

Ministry of Communications and Transport  
Tuvalu

**PREPARATRY SURVEY REPORT  
ON  
THE PROJECT FOR CONSTRUCTION OF  
A CARGO/PASSENGER VESSEL  
IN  
TUVALU**

July, 2013

**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 Tuvalu, 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 Tuvalu for their close cooperation extended to the survey team.

July, 2013

Kazunori MIURA  
Director General,  
Economic Infrastructure Department  
Japan International Cooperation Agency

## Summary

### ① Country Profile

Tuvalu is a Pacific island country, with total land of 26 km<sup>2</sup>, located in the South Pacific just west of the International Date Line, between latitude 5° - 11° south, and longitude 160° - 173° east. Tuvalu comprises three reef islands and six atolls: Funafuti (the Capital Island), Nanumea, Nukunono, Nanumanga, Nui, Vaitupu, Nukufetau, Nukulaela and Niulakita, which are scattered in the sea 150 km in east - west and 700 km in north - south.

Total population of Tuvalu is 10,872 (2012 projection) increasing 0.94% per annum. About 60% of the population concentrates in the Capital Funafuti and 40% in the other eight islands.

Nominal GDP of Tuvalu was US\$ 40 million, which corresponds to US\$ 3,260 per capita, and economic growth rate is 1.21 % per annum (IMF 2012).

GDP in 2005 to 2011 consists of primary industry mainly of fishery a little over 20 %, secondary industry a little under 10 %, and tertiary industry about 70 %.

Products of Tuvalu is limited to some foods, fishes and handicraft, and thereby most of the living necessities relies on import.

In 2008 annual revenue of Tuvalu was AU\$ 45,357,000 and annual expenditure AU\$ 42,936,000. Major source of revenue was tax, fishing license, internet license and profit from the Tuvalu Trust Fund. The revenue includes assistance of Taiwan under the Tuvalu Government position approving Taiwan Government.

### ② Background, history, and basic concept of the Project

Passenger and cargo transport in Tuvalu are shouldered by the two government operated cargo passenger vessels: MV Nivaga II (1,043 gross tons, grant aid by UK 1988, international service, hereinafter called N2) and MV Manu Folau (582 gross tons, grant aid by Japan 2002, domestic service, hereinafter called MF).

Being no air transport, only means of transporting people and cargoes are sea transport. In the end and beginning of school terms, church events and sports events, many people travel and vessels are very crowded. Foods, daily goods, fuel oil, etc. are transported from the capital Funafuti to the outer islands by the vessels.

International air transport is served by Air Pacific between Funafuti, the capital of Tuvalu, and Suva, the capital of Fiji, two times a week. Due to the size of the airplane, number of passengers and volume of cargoes possible to carry on board are limited. Airfare being high, demand of boarding government vessels is high. International sea transport between Tuvalu and Fiji is served by N2 and MF about once at every two months, carrying about 110 passengers as an average on board one the voyage of one way. In the Christmas season, passenger demand is sometimes over the vessel's license capacity.

Although most of foods, clothing, construction materials, etc., which are all necessary for Tuvalu people's life are imported by container vessel of oversea commercial shipping, service of container vessel is not frequent and freight is high, and thereby demand for import by the Tuvalu Government vessels' at inexpensive freight is high.

However, N2, now 25 years old, frequently delays and cancels her voyage schedule due to machinery breakdown and hull structure corrosion. She is difficult to undertake safe and scheduled services, and besides high repair cost is the heavy burden in the operation. When N2 should not be able to continue her services, sea transport of Tuvalu must rely only on MF. Eleven years old MF, who had extensive repairs by the JICA follow-up project in 2010 – 2011, will be possible to continue her services without problem but occasional machinery problem and stoppage due to regular dry docking are unavoidable and sea transport becomes unstable situation.

Under such hardship, the Government of Tuvalu made a request to the Government of Japan for procurement of a cargo passenger vessel of international service, and besides, in association with the said vessel, workshop for the vessel maintenance, spare parts store ashore and dispatch of expert to instruct vessel maintenance.

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

In response to the request by the Government of Tuvalu, the Government of Japan decided to implement the preparatory survey and JICA dispatched the preparatory survey team to Tuvalu from February 5th to 28th 2013.

In Tuvalu, the team discussed with the Tuvalu side about the contents of the request and surveyed operation record of the existing vessels, condition of the vessels, situation of vessel maintenance, etc.

As the result of surveying N2, to which replacement with a new vessel had been requested, it was realized that aging was so considerable that necessity for replacement was pressing. It was also realized that sea transport services by the two vessels, i.e. MF and the Plan Vessel, was inevitable to maintain sea transport facility in Tuvalu.

Concerning the workshop for the vessel maintenance, surveying situation of the workshop on board N2, it was concluded that a workshop with sufficient area and tool facility and besides a spare parts store to stow items to be kept on board be provided on board the Plan Vessel.

A storage for large spare parts shall be prepared ashore at the responsibility of the Tuvaluan side.

Concerning dispatch of expert to instruct vessel maintenance, this component of the request was found fulfilled by the separate JICA plan, different from this Project, which plans assignment of a regional marine expert to look after marine sectors of Pacific courtiers, and thereby this component of the request shall not be included in the scope of the Project.

According to above, it is concluded that this Project shall take up procurement of a new cargo-passenger vessel engaging on international voyage together with a set of spare parts under the Preventive Maintenance Policy (PMP<sup>1</sup>).

Based on the result of survey, JICA carried out studies on the vessel capacity, design, specification, building schedule, project cost estimate, etc. in Japan, and then dispatched a team to Tuvalu to explain the outline design, procedures of the Project implementation including responsibilities of on the Tuvalu side from May 30th to June 6th, 2013. Tuvalu side was satisfied and agreed with the explanation.

The capacity of the new cargo-passenger vessel was determined, first obtaining the basic demand of passengers and cargoes from the past operation data, and then increase of demand in future was considered. For passenger capacity, those on the international voyages and domestic voyages were separately determined. The passenger capacity was finally determined: for the international voyages by adding future increase after 10 years on the basic demand, and for the domestic voyages adding future increase after 10 years and besides adding increase due to quota increase of Motufoua Secondary School students on the basic demand.

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<sup>1</sup> PMP calls for maintenance regardless of functioning or malfunctioning overhauling and changing parts as necessary. PMP manual shows periodical maintenance schedule on weekly, monthly, quarterly, annual and long term for onboard machinery and equipment. Life of machinery and besides life of spare parts are expected elongated, and sudden failure can be minimized.

Concerning cargo hold capacity, it was concluded that the same capacity as N2 be maintained and no demand changes in future need be considered.

The main particulars of the new cargo-passenger vessel were then determined as follows:

Number of vessel	1
Length overall	60.50 m
Breadth	12.60 m
Depth	6.00 m
Gross tonnage, international	1,270 tons
Main engine power	478kW x 2
Deadweight	500 t
Cargo hold capacity	450 m <sup>3</sup>
Passenger capacity	(International) 271 p (Domestic) 380 p
Trainee	20 p
Crew	49 p

#### ④ Project period and project cost at Tuvalu side

The total timeframe to implement the Project is estimated total about 26.5 months including tender process (detail design phase of about 7.0 months and shipbuilding phase including transportation of about 19.5 months).

Project cost to be borne by the Tuvalu side will be limited to the bank commission and charges estimated JPY 1.5 Million, equivalent to AU\$ 16.8 thousand.

#### ⑤ Project evaluation

To maintain sea transport infrastructure in Tuvalu people even as a minimum, fleet of two vessels consisting of MF and the Plan Vessel is indispensable. Reviewing deteriorated condition and machinery breakdown, urgency of the Plan Vessel is understood pressing. The Project agrees also with the aim of “Te Kakeega II” (National Strategy for Sustainable Development: 2005 - 2015).

As the Plan Vessel must be designed and constructed to realize navigation safety, onboard comfort, environment friendliness, fuel economy thereby operation economy, as well as improving inconveniences of N2, it is concluded appropriate to implement the Project under the grant aid cooperation by Japan employing shipbuilding technology and industries of Japan.

Aim of the Project is to contribute for stabilizing the lifeline of Tuvalu people through maintaining sea transport capacity in Tuvalu. After the implementation of the Project, increase of the number of passengers, decrease of the maintenance and repair cost, time saving of cargo operation in the outer islands and decrease of voyage cancellation are expected. Besides, as qualitative effects, stabilized supply of daily commodities through regular sea transport and increased convenience on Tuvalu people who travel within Tuvalu and who travel between Tuvalu and Fiji are expected.

According to above, it is concluded that the appropriateness of the project is high and thereby effective result is expected.

## Contents

Preface	
Summary	
Contents	
Location Map / Perspective	
List of Figures & Tables	
Abbreviations	
<b>CHAPTER 1 BACKGROUND OF THE PROJECT .....</b>	<b>1-1</b>
1-1 BACKGROUND OF THE PROJECT .....	1-1
1-1-1 Summary of the survey result .....	1-1
1-1-2 Natural condition of the project site.....	1-2
1-1-3 Environmental and social considerations.....	1-3
<b>CHAPTER 2 CONTENTS OF THE PROJECT .....</b>	<b>2-1</b>
2-1 BASIC CONCEPT OF THE PROJECT .....	2-1
2-2 OUTLINE DESIGN OF THE JAPANESE ASSISTANCE.....	2-2
2-2-1 Design policy .....	2-2
2-2-1-1 Fundamentals .....	2-2
2-2-1-2 Study on the capacity of the Plan Vessel.....	2-3
2-2-1-3 Design Policy related to budget of operation and maintenance .....	2-12
2-2-1-4 Rules to apply and Classification Society .....	2-13
2-2-1-5 Improvement based on feedback from MV Nivaga II .....	2-14
2-2-1-6 Improvement based on feedback from MV Manu Folau .....	2-17
2-2-1-7 Maintenance of Tuvalu vessels .....	2-17
2-2-1-8 Transportation from Japan to Tuvalu .....	2-19
2-2-2 Basic plan.....	2-19
2-2-2-1 Main particulars of the Plan Vessel and MV Nivaga II.....	2-19
2-2-2-2 Vessel design policy .....	2-19
2-2-2-3 Specification of the Plan Vessel .....	2-25
2-2-2-4 Specification of the Equipment.....	2-33
2-2-3 Outline design drawings.....	2-34
2-2-4 Implementation plan .....	2-39
2-2-4-1 Implementation policy .....	2-39
2-2-4-2 Special consideration with regard to Construction and Procurement .....	2-41



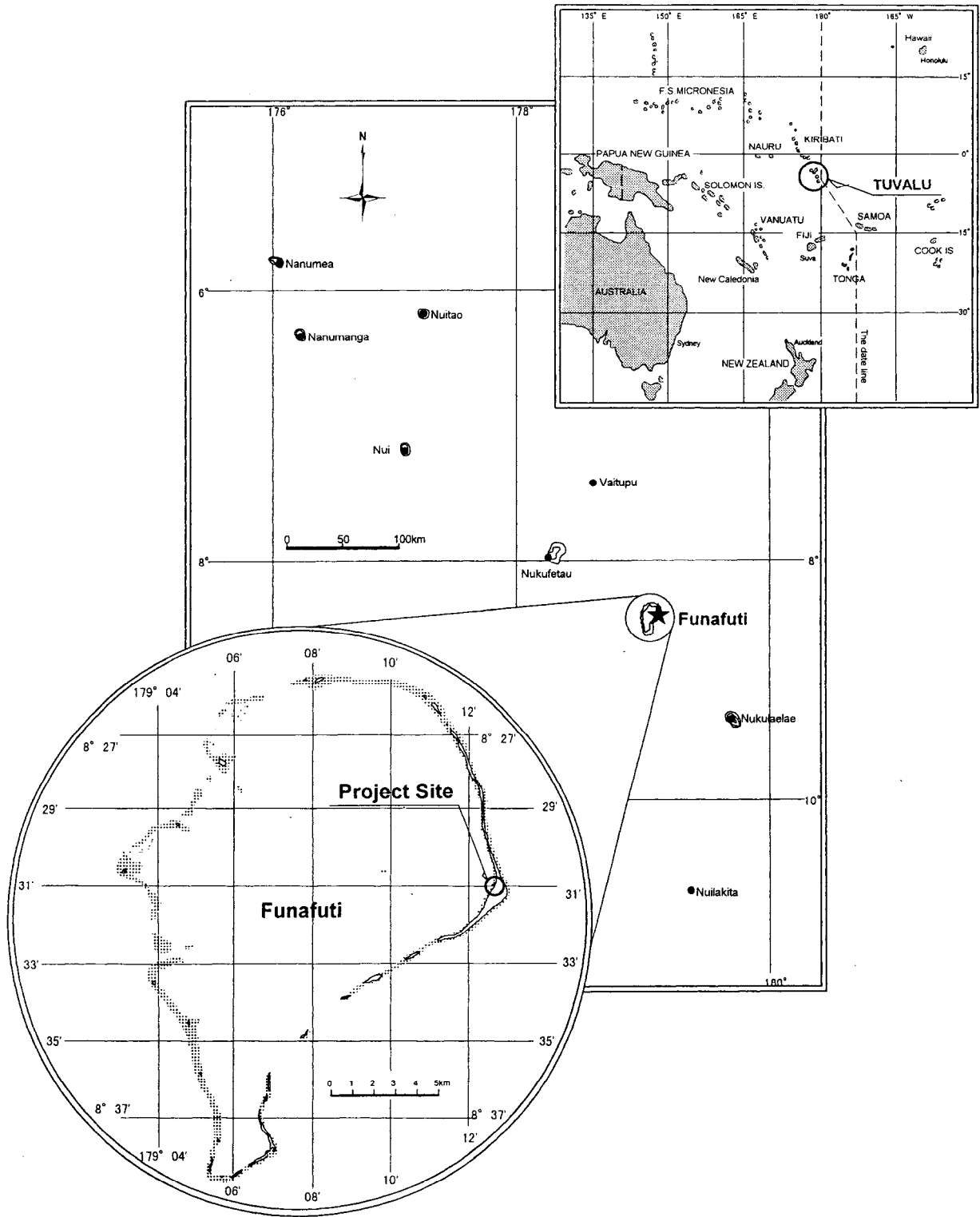
2-2-4-3	Scope of Works .....	2-41
2-2-4-4	Consultant Supervision .....	2-42
2-2-4-5	Quality Control Plan .....	2-43
2-2-4-6	Equipment Procurement Plan.....	2-44
2-2-4-7	Operational Guidance Plan .....	2-44
2-2-4-8	Soft Component (Technical Assistance) Plan .....	2-45
2-2-4-9	Implementation Schedule.....	2-45
2-3	OBLIGATIONS OF THE RECIPIENT COUNTRY .....	2-48
2-4	PROJECT OPERATION PLAN.....	2-48
2-4-1	Management capacity of the operator .....	2-48
2-4-2	Maintenance system.....	2-48
2-4-3	Future of the existing vessel N2.....	2-49
2-5	PROJECT COST ESTIMATION .....	2-49
2-5-1	Initial cost estimation .....	2-49
2-5-2	Operation and Maintenance Cost.....	2-49

### **CHAPTER 3 PROJECT EVALUATION..... 3-1**

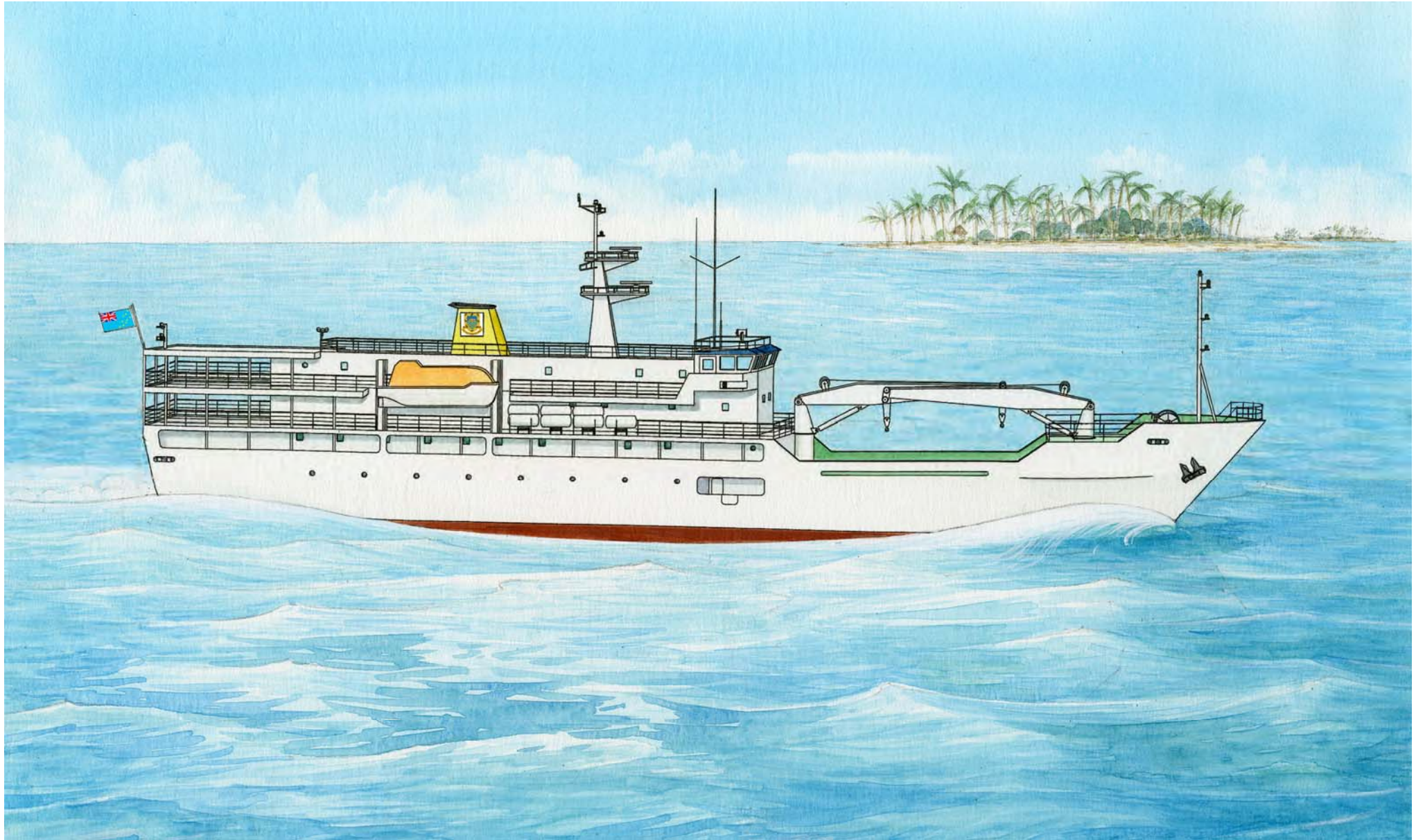
3-1	PRECONDITIONS AND NECESSARY INPUTS BY THE RECIPIENT COUNTRY .....	3-1
3-2	PROJECT EVALUATION .....	3-1
3-2-1	Relevance.....	3-1
3-2-2	Effectiveness .....	3-2

#### [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



Location Map



## List of Figures & Tables

Table 1-1	Existing vessel (N2), requested vessel and the Plan Vessel .....	1-1
Table 2-1	Passenger transport by N2 per annum (person) .....	2-6
Table 2-2	Passenger transport by MF per annum (person).....	2-7
Table 2-3	Cargo transport by N2 per annum (m3) .....	2-7
Table 2-4	Cargo transport by MF per annum (m3) .....	2-7
Table 2-5	Maximum number of passengers and cargo volume .....	2-8
Table 2-6	Transport capacity of the Plan Vessel.....	2-10
Table 2-7	Number of passengers transported by N2 .....	2-11
Table 2-8	Capacity of the Plan Vessel in comparison with N2 and the request .....	2-12
Table 2-9	Expenditure estimate of Tuvalu government vessels including the Plan Vessel .....	2-13
Table 2-10	Feedback from survey of N2.....	2-14
Table 2-11	Interview with passengers .....	2-16
Table 2-12	Interview from cargo shippers.....	2-17
Table 2-13	Main particulars of the Plan Vessel .....	2-19
Table 2-14	Specification of the Plan Vessel .....	2-25
Table 2-15	Specification of the Equipment .....	2-33
Table 2-16	Quality Control Plan .....	2-43
Table 2-17	Implementing schedule overview .....	2-46
Table 2-18	Projection of Expenditure .....	2-51
Table 3-1	Quantitative indicators to measure effectiveness of the Project.....	3-2
Fig. 1-1	Wave height statistics.....	1-3
Fig. 2-1	MF, Pax transport, Domestic, 2008-2010 .....	2-3
Fig. 2-2	N2, Pax transport, Domestic, 2008-2011 .....	2-4
Fig. 2-3	MF, Cargo transport, Domestic, 2008-2010 .....	2-4
Fig. 2-4	N2, Cargo transport, Domestic, 2008-2011 .....	2-5
Fig. 2-5	MF, Pax transport, International, 2008-2010.....	2-5
Fig. 2-6	N2, Pax transport, International, 2008-2011 .....	2-5
Fig. 2-7	N2, Pax transport, International, 2008-2010 .....	2-6
Fig. 2-8	Population growth .....	2-9
Fig. 2-9	Police boat .....	2-23
Fig. 2-10	General arrangement plan.....	2-34

Fig. 2-11	Midship section plan .....	2-35
Fig. 2-12	Engine room arrangement plan .....	2-36
Fig. 2-13	Workboat plan.....	2-37
Fig. 2-14	Lines plan.....	2-38
Fig. 2-15	Projected building schedule of the Plan Vessel .....	2-47

## Abbreviations

AIS	Automatic Identification System
COLREG	International Regulations for Preventing Collisions at Sea
DMPS	Department of Marine and Port Services
ECDIS	Electronic Chart Display and Information System
EGC	Enhanced Group Calling
EIA	Environment Impact Assessment
EPIRB	Emergency Position Indicate Radio Beacon
FSHIL	Fiji Ships & Heavy Industries Limited
GDP	Gross Domestic Product
GPS	Global Positioning System
HF	High Frequency
HK	The Ship Equipment Inspection Society of Japan
ICLL	International Convention on Load Lines
IMEL	Industrial and Marine Engineering Limited
JCI	Japan Craft Inspection Organization
LED	Light Emitting Diode
LRS	Lloyd's Register of Shipping
MARPOL	International Convention for the Prevention of Pollution from Ships
MCT	Ministry of Communications and Transport
MF	Medium Frequency
MLC	Maritime Labour Convention
MTFF	Mid-Term Fiscal Framework
NAVTEX	Navigation Telex
NK	Nippon Kaiji Kyokai
PMP	Preventive Maintenance Policy
PRIF	Pacific Region Infrastructure Facility
PRS	Pacific Register of Ships
SART	Search and Rescue Transponder
SOLAS	International Convention for the Safety of Life at Sea
SPC	Secretariat of the Pacific Community
SPMC	South Pacific Maritime Code
SRNCV	Safety Standard for Non-Convention Vessels
STCW	The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
TM69	International Convention on Tonnage Measurement of Ships
TMTI	Tuvalu Maritime Training Institute
TSSSTP	Tuvalu Ship to Shore Transport Project
VDR	Voyage Data Recorder
VHF	Very High Frequency

# Chapter 1 Background of the Project

## 1-1 Background of the Project

Passenger and cargo transport among nine islands scattered in the wide sea area over 700 km are now borne by MV Nivaga II (1,043 gross tons, grant aid by UK 1988, international service, hereinafter called N2) and MV Manu Folau (582 gross tons, grant aid by Japan 2002, domestic service, hereinafter called MF), Tuvalu Government vessels. N2 is so aged as to cancel her sailing frequently but obliged to continue unsafe and unsteady services. Under such sea transport situation, Government of Tuvalu made a request for the replacement of N2 to the Government of Japan. Understanding the adequacy and urgency of the request, the Government of Japan decided to implement the survey and JICA dispatched a preparatory survey team to Tuvalu from February 5th to 28th, 2013.

### 1-1-1 Summary of the survey result

The request consists of three components, i.e. (1) a new cargo-passenger vessel, (2) workshop and spare parts storage ashore and (3) dispatch of expert for vessel maintenance, to which result of the survey is as summarized as follows.

#### (1) New cargo-passenger vessel

Through the site survey and consultation with the Taskforce of the Tuvalu side, adequate capacity of the Plan Vessel to carry passengers and cargoes was studied. Vessel design to satisfy the required capacity was then developed. Main particulars of the Plan Vessel design, together with N2 and the request are as following.

Table 1-1 Existing vessel (N2), requested vessel and the Plan Vessel

		N2	Request	Plan Vessel	
Type of vessel		International cargo passenger vessel			
Length overall		58.00 m	60 ~ 70 m	60.50 m	
Breadth		12.00 m		12.60 m	
Depth		4.50 m		6.00 m	
Draft		3.10 m	3.10 m	3.10 m	
Gross tonnage		1,043 tons		1,270 tons	
Main engine power		478 kW x 2	About 500 kW x 2	About 478 kW x 2	
Service speed		10 knot	12 knot	11.7 kot	
Complement	Total	209 p	377 p	International 320 p	Domestic 429 p
	Passenger	168 p	330 p	271 p	380 p
	Crew	31 p	27 p	29 p	29 p
	Trainee	10 p	20 p	20 p	20 p
Cargo hold capacity		450 m <sup>3</sup>	Do.	Do.	

**(2) Workshop and spare parts storage ashore**

Concerning the workshop for the vessel maintenance, surveying situation of the workshop on board N2, it was concluded that a workshop with sufficient area and tool facility and besides a spare parts store to stow items to be kept on board be provided on board the Plan Vessel.

A storage for large spare parts shall be prepared ashore at the responsibility of the Tuvaluan side.

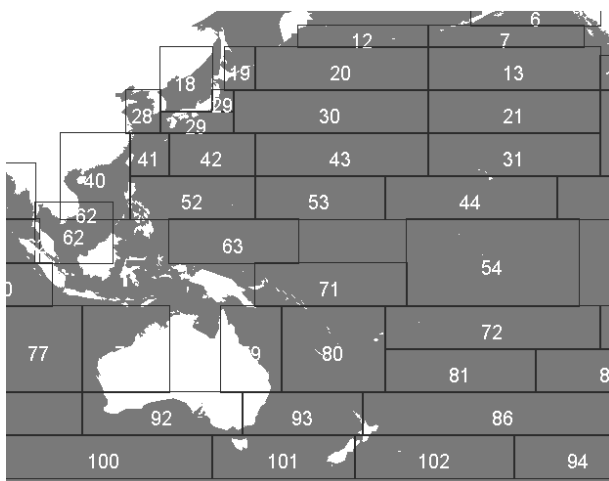
**(3) Dispatch of engineer**

Concerning dispatch of expert to instruct vessel maintenance, this component of the request was found fulfilled by the separate JICA plan, different from this Project, which plans assignment of a regional marine expert to look after marine sectors of Pacific courtiers, and thereby this component of the request shall not be included in the scope of the Project.

**1-1-2 Natural condition of the project site**

Finding that Tuvalu has no statistical data on wave height in the seas around Tuvalu, wave height statistics were obtained from the database provided by the National Maritime Research Institute of Japan.

According to the obtained wave statistics, significant wave height in Tuvalu is 2.16 m, which is equivalent to 2.21 m in the Pacific side of Japan. Therefore it is concluded that the Plan Vessel may be designed for the seaworthiness equivalent to the Japanese vessels.



Sea area	Spr	Sum	Aut	Win	All
↑ Wave height ↓	Probability				
Total	Number of samples				
	Most probable significant wave height				



No.71 Sea area around Tuvalu

A80	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	0.0000	0.0001	0.0000
12.75-	0.0000	0.0001	0.0000	0.0002	0.0001
11.75-	0.0001	0.0004	0.0003	0.0004	0.0003
10.75-	0.0004	0.0004	0.0003	0.0005	0.0004
9.75-	0.0005	0.0006	0.0005	0.0006	0.0006
8.75-	0.0004	0.0005	0.0006	0.0005	0.0005
7.75-	0.0002	0.0004	0.0004	0.0004	0.0003
6.75-	0.0002	0.0007	0.0006	0.0010	0.0006
5.75-	0.0020	0.0035	0.0023	0.0020	0.0024
4.75-	0.0051	0.0052	0.0022	0.0029	0.0040
3.75-	0.0227	0.0358	0.0074	0.0189	0.0210
2.75-	0.1614	0.2112	0.0837	0.0796	0.1346
1.75-	0.5886	0.5579	0.4723	0.5255	0.5429
0.75-	0.2162	0.1811	0.4189	0.3657	0.2882
0-	0.0021	0.0022	0.0104	0.0036	0.0041
TOTAL	93280	59901	53433	79352	285966
	2.2551	2.3846	1.9534	2.0367	2.1653

No.29 Offshore 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

Fig. 1-1 Wave height statistics

**1-1-3 Environmental and social considerations**

Tuvalu and Fiji are ratifying MARPOL (International Convention for the Prevention of Pollution from Ships) and thereby the Plan Vessel is required to comply with the following measures to prevent pollution.

- Against pollution by oil: Oily water separating equipment must be installed on board.
- Against pollution by sewage: Sewage holding tank must be installed not to discharge sewage in the restricted seas.
- Against air pollution Diesel engines installed on board must of type complying with the NOx emission control

## **Chapter 2 Contents of the Project**

### **2-1 Basic concept of the Project**

#### **(1) Overall goal and Project purpose**

“Te Kakeega II 2005-2015”, national development plan of the Government of Tuvalu, lays importance on the transport infrastructure, and “2012 National Budget Program Estimate” refers to steady operation of Nivaga II and Manu Folau as the short term aim of the marine sector.

Currently, passenger and cargo transport in Tuvalu are shouldered by the two government operated cargo passenger vessels, but one of two vessels is over 25 years old, aged to frequent breakdowns and difficult to undertake safe scheduled operations.

This Project aims at sustaining and improving sea transport system in Tuvalu, enhancing safety of sea transport in Tuvalu, and realizing steady sea transport held up by the national development plan Te Kakeega II.

#### **(2) Outline of the Project**

Passenger and cargo transport in Tuvalu are shouldered by the two government operated cargo passenger vessels: N2 (MV Nivaga II, 1,043 gross tons, grant aid by UK 1988, international service) and MF (MV Manu Folau, 582 gross tons, grant aid by Japan 2002, domestic service). However, N2, now 25 years old, frequently delays and cancels her voyage schedule due to machinery breakdown and hull structure corrosion. She is difficult to undertake safe and scheduled services, and besides high repair cost is the heavy burden in the operation. When N2 should not be able to continue her services, sea transport of Tuvalu must rely only on MF who had been grant aided by Japan on 2002 and sea transport becomes unstable situation. For Tuvalu, which relies heavily on sea transport internationally and domestically, two safe and reliable cargo passenger vessels are indispensable and thereby a new cargo passenger vessel in place of N2 is understood as the pressing request from Tuvalu.

Regarding classification of N2 and MF, both had been removed from their classification. MF got the classification again by the JICA Follow-up project, but N2 is too aged and deteriorated to re-class. It is found that insufficient maintenance had been in the background of loss of classification. It was realized that close maintenance is important for the stable sea transport in Tuvalu and is indispensable for the Plan Vessel under the Project not to repeat early aging and loss of classification, and thereby understood that PMP<sup>2</sup> (Preventive Maintenance Policy) proposed by the Japan side should be adopted for the Plan Vessel.

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<sup>2</sup> PMP calls for maintenance regardless of functioning or malfunctioning overhauling and changing parts as necessary. PMP manual shows periodical maintenance schedule on weekly, monthly, quarterly, annual and long term for onboard machinery and equipment. Life of machinery and besides life of spare parts are expected elongated, and sudden failure can be minimized.

Wish of Tuvalu side for Japan to adopt the Project according to the Request of Tuvalu is as such very high, and it is understood that the background conditions to proceed with the Project is fulfilled.

According to above, this Project is to build one cargo passenger vessel and to procure the related equipment.

## **2-2 Outline design of the Japanese assistance**

### **2-2-1 Design policy**

#### **2-2-1-1 Fundamentals**

The Plan Vessel should be so designed, as to improve sea transport services in Tuvalu; as to have appropriate passenger and cargo transport capacity; as to navigate safely at sea; as to be environment friendly; as to be economical in operation; as to have appropriate passenger facility; as to be efficient in cargo operation; as to be durable; and as to be maintenance friendly, as outlined following.

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

Studying passenger, general cargo and copra cargo statistics of existing Tuvalu vessels, the capacity for the Plan Vessel should be determined.

#### **(2) Safety**

The Plan Vessel should be built applying various international convention rules as a vessel engaged on international services so that safety of the Plan Vessel is ensured. Besides, the Plan Vessel should apply safety standards as required by the Tuvalu Government for a vessel engaging on domestic services.

#### **(3) Environment Friendliness**

MARPOL regulations (International Convention for the Prevention of Pollution from Ships, 1973) ratified by Tuvalu Government should apply for the control of oil discharge, control of sewage water discharge, and control of NOx emission from diesel engines.

#### **(4) Operation Economy**

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

#### **(5) Passenger accommodation**

Despite long sailing days, adequate spaces are not arranged in the existing vessel and passengers are suffering severe ship journey. In the Plan Vessel, the passenger spaces should be of adequate areas corresponding to the number of passengers.

## (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 Plan Vessel, all seawater cooling pipes (steel) should be of plastic coated inside to prevent rusting of seawater pipes.

Diesel engine represents the latter case. In the Plan Vessels, PMP should 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 should be procured by the Project.

### 2-2-1-2 Study on the capacity of the Plan Vessel

#### (1) Statistics of passenger and cargo transport

Statistics of Domestic and international passenger and cargo transport by MF and N2 are as shown on following. For MF, data of 2011 are missing, and for N2, data of 2009 are missing.

##### 1) Domestic passenger transport

MF, 2008-2010

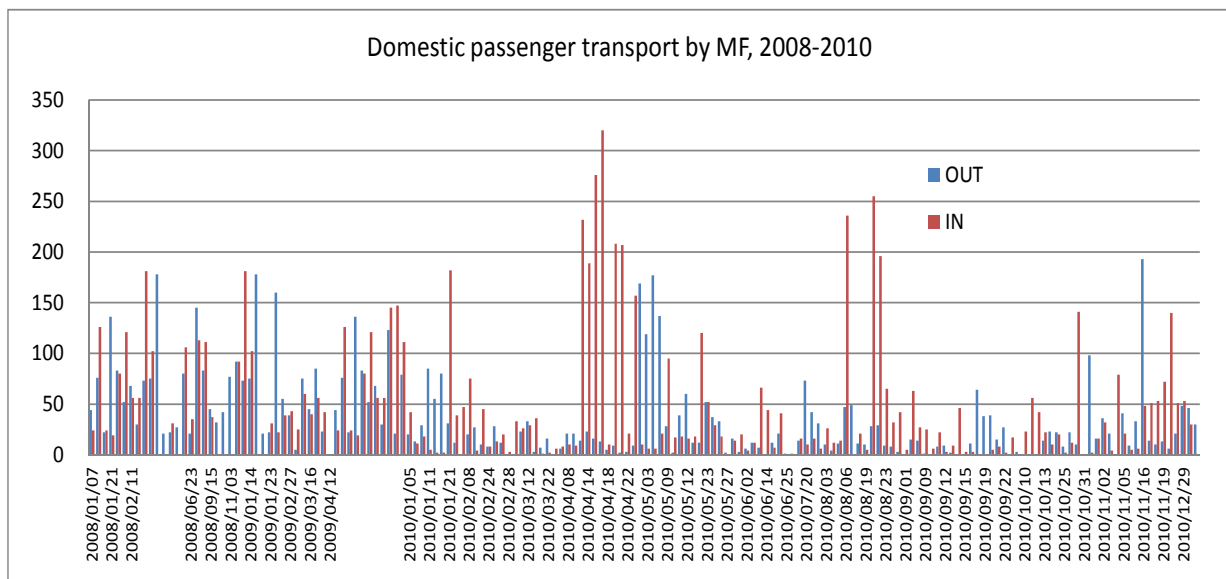


Fig. 2-1 MF, Pax transport, Domestic, 2008-2010

N2, 2008-2011

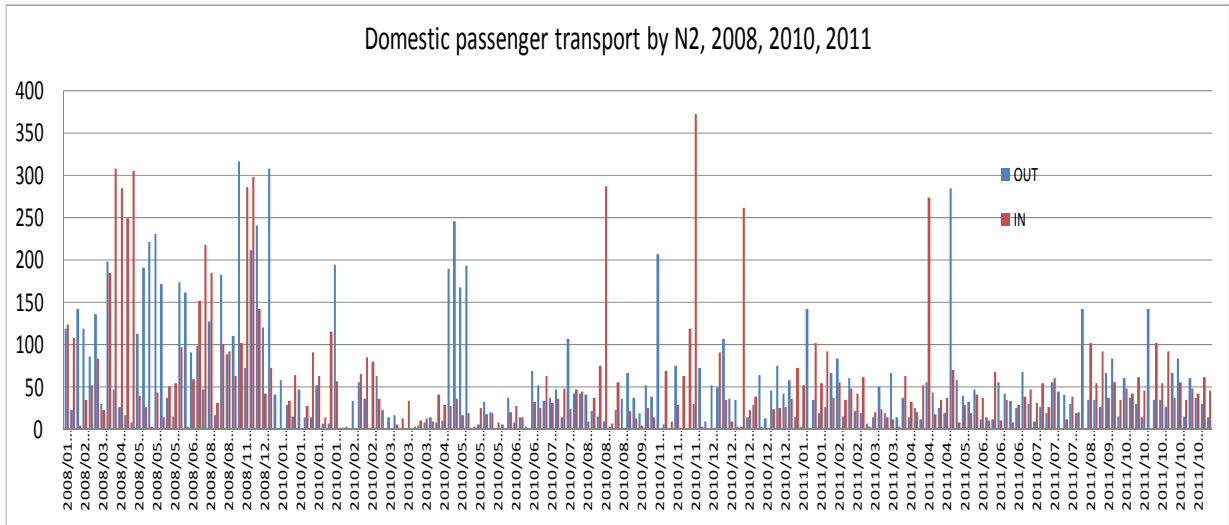


Fig. 2-2 N2, Pax transport, Domestic, 2008-2011

2) Domestic cargo transport

MF, 2008-2010

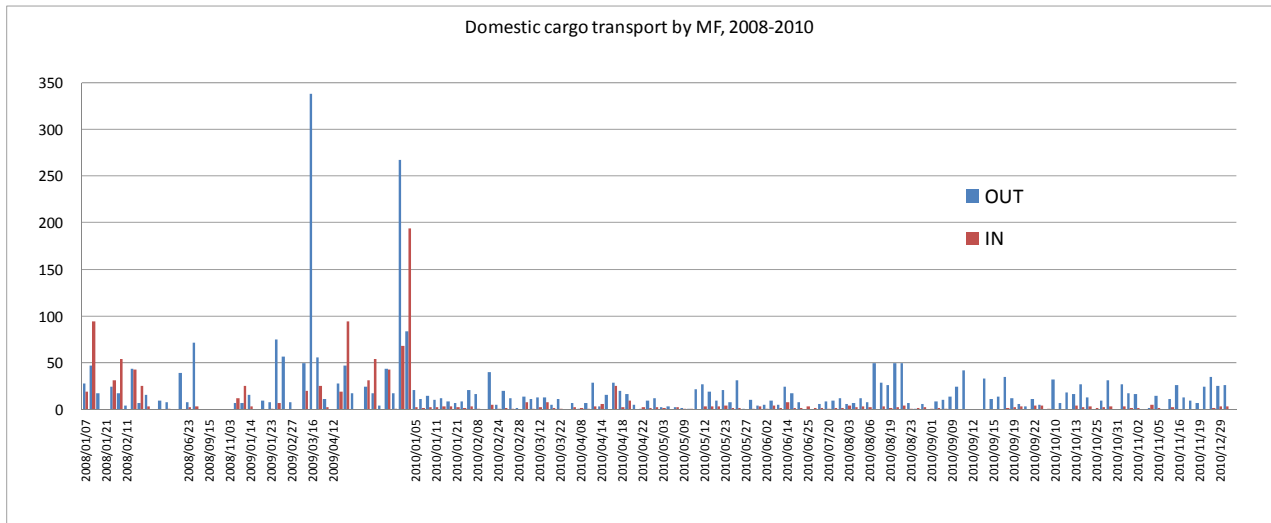


Fig. 2-3 MF, Cargo transport, Domestic, 2008-2010



#### 4) International cargo transport

MF, 2008-2009

No data available

N2, 2008-2010

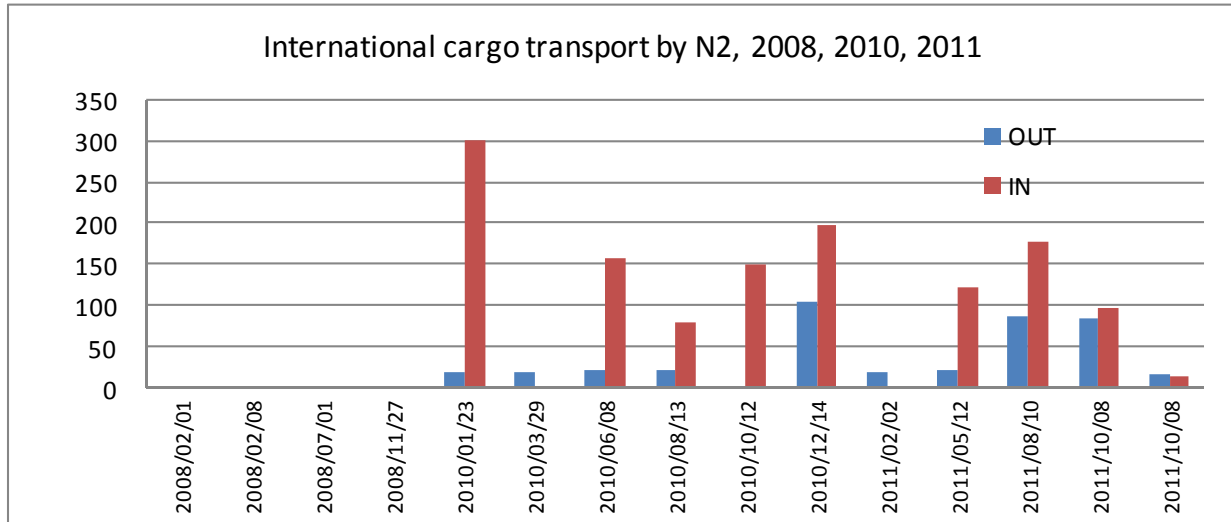


Fig. 2-7 N2, Pax transport, International, 2008-2010

#### 5) Summary of statistics

Summary of passenger and cargo transport by N2 and MF in a year is shown below.

Table 2-1 Passenger transport by N2 per annum (person)

Year	Domestic			International			Total			Mean
	Nos. voyage	Dep. Funafuti	Arr. Funafuti	Nos. voyage	Dep. Funafuti	Arr. Funafuti	Nos. voyage	Dep. Funafuti	Arr. Funafuti	
2008	35	4,081	3,820	4	446	229	39	4,527	4,049	4,288
2009	No data									
2010	30	3,210	3,081	6	666	674	36	3,876	3,755	3,816
2011	23	3,019	3,013	5	984	723	28	4,003	3,736	3,870
Mean	29.3	3,436	3,305	5.0	699	542	34.3	4,135	3,847	3,991

Table 2-2 Passenger transport by MF per annum (person)

Year	Domestic			International			Total			Mean
	Nos. voyage	Dep. Funafuti	Arr. Funafuti	Nos. voyage	Dep. Funafuti	Arr. Funafuti	Nos. voyage	Dep. Funafuti	Arr. Funafuti	
2008	24	1,432	1,222	1	106	5	25	1,538	1,227	1,383
2009	16	1,682	1,642	1	85	44	17	1,767	1,686	1,727
2010	47	2,971	5,117	1	135	0	48	3,106	5,117	4,112
2011	No data									
Mean	29	2,028	2,660	1.0	109	16	30	2,137	2,676	2,407

In one round trip voyage passengers of outbound voyage disembark at intermediate islands, and inbound passengers embark instead. The mean in above table means average of passenger departing and arriving Funafuti.

Table 2-3 Cargo transport by N2 per annum (m<sup>3</sup>)

Year	Domestic			International			Total			Mean
	Nos. voyage	Dep. Funafuti	Arr. Funafuti	Nos. voyage	Dep. Funafuti	Arr. Funafuti	Nos. voyage	Dep. Funafuti	Arr. Funafuti	
2008	35	927	170	4	0	0	39	927	170	548
2009	No data									
2010	30	3,703	755	6	186	885	36	3,889	1,640	2,765
2011	23	3,754	882	5	229	412	28	3,983	1,294	2,638
Mean	29.3	2,794	602	5.0	138	433	34.3	2,933	1,035	1,984

Table 2-4 Cargo transport by MF per annum (m<sup>3</sup>)

Year	Domestic			International			Total			Mean
	Nos. voyage	Dep. Funafuti	Arr. Funafuti	Nos. voyage	Dep. Funafuti	Arr. Funafuti	Nos. voyage	Dep. Funafuti	Arr. Funafuti	
2008	24	336	275	1	0	0	25	336	275	305
2009	16	1,184	599	1	0	0	17	1,184	599	891
2010	47	1,571	245	1	90	6	48	1,661	250	956
2011	No data									
Mean	29	1,030	373	1	30	2	30	1,060	375	718



## (2) Study policy

To establish appropriate passenger carrying capacity of the requested vessel, demand of passenger transport was obtained according to the following procedure.

- 【Peak demand in the past operation statistics of N2】 +
- 【Demand change due to population change in future】 +
- 【Demand increase due to quota increase of Motufoua Secondary School in Vaitupu】

Demand of cargo transport of N2 is greater in the Fiji services than in the domestic services, but that demand is for complementing capacity of container vessels, the main means of cargo transport, and thereby the cargo hold capacity of the Plan Vessel may remain same as that of N2 not considering future demand changes.

The Plan Vessel design, to satisfy passenger and cargo transport demands, to lay out appropriate crew accommodation, and to outfit machinery and equipment, was then drawn, and finalized discussing with the Taskforce team<sup>3</sup> of Tuvalu.

## (3) Baseline data of passenger and cargo capacity for the Plan Vessel

Maximum number of passengers and cargo volume from the transport statistics, except abnormal values, are shown on following.

Table 2-5 Maximum number of passengers and cargo volume

	Number of passengers (person)			Cargo volume <sup>4</sup> (m <sup>3</sup> )		
	license capacity	Actual number in domestic services	Actual number in international services	Cargo hold capacity	Actual volume in domestic services	Actual volume in international services
MF	160	270	135	214	250	N/A
N2	168	300	246	450	150	300

## (4) Demand of passenger transport

Except for Suva service of MF, both MF and N2 have been carrying passengers over the licensed capacity: on board N2, 19 times in 2008, 10 times in 2011 and 7 times in 2012, thus average 12 times in a year. Passenger overloading on board ships are subject to penalty much severer than the land transport, but the control of Suva port authority is not very stringent so that overloading of N2 has been allowed. However, the Plan Vessel of the grant aid by Japan must not be of such capacity as anticipating overloading, but must be of a capacity covering peak demand, and thereby passenger demands shown in the abovementioned table must be adopted as the basic demand for the Plan Vessel.

Determination of passenger capacity of the Plan Vessel should be separate for international and domestic

<sup>3</sup> A taskforce to discuss design of the Plan Vessel. Member consists of MTC, DMPS, N2 and MF officers, TMTC and Shipping company, chaired by MTC Assistant Secretary.

<sup>4</sup> Cargo hold capacity is the volume measured along the internal surface of the cargo hold. Cargo volume is the sum of volume of each cargo (width x depth x height) stowed in the cargo hold. Stowage factor = Cargo volume / Cargo hold capacity, which is normally less than unity.

service (international < domestic) so that SOLAS<sup>5</sup> requirements for the international service can be lightened.

According to above, the basic demand was determined 300 passengers for domestic service and 246 persons for international service.

**(5) Demand for cargo transport**

Cargo volume of N2 is greater in the international service than in the domestic service. As the freight of Tuvaluan vessels is lower than container vessels, shipping orders from shippers become busy soon after the release of sailing schedule to Suva.

Max. cargo volume 300 m<sup>3</sup> in the international service of N2 is the sum of measurement of footprint area x height of each cargo. Stowage factor 0.67 (=300/450) to the cargo hold volume of 450m<sup>3</sup> is a high value, i.e. fully stowed with small broken space in the cargo hold. Normally cargo volume carried on board N2 was about 150m<sup>3</sup>, for which stowage factor is 0.33.

DMPS (Department of Marine and Port Services) who operates N2 and MF considers that the role of N2 is to complement cargo import by container vessels, and not related directly to the import demand of Tuvalu people, and thereby the cargo hold capacity of the Plan Vessel offered to shippers may be same as that of N2.

According to above, cargo hold capacity of the Plan Vessel is determined 450m<sup>3</sup> same as N2.

**(6) Future demand for the Plan Vessel**

**1) Future demand of passenger transport based population growth**

Future demand for domestic and international passenger transport will be proportional to the population growth of Tuvalu. Census data of Tuvalu shows 10% population increase in last 10 years, therefore it is considered reasonable to adopt 10% increase in the sea transport, both for domestic and international services, which should be added to the current basic demand to determine the capacity of the Plan Vessel.

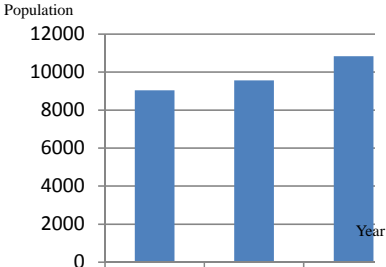


Fig. 2-8 Population growth  
Source: Tuvalu Statistics

**2) Future demand of passenger transport based on the quota increase of Motufoua Secondary School in Vaitupu**

Motufoua Secondary School in Vaitupu is the major secondary school in Tuvalu. School leavers from primary schools in each island go to Motufoua living in the dormitory there for six years. Motufoua

<sup>5</sup> Vessels engaging on international service, except for military vessels and fishing vessels, etc., must comply with the international convention rules and keep certificates of compliance, and must be manned by crew having international seafarer license. International conventions are SOLAS (International Convention for the Safety of Life at Sea), ICLL (international Convention on Load Lines), MARPOL (International Convention for the Prevention of Marine Pollution from Ships), TM69 (International Convention on Tonnage Measurement of ships), etc. Vessels not engaging on international services but engaging on domestic services are controlled by the rules and regulations of each flag state.

students go back to their home island by N2 or MF on long school holidays, which are the passenger peak time for vessels. Number of students on board vessels will be proportional to the number of students in Motufoua Secondary School.

Such long school holidays are three times in a year:

- Beginning of May ~ end of May
- Beginning of August ~ end of August
- Beginning of December ~ Middle of January

As number of students in Motufoua Secondary School had increased up to 689 students in 2007, which had been quite over the quota of 500 students, higher grade students was moved to USP campus in Funafuti to reduce Motufoua students down to 500. To correct such temporary situation, a JICA project to increase quota of Motufoua is now planned. The project aims at quota increase from 500 to 700 students.

Students are from all islands and thereby number of students in the school is proportional to the population of each island, and further, maximum increase in number of students on board Tuvalu vessels after quota increase must occur in the sailing route involving the islands of the largest population, i.e. at departure and arrival at Funafuti in the [Niulakita ~ Nukulaelae ~ Funafuti ~ Vaitupu] sailing route. Population of Niulakita, Nukulaelae and Funafuti in proportion to the entire Tuvalu are 0.3%, 5.0 % and 57.2 % respectively, and thereby at Funafuti  $(700 - 500)^P \times (0.3\% + 5.0\% + 57.2\%) = 125^P$  will increase. Adding teachers, etc., total increase will be about 130 persons as maximum.

Increase of the passenger capacity of the Plan Vessel due to Motufoua increase may be limited to about 50 persons, because considerable number of students stay at Motufoua dormitory not returning to their home islands; in those peak times MF and N2 are dispatched several times to clear many students at once; thus necessary increase of the Plan Vessel capacity is estimated  $130^P \times \frac{1}{2} \times 75\% = \text{about } 50^P$ . This increase is only for domestic service. In above estimate, all increase is covered by the Plan Vessel, not relying on MF, who is already overloading students and must not be additionally loaded.

**(7) Transport capacity for the Plan Vessel**

According to the discussion above, necessary transport capacity of the Plan Vessel should be as follows.

Table 2-6 Transport capacity of the Plan Vessel

		Passenger transport		Cargo transport
		International	Domestic	
a	Basic demand	246 persons	300 persons	450 m <sup>3</sup>
b	Additional capacity due to future population growth (+10%)	25 persons	30 persons	-
c	Additional capacity to cover quota increase of Motufoua Secondary School students	0	50 persons	-
a+b+c	Necessary transport capacity of the Plan Vessel	271 persons	380 persons	450 m <sup>3</sup>

### (8) Number of passenger transport per annum

In 2008 ~ 2011, existing vessel N2 has transported 3,991 passengers average per annum as follows.

Table 2-7 Number of passengers transported by N2

Year	Domestic voyage			International voyage			Total			Average
	voyage Nos.	Departing Funafuti	Arriving Funafuti	voyage Nos.	Departing Funafuti	Arriving Funafuti	voyage Nos.	Departing Funafuti	Arriving Funafuti	
2008	35	4,081	3,820	4	446	229	39	4,527	4,049	4,288
2009	No data									
2010	30	3,210	3,081	6	666	674	36	3,876	3,755	3,816
2011	23	3,019	3,013	5	984	723	28	4,003	3,736	3,870
Average	29.3	3,436	3,305	5.0	699	542	34.3	4,135	3,847	3,991

In one round trip voyage passengers of outbound voyage disembark at intermediate islands, and inbound passengers embark instead. The average in above table means average of passenger departing and arriving Funafuti.

After the Plan Vessel comes into service, number of passengers is expected to increase due to population growth at 1.5 per annum and due to quota increase of Motufoua Secondary School students, i.e. 50 p x 3 holidays x 2 / 2 (average) = 150 p, and thereby total number of passengers to be carried by the Plan Vessel per annum is projected:

Five years after starting service  $3,991 \times 1.05 + 150 = 4,340$  p

Ten years after starting service  $3,991 \times 1.10 + 150 = 4,540$  p

### (9) Scale of the Plan Vessel

Studying the Plan Vessel design to satisfy abovementioned transport capacity, main features of the Plan Vessel was determined as shown on the table 2-4.

Gross tonnage generally represents external volume of vessels. The gross tonnage of the Plan Vessel is 1,270 tons: about 20% greater than that of N2.

Before this Preparatory Survey, DMPS had been estimating gross tonnage of the Plan Vessel 1,500 ~ 2,000 tons, whereas the Minister of MCT (Ministry of Communication and Transport) had been considering gross tonnage about same as N2 from view of maintenance cost.

The Preparatory Survey Team studied the Plan Vessel design laying importance on minimizing the cost of operation and maintenance, thereby minimizing reasonably vessel gross tonnage, fuel consuming diesel engines, etc. while satisfying necessary transport capacity and other fundamental requirements.

Table 2-8 Capacity of the Plan Vessel in comparison with N2 and the request

	N2	The request	The Plan Vessel	
Length overall	58.00 m	60 ~ 70 m	60.50 m	
Breadth, molded	12.00 m		12.60 m	
Depth, molded	4.50 m		6.00 m	
Design draft	3.10 m	3.10 m	3.10 m	
Gross tonnage, international	1,043 tons		1,270 tons	
Main engine	478kW x 2	about 500kW x 2	about 478kW x 2	
Speed	10 knots	12 knots	11.7 knots	
Complement	209 persons	377 persons	International	Domestic
			320 persons (Pax : 271p) (Crew : 49p)	429 persons (Pax : 380p) (Crew : 49p)
Cargo hold capacity	450 m <sup>3</sup>	450 m <sup>3</sup>	450 m <sup>3</sup>	

### 2-2-1-3 Design Policy related to budget of operation and maintenance

Operation and maintenance budget of the government vessels, N2 and MF, is included in the government fiscal budget<sup>6</sup> and implemented, but requested budget has been sometimes cut in the negotiations so that purchasing necessary spare parts had been sometimes difficult.

In the Government of Tuvalu, MTFF (Mid-Term Fiscal Framework) was introduced in about 2010. The MTFF collects and summarize estimate of government revenue, expenditure and foreign aid for next five years to overview mid-term budgetary balance of the Government. In the first half of the year, every ministry submits the budget and the Office of the Prime Minister and the Ministry of Finance summarize them.

To make sure that the budget for the vessel operation and maintenance, including the Plan Vessel, be adequately included in the MTFF, the Preparatory Survey Team studied the operation and maintenance budget necessary in the near future and submitted to DMPS. The submitted estimate is expected to be reflected on the actual budget procedure by DMPS.

However, budget of Tuvalu Government remains same tight situation, and thereby it is important for the Project of the Plan Vessel being of design to minimize operation and maintenance expenditure.

Estimate of operation and maintenance of the Government vessels submitted to DMPS is summarized as follows. Refer further detail to the 2-5-2 Operation and Maintenance Cost.

<sup>6</sup> Annual fiscal term of Tuvalu: January 1st ~ December 31st

Table 2-9 Expenditure estimate of Tuvalu government vessels including the Plan Vessel

1,000AUS

	MF	N2	Plan Vessel	Total
FY2011 Actual	995	1,632		2,627
FY2012 Actual	1,116	1,424		2,540
FY2013 Estimate	1,103	1,582		2,685
FY2014 Estimate	1,066	1,387		2,453
FY2015 Estimate	1,133	1,387		2,520
FY2016 Estimate	1,063		1,212 (Annual survey)	2,275
FY2017 Estimate	1,183		1,244 (Annual survey)	2,427
FY2018 Estimate	1,063		1,319 (Intermediate survey)	2,382
FY2019 Estimate	1,136		1,244 (Annual survey)	2,380
FY2020 Estimate	1,103		1,436 (Special survey)	2,539

Compared with the existing vessel N2, expenditure of the Plan Vessel is higher in the cost of docking fee, lower in the repair cost and addition of classification fee, etc. and in total lower than N2. Fluctuation of fuel oil market price and inflation are not considered.

#### 2-2-1-4 Rules to apply and Classification Society

##### (1) Maritime regulations of Tuvalu for domestic and international vessel

Vessels engaging only on domestic services must apply maritime regulations of the registered country or regional regulations, e.g. South Pacific Maritime Code 1986, Safety Standard for Non Convention Vessels 2002, etc., but vessels engaging on international services must apply various international regulations, e.g. SOLAS (International Convention for the Safety of Life at Sea), ICLL (international Convention on Load Lines), MARPOL (International Convention for the Prevention of Marine Pollution from Ships), TM69 (International Convention on Tonnage Measurement of ships), etc.

The Plan Vessel of this Project intending international services to Suva, Fiji, is subject to application of international regulations.

Merchant Shipping Act, 2008 as the fundamental maritime law of Tuvalu, specifies application of international maritime conventions as follows.

#### 47 International maritime conventions

- (1) Subject to this Act, the Safety Convention, the Load Line Convention, the Tonnage Measurement Convention, the Collisions Convention and the Limitation of Liability Convention shall have the force of law in Tuvalu.
- (2) Upon notice being given by the Minister in the Gazette the STCW Conventions shall have the force of law in Tuvalu.

SOLAS Convention for the safety of international service vessels is the stringent regulations especially for small passenger vessels. In the SOLAS regulations of lifesaving appliance, lifeboats having aggregate

capacity to cover at least 30% of total persons on board and inflatable liferafts to cover the rest are required, whereas no lifeboat is required for domestic service vessels. To lighten the SOLAS requirement of space-occupying lifeboat, two different passenger capacities are adopted, i.e. for international service with less persons on board (total 320 persons including 271 pax) and domestic service with more persons on board (total 429 persons including 380 pax).

As the safety standard for domestic service, Safety Regulations for Non-Convention Vessels, Suva 2002<sup>7</sup> is adopted.

International service of the Plan Vessel is mainly Suva, Fiji, but there is demand for sailing to Tarawa, Kiribati. Mileage to Suva is 580 nautical miles, which is within the coverage of “short international voyage” defined in the SOLAS (mileage ≤600 sea miles) and relaxations on the safety equipment apply. Mileage to Tarawa is 700 sea miles which is beyond the range of the short international voyage, but reduced number of passenger down to about 100 persons allows sailing of the Plan Vessel to Tarawa. The Taskforce confirms 100 passengers is sufficient for the Tarawa service.

**(2) Classification**

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

Major shipping countries have classification society, e.g. NK classification in Japan, Lloyd’s classification in UK. Government of Tuvalu had already given a permanent authorization for NK classification to inspect vessels on behalf of the Government of Tuvalu on 2004. In this Project, NK classification of Japan is adopted.

**2-2-1-5 Improvement based on feedback from MV Nivaga II**

**(1) Survey result**

Surveying N2, a number of points to be improved were found. Countermeasures should be taken in the design and construction of the Plan Vessels.

Table 2-10 Feedback from survey of N2

No.	Problems found in N2	Countermeasures on the Plan Vessel
1	After leaving Lloyd’s classification, safety system of N2 is maintained at the status quo and not updated to comply with the current SOLAS requirements, e.g. sprinkler, etc. Some of the existing safety systems, e.g. fire alarm and lifesaving appliance, are not working properly.	To be outfitted in compliance with the latest SOLAS systems.

<sup>7</sup> Safety standard of domestic service ships in the Pacific, adopted in Suva on 2002, hosted by SPC with participation of IMO specialist.

No.	Problems found in N2	Countermeasures on the Plan Vessel
2	Licensed passenger capacity of N2 cannot cover peak demand which occurs especially at the end and beginning of Motufoua Secondary School semesters, and thereby N2 frequently carries unsafely excessive number of passengers over licensed number.	To determine complement capacity based on the current peak load, adding future growth due to population growth and Motufoua school quota increase.
3	N2 does not satisfy current international regulations, thereby not possible to engage freely on international services to the foreign countries other than Fiji, who is now kindly accepts sub-standard vessels in the region.	To be constructed satisfying latest international regulations, so that international services other than Fiji, e.g. Kiribati, will become possible.
4	Boarding and offboarding of passengers to/from workboat in the island operation is made using shipside gangway ladder, which is not sufficiently stable thereby unsafe. In Funafuti, the boarding deck is high and the gangway ladder between wharf and deck is too steep for aged people carrying luggage.	To fit sideport gangway at a reasonable height allowing easy access to/from workboat. Funafuti boarding deck will be the upper deck, reasonable in height, allowing safe boarding and offboarding.
5	Cargo hatch cover of N2 is of a type consisting of wooden hatch board and watertight tarpaulin, which has problems of time-labor consuming and water leakage from aged tarpaulin.	To adopt steel lift-away hatchcovers handled by crane.
6	Reefer cargoes are stowed in 10 feet reefer containers on the cargo deck, but the reefer containers are not so durable as to break down frequently.	To install reefer cargo hold and refrigerating machine of durable type inside the vessel.
7	Air compressors consist of one e.motor driven main air compressor and one diesel driven emergency air compressor. When the main unit is out of order the vessel must rely on the emergency unit, which cannot run automatically.	To install two e.motor driven air compressors and one diesel driven air compressors.
8	Cargo hold is so deep that soft cargoes, break bulk cargoes and corrugated cartons cannot be piled up to cargo hold top, and thereby broken spaces are sometimes large.	To install an intermediate deck with hatchcovers in the cargo holds, so that efficient cargo stowage will be available.
9	Two wooden workboats are carried on board, but they are too small to carry heavy or large cargoes. Sometimes two boats were tied side-by-side to carry large cargo, but tied two boats were not so stable enough that cargo dropped into the sea in the past.	To carry large workboats of aluminum to allow carriage of many cargoes and paxes at a time, and besides safe landing of large cargoes using workboat. Landing ramp for vehicle will also be fitted.



No.	Problems found in N2	Countermeasures on the Plan Vessel
10	Workshop on board N2 is too narrow to work there and to stow necessary parts and tools. There is no store exclusive for the engine parts, and some parts are stowed in the corner of wharf warehouse, which is dusty not suitable for parts stowage.	To arrange onboard workshop and parts store of appropriate area, and Tuvalu side to arrange shore store for large spare parts and for such parts as not readily necessary on board.
11	In the open sea condition is sometimes severe thereby severe ship rolling, and passengers suffer from seasickness. After the vessel arrival at Funafuti, smell of vomit remains strongly in the vessel.	To install roll stabilizing system, to reduce rolling amplitude in the swell
12	N2 together with entire Funafuti becomes water shortage when dry season continues long days. In such dry time, N2 cannot get necessary water from the water tank in the wharf and must rely on the public water tank whose water level is also low that time but sometimes difficult to get necessary quantity.	To install water maker of reverse osmosis type on board, to manage water by the vessel and not to take water from Funafuti people's water tank.
13	N2 has four hydraulic oil pump units, each of which is connected direct to different deck machinery, so that failure of any one pump unit makes corresponding machinery, e.g. cargo winch or anchor windlass, inoperable. Probability of failure on the entire hydraulic system is high at four times the probability of one pump unit.	To install two pump units, one for working and the other in standby, which serves all hydraulic deck machinery. Failure of one pump unit can be taken over by the other pump unit in standby so that no machinery becomes inoperable
14	Remote control signal of the main engine from the bridge to the engine room is of pneumatic system not electric, is easy to become malfunction and difficult to find cause of malfunction.	To adopt reliable and durable electric signal system.

**(2) Feedback from interview with passengers and shippers**

Table 2-11 Interview with passengers

No.	Result of interview	Countermeasures
1.	Very narrow when many passengers are on board. (7)	(N2 used to carry 300 passengers on board the vessel with 168 passenger license, and must be very narrow for such big number of passengers.) Passenger space of the Plan Vessel is assigned appropriately for the licensed number of passengers.
2.	Number of toilets is insufficient. (7)	To arrange toilets, number adequate for number of passengers, referring to standard in the number of

No.	Result of interview	Countermeasures
		toilets on board aircrafts.
3.	Severe in sea sickness. (3)	To install roll stabilizer to ease sea sickness.
4.	Rain blows in the passenger area. (1)	To fit rain shields around passenger area.
5.	Items sold in the canteen are insufficient. (1)	To arrange bigger canteen possible to sell more items.
6.	Ship hull is aged and damaged. (1)	-

Table 2-12 Interview from cargo shippers

No.	Problems found in N2	Countermeasures on the Plan Vessel
1.	More Suva services are desired.	-
2.	Capacity to carry reefer cargoes should be bigger.	Where N2 carries one 10 feet reefer container whose capacity is about 10 m <sup>3</sup> and one temperature only, the Plan Vessel will have reefer cargo hold of two compartments of each 15 m <sup>3</sup> at two different temperatures.
3.	Cargo was lost into the sea in the island operation.	The new Vessel will use large workboats thereby less risk of dropping cargo into the sea.

#### 2-2-1-6 Improvement based on feedback from MV Manu Folau

No.	Problems found in MF	Countermeasures on the Plan Vessel
1.	Gyro compass is damaged but too costly to repair. (In the JICA follow-up project, a GPS compass was installed instead of repairing gyro compass.)	To back up the gyro compass, which is required by SOLAS, a GPS compass is installed. Life of the gyro compass can be longer if GPS compass is mainly used.
2.	Access for servicing and manholes are narrow and there are places where servicing is not easy.	To consider better access in the detailed design of the Plan Vessel.
3.	Sewage tank corroded and had to be changed to the new tank.	Anti-corrosive paint inside will be carefully applied.
4.	Sewage pipes are sometimes clogged.	Sewage pipes of larger bent and diameter and will be used.
5.	Number of toilets and showers are insufficient	More toilets and showers are arranged suitable for the greater number of passengers.

#### 2-2-1-7 Maintenance of Tuvalu vessels

In Tuvalu no workshop facility of ship maintenance and repair is available, and no maker service is readily available. Once importance machinery should fail, ship must go to Fiji or other industrial country to repair,

and must wait for long days to get spare parts. Therefore, daily and planned maintenance of the vessel hull and machinery is among others important for stable and reliable operation of the Plan Vessel.

It is concluded suitable to adopt PMP for the Plan Vessel to establish daily and periodical maintenance system. Crew of Tuvalu vessels can work for diesel engine overhauling and considered to have necessary skill for conducting PMP.

Under the PMP, a set of spare parts to be used as the recycling parts for periodical maintenance will be supplied including such spare parts in the scope of the Project. The scope of PMP spare parts will include cylinder head assembly, piston assembly, gasket kit, spare pumps, temp and pressure sensors, etc. for main and auxiliary diesel engines, propellers, tail shaft bearings, zinc anodes, etc.

Deck crew are sometimes busy in stevedore work in the islands and cannot well spare time for maintenance of steel structure, and as the consequence there are many steel structures which are left rusted considerably. MCT plans establishment of “Port Authority” separating the concerned part from the DPMS. Stevedore work is the part of the Port Authority so that the vessel crew will have more time for the hull maintenance free from stevedore work. However, not waiting for the establishment of the Port Authority, SPMS should consider better hull maintenance system. For the Plan Vessel, close de-rusting and paint touch-up from the beginning will well prevent growth of rusting wear, and the survey team stressed importance of daily maintenance of steel structure for reducing repair cost in future and elongate the vessel’s life. PMP program will be planned to include steel structure maintenance.

When MF had been built, PMP spare parts had been supplied, but those spare parts were not stowed in a suitable place so that stowed metallic spare parts were many spoiled. On board the Plan Vessel, engine parts store and workshop, better condition to maintain spare parts, will be arranged. Suitable store for large spare parts will also be prepared ashore at the Tuvaluan side responsibility.

As a consequence of the satisfactory maintenance, classification is maintained and sound condition of vessels is confirmed by the classification. Regarding classification of the Tuvaluan vessels, MF had been removed from NK class but was re-classed into PRS class<sup>8</sup>, and N2 had been removed from Lloyd class and is now in a condition difficult to re-class. Importance of maintaining classification for the Plan Vessel to engage on the international passenger service to which application of SOLAS regulation is compulsory was stressed to MCT, and further the Survey Team stressed that the renewal of classification for MF is the condition for the Project to be adopted by the Japanese Government. Thereafter, the classification annual survey of MF was done on May 2013 and classification was maintained. Importance of the classification of MF was so recorded in the Minutes of Discussion for the Preparatory Survey and the completion of classification survey was further recorded in the Minutes of Discussion for the Explanation of the Draft Report of the Preparatory Survey.

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<sup>8</sup> PRS: Pacific Register of Shipping, small scale ship classification registered in PNG, introducing itself as familiar with vessels in the Pacific.

### 2-2-1-8 Transportation from Japan to Tuvalu

The Plan Vessel will be built in Japan, passing inspection of classification society, registered in Tuvaluan flag provisionally, and sail from Japan to the homeport Funafuti, Tuvalu by her own propulsion.

Shipbuilding contract comprises construction of the Plan Vessel, procurement of the Equipment and transportation of the Plan Vessel. The Plan Vessel will be manned by crews hired by the shipbuilding contractor.

All vessels sailing in the high seas must raise the flag and keep the certificate of nationality. The Plan Vessel, even before final delivery in Funafuti, must be registered in Tuvalu after the completion of the construction and before sailing.

From Japan to Funafuti, the Plan Vessel will sail about 3,500 nautical miles (about 6,500 km) along the great circle, taking about 16 days. Capacity of the fuel oil tank is sufficient for steaming direct to Funafuti without refueling on the way.

### 2-2-2 Basic plan

#### 2-2-2-1 Main particulars of the Plan Vessel and MV Nivaga II

Main particulars of the Plan Vessel satisfying transport demand and fundamental requirements are as follows.

Table 2-13 Main particulars of the Plan Vessel

	Nivaga II	Request	New vessel	
Length overall	58.00 m	60~70 m	60.50 m	
Breadth, molded	12.00 m		12.60 m	
Depth, molded, upper deck	4.50 m		6.00 m	
Design draft	3.10 m	3.10 m	3.10 m	
Gross tonnage, int'l	1,043 tons		1,270 tons	
Main engine	478kW x 2	about 500kW x 2	about 478kW x 2	
Speed	10 knots	12 knots	11.7 knots	
Complement	209 persons	377 persons	International	Domestic
			320 persons (271 Pax) (49 Crew)	429 persons (380 Pax) (49 Crew)
Cargo hold capacity	450 m <sup>3</sup>	450 m <sup>3</sup>	450 m <sup>3</sup>	

#### 2-2-2-2 Vessel design policy

##### (1) Restrictions of hull dimensions

Sea passages within Tuvaluan waters and international Fiji service are without narrow or shallow waters and deep enough for sailing of N2 class vessels, thereby no restrictions to determine the hull of the Plan Vessel.

Main dimensions of the Plan Vessel hull was determined suitable for passenger capacity of 380 persons in

the domestic service, which had been determined maximum passenger demand in the past statistics adding future demand increase due to population growth and Motufoua students increase, thus clearing overloading of passengers in the past on board the existing vessels.

Breadth and depth of the hull are made wider and deeper than those of N2 to maintain sufficient buoyancy and stability thereby to satisfy stringent stability requirement of SOLAS for passenger vessels in the damaged and flooded condition.

Draft of the vessel set at 3.10 m for ordinary service condition and further 3.30 m to allow extra heavy loaded condition.

## **(2) Gross tonnage**

The Plan Vessel must have much greater passenger capacity than N2, but increase of gross tonnage is minimized, i.e. 1,270 tons which is by 20 % more than that of N2, through the careful ship design procedure of efficient accommodation layout, etc. under the consideration to minimize hull maintenance cost.

## **(3) Speed and main engine**

Bigger main engine consumes more fuel oil. For Tuvaluan vessels impact of more fuel oil consumption on the operation cost is big, because unit price of fuel oil in Tuvalu is very high compared with international price. Laying emphasis on the fuel oil cost, main engine horsepower of the Plan Vessel was made equivalent to that of N2's 478 kW. Considering necessity for higher speed in case of patient transport ambulance duty, effort on ship design to optimize hull shape and propulsion system of low-revolution large-diameter was made so that 11.7 knots which is by 1.7 knot faster than N2 was made available.

## **(4) Roll damping control**

Tuvaluan cargo passenger vessels are sailing in the open sea where swells are often high thereby severe ship rolling and passengers suffer from severe seasickness. Ship rollings are often as high as 30 degrees to either side. Sea sickness is always a problem for passengers traveling on board a ship.

MF is fitted with a roll damping system, which had a favorable reception by MF passengers and crew. Tuvaluan side requested same roll damping device also for the Plan Vessel.

The roll damping device of MF and the Plan Vessel is the "Rudder roll stabilizer" activating rudder while maintaining vessel's course. The system does not occupy large space for the device and the price is reasonable. Heading input for the stabilizer will use heading data of satellite GPS compass, which is of less risk of failure than gyro compass.

## **(5) Lifesaving**

From the facts that requirements of safety regulations for international vessels are much stringent than the requirements than the requirements for domestic vessels; lifeboat must be minimum in size considering size of the hull; and number of passengers in the international services are much less than those in the international services, different numbers of passenger capacity were assigned for domestic and international services.

Complement capacity in case of international services is 320 persons, comprising 271 passengers (current peak demand plus demand increase in 10 years), for which lifeboats and liferafts are complete according to

the SOLAS.

Complement capacity in case of domestic services is 429 persons, comprising 380 passengers (current peak demand plus demand increase in 10 years plus future increase due to increase of Motufoua students), for which liferafts are made complete to cover total complement on board.

**(6) Passenger facilities**

Cabins for passengers are generally of two double tier bunks cabin for effective use of cabin area. The cabins are graded 1st class and 2nd class. The 1st class cabins have en suite toilet and one of upper bunks is of foldaway type allowing its lower bunk to be used as a settee.

Outdoor passenger spaces are provided abaft the deckhouses and fitted with timber deck, and rain shield at sides.

A canteen is provided in the outdoor passenger area for serving foods cooked in the galley, cold and hot drinks, snacks, etc.

**(7) Crew facilities**

Crew complement is 29 persons including an electric engineer added according to the recent requirement of SOLAS. Crew accommodation facilities are in compliance with the ILO Maritime Labor Convention 2006 as far as practicable and reasonable. Some of the requirements e.g. suite rooms for senior officers are to be exempted by the flag administration as understood by the Taskforce<sup>9</sup>.

**(8) Trainee accommodation**

Same as N2, accommodation facility for 20 trainees of TMTI (Tuvalu Maritime Training Institute) is provided. Considering the TMTI plan to accept women students from 2014, Sleeping space for trainees is separated for 16 men students and 4 women students.

**(9) Cargo hold**

The Plan Vessel has a tween deck between the double bottom top and upper deck for reasonable height of the cargo hold and efficient cargo stowage. The hatch opening of the tween deck is fitted with steel hatch covers opened and closed by the onboard cargo crane. Cargoes can be stowed on the tween deck hatchcovers.

The upper deck hatchcovers are of steel weathertight pontoon type intending easy handling operated by the onboard crane and reliable watertightness.

The upper deck and tween deck hatchway openings have a width of 6.2 m allowing handling of standard timber bundles of 6.0 m in length.

**(10) Cargo gears**

For cargo operation and workboat operation, two cargo cranes of straight jib type, which is compact, easy to operate and less parts to maintain thereby less risk of damage, are installed.

In the remote island operation, cargo hook of the crane swings due to swell in the open sea. To stop the cargo hook swinging, a stabilizing winch is installed for each crane.

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<sup>9</sup> Refer to the Appendix-2 attached to this Report regarding detail of the ILO MLC requirements and the Plan Vessel facility.

### **(11) Workboats**

Confirming that the workboat passage had been widened and deepened by the TSSTP<sup>10</sup>, the Plan Vessel uses workboats larger than current wooden boats. The new workboats are 10 m in length, 4 m in width and aluminum hull. Wooden hull is no longer suitable and steel hull is too heavy. To allow rolling off of vehicle on board the workboat, a landing ramp of 2.2 m width will be fitted.

Comparing with the dimensions of the workboats currently used on board N2 and MF, 7.5 m in length and 2.5 m in width, The new workboats have an area (Length x Width) about two times the existing boats, i.e. the new boats are expected to carry about two times the current boats and times of go-and-back between mother ship and shore is expected to about half. Necessary time for the Plan Vessel to stay at the island will be accordingly shorter.

MIG welding machine is included as the repair tool of aluminum hull.

### **(12) Maneuverability**

The Plan Vessel fitted with two propellers and two rudders has maneuverability better than ordinary vessels, and there are no narrow passages in the Suva and domestic islands services, and thereby it is concluded that the maneuverability of the Plan Vessel is sufficiently good without help of special rudder and bow thruster.

### **(13) Navigation equipment**

As a vessel fully applying SOLAS regulation, the Plan Vessel is equipped with magnet standard compass, gyro compass, ARPA (Automatic Radar Plotting Aid) radar, speed log, echo sounder, GPS (Global Positioning System), air horn, AIS (Automatic Identification System), VDR (Voyage Data Recorder), ECDIS (Electronic Chart Display and Information System), etc. The deck officer who will be invited to Japan for operation training of the Plan Vessel will also have an operation training of ECDIS in Japan to obtain ECDIS license.

GPS satellite compass is additionally fitted considering short life of the gyro compass.

### **(14) Radio equipment**

The Plan Vessel, as a vessel sailing in A3 sea areas which is beyond the MF radio coverage but within Inmarsat radio coverage, is fitted with radio equipment comprising Inmarsat C, MF/HF radio telephone, VHF radio telephone, aeronautical frequency radio equipment, EPIRB, SART, Two-way VHF radio telephone, and EGC. Being no NAVTEX broadcasting in the planned service area, the SOLAS requirement on the NAVTEX will be exempted.

### **(15) Generator**

Main generators will be 200kVA x 2 sets, one of which covers all electric loads in most of the service conditions, and considering no blackout even when one generator becomes out of order. The electric voltage of 225 V and frequency of 50 Hz, same as the shore power in Tuvalu, are adopted for the onboard power supply.

Additionally, solar power system of about 4kW output is installed for auxiliary use, from fuel saving and

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<sup>10</sup> Tuvalu Ship to Shore Transport Project, aided by the New Zealand Government, as a project to improve transporting personnel and cargoes between ship and shore. Widening and deepening of the water passage for workboat between the sea and shore was completed by the TSSTP, and now larger workboat can pass the passage.

ecological view, and considering strong tropic sunshine good for solar power.

#### **(16) Water desalination system**

Tuvalu, who has no river water, must rely mainly on rainwater and secondarily on desalination water maker, suffers from serious shortage of water when no rain lasts several months.

Funafuti wharf has a rainwater tank for ship supply purpose, but the tank also comes to low water level when dry season without rain lasts long, and thereby vessels must get water from civil water tank and leave Funafuti with half tankage of water. Such situation occurs several times in a year, and on board the vessel captain must controls using of water, e.g. not using showers.

On board the Plan Vessel, a water maker of reverse osmosis type will be installed, to avoid water shortage on board and not to take water from civil water tank.

Capacity of the water maker was determined assuming that half of total 145 t tankage is covered by the water maker in one week sailing days plus one week anchorage days, i.e.  $145^t \times \frac{1}{2} / 14^d = \text{about } 5^{\text{tons/day}}$ .

N2 and MF had a reverse osmosis water maker when the vessels were new, but very quickly the water maker has become out of order. On the other hand, the police boat donated by the Australia has been running water maker of same type for long time without any trouble. Captain and chief engineer of the police boat commented the way of operation and cause of damage as follows.



Fig. 2-9 Police boat

- The police boat has a reverse osmosis water maker similar to that on board MF. Life of the reverse osmosis module is 5 - 6 years.
- Importance on operating the water maker is operating the equipment continuously without stopping. Once the equipment is stopped, the module must be removed and stowed in a chemical water, and the equipment pipeline must be kept cleaned during no use time.
- The water maker of the police boat is kept running all the time to avoid trouble, also when berthed at Funafuti wharf. Water quality of Funafuti wharf is sufficiently good for water maker, and no breakdown and trouble due to continuous running has been experienced so far.

It was found that N2 and MF had been frequently stopping the water maker being nervous about water quality in Funafuti wharf, and this frequent stops led water makers out of order and short life of the equipment. In the Plan Vessel, it was stressed that the equipment must be run continuously without stopping.

#### **(17) Countermeasures against corrosion**

Ageing of vessels is mainly: in the hull part from corrosion wear of steel structure and in the machinery part from wearing of diesel engine. Wearing of diesel engine may be recovered by changing engine parts or changing whole engine, but the hull which had been corroded extensively may have to be given up.



As such, definitive life of vessels depends on the life of hull corrosion. The hull corrosion is the electrolysis action of steel in seawater, which can be considerably controlled by the vessel design, anti-corrosion equipment and crew maintenance.

#### **1) Zinc anode plates on outside shell**

Steel in contact with seawater corrodes and wears, but zinc or aluminum placed near the steel material corrodes and wear first and steel does not corrode. Zinc anode plates fitted on the outside shell protect steel hull from corrosion. Outside shell of N2 has been well protected to a good condition by the zinc anode plates, which had been replaced with new ones at every drydocking. The zinc anode plates to be fitted must be of size and number corresponding to the length to the next drydocking.

#### **2) Engine room bottom**

There are leakage of seawater from water seals of stern tube and seawater pump, and leaked seawater bilge may stand in the engine room bottom. If such metal as bolt, nut or tool had dropped onto the engine room bottom, steel hull and dropped metal in the seawater start local electrolysis action and steel bottom plate can corrode down in conical shape. When the engine room bottom is single bottom construction, such corrosion can result in piercing hole, flooding and finally sinking. In the Plan Vessel, engine room will be all double bottom construction eliminating risk of piercing hole to flooding. Bilge water will all be led to bile wells, which are easy to clean.

#### **3) Ballast water tank**

Vessels have usually ballast tanks in double bottom and in the peak tanks to lower the center of gravity or to adjust trim of the vessel, but seawater inside the ballast water tank can corrode steel structure from inside resulting in piercing hole. Actually N2 had corrosion holes on 2012. The Plan Vessel also has ballast water tank in the forepeak and aftpeak for trim adjustment, but those tanks will not be filled with seawater but permanently filled only with fresh water (half filled to allow shifting of the water fore and aft) so that corrosion problem inside ballast water tanks can be eliminated.

For the seawater ballast system, recent international regulation requires complicated ballast water treatment system to disinfect biological materials in the ballast water likely discharged in the foreign port, but the Plan Vessel is not required to install such equipment.

#### **4) Routine maintenance**

In the engine room, the bottom must be cleaned discharging bilge water (through oily water separator not to discharge oily water to the outside) and removing rubbish as a part of routine work of engine crew. In the exposed deck part, de-rusting and touch-up of anticorrosive must be a part of routine work of deck crew.

#### **(18) Others**

As the up-to-date system recently adopted for ships, solar power system and LED (Light-Emitting Diode) lights will be adopted for the Plan Vessel.

The solar power system is of about 5 kW type commonly adopted in the private houses, which can lighten main generator load a little, and LED equipment light quickly, work long and consume electricity low.

### 2-2-2-3 Specification of the Plan Vessel


Table 2-14 Specification of the Plan Vessel

Item	Specification	
<b>1. Main particulars</b>		
Vessel type	SOLAS compliance international passenger vessel (Short international voyage as defined in the SOLAS)	
Subject to transport	Passenger and cargo	
Flag	Tuvalu	
Classification	ClassNK	
Rules to apply	Tuvalu Merchant Shipping Act	
	ClassNK rules	
	Safety of Life at Sea (SOLAS)	
	Safety Regulations for Non-Convention Vessels, Suva 2002 (SRNCV)	
	International Tonnage Regulation (TM69)	
	International Collision Prevention (COLREG)	
	International Convention on Load Line (ICLL)	
	International Convention to Prevent marine Pollution (MARPOL)	
	ILO Maritime Labor Convention 2006 (MLC)	
	Rules to carry dangerous goods (petrol, diesel and LPG)	
Length overall	60.50 m	
Length between perpendiculars	52.00 m	
Breadth	12.60 m	
Depth (Upper/Second deck)	6.00 m / 3.65 m	
Draft, designed	3.10 m	
Draft, scantling	3.30 m	
Gross tonnage	1,270 t	
Deadweight on design draft	500 t	
Service speed	11.7 knot, fully laden at service rating of ME	
Main engine	478 kW (650 hp) x 2	
Complement	International	Domestic
Total	320	429
Pax	1 <sup>st</sup> Cabin	28
	2 <sup>nd</sup> Cabin	66
	Outdoor	177
	Pax total	271
Crew	29	29
Trainee	20	20
Tank capacity		

Item		Specification
	Fuel oil	145 m <sup>3</sup>
	Fresh water	90 m <sup>3</sup>
	Rainwater tank	20 m <sup>3</sup>
	Water ballast	100 m <sup>3</sup> . forepeak and afterpeak
	Hold capacity	450 m <sup>3</sup>
	Reefer cargo hold	38 m <sup>3</sup>
<b>2. Cargo transport and cargo crane</b>		
Cargo oil		Petrol and diesel drums on deck Diesel oil supply from double bottom to drums
LPG gas		Gas cylinders on deck
Crane	Jib crane	Straight boom hydraulic jib crane 5 t SWL x 11 m radius x 2 sets
	Stabilizing Winch	Electric hoist 5 kN x 20 m/min 2 sets
<b>3. Accommodation</b>		
1 <sup>st</sup> class pax		4p cabin x 7, en suite toilet: 7 cabins for total 28 pax
2 <sup>nd</sup> class pax		4p cabin x 16 + 2p cabin x 1 (for instructor), common toilet: 17 cabins for total 66 pax
Deck class pax		3 decks, for total 286 pax, 03, 04 and 05 decks, artificial timber deck Rain shield (canvas) around.
Sick bay		One room
Senior officer		Single cabin, en suite toilet x 4 rooms
Junior officer		Single cabin x 5 rooms
Crew's room		Double berth cabin x 10 rooms
Trainees' room		8 double berth room x 1 room
Women trainee room		2 double berth room x 1 room
Galley		E.range (4 kW hot plate x 4, 2kW hot plate x 2) with oven x 1 Fridge (500 liters) x 1 Water boiler (1 kW / 10 liter) x 1 Toaster (4 slots) x 1 Microwave x 1 Rice cooker (3.6 ltr) x 1 Double sink, Cupboard etc.
Saloon		21 seats, Buffet equipment: Food warmer, Soup warmer, Sink, Sideboard etc.
Duty mess room		16 seats, Sink, Sideboard, etc.

Item	Specification
Canteen	Fridge (500 liters) x 1 Water boiler (1 kW / 10 liter) x 1 Microwave x 1 Ice cube machine (25 kg /day) x 1 Chilled water fountain x 3 (on each passenger deck) Selling counter, shelves, etc.
Food lift	Between galley deck and canteen deck Pallet size about 650mm x 650mm
Provision store	Dry provision store Freezing chamber 7 m <sup>3</sup> , -25 °C Vegetable chamber 7 m <sup>3</sup> , +3 °C Ref. provision machine (100%) x 2
Laundry	Laundry machine x 2
Sewage handling	Direct discharge and holding tanks Discharging pump: Cutter type 6 m <sup>3</sup> /h x 8m x 2 Holding tank capacity: 14m <sup>3</sup> x 1, 9m <sup>3</sup> x 1 MSD type III
<b>4. Dry cargo hold</b>	
Layout	Two separate dry cargo hold each with tweendeck
Upperdeck hatchcover	Steel weathertight pontoon, lift-away, 3.0 mL x 6.2 mW, divided into 3 sections
Tweendeck hatchcover	Side hinged steel hatchcover, lifted by crane, 2.9 m L x 6.2 m W
Cargo hold bottom ceiling and side sparring	+3mm extra plate thickness for tank top With timber sparring at side
<b>5. Reefer cargo hold</b>	
Layout	Built-in reefer cargo hold, 15 m <sup>3</sup> x 2 with cargo hatch on top
Temperature	-25 °C ~ +3 °C
Refrigeration machine	Ref. provision machine (100%) x 2
<b>6. Workboat:</b> To be dealt with as the Equipment. Refer to 2-2-2-4.	
<b>7. Deck Machinery</b>	
Windlass	Hydraulic motor driven with 2 chain wheels and 2 warping heads x 1 Chain diameter: 32 mm Chain wheel: 48 kN x 9 m/min
Mooring Capstan	Hydraulic motor driven 30 kN x 15 m/min x 1

Item	Specification
Hydraulic oil pump for windlass and capstan	E.motor driven oil pump x 2 (100% x 2)
Steering Gear	Parallel working for 2 rudders with hydraulic pump unit x 2 (100 % x 2) Manual follow-up (wheelhouse), Manual non-follow-up (wheelhouse), Automatic GPS compass pilot, Manual remote steering using portable control unit
Rudder roll stabilizer	1
Rudder	Balanced spade rudder 3.7 m <sup>2</sup> (35 deg.) x 2
<b>8. Mooring Equipment</b>	
Anchor	AC-14 968kg x 3 (incl. 1 spare)
Anchor chain	385 m x 32 mm dia, grade U2
Chain compressor	2
Mooring rope (rule)	140 m x 32 mmD polypropylene monofilament x 6
Mooring rope (working)	100 m x 60mmD polypropylene monofilament x 6
Tow line	180 m x 25 mmD SWR x 1
Bollard	250 mmD x 8
Roller fairleader	8
<b>9. Life saving</b>	
Lifeboat/rescueboat	Totally enclosed type: 48 p x 2 (7.0 mL x 2.7 mB)
Life raft	Inflatable 25 P x 14
Life jacket	429 + 4 for adults + 38 for kids
EEBD (Emergency Escape Breathing Device)	14
Others	Lifebuoy, distress signal, etc.
<b>10. Fire fighting</b>	
Sprinkler	For accommodation
Smoke/fire detector	For accommodation, engine room and cargo hold
Fixed CO <sub>2</sub> total flooding	Main engine room, generator room and cargo hold
Hydrant	Engine room, accommodation and outdoor
Portable fire ext.	Powder and foam
Fireman's outfit	4
Personal equipment	4
Full protective clothing	4
<b>11. Ventilation</b>	
Main engine room	Mechanical supply fan 3.7 kW x 2
Generator room	Mechanical supply fan 3.7 kW x 1

Item	Specification
Shaft space	Mechanical exhaust fan 0.4 kW x 11
Workshop	Mechanical exhaust fan 0.4 kW x 1
Steering gear room	Mechanical exhaust fan 0.2 kW x 1
Galley, toilet	Mechanical exhaust fans 0.4 kW x 4 Mechanical exhaust fan 0.2 kW x 1 Exhaust pipe fans x 12
Air con	Accommodation: 3 zones No.1 for 01 deck No.2 for 02/03 decks No.3 for 04/05 decks Compressors (100%) x 2 Workshop x 1 Engine monitor room x 1
Cargo hold	Mechanical supply fan 0.75 kW x 2
<b>12. Windows and scuttles</b>	
W/H front, Square window	1400mm x 800mm x 1, fixed
W/H front, Square window	950mm x 800 x 4, fixed
W/H front, Square window	800mm x 800 x 2, fixed
W/H front, Square window	800mm x 800 x 2, openable
W/H side, Square window	800mm x 800 x 2, fixed
W/H side, Square window	965/720mm  x 800 x 2, fixed
W/H aft., Square window	800mm x 800 x 2, fixed
Cabins, square windows	350mm x 500mm x 39, openable
Round scuttle	300 dia. x 16, openable
Round scuttle	300 dia. x 3, fixed
Round scuttle	250 dia. x 6, fixed
Window wiper	Swing type x 3
<b>13. Watertight door</b>	
Hydraulic operated water tight door	700mmW x 5、 900mmW x 2
Watertight hinged door (at the gangway lobby to the accommodation)	1.4mH x 0.7 mW x 2
<b>14. Engine room machinery</b>	
Main engine	Medium speed diesel, 6 cylinder, below 1,500 rpm 478 kW (650ps) x 2, IMO Tier II emission control
Gearbox	Wet multi-plate clutch output revolution 270 rpm

Item	Specification
Propeller	4 blades solid x 2, Dp = 2.0m
Shaft bearing	Seawater lubrication
Fuel flow meter	Local and remote indication 2 for ME, 1 for gensets
Lubricating oil purifier	Centrifugal abt. 700 lit/h x 2
Main genset	Diesel genset x 2, 200 kVA x 220V x 50Hz
Emergency genset	50 kVA x 220V x 50Hz
Main air compressor	Electric driven 7.7 m <sup>3</sup> /h x 3 MPa x 2
Emergency air compressor	3.0 kW Diesel engine driven x 1
ME cool SW pump	M/E driven x 2
ME LO pump	M/E driven x 2
ME standby LO pump	Electric driven, capacity same as M/E driven one x 1, stored as spare
Gearbox LO pump	Gearbox driven x 2
Gearbox standby LO pump	Electric driven, capacity same as G/B driven one x 1, stored as spare
FO transfer pump	Electric driven, gear, 2 m <sup>3</sup> /h x 0.2 MPa x 2
Bilge/fire/GS pump	Electric driven, centr., 25 m <sup>3</sup> /h x 0.55 MPa x 2
Bilge pump	Electric driven, centr., 25 m <sup>3</sup> /h x 0.55 MPa x 1, in engine store/workshop
E/R bilge pump	Electric driven piston type 1.5kW, for oily water separator
Fresh water pump	Electric driven, centr., 3.7 kW x 2, 1.0 m <sup>3</sup> pressure tank x 1
Sea water service pump	Electric driven, centr., 3.7 kW x 2, 1.0 m <sup>3</sup> pressure tank x 1
Emergency fire pump	Electric driven, centr., 25 m <sup>3</sup> /h x 0.55 MPa x 1, Outside engine room
Sludge transfer pump	Electric driven screw type 1.5 kW x 1
Oily water separator	15 ppm x 1
Fresh water sterilizer	UV type x 2
Reverse osmosis desalination plant	5.0 t/day x 1, at 30 deg C To attach 2 sets of spare modules
Fuel oil supply pump	Electric driven, centr., 1.5kW x 16m <sup>3</sup> x 0.12MPa x 1, with gas-station nozzle with flow meter on deck

### 15. Electric power supply

Main switchboard	With auto synchronizing device and auto load sharing device
Emergency switchboard	1 set in the emergency generator room
Storage battery	Transitional use 300 Ah x 24 V x 1 Radio use 200 Ah x 24 V x 1 Emergency generator starting x 1 (Em.gen maker's supply)
Transformer	Down trans. 60 kVA 220/440 V 3ph x 1, to accept shore power
Solar power system	Fitted for lighting, with power management, 5 kW x 1

Item	Specification
<b>16. Engine monitor room</b>	
Outfitting	Main switchboard, engine monitor console and aircon
Engine monitor computer	2 CPUs and 2 monitors, extension at C/E cabin
<b>17. Engine workshop</b>	
Machine tools	Lathe 0.8 mL x 0.4 kW, grinder 200 mm x 0.4 kW, drilling machine 13 mm x 0.4 kW, nozzle tester, workbench, e.arc welding machine 250 A, Chain block 0.9 t x 3, MIG welding machine, gas cutting set, hand tools, shelves, etc.
Engine store	Attached
Aircon	Fitted for workshop section
<b>18. Inboard communication</b>	
Engine order telegraph	2
Telephone	Wheelhouse, saloon, duty mess, engine monitor room, engine room, officer's rooms (3 rooms) and steering gear room
Public addressor	Amplifier (dual for pax vessel) and speakers, with talkback (bridge and 2 locations)
Alarm sirens and bells	1 set
<b>19. Lighting</b>	
Onboard lights	LED
Navigation lights	1 set per COLREG
Deck projector	400 W Halogen x 11 and embarkation lights for life boats and life rafts per SOLAS
Search light	1 kW x 1, manual lever control from wheelhouse
Daylight signal	1
<b>20. Navigation instruments</b>	
Magnetic compass	Reflector type, 165mm dia. x 1
Gyro compass	1
GPS compass	1
Steering control	1, Gyro and GPS compass autopilot
Radar	2
ECDIS (Electronic chart)	1
Echo sounder	1
Speed log	Doppler type x 1
GPS with plotter	1
Air horn	1



Item	Specification
Weather fax	1
BNWS (Bridge navigation Watch Alarm System)	1
VDR (Voyage Data Recorder)	1
AIS (Automatic Identification System)	1
Helm indicator	2 (for wheel house and EMR)
Engine rev. indicator	4 (for wheel house x 2 and EMR x 2)
Shaft rev. indicator	2 (for wheel house x 2 and EMR x 2)
Wind vane anemometer	1
Video system	36 inch x 5 monitors with DVD decks In Saloon, duty mess, and 3 outdoor pax decks Encased outdoor unit
<b>21. Radio apparatus (Based on GMDSS A3)</b>	
VHF radio telephone	2
MF/HF SSB Radio	1
Inmarsat C	1, With EGC, LRIT and SSAS functions
NAVTEX	None No NAVTEX broadcasting in the South Pacific. Letter of exemption from GOT
EPIRB	2
SART	2
Two way VHF radio	3
Aircraft rescue radio	1
Walkie talkie for daily use	4
<b>22. Construction material</b>	
Hull	NK class marine steel
Cooling seawater pipes	Steel pipe lined with plastic inside
Timber deck	Artificial timber plank for deck passenger area
Bottom paint	Epoxy anticorrosive Tin-free antifouling, 2 years life

#### 2-2-2-4 Specification of the Equipment

Following items are dealt with as “the Equipment” separate from the Plan Vessel

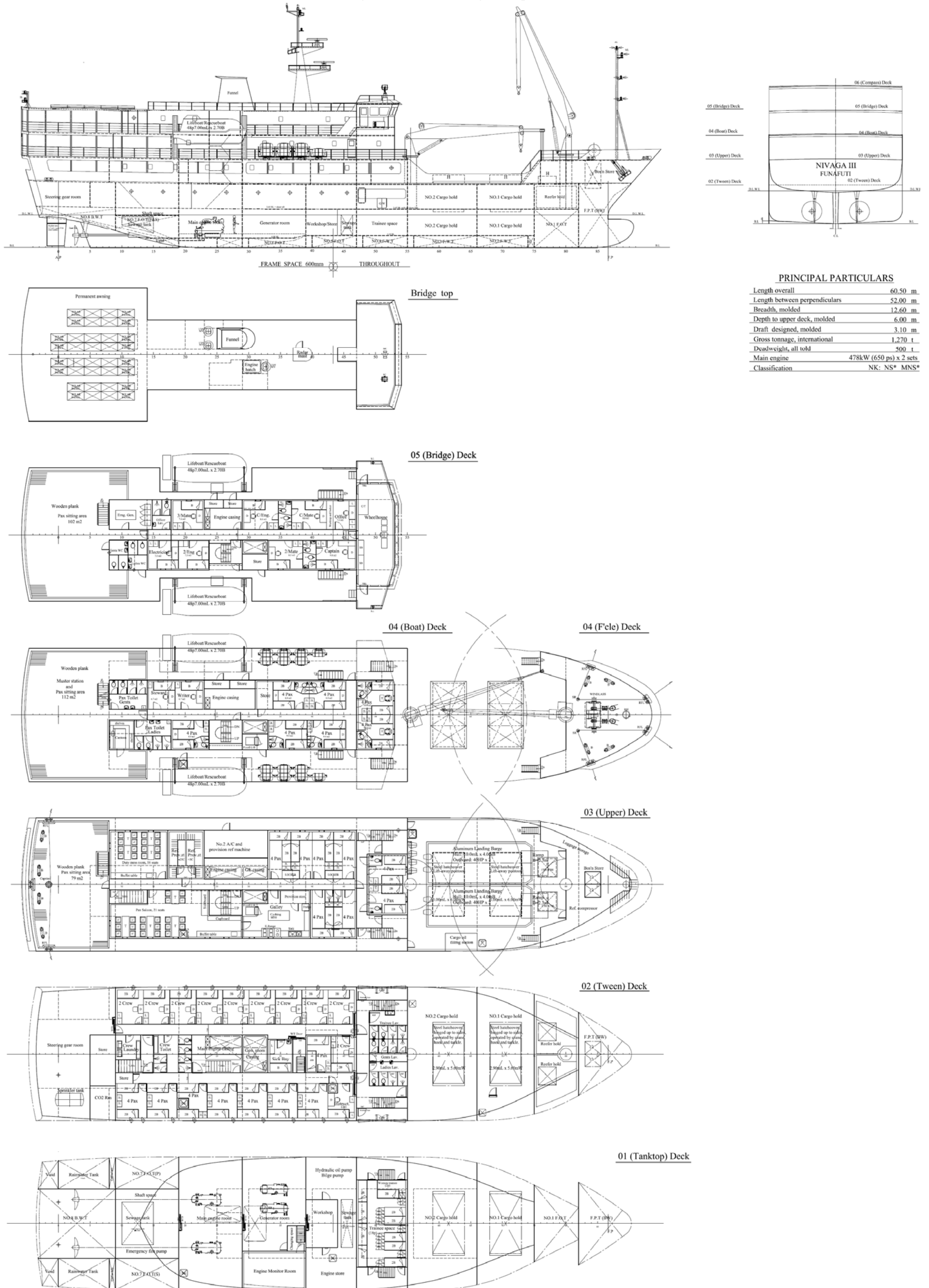
Table 2-15 Specification of the Equipment

Workboat	
Hull dimensions	About 10 mL x 4.0 mB, possible to carry vehicles With bow ramp of 2.2 mW for vehicle to roll on and off Powered by two outboard motors
Material	Aluminum
Outboard motor	40 HP x 2 / boat + 2 spare: 6 outboards total With 6 spare propellers total
Number of boats	2

2-2-3 Outline design drawings

(1) General arrangement plan

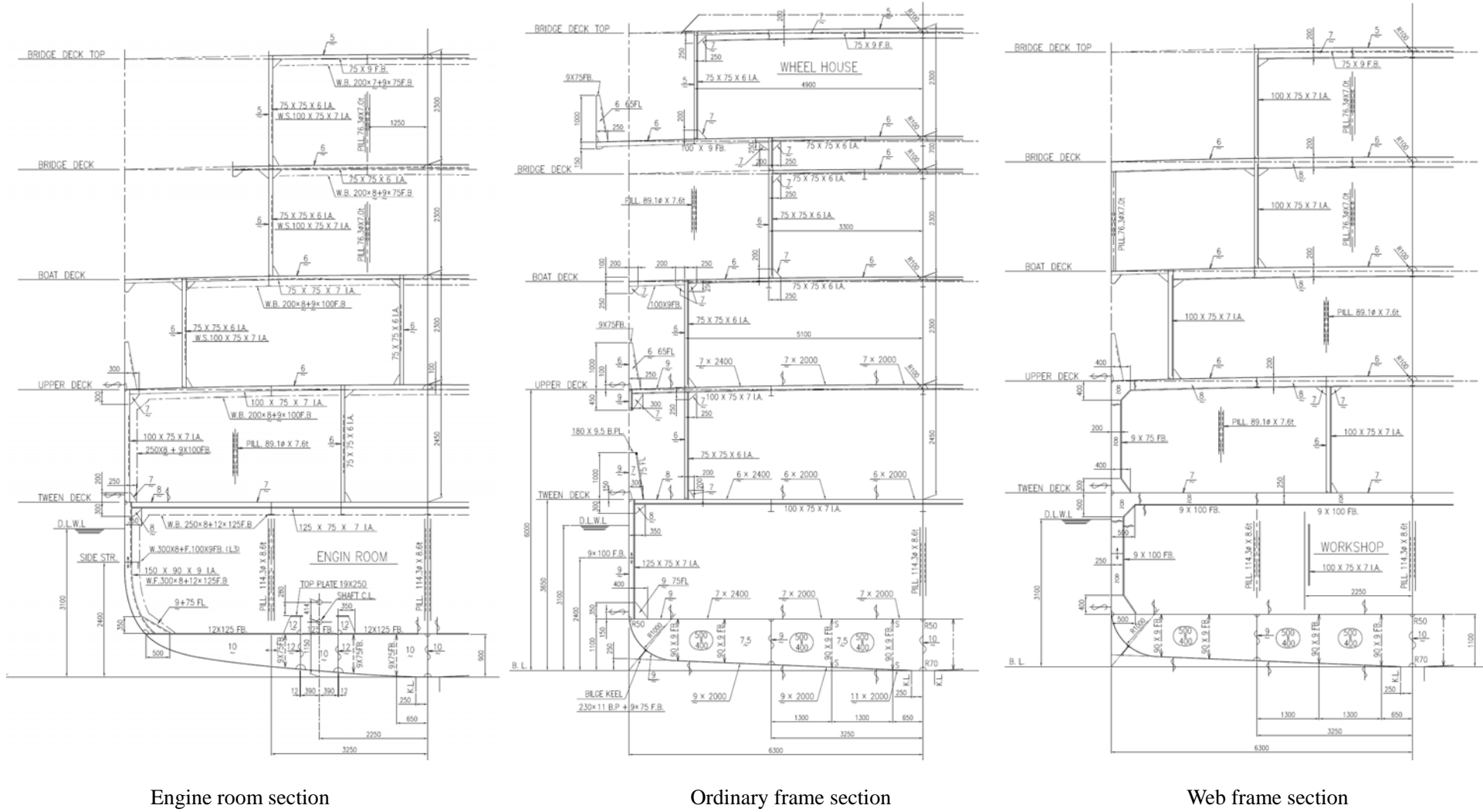
Fig. 2-10 General arrangement plan



(2) Structural section plan

Fig. 2-11 Midship section plan

2-35



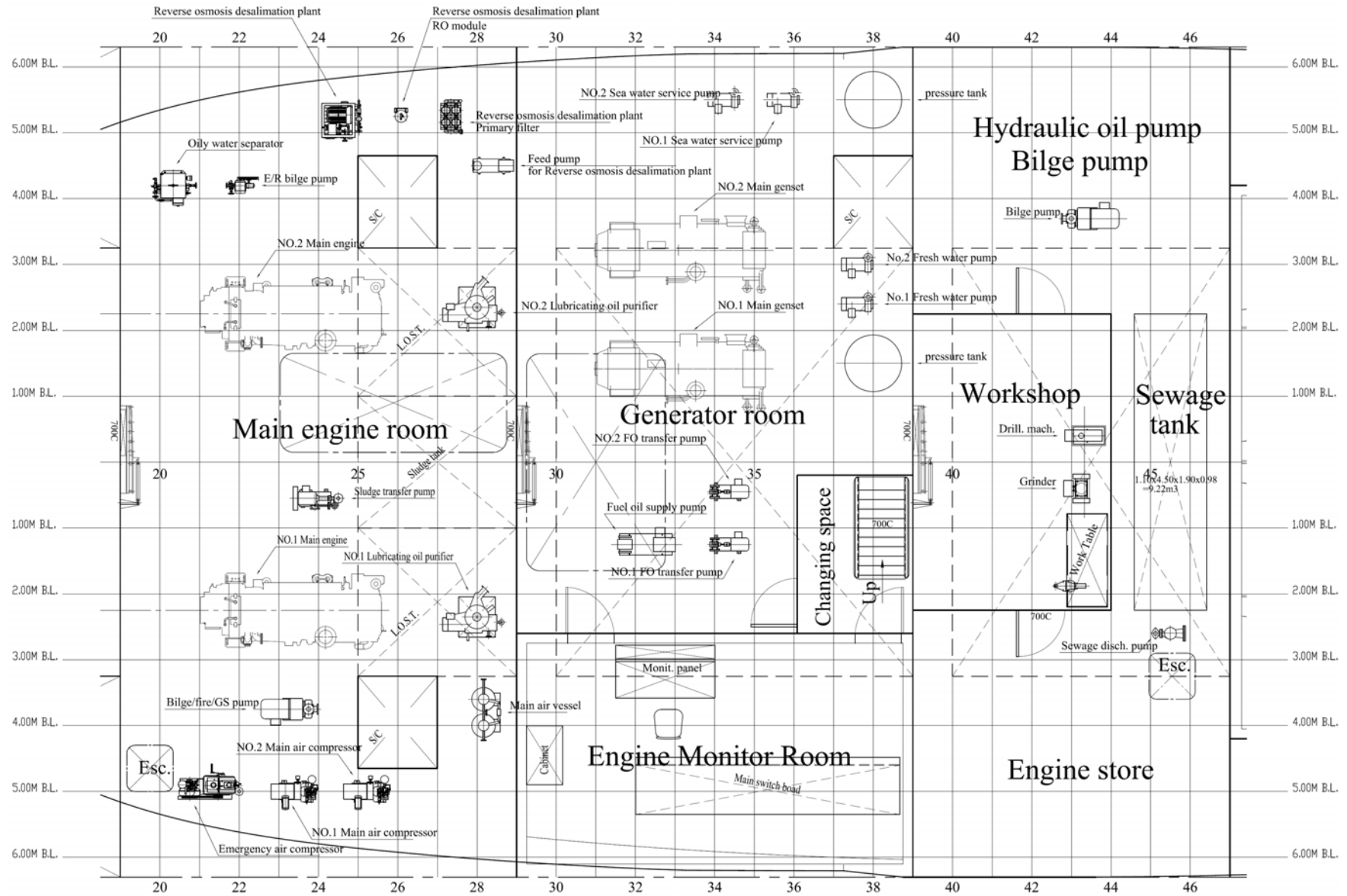
Engine room section

Ordinary frame section

Web frame section

(3) Engine room arrangement

Fig. 2-12 Engine room arrangement plan

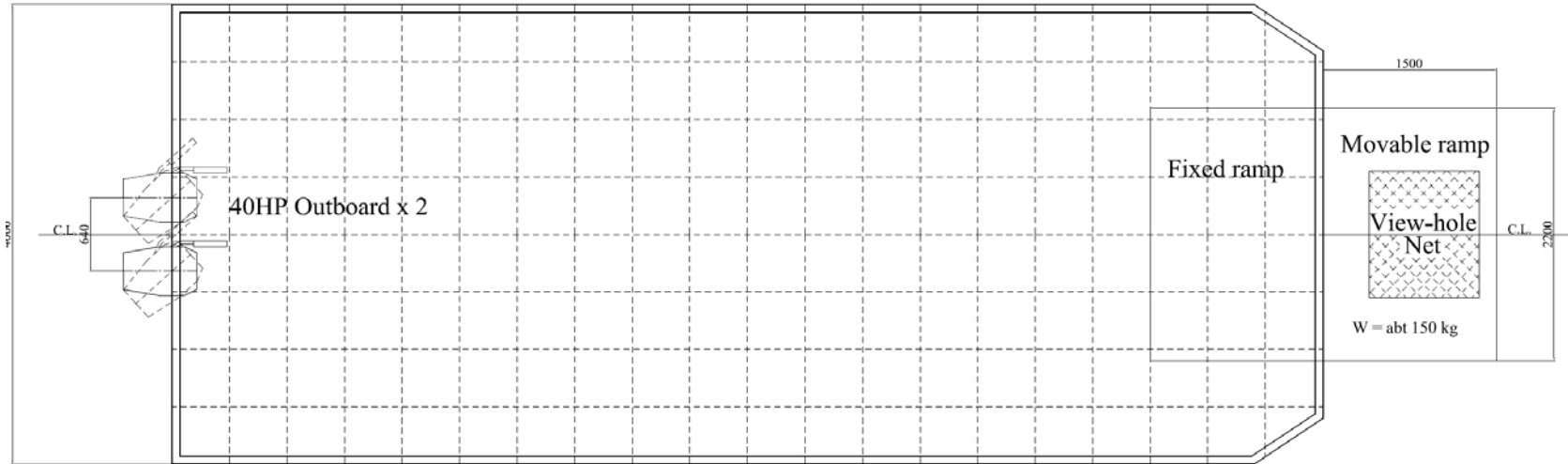
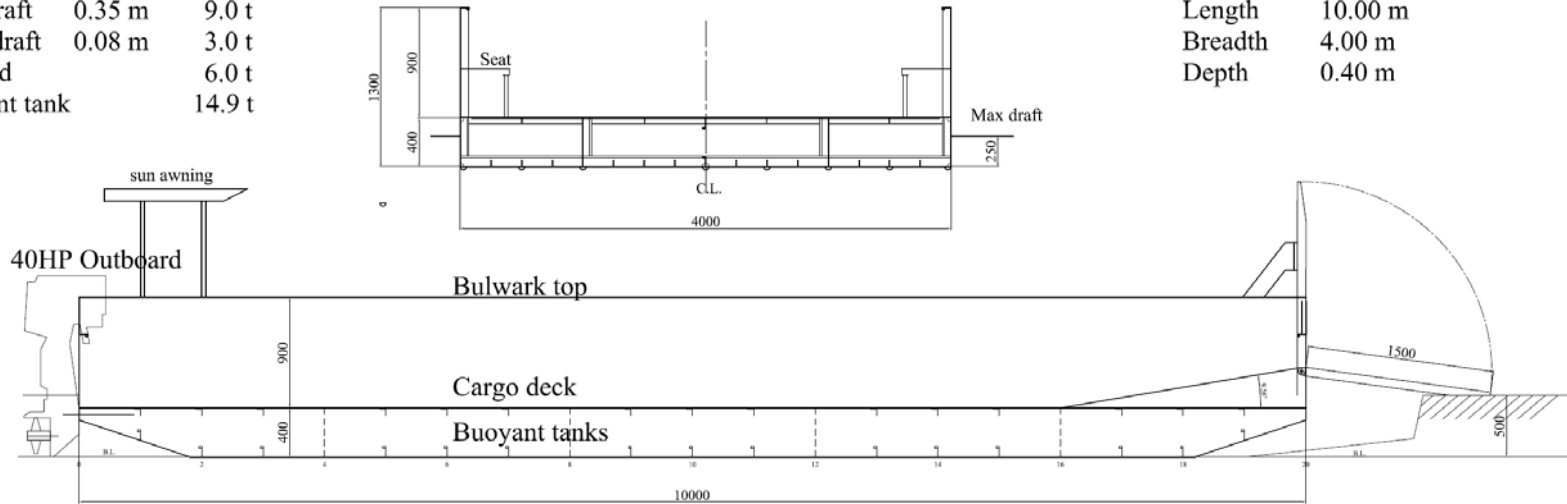


(4) Workboat layout

Fig. 2-13 Workboat plan

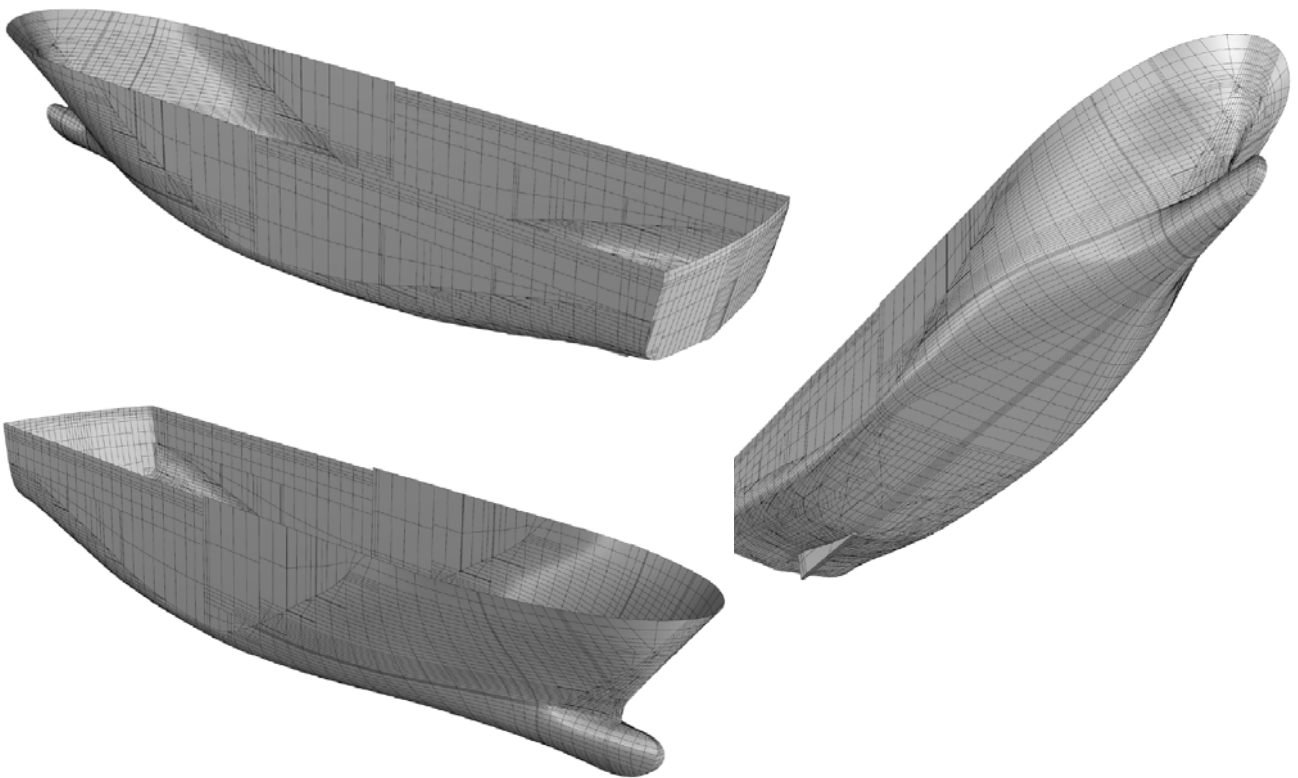
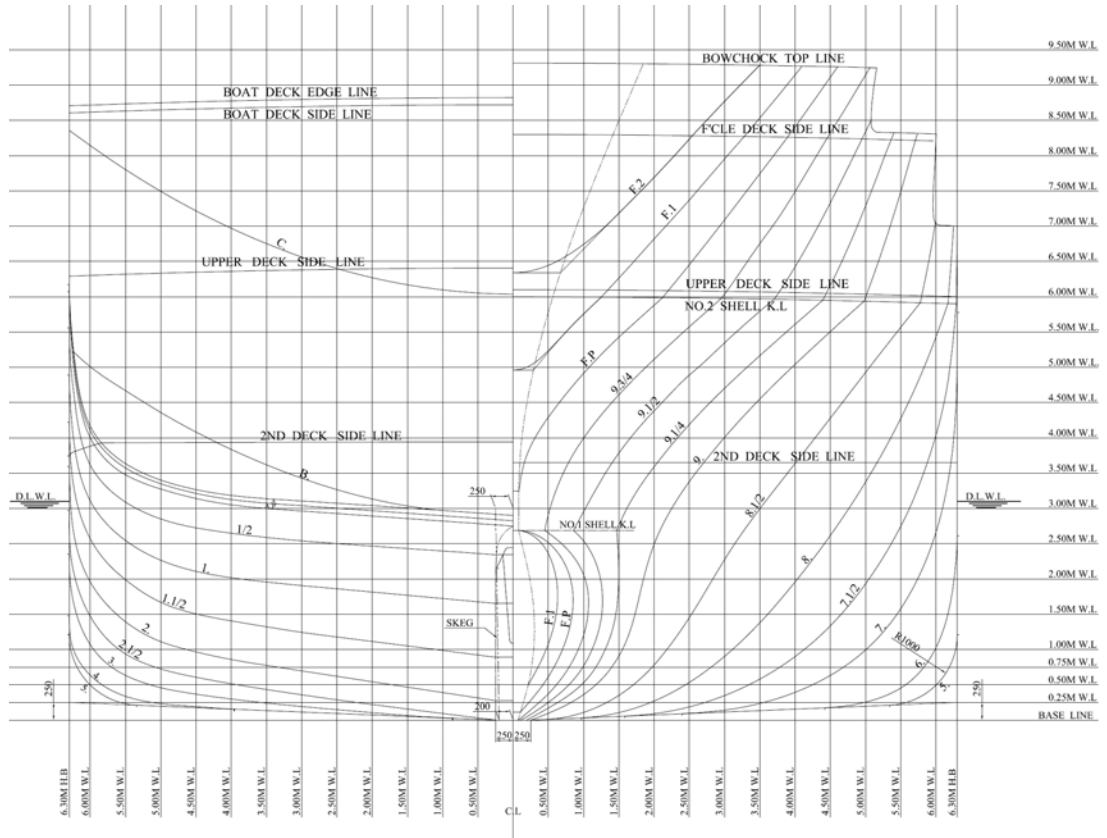
	Draft	Displacement
Max draft	0.35 m	9.0 t
Light draft	0.08 m	3.0 t
Payload		6.0 t
Buoyant tank		14.9 t

Length	10.00 m
Breadth	4.00 m
Depth	0.40 m



(5) Line plan

Fig. 2-14 Lines plan



## **2-2-4 Implementation plan**

### **2-2-4-1 Implementation policy**

#### **(1) Procedure**

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

- 1) Exchange of Notes between the Government of Japan and the Government of Tuvalu and Grant Agreement between JICA and the Government of Tuvalu, 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 Tuvalu, 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 Tuvalu. 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 Tuvalu, 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 Tuvalu, 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 Tuvalu.
- 7) The Consultant assists in contract negotiations with the Government of Tuvalu and witness the Contract.
- 8) Verification of the signed contract by JICA.
- 9) Based on the shipbuilding contract, the Contractor builds and conducts sea trials of the Plan Vessel, and hand-over the Plan 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 Vessel.
- 10) The Vessel with Equipment on board departs Japan to Tuvalu for turnover.

#### **(2) Basic provisions related to the Project procedures**

Basic items related to the Project procedures under Japan's Grant Aid scheme are as follows.

- 1) Responsible Agency and Project implementing Agency for the Project

The Responsible Agency and Project implementing Agency are the same organization, Ministry of Communication and Transport (MCT), the Government of Tuvalu.

- 2) Consultant

Following the Exchange of Notes and the Grant Agreement, a Consultant Agreement will be



concluded between the Government of Tuvalu and the Consultant, which is Japanese firm recommended by JICA. As the proxy of the Government of Tuvalu, 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 Vessel 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 Plan Vessel building and Equipment procurement

For the Plan 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 Plan Vessel and procurement of related Equipment. The Contractor builds the Plan Vessel, and conducts sea trial, procures the Equipment and transports the Plan Vessel with the Equipment on board to Tuvalu for turnover.

4) Building plan of the Plan Vessel

To build the Plan 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 Tuvalu. The following areas must be given careful consideration when examining the Construction Plan.

- a) As this Project is 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.
- b) 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.
- c) Various tests must be performed, as required by Tuvalu and Classification Society. The required sea trial must be performed upon completion of the construction phase to confirm vessel performance.
- d) In the final stage of construction, two engineers (captain and chief engineer of the Vessel) appointed for the Plan Vessel 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 Plan Vessel back to Tuvalu, for further familiarization.
- e) Receiving the Provisional Certificate of Nationality from the Government of Tuvalu, the Contractor transports the Plan Vessel, at his own responsibility, from the Contractor's quay

(wharf) to the Vessel's homeport. After arrival at the homeport, final inspection will be immediately conducted and thereafter the Plan Vessel with the equipment will be turned over to the Government of Tuvalu.

5) Procurement plan of the Equipment

The Contractor procures the equipment for the Project based on the Contract and technical specification.

6) Dispatch of engineers

After turning-over the Vessel, two engineers, deck and machinery part, shall be dispatched each by the shipbuilding Contractor to Tuvalu for 15 days including the first island service trip as the guarantee engineers to cope with machinery malfunctions which usually appear in the early time after the delivery. Those engineers will be give instructions on PMP, operation of machinery, system and maintenance as far as possible.

**2-2-4-2 Special consideration with regard to Construction and Procurement**

- a) The procedure of hull assembly and outfitting should be established taking into consideration of the Vessel layout and special features.
- b) 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.
- c) Quay tests for various machinery and equipment and sea trials should be in detail planned and included in the work schedule.
- d) 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 Tuvalu side are generally as follows.

- a) Building of the Plan Vessel, procurement of the Equipment and their transportation from Japan to Tuvalu are all undertaken by the Japanese side.
- b) Tuvalu side is to prepare parts store in Funafuti for large spare parts for the Plan Vessel.
- c) Tuvalu side is to undertake arrangement of all licenses and certificates necessary for the execution of the Project.

As mentioned above, after the shipbuilding and equipment procurement contracts, the Project implementation does not rely on the work to be shared by Tuvalu side, except for national licenses, e.g. the Radio Station License and the Provisional Certificate of Nationality which must be issued by the Government of Tuvalu during the shipbuilding stage, and preparation of the parts store which has become necessary when the Plan Vessel has arrived at Tuvalu.

After completion of the delivery of the Plan Vessel in Tuvalu, Tuvalu side is to undertake all arrangements necessary to operate the Plan Vessel, i.e. crew, operator, running costs, insurance, government subsidy, etc., to operate the Plan Vessel safely and smoothly.

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

- a) Design and construction of the Plan Vessel.
- b) Procurement of the related equipment for the Project.
- c) Transportation of the Plan Vessel from Japan to Tuvalu with the equipment on board.
- d) Consultant services for detail design, assistance in tender and supervision during shipbuilding and equipment procurement.

(2) Scope of work at Tuvalu side

The followings are the scope of work at Tuvalu side.

(Arrangement during implementation of the Project)

- a) 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
- b) Acquisition of all licenses and certificates of the Government of Tuvalu, necessary for the Project, e.g. Provisional Certificate of Nationality, Radio Station License etc.

(Arrangements when the Plan Vessel has arrived at Tuvalu)

- c) Exemption of the Plan Vessel and the Equipment from customs duties, internal taxes and fiscal levies, and prompt customs clearance.
- d) Exemption of Japanese nationals from customs duties, internal taxes and fiscal levies for their services in Tuvalu.

(Shore facilities in Tuvalu)

- e) Preparation of parts store in Funafuti for large spare parts of the Plan Vessel.

(Other)

- f) 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.

- a) Approvals of drawings and technical specification  
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.
- b) 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.
- c) 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.
- d) Turnover business  
After transporting the Plan Vessel to the homeport, Tuvalu, the Consultant should be present at all inspections at the wharf and issue the certification documents required for local turnover.
- e) 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 Tuvalu 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 Plan Vessel and the equipment for the Project should be conducted as follows.

Table 2-16 Quality Control Plan

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.

Items		Quality control
	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 outfitings	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 hull	Designed according to JCI (Japanese Craft Inspection Organization) standard
	Outboard motor	JCI type-approved motor

#### 2-2-4-6 Equipment Procurement Plan

Machinery and equipment to be on board the Vessel and associated Equipment will be in general of Japanese products, which are stable in quality, delivery and price.

#### 2-2-4-7 Operational Guidance Plan

##### (1) Operation training

One month before the Plan Vessel departure from Japan to Tuvalu, two senior crew (navigation officer and engine officer) are invited to Japan from Tuvalu to have operation training from shipyard engineers and maker engineers. Those two crew will board the Plan Vessel from Japan to Tuvalu to continue onboard training. All necessary costs, i.e. airfare, domestic transport, accommodation, daily allowance and insurance, are to be borne by the shipbuilder as a part of the shipbuilding contract.

## **(2) Guarantee engineer**

After turning-over of the Plan Vessel, two engineers, deck and machinery part, shall be dispatched by the shipbuilding Contractor to Tuvalu for 15 days including the first island trip service as the guarantee engineers to cope with machinery malfunctions which usually appear in the early time after the delivery. Those engineers will be give instructions on PMP, operation of machinery, system and maintenance as far as possible.

### **2-2-4-8 Soft Component (Technical Assistance) Plan**

No soft component and technical assistance are included in the Project.

### **2-2-4-9 Implementation Schedule**

#### **(1) Portion of work at Tuvalu side for the Project**

After the shipbuilding and equipment procurement contracts, the Project implementation does not rely on the work to be shared by Tuvalu side, except for national licenses, e.g. the Radio Station License and the Provisional Certificate of Nationality, which must be issued by the Government of Tuvalu. Undertakings at Tuvalu side are the works necessary for the operation of the Plan Vessel including preparation of spare parts store.

Refer further to section 2.4.1 (4) Scope of Works, regarding detail of work at Japan side and Tuvalu side.

#### **(2) Detail of building schedule of the Plan Vessel**

In building the Plan 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, firefighting 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 Plan Vessel will be delivered to the Government of Tuvalu. The procured Equipment is loaded on board the Plan Vessel. Transport of the Plan Vessel with the Equipment on board to Tuvalu is carried out under the responsibility of the shipbuilding Contractor.

The Plan Vessel is manned by Japanese crew hired by the shipbuilder. Two crew who had been dispatched from Tuvalu are to return to Tuvalu on board the Plan Vessel sailing from Japan to Tuvalu for the purpose of familiarization with the Plan Vessel.

Implementing schedule of the Vessel is as shown below.

Table 2-17 Implementing schedule overview

From Exchange of Notes/Grant Agreement to the Contract	From the Contract to the completion of construction work	Preparation of the transport, transport sailing, local inspection and turn-over	Total schedule From the Contract to turn-over to Tuvalu
7 months	18 months	1.5 months	19.5 months

The projected building schedule of the Vessel is shown on the next page.

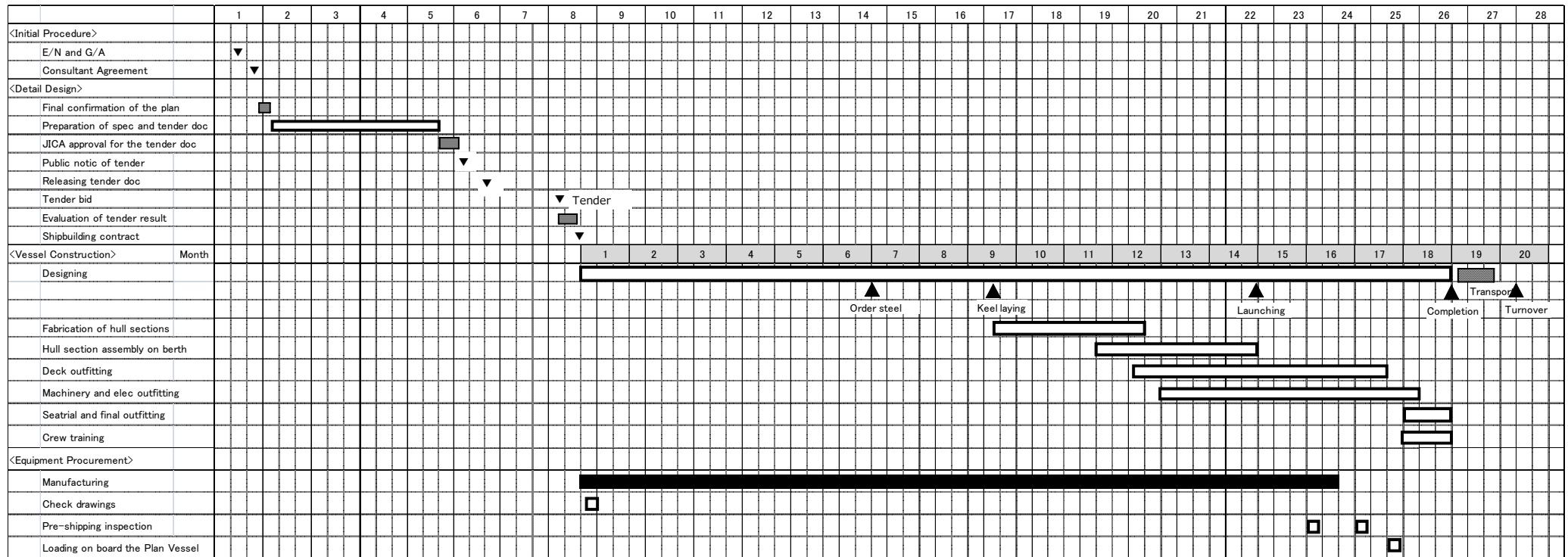


Fig. 2-15 Projected building schedule of the Plan Vessel



### **2-3 Obligations of the recipient country**

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

Shore facilities, which the Plan Vessel will use in their operation, need not be modified or improved, but spare parts store to stow large-size spare parts must be prepared by Tuvalu side before the Plan Vessel arrives at Funafuti.

Accordingly, obligation of Tuvalu side is limited to documentation, vessel operation and maintenance, exemption from custom duties, banking arrangement including payment of bank commissions and spare parts store.

### **2-4 Project operation plan**

#### **2-4-1 Management capacity of the operator**

DMPS has long experience on sea transport services.

Maneuvering skill is found sufficient for island services in Tuvalu and Suva services. No sea accident due to operational reasons is experienced.

Machinery management and operation are found sufficient supporting vessel operation even under the hardship to keep N2's main engine running whose maker in UK had been closed thereby difficult to get spare parts.

Management ashore is undertaking bookkeeping, operation planning, crew management, ticketing and general affairs, which are found done well with necessary documentation management.

#### **2-4-2 Maintenance system**

Maintenance works of DMPS vessels are carried out by the vessels crew under the annual budget managed by the shore management.

Under the situation that the shipbuilder and engine maker had been both closed and thereby no support and engine spare parts are available from them, engine department of N2 is in a difficult situation to establish scheduled maintenance. However, skill of engineers of N2, keeping the engine room in working order, are sufficiently high to carry out scheduled maintenance system e.g. PMP if conditions for the scheduled maintenance system are prepared for them.

For the steel structures of N2, on deck and in the engine room, it is concluded that the daily work of maintenance for steel structures (derusting and touchup) has been poor. Unmaintained steel structures are in many places rusted and worn down too considerably to repair. To plan the Project of the Plan Vessel, it is essential to establish routine maintenance of the steel structures.

According to above, PMP (Preventive Maintenance Policy) shall be adopted in the Plan Vessel Project as follows.

- a) To prepare maintenance program (weekly, monthly and annual).  
The program should cover not only machinery but also derusting on board.
- b) To procure spare parts necessary for the PMP.
- c) To procure tools necessary for the PMP, i.e. overhauling and repairing tools including derusting tools.
- d) To prepare engine workshop and spare parts store on board.
- e) To invite captain and chief engineer to the Plan Vessel under construction to give instruction of vessel and machinery operation and besides instruction of the PMP.

### **2-4-3 Future of the existing vessel N2**

Regarding the future of N2 after the Plan Vessel has commissioned, following options are considered. The Government of Tuvalu shall consider and decide the future of N2.

- Option-1 Selling (No problem on UK government who had grant aided N2)
- Option-2 Scrapping (Actually cannot be an option as no ship scrapping industry nearby)
- Option-3 Sinking for artificial reef
- Option-4 Mooring at TMTI as a school facility (To be removed from ship registration)

## **2-5 Project cost estimation**

### **2-5-1 Initial cost estimation**

All shipbuilding cost including transportation of the Plan Vessel from Japan to Tuvalu is to be borne by the Japan side. As no shore facility which need be newly erected by the Tuvalu side is intended, the cost which Tuvalu Government has to bear will be only for the bank commission and charges estimated JPY1.5 Million, equivalent to about AU\$16.8 thousand (at a rate of JPY89.15 compared to one AU\$ on March, 2013).

### **2-5-2 Operation and Maintenance Cost**

In the operation of Tuvalu vessels, operation expenditure is over two times the revenue. While fare and freight are set at low level considering income of Tuvalu people, fuel price is almost three times the price in the industrial countries and cost of miscellaneous items to be purchased through Fiji is high, and thereby subsidy of the Government is indispensable to maintain public sea transport services.

Costs for operation, maintenance and repair necessary for the Government vessels are budgeted in the annual Government budget but the requested amount had been often reduced and thereby budget was often not enough to buy equipment and parts necessary for vessels.

In the Government of Tuvalu, MTF (Mid-Term Fiscal Framework) was introduced in about 2010. The MTF collects and summarize estimate of government revenue, expenditure and foreign aid for next five

years to overview mid-term budgetary balance of the Government. In the first half of the year, every ministry submits the budget and the Office of the Prime Minister and the Ministry of Finance summarize them.

To make sure that the budget for the vessel operation and maintenance, including the Plan Vessel, be adequately included in the MTFE, the Preparatory Survey Team studied the operation and maintenance budget necessary in the near future and submitted to DMPS.

The following table shows estimate of N2 for the period 2011 through 2015 (assuming the Plan Vessel commissioning on the end of 2015) and the Plan Vessel for the period 2016 through 2020. The study is basing on the MCT Votebook, and assuming no fuel oil price change and no inflation.

It is found that the Plan Vessel costs lower compared with N2, which comes from greater in the maintenance cost, lower in the repair cost and additional cost of maintaining classification.

Table 2-18 Projection of Expenditure

**For Nivaga II and Nivaga III**

1,000 AU\$

Year	2011 *1	2012 *1	2013	2014	2015	2016	2017	2018	2019	2020	Remark	
Vessel	Nivaga II					(Nivaga III)					Remark	
Expenditure	Crew wage	434	398	416	416	416	447	447	447	447	NIII=NII+2 crew	
	Maintenance	540	432	540	345	345	139	171	246	171	Incl. workboat maintnance	
	Repair	↑	↑	↑	↑	↑	21	53	70	53	107	
	Class Survey	-	-	-	-	-	9	9	13	9	21	
	Dock	↑	↑	↑	-	-	77	77	130	77	204	
	Spare, etc.	↑	↑	↑	↑	↑	32	32	32	32	32	
	Fuel, LO	508	450	479	479	479	479	479	479	479	479	
	Victuring, Canteen	138	133	135	135	135	135	135	135	135	135	Estimated as same as the average amount of 2011 and 2012
	Water	2	0	1	1	1	1	1	1	1	1	
	Cleaning, Uniform, etc	10	11	10	10	10	10	10	10	10	10	
<b>Total</b>	<b>1,632</b>	<b>1,424</b>	<b>1,582</b>	<b>1,387</b>	<b>1,387</b>	<b>1,212</b>	<b>1,244</b>	<b>1,319</b>	<b>1,244</b>	<b>1,436</b>		
Remark												
	Dock	Planned	Emergency	Planned	-	-	Planned	Planned	Planned	Planned	Planned	
	Repair *2	High	Average	High	Average	Average	10% of MF	25% of MF	33% of MF	25% of MF	50% of MF	
	Class Survey	-	-	-	-	-	Annual	Annual	Inter.	Annual	Special	
	Spare, etc *2						15% of MF	15% of MF	15% of MF	15% of MF	15% of MF	

**For Manu Folau**

1,000 AU\$

Year	2011 *1	2012 *1	2013	2014	2015	2016	2017	2018	2019	2020	Remark	
Vessel	Manu Folau										Remark	
Expenditure	Crew wage	266	280	273	273	273	273	273	273	273		
	Maintenance	214	209	259	222	289	219	339	219	292	259	Incl. workboat maintnance
	Repair	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
	Class Survey	-	-	7	10	7	7	17	7	10	7	
	Dock	↑	↑	40	↑	70	↑	110	↑	70	40	
	Spare, etc.	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
	Fuel, LO	400	498	449	449	449	449	449	449	449	449	
	Victuring, Canteen	102	117	110	110	110	110	110	110	110	110	Estimated as same as the average amount of 2011 and 2012
	Water	1	0	1	1	1	1	1	1	1	1	
	Cleaning, Uniform, etc	12	12	12	12	12	12	12	12	12	12	
<b>Total</b>	<b>995</b>	<b>1,116</b>	<b>1,103</b>	<b>1,066</b>	<b>1,133</b>	<b>1,063</b>	<b>1,183</b>	<b>1,063</b>	<b>1,136</b>	<b>1,103</b>		
Remark												
	Dock	Done (JICA)	-	Planned	-	Planned	-	Planned	-	Planned	-	
	Class Survey	-	-	Annual	Annual	Inter.	Annual	Special	Annual	Inter	Annual	

**Total Expenditure of Nivaga and Manu Folau**

1,000 AU\$

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Nivaga	1,632	1,424	1,582	1,387	1,387	1,212	1,244	1,319	1,244	1,436
Manu Folau	995	1,116	1,103	1,066	1,133	1,063	1,183	1,063	1,136	1,103
<b>Total</b>	<b>2,627</b>	<b>2,540</b>	<b>2,685</b>	<b>2,453</b>	<b>2,520</b>	<b>2,275</b>	<b>2,427</b>	<b>2,382</b>	<b>2,380</b>	<b>2,539</b>

## **Chapter 3 Project evaluation**

### **3-1 Preconditions and necessary inputs by the recipient country**

As the construction of the Plan Vessel and the procurement of the Equipment are all undertaken by the Japan side, undertakings at the Tuvalu side is limited to the following.

(Arrangement during implementation of the Project)

- a) 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
- b) Acquisition of all licenses and certificates of the Government of Tuvalu, necessary for the Project, e.g. Provisional Certificate of Nationality, Radio Station License etc.

(Arrangements when each vessel has arrived at Tuvalu)

- c) Exemption of the Plan Vessel and the Equipment from customs duties, internal taxes and fiscal levies, and prompt customs clearance.
- d) Exemption of Japanese nationals from customs duties, internal taxes and fiscal levies for their services in Tuvalu.

(Shore facilities in Tuvalu)

- e) Preparation of parts store in Funafuti for large spare parts for the PMP of the Plan Vessel.

(Other)

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

### **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) To maintain the lifeline for the Tuvalu people, two vessels system is indispensable for the international and domestic sea transport. Sea transport in Tuvalu is, however, in a difficult situation due to aged N2, who is now low in the operation rate, high in the repair cost and even difficult to keep working. The project aims at maintaining sea transport system for passengers and cargoes in the safe and stable condition, through procurement of a new cargo passenger vessel for international and domestic services. The benefit of the project will extend to the entire population of Tuvalu (10,837 persons, 2012).
- (2) The Project helps “Reliable sea transport infrastructure” aimed by the “Te Kakeega II” (National Strategy for Sustainable Development: 2005 - 2015) as the prioritized strategy.

- (3) Daily maintenance work the existing vessels are all undertaken by the vessels crew, who have good fundamental skill even possible to make spare parts at their own work under the hardship difficult to get spare parts from makers. This project supports the Plan Vessel maintenance by adopting PMP (Preventive Maintenance Policy) to systemize vessel maintenance work for longer life of hull and machinery, and spare parts necessary for executing PMP are included in the Projects.
- (4) Cost for operation and maintenance of the Government vessels including the Plan Vessels will be budgeted as a part of MTF (Mid-Term Fiscal Framework), which had been started from about 2010 in the Government of Tuvalu.
- (5) The Plan Vessel will be so designed and constructed as to realize navigation safety, onboard comfort, environment friendliness, fuel economy thereby operation economy, as well as improving inconveniences of N2. The Plan Vessel will work showing such favorable performances.

### 3-2-2 Effectiveness

#### (1) Quantitative effect

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

Table 3-1 Quantitative indicators to measure effectiveness of the Project

Indicator	Standard indicator (2012)	Target indicator (2019, 4 years after the Project completion)
No. of passengers carried	About 4,000 pax/year (Average in past 3 years)	About 4,300 pax/year (Average in 3 years after the delivery)
Maintenance cost	AU\$ 432,000/year	AU\$ 182/year (Average in 3 years after the delivery)
Cargo operation time in the outer islands	About 6 h/island	About 4.5 h/island
Breakdown/stoppage days	About 10 days/year (Average in past 3 years)	1 day or less/year (Average in 3 years after the delivery)

#### (2) Qualitative effect

Qualitative effect brought by the Project will be as follows.

- a) Cargoes are regularly transported so that daily commodities become steadily available.
- b) Traveling within Tuvalu and abroad to Fiji become regular and convenient for Tuvalu people.

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 (M/D)
5. References

## 1 Member List of the Study Team

### 1-1 Member List (Field survey)

Function	Name and Organization
Team Leader	Mr. Satoshi WAKASUGI Advisor Transportation and ICT Division 1 Economic Infrastructure Department Japan International Cooperation Agency (JICA)
Project Coordinator	Ms. Akiyo MORITA Department of Human Resources for International Cooperation Japan International Cooperation Agency (JICA)
Project Manager / Sea transport planning	Mr. Toyonori WATANABE Fisheries Engineering Co., Ltd.
Hull and Machinery Design	Mr. Shuhei SOEDA Fisheries Engineering Co., Ltd.
Outfitting and Electric Design	Mr. Koji TAKESHITA Fisheries Engineering Co., Ltd.
Operation and management planning	Mr. Akio MARUYAMA Fisheries Engineering Co., Ltd.
Equipment and procurement planning / Cost estimation	Mr. Yuichi WACHI Fisheries Engineering Co., Ltd.

### 1.2 Member List (Explanation of Draft Report)

Function	Name and Organization
Team Leader	Mr. Satoshi WAKASUGI Advisor Transportation and ICT Division 1 Economic Infrastructure Department Japan International Cooperation Agency (JICA)
Project Manager / Sea transport planning	Mr. Toyonori WATANABE Fisheries Engineering Co., Ltd.
Hull and Machinery Design	Mr. Shuhei SOEDA Fisheries Engineering Co., Ltd.



## 2. Study Schedule

### 2.1 Field Survey

Date			Schedule
2	3	Sun	JICA and Consultants : Japan→Souel→Nadi→Suva
	4	Mon	Courtesy call to the Japanese Embassy and JICA office
	5	Tue	Ar. Funafuti Courtesy call to Prime Minister, Minister of Communications, Transport & Public Utilities, Assistant Secretary, MCT, and Chief Cabinet Secretary
	6	Wed	Discussion with Taskforce members, Design of Plan vessel
	7	Thu	Discussion with Taskforce members, Design of Plan vessel
	8	Fri	Survey of Nivaga II and Manu Folau Discussion with Taskforce members, Design of Plan vessel
	9	Sat	Design of Plan vessel
	10	Sun	Internal meeting, Design of Plan vessel and analisis of collected data
	11	Mon	Signing of Minutes of Discussions, Survey of Nivaga II
	12	Tue	JICA : Lv. Funafuti Consultants : Survey of Nivaga II
	13	Wed	Survey of Manu Folau
	14	Thu	Visit to Tuvalu Maritime Training Institute and hearing survey Design of Plan vessel and data analisis
	15	Fri	Design of Plan vessel and data analisis
	16	Sat	Survey of Nivaga II, Manu Folau
	17	Sun	Survey of Nivaga II (Equipment)
	18	Mon	Design of Plan vessel and data analisis
	19	Tue	Survey of Nivaga II, Design of Plan vessel and data analisis
	20	Wed	Discussion with Taskforce members, Design of Plan vessel
	21	Thu	Design of Plan vessel and data analisis
	22	Fri	Survey of Workshop for “Te Mataili”
	23	Sat	Internal meeting, Design of Plan vessel
	24	Sun	Internal meeting, Design of Plan vessel
	25	Mon	Internal meeting, Design of Plan vessel
	26	Tue	Final discussion with Taskforce members, Design of Plan vessel
	27	Wed	Discussion with the Development Plan Secretariat Meeting members
	28	Thu	Consultants : Lv. Funafuti

## 2.2 Explanation of Draft Report

Date			Schedule
5	28	Tue	Consultants : Japan→Souel→Nadi→Suva
	29	Wed	Nadi→Suva Courtesy call to JICA office
	30	Thu	Suva→Funafuti Courtesy call to Ministry of Communications, Transport & Public Utilities
	31	Fri	Discussion with Taskforce members
6	1	Sat	Survey of Nivaga II
	2	Sun	Internal meeting, Survey of stockplace for spare parts
	3	Mon	Discussion with Taskforce members
	4	Tue	JICA : Suva→Funafuti Discussion with Taskforce members
	5	Wed	Signing of Minutes of Discussions
	6	Thu	JICA and Consultants : Lv. Funafuti
	7	Fri	Nadi→Souel→Japan

### 3. List of Parties Concerned in the Recipient Country

Name	Organization
Hon. Willy Telavi	Prime Minister
Mr. Panapasi Nelesone	Chief Cabinet Secretary
Hon. Kausea Natano	Deputy Prime Minister and Minister of Communications, Transport & Public Utilities
Mr. Tepaukie Sotaga	Assistant Secretary, MCT (Ministry of Communications & Transport)
Mr. Tanielu Italeli	Ag. Director of Marine, MCT
Mr. Siila Tapuaiga	Ag. Assistant Marine Manager, MCT
<b>&lt; Taskforce members &gt;</b>	
Mr. Tepau Sotaga Paape	Assistant Secretary, MCT
Mr. Tanielu Italeli	Ag. Director of Marine, MCT
Mr. Siila Tapuaiga	Ag. Assistant Marine Manager, MCT
Mr. Nito Lipine	Chief Officer, DMPS
Mr. Leupena Pauele	Captain, MV Nivaga II
Mr. Salolo Tepoga	Chief Engineer, MV Nivaga II
Mr. Asolelei Aniteleni	Chief Officer, MV Manu Folau
Mr. Fanakenga Tinapa	Chief Engineer, MV Manu Folau
Mr. Iefata Paeniu	CEO, TMTI (Tuvalu Maritime Training Institute)
Mr. Leota Patiale	Chief Engineer, TMTI
Mr. Taimitasi Paelate	Chief Engineer, CNCO / Swire
Mr. Teitimani Simeona	Chief Officer, CNCO / Swire
<b>&lt; Workshop for MV. TE MATAILI &gt;</b>	
Mr. Lee Warncke	Technical Adviser
Mr. Saifoloi Talesi	Force Engineer
<b>&lt; MV. TE MATAILI &gt;</b>	
Mr. Eliuta Taula	MV. TE MATAILI Commanding Officer
Mr. Tavai Kaipeti	MV. TE MATAILI Charge Engineer
<b>&lt; JICA &gt;</b>	
Mr. Tomohide Uchida	Development Policy advisor

4. Minutes of Discussions (M/D)

4-1. Field Survey

**MINUTES OF DISCUSSIONS  
ON THE PREPARATORY SURVEY  
FOR THE PROJECT FOR CONSTRUCTION OF A CARGO/PASSENGER  
VESSEL IN TUVALU**

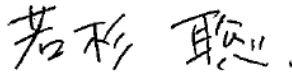
In response to a request from the Government of Tuvalu (hereinafter referred to as "GoT"), the Government of Japan decided to conduct a Preparatory Survey on the Project for "Construction of a Cargo/Passenger Vessel in Tuvalu" (hereinafter referred to as "the Project"). In accordance with this decision, Japan International Cooperation Agency (hereinafter referred to as "JICA") decided to commence the survey.

JICA sent the Preparatory Survey Team for the Field Survey (hereinafter referred to as "the Team"), which is headed by Mr. Satoshi Wakasugi, Advisor, Transportation and ICT Division 1, Transportation and ICT Group, Economic Infrastructure Department, JICA, and is scheduled to stay in the country from February 5<sup>th</sup> to February 28<sup>th</sup>, 2013.

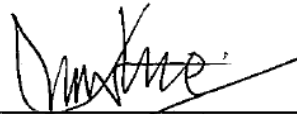
The Team held discussions with GoT Taskforce for the new vessel (hereinafter referred to as "the TF") and the officials concerned and conducted a field survey at the Project site.

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 a Draft Report of the Preparatory Survey.

Funafuti, February 11, 2013



Satoshi Wakasugi  
Leader  
Preparatory Survey Team  
Japan International Cooperation Agency  
Japan



Tepaukie Sotaga  
Assistant Secretary  
Ministry of Communications and Transport  
Tuvalu

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## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to build a cargo/passenger vessel (hereinafter referred to as “the new vessel”) replacing the existing cargo/passenger vessel Nivaga II, which is about 25 years old.

### 2. Project Site

As shown in Annex-1.

### 3. Responsible and Implementing Organizations

The responsible and implementing organization is the Ministry of Communication and Transport.

The organization charts are shown in Annex-2.

### 4. Item requested by GoT

After discussions with the Team, GoT requested the items below.

- Type: Cargo-Passenger vessel
- Total complement capacity: 318 persons (international) /379 persons (domestic)
- Dry cargo hold capacity : 450 m<sup>3</sup>

The Team will study other detailed specification such as Length Overall, Gross Tonnage, etc. according the fundamental requirements of the vessels, and JICA will assess the appropriateness of the request.

### 5. Japan's Grant Aid Scheme

5-1. GoT understands the Japan's Grant Aid Scheme and necessary measures to be taken by GoT. The Team explained the procedures for the Project as described in Annex-3 and Annex-4.

5-2. GoT agreed to take the necessary measures, as described in Annex-5 for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

### 6. Schedule of the Study

6-1. The Team will proceed with further studies in Tuvalu until February 28th , 2013.

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 May, 2013.

6-3. If the contents of the report are accepted in principle by GoT, JICA will complete the final report and send it to Tuvalu by August, 2013.

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7. Budget Allocation and Vessel Classification

- 7-1. GoT agreed to allocate necessary annual budget for the new vessel's (1) operation and maintenance, (2) continuous vessel classification, and (3) SOLAS satisfaction measurements.
- 7-2. GoT agreed to renew vessel classification for the existing vessel Manu Folau, another Japanese Grant Aid project vessel in 2001, by March 2013, and to notify JICA when the classification is renewed. GoT understands that without renewal of Manu Folau's vessel classification, the Project may not be approved by the Government of Japan.
- 7-3. The Team requested GoT to submit the expected annual budget plan for the new vessel to JICA by the end of May, 2013, and GoT agreed to submit it.

8. Other Relevant Issues

- 8-1. Both sides confirmed that it is essential that GoT undertake daily and periodic maintenance (including major overhaul) for the new vessel. Also, both sides confirmed that the new vessel to adopt PMP (Preventive Maintenance Policy). GoT agreed to implement PMP system properly, exchange and clean parts as scheduled, to prolong the new vessel's life term.
- 8-2. GoT agreed to prepare necessary storage space for some of the bigger spare part components for the new vessel at Funafuti port.
- 8-3. Both sides agree that Japanese technology such as LED light and solar power panel, to be included in the new vessel's design and specification.
- 8-4. In relation with the widening and deepening of the reef channel by New Zealand "Ship-to-Shore" Project, the Team will look into a possibility of larger workboat.
- 8-5. GoT and the TF will discuss on plan for Nivaga II after she is replaced by the new vessel, and notify the result of the discussion to JICA.
- 8-6. Both sides confirmed women trainees quarter will be considered when designing the new vessel.

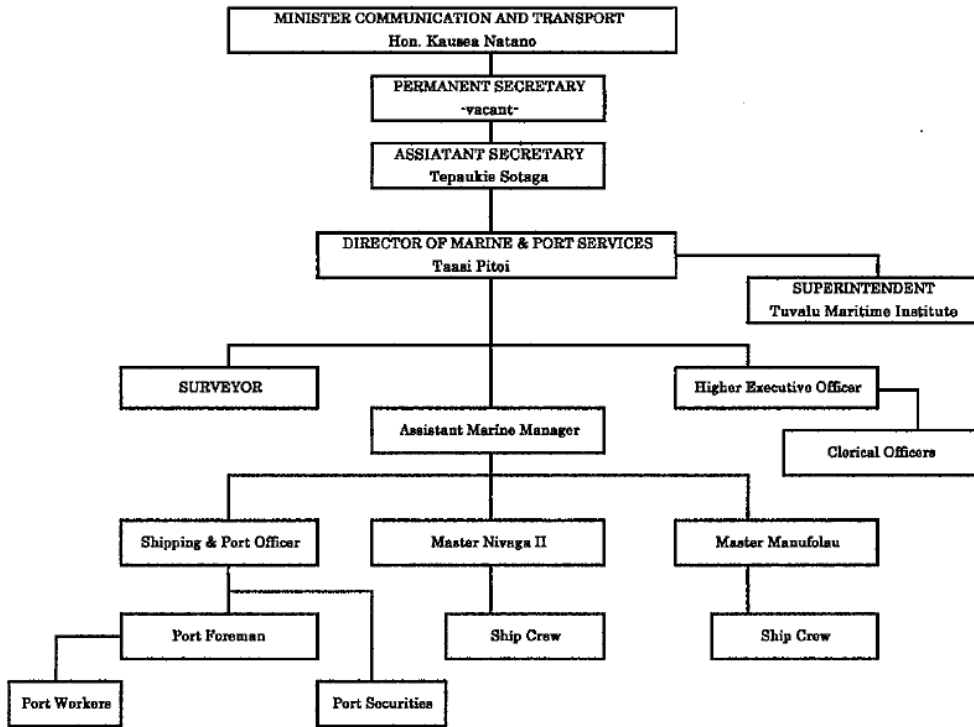
- Annex-1 Project Site
- Annex-2 Organization Charts
- Annex-3 Japan's Grant Aid
- Annex-4 Flow Chart of Japan's Grant Aid Procedures
- Annex-5 Major Undertakings to be taken by Each Government

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**ORGANIZATION CHART**  
MINISTRY OF COMMUNICATION AND TRANSPORT, DEPARTMENT OF MARINE & PORT SERVICES



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73



## 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 an 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.

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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.

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73

(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.

(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

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Annex-4 Japanese Grant Aid Flow Chart  
FLOW CHART OF JAPAN'S GRANT AID PROCEDURES

Stage	Flow & Works	Recipient Government	Japanese Government	JICA	Consultant	Contractor	Others
Application	Request (T/R: Terms of Reference)	✓					
	Screening of Project → Evaluation of T/R → Project Identification Survey*		✓	✓			
Project Formulation & Preparation	Preparatory Survey	Preliminary Survey* → Field Survey Home Office Work Reporting *if necessary	✓	✓	✓		
		Outline Design Study → Selection & Contracting of Consultant by Proposal → Field Survey Home Office Work Reporting	✓	✓	✓	✓	
		Explanation of Draft Final Report → Final Report Final Report	✓	✓	✓	✓	
Appraisal & Approval	Appraisal of Project		✓	✓			
	Inter Ministerial Consultation		✓				
	Presentation of Draft Notes	✓	✓				
	Approval by the Cabinet		✓				
Implementation	E/N and G/A (E/N: Exchange of Notes) (G/A: Grant Agreement)	✓	✓	✓			
	Banking Arrangement (A/P: Authorization to Pay)	✓					✓
	Consultant Contract → Verification → Issuance of A/P	✓		✓	✓		
	Detailed Design & Tender Documents → Approval by Recipient Government → Preparation for Tendering	✓		✓	✓		
	Tendering & Evaluation	✓		✓	✓	✓	
	Procurement/Construction Contract → Verification → A/P	✓		✓	✓	✓	
	Construction → Completion Certificate Recipient Government → A/P	✓		✓	✓	✓	
	Operation → Post Evaluation Study	✓		✓			
	Ex-post Evaluation	✓	✓	✓			
	Follow up						

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## 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 the vessel	•	
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 to be provided (procurement of fuel, spare parts and overhaul of the vessel)		•
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 with equipment on board by their own propulsion)	•	
	2) Tax exemption and custom clearance of the products (vessel 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 / be borne by the Authority without using the Grant		•
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 be maintained and used properly and effectively for the implementation of the Project		•
9	To secure necessary storage room for the spare parts at the port		•
10	To issue letter, certificate, license and other necessary documents necessary for designing, delivery, construction and operation of the vessel (example: exemption from ILO Maritime Labour Convention, issuance of radio station license, Provisional Certificate of Registry)		•
11	To bear all the expenses, other than those covered by the Grant, necessary for implementation of the Project		•
12	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)

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75

4-2. Explanation of Draft Report

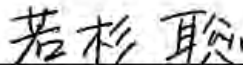
**MINUTES OF DISCUSSIONS  
ON THE PREPARATORY SURVEY  
ON THE PROJECT FOR CONSTRUCTION OF A CARGO/PASSENGER VESSEL IN  
TUVALU  
(EXPLANATION OF THE DRAFT OUTLINE DESIGN REPORT)**

In February 2013, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Preparatory Survey Team for the Project for "Construction of a Cargo/Passenger Vessel in Tuvalu" (hereinafter referred to as "the Project") to Tuvalu. The Preparatory Survey Team held a series of discussions with the concerned officials of the Government of Tuvalu (hereinafter referred to as "the Tuvalu side") and conducted field survey. After returning back to Japan, based on the discussions, field survey results and technical examination, JICA prepared a draft report of the survey as the Preparatory Survey on the Project (hereinafter referred to as "the draft report").

In order to explain and discuss with the Tuvalu side on the contents of the draft report, JICA sent to Tuvalu, the draft report explanation team (hereinafter referred to as "the Team"), which is headed by Mr. Satoshi WAKASUGI, Advisor, Transportation and ICT Division 1, Economic Infrastructure Department, JICA, from May 30 to June 6, 2013.

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

Funafuti, June 5<sup>th</sup>, 2013



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Satoshi WAKASUGI  
Leader,  
Preparatory Survey Explanation Team  
Japan International Cooperation Agency  
Japan



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Tepaukie Sotaga Paape  
Assistant Secretary,  
Ministry of Communications and Transport  
Tuvalu

## ATTACHMENT

### 1. Components of the Draft Outline Design Report

The Tuvalu side agreed and accepted in principle the contents of the draft report.

### 2. Japan's Grant Aid Scheme

The Tuvalu side reconfirmed the Japan's Grant Aid scheme. The Tuvalu side reassured to take the necessary measurements as explained by the Preparatory Survey Team and described in the Annex-5 of the Minutes of Discussions signed by both sides on February 11, 2013.

### 3. Schedule of the Study

JICA will complete the Final Outline Design Report of the Preparatory Survey in English, in accordance with the confirmed items and send the report to the Tuvalu side through JICA Fiji Office by the end of August, 2013.

### 4. Cost Estimation

Both sides agreed that in order to secure a fair and equitable procurement, the Project Cost Estimation 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 budget necessary for operation and maintenance of the vessels, for existing Manu Folau and Nivaga II and new cargo/passenger vessel (hereinafter referred to as "the New Vessel"), has been booked on Mid-Term Fiscal Framework (MTFF) budget plan. The Tuvalu side assured to allocate necessary budget for operation and maintenance of the vessels and will continue to book the necessary budget to the MTFF budget plan.
- 5-2. Both sides confirmed that it is essential that the Tuvalu side undertake daily and periodic maintenance, including major dry-dock overhaul as well as periodical rust removal for the New Vessel. Also, both sides confirmed that the New Vessel to adopt PMP (Preventive Maintenance Policy). The Tuvalu side agreed to implement PMP system properly, exchange and clean parts as scheduled, to prolong the new vessel's life term.
- 5-3. Tuvalu side agreed to retain the classification for both the New Vessel and Manu Folau properly.
- 5-4. Tuvalu side agreed to operate the New Vessel under maximum complement capacity (International voyage: 271 passenger and 49 crew, total 320 persons/Domestic voyage: 380 passenger and 49 crew, total 429 persons) for the safe and comfortable voyage. Tuvalu side confirmed to count the exact number of passengers onboard each trip, maybe by introducing new ticket (boarding card) system which could monitor passenger embarkation and disembarkation.
- 5-5. Manu Folau's vessel classification has been renewed by the classification society, Pacific Register of Ships Ltd, with several conditions. The Tuvalu side confirmed that the conditions listed below has been taken care of.

TS

(W)

- The wasted first length of anchor chain to be removed from port and starboard cables
- Anchor chain calibrations to be supplied
- Wasted access hatch on after poop to have lid repaired
- Emergency lighting to make operative
- Port and starboard anchor chains to be renewed to the extent required following review of calibration.

5-6. As agreed on item 8-2. of the Preparatory Survey Minutes of Discussions signed by both sides on February 11, 2013, the Tuvalu side will prepare necessary storage space for large spare parts (such as Propellers and cylinder liners) for the new vessel at the Funafuti port.





Annex-1 : Project Cost Estimation

This page is closed due to the confidentiality.

5. Reference

5-1. Projected expenditure of the Plan vessel

## Projected CPax Expenditure

### **1. Estimation period**

Nivaga II: 2011 - 2015

Nivaga III: 2016 - 2020

### **2. Estimation Base**

2011 & 2012: MTC Vote Book (The vote books are not complete. Lacking data are estimated from recorded data.)

2013 - 2015 Nivaga II

The planned dry docking will be carried out in 2013. No docking is assumed in 2014 and 2015.

Maintenance cost of 2013 is estimated very high because of planned docking, which usually includes many dock orders. Moderate maintenance will be expected in 2014 and 2015.

Other expenditure, such as crew wage, fuel cost, etc. will be same as the average of 2011 and 2012.

2016 - 2020 Nivaga III

The planned dry docking and classification survey will be carried out every year. The intermediate survey will be carried out in 2018 and the special survey in 2020.

Docking and berthing periods will be as follows:

	Annual	Intermediate	Special
Dock	3 days	5 days	10 days
Berth	4 days	5 days	10 days
Total	7 days	10 days	20 days

Refer to table 3 "Docking Expenditure Estimation" for the detailed estimated work.

Maintenance and repair cost other than works during docking was estimated based on Manufolau's 2011 and 2012 average expenditure as follows:

	2016	2017	2018	2019	2020
Survey	Annual	Annual	Inter.	Annual	Special
Maintenance	10%	25%	33%	25%	50%
Contingency	15%	15%	15%	15%	15%
Total	25%	40%	48%	40%	65%
Remark	Guarantee Period				

Crew wage will be increased because of the additional 2 crews.

Other expenditure, such as fuel cost, etc. will be same as the average of 2011 and 2012 of Nivaga II.

**No inflation is considered.**

**3. Result**

Nivaga II is suffering deterioration. Because of expensive hull repair cost and various machinery parts cost, the maintenance expenditure of Nivaga II is estimated to remain high.

After the introduction of Nivaga III, maintenance cost will be significantly reduced. In spite of additional classification survey fee and every year dry docking, the total expenditure of Nivaga III will be lower than Nivaga II.

The detailed estimations are indicated on table 1 "Projected CPax Expenditure Summary".



Table 2. Classification Survey Fee Estimation

NK Class Survey Fee for NII		cost base:		2013						
	Survey		Days	Hotel,etc*		Fright				
	USD	AUD		USD	AUD		AUD			
Annual	6000	5,823	3	540	524	2400				
Interm	10500	10,190	5	900	873	2400				
Special	18000	17,469	7	1200	1,165	2400				
*:USD150/day + 20%(taxi, etc)										
1 us dollar = 0.970496894 australian dollar										
Annual		2013	2014	2015	2016	2017	2018	2019	2020	Inflation
	Survey	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	0.0%
	Hotel	524	524	524	524	524	524	524	524	0.0%
	Fright	2400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	0.0%
	Sum	8,747	8,747	8,747	8,747	8,747	8,747	8,747	8,747	
Interm.		2013	2014	2015	2016	2017	2018	2019	2020	Inflation
	Survey	10,190	10,190	10,190	10,190	10,190	10,190	10,190	10,190	0.0%
	Hotel	873	873	873	873	873	873	873	873	0.0%
	Fright	2400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	0.0%
	Sum	13,464	13,464	13,464	13,464	13,464	13,464	13,464	13,464	
Special		2013	2014	2015	2016	2017	2018	2019	2020	Inflation
	Survey	17,469	17,469	17,469	17,469	17,469	17,469	17,469	17,469	0.0%
	Hotel	1,165	1,165	1,165	1,165	1,165	1,165	1,165	1,165	0.0%
	Fright	2400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	0.0%
	Sum	21,034	21,034	21,034	21,034	21,034	21,034	21,034	21,034	
		Results		9	9	13	9	21		

