeport Majuro.

Installation on board each existing vessels should be undertaken by the RMI/MISC side.

Number of liferafts necessary for MISC existing vessels is as follows. Liferafts for MV Landrik is for



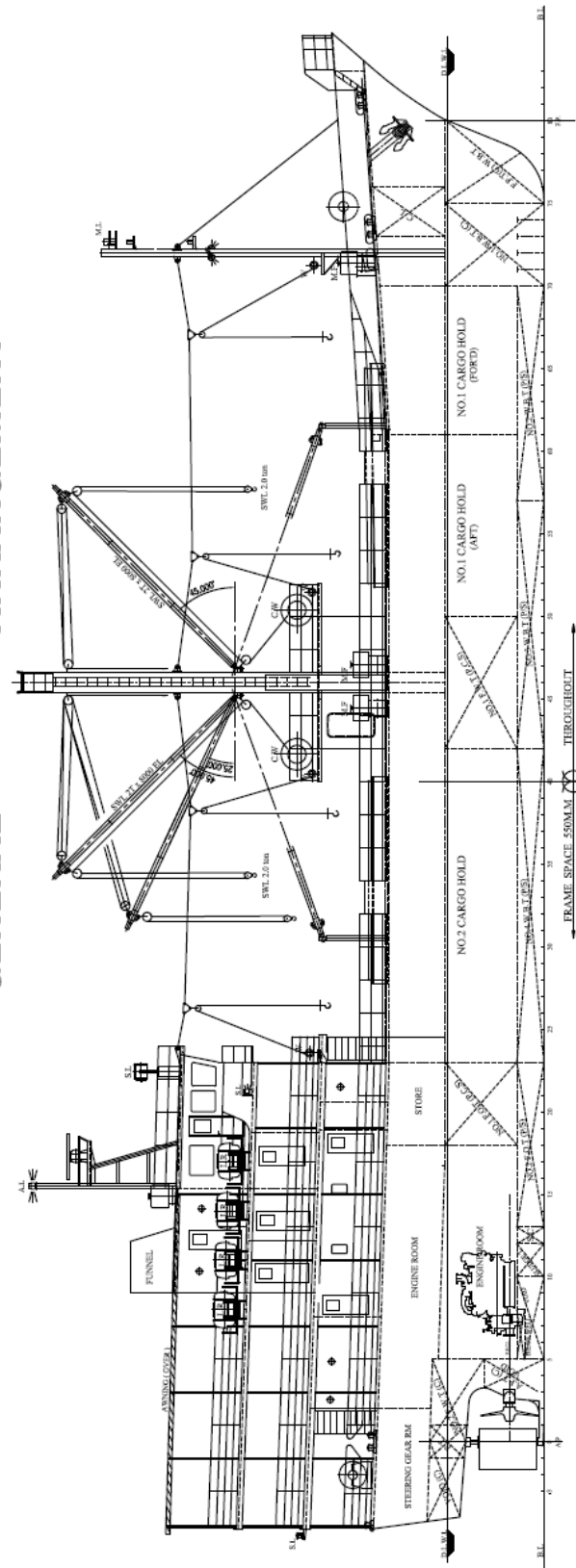
the capacity to cover crew only, understanding that she will not engage in passenger services.

MV Aemman	Passengers 150 persons + Crews 18 persons = 168 persons	
	Inflatable liferafts (for 25 persons)	7 sets
MV Ribujuk Ae	Passengers 100 persons + Crews 16 persons = 116 persons	
	Inflatable liferafts (for 25 persons)	5 sets
MV Landrik	Crews 17 persons	
	Inflatable liferafts (for 25 persons)	1 set
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Total		13 sets

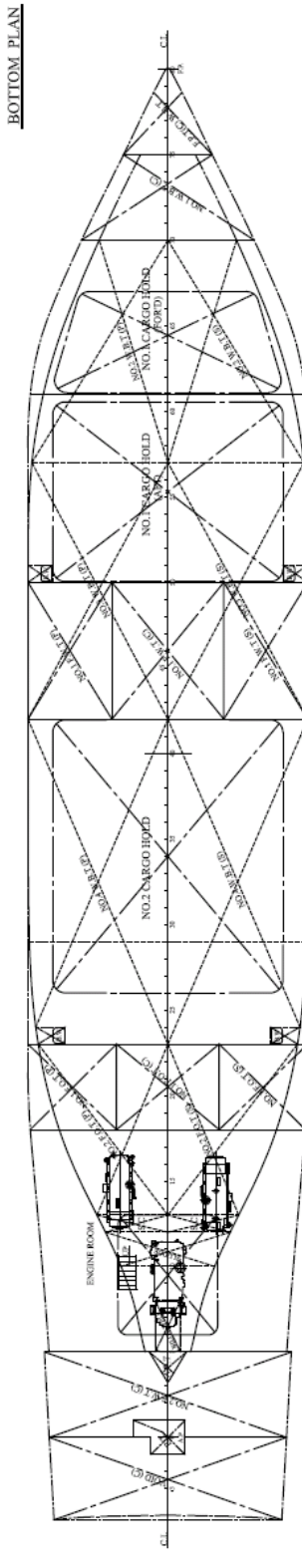
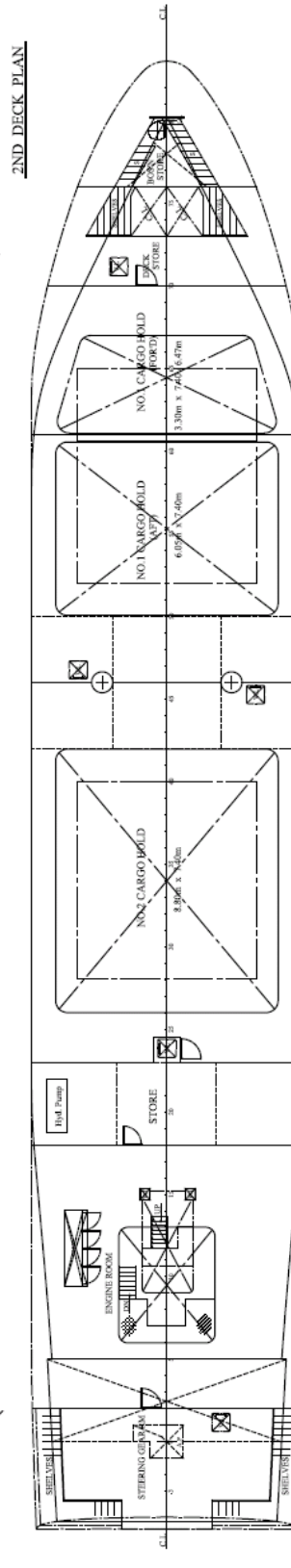
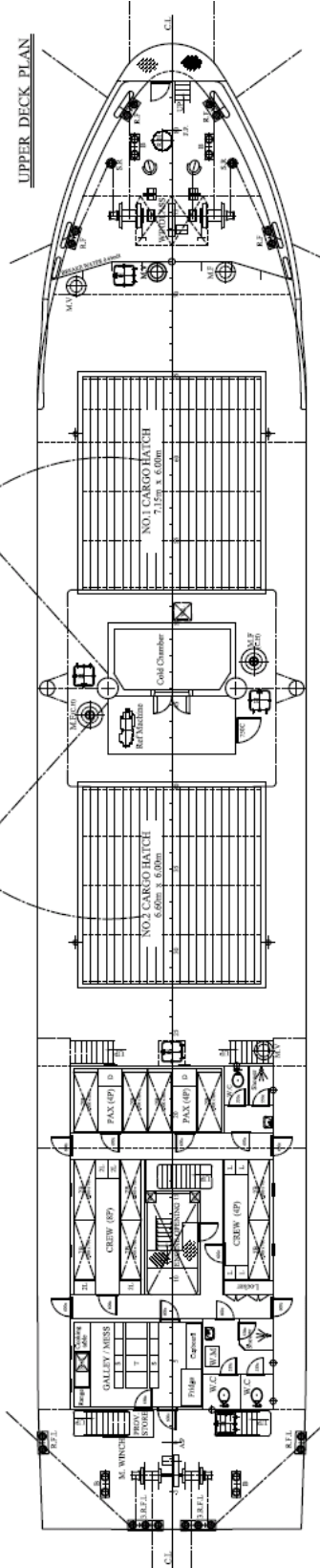
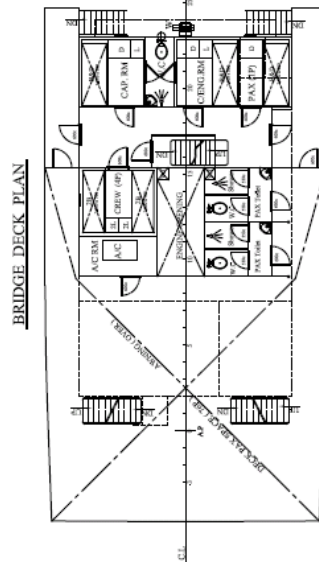
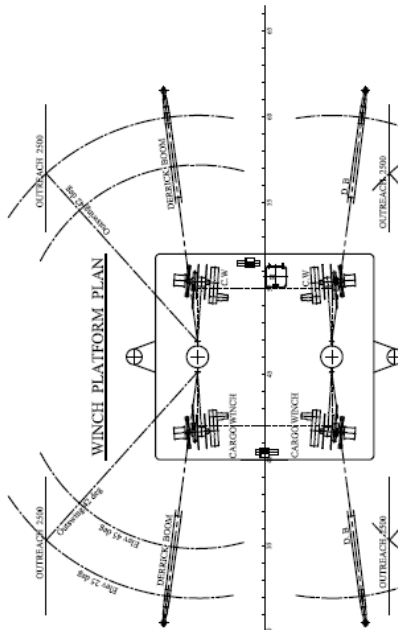
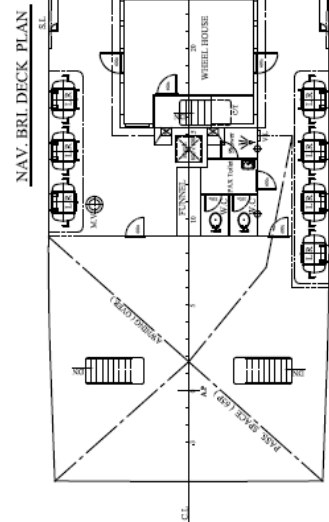
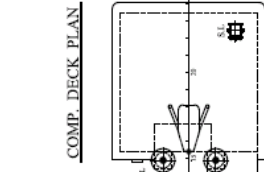
2.2.3. Outline Design Drawings

- (1) New CPax Vessel
- 1) General arrangement, CPax

GENERAL ARRANGEMENT

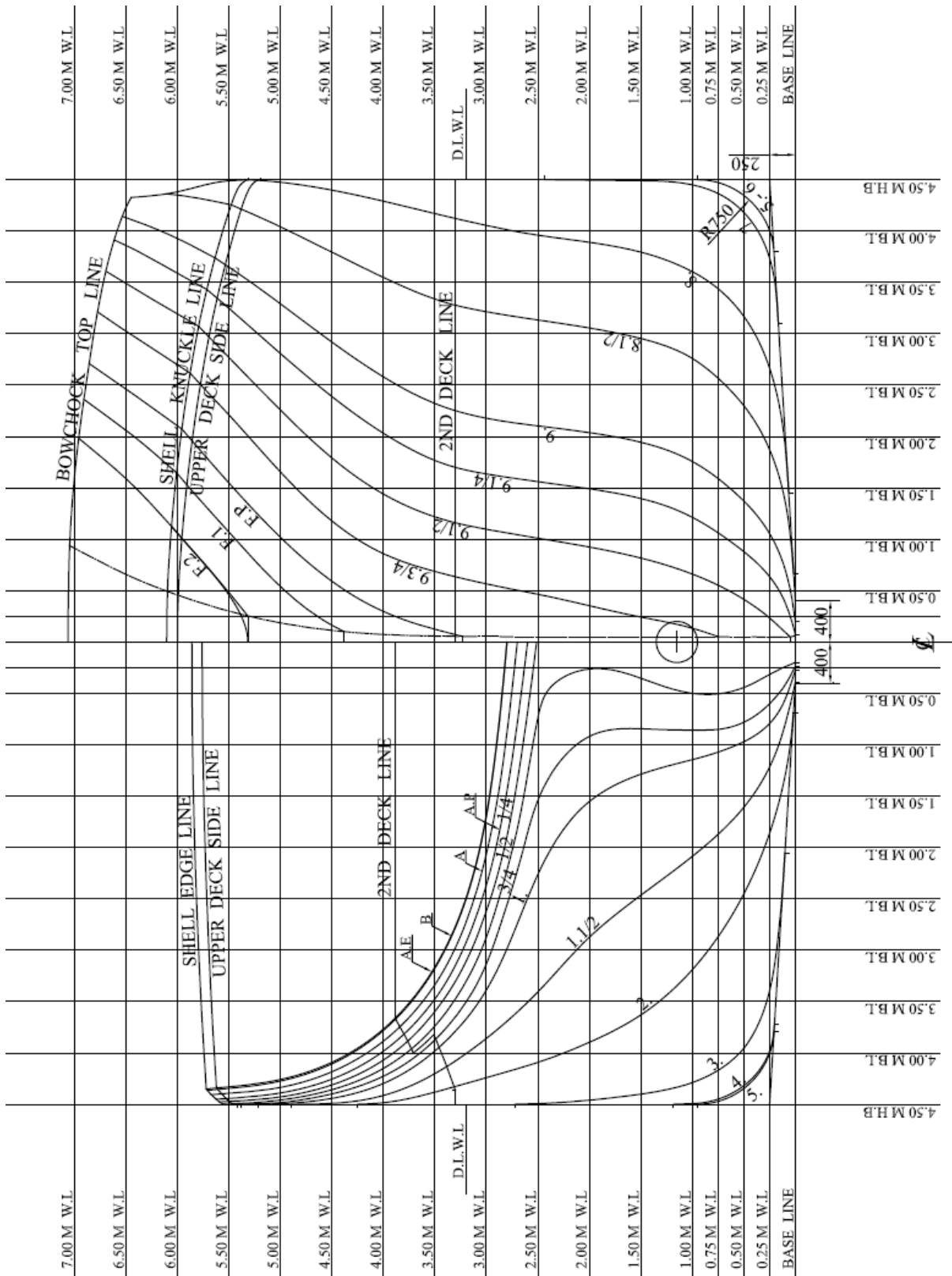


PRINCIPAL PARTICULARS	
LENGTH	40.00 M
BREADTH	4.40 M
DEPTH	3.50 M
NET TONNAGE	100.00
GROSS TONNAGE	100.00
REGISTERED TONNAGE	100.00
DISPLACEMENT	100.00
CLASSIFICATION	NO. 100.00



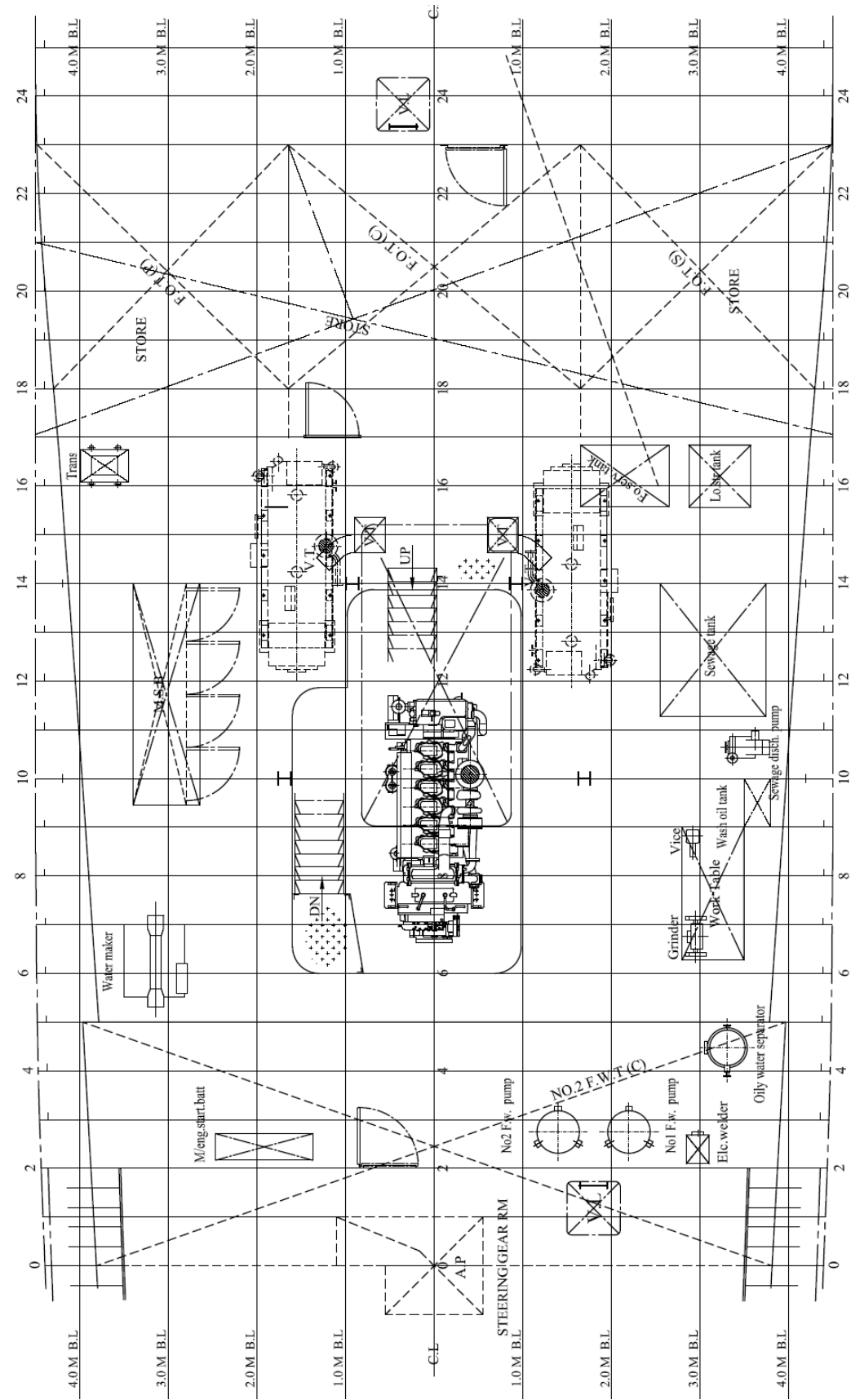
Fisheries Engineering Co., Ltd.

2) Lines plan, CPax





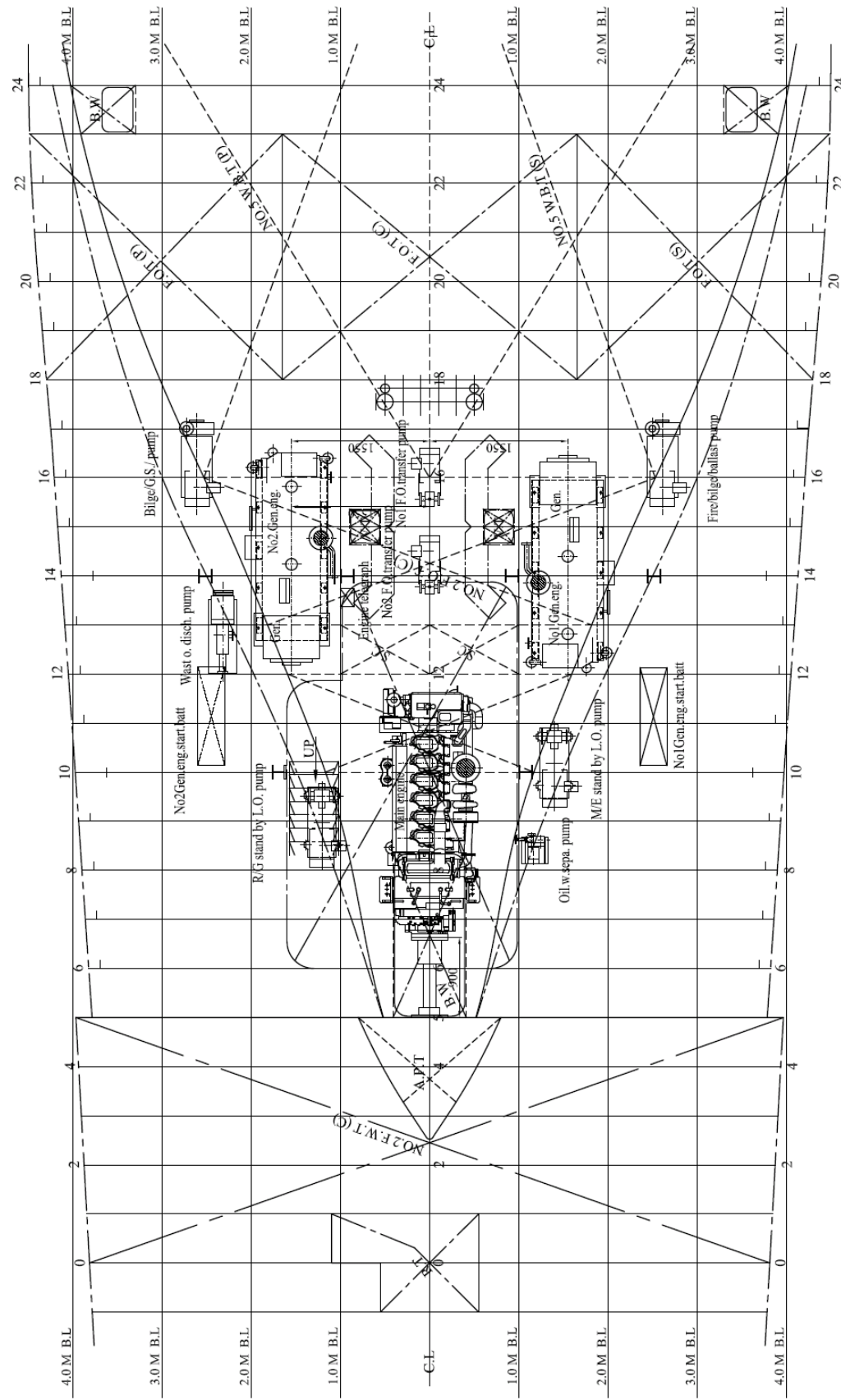
4) Engine room arrangement, CPax



ENGINE ROOM  
2ND DECK PLAN  
A3 S=1/40

P.

ENGINE ROOM BOTTOM PLAN

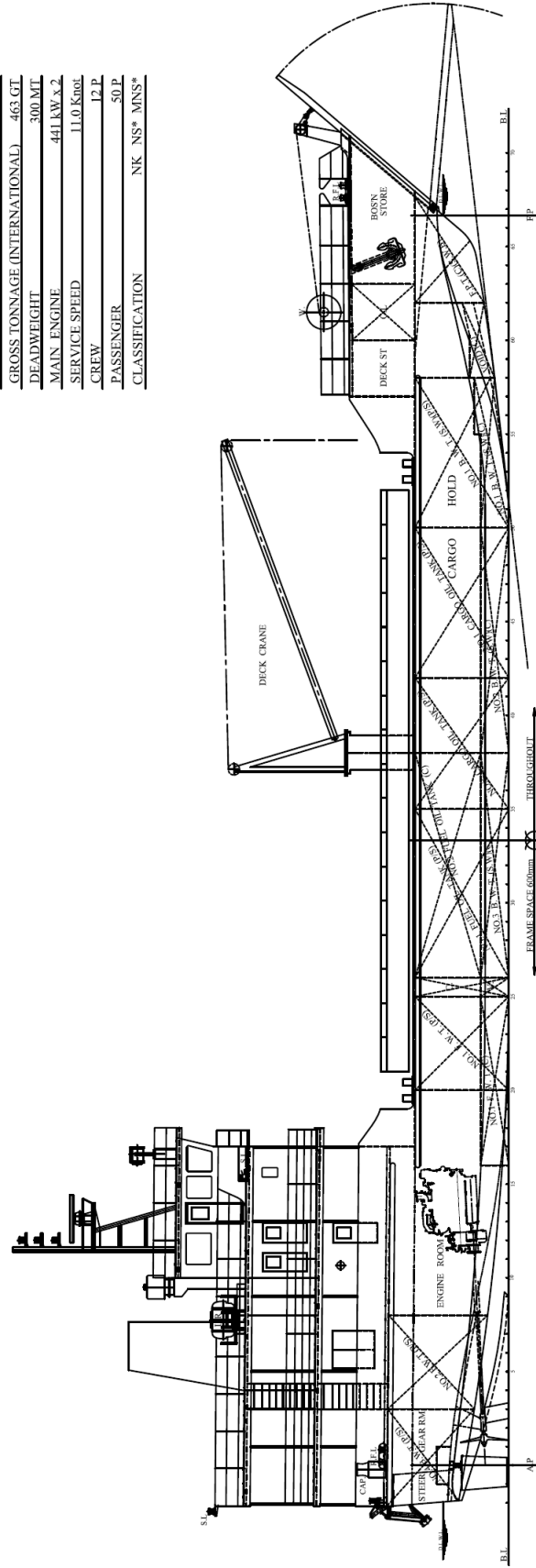


ENGINE ROOM  
BOTTOM PLAN  
A3 S=1/40

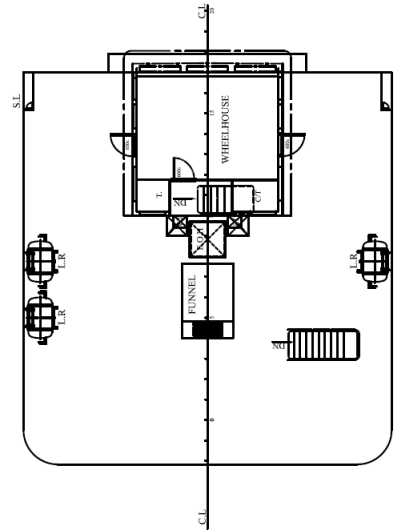
- (2) New LC Vessel  
 1) General arrangement, LC

# GENERAL ARRANGEMENT

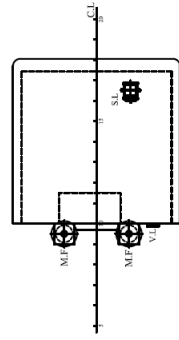
PRINCIPAL PARTICULARS	
LENGTH (OVERALL)	44.09 M
LENGTH (BET. P.P.)	40.00 M
BREADTH (MOLDED)	10.80 M
DEPTH (MOLDED)	3.00 M
DESIGN DRAFT (MOLDED)	2.10 M
GROSS TONNAGE (INTERNATIONAL)	463 GT
DEADWEIGHT	500 MT
MAIN ENGINE	441 kW x 2
SERVICE SPEED	11.0 Knots
CREW	12 P.
PASSENGER	50 P.
CLASSIFICATION	NK NS* MNS*



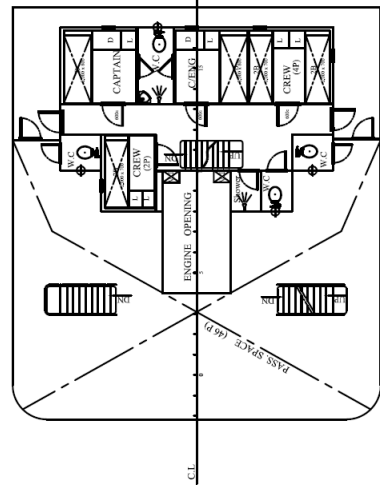
NAV. BRIDGE DECK PLAN



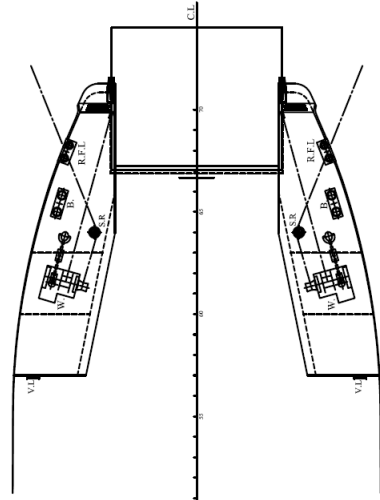
COMP. DECK PLAN



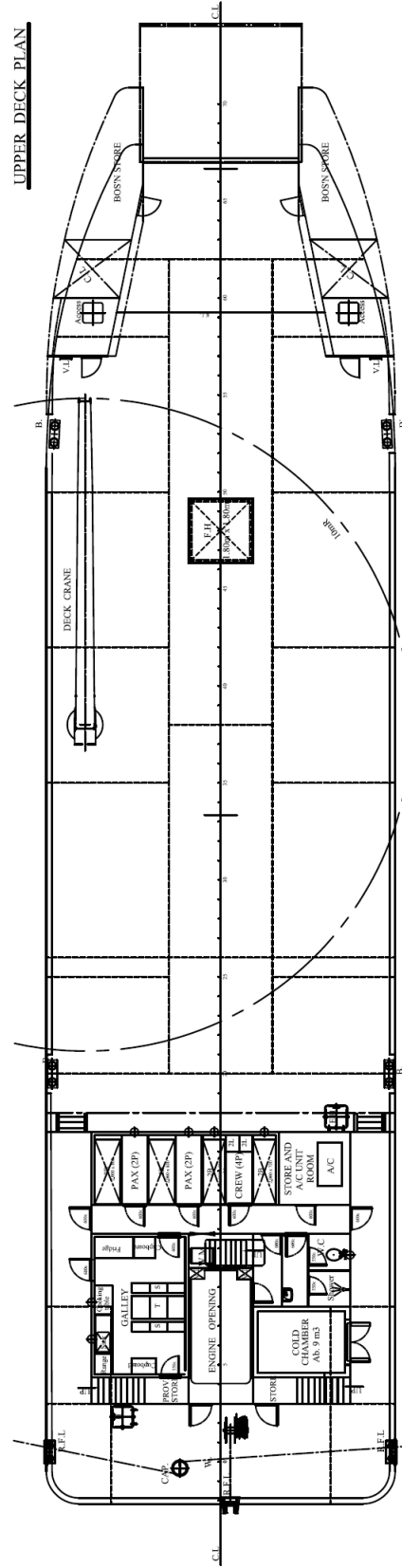
BRIDGE DECK PLAN



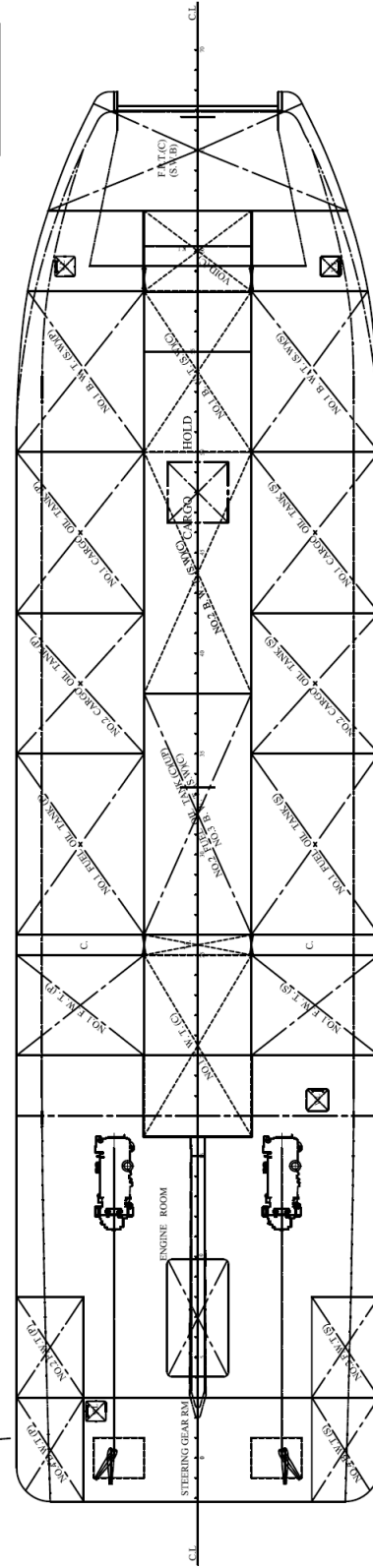
F.C.L.E. DECK PLAN



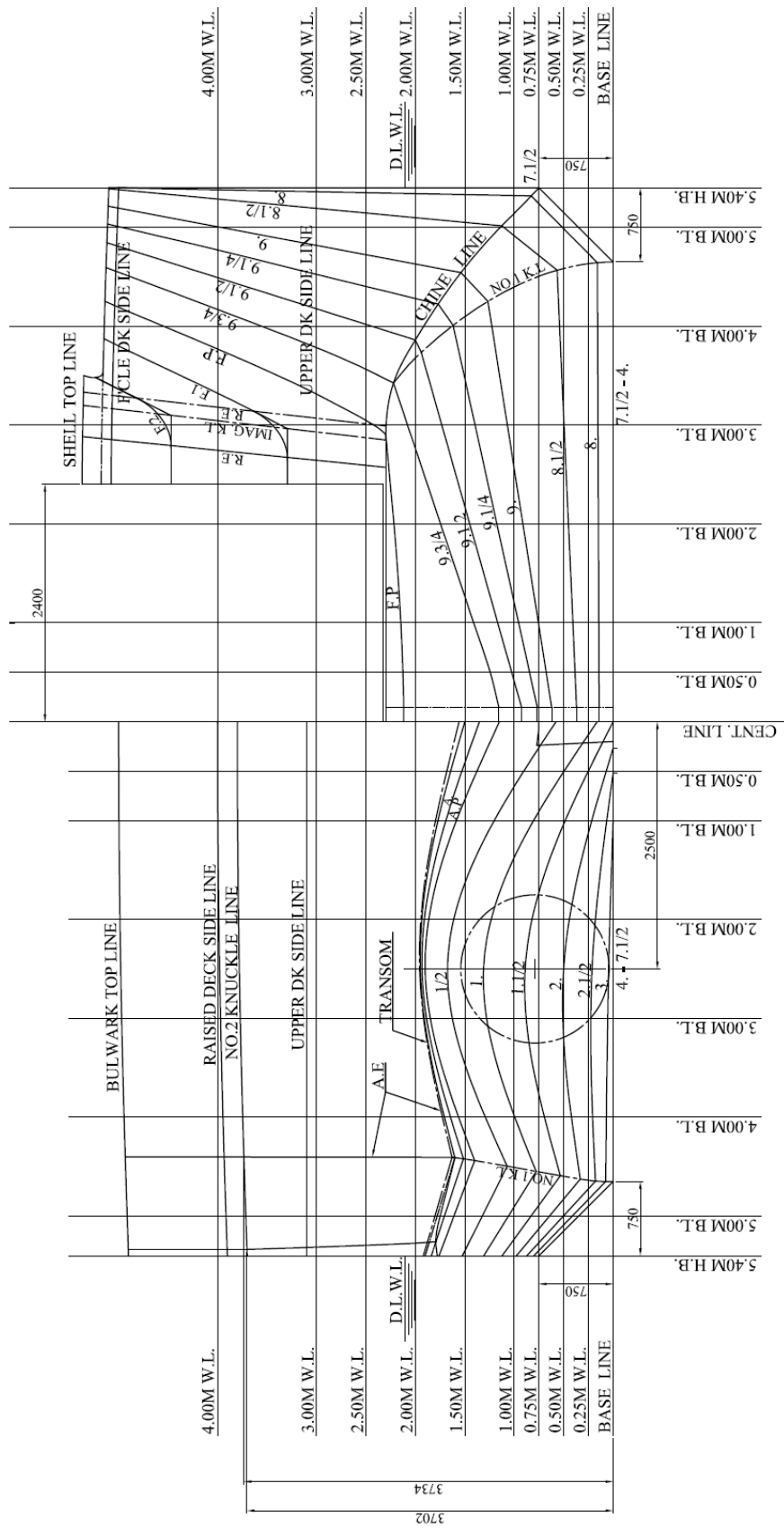
UPPER DECK PLAN



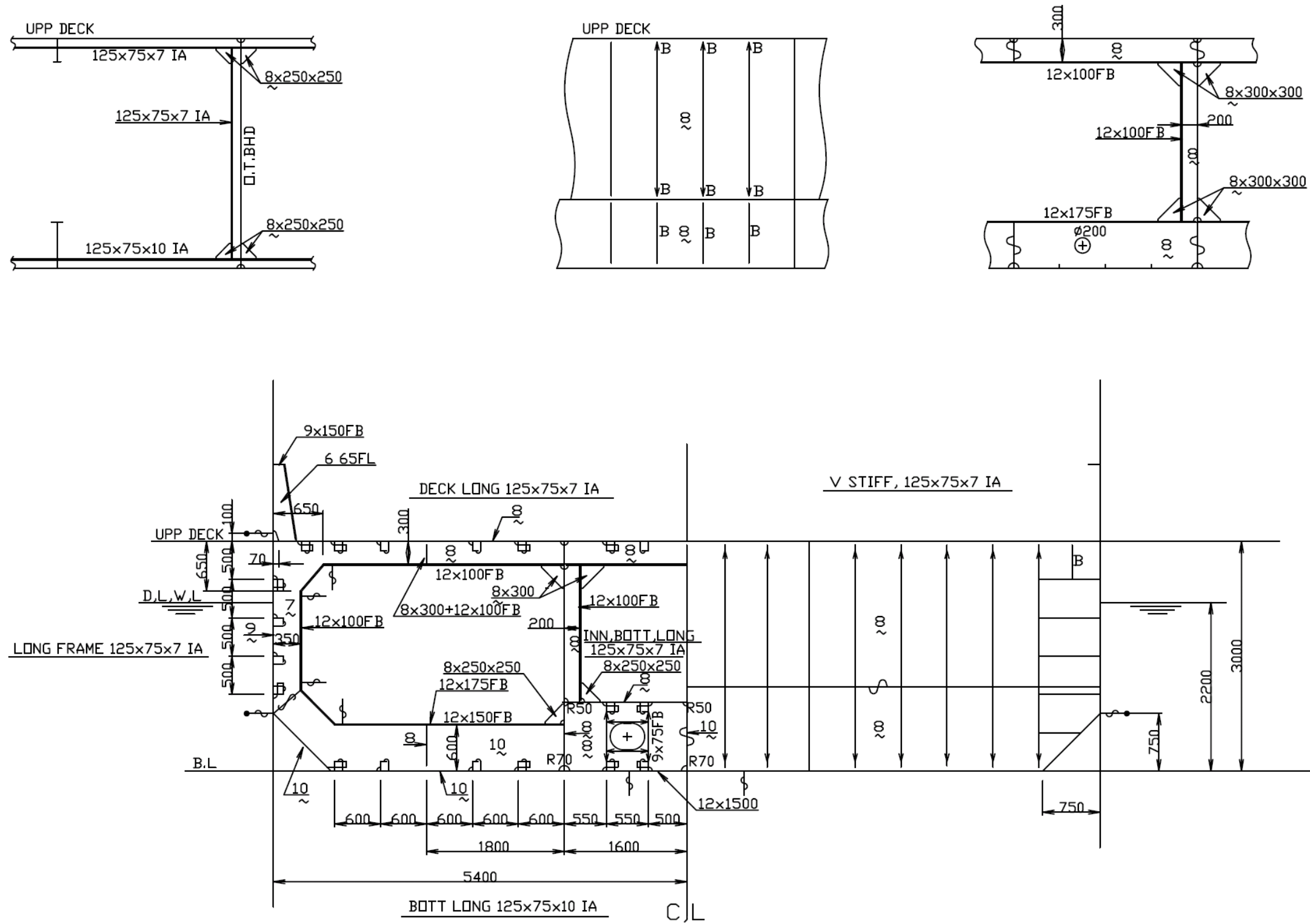
BOTTOM PLAN



2) Lines plan, LC

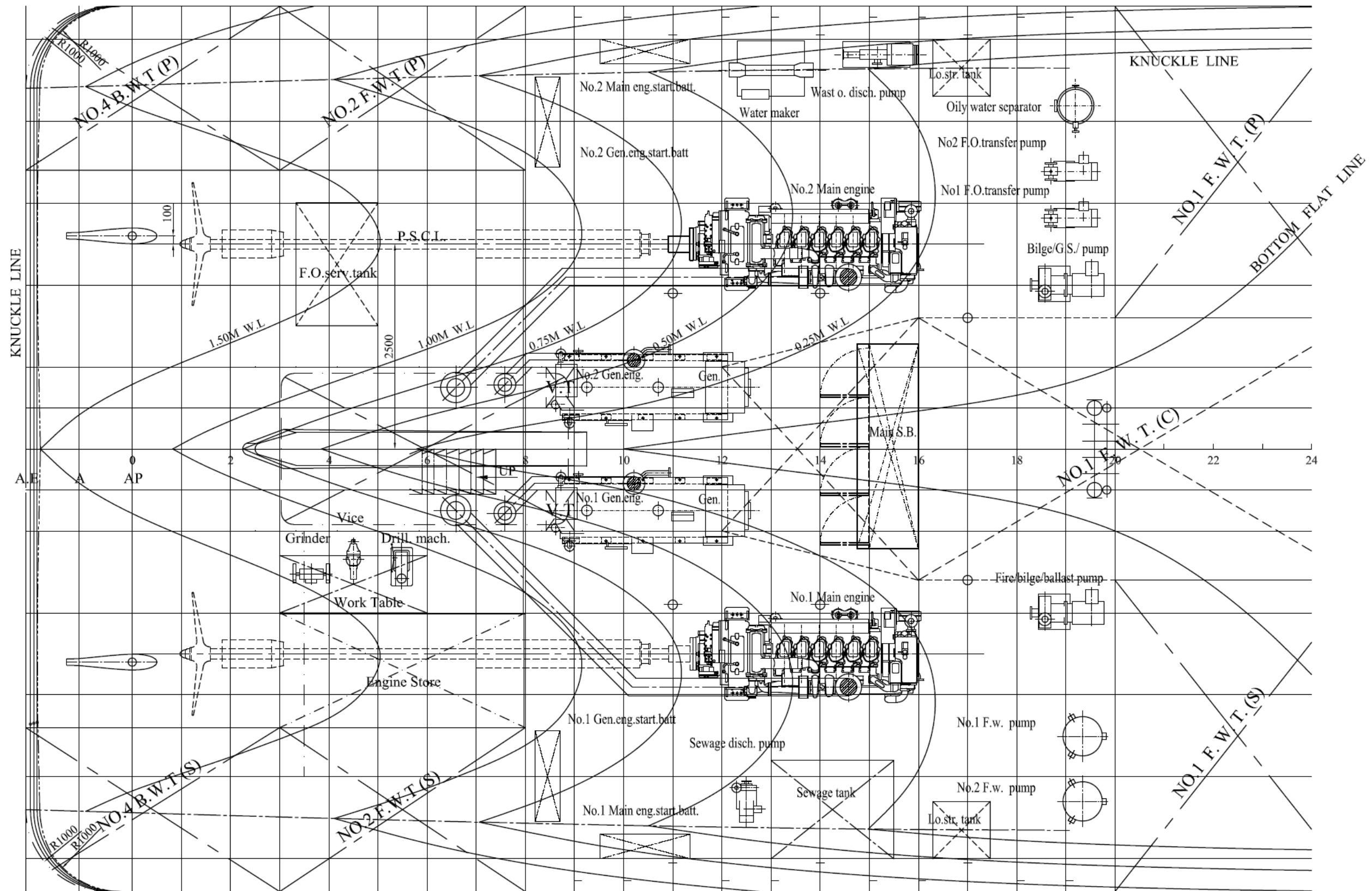


3) Midship section plan, LC





4) Engine room arrangement, LC



#### 2.2.4. Implementation Plan

One New CPax Vessel and one New LC Vessel procured under this Project should be constructed by two separate procedures, i.e. two separate public notices; two separate tenders; and two separate contracts.

##### 2.2.4.1. Implementation Policy

###### (1) Procedure

The New Vessels will be planned, documented and constructed along following procedure under the Japanese Grant Aid scheme of the Government of Japan.

- 1) Exchange of Notes between the Government of Japan and the Government of the Republic of Marshall Islands (RMI) and Grant Agreement between JICA and the Government of the RMI, for the implementation of the Project.
- 2) Conclusion of a Consultant Agreement between a Consultant recommended by Japan International Cooperation Agency (JICA) and the Project Implementing Agency established by the Government of the RMI, for the Consultant's work to implement the Project.
- 3) Verification of the Consultant Agreement by JICA.
- 4) The Consultant prepares detail designs and draft tender documents, and obtains approval from the Government of the RMI. These include methods of pre-qualification, technical specifications, general arrangement plan, project cost estimates, and draft shipbuilding contract.
- 5) Based on the approved Tender Qualification procedure, the Consultant conducts Tender qualification examination, obtains the approval of the Government of the RMI, and selects applicants. The Applicant must be Japanese ship building firm(s).
- 6) The Consultant carries out the Tender process, in the presence of the Government of the RMI, and examines the Tender documents submitted by the applicants. Based on the results of the applicant evaluations, the Consultant recommends the intended contractor to the Government of the RMI.
- 7) The Consultant assists in contract negotiations with the Government of the RMI and witness the Contract.
- 8) Verification of the The signed contract by JICA.
- 9) Based on the shipbuilding contract, the Contractor builds and conducts sea trials of the Vessel, and hand-over the Vessel together with the Equipment. The Consultant, in accordance with the Consultant Agreement, provides construction supervision, conducts sea trial, and witness the hand-over of the Vessels.
- 10) The Vessels with Equipment on board departs Japan for RMI.

(2) Basic provisions related to the Project procedures

Basic items related to the Project procedures under Japan's Grant Aid scheme are as follows. The following procedures apply to each of CPax and LC vessel.

1) Responsible Agency and Project implementing Agency for the Project

The Responsible Agency is the Ministry of Transportation and Communication (MTC), the Government of the RMI and the implementing agency is Marshall Islands Shipping Cooperation (MISC) under the MTC. With respect to the project implementation, MTC will generally deal with all documents and give approval and MISC will deal with technical documents and drawings by the authority of MTC.

2) Consultant

Following the Exchange of Notes and the Grant Agreement, a Consultant Agreement will be concluded between the Government of the RMI and the Consultant, which is Japanese firm recommended by JICA. As the proxy of the Government of the RMI, the Consultant will prepare the Tender documents including technical specifications and give assistance as necessary in the tender bidding and contractual phases, and further provide continuous supervision of the Vessels construction. For the purposes of carrying out this supervisory function, the Consultant will dispatch responsible engineers and outfittings experts to the shipyard, as necessary during the construction process.

3) The New Vessel building and Equipment procurement

For the Vessel building and related equipment procurement, qualification data submitted by Japanese firms will be evaluated first, and those who had passed the qualification appraisal are allowed to participate in the tender bidding. The tender is conducted along with the procedure established in advance. The successful tenderer signs the Contract for building the Vessel and procurement of related Equipment. The Contractor builds the Vessel, and conducts sea trial, procures the Equipment and transports the Vessel with the Equipment on board to the RMI for turnover.

4) Building plan of the New Vessel

To build the Vessel, the Contractor, pursuant to the contract and technical specifications, designs the hull and outfittings for building in the Contractor's yard facilities. Following preparation of the construction design by the Contractor, the Vessel is built along shipbuilding process: steel hull construction, outfitting (deck, machinery and electrical), tests, and then transport to the RMI. The following areas must be given careful consideration when examining the Construction Plan.

- 1) As this Project is being implemented under the Japanese Grant Aid scheme, strict adherence to the construction schedule is the major premise. The building plan must be prepared so as to fulfill all contract conditions within the term validity stipulated in the Exchange of Notes.

- 2) With regard to the delivery deadlines for machinery and equipment, careful consideration must also be given to preventing disruption of the construction work flow by maintaining tight control of machinery and equipment procurement and linking the hull construction and outfitting program to delivery schedules of the relevant machinery and equipment.
- 3) Various tests must be performed, as required by the RMI and Classification Society. The required sea trial must be performed upon completion of the construction phase to confirm vessel performance.
- 4) In the final stage of construction, two engineers appointed each of the CPax and LC vessels as senior officers are invited to Japan to participate in the final outfittings work and sea trials as well as receiving instructions from various makers, all for familiarization with the vessel systems and performance. These engineers travel aboard the New Vessel back to the RMI, for further familiarization.
- 5) Receiving the Provisional Certificate of Nationality from the Government of the RMI, the Contractor transports the Vessel, at his own responsibility, from the Contractor's quay (wharf) to Majuro, RMI, the Vessel's homeport. After arrival at Majuro, final inspection will be immediately conducted and thereafter the Vessel will be turned over to the Government of the RMI.

#### 5) Procurement plan of the Equipment

The each Contractor procures related equipment for each Vessel based on the Contract and technical specification.

#### 6) Dispatch of engineers

After turning-over the Vessel, two engineers (deck and machinery part) are dispatched each by the shipbuilding Contractor to the RMI for 15 days to provide ongoing guidance on operation of machinery, system and maintenance.

#### 2.2.4.2. Special consideration with regard to Construction and Procurement

Following should be observed in building the Vessel and reflected in controlling work schedule.

- ① The procedure of hull assembly and outfitting should be established taking into consideration of the Vessel layout and special features.
- ② For those materials, machinery and equipment, whose delivery is not very firm, delivery possibility should be followed up frequently and reflect the change in the work schedule promptly.
- ③ Quay tests for various machinery and equipment and sea trials should be in detail planned and included in the work schedule.
- ④ The work schedule should be regularly (at least once in a week) followed up and updated.

#### 2.2.4.3. Scope of Works

Scope of Works at Japanese side and the RMI side is generally as follows.

- ① Building of the Vessels, procurement of the Equipment and their transportation from Japan to the RMI are all undertaken by the Japanese side.
- ② The RMI side must undertake arrangement of license necessary to build and transport the Vessels.

As mentioned above, after the shipbuilding and equipment procurement contracts, the Project implementation does not rely on the work to be shared by the RMI side, except for the Provisional Certificate of Nationality, which must be issued by the Government of the RMI.

After over the delivery of the new Vessels in the RMI, RMI side is to undertake all arrangements necessary to operate the Vessels, i.e. crew, operator, running costs, insurance, government subsidy, etc., to operate the Vessels safely and smoothly.

Following is the further breakdown of the works at Japanese side and the RMI side.

##### (1) Scope of work at Japanese side

The followings are the scope of work at Japanese side, as the Project under the Japan's Grant Aid scheme.

- Design and construction of the New CPax Vessel and the New LC Vessel.
- Procurement of the related equipment for the New CPax Vessel and the New LC Vessel.
- Transportation of the New CPax Vessel and the New LC Vessel. Each Vessel sails from Japan to the RMI carrying equipment on board.
- Consultant services for detail design, assistance in tender and supervision during shipbuilding and equipment procurement.

##### (2) Scope of work at the RMI side

The followings are the scope of work at the RMI side.

##### (Arrangement during implementation of the Project)

- Conclusion of Banking Arrangement with an authorized foreign exchange bank in Japan, issuance of a authorization to pay, and bearing necessary commissions to the bank, for the contracts verified by JICA in relation with this Project
- Acquisition of licenses and certificates of the Government of the RMI, necessary for building and transporting the New Vessel, e.g. Provisional Certificate of Nationality, and Radio Station License.

(Arrangements when each vessel has arrived at the RMI)

- Exemption of the New Vessels and Equipment from customs duties, internal taxes and fiscal levies, and prompt customs clearance.
- Exemption of Japanese nationals from customs duties, internal taxes and fiscal levies for their services in the RMI.

(Related facilities in the RMI)

- MISC Workshop refurbish: MISC workshop should be refurbished fitting shelves to stow spare parts of the Vessels and workshop for cleaning and reconditioning of parts as necessary.

(Other)

- Any other items which are not covered under the Project.

#### 2.2.4.4. Consultant Supervision

##### (1) Basic Concept of the Consultant Supervision

The Consultant will verify that the construction and procurement schedule have been designed based on the Japan's Grant Aid system. Supervision plan of both shipbuilding and equipment procurement will be prepared on this basis. The Consultant will check whether the quantities, plans, and specifications satisfy the contract documents. The supervision programs will be conducted as follows.

##### ① Approvals of drawings and technical specifications

The Consultant should examine, approve and/or gives instructions to correct the construction plan, work schedule, production design drawings and specifications promptly, and should reply to the questions from the Contractor promptly as well, so as to prevent disruption in the project schedule.

##### ② Work schedule supervision

The Consultant should always grasp progress of the work schedule, and order whenever necessary to adjust working schedule to ensure on-time completion.

##### ③ Quality inspection

Along with building progress, the supervisor(s) in charge of outfitting and equipment should be dispatched for the necessary periods to workshops and the shipyard to inspect construction at site, checking machinery and outfitting work with the contract drawings, specifications, and approval documents. The supervisor(s) should conduct inspections of the equipment and outfitting work, based on the approved test procedure and the Contractor's in-house standards.

##### ④ Turnover business

After transporting the Vessels to Majuro, the RMI, the Consultant should be present at all inspections at the wharf and issue the certification documents required for local turnover.

⑤ Construction report

The Consultant should make monthly reports on construction progress and schedules work for the succeeding month, appending factory photos. These reports should be submitted to both the Government of the RMI and JICA.

(2) Supervisory arrangement

The Consultant should establish a project team consisting of the project manager, naval architect, outfitting staff, machinery staff, electric staff, joiner work staff and equipment procurement staff, and prepare implementing detail design and exercise supervision over the construction and procurement activities.

2.2.4.5. Quality Control Plan

Quality control of raw materials and installed machinery / equipment for the Vessels and Equipment should be conducted as follows.

Items		Quality control
Materials	Structural steel	To use steel materials with certificate of inspection (mill sheet) for every plate and every bar section according to the Class NK standard.
	Pipes and valves	To use pipes and valves with JIS certificate.
	Timber	Consultant to inspect on arrival of the materials.
	Fire protection	Fireproof bulkhead, lining, insulation, fire door etc., for structural fire protection to be of SOLAS and ClassNK standards, for which prototype tests had been conducted and have type approval.
On board equipment and outfittings	Diesel engine	Designed according to Class NK standards, prototype tests had been conducted, type-approved, and manufactured in the qualified by Class NK. Completed diesel engines to be load-tested including overload for necessary duration on test bench according to the standard program of Class NK.
	Auxiliaries	Designed according to Class NK standards, manufactured in the factory qualified by Class NK, and have certificate of Class NK.
	Fire extinguishers /Lifesaving appliances	Designed according to SOLAS regulation, and have type-approval No. of HK (The ship Equipment Inspection Society of Japan).
	Inventories	Type-approved by HK (The ship Equipment Inspection Society of Japan).
	Deck outfitting	Designed according to JIS, and the Consultant to inspect the equipment.
Equipment	Workboat/Rescueboat	Inspection during construction and final inspection according to the standard of Japan Craft Inspection Organization.
	Forklift	Final inspection including operation.

#### 2.2.4.6. Equipment Procurement Plan

Machinery and equipment to be on board the Vessel and associated Equipment being not produces in the RMI, they will be in general of Japanese products, which are stable in quality, delivery and price.

#### 2.2.4.7. Operational Guidance Plan

For a period of at least 0.5 month, including first service trip, after the Vessel has turned-over to the RMI, each shipbuilding contractor shall dispatch each two guarantee engineers (deck part and engine part) to cope with initial failures and further to support operation of the Vessel systems and maintenance for the MISC crew.

#### 2.2.4.8. Soft Component (Technical Assistance) Plan

No soft component is included in the Project.

In this project, PMP (Preventive Maintenance Policy) is included. Procurement of necessary exchange parts, drafting PMP program, and instruction of PMP to the Vessel crew will be conducted.

The Vessel crew, normally the captain and the chief engineer, will be dispatched to Japan for a month before the Vessel completion for familiarization to the Vessel including PMP instructions. They will return to the homeport on board the new Vessel for further familiarization.

After the Vessel turn-over to the RMI, two guarantee engineers will be dispatched from the shipbuilding contractor to the Vessel for at least 0.5 month to cope with initial failures. They will undertake support to conduct the PMP.

As such, PMP will be conducted as a part of shipbuilding program, and thereby not be dealt with as the soft component of the Project.

#### 2.2.4.9. Implementation Schedule

##### (1) Portion of work at the RMI side in building the Vessels and procuring the Equipment

After the shipbuilding and equipment procurement contracts, the Project implementation does not rely on the work to be shared by the RMI side, except for the Radio Station License and the Provisional Certificate of Nationality, which must be issued by the Government of the RMI. Undertakings at the RMI side are the works necessary for the operation of the New Vessels and to be completed before the commissioning of the New Vessels in the RMI.

Refer further to section 2-4-3 Scope of Work, regarding detail of work at Japan side and the RMI side.

##### (2) Detail building schedule of the New Vessels

In building the New Vessel, the shipbuilding Contractor first carries out production designs of steel hull structures and various outfittings based on the contract and associated technical specification, and besides based on the shipbuilder's own facility. With the completed production design drawings, hull construction, deck outfitting, machinery outfitting and electric outfitting follow as below.



a) Hull construction

Hull is the watertight structure with internal volume as buoyancy, and with strength to withstand water pressure, wave pressure, cargo loads in static and dynamic conditions. The work starts from marking on raw steel material, cutting, sub-assembly and block assembly on shipbuilding berth.

b) Deck outfitting

This work is performed after completion of the hull work. It comprises mooring arrangements, steering system, accommodation work, lifesaving apparatus, fire fighting equipment, cargo gears, etc.

c) Machinery outfitting

This work comprises installation, piping and associated work of main engines, diesel generators, pumps, etc. mainly in the engine room

d) Electric outfitting

This work is for installation of electric apparatus, control panels, etc. and for electric cable installation to supply electric power to all electric equipment on board.

e) Transport

After completion of the construction work at the shipyard and necessary tests, the New Vessels will be handed-over to the Government of the RMI. The procured Equipment is loaded on board the New Vessels. Transport of the vessel loaded with the Equipment to the RMI is carried out under the responsibility of the shipbuilding Contractor.

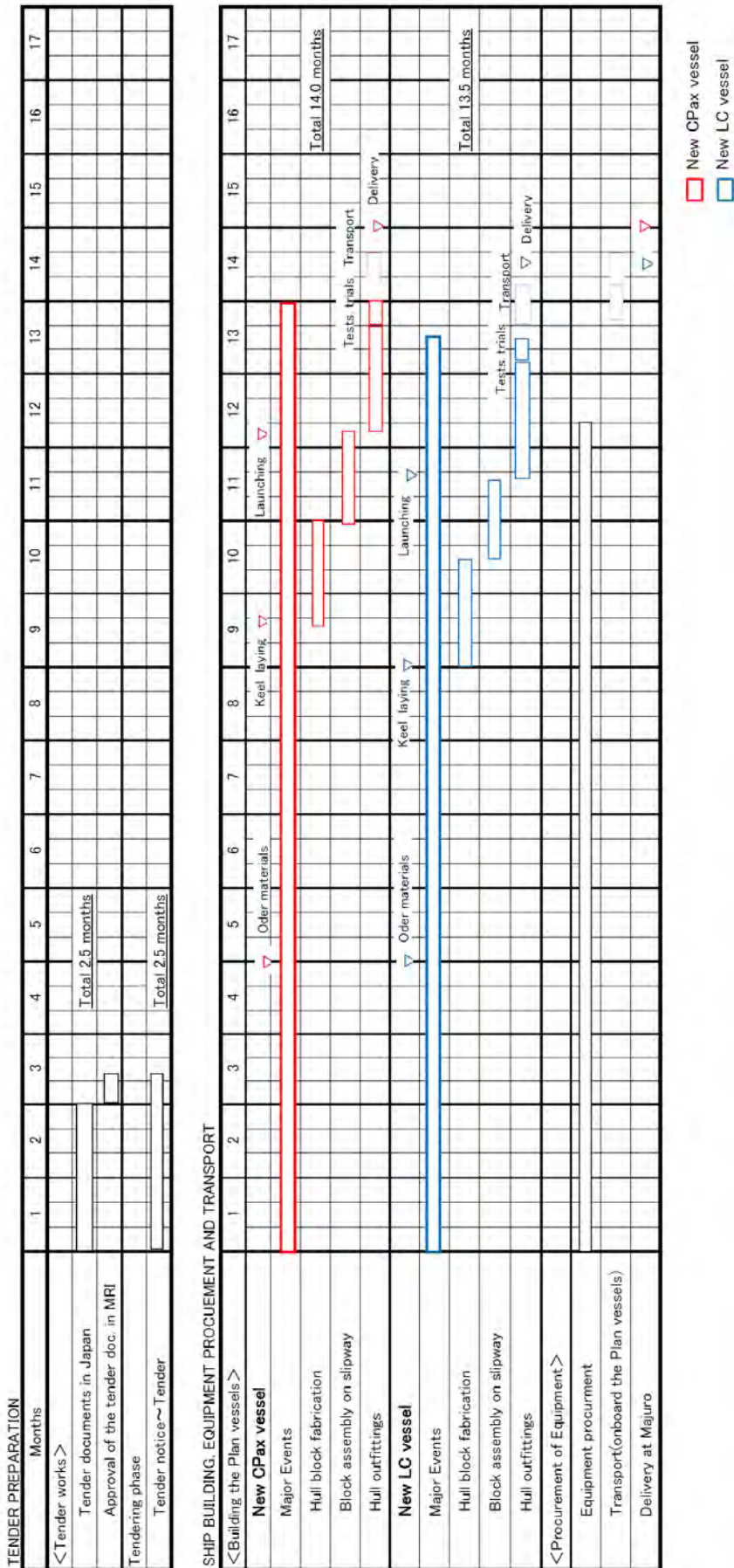
Two engineers who had been dispatched from the RMI are to return to the RMI on board the New Vessels sailing from Japan to the RMI for the purpose of familiarization with the New Vessels.

Implementing schedule of Each Vessel is as shown below.

	From the Contract to the completion of construction	Preparation of the transport, transport sailing, local inspection and turn-over	Total schedule From the Contract to turn-over to the RMI
New CPax Vessel	13.0 months	1.0 months	14.0 months
New LC Vessel	12.5 months	1.0 months	13.5 months

The projected building schedule of the Vessels is shown on the following diagram.

Table 5: Projected building schedule of the Vessels



### 2.3. Obligations of Recipient Country

As the building of the new Vessels and the procurement of the Equipment are all undertaken by the Japan side, the RMI side is not necessary to take part in the shipbuilding work.

Shore facilities, which the new Vessels will use in their operation, need not be modified or improved, thereby no obligation at the RMI side for those shore facilities.

Accordingly, obligation of the RMI side is limited to documentation, vessel operation and maintenance, exemption from custom duties and banking arrangement including payment of bank commissions, as referred to in the Minutes of Discussion signed on January 21, 2011.

### 2.4. Project Operation Plan

#### 2.4.1. Vessel operation body

MISC has been undertaking cargo passenger transport services in the RMI since established in October 2006.

The Government of the RMI once tried to entrust sea transport service to private shipping company renting out Government ships, but failing that attempt of privatization, the Government came back to the Government shipping and then established a public enterprise MISC. By such recent experience of failing privatization, possibility of privatizing island link shipping services is considered very low.

MISC is now operating three CPax vessels, MV Aemman, MV Ribuuk Ae and MV Landrik to transport passengers and cargoes with shipping fare left unchanged from 1983, and besides to sell daily goods to island people, and to transport copra from islands to Majuro. These revenues being considerably less than the expenditure, subsidy from the government, about 50 ~ 60% of the total expenditure is indispensable to run the public shipping services.

MISC crew, total 63 persons, for the three vessels have satisfactory competence to the safe maneuver in the coral sea of the RMI.

MISC vessels repair and maintenance are undertaken by 63 crew members and 8 shore staffs of MISC, on board MISC vessels and in the MISC workshop. MISC crew and shore staff is competent sufficient to conduct PMP (Preventive Maintenance Policy). Budget to go to slipping has been approved by the Government, and thereby hull bottom work of MISC vessels is going to start.

MISC administration section has 6 staff undertaking cargo and passenger booking, general affairs and accounting. Their businesses are generally computerized and data are kept well.

As such, fleet operation, corporate management and vessel maintenance are found sufficient to run the new CPax and LC vessels.

#### 2.4.2. Vessel maintenance

The accident of LC Jeljelat Ae stressed the importance of vessel maintenance, which encouraged the Government of the RMI to adopt a new legislation "Government Shipping Vessels Maintenance Act, 2011". To support the new legislation for the MISC vessels also from this Project, PMP (Preventive

maintenance Policy: overhauling and reconditioning regularly exchanging working parts with conditioned parts) will be introduced. The PMP parts are those parts to be used for overhauling regularly regardless of the condition of machinery (i.e. whether it is in order or out of order) at a time planned in advance according to the PMP program. Working parts will be removed from the machinery and replaced with stowed spare parts. The removed parts will be cleaned, reconditioned and stowed in the workshop shelf. In the next maintenance for the same part, reconditioned and stowed parts will be used and same work will be repeated. This procedure requires initial investment to procure a set of spare parts, but reduces breakdown due to e.g. wearing and elongates life of parts. PMP program will be prepared and instructed by the Consultant. MISC vessel crew and workshop are found competent sufficient to conduct the PMP.

#### 2.4.3. Future of existing three MISC Vessels

##### 1) MV Aemman (built 2005)

The RMI plans to take the vessel to slipping, where bottom hull will be inspected / repaired. Re-classification and maintaining the classification are intended. When the plan has been executed and maintained, further life of about 20 years is expected.

##### 2) MV Ribuuk Ae (Built 1995)

Corrosion and fouling of bottom hull must be considerable as the vessel hasn't been docked for more than 10 years. The vessel should go to slipping as soon as possible to repair bottom hull. As classification will be difficult to get, maintenance will have to be made at the MISC's own standard. When the vessel is maintained properly including slipping, further life of about 10 years is expected.

##### 3) MV Landrik (Built 1985)

Option of the future of MV Landrik to be replaced by the New CPax Vessel will be (1) scrapping, (2) selling and (3) continuing to use.

Generally, holding a vessel is costly, but cost to hold MV Landrik, not classed and not insured, will be low. MISC basically intends to hold MV Landrik as far as possible.

As MV Landrik has not been docked since year 2000 when the RMI acquired the vessel, corrosion and fouling of bottom hull must be considerable. It is therefore important for MV Landrik to continue operation in the RMI after taking the vessel to slipping, inspecting and repairing bottom hull properly. The Preparatory Survey team advised MISC and MISC that MV Landrik be repaired and maintained properly, otherwise she should not engage in the passenger transport service, as recorded in the Minutes of discussion.

## 2.5. Project Cost Estimation

### 2.5.1. Cost at the RMI side

All shipbuilding cost including transportation from Japan to Majuro is to be borne by the Japan side. As no shore facility building or modification at the RMI side is intended, the cost to be borne by the RMI side will be only for the bank commission and charges estimated JPY 1,290,000, equivalent to US\$ 15,300 (at a rate JY84.46/US\$ on February 2011).

### 2.5.2. Operation and Maintenance Cost

#### (1) Account balance of MISC with the new Vessels

Account balance of 5 years after starting trip by MISC, when the new Vessels are expected to start operation is estimated as follows.

Table 6: Estimated account balance of MISC including the new Vessels

	Actual result (UD\$)			Projection (US\$)	
	FY2008	FY2009	FY2010	Average for 5-years after starting trip (Case 1)	Average for 5-years after starting trip (Case 2)
Total Revenue	1,511,375	1,273,442	1,243,345	1,390,000	1,431,800
Total Expenditure	2,693,539	2,869,375	2,382,841	3,078,819	3,078,819
Balance	▲ 1,182,164	▲ 1,595,933	▲ 1,139,496	▲ 1,688,819	▲ 1,647,019
Subsidy	1,008,149	1,091,846	969,150		
Fund of "Government Shipping Vessels Maintenance Act, 2011"	0	0	0		
Total balance	▲ 174,015	▲ 504,087	▲ 170,346	▲ 1,688,819	▲ 1,647,019

Case 1 of the revenue projection shows the case when passenger and cargo fares are kept unchanged, and the case 2 shows when fares are raised by 5%. The fares are kept same since 1983, but MISC now considers fares should be raised in the years ahead assessing impact on public.

Revenue other than the passenger and cargo fares is assumed same as the existing vessels.

As the subsidy from the Government, additional subsidy from the fund of "Government Shipping Vessels Maintenance Act, 2011" will be added.

Increase of expenditure from the past data is from the reason that docking fees (including fuel cost) and liferaft servicing fees are added.

#### ① Revenue projection

The revenue projection including the new Vessels is shown below. The projection is basing on the MISC account statistics of past three years.

As stated before, passenger and cargo fares are kept same in the case 1 and raised by 5% in case 2, and other revenues are assumed same as the average of the past three years.

Table 7: Revenue projection including the new Vessel

	Actual result (US\$)					Projection (US\$)		
	Breakdown	FY2008	FY2009	FY2010	FY2008-2010 3年平均	Breakdown	Average for 5-years after starting trip (Case 1)	Average for 5-years after starting trip (Case 2)
Revenue of Daily goods sales for outer Islands	MV AEMMAN	14,479	21,247	61,498	32,408	MV AEMMAN	33,000	33,000
	MV RIBUUK AE	9,136	133,832	153,247	98,739	MV RIBUUK AE	99,000	99,000
	MV LANDRIK	9,461	95,038	148,684	84,394	MV LANDRIK	33,000	33,000
	LC JELJELAT AE	1,026	8,598	11,181	6,935	LC JELJELAT AE	7,000	7,000
	other	34,657	17,633	16,186	22,825	other	23,000	23,000
	Sub-total	68,759	276,347	390,795	245,300		195,000	195,000
Freight revenue of General cargo	MV AEMMAN	123,839	68,516	65,885	86,080	MV AEMMAN	87,000	91,350
	MV RIBUUK AE	78,746	42,033	48,721	56,500	MV RIBUUK AE	57,000	59,850
	MV LANDRIK	98,643	68,864	70,166	79,224	MV LANDRIK	87,000	91,350
	LC JELJELAT AE	12,399	16,168	14,085	14,217	LC JELJELAT AE	15,000	15,750
	other	45,758	27,183	7,789	26,910	other	27,000	28,350
	Sub-total	359,386	222,764	206,644	262,931		273,000	286,650
Freight revenue of Copra	MV AEMMAN	121,272	107,859	102,080	110,404	MV AEMMAN	111,000	111,000
	MV RIBUUK AE	72,704	64,412	58,770	65,296	MV RIBUUK AE	71,000	71,000
	MV LANDRIK	87,591	94,232	67,854	83,226	MV LANDRIK	111,000	111,000
	LC JELJELAT AE	0	14,846	17,898	10,915	LC JELJELAT AE	16,000	16,000
	other	-22,815	0	0	0	other	0	0
	Sub-total	258,752	281,350	246,602	269,840		309,000	309,000
Revenue of Copra sales (from Tobolar Copra Processing Plant)	MV AEMMAN	0	0	13,126	13,126	MV AEMMAN	14,000	14,000
	MV RIBUUK AE	0	26,357	23,953	25,155	MV RIBUUK AE	26,000	26,000
	MV LANDRIK	0	26,573	25,225	25,899	MV LANDRIK	14,000	14,000
	LC JELJELAT AE	0	6,659	6,132	6,396	LC JELJELAT AE	7,000	7,000
	other	0	0	0	0	other	0	0
	Sub-total	0	59,589	68,436	70,575		61,000	61,000
Charter revenue	MV AEMMAN	45,437	10,500	4,500	20,146	MV AEMMAN	21,000	21,000
	MV RIBUUK AE	45,296	14,015	19,502	26,271	MV RIBUUK AE	27,000	27,000
	MV LANDRIK	23,986	0	0	7,995	MV LANDRIK	21,000	21,000
	LC JELJELAT AE	507,836	314,340	253,394	358,523	LC JELJELAT AE	359,000	359,000
	other	104,103	24,571	0	64,337	other	65,000	65,000
	Sub-total	726,658	363,427	277,396	477,273		493,000	493,000
Passenger revenue	MV AEMMAN	34,935	27,433	27,015	29,794	MV AEMMAN	30,000	31,500
	MV RIBUUK AE	22,549	15,334	10,259	16,047	MV RIBUUK AE	17,000	17,850
	MV LANDRIK	34,037	22,006	11,000	22,348	MV LANDRIK	30,000	31,500
	LC JELJELAT AE	4,337	5,105	5,193	4,878	LC JELJELAT AE	5,000	5,250
	other	1,962	87	4	684	other	1,000	1,050
	Sub-total	97,819	69,965	53,471	73,752		83,000	87,150
Total revenue by breakdown	MV AEMMAN	339,961	235,556	274,103	291,957	MV AEMMAN	292,000	301,850
	MV RIBUUK AE	228,432	295,983	314,453	288,008	MV RIBUUK AE	289,000	300,700
	MV LANDRIK	253,719	306,713	322,929	303,086	MV LANDRIK	292,000	301,850
	LC JELJELAT AE	525,598	365,716	307,882	401,864	LC JELJELAT AE	402,000	410,000
	other	163,665	69,474	23,979	114,756	other	115,000	117,400
Grand total		1,511,375	1,273,442	1,243,345	1,399,672		1,390,000	1,431,800

Case 1: Passenger and cargo fares are kept unchanged.

Case 2: Passenger and cargo fares are raised by 5% from present.

② Expenditure projection

The expenditure projection including the new Vessels is shown below. The projection is based on the average of the past three years, but fees for docking, liferaft servicing and classification are newly added. Those newly added fees are shown in the data on the “Maintenance cost estimate for MISC fleet vessels including JICA project vessels” submitted from the JICA mission to the MTC (Table 9).

In the expenditure projection, fuel oil cost is assuming better fuel oil consumption achieved by the improvement of hull form and efficient propeller. Fuel oil costs of the New Vessels (CPax and LC) being found about 90% of existing vessels (MV Aemman and LC Jeljelat Ae) as shown on the “Simulation of fuel oil consumption for the new vessels” (Table 10).

Table 8: Expenditure projection including the new Vessel

Expense item	Actual result (US\$)					Projection (US\$)	
	Breakdown	FY2008	FY2009	FY2010	FY2008-2010 Average of last 3 years	Breakdown	Average for 5-years after starting trip
Payroll	MV AEMMAN	270,373	246,708	218,886	245,322	MV AEMMAN	246,000
	MV RIBUUK AE	201,949	209,847	160,957	190,918	MV RIBUUK AE	191,000
	MV LANDRIK	231,720	236,348	246,267	238,112	MV LANDRIK	246,000
	LC JELJELAT AE	183,649	202,707	196,783	194,380	LC JELJELAT AE	195,000
	Common for all ships	46,377	36,947	22,077	35,133	Common for all ships	36,000
	Administration	251,928	299,566	205,273	252,255	Administration	253,000
	Sub-total	1,185,996	1,232,122	1,050,242	1,156,120		1,167,000
Fuel and oil	MV AEMMAN	171,991	48,316	75,832	98,713	MV AEMMAN	97,000
	MV RIBUUK AE	108,234	43,025	50,248	67,169	MV RIBUUK AE	68,000
	MV LANDRIK	64,677	77,715	18,394	53,595	MV LANDRIK	87,000
	LC JELJELAT AE	287,861	154,553	107,692	183,369	LC JELJELAT AE	184,000
	Common for all ships	214,072	96,064	114,560	141,565	Common for all ships	142,000
	Administration	-56,365	14,750	4,621	9,686	Administration	10,000
	Sub-total	790,469	434,422	371,347	554,096		588,000
Food stuff and water	MV AEMMAN	39,789	24,257	26,689	30,245	MV AEMMAN	31,000
	MV RIBUUK AE	37,982	30,456	31,561	33,333	MV RIBUUK AE	34,000
	MV LANDRIK	34,486	26,667	36,583	32,578	MV LANDRIK	31,000
	LC JELJELAT AE	36,861	25,335	19,809	27,335	LC JELJELAT AE	28,000
	Common for all ships	40,662	48,790	22,768	37,407	Common for all ships	38,000
	Administration	8,651	17,579	2,041	9,424	Administration	10,000
	Sub-total	198,432	173,083	139,451	170,322		172,000
Daily goods purchase for outer Islands	MV AEMMAN	0	0	0	0	MV AEMMAN	0
	MV RIBUUK AE	0	0	0	0	MV RIBUUK AE	0
	MV LANDRIK	0	0	0	0	MV LANDRIK	0
	LC JELJELAT AE	0	0	0	0	LC JELJELAT AE	0
	Common for all ships	0	0	0	0	Common for all ships	0
	Administration	0	218,989	238,818	228,903	Administration	229,000
	Sub-total	0	218,989	238,818	228,903		229,000
Copra purchase from outer Islands	MV AEMMAN	0	0	693	693	MV AEMMAN	46,000
	MV RIBUUK AE	0	60,844	9,621	35,233	MV RIBUUK AE	46,000
	MV LANDRIK	0	133,581	151,939	285,520	MV LANDRIK	46,000
	LC JELJELAT AE	0	6,212	4,702	5,457	LC JELJELAT AE	46,000
	Common for all ships	0	0	0	0	Common for all ships	0
	Administration	0	0	343	0	Administration	0
	Sub-total	0	200,637	167,298	183,968		184,000
Repair and maintenance expense including spare parts and materials	MV AEMMAN	6,745	30,514	18,130	18,463	MV AEMMAN	125,980
	MV RIBUUK AE	17,723	22,535	10,979	17,079	MV RIBUUK AE	93,399
	MV LANDRIK	6,895	36,496	12,457	18,616	MV LANDRIK	74,780
	LC JELJELAT AE	26,475	59,343	32,287	39,368	LC JELJELAT AE	84,660
	Common for all ships	177,512	140,298	85,663	134,491	Common for all ships	20,000
	Administration	60,852	27,449	24,890	37,731	Administration	38,000
	Sub-total	296,202	316,634	184,405	265,747		436,819
Tools and equipment	MV AEMMAN	0	0	0	0	MV AEMMAN	0
	MV RIBUUK AE	0	0	1,807	1,807	MV RIBUUK AE	0
	MV LANDRIK	0	0	0	0	MV LANDRIK	0
	LC JELJELAT AE	0	0	0	0	LC JELJELAT AE	0
	Common for all ships	0	0	14,624	14,624	Common for all ships	17,000
	Administration	0	0	0	0	Administration	0
	Sub-total	0	0	16,431	16,431		17,000
supplies expense	MV AEMMAN	0	0	3,137	3,137	MV AEMMAN	4,000
	MV RIBUUK AE	0	0	5,755	5,755	MV RIBUUK AE	6,000
	MV LANDRIK	0	958	664	811	MV LANDRIK	4,000
	LC JELJELAT AE	0	1,826	16,618	9,222	LC JELJELAT AE	10,000
	Common for all ships	0	63,991	38,933	51,462	Common for all ships	52,000
	Administration	1,183	0	9,436	5,309	Administration	6,000
	Sub-total	1,183	66,775	74,542	75,695		82,000
Stevedoring	MV AEMMAN	0	0	0	0	MV AEMMAN	3,000
	MV RIBUUK AE	0	3,293	4,251	3,772	MV RIBUUK AE	3,000
	MV LANDRIK	75	1,959	5,161	2,398	MV LANDRIK	3,000
	LC JELJELAT AE	0	982	634	808	LC JELJELAT AE	3,000
	Common for all ships	0	1,993	0	1,993	Common for all ships	0
	Administration	0	1,206	0	1,206	Administration	0
	Sub-total	75	9,433	10,046	10,177		12,000
Other	MV AEMMAN	360	1,205	2,369	1,311	MV AEMMAN	2,000
	MV RIBUUK AE	1,619	1,656	2,610	1,962	MV RIBUUK AE	2,000
	MV LANDRIK	3,566	4,465	716	2,916	MV LANDRIK	2,000
	LC JELJELAT AE	741	16,989	2,594	6,775	LC JELJELAT AE	7,000
	Common for all ships	76,324	14,259	8,688	33,090	Common for all ships	34,000
	Administration	138,573	178,705	113,283	143,520	Administration	144,000
	Sub-total	221,182	217,280	130,261	189,574		191,000
Total expenditure by breakdown	MV AEMMAN	489,257	351,000	345,735	397,883	MV AEMMAN	554,980
	MV RIBUUK AE	367,507	371,656	277,788	357,027	MV RIBUUK AE	443,399
	MV LANDRIK	341,419	518,188	472,181	634,546	MV LANDRIK	493,780
	LC JELJELAT AE	535,587	467,946	381,119	466,713	LC JELJELAT AE	557,660
	Common for all ships	554,947	402,341	307,313	449,765	Common for all ships	339,000
	Administration	404,822	758,245	598,705	688,034	Administration	690,000
	Grand total	2,693,539	2,869,375	2,382,841	2,993,969		3,078,819

Table 9: Maintenance cost estimate for MISC fleet vessels including JICA project vessels

FY	2011	2012	2013	Starting trip (A)	(A)+1	(A)+2	(A)+3	(A)+4	(A)+5	Average for 5-years after starting trip
<b>MV Aemman</b>										0
Slipping	62,850		62,850			62,850		62,850		25,140
Tailshaft withdrawal	4,200									0
Main and aux diesel overhaul	25,000									0
FO cost to Kosrae slipping										0
FO cost to Suva slipping	44,700		44,700			44,700		44,700		17,880
Classification										0
Re-classification	33,600									0
Annual survey		12,600	12,600	12,600	12,600		12,600	12,600	12,600	10,080
Special survey						14,400				2,880
Paint, spares, tools	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Paint purchase										0
Spare parts purchase										0
Sum	240,350	82,600	190,150	82,600	82,600	191,950	82,600	190,150	82,600	125,980
<b>MV Landrik</b>										0
Slipping	62,850			62,850			62,850			25,140
Bottom shell change, etc.	70,000									0
FO cost to Kosrae slipping										0
FO cost to Suva slipping	44,700			44,700			44,700			17,880
Paint, spares, tools	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Sum	247,550	70,000	70,000	177,550	70,000	70,000	177,550	70,000	70,000	113,020
<b>MV Rebuuk Ae</b>										0
Slipping	47,138			47,138			47,138			18,855
Bottom shell change, etc.	70,000									0
FO cost to Kosrae slipping				11,360			11,360			4,544
FO cost to Suva slipping	35,760									0
Paint, spares, tools	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Sum	222,898	70,000	70,000	128,498	70,000	70,000	128,498	70,000	70,000	93,399
<b>New Aemman type</b>										0
Slipping					62,850			62,850		25,140
FO cost to Kosrae slipping										0
FO cost to Suva slipping					31,700			31,700		12,680
Classification										0
Re-classification										0
Annual survey				12,600	12,600	12,600	12,600		12,600	10,080
Special survey								14,400		2,880
Paint, spares, tools				20,000	22,000	24,000	26,000	28,000	30,000	24,000
Sum				32,600	129,150	36,600	38,600	136,950	42,600	74,780
<b>New Landing craft</b>										0
Slipping					62,850			62,850		25,140
FO cost to Kosrae slipping										0
FO cost to Suva slipping					56,400			56,400		22,560
Classification										0
Re-classification										0
Annual survey				12,600	12,600	12,600	12,600		12,600	10,080
Special survey								14,400		2,880
Paint, spares, tools				20,000	22,000	24,000	26,000	28,000	30,000	24,000
Sum				32,600	153,850	36,600	38,600	161,650	42,600	84,660
<b>Common item</b>										0
Liferaft maintenance	12,100	12,100	12,100	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Sum	12,100	12,100	12,100	20,000	20,000	20,000	20,000	20,000	20,000	20,000
<b>Grand total</b>	<b>723,000</b>	<b>235,000</b>	<b>342,000</b>	<b>474,000</b>	<b>526,000</b>	<b>425,000</b>	<b>486,000</b>	<b>649,000</b>	<b>328,000</b>	<b>512,000</b>



Table 10: Simulation of fuel oil consumption for the new vessels

**CPax Fuel oil consumption**

**Ordinary Field Trip Services**

		unit	Aemman	New CPax
Main engine max rating	Pme	kW	440	440
Main engine specific FOC	Sfme	g/kW/h	205	200
Gen engine max rating	Pge	kW	85	85
Gen engine specific FOC	Sfge	g/kW/h	220	215

**Northern Route**

Navigation		unit	Aemman	New CPax
Sailing days	D	day	4.4	4.4
Main engine load %	Rme	%	65	55
Main engine FOC	FOCme	t	6.19	5.11
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	1.28	1.25
FOC for navigation		t	7.47	6.36
<b>Cargo operation</b>				
Operation days	D	day	10	10
Gen engine load %	Rge	%	50	50
Gen engine FOC	FOCge	t	2.24	2.19
Total fuel oil consumption		t	9.71	8.55

**Eastern Route**

Navigation		unit	Aemman	New CPax
Sailing days	D	day	0.7	0.7
Main engine load %	Rme	%	65	55
Main engine FOC	FOCme	t	0.98	0.81
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	0.2	0.2
FOC for navigation		t	1.18	1.01
<b>Cargo operation</b>				
Operation days	D	day	8	8
Gen engine load %	Rge	%	50	50
Gen engine FOC	FOCge	t	1.8	1.75
Total fuel oil consumption		t	2.98	2.76

**Central-Western Route**

Navigation		unit	Aemman	New CPax
Sailing days	D	day	4.6	4.6
Main engine load %	Rme	%	65	55
Main engine FOC	FOCme	t	6.47	5.34
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	1.34	1.31
FOC for navigation		t	7.81	6.65
<b>Cargo operation</b>				
Operation days	D	day	10	10
Gen engine load %	Rge	%	50	50
Gen engine FOC	FOCge	t	2.24	2.19
Total fuel oil consumption		t	10.05	8.84

**Southern Route**

Navigation		unit	Aemman	New CPax
Sailing days	D	day	2.9	2.9
Main engine load %	Rme	%	65	64
Main engine FOC	FOCme	t	4.08	3.92
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	0.85	0.83
FOC for navigation		t	4.93	4.75
<b>Cargo operation</b>				
Operation days	D	day	4	4
Gen engine load %	Rge	%	50	50
Gen engine FOC	FOCge	t	0.9	0.88
Total fuel oil consumption		t	5.83	5.63

**Fue Oil Consumption on Field Trip Service**

		unit	Aemman	New CPax
Northern Route		t	9.71	8.55
Eastern Route		t	2.98	2.76
Central-Western Route		t	10.05	8.84
Southern Route		t	5.83	5.63
Average FOC/trip		t	7.1	6.4
Number of trips / year *1		time	11.7	11.7
Total FOC for field trip services / year		t	83.1	74.9

**Charter Trip Operation**

Navigation		unit	Aemman	New CPax
Sailing days	D	day	2.5	2.5
Main engine load %	Rme	%	65	55
Main engine FOC	FOCme	t	3.52	2.9
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	0.73	0.71
FOC for navigation		t	4.25	3.61
<b>Cargo operation</b>				
Operation days	D	day	2.5	2.5
Gen engine load %	Rge	%	50	50
Gen engine FOC	FOCge	t	0.56	0.55
Total fuel oil consumption		t	4.81	4.16
Number of trips / year *2		time	3.3	3.3
Total FOC for charter trip services/year		t	15.9	13.7

**Grand Total FOC / year**

		unit	Aemman	New CPax
Ordinary Field Trip Services		t	83.1	74.9
Charter Trip Operation		t	15.9	13.7
Grand total		t	99	88.6

$$FOCme = Pme \cdot Rme \cdot Sfme \cdot 24^h \cdot D \cdot 10^{-8}$$

$$FOCge = Pge \cdot Rge \cdot Sfge \cdot 24^h \cdot D \cdot 10^{-8}$$

\*1 Average number of field trip service, Aemman 2008~2010  
\*2 Average number of charter trip service, Aemman 2008~2010

**LC Fuel oil consumption**

**Ordinary Field Trip Services**

		unit	Jeljelat Ae	New LC
Main engine max rating	Pme	kW	936	880
Main engine specific FOC	Sfme	g/kW/h	205	200
Gen engine max rating	Pge	kW	85	85
Gen engine specific FOC	Sfge	g/kW/h	220	215

**Northern Route**

Navigation		unit	Jeljelat Ae	New LC
Sailing days	D	day	3	3
Main engine load %	Rme	%	55	50
Main engine FOC	FOCme	t	7.6	6.34
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	0.88	0.86
FOC for navigation		t	8.48	7.2
<b>Cargo operation</b>				
Operation days	D	day	2	2
Gen engine load %	Rge	%	45	45
Gen engine FOC	FOCge	t	0.4	0.39
Total fuel oil consumption		t	8.88	7.59

**Eastern Route**

Navigation		unit	Jeljelat Ae	New LC
Sailing days	D	day	0.7	0.7
Main engine load %	Rme	%	55	50
Main engine FOC	FOCme	t	1.77	1.48
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	0.2	0.2
FOC for navigation		t	1.97	1.68
<b>Cargo operation</b>				
Operation days	D	day	2	2
Gen engine load %	Rge	%	45	45
Gen engine FOC	FOCge	t	0.4	0.39
Total fuel oil consumption		t	2.37	2.07

**Central-Western Route**

Navigation		unit	Jeljelat Ae	New LC
Sailing days	D	day	3.2	3.2
Main engine load %	Rme	%	55	50
Main engine FOC	FOCme	t	8.11	6.76
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	0.93	0.91
FOC for navigation		t	9.04	7.67
<b>Cargo operation</b>				
Operation days	D	day	2	2
Gen engine load %	Rge	%	45	45
Gen engine FOC	FOCge	t	0.4	0.39
Total fuel oil consumption		t	9.44	8.06

**Southern Route**

Navigation		unit	Jeljelat Ae	New LC
Sailing days	D	day	2	2
Main engine load %	Rme	%	55	50
Main engine FOC	FOCme	t	5.07	4.22
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	0.58	0.57
FOC for navigation		t	5.65	4.79
<b>Cargo operation</b>				
Operation days	D	day	2	2
Gen engine load %	Rge	%	45	45
Gen engine FOC	FOCge	t	0.4	0.39
Total fuel oil consumption		t	6.05	5.18

**Fue Oil Consumption on Field Trip Service**

		unit	Jeljelat Ae	New LC
Northern Route		t	8.88	7.59
Eastern Route		t	2.37	2.07
Central-Western Route		t	9.44	8.06
Southern Route		t	6.05	5.18
Average FOC/trip		t	6.7	5.7
Number of trips / year *3		time	3.67	3.67
Total FOC for field trip services / year		t	24.6	20.9

**Charter Trip Operation**

Navigation		unit	Jeljelat Ae	New LC
Sailing days	D	day	2	2
Main engine load %	Rme	%	55	50
Main engine FOC	FOCme	t	5.07	4.22
Gen engine load %	Rge	%	65	65
Gen engine FOC	FOCge	t	0.58	0.57
FOC for navigation		t	5.65	4.79
<b>Cargo operation</b>				
Operation days	D	day	1.5	1.5
Gen engine load %	Rge	%	45	45
Gen engine FOC	FOCge	t	0.3	0.3
Total fuel oil consumption		t	5.95	5.09
number of trips / year *4		time	32.7	32.7
Total FOC for charter trip services/year		t	194.6	166.4

**Grand Total FOC / year**

		unit	Jeljelat Ae	New LC
Ordinary Field Trip Services		t	24.6	20.9
Charter Trip Operation		t	194.6	166.4
Grand total		t	219.2	187.3

$$FOCme = Pme \cdot Rme \cdot Sfme \cdot 24^h \cdot D \cdot 10^{-8}$$

$$FOCge = Pge \cdot Rge \cdot Sfge \cdot 24^h \cdot D \cdot 10^{-8}$$

\*3 Average number of field trip service, Jeljelat Ae 2008~2010  
\*4 Average number of charter trip service, Jeljelat Ae 2008~2010

## 2.6. Other Relevant Issues

Timeframe to build each vessel, from the shipbuilding contract to the delivery in Majuro will be 14 months and 13.5 months for CPax vessel and LC vessel respectively. The RMI side should take prompt procedure, e.g. issuing provisional certificate registry, custom clearance, to complete the project within the period stipulated in the Exchange of Notes.

## CHAPTER 3. Project Evaluation

### 3.1. Preconditions and Necessary Inputs by the Receiving Country

- The Government of the RMI is to issue necessary licenses and certificates, e.g. provisional certificate of registry, radio station license.
- The Government of the RMI is to exempt the new vessels concerns from custom duty.
- The Government of the RMI is to bear bank commissions and charges.
- The Government of the RMI is to maintain the allocation of budget necessary for operation and maintenance of MISC existing and new vessels.
- General scheme of the public sea transport is to remain unchanged, i.e. the Government including public enterprise undertakes public service responsibly.

### 3.2. Project Evaluation

#### 3.2.1. Relevance

Relevance of the Project, as the Grant Aid Cooperation Project of the Japanese Government, is considered as follows.

- (1) Current sea transport system of the RMI is in a critical situation, i.e. considerable decrease in its transport capacity due to frequent stop/lay-up of aged cargo passenger vessel MV Landrik, and losing function to carry heavy/bulky cargoes due to sinking of LC Jeljelat Ae. People of remote islands, to whom sea transport is the lifeline, suffer poor transport in their daily life.

The Project aims at restoring such poor sea lifeline to a safe and stable condition by supplying two vessels, i.e. one CPax vessel and one LC vessel.

The benefits of the Project will extend to the entire population in the RMI (54,310 person, 2010 census).

- (2) The Project supports and promote the target task “Improvement of remote island people’s life” shown in the national development plan “VISION2018”.
- (3) The two new vessels together with the other existing vessels are operated by MISC with low passenger fare and cargo freight, which are set at low level considering income level of the RMI people. The Government of the RMI has been subsidizing to compensate such low fare and freight. Further, the new fund system, a different subsidy, for the vessel

maintenance was enacted in 2011. The Project supports the vessel maintenance by adopting, PMP (Preventive Maintenance Policy) system to systematize and economize vessel maintenance works.

- (4) Design and construction of the new vessels are made laying importance on safety at sea, onboard comfort, eco-friendliness, fuel economy, etc. and besides improving specific points of existing vessels. The new vessels will work showing such favorable performance.

It is concluded from above that the relevance of the Project is found quite high.

### 3.2.2. Effectiveness

- (1) Quantitative effect

Quantitative indicators to measure the effectiveness of the Project are proposed below.

To see the condition of restoring from present, reference base year is set at the year 2010.

The operation data of the new CPax vessel should refer to those of MV Aemman, and the new LC vessel to LC Jeljelat Ae.

Annual copra transport volume by all MISC vessels should refer to the record of four MISC vessels (MV Aemman, MV Ribuuk Ae, MV Landrik and LC Jeljelat Ae) in 2010.

Target of each indicator should be the record of 2009. In the year 2008, all MISC vessels were extraordinary busy, not only vessel but also crew without ordinary leaves for rest, and found not suitable for the target year

No	Indicator	Standard indicator (2010)	target indicator (2016) (assuming 3 years after delivery)
1	New CPax: Total operation days per year (Majuro departure – arrival, and filed trip service only not including charter operation)	166 days/year	184 days/year
2	New LC: Number of charter operation	23 times/year	26 times/year
3	Copra transport: Aggregate volume by all MISC vessels in a year	3,969 t/year	4,600 t/year
4	Reduction of fuel oil consumption	AEMMAN: 99.0 t/year JELJELAT AE : 219.2 t/year	10% decrease of fuel oil consumption in the field trip services

It is expected that the MISC transport capacity, which has been decreased by aged CPax vessel and which has been lost by sinking of LC, will be restored and normalized by the new CPax and LC vessels.

In the column 4 above, evaluation on fuel oil cost will not be appropriate because of change in the number of trips, fuel price variation, etc., and thereby evaluation should be made e.g. on the fuel oil consumption in the field trip services

(2) Qualitative effect

Qualitative effects brought by the Project will be as follows.

- Safety at sea and comfort on board are improved.
- Increase of the operation days will allow people to travel more frequently.
- Increase of the operation days will allow copra transport volume greater, thereby more income at island people and more copra industrial product.
- Stable operation thereby regular daily goods supply will allow island people's life more stable.

It is concluded from above that the effectiveness of the Project is found quite high.

## APPENDICES

1. Member List of the Study Team
2. Study Schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions
5. References



## 1. Member List of the Study Team

### 1-1. Member List (Field Survey)

<u>FUNCTION</u>	<u>NAME and ORGANIZATION</u>
Team Leader	Mr. Koichi MIYAKE Executive Technical Advisor to the Director General, Economic Infrastructure Department Japan International Cooperation Agency
Project Coordinator	Mr. Hiroyuki YOKOI Transportation and ICT Division 1, Transportation and ICT Group, Economic Infrastructure Department Japan International Cooperation Agency
Project Manager / Sea transport planning	Mr. Toyonori WATANABE Fisheries Engineering Co., Ltd.
Hull and Machinery Design	Mr. Akio MARUYAMA Fisheries Engineering Co., Ltd.
Outfitting and Electric Design	Mr. Koji TAKESHITA Fisheries Engineering Co., Ltd.
Equipment and procurement planning / Cost estimation	Mr. Akio YAMADA Fisheries Engineering Co., Ltd.
Operation and management planning	Ms. Yuka AKAI Fisheries Engineering Co., Ltd.



1-2. Member List (Consultation of Draft Report)

FUNCTION	NAME and ORGANIZATION
Team Leader	Mr. Makoto Ashino Senior Advisor to the Director General, Economic Infrastructure Department, Japan International Cooperation Agency
Project Manager / Sea transport planning	Mr. Toyonori WATANABE Fisheries Engineering Co., Ltd.
Hull and Machinery Design	Mr. Akio MARUYAMA Fisheries Engineering Co., Ltd.

## 2. Study Schedule

### 2-1. Study Schedule (Field Survey)

			Team Leader	Project Coordinator	Project Manager / Sea transport planning	Hull and Machinery Design	Outfitting and Electric Design	Operation and management planning	Equipment and procurement planning/Cost estimation
			Mr. Koichi Miyake JICA	Mr. Hiroyuki Yokoi JICA	Mr. T. Watanabe ①	Mr. A. Maruyama ②	Mr. K. Takeshita ③	Ms. Y. Akai ④	Mr. A. Yamada ⑤
1	1/9	Sun						Dep. Narita→Ar. Guam	
2	1/10	Mon						Dep. Guam→Ar. Majuro	
3	1/11	Tue							
4	1/12	Wed							
5	1/13	Thu							
6	1/14	Fri							
7	1/15	Sat							
8	1/16	Sun							
9	1/17	Mon							
			JICA		①	②	③	④	⑤
10	1/18	Tue							
11	1/19	Wed							
12	1/20	Thu							
13	1/21	Fri							
14	1/22	Sat							
15	1/23	Sun	Dep. Guam→Ar. Narita	Dep. Guam→Ar. Yangon					
16	1/24	Mon							
17	1/25	Tue							
18	1/26	Wed							
19	1/27	Thu		→Ar. Narita					
20	1/28	Fri							
21	1/29	Sat							
22	1/30	Sun							
23	1/31	Mon							
24	2/1	Tue							
25	2/2	Wed							
26	2/3	Thu							
27	2/4	Fri							
28	2/5	Sat							
29	2/6	Sun							

2-2. Study Schedule (Consultation of Draft Report)

			Team Leader	Project Manager/ Sea transport planning	Hull and Machinery Design	
			Mr. M. Ashino	Mr. T. Watanabe	Mr. A. Maruyama	
	9月2日	Fri			Dept. Narita → Ar. Guam	1
	9月3日	Sat			Dept. Guam → Ar. Majuro	2
1	9月4日	Sun	Dept. Narita → Ar. Guam	Meeting with MISC		3
2	9月5日	Mon	Dept. Guam → Ar. Majuro	Meeting with JICA, MTC and MISC		4
3	9月6日	Tue	Courtesy call on Japanese Embassy, Chief Secretary Discussion with MTC and MISC			5
4	9月7日	Wed	Discussion with MTC, MISC and Ministry of Fireign Affairs			6
5	9月8日	Thu	Discussion with MISC			7
6	9月9日	Fri	Signing of M/D, Report to Japanese Embassy			8
7	9月10日	Sat	Dept. Majuro→Guam →Ar. Narita	Meeting with MISC		9
	9月11日	Sun		Meeting with MISC		10
	9月12日	Mon		Dept. Majuro→Guam→Ar. Narita		11

3. List of Parties Concerned in the Recipient Country

NAME	ORGANIZATION
Casten N. Nemra	Chief Secretary, Office of the Chief Secretary
Jorelik Tibon	Deputy Chief Secretary, Office of the Chief Secretary
Kino S. Kabua	Secretary, Ministry of Foreign Affairs
Gee leong Bing	Acting Secretary, Ministry of Foreign Affairs
Annette N. Note	Assistant Secretary, Bureau of Bilateral Affairs, Ministry of Foreign Affairs
Kenneth A. Kedi	Minister, Ministry of Transportation and Communication
Phil Philippo	Secretary, Ministry of Transportation and Communication
Carl Alik	Assistant Secretary, Ministry of Transportation and Communication
Capt. Loungmos Hermios	Director, Maintain Division Ministry of Transportation and Communication
Wally Milne	General Manager, Marshall Islands Shipping Corporation
Alson J. Kelen	Chairman, Marshall Islands Shipping Corporation
John Kaiko	Chairman, Marshall Islands Shipping Corporation
Reynaldo V. Sunga	PMU Manager, Project Management Unit Ministry of Public Works
Smith Ysawa	Secretary, Ministry of Public Works
Imang Chong Gum	Assistant Secretary, Ministry of Public Works
Donny Note	PMU Draftsman / Inspector Ministry of Public Works
Reginald White	National Weather Service office
Elmo Astorga Jr.	Chief Accountant Tobolar Copra Processing Authority

4. Minutes of Discussions  
4-1. Minutes of Discussions (Field Survey)

**MINUTES OF DISCUSSIONS  
ON THE PREPARATORY SURVEY  
ON THE PROJECT FOR IMPROVEMENT OF  
DOMESTIC SHIPPING SERVICES  
IN REPUBLIC OF THE MARSHALL ISLANDS**


In response to a request from the Government of Republic of the Marshall Islands (hereinafter referred to as "GoRMI"), the Government of Japan decided to conduct a Preparatory Survey on the Project for Improvement of Domestic Shipping Services (hereinafter referred to as "the Project"). In accordance with the decision, Japan International Cooperation Agency (hereinafter referred to as "JICA") decided to commence the survey.

JICA sent to RMI the Preparatory Survey Team for the Field Survey (hereinafter referred to as "the Team"), which is headed by Mr. Koichi Miyake, Executive Technical Advisor to the Director General, Economic Infrastructure Department, JICA, and is scheduled to stay in the country from January 10<sup>th</sup> to February 5<sup>th</sup>, 2011.

The Team held discussions with the officials concerned of GoRMI and conducted a field survey at the Project site.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Preparatory Survey Report.

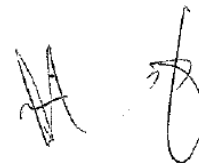
Majuro, January 21, 2011



Koichi Miyake  
Leader  
Preparatory Survey Team  
Japan International Cooperation Agency  
Japan



Hon. Kenneth A. Kedi  
Minister  
Ministry of Transportation and Communications  
Republic of the Marshall Islands



## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to build the vessel(s) carrying cargoes and passengers for safety and reliability of domestic sea transportation.

### 2. Project Site

The site is shown in Annex-1.

### 3. Responsible and Implementing Organizations

The responsible ministry is the Ministry of Transportation and Communications (MOTC).

The implementing organization is Marshall Islands Shipping Corporation (MISC).

The organization charts are shown in Annex-2 and 3 respectively.

### 4. Items requested by GoRMI

After discussions with the Team, both sides confirmed the items below.

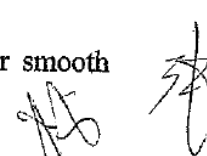
4-1. The original request from GoRMI was to build two (2) Cargo-Passenger vessels with approximately 500 deadweight tonnage, similar size of "Aemman". However, in response to the sinking incident of "Jeljelat Ae" (Landing Craft type) on January 1<sup>st</sup>, 2011, GoRMI proposed that one of the requested vessels would be changed to the Landing Craft type vessel which has similar or larger size of "Jeljelat Ae". The Team took note and requested GoRMI to submit the revised request officially through the diplomatic channel by the end of January, 2011.

4-2. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

### 5. Japan's Grant Aid Scheme

5-1. GoRMI understands the Japan's Grant Aid Scheme and necessary measures to be taken by GoRMI. The Team explained the procedures for the Project described in Annex-4 and 5.

5-2. GoRMI will take the necessary measures, as described in Annex-6 for smooth



implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Survey

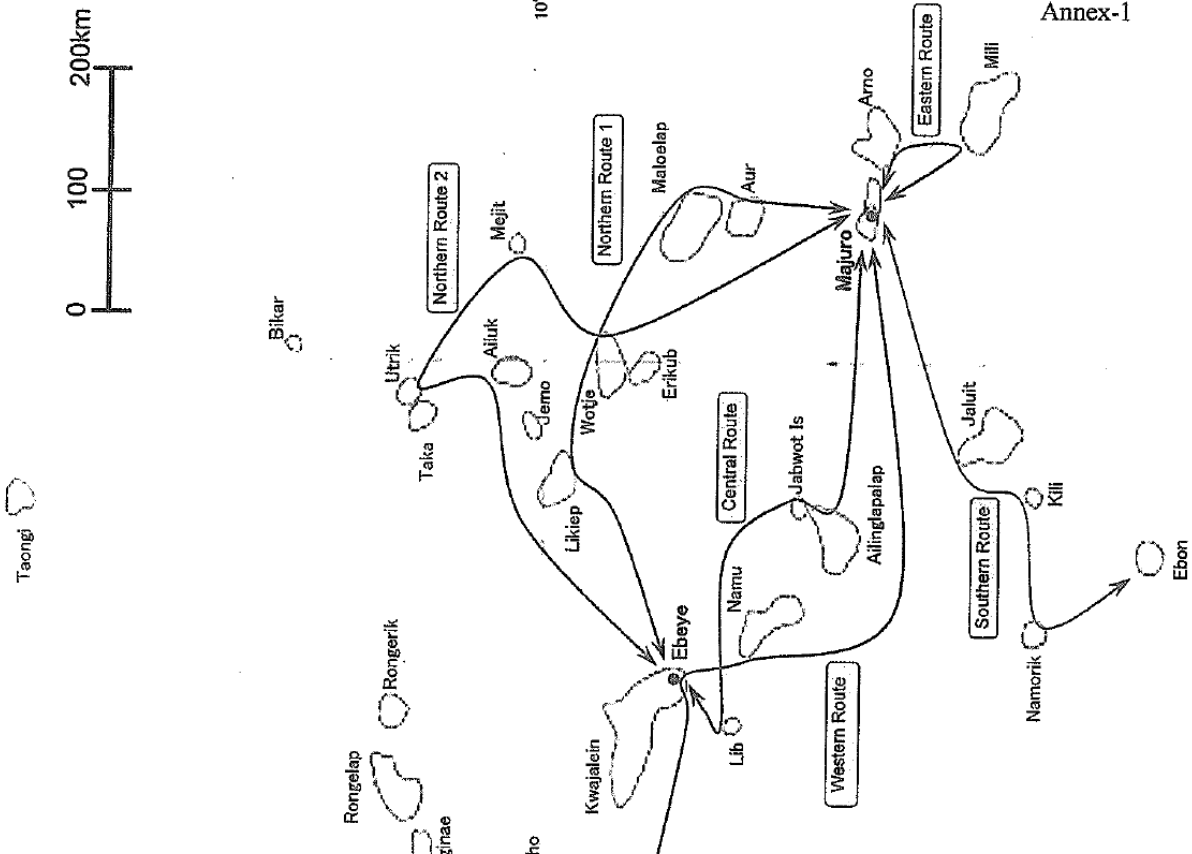
- 6-1. The Team will proceed with further studies in GoRMI until February 5, 2011.
- 6-2. JICA will prepare the draft report and the draft specification in English and dispatch a mission in order to explain their contents around August, 2011.
- 6-3. If the contents of the report are accepted in principle by GoRMI, JICA will complete the final report and send it to GoRMI by November, 2011.

7. Other Relevant Issues

- 7-1. Both sides confirmed that it is essential that GoRMI will undertake daily and periodical maintenance (including docking and classification) for the procured vessel(s). GoRMI recognized the importance of the maintenance and made a commitment to allocate a necessary budget through the legislation of the Government Shipping Vessels Maintenance Fund Act (Tentative). The Team requested GoRMI to update the status of the Act during the survey and to notify the expected annual budget plan, in consultation with the Team, to JICA RMI office by the end of July, 2011, and GoRMI agreed to it.
- 7-2. GoRMI shall improve and/or rehabilitate the wharf(s) necessary for safe and smooth operation of the procured vessel(s) at its own expense, if necessary.
- 7-3. Both sides confirmed that the "Landrik" is in unsafe condition and would not be engaged in passenger transportation service unless it is adequately repaired and maintained. Both sides also confirmed that "Ribuk Ae" and "Aemman" which are in service for passenger and cargo transportation would require daily and periodical maintenance including docking.
- 7-4. Both sides confirmed that the procured vessel(s) shall keep safe operation.
- 7-5. GoRMI shall secure the necessary personnel and budget for the procured vessel(s) operation.

- Annex-1 Project Site
- Annex-2 Organization Chart (MOTC)
- Annex-3 Organization Chart (MISC)
- Annex-4 Japan's Grant Aid
- Annex-5 Flow Chart of Japan's Grant Aid Procedures
- Annex-6 Major Undertakings to be taken by Each Government

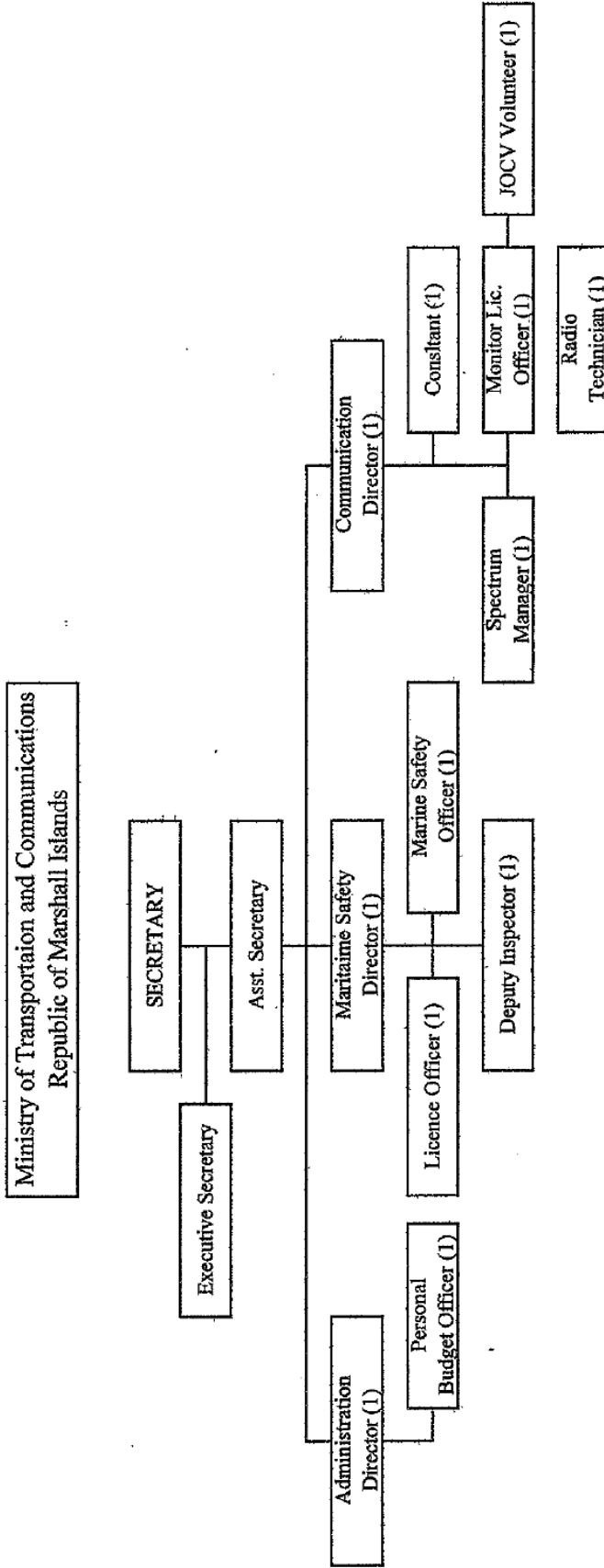




<p><b>Sector A: Southern Route</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Jaluit At (1,069)</li> <li>3. Kill Is (774)</li> <li>4. Namorik At (772)</li> <li>5. Ebon At (902)</li> <li>6. Namorik At (772)</li> </ol>	<p><b>Sector B: Northern Route 1</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Aur At (537)</li> <li>3. Mabelap At (856)</li> <li>4. Wotje At (866)</li> <li>5. Likiep At (527)</li> <li>6. Ebeye Kwajalein (10,902)</li> </ol>	<p><b>Sector C: Northern Route 2</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Wotje At (866)</li> <li>3. Mejit Is (416)</li> <li>4. Utrik At (433)</li> <li>5. Ailuk At (513)</li> <li>6. Ebeye Kwajalein (10,902)</li> </ol>	<p><b>Sector D: Central Route</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Ailinglaplap At (1,959)</li> <li>3. Jabwo Is (96)</li> <li>4. Lib Is (147)</li> <li>5. Ebeye Kwajalein (10,902)</li> </ol>	<p><b>Sector E: Western Route</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Namu At (903)</li> <li>3. Ebeye Kwajalein (10,902)</li> <li>4. Lae At (322)</li> <li>5. Ujae At (440)</li> <li>6. Wotho At (150)</li> <li>7. Enewetak At (853)</li> </ol>	<p><b>Sector F: Eastern Route</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Mill At (1,032)</li> <li>3. Arno At (2,069)</li> </ol>
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\*At=Atoll, Is=Island, ( )=Population(1999)

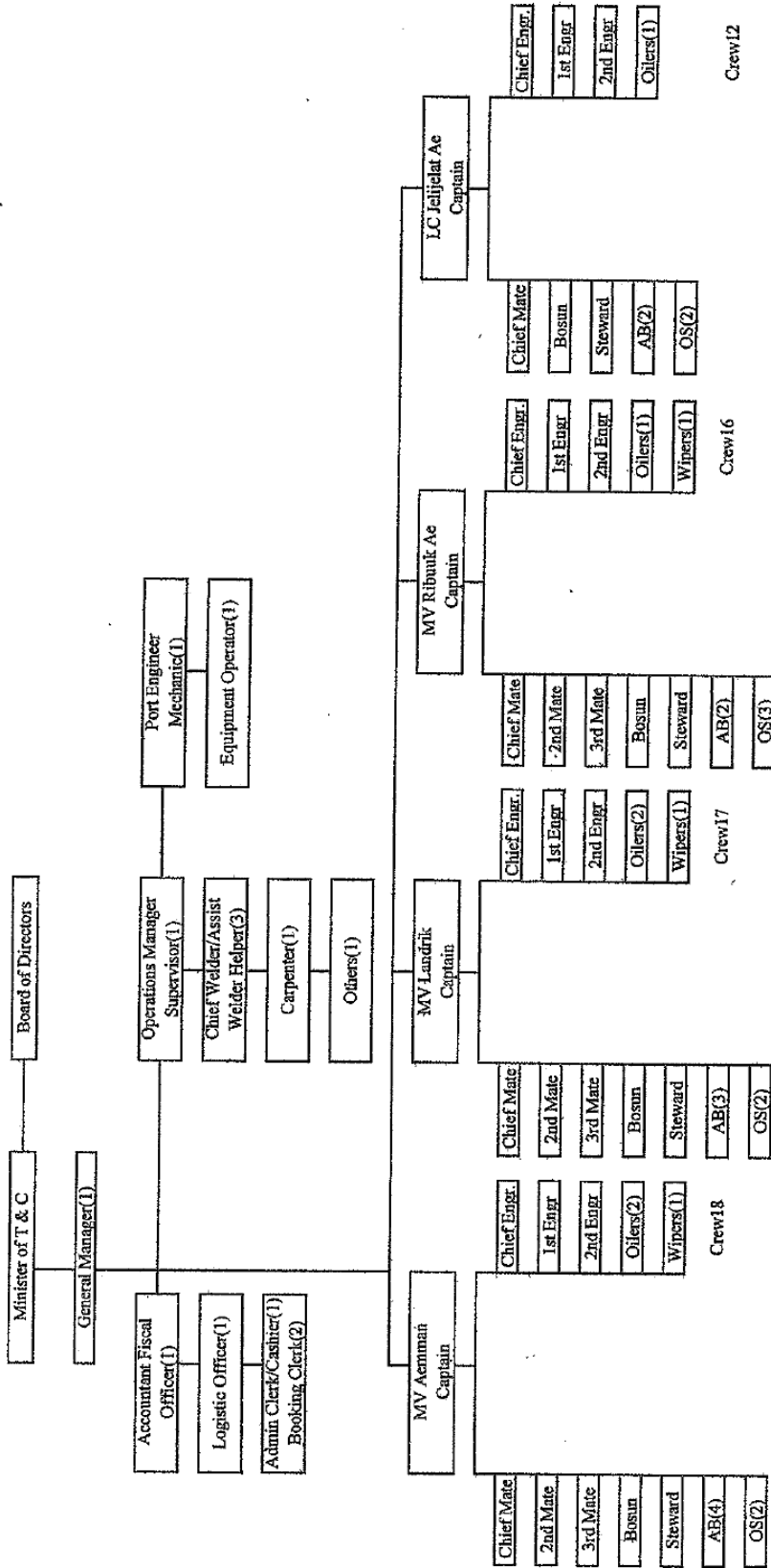
Organization Chart of Ministry of Transportaion and Communications



Annex-2

*[Handwritten signatures]*

Organization Chart of Marshall Islands Shipping Corporation



Aemunan	18
Landrik	17
Ribauk Ae	16
Jeljelat Ae	12
Shore Support	8
Administration	6
Total	77

Annex-3

## JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as “the GOJ”) is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

### 1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

- Preparatory Survey
  - The Survey conducted by JICA
- Appraisal & Approval
  - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
  - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as “the G/A”)
  - Agreement concluded between JICA and a recipient country
- Implementation
  - Implementation of the Project on the basis of the G/A

### 2. Preparatory Survey

#### (1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.

- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

**3. Japan's Grant Aid Scheme**

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

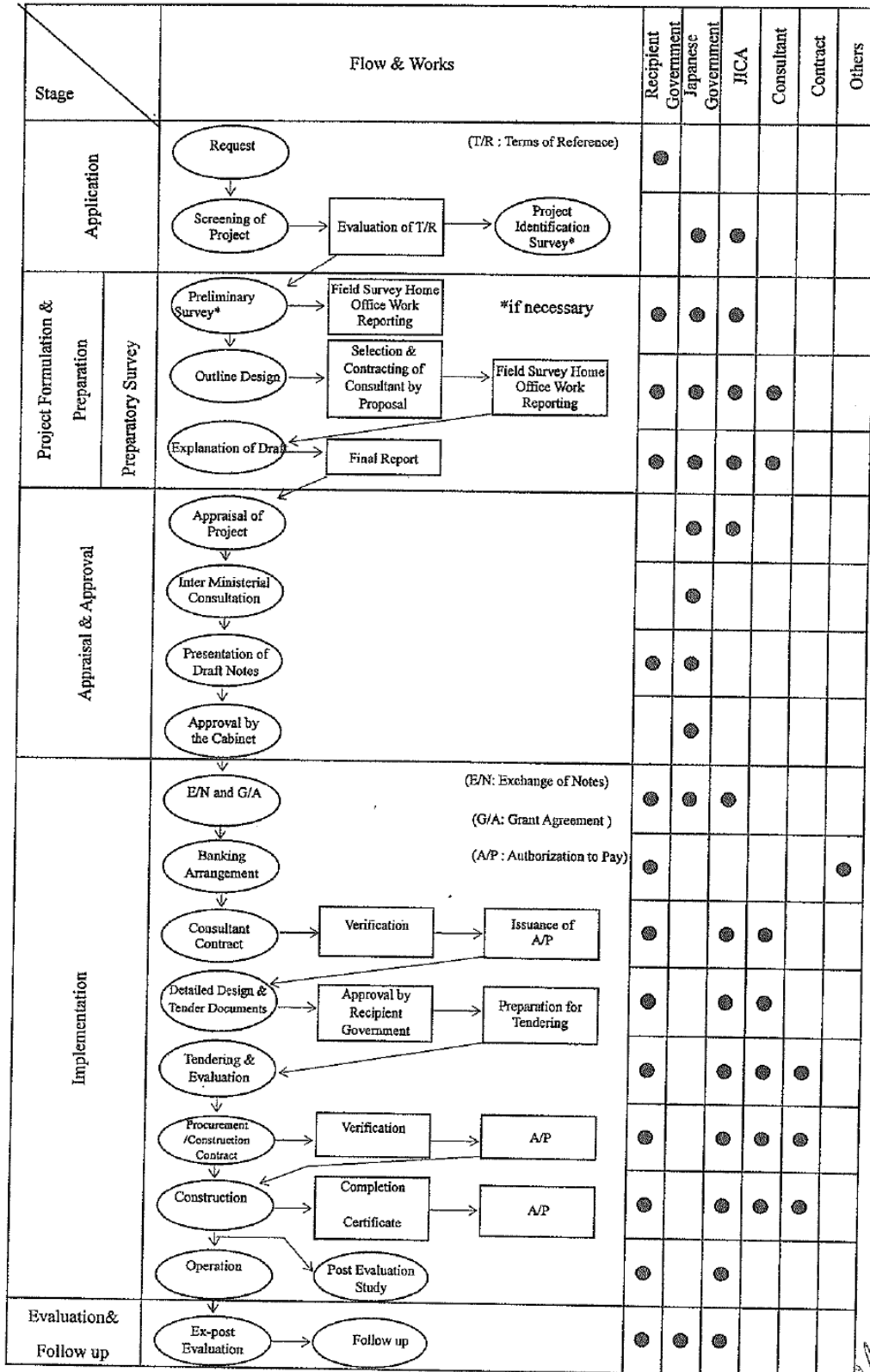
a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



## Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To design and construct vessel(s)	•	
2	To procure equipment to be covered under the Project	•	
3	Any items which are not covered under the Project, e.g. rehabilitation of existing wharf, etc.		•
4	Allocate the appropriate budget and/ or subsidies and conduct the undertakings in a timely manner necessary for proper operation and maintenance of vessel(s) to be provided (procurement of fuel, spare parts and overhaul of the vessel(s))		•
5	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the products from Japan to the recipient country (Sailing of the new vessel(s) with equipment on board by their own propulsion)	•	
	2) Tax exemption and custom clearance of the products (vessels with equipment on board) at the port of disembarkation (homeport)		•
6	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		•
7	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		•
8	To ensure that the vessel(s) be maintained and used properly and effectively for the implementation of the Project		•
9	To bear all the expenses, other than those covered by the Grant, necessary for implementation of the Project		•
10	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		•
	2) Payment commission		•

(B/A : Banking Arrangement, A/P : Authorization to pay)



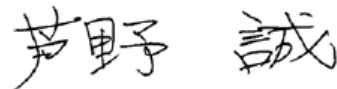
**Minutes of Discussions  
on the Preparatory Survey  
on the Project for Improvement of Domestic Shipping Services  
in Republic of the Marshall Islands  
(Explanation of Draft Report)**

In January 2011, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team on the Project for Improvement of Domestic Shipping Services (hereinafter referred to as "the Project") to the Republic of Marshall Islands (hereinafter referred to as "RMI") and through discussions, field survey and technical examination of the result in Japan, JICA prepared a draft report of the survey.

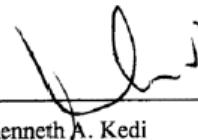
In order to explain and to consult with the concerned officials of the Government of Republic of Marshall Islands (hereinafter referred to as "GoRMI") on the contents of the draft report, JICA sent to RMI the Preparatory Survey Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Makoto Ashino, Senior Advisor to the Director General, Economic Infrastructure Department, JICA, from September 4 to September 10, 2011.

As a result of discussions, both sides confirmed the main items described in the attached sheets.

Majuro, September 9, 2011



Makoto Ashino  
Leader  
Preparatory Survey Explanation Team  
Japan International Cooperation Agency



Hon. Kenneth A. Kedi  
Minister,  
Ministry of Transportation and Communication  
Republic of Marshall Islands



## ATTACHMENT

### 1. Components of the Draft Report

The GoRMI agreed and accepted in principle the contents of the draft report of the Preparatory Survey and draft specification of the vessels explained by the Team.

### 2. Japan's Grant Aid Scheme

The GoRMI reconfirmed the Japan's Grant Aid scheme and the necessary measures to be taken by the RMI side as explained by the Preparatory Survey Team and described in the Annex-4 of the Minutes of Discussions signed by both sides on January 21, 2011.

### 3. Schedule of the Study

JICA will complete the Final Report in English, in accordance with the confirmed items and send it to the GoRMI through JICA Marshall Islands Office by end of November, 2011.

### 4. Cost Estimation

Both sides agreed that, in order to secure a fair and equitable procurement, the Project Cost Estimation as attached in Annex-1 should never be duplicated or released to any third parties before the signing of all the Contract(s) for the Project.

### 5. Other Relevant Issues

5-1. Both sides confirmed that the following undertakings should be taken by the RMI side at the RMI expenses.

(1) To obtain the Provisional Certificates of Nationality and necessary documents for the transportation of the new vessels to be constructed under the Project from Japan to Majuro, Marshall Islands.

(2) Banking Arrangements (with an authorized foreign exchange in Japan), issuance of Authorization to Pay and bearing commissions to the Bank.

(3) Exemption of the new vessels from custom duties, internal taxes, fiscal levies and prompt customs clearance.

(4) Exemption of Japanese nationals from customs duties, internal taxes, fiscal levies for their services in RMI.

5-2. RMI side shall secure necessary budget and personnel for operation and maintenance for vessels granted through the Project.

5-3. RMI side confirmed that GoRMI has established a special fund for the maintenance and repairing of Government Shipping Vessels. This fund will be used for maintenance of Marshall Islands Shipping Cooperation (hereinafter referred to as "MISC") shipping vessels.

5-4. RMI side confirmed that when more than licensed number of passengers (150 passengers for the new cargo passenger vessel and 50 passengers for the new landing craft vessel) boards the new vessels



procured by the Project, RMI side will take necessary action to secure the safety of all the passengers and receive sailing permit from RMI relevant authority.

- 5-5. Liferafts for the existing vessels will be procured by the Project. RMI side confirmed that the liferafts will be properly set to the existing vessels and will be maintained properly.



Annex-1 : Project Cost Estimation

This page is closed due to the confidentiality.

## 5. References

### 5-1. Considerations on the Maritime Regulations

Mr. Phil Philippo  
Secretary of Transport & Communications  
Republic of the Marshall Islands

Date: 24 January 2011

Re: Considerations on the Maritime Regulations  
In the Project for Improvement of Domestic Shipping Services  
in Republic of the Marshall Islands

Sir,

To implement the project, it is suggested for the RMI Maritime Administration to consider following measures on the safety systems of the new vessels built under the Project.

1. "Safety Regulations for Non-Convention Vessels" (SRNCV), adopted in the SPC on 2002, should apply supplementing the "Domestic Watercraft Regulations" of the RMI. The said SRNCV covers safety requirements for the "cargo-passenger vessels", under which the new vessels of the Project fall. For example, requirements of liferafts and lifejackets are specified there specifically.
2. According to the SRNCV, safety radio installations on board should be based on the GMDSS system, with the area A2, which corresponds to the medium frequency radio coverage between vessel and shore. Following radio apparatuses should be installed on board.
  - 1 - MF/HF SSB radiotelephone, with DSC alert and DSC watch-keeping facility
  - 1 - VHF radiotelephone, with DSC alert and DSC watch-keeping facility
  - 2 - EPIRBs (Emergency Position Indicating Radio Beacon)
  - 2 - SARTs (Search and Rescue Transponder)
  - 3 - Two-way portable VHF transceiversInstallation of the NAVTEX receiver should be exempted, as the NAVTEC broadcasting is not available in the RMI waters.
3. Onboard navigation equipment should include following according to the SRNCV.
  - 1 - Satellite GPS compass
  - 1 - Magnetic compass
  - 1 - Radar, 9GHz band
  - 2 - GPS receivers

In place of a gyrocompass, which is required for the cargo-passenger vessel under the

SRNCV, a satellite GPS compass, which has no moving parts thereby longlife, should be adopted.

4. One set of AIS (Automatic Identification System) should be installed according to the recent international requirement.
5. The gross tonnage of MV Aemman is 534 tons to the international measurement system and 175 tons to the Japanese domestic measurement system. The gross tonnage of the new Aemman type vessel will be similar to that of MV Aemman. In addition to the international tonnage certificate, Japanese domestic tonnage certificate, which shows a figure below 500, should be issued. The said Japanese domestic gross tonnage should be referred to in applying the RMI Domestic Watercraft Regulations. The gross tonnage of the new landing craft type vessel will be below 500 tons either by the international and Japanese domestic measurement.

We would appreciate you prompt attention and confirmation on above.

Respectfully yours,

---

Toyonori Watanabe  
Project Manager  
Fisheries Engineering Co., Ltd.

## 5- 2. Result of Model Tank Test for the New LC Vessel

To analyze and confirm performance of the New LC Vessel, model tank test using precise ship model.

Date tested	23 and 24 May, 2011
Place tested	Ship model test tank (circulation tank), Sasebo Heavy Industries Co., Ltd., Sasebo
Ship model dimension	Length between perpendiculars = 1.4286 m Scale = 1/28.00
Appendage	Rudder, bilge keel, shaft bracket, propeller shaft
Tests conducted	Resistance test (full load draft and light draft) Streamline observation
Lab conducted the tests	Fluid Techno



Shallow draft and beamy hull.

Wide deck at fore end to fit bow ramp and accordingly blunt waterline.

Bow form is made sloped against head sea avoiding flat face as far as possible for less water resistance and less wave impact.

Red tufts are for observing streamline.



Fig-1 Bow





To accommodate large diameter efficient propeller, and besides to smooth waterflow, tunnel stern hull form is adopted. Red tufts are for observing streamline.



Fig - 2 Stern



Fig - 3 Full load draft 11knot

Wave breaking is observed at the bow end.

Bow wave and following shoulder wave are moderate. Stern wave from the stern end is very low.



Fig - 4 Streamline along bottom

Wave breaking can be reduced by slanting bow end corners.

Streamlines along hull bottom are running almost straight.

Streamlines don't run across bilge corners, justifying corner bilge form.

Broken wave bubbles being produced almost along full width of the bow end and run straight to the stern, echo sounder transducer cannot be placed in those bubble passage areas. The transducer must be fitted at the bottom of the stern skeg where is bubble free.

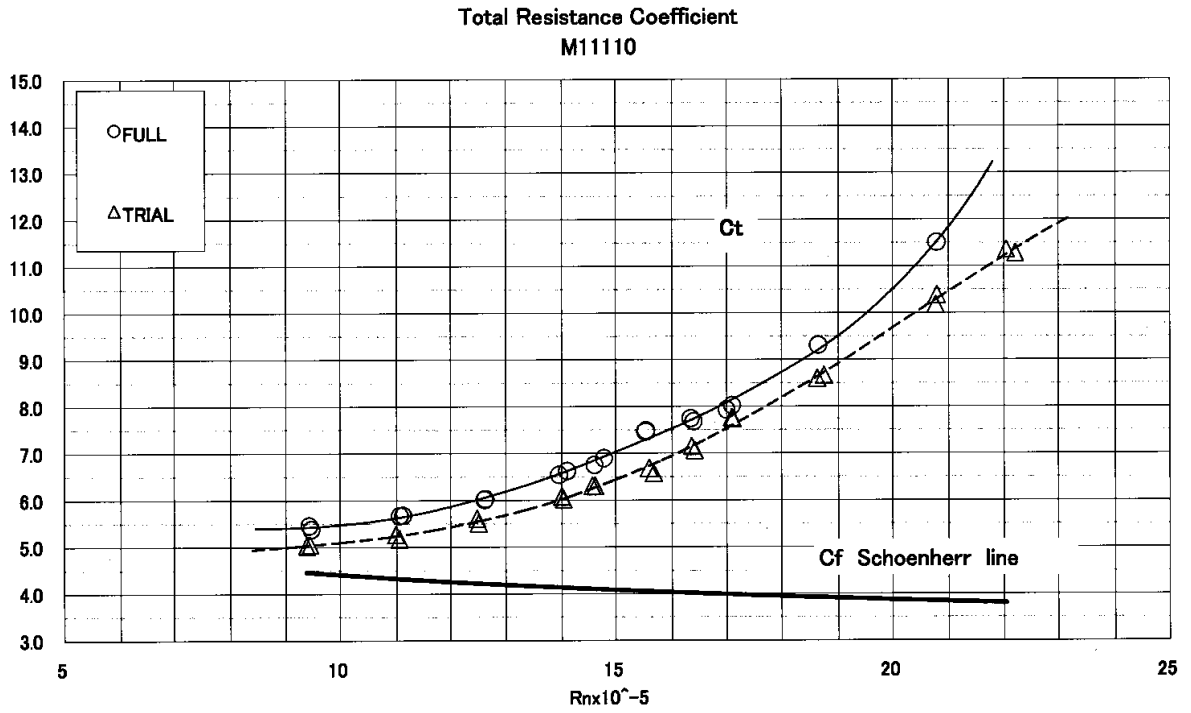


Fig - 5 Resistance measurement (non-dimensional residual resistance coefficient)

## REQUIRED POWER

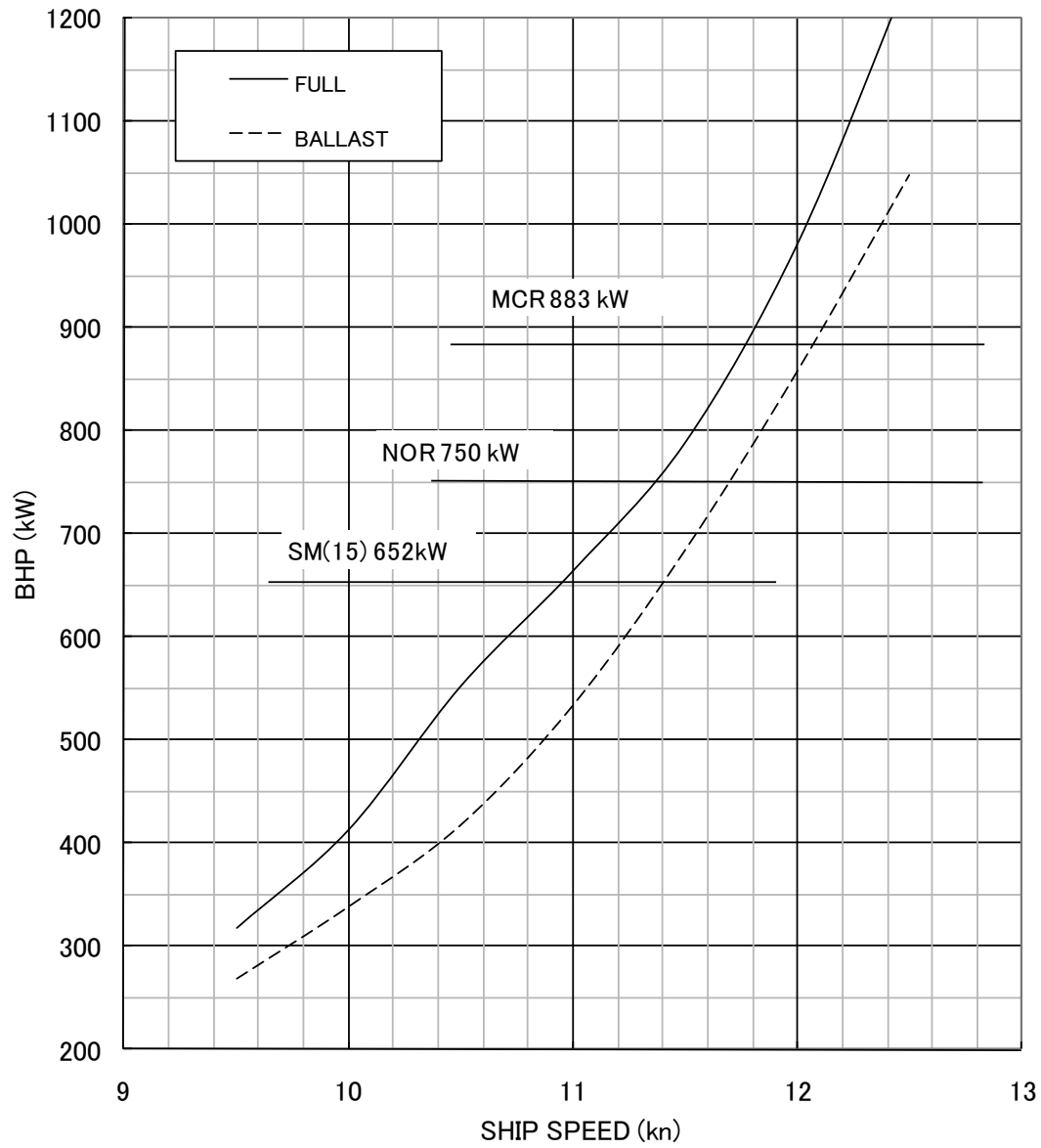


Fig - 6 Speed ~Power Curves

Speed performance is confirmed as follows.

Condition	Full load draft	Light load draft
Mean draft / Trim	2.1 m / 0 m	1.74 m / 1.1 m
Displacement	724 t	570 t
Main engine output 100%, 883kW, calm sea	11.7 knot	12.0 knot
Main engine output 85%, 750kW, calm sea	11.3 knot	11.7 knot
Main engine output 85%, 750kW, 15% sea margin	10.9 knot	11.4 knot

5-3. The Government Shipping Vessels Maintenance Act, 2011

**NITIJELA OF THE REPUBLIC OF THE MARSHALL ISLANDS**

**32<sup>ND</sup> CONSTITUTIONAL REGULAR SESSION, 2011**

**BILL NO.: 101**

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*P.L. 2011-64*

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**AN ACT**

**to create a special fund for maintenance of Government Shipping Vessels.**

**BE IT ENACTED BY THE NITIJELA OF THE REPUBLIC OF THE MARSHALL ISLANDS:**

**Section 1. Short Title.**

This Act may be cited as the Government Shipping Vessels Maintenance Act, 2011.

11 **Section 2. Shipping Vessels Maintenance Fund.**

12 (1) There is hereby established a special fund, the Shipping Vessels Maintenance Fund  
13 hereinafter refer to as “the Fund”.

14 (2) The Fund is a special revenue fund within the National Treasury and under the control  
15 and supervision of the Ministry of Finance, which shall provide for its administration in  
16 accordance with the Financial Management Act of 1990.

17 (3) For the purpose of this Act, “Government Shipping Vessels” means shipping vessels  
18 under the management of the Marshall Islands Shipping Corporations.

19 **Section 3. Payments into the Fund.**

20 There shall be paid into the Fund:

21 (a) monies appropriated by the Nitijela, or as may be received or become available to the  
22 Marshall Islands Shipping Corporation for the purposes of maintenance of shipping  
23 vessels;

24 (b) such other monies whether in the form of gifts, grants, donations or otherwise, and  
25 specifically for the maintenance of shipping vessels.

1 **Section 4. Payments out of the Fund.**

2 (1) Payments shall be made out of the Fund for the following purposes:

3 (a) repair and maintenance of shipping vessels, including the purchase of spare  
4 parts and other requisites needed for such purposes;

5 (b) acquire and purchase safety equipments such as rafts, life jackets, fire  
6 extinguishers and such other safety requisites needed on a boat or vessel;

7 (c) survey and classification of ships; and

8 (d) dry-docking.

9 **Section 5. Accounts and Records.**

10 (1) The Secretary of Finance shall maintain, in accordance with the procedures prescribed  
11 by the Financial Management Act, proper accounts and records with respect to the Fund,  
12 and any item of property purchased with money from the Fund.

13 (2) The accounts shall be laid before the Nitijela by the Minister of Finance pursuant to  
14 Article VIII, Section 5 (4) of the Constitution.

15 (3) The accounts and records maintained under Subsection (1) of this Section shall be  
16 audited by the Auditor General as provided for under Article VIII, Section 15 of the  
17 Constitution.

18 **Section 6. Effective Date.**

19 This Act shall take effect on the date of certification in accordance with Article IV,  
20 Section 21 of the Constitution and the Rules of Procedures of the Nitijela.

21

22 **CERTIFICATE**

23 **I hereby certify:**

P.L. 2011-44

1           1.     That Nitijela Bill No. 101 was passed by the Nitijela of the Republic of the  
2                    Marshall Islands on the 29<sup>th</sup> day of September, 2011; and

3           2.     That I am satisfied that Nitijela Bill No. 101 was passed in accordance with the  
4                    relevant provisions of the Constitution of the Republic of the Marshall Islands and  
5                    the Rules of Procedures of the Nitijela.

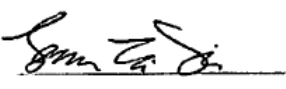
6           I hereby place my signature before the Clerk this 17<sup>th</sup> day of October 2011.

7

Attest:



**Hon. Alvin T. Jacklick**  
Speaker  
Nitijela of the Marshall Islands



**Lena E. Tiobech**  
Clerk  
Nitijela of the Marshall Islands

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## APPENDICES

1. Member List of the Study Team
2. Study Schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions
5. References





## 1. Member List of the Study Team

### 1-1. Member List (Field Survey)

<u>FUNCTION</u>	<u>NAME and ORGANIZATION</u>
Team Leader	Mr. Koichi MIYAKE Executive Technical Advisor to the Director General, Economic Infrastructure Department Japan International Cooperation Agency
Project Coordinator	Mr. Hiroyuki YOKOI Transportation and ICT Division 1, Transportation and ICT Group, Economic Infrastructure Department Japan International Cooperation Agency
Project Manager / Sea transport planning	Mr. Toyonori WATANABE Fisheries Engineering Co., Ltd.
Hull and Machinery Design	Mr. Akio MARUYAMA Fisheries Engineering Co., Ltd.
Outfitting and Electric Design	Mr. Koji TAKESHITA Fisheries Engineering Co., Ltd.
Equipment and procurement planning / Cost estimation	Mr. Akio YAMADA Fisheries Engineering Co., Ltd.
Operation and management planning	Ms. Yuka AKAI Fisheries Engineering Co., Ltd.

1-2. Member List (Consultation of Draft Report)

FUNCTION	NAME and ORGANIZATION
Team Leader	Mr. Makoto Ashino Senior Advisor to the Director General, Economic Infrastructure Department, Japan International Cooperation Agency
Project Manager / Sea transport planning	Mr. Toyonori WATANABE Fisheries Engineering Co., Ltd.
Hull and Machinery Design	Mr. Akio MARUYAMA Fisheries Engineering Co., Ltd.

## 2. Study Schedule

### 2-1. Study Schedule (Field Survey)

			Team Leadear	Project Coordinator	Project Manager / Sea transport planning	Hull and Machinery Design	Outfiting and Electric Design	Operaton and management planning	Equipment and procurement planning/Cost estimation
			Mr. Koichi Miyake JICA	Mr. Hiroyuki Yokoi JICA	Mr. T. Watanabe ①	Mr. A. Maruyama ②	Mr. K. Takeshita ③	Ms. Y. Akai ④	Mr. A. Yamada ⑤
1	1/9	Sun						Dep. Narita→Ar. Guam	
2	1/10	Mon						Dep. Guam→Ar. Majuro	
3	1/11	Tue							
4	1/12	Wed							
5	1/13	Thu							
6	1/14	Fri							
7	1/15	Sat							
8	1/16	Sun							
9	1/17	Mon							
			JICA		①	②	③	④	⑤
10	1/18	Tue							
11	1/19	Wed							
12	1/20	Thu							
13	1/21	Fri							
14	1/22	Sat							
15	1/23	Sun	Dep. Guam→Ar. Narita	Dep. Guam→Ar. Yangon					
16	1/24	Mon							
17	1/25	Tue							
18	1/26	Wed							
19	1/27	Thu		→Ar. Narita					
20	1/28	Fri							
21	1/29	Sat							
22	1/30	Sun							
23	1/31	Mon							
24	2/1	Tue							
25	2/2	Wed							
26	2/3	Thu							
27	2/4	Fri							
28	2/5	Sat							
29	2/6	Sun							

2-2. Study Schedule (Consultation of Draft Report)

			Team Leader	Project Manager/ Sea transport planning	Hull and Machinery Design	
			Mr. M. Ashino	Mr. T. Watanabe	Mr. A. Maruyama	
	9月2日	Fri			Dept. Narita → Ar. Guam	1
	9月3日	Sat			Dept. Guam → Ar. Majuro	2
1	9月4日	Sun	Dept. Narita → Ar. Guam	Meeting with MISC		3
2	9月5日	Mon	Dept. Guam → Ar. Majuro	Meeting with JICA, MTC and MISC		4
3	9月6日	Tue	Courtesy call on Japanese Embassy, Chief Secretary Discussion with MTC and MISC			5
4	9月7日	Wed	Discussion with MTC, MISC and Ministry of Fireign Affairs			6
5	9月8日	Thu	Discussion with MISC			7
6	9月9日	Fri	Signing of M/D, Report to Japanese Embassy			8
7	9月10日	Sat	Dept. Majuro→Guam →Ar. Narita	Meeting with MISC		9
	9月11日	Sun		Meeting with MISC		10
	9月12日	Mon		Dept. Majuro→Guam→Ar. Narita		11

3. List of Parties Concerned in the Recipient Country

NAME	ORGANIZATION
Casten N. Nemra	Chief Secretary, Office of the Chief Secretary
Jorelik Tibon	Deputy Chief Secretary, Office of the Chief Secretary
Kino S. Kabua	Secretary, Ministry of Foreign Affairs
Gee leong Bing	Acting Secretary, Ministry of Foreign Affairs
Annette N. Note	Assistant Secretary, Bureau of Bilateral Affairs, Ministry of Foreign Affairs
Kenneth A. Kedi	Minister, Ministry of Transportation and Communication
Phil Philippo	Secretary, Ministry of Transportation and Communication
Carl Alik	Assistant Secretary, Ministry of Transportation and Communication
Capt. Loungmos Hermios	Director, Maintain Division Ministry of Transportation and Communication
Wally Milne	General Manager, Marshall Islands Shipping Corporation
Alson J. Kelen	Chairman, Marshall Islands Shipping Corporation
John Kaiko	Chairman, Marshall Islands Shipping Corporation
Reynaldo V. Sunga	PMU Manager, Project Management Unit Ministry of Public Works
Smith Ysawa	Secretary, Ministry of Public Works
Imang Chong Gum	Assistant Secretary, Ministry of Public Works
Donny Note	PMU Draftsman / Inspector Ministry of Public Works
Reginald White	National Weather Service office
Elmo Astorga Jr.	Chief Accountant Tobolar Copra Processing Authority

4. Minutes of Discussions  
4-1. Minutes of Discussions (Field Survey)

**MINUTES OF DISCUSSIONS  
ON THE PREPARATORY SURVEY  
ON THE PROJECT FOR IMPROVEMENT OF  
DOMESTIC SHIPPING SERVICES  
IN REPUBLIC OF THE MARSHALL ISLANDS**


In response to a request from the Government of Republic of the Marshall Islands (hereinafter referred to as "GoRMI"), the Government of Japan decided to conduct a Preparatory Survey on the Project for Improvement of Domestic Shipping Services (hereinafter referred to as "the Project"). In accordance with the decision, Japan International Cooperation Agency (hereinafter referred to as "JICA") decided to commence the survey.

JICA sent to RMI the Preparatory Survey Team for the Field Survey (hereinafter referred to as "the Team"), which is headed by Mr. Koichi Miyake, Executive Technical Advisor to the Director General, Economic Infrastructure Department, JICA, and is scheduled to stay in the country from January 10<sup>th</sup> to February 5<sup>th</sup>, 2011.

The Team held discussions with the officials concerned of GoRMI and conducted a field survey at the Project site.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Preparatory Survey Report.

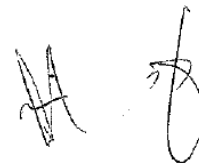
Majuro, January 21, 2011



Koichi Miyake  
Leader  
Preparatory Survey Team  
Japan International Cooperation Agency  
Japan



Hon. Kenneth A. Kedi  
Minister  
Ministry of Transportation and Communications  
Republic of the Marshall Islands



## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to build the vessel(s) carrying cargoes and passengers for safety and reliability of domestic sea transportation.

### 2. Project Site

The site is shown in Annex-1.

### 3. Responsible and Implementing Organizations

The responsible ministry is the Ministry of Transportation and Communications (MOTC).

The implementing organization is Marshall Islands Shipping Corporation (MISC).

The organization charts are shown in Annex-2 and 3 respectively.

### 4. Items requested by GoRMI

After discussions with the Team, both sides confirmed the items below.

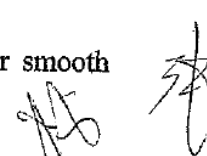
4-1. The original request from GoRMI was to build two (2) Cargo-Passenger vessels with approximately 500 deadweight tonnage, similar size of "Aemman". However, in response to the sinking incident of "Jeljelat Ae" (Landing Craft type) on January 1<sup>st</sup>, 2011, GoRMI proposed that one of the requested vessels would be changed to the Landing Craft type vessel which has similar or larger size of "Jeljelat Ae". The Team took note and requested GoRMI to submit the revised request officially through the diplomatic channel by the end of January, 2011.

4-2. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

### 5. Japan's Grant Aid Scheme

5-1. GoRMI understands the Japan's Grant Aid Scheme and necessary measures to be taken by GoRMI. The Team explained the procedures for the Project described in Annex-4 and 5.

5-2. GoRMI will take the necessary measures, as described in Annex-6 for smooth





implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

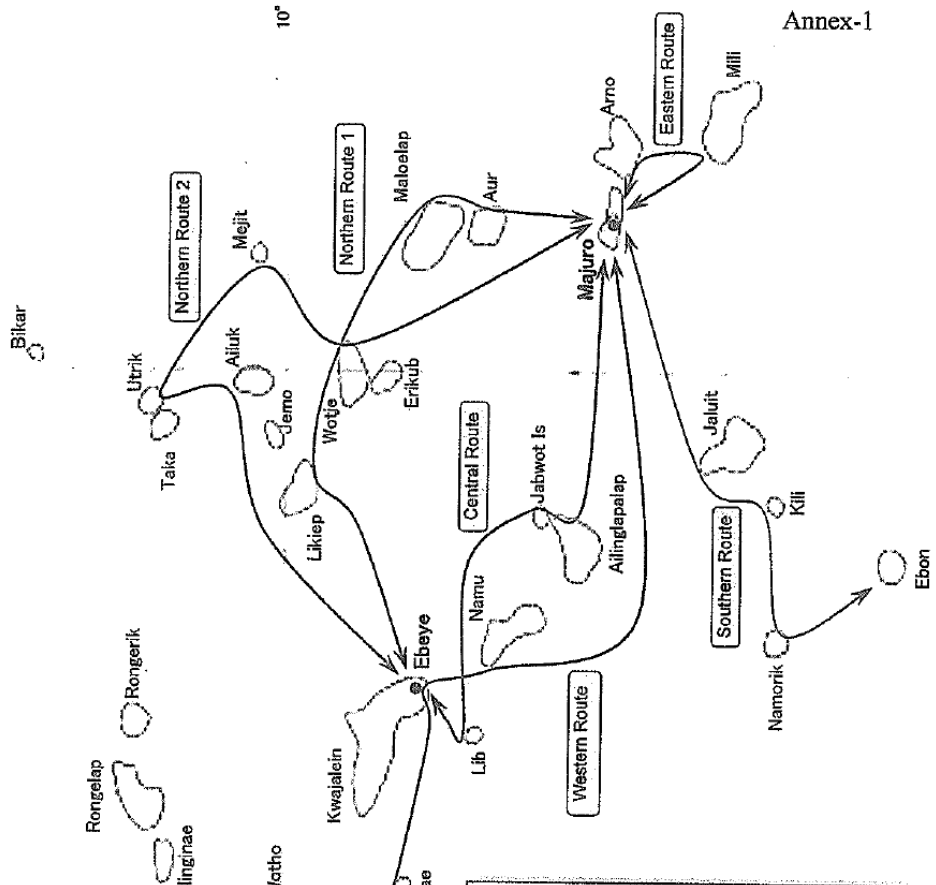
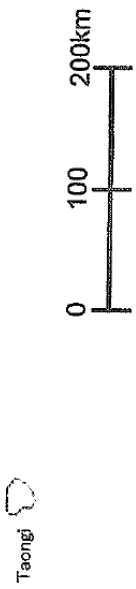
6. Schedule of the Survey

- 6-1. The Team will proceed with further studies in GoRMI until February 5, 2011.
- 6-2. JICA will prepare the draft report and the draft specification in English and dispatch a mission in order to explain their contents around August, 2011.
- 6-3. If the contents of the report are accepted in principle by GoRMI, JICA will complete the final report and send it to GoRMI by November, 2011.

7. Other Relevant Issues

- 7-1. Both sides confirmed that it is essential that GoRMI will undertake daily and periodical maintenance (including docking and classification) for the procured vessel(s). GoRMI recognized the importance of the maintenance and made a commitment to allocate a necessary budget through the legislation of the Government Shipping Vessels Maintenance Fund Act (Tentative). The Team requested GoRMI to update the status of the Act during the survey and to notify the expected annual budget plan, in consultation with the Team, to JICA RMI office by the end of July, 2011, and GoRMI agreed to it.
- 7-2. GoRMI shall improve and/or rehabilitate the wharf(s) necessary for safe and smooth operation of the procured vessel(s) at its own expense, if necessary.
- 7-3. Both sides confirmed that the "Landrik" is in unsafe condition and would not be engaged in passenger transportation service unless it is adequately repaired and maintained. Both sides also confirmed that "Ribuk Ae" and "Aemman" which are in service for passenger and cargo transportation would require daily and periodical maintenance including docking.
- 7-4. Both sides confirmed that the procured vessel(s) shall keep safe operation.
- 7-5. GoRMI shall secure the necessary personnel and budget for the procured vessel(s) operation.

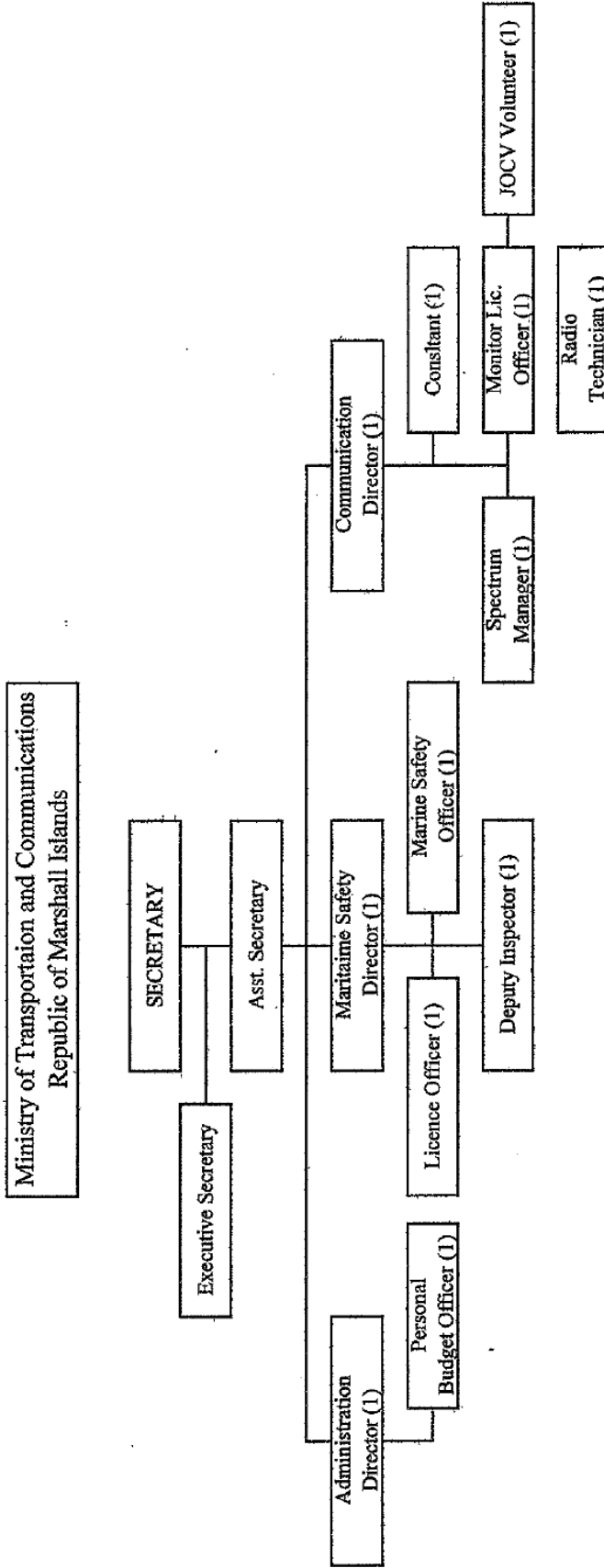
- Annex-1 Project Site
- Annex-2 Organization Chart (MOTC)
- Annex-3 Organization Chart (MISC)
- Annex-4 Japan's Grant Aid
- Annex-5 Flow Chart of Japan's Grant Aid Procedures
- Annex-6 Major Undertakings to be taken by Each Government



<p><b>Sector A: Southern Route</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Jaluit At (1,069)</li> <li>3. Kill Is (774)</li> <li>4. Namorik At (772)</li> <li>5. Ebon At (902)</li> <li>6. Namorik At (772)</li> </ol>	<p><b>Sector B: Northern Route 1</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Aur At (537)</li> <li>3. Mabelap At (856)</li> <li>4. Wotje At (866)</li> <li>5. Likiep At (527)</li> <li>6. Ebeye Kwajalein (10,902)</li> </ol>	<p><b>Sector C: Northern Route 2</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Wotje At (866)</li> <li>3. Mejit Is (416)</li> <li>4. Utrik At (433)</li> <li>5. Ailuk At (513)</li> <li>6. Ebeye Kwajalein (10,902)</li> </ol>	<p><b>Sector D: Central Route</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Ailinglaplap At (1,959)</li> <li>3. Jabwot Is (96)</li> <li>4. Lib Is (147)</li> <li>5. Ebeye Kwajalein (10,902)</li> </ol>	<p><b>Sector E: Western Route</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Namu At (903)</li> <li>3. Ebeye Kwajalein (10,902)</li> <li>4. Lae At (322)</li> <li>5. Ujae At (440)</li> <li>6. Wotho At (150)</li> <li>7. Enewetak At (853)</li> </ol>	<p><b>Sector F: Eastern Route</b></p> <ol style="list-style-type: none"> <li>1. Majuro At (23,676)</li> <li>2. Mill At (1,032)</li> <li>3. Arno At (2,069)</li> </ol>
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\*At=Atoll, Is=Island, ( )=Population(1999)

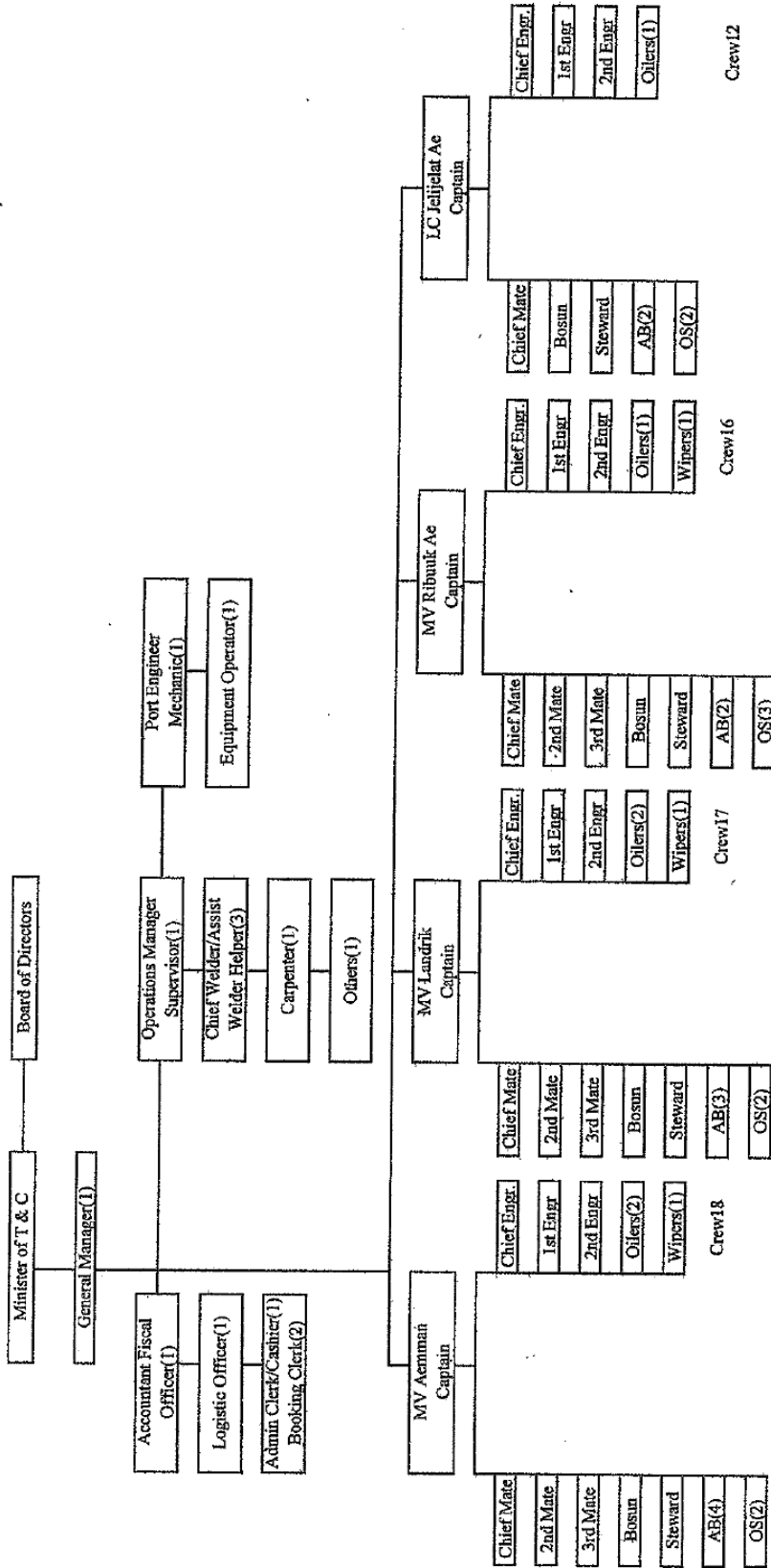
Organization Chart of Ministry of Transportaion and Communications



Annex-2

*[Handwritten signatures]*

Organization Chart of Marshall Islands Shipping Corporation



Aemunan	18
Landrik	17
Ribauk Ae	16
Jeljelat Ae	12
Shore Support	8
Administration	6
Total	77

Annex-3

## JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as “the GOJ”) is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

### 1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

- Preparatory Survey
  - The Survey conducted by JICA
- Appraisal & Approval
  - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
  - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as “the G/A”)
  - Agreement concluded between JICA and a recipient country
- Implementation
  - Implementation of the Project on the basis of the G/A

### 2. Preparatory Survey

#### (1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.

- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

**3. Japan's Grant Aid Scheme**

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

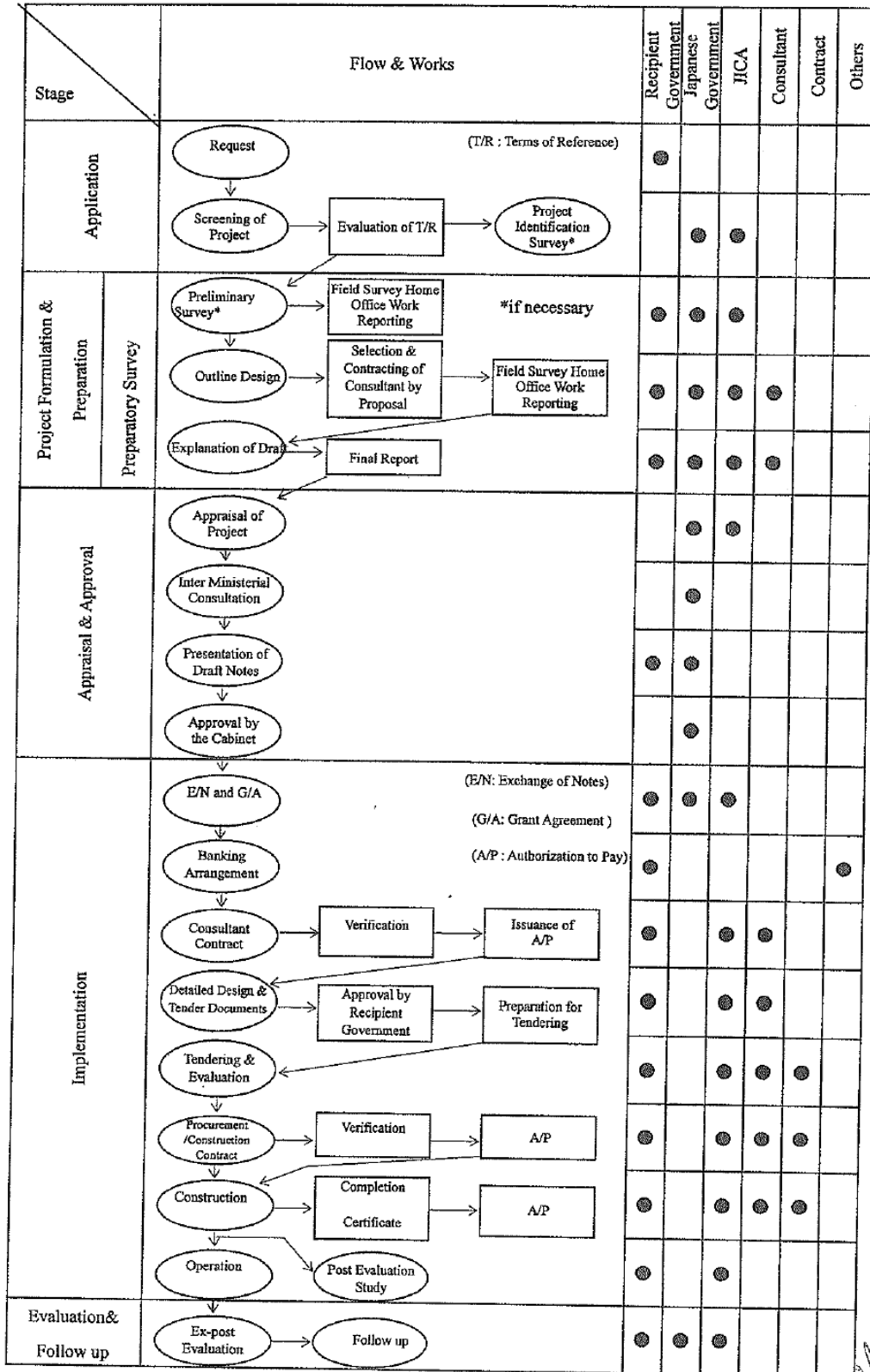
b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.



FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



## Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To design and construct vessel(s)	●	
2	To procure equipment to be covered under the Project	●	
3	Any items which are not covered under the Project, e.g. rehabilitation of existing wharf, etc.		●
4	Allocate the appropriate budget and/ or subsidies and conduct the undertakings in a timely manner necessary for proper operation and maintenance of vessel(s) to be provided (procurement of fuel, spare parts and overhaul of the vessel(s))		●
5	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the products from Japan to the recipient country (Sailing of the new vessel(s) with equipment on board by their own propulsion)	●	
	2) Tax exemption and custom clearance of the products (vessels with equipment on board) at the port of disembarkation (homeport)		●
6	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
7	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
8	To ensure that the vessel(s) be maintained and used properly and effectively for the implementation of the Project		●
9	To bear all the expenses, other than those covered by the Grant, necessary for implementation of the Project		●
10	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

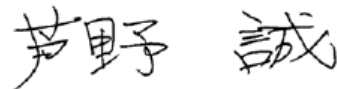
**Minutes of Discussions  
on the Preparatory Survey  
on the Project for Improvement of Domestic Shipping Services  
in Republic of the Marshall Islands  
(Explanation of Draft Report)**

In January 2011, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team on the Project for Improvement of Domestic Shipping Services (hereinafter referred to as "the Project") to the Republic of Marshall Islands (hereinafter referred to as "RMI") and through discussions, field survey and technical examination of the result in Japan, JICA prepared a draft report of the survey.

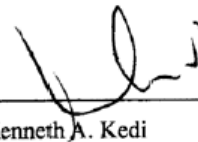
In order to explain and to consult with the concerned officials of the Government of Republic of Marshall Islands (hereinafter referred to as "GoRMI") on the contents of the draft report, JICA sent to RMI the Preparatory Survey Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Makoto Ashino, Senior Advisor to the Director General, Economic Infrastructure Department, JICA, from September 4 to September 10, 2011.

As a result of discussions, both sides confirmed the main items described in the attached sheets.

Majuro, September 9, 2011



Makoto Ashino  
Leader  
Preparatory Survey Explanation Team  
Japan International Cooperation Agency



Hon. Kenneth A. Kedi  
Minister,  
Ministry of Transportation and Communication  
Republic of Marshall Islands



## ATTACHMENT

### 1. Components of the Draft Report

The GoRMI agreed and accepted in principle the contents of the draft report of the Preparatory Survey and draft specification of the vessels explained by the Team.

### 2. Japan's Grant Aid Scheme

The GoRMI reconfirmed the Japan's Grant Aid scheme and the necessary measures to be taken by the RMI side as explained by the Preparatory Survey Team and described in the Annex-4 of the Minutes of Discussions signed by both sides on January 21, 2011.

### 3. Schedule of the Study

JICA will complete the Final Report in English, in accordance with the confirmed items and send it to the GoRMI through JICA Marshall Islands Office by end of November, 2011.

### 4. Cost Estimation

Both sides agreed that, in order to secure a fair and equitable procurement, the Project Cost Estimation as attached in Annex-1 should never be duplicated or released to any third parties before the signing of all the Contract(s) for the Project.

### 5. Other Relevant Issues

5-1. Both sides confirmed that the following undertakings should be taken by the RMI side at the RMI expenses.

(1) To obtain the Provisional Certificates of Nationality and necessary documents for the transportation of the new vessels to be constructed under the Project from Japan to Majuro, Marshall Islands.

(2) Banking Arrangements (with an authorized foreign exchange in Japan), issuance of Authorization to Pay and bearing commissions to the Bank.

(3) Exemption of the new vessels from custom duties, internal taxes, fiscal levies and prompt customs clearance.

(4) Exemption of Japanese nationals from customs duties, internal taxes, fiscal levies for their services in RMI.

5-2. RMI side shall secure necessary budget and personnel for operation and maintenance for vessels granted through the Project.

5-3. RMI side confirmed that GoRMI has established a special fund for the maintenance and repairing of Government Shipping Vessels. This fund will be used for maintenance of Marshall Islands Shipping Cooperation (hereinafter referred to as "MISC") shipping vessels.

5-4. RMI side confirmed that when more than licensed number of passengers (150 passengers for the new cargo passenger vessel and 50 passengers for the new landing craft vessel) boards the new vessels



procured by the Project, RMI side will take necessary action to secure the safety of all the passengers and receive sailing permit from RMI relevant authority.

- 5-5. Liferrafts for the existing vessels will be procured by the Project. RMI side confirmed that the liferafts will be properly set to the existing vessels and will be maintained properly.



Annex-1 : Project Cost Estimation

This page is closed due to the confidentiality.

## 5. References

### 5-1. Considerations on the Maritime Regulations

Mr. Phil Philippo  
Secretary of Transport & Communications  
Republic of the Marshall Islands

Date: 24 January 2011

Re: Considerations on the Maritime Regulations  
In the Project for Improvement of Domestic Shipping Services  
in Republic of the Marshall Islands

Sir,

To implement the project, it is suggested for the RMI Maritime Administration to consider following measures on the safety systems of the new vessels built under the Project.

1. "Safety Regulations for Non-Convention Vessels" (SRNCV), adopted in the SPC on 2002, should apply supplementing the "Domestic Watercraft Regulations" of the RMI. The said SRNCV covers safety requirements for the "cargo-passenger vessels", under which the new vessels of the Project fall. For example, requirements of liferafts and lifejackets are specified there specifically.
2. According to the SRNCV, safety radio installations on board should be based on the GMDSS system, with the area A2, which corresponds to the medium frequency radio coverage between vessel and shore. Following radio apparatuses should be installed on board.
  - 1 - MF/HF SSB radiotelephone, with DSC alert and DSC watch-keeping facility
  - 1 - VHF radiotelephone, with DSC alert and DSC watch-keeping facility
  - 2 - EPIRBs (Emergency Position Indicating Radio Beacon)
  - 2 - SARTs (Search and Rescue Transponder)
  - 3 - Two-way portable VHF transceiversInstallation of the NAVTEX receiver should be exempted, as the NAVTEC broadcasting is not available in the RMI waters.
3. Onboard navigation equipment should include following according to the SRNCV.
  - 1 - Satellite GPS compass
  - 1 - Magnetic compass
  - 1 - Radar, 9GHz band
  - 2 - GPS receivers

In place of a gyrocompass, which is required for the cargo-passenger vessel under the

SRNCV, a satellite GPS compass, which has no moving parts thereby longlife, should be adopted.

4. One set of AIS (Automatic Identification System) should be installed according to the recent international requirement.
5. The gross tonnage of MV Aemman is 534 tons to the international measurement system and 175 tons to the Japanese domestic measurement system. The gross tonnage of the new Aemman type vessel will be similar to that of MV Aemman. In addition to the international tonnage certificate, Japanese domestic tonnage certificate, which shows a figure below 500, should be issued. The said Japanese domestic gross tonnage should be referred to in applying the RMI Domestic Watercraft Regulations. The gross tonnage of the new landing craft type vessel will be below 500 tons either by the international and Japanese domestic measurement.

We would appreciate you prompt attention and confirmation on above.

Respectfully yours,

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Toyonori Watanabe  
Project Manager  
Fisheries Engineering Co., Ltd.



## 5- 2. Result of Model Tank Test for the New LC Vessel

To analyze and confirm performance of the New LC Vessel, model tank test using precise ship model.

Date tested	23 and 24 May, 2011
Place tested	Ship model test tank (circulation tank), Sasebo Heavy Industries Co., Ltd., Sasebo
Ship model dimension	Length between perpendiculars = 1.4286 m Scale = 1/28.00
Appendage	Rudder, bilge keel, shaft bracket, propeller shaft
Tests conducted	Resistance test (full load draft and light draft) Streamline observation
Lab conducted the tests	Fluid Techno



Shallow draft and beamy hull.

Wide deck at fore end to fit bow ramp and accordingly blunt waterline.

Bow form is made sloped against head sea avoiding flat face as far as possible for less water resistance and less wave impact.

Red tufts are for observing streamline.



Fig-1 Bow



To accommodate large diameter efficient propeller, and besides to smooth waterflow, tunnel stern hull form is adopted. Red tufts are for observing streamline.



Fig - 2 Stern



Fig - 3 Full load draft 11knot

Wave breaking is observed at the bow end.

Bow wave and following shoulder wave are moderate. Stern wave from the stern end is very low.



Fig - 4 Streamline along bottom

Wave breaking can be reduced by slanting bow end corners.

Streamlines along hull bottom are running almost straight.

Streamlines don't run across bilge corners, justifying corner bilge form.

Broken wave bubbles being produced almost along full width of the bow end and run straight to the stern, echo sounder transducer cannot be placed in those bubble passage areas. The transducer must be fitted at the bottom of the stern skeg where is bubble free.

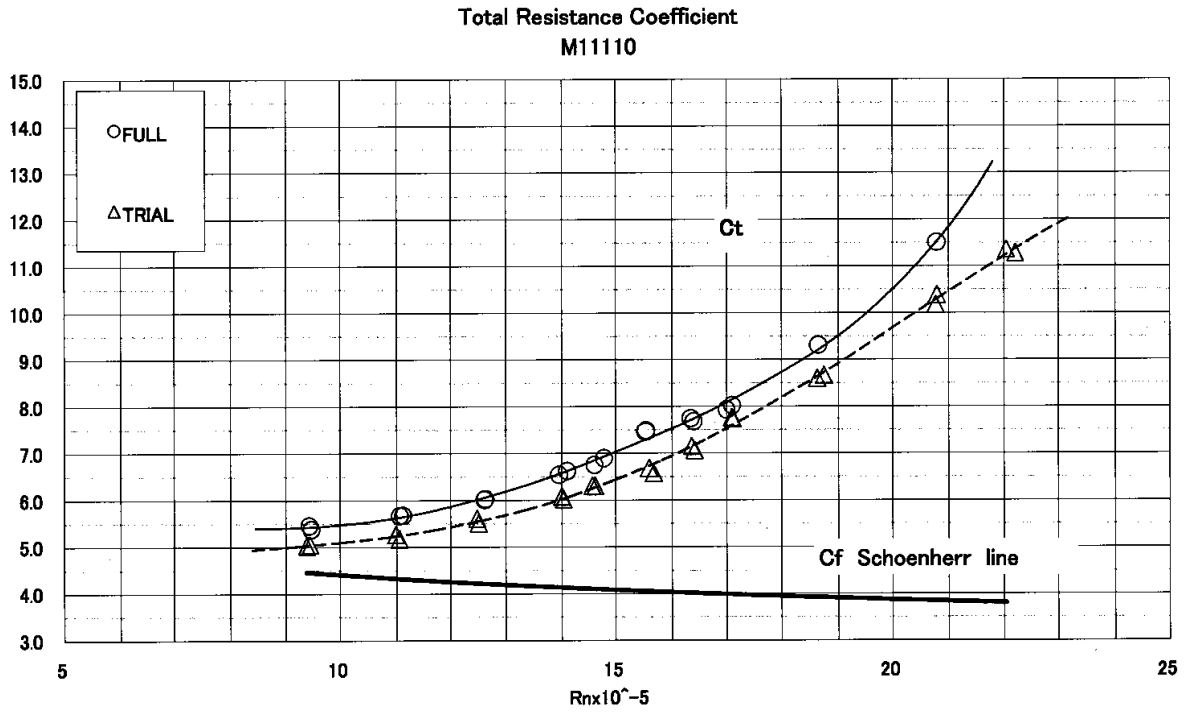


Fig - 5 Resistance measurement (non-dimensional residual resistance coefficient)

## REQUIRED POWER

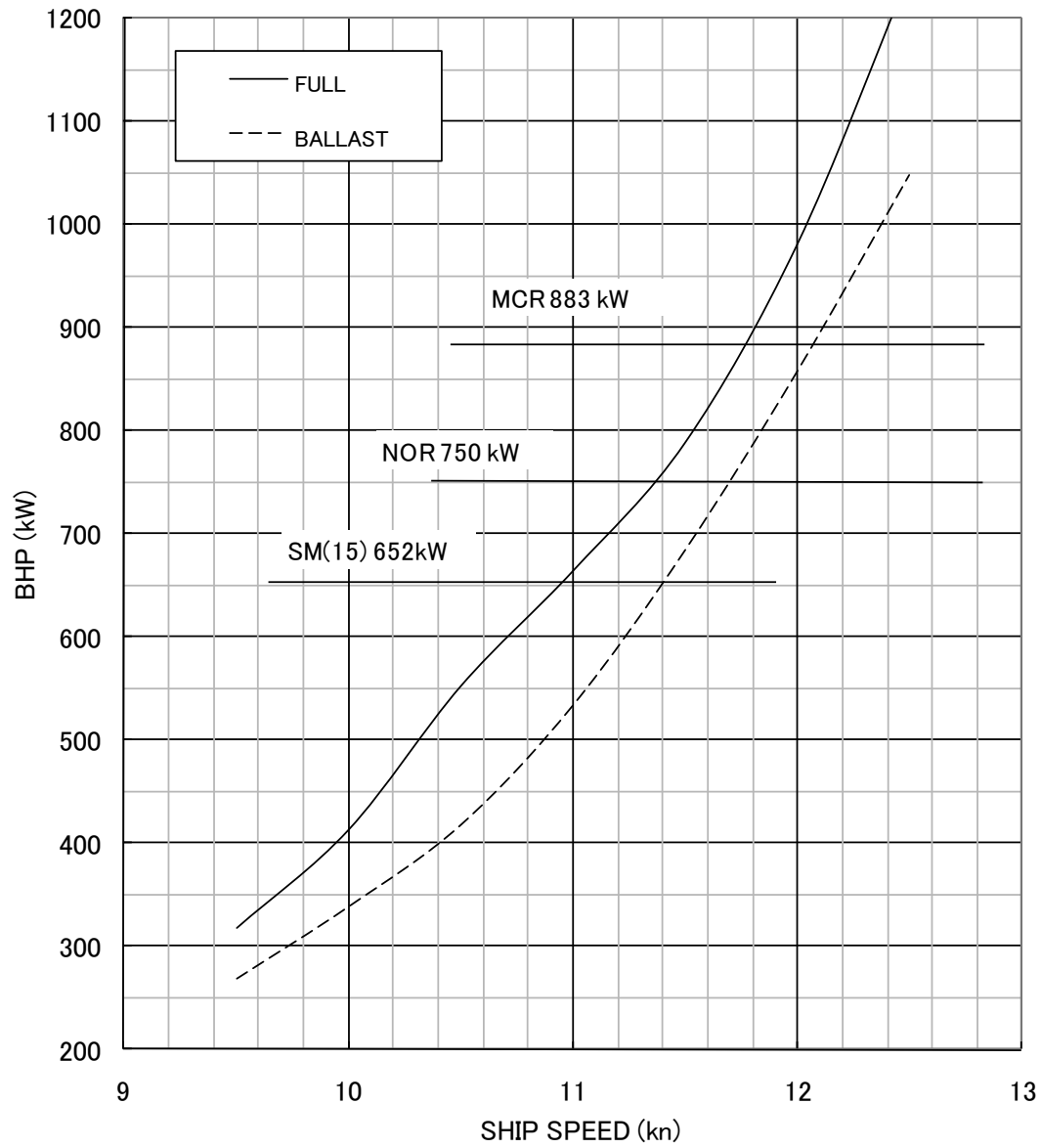


Fig - 6 Speed ~Power Curves

Speed performance is confirmed as follows.

Condition	Full load draft	Light load draft
Mean draft / Trim	2.1 m / 0 m	1.74 m / 1.1 m
Displacement	724 t	570 t
Main engine output 100%, 883kW, calm sea	11.7 knot	12.0 knot
Main engine output 85%, 750kW, calm sea	11.3 knot	11.7 knot
Main engine output 85%, 750kW, 15% sea margin	10.9 knot	11.4 knot

5-3. The Government Shipping Vessels Maintenance Act, 2011

**NITIJELA OF THE REPUBLIC OF THE MARSHALL ISLANDS**

**32<sup>ND</sup> CONSTITUTIONAL REGULAR SESSION, 2011**

**BILL NO.: 101**

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*P.L. 2011-64*

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**AN ACT**

**to create a special fund for maintenance of Government Shipping Vessels.**

**BE IT ENACTED BY THE NITIJELA OF THE REPUBLIC OF THE MARSHALL ISLANDS:**

**Section 1. Short Title.**

This Act may be cited as the Government Shipping Vessels Maintenance Act, 2011.

11 **Section 2. Shipping Vessels Maintenance Fund.**

12 (1) There is hereby established a special fund, the Shipping Vessels Maintenance Fund  
13 hereinafter refer to as “the Fund”.

14 (2) The Fund is a special revenue fund within the National Treasury and under the control  
15 and supervision of the Ministry of Finance, which shall provide for its administration in  
16 accordance with the Financial Management Act of 1990.

17 (3) For the purpose of this Act, “Government Shipping Vessels” means shipping vessels  
18 under the management of the Marshall Islands Shipping Corporations.

19 **Section 3. Payments into the Fund.**

20 There shall be paid into the Fund:

21 (a) monies appropriated by the Nitijela, or as may be received or become available to the  
22 Marshall Islands Shipping Corporation for the purposes of maintenance of shipping  
23 vessels;

24 (b) such other monies whether in the form of gifts, grants, donations or otherwise, and  
25 specifically for the maintenance of shipping vessels.

1 **Section 4. Payments out of the Fund.**

2 (1) Payments shall be made out of the Fund for the following purposes:

3 (a) repair and maintenance of shipping vessels, including the purchase of spare  
4 parts and other requisites needed for such purposes;

5 (b) acquire and purchase safety equipments such as rafts, life jackets, fire  
6 extinguishers and such other safety requisites needed on a boat or vessel;

7 (c) survey and classification of ships; and

8 (d) dry-docking.

9 **Section 5. Accounts and Records.**

10 (1) The Secretary of Finance shall maintain, in accordance with the procedures prescribed  
11 by the Financial Management Act, proper accounts and records with respect to the Fund,  
12 and any item of property purchased with money from the Fund.

13 (2) The accounts shall be laid before the Nitijela by the Minister of Finance pursuant to  
14 Article VIII, Section 5 (4) of the Constitution.

15 (3) The accounts and records maintained under Subsection (1) of this Section shall be  
16 audited by the Auditor General as provided for under Article VIII, Section 15 of the  
17 Constitution.

18 **Section 6. Effective Date.**

19 This Act shall take effect on the date of certification in accordance with Article IV,  
20 Section 21 of the Constitution and the Rules of Procedures of the Nitijela.

21

22 **CERTIFICATE**

23 **I hereby certify:**



P.L. 2011-44

1           1.     That Nitijela Bill No. 101 was passed by the Nitijela of the Republic of the  
2                    Marshall Islands on the 29<sup>th</sup> day of September, 2011; and

3           2.     That I am satisfied that Nitijela Bill No. 101 was passed in accordance with the  
4                    relevant provisions of the Constitution of the Republic of the Marshall Islands and  
5                    the Rules of Procedures of the Nitijela.

6           I hereby place my signature before the Clerk this 17<sup>th</sup> day of October 2011.

7

Attest:



**Hon. Alvin T. Jacklick**  
Speaker  
Nitijela of the Marshall Islands



**Lena E. Tiobech**  
Clerk  
Nitijela of the Marshall Islands

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