

**PREPARATORY SURVEY REPORT  
ON  
THE PROJECT FOR  
THE IMPROVEMENT OF MEDIUM WAVE RADIO  
BROADCASTING NETWORK  
AND DISASTER PREVENTION  
IN  
TUVALU**

**NOVEMBER 2009**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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**YACHIYO ENGINEERING CO., LTD**

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## **PREFACE**

Japan International Cooperation Agency (JICA) conducted the preparatory survey on the project for the Improvement of Medium Wave Radio Broadcasting Network and Disaster Prevention in Tuvalu.

JICA sent to Tuvalu a survey team from March 10 to March 26, 2009.

The team held discussions with the officials concerned of the Government of Tuvalu, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Tuvalu in order to discuss a draft outline design, and as this result, 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.

I wish to express my sincere appreciation to the officials concerned of the Government of Tuvalu for their close cooperation extended to the teams.

November 2009

Toshiyuki Kuroyanagi  
Director General, Economic Infrastructure Department  
Japan International Cooperation Agency

November 2009

## **LETTER OF TRANSMITTAL**

We are pleased to submit to you the preparatory survey report on the project for the Improvement of Medium Wave Radio Broadcasting Network and Disaster Prevention in Tuvalu.

This survey was conducted by Yachiyo Engineering Co., Ltd., under a contract to JICA, during the period from February to November, 2009. In conducting the survey, we have examined the feasibility and rationale of the project with due consideration to the present situation of Tuvalu and formulated the most appropriate outline design for the project under Japan's Grant Aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Kiyofusa Tanaka

Project manager,

Preparatory Survey team on the project for  
the Improvement of Medium Wave Radio  
Broadcasting Network and Disaster Prevention  
Yachiyo Engineering Co., Ltd.

## **SUMMARY**

# SUMMARY

## ① Overview of the Country

Tuvalu is a country which is made up of nine coral atolls in the South Pacific. Kiribati, the Solomon Islands, Fiji and Samoa are situated to the north, west, south and east of Tuvalu respectively. The total land area is approximately 26 km<sup>2</sup> and the maximum elevation from sea level is approximately 4 m. Most of the land consists of coral and coral sand. Tuvalu belongs to the oceanic tropical climate zone and its weather is affected by subtropical westerlies and trade winds. Both the temperature and relative humidity are high throughout the year. The country is facing a problem of coastal erosion. The temperature is fairly constant throughout the year with a high maximum temperature, minimum temperature and mean annual temperature of 36.1°C, 28.3°C and 32.3°C respectively. Tuvalu has a total population of approximately 10,900 (2008; national statistics) which is dominated by Polynesians although Micronesians form a small minority.

Since its independence from British rule in 1978, the development of a self-reliant economy has been a major task but has been found to be difficult because of the small size of the country and the scarcity of domestic resources other than marine resources. The principal revenue sources for the government are fishing fees and overseas remittance by Tuvalu crewmen onboard foreign fishing boats. The fiscal deficit has historically been covered by the operating profit of the Tuvalu Trust Fund (established in 1987 with contributions by Tuvalu, the UK, Australia and New Zealand). The management of this fund produced a healthy surplus up to recent years when an annual loss has been incurred due to the downturn of the global financial market. Accordingly, the Government of Tuvalu is trying to reduce its fiscal expenditure.

## ② Background of the Project

The Vision 2015 (1998 - 2015) which is the national development strategy of Tuvalu identifies five priority areas for development: ① human resources development, ② public sector reform, ③ private sector development, ④ distant atoll development and ⑤ basic infrastructure development. In connection with ④ and ⑤, the Government of Tuvalu hopes to see the recommencement of MW radio broadcasting with national coverage to rectify the information gap between people on Funafuti Atoll and those on distant atolls and the establishment of a reliable means of conveying vital information to all its nationals at the time of an emergency or disaster.

The Te Kekeega II: National Strategy for Sustainable Development 2005 - 2015 which was formulated on the basis of the issues proposed by the Vision 2015 calls for the vitalisation of the national economy through human resources development with a view to promoting small-scale industries in Tuvalu. However, government finance has been chronically in the red, forcing the

national economy to rely on ODA. Vocational training, including business management training, and the creation of jobs are believed to be essential for social and human resources development to promote industrial activities in the country while training in the education and health sectors is equally important. The important issues identified by the Te Kekeega II include health (public appeal regarding communicable disease control measures), education and human resources development (training of teachers) and infrastructure development (creation of an economical means of information communication) and MW radio broadcasting is expected to function as an information tool to assist wide-ranging development efforts.

Radio broadcasting in Tuvalu commenced in 1975 when the former suzerain power established a broadcasting and information section in the pre-independence period to start MW radio broadcasting. While this body was subsequently changed to a public corporation, the difficulty of securing income through advertisements, etc. led to its reorganization as the Tuvalu Media Department (TMD) which is directly controlled by the Office of the Prime Minister. The eight distant atoll islands other than the capital of Funafuti Island have some 600 inhabitants each. To provide vital information for the people of Tuvalu living on atoll islands scattered over a vast expanse of the South Pacific Ocean, the TMD used to provide a nationwide MW radio broadcasting service based in Funafuti. Although this service has been suspended due to the collapse of the antenna tower, etc., the TMD has developed an alternative satellite-based FM broadcasting network based in Funafuti by installing a FM relay transmitter on each atoll island with the cooperation of Tuvalu Telecom, the public telephone company in Tuvalu. As both the regular maintenance work and response to any breakdown of the relay transmitter on each atoll island rely on the shipping service from Funafuti which is only available approximately once a month, any period of broadcasting suspension tends to be long, forcing the islanders to live without any outside information during this period. Meanwhile, the radio station building is now showing signs of aging after 30 years of service, especially the roof and interior, and is experiencing the leaking of rainwater and difficult opening and closing of the windows. The radio broadcasting equipment has also deteriorated and, despite of breakdowns of some equipment, it has become very difficult to repair as the production of spare parts was terminated long ago. Salt damage can be clearly seen with the air-conditioning units and communication cable connecting the radio station and transmitter house. Under such circumstances, it is clear that Tuvalu faces an urgent need for the complete renewal of the radio broadcasting system of the TMD to ensure the continuity of the public broadcasting service. However, the austere fiscal situation makes it difficult for the TMD to renew its equipment and facilities based on its self-help efforts. Because of this, a request was made for Japanese grant aid assistance for the provision of a MW radio broadcasting transmitter with wide coverage as well as for the construction of a new radio station building, etc. together with programme-production facilities and equipment.

### ③ Outline of the Study Findings and Project Contents

In response to the request made by Tuvalu, the Government of Japan decided to conduct a basic design study and the Preliminary Study Team was dispatched by the JICA to Tuvalu from 11th May to 4th June, 2008. Following the findings of the Preliminary Study Team, the Basic Design Study Team was dispatched to Tuvalu from 8th March to 9th April, 2009 to confirm the contents of the request and to conduct a site survey and other necessary work. On its return to Japan, the Basic Design Study Team examined the necessity and relevance of the Project based on information obtained during the field survey and the findings of analysis in Japan and compiled the Summary of the Basic Design. A mission to explain the contents of a draft report was then dispatched to Tuvalu from 26th July to 2nd August, 2009 and the present Basic Design Study Report was compiled, incorporating the findings of the above-mentioned mission. The Study Team has confirmed through discussions with the TMD as well as its own study that the TMD wants to revive its MW radio broadcasting service with new equipment because of the following two reasons.

- i. The rehabilitation of the only public broadcasting service in Tuvalu will establish a reliable means of information communication for distant atoll islands. As a result, the socioeconomic aspect of national life will become more stable and will improve.
- ii. The establishment of a MW radio broadcasting system will enable the provision of a steady radio broadcasting service for people on distant atoll islands.

The renewal of the radio station building, its facilities and programme-production systems through the implementation of the Project will make it possible for the TMD to broadcast educational programmes, health programmes and others to enlighten people along with news and entertainment programmes in clear sound.

Through discussions with the TMD to identify the equipment required to achieve the above objectives, the Study Team confirmed the high priority of the renewal of the MW antenna system, MW radio transmitter and programme-making equipment as well as the construction of a new radio station building. The outline of the basic design shown in the table below was compiled by the Study Team on its return to Japan, taking the findings of the field survey and results of discussions with the Tuvalu side into consideration.

Outline of the Basic Design

Item	Quantity
1. MW Antenna System	1 lot
2. 10 kW Medium Wave Transmitter	1 lot
3. Power Supply Equipment and Air-conditioning for Transmitter	1 lot
4. Main Control System	1 lot
5. ON AIR Studio System	2 lots
6. Production Studio System	1 lot
7. Editing System	1 lot
8. Equipment for News Gathering	1 lot
9. Maintenance Equipment and Tools	1 lot
10. Spare Parts	1 lot
11. Consumable Parts	1 lot

As the MW radio broadcasting system to be introduced under the Project can cover entire Tuvalu with the transmitter located in Funafuti, maintenance of the antenna and transmitter can be conducted in Funafuti where the TMD office is located, making the maintenance of any relay facilities on distant atoll islands unnecessary. This means that the maintenance of the radio transmission facilities in the capital of Funafuti will be enough to guarantee a stable radio broadcasting service for all people of Tuvalu.

As the Project sites are located on coastal lowland, the specifications for the radio station building and transmitter house include a high floor for protection from storm surge and ongoing rise of the sea level. Their external walls and outdoor facilities will be salt-resistant. The planned system configuration and equipment layout under the Project are designed to allow efficient programme-production using the existing equipment owned by the TMD for continual radio broadcasting when the building construction work and equipment renewal work are in progress. Moreover, recommendations are made for the personnel, training and financial plans based on discussions with the TMD on the operation and maintenance of the new facilities and equipment.

#### ④ Project Period and Estimated Project Cost

The body responsible for the overall implementation of the Project is the Office of the Prime Minister and the TMD is a department of this office. In implementing the Project under the grant aid scheme of the Government of Japan, the total cost of the Project to be implemented in accordance with the Japan's Grant Aid scheme will be determined before concluding the Exchange of Notes (E/N) for the Project. The main undertaking on the Tuvalu side is to secure space for equipment installation and to remove or relocate the existing equipment. The project period will be approximately 16.0 months, including the detailed design period and the equipment installation period.



## **⑤ Verification of the Relevance of the Project**

The existing MW transmitter broke down as a result of a fire at the transmitter house and cannot be repaired because of the difficulty to obtain spare parts for this equipment which is more than 30 years old. The present alternative FM broadcasting uses a satellite link and relay transmitter installed on individual distant atoll islands. The system frequently breaks down and swift and appropriate maintenance of the system is difficult due to the limited access to each island, resulting in the long suspension of the service of several months in some cases. While a stable and continual public broadcasting service in Tuvalu will require the renewal of the MW transmitter, antenna and studio equipment among others, the Government of Tuvalu is currently unable to secure a sufficient budget for the blanket renewal of the radio broadcasting station and associated systems. The present situation in Tuvalu indicates an urgent need for the renewal of the entire radio broadcasting system of the TMD to maintain the only public broadcasting system in Tuvalu and the Project is judged to be highly relevant to the situation in Tuvalu as well as the purpose of Japan's grant aid scheme.

The Project will result in enhanced and reliable radio broadcasting in Tuvalu through the construction of a new radio station building and transmitter house along with the provision of a new MW antenna system, MW transmitter, master control system, studio/editing equipment and others. While staff members of the TMD possess sufficient technical capability to operate and maintain the existing equipment, the wholesale renewal of equipment manufactured in the 1970's by the latest digital equipment under the Project means that they must acquire basic knowledge of the handling of digital equipment. For this reason, the contractor should dispatch Japanese engineers to Tuvalu to conduct OJT on the operation and maintenance of the new equipment, including the use of instruments, diagnosis of equipment failure, quality management and parts replacement. This will ensure appropriate operation and maintenance without the TMD experiencing any major technical problems.

The implementation of the Project is expected to achieve the following direct and indirect effects described below.

### **(1) Direct Effects**

#### **1) Restoration of MW Radio Broadcasting**

The recommencement of MW radio broadcasting will expand Tuvalu's radio broadcasting service to cover entire Tuvalu, including Funafuti Atoll and eight inhabited distant atolls, to expand the present unstable coverage of Funafuti Atoll and six distant atolls, making it possible to provide a continuous and uninterrupted radio broadcasting service to all people of Tuvalu.

## 2) Enhancement of Public Broadcasting

The range of new equipment to be provided under the Project will make it possible to produce important programmes for the people of Tuvalu, such as those on health and education, as well as disaster warnings, fulfilling the obligation of a public radio broadcasting service to provide a diverse range of programmes for the people of Tuvalu.

## 3) Reduction and Improvement of Maintenance Work

Unlike the present FM radio broadcasting service via a satellite link, the maintenance cost for facilities on distant atolls will not be required, making the overall maintenance work for the broadcasting system much easier.

## (2) Indirect Effects

### 1) Educational Effect of Public Broadcasting

As a public radio broadcasting service, diverse educational programmes can be broadcast to the people of Tuvalu, improving the daily lives of people through their improved awareness of disaster prevention, health and safety requirements.

### 2) Mitigation of Damage by Natural Disasters

The newly restored MW radio broadcasting service will be able to widely transmit information to the people of Tuvalu, making it possible for people to receive vital information on disaster prevention in advance. Consequently, it can be expected that damage caused by natural disasters in Tuvalu will be mitigated.

As the Project is expected to have not only the major effect of making continual radio broadcasting a reality but will also contribute to the promotion of a national programme as well as the improvement of national life in such aspects as education, health and disaster prevention in Tuvalu, its implementation with Japan's grant aid is judged to be highly appropriate. The operation and maintenance aspect of the Project should not pose any problems for the implementation of the Project as the technology transfer by means of OJT, etc. by Japanese engineers will satisfactorily secure the required technical standard for this purpose with the current manpower and corresponding system in Tuvalu.

It will be necessary for the Tuvalu side to conduct the following tasks to ensure the smooth achievement and continuation of the expected effects of the Project.

- 1) Completion of the relocation of the existing equipment and setting up of a temporary radio station prior to the commencement of the construction work by the Japanese side

- 2) Continuation of an effective operation and maintenance system by securing the necessary manpower at the TMD and providing intensive training
- 3) Transfer of operation and maintenance skills regarding the use and repair of the new digital broadcasting equipment and building maintenance (new radio station building and transmitter house) to staff members of the TMD

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ツバル国 位置図  
Location map of Tuvalu

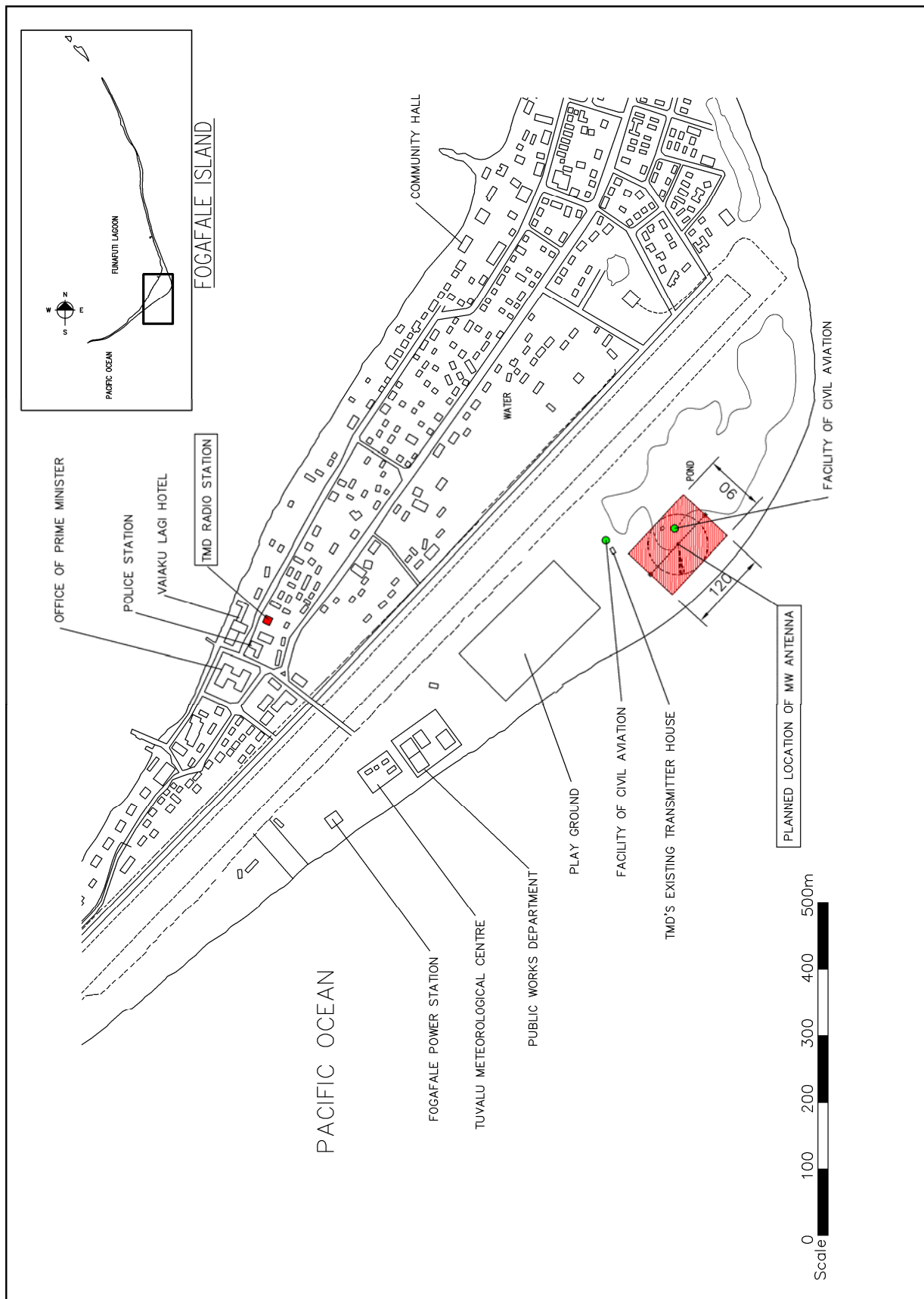


ツバル国 全図  
Overall map of Tuvalu



フナフチ環礁全図  
Overall Map of Funafuti Atoll

Location Map of the Project Site (1/2)



Location Map of the Project Site (2/2)

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## ABBREVIATIONS

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
AVR	Automatic Voltage Regulator
A\$	Australian Dollar
BBC	British Broadcasting Corporation
COP	Conference of Parties
CIF	Consolidated Investment Fund
EIA	Environmental Impact Assessment
ENG	Electric News Gathering
EU	European Union
E/N	Exchange of Notes
FM	Frequency Modulation
GDP	Gross Domestic Product
GNI	Gross National Income
GSM	Global System for Mobile Communications
G/A	Grant Agreement
ISO	International Organization for Standardization
ITU	International Telecommunication Union
JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standards
M/D	Minutes of Discussion
NBT	National Bank of Tuvalu
OJT	On the Job Training
PINA	Pacific Islands News Association
PRSP	Poverty Reduction Strategy Paper
SDE	Social Development Expenditure
UNDP	United Nations Development Programme
UPS	Uninterrupted Power Supply
TEC	Tuvalu Electricity Corporation
TMC	Tuvalu Media Corporation
TMD	Tuvalu Media Department
TTC	Tuvalu Telecommunication Corporation
TTF	Tuvalu Trust Fund
UHF	Ultra High Frequency
VHF	Very High Frequency
WHO	World Health Organization

## **CHAPTER 1**

### **BACKGROUND OF THE PROJECT**

# **CHAPTER 1 BACKGROUND OF THE PROJECT**

## **1.1 Background and Outline of the Project**

### **(1) Necessity for the Project**

Tuvalu is a country which is made up of nine coral atolls. Except for Funafuti Atoll where the capital is located, the remaining eight coral atolls have some 600 inhabitants each, living a primarily self-sufficient life. These atolls are linked by two boats, including one provided by Japan. However, the service frequency is approximately once a month and the service is often delayed or even cancelled due to a cyclone or mechanical failure.

The Tuvalu Media Department (TMD) which was established in 1975 constructed a radio station in the same year to provide vital information for the people of Tuvalu who are scattered over a vast area of the South Pacific. In 1978, the TMD procured the existing basic equipment for radio broadcasting to commence nationwide MW radio broadcasting. However, the MW transmitter was put out of action by the collapse of the antenna and other reasons. Radio broadcasting to distant atolls has since been replaced by FM broadcasting with the self-help efforts of the TMD using the satellite link owned by Tuvalu Telecom Corporation (TTC). Although TTC engineers based on Funafuti are responsible for the routine maintenance of the satellite transmission network equipment and FM transmitters on distant atolls, the lack of smooth transport between Funafuti and distant atolls means the lengthy discontinuation of the broadcasting service on some occasions, forcing the inhabitants of these distant atolls to live without any outside information. Meanwhile, the radio station building is now showing signs of aging after 30 years of service, especially the roof and ceiling, and is experiencing the leaking of rain and difficult opening and closing of the windows. The radio broadcasting equipment has also deteriorated and it has become very difficult to obtain spare parts, the production of which was terminated long ago. Salt damage can be clearly seen with the air-conditioning units and communication cable connecting the radio station and transmitter house.

Under these circumstances, continual public broadcasting to provide all people of Tuvalu with vital information will require a shift from the present distributed broadcasting network with the installation of a FM receiver on each atoll to a centralised broadcasting network with the setting up of MF radio broadcasting facilities in Funafuti Atoll for wide coverage. There is also an urgent need for the complete renewal of the radio station facilities, ranging from the studio for programme recording and the programme storage facilities to the master control room to send programmes to the transmitter house. As part of the planning process for such renewal, a suitable system for the broadcasting service operating system of the TMD must be carefully examined

based on thorough analysis of the local knowledge of the latest broadcasting equipment, technical data affecting future operation and the local capacity to respond to mechanical breakdowns as these issues will greatly affect the reliability of the broadcasting service. Moreover, careful consideration will be required for project implementation, including arrangements to minimise interruption to broadcasting during the switching-over from the present system to the new system. While the TMD has technical capability relating to radio broadcasting as evidenced by the relevant service it has provided up to the present, it finds it difficult to formulate a large-scale project which includes the transmitter and other facilities such as that presently proposed because of its limited technical expertise in this area. From the financial point of view, while the TMD can renew minor equipment as part of its routine maintenance, it cannot provide the huge budget required to renew the entire broadcasting system, including the station building.

Given the background of the Project described above, it is clear that Tuvalu faces an urgent need for the complete renewal of the radio broadcasting system of the TMD to ensure the continuity of the public broadcasting service. Accordingly, the implementation of the requested Project is believed to be highly relevant to the principle and purpose of Japan's ODA.

## (2) Outline of the Request

At the time of the Preliminary Study, the request made by the Tuvalu side included an OB van. Through the consultation with the Tuvalu side regarding the necessity and purpose of this van, the Study Team concluded that the priority of the van is low. Consequently, both sides confirmed the contents of the request listed in Table 1.1-1 for the purpose of operating and maintaining the stable radio broadcasting service, which is currently unstable.

Table 1.1-1 Contents of the Request

	Item	Description	Quantity
1	Radio station building	ON AIR studio (2); programme production studio (1); master control room; maintenance room; reference room (also acting as an editing room); office; meeting room; toilet	300 m <sup>2</sup>
2	MW antenna system	This will be sited at a side of the runway between the play ground and pond.	1 lot
3	MW transmitter	10 kW MW transmitter	1 lot
4	Automatic voltage regulator (AVR)	AVR and auxiliary equipment	1 lot
5	Master control room equipment	Monitoring and control of the studios and programme links	1 lot
6	Studio equipment	ON AIR studio equipment; production studio equipment; editing equipment; reporting equipment	1 lot
7	Cables and spare parts	Consumables for start-up and emergency repair parts	1 lot

## **1.2 Natural Conditions**

### **(1) Terrain**

Two project sites are planned to accommodate the new radio station building of the TMD and the transmission facilities, including the antenna, respectively. These sites are located on opposite sides of the airport runway in the central part of Fongafale Island in the southeastern part of Funafuti Atoll. This narrow Fongafale Island stretches in the north-south direction with a maximum elevation of approximately 4 m. As such, the entire island is virtually flat with little undulation. The existing radio station building located to the west of the runway is on the lagoon side of the atoll in an area with many public facilities, such as the office of the Prime Minister, police station, TTC office and Viaku Lagi Hotel. Meanwhile, the planned site for the transmitter house and antenna is surrounded by some 3 m high cliffs facing the ocean to the southeast and a play ground, Public Works Department building, Tuvalu Meteorological Centre building and power station in that order to the southwest. There is a pond to the northeast and the airport runway stretches from north to south to the northwest of this site. A some 4 m wide road runs between the runway and the planned antenna site.

### **(2) Climate**

Tuvalu has an oceanic tropical climate and the weather is affected by subtropical westerlies and trade winds. Both the temperature and relative humidity are high throughout the year. Although hurricanes do not hit Tuvalu frequently, three hurricanes in 1997 caused considerable damage. The temperature is fairly constant throughout the year with a high maximum temperature, minimum temperature and mean annual temperature of 36.1°C, 28.3°C and 32.3°C respectively. The relative humidity is also high throughout the year with a maximum humidity, minimum humidity and mean annual humidity of 99%, 62% and 79% respectively. The rainy season lasts from November to April and the highest monthly rainfall of some 400 mm is observed in January. The dry season lasts from May to October and the monthly rainfall in this period is some 230 - 270 mm. The annual rainfall is approximately 3,400 mm. A maximum wind velocity of 30 m/sec was recorded in 1987. The prevailing wind direction is westerly during the rainy season (from November to April) and easterly during the dry season (from May to October). Thunderstorms occur during the rainy season with approximately 15 thunderstorm days a year.

### **(3) Ground**

The ground at the planned construction sites for the new radio station, antenna and transmitter house consists of coral and coral sand and is strong enough not to suffer from uneven subsidence because of the planned structures.

Judging from the state of seawater discharge from the ground at the play ground side of the runway as observed by the Study Team, the groundwater table is inferred to be fairly high.

The findings of the natural conditions survey indicate that the planned site for the new radio station building consists of a sandy layer to GL -2.0 ~ -2.5 m, supported by a coral layer beneath. Based on this, the bearing capacity of the ground for the building foundations is assumed to be 60 kN/m<sup>2</sup>. In the case of the planned site for the antenna and transmitter house, the geological survey findings for this site indicate that there is a coral layer at a depth of GL -0.5 m. Accordingly, the allowable bearing capacity of the ground at this site is set at 150 kN/m<sup>2</sup>.

### **1.3 Environmental and Social Considerations**

As the facilities and equipment to be built or installed under the Project will simply replace the existing facilities and equipment, there will be no fresh impact on the environment. As such, it has been confirmed that the Project falls outside the scope of an environmental impacts assessment or any other similar environmental impact check. However, there is a place where the existing mangrove trees require removal as part of the weeding process to clear the planned MW antenna site by the Tuvalu side. Transplanting work will be conducted by the Tuvalu side wherever such work is deemed to be appropriate.

## **CHAPTER 2**

### **CONTENTS OF THE PROJECT**

## **CHAPTER 2 CONTENTS OF THE PROJECT**

### **2.1 Basic Concept of the Project**

#### **(1) Superior Goal and Project Goal**

The VISION 2015 (1998 - 2015) which is the national development strategy of Tuvalu identifies the following five priority areas for development.

- ① Human resources development
- ② Public sector reform
- ③ Private sector development
- ④ Distant atoll development
- ⑤ Basic infrastructure development

In connection with ④ and ⑤, the Government of Tuvalu hopes to see the recommencement of MW radio broadcasting with national coverage to rectify the information gap between people on Funafuti Atoll and those on distant atolls and the establishment of a reliable means of conveying vital information to all its nationals at the time of an emergency or disaster.

MW radio broadcasting is expected to play an important role as a means of communication in connection with the issues identified by Tuvalu's National Strategies for Sustainable Development 2005 - 2015 (Te Kakeega II) announced by the Government of Tuvalu in September, 2005 at the UN Headquarters. The particularly relevant issues are ① health (public appeal regarding communicable diseases control measures), ② education and human resources (training of teachers) and ③ infrastructure development (creation of economical means of information communication). Moreover, prior to the Hokkaido Toyako Summit in July, 2008, Japan expressed its intention to provide support for Tuvalu's efforts to combat the adverse impacts of climate change (in the three fields of coastal conservation, disaster prevention and alternative energies). The present Project is part of Japan's cooperation for disaster prevention.

Against this background, the superior goal of the requested grant aid project is "the creation of socially and economically stable and improved national life through the restoration of the sole public broadcasting in Tuvalu to establish a means of information communication with distant atolls". To achieve this goal, the Project aims at developing a MW radio broadcasting system to ensure a reliable and stable MW radio broadcasting service for all atolls in Tuvalu.



## (2) Outline of the Project

The project goal is the provision of a stable radio broadcasting service throughout Tuvalu to replace the current unstable service. For this purpose, the introduction of a MW radio broadcasting service with the necessary systems and equipment as listed in Table 2.1-1 is planned. With the implementation of the Project, the current FM radio broadcasting service, the maintenance of which at outer atolls is difficult due to transport restrictions, will be replaced by a MW radio broadcasting service based on Funafuti Atoll with the prospect of the much easier maintenance and higher stability of the service.

Table 2.1-1 Contents of Cooperation

Description	Quantity
1. MW Antenna System	1 lot
2. 10kW Medium Wave Transmitter	1 lot
3. Power Supply Equipment and Air Conditioning for Transmitter	1 lot
4. Master Control System	1 lot
5. ON AIR Studio System	2 lots
6. Production Studio System	1 lot
7. Editing System	1 lot
8. Equipment for News Gathering	1 lot
9. Maintenance Equipment and Tools	1 lot
10. Spare Parts	1 lot
11. Consumable Parts	1 lot

## 2.2 Basic Design of the Requested Japanese Assistance

### 2.2.1 Design Policy

#### (1) Basic Concept

The basic concept of the Project is the construction of a new radio station building along with the procurement and installation of a MW radio broadcasting system so that all atolls in Tuvalu are covered by MW radio broadcasting using the frequency of 621 kHz (transmission output of 10 kW and an antenna height of 45 m) already registered with the International Telecommunication Union (ITU).

The FM radio broadcasting service currently provided by the TMD covers not only Funafuti Atoll but also eight distant atolls using the relay FM transmitter on each atoll via the satellite link owned by Tuvalu Telecom (broadcasting is currently unavailable on two atolls because of breakdown of the transmitter). While Tuvalu Telecom is responsible for the maintenance of the said FM transmitters on distant atolls as mentioned earlier, the actual state of maintenance is

inadequate because of the shortage of engineers. Once the system on a distant atoll breaks down, restoration takes quite a long time and local FM broadcasting can be suspended for several months.

For the MW radio broadcasting service to be established under the Project, the selection of Funafuti as the transmitter site will enable the coverage of entire Tuvalu using the output level registered with the ITU. Through consultations between the Tuvalu and Japanese sides, it has been confirmed that the maintenance of all of the new antenna, transmitter and other radio broadcasting facilities and equipment can be promptly conducted by the TMD with little difficulty as they will all be located on Funafuti Atoll on which the TMD is also located.

## (2) Design Concept Regarding the Natural Conditions

### 1) Temperature and Relative Humidity

According to meteorological data for 2008 obtained from the Tuvalu Meteorological Centre, the maximum temperature and minimum temperature in the project area were 33.0°C and 22.9°C respectively. As the main equipment of the MW radio broadcasting system to be procured under the Project will basically be used in an air-conditioned room, no special measures are required to deal with the outdoor air temperature and humidity. However, for the design of the indoor temperature, the design outdoor air temperature will be set at 35°C and the maximum allowable temperature for the system in general will be set at 40°C so that the performance and functions of the system and its equipment can be secured. The minimum design wind velocity for the purpose of structural design is set to be 30.0 m/sec while the rainy season from November to April should be duly considered in the planning of the installation work.

### 2) Storm Surge

There are records of storm surge damage in areas near the sites for the planned new radio station building and transmitter house. The floor levels of these buildings will be determined in consideration of past flood records and the need for protection from recent as well as future rises of the sea level as in the case of the design for nearby public buildings. The floor height of the radio station building is set to be 100 m because of the planned introduction of a water tank below as described later. The floor height of the transmitter house will also be 100 cm above the ground as a safety precaution as this will be constructed in a pond area of which the elevation is lower than that of the surrounding area.

### 3) Salt Damage

The planned sites for the radio station building, transmitter house and MW antenna are located along the coast. Salt-resistant specifications will, therefore, be considered for the outer walls, antenna mast and outdoor air-conditioning units, all of which will be exposed to outside air containing salt.

### 4) Earthquakes

No earthquakes have been recorded in Tuvalu and seismic force will not be considered for the design of the buildings, foundations and equipment to be constructed or installed under the Project.

## (3) Design Concept Regarding the Social Conditions

Most people of Tuvalu are Christians and there are no prominent customs which will greatly affect the construction schedule, etc., such as the Islamic custom of Ramadan. However, the planned construction site for the new radio station building is near public facilities and private houses and it will be necessary to publicise the purpose, duration and method of the construction work to local residents prior to the commencement of the work and also to hold meetings at community halls to ensure a good understanding of the Project among local residents. There is no water supply system in Funafuti and the salinated groundwater means that it is necessary to depend on rainwater. While the water to be used for the construction work under the Project will, in principle, be rainwater, water from a desalination plant provided by Japan's ODA in the past will be used if there is a shortage of rainwater supply for the construction work in view of the chronic water shortage in Funafuti due to population concentration and other reasons.

## (4) Design Concept Regarding the Local Construction Industry

The TMD runs the sole radio broadcasting station in Tuvalu and local construction companies lack experience of directly conducting large-scale construction work for a radio station or large plant. Their involvement in large-scale construction work is almost exclusively limited to the supply of labour as a subcontractor. Accordingly, only labour, small transportation vehicles and small construction machinery can be procured locally. In principle, construction materials will be procured locally as much as possible although the local supply capacity is quite limited, even for coral sand and aggregates to make concrete, and it will be practically impossible to procure the required amounts of construction materials by the Project in Tuvalu. Therefore, these materials will be imported from Japan and/or neighbouring third countries such as Fiji. As mentioned earlier, the new radio station building to be constructed under the Project will be located near other public facilities and private houses and, therefore, the introduction of security fencing and

other safety measures will be considered to protect local residents and construction workers during the construction period.

(5) Design Concept Regarding Procurement, Including Third Country Procurement

None of the broadcasting equipment to be procured and installed under the Project is manufactured in Tuvalu. While it can be procured in Japan or a third country, there are few Western manufacturers with a well-established after-service system to deal with problems or repairs or the supply of spare parts. Given the necessity to reduce the overall cost and to ensure competition as required by Japan's grant aid scheme, Western countries will be included as possible procurement sources for some of the equipment. As the broadcasting system to be installed must be highly reliable to serve a state-run broadcasting station with a social responsibility, a single Japanese manufacturer should, therefore, develop a system which may incorporate third country products and conduct system compatibility tests to guarantee the performance of the entire system.

(6) Design Concept Regarding the Equipment Grade

There are largely three categories of broadcasting equipment, i.e. for home use, for business use and for broadcasting station use. The equipment in the last category is designed to ensure continual trouble-free operation based on a high level of reliability and redundancy of the equipment circuits. As a result, equipment for broadcasting station use is more expensive than that in the other categories. Equipment for broadcasting station use will be selected for the Project for such key areas of operation of the broadcasting station as the MW antenna system, transmitter, master control system, studio system and editing system. Meanwhile, buildings will be given the rigid RC structure in principle as in the case of joint government buildings in Tuvalu.

(7) Design Concept Regarding the Procurement Method and Construction Period

The equipment procured in Japan or a third country will mainly be transported to Tuvalu by sea. The TMD site where the new radio station will be located is a driving distance of some 10 minutes from the Port of Funafuti and no special problems regarding inland transportation are anticipated. Approximately 40 days will be required to transport the goods from Japan to the project sites.

Prior to the commencement of the radio station building construction work by the Japanese side, it will be necessary for the Tuvalu side to temporarily suspend the current FM radio broadcasting in order to remove and relocate the equipment from the existing radio station building. It will also be necessary for the Tuvalu side to complete the ground clearance and removal of any obstructions at the MW antenna site. The personnel plan for the Project must be efficient in that the work supervision by the consultant ensures the provision of appropriate advice and guidance

for the counterparts in Tuvalu so that the undertakings by the Tuvalu side are completed without delay.

#### (8) Design Concept Regarding Communications

In the past, a telephone line of Tuvalu Telecom was used as a programme transmission line from the master control room to the transmitter house. Following the collapse of the antenna mast in 2002, this transmission line was left unused and was eventually cut off near the existing radio station building. As the maintenance condition of the laid Telecom cables is poor, the reliable transmission of broadcasting programmes using these cables is believed to be unrealistic. Therefore, the use of the radio transmission method using a STL (studio transmission link) will be planned under the Project in view of its easy installation and maintenance. A STL is commonly used by broadcasting stations. In Japan, broadcasting stations use both radio transmission and cable transmission for mutual back-up. Under the Project, the existing FM broadcasting (frequency: 101.1 MHz) will be used as the STL medium. It is assumed that it will not be possible to operate the existing seven year old FM transmitter much longer as the voltage standing wave ratio (VSWR) alarm is continually lit in addition to its conspicuous over-heating. For this reason, a new FM transmitter will be installed as a STL transmitter/receiver under the Project to provide the main transmission path between the master control room of the radio station building and the transmitter to be installed near the antenna site. At the same time, a cable line of Tuvalu Telecom, which will be installed by the Tuvalu side, will act as a back-up transmission path to enhance the reliability of radio broadcasting.

#### (9) Design Concept Regarding Electrical Installations

Power supply to the existing TMD radio station building is made via three lines. Two of these are commercial power lines operated by the Tuvalu Electricity Corporation and the other line is an emergency power supply line connected to an emergency generator owned by Tuvalu Telecom. This emergency system is automatically activated when the commercial power supply suffers a failure and power is supplied to the master control room and news studio because of their highest priority for continued broadcasting. The Study Team measured the voltage of the commercial power supply which is normally used.

Place of measuring : production studio

Period of measuring : from 11<sup>th</sup> (18:40) to 12<sup>th</sup> (16:48) March, 2009

Results : see Fig. 2.2-1

Remarks : While the nominal voltage in Tuvalu is 240 V (single phase), the measured mean voltage was around 204 V during the daytime and 208 V at night. Although the Study Team did not experience a power failure, these measured values suggest that the supplied voltage is below the generally allowable range (-10%) for voltage drop. Such a low voltage

caused an output decline of air-conditioning units and also has an adverse impact on the electronic circuits of broadcasting equipment, possibly leading to abnormal heating, malfunctioning and/or breakdown. The installation of a UPS (uninterruptible power supply unit with an automatic voltage adjustment function) with a capacity comparable to the power consumption of equipment on the power supply side of the equipment to be installed at the new radio station building is planned. During the field survey, the Study Team advised on the need of TEC to maintain an appropriate load balance by means of adjusting the tap for the distribution transformer which supplies power to the TMD radio station building and/or changing the connection to another distribution transformer.

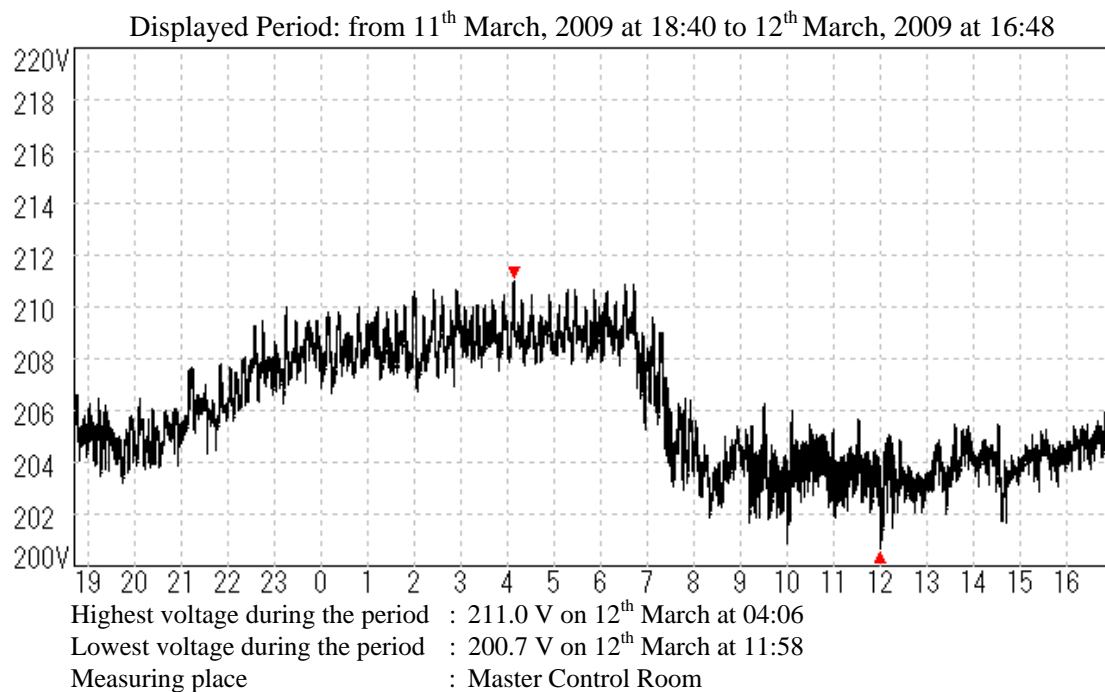


Fig. 2.2-1 Voltage Measuring Results at the TMD Building



- ③ Annual Rainfall 3,059 mm (2008)
- ④ Wind Velocity Maximum : 30.0 m/sec (2008)
- ⑤ Seasons
  - Rainy Season November to April
  - Dry Season May to October
- ⑥ Earthquakes No record
- ⑦ Site Conditions
  - Elevation (above mean sea level)  $\leq 5$  m (radio station building)  
 $\leq 2$  m (MW antenna and transmitter house site)
  - Bearing Strength 60 kN/m<sup>2</sup> (radio station building site)  
150 kN/m<sup>2</sup> (MW antenna and transmitter house site)
  - AC Power Supply 415 V (3 phase) and 240 V (single phase, 50 Hz)

## 2) Applicable Design Standards

	Name of Code/Standards	Description
(a)	IEC (International Electrotechnical Commission)	Applied to electrical products in general
(b)	ISO (International Organization for Standardisation)	Applied to industrial products in general
(c)	JIS (Japanese Industrial Standards)	As above
(d)	JEC (Japanese Electrotechnical Committee)	Applied to electrical products in general
(e)	JEM (Japan Electrical Manufacturers' Association)	As above
(f)	JEAC (Japan Electric Association Codes)	As above
(g)	JCS (Japanese Cable Makers' Association Standard)	Applied to electrical wires and cables
(h)	EIAJ (Electronic Industries Association of Japan)	Applied to electrical products in general
(i)	ITU (International Telecommunication Union)	As above
(j)	SMPTE (Society of Motion Picture and Television Engineers)	Applied to broadcasting equipment in general
(k)	AES/EBU (Audio Engineering Society and European Broadcasting Union)	As above (digital audio standards)
(l)	ICAO (International Civil Aviation Organization)	Applied to antenna masts
(m)	EIA (Electric Industries Alliance)	As above
(n)	AIJ (Architectural Institute of Japan)	Applied to building design

## (3) Facilities Plan

### 1) Planning Outline for Each Facility

The scale of the radio station building and transmitter house to be constructed under the Project is set at similar to that of the existing facilities. The selection of the necessary components and area as well as technical specifications of each studio, room or other spaces referred to the design of an ordinary radio station building consisting of the minimum number of on-air studios and recording studios, design contents of the construction plans of past grant aid projects and situation of use of the studios, rooms and other spaces in a radio station building in active operation. Because of the absence of any relevant building design



standards in Tuvalu, Japanese building standards were referred to for the building design. Records indicate that areas near the planned construction sites have suffered storm surge damage in the past. In view of the relevant flooding records and building design adopted for public facilities nearby, the floor level is set at 100 cm above ground to protect the building from occasional storm surge as well as the recent and future rises of the sea level. As the planned construction sites are located along the coast, salt-resistant specifications will be adopted for the outer walls, antenna mast and outdoor air-conditioning units, all of which will be exposed to outside air containing salt. The planned facilities and their specifications are outlined below.

## Project Contents

### < A. Radio Station Building >

#### (1) Construction of a new radio station building (RC single story)

Floor areas of the main rooms

- ON AIR studio	: 18 m <sup>2</sup>
- Production studio	: 72 m <sup>2</sup>
- Master control room/maintenance room	: 18 m <sup>2</sup>
- Reception hall	: 22 m <sup>2</sup>
- Administration office	: 100 m <sup>2</sup>
- Machine room	: 30 m <sup>2</sup>
- Others	: 76 m <sup>2</sup>
Total	: 336 m <sup>2</sup>

#### (2) Eaves height : GL +5.5 m

#### (3) Auxiliary systems for the building

Electrical systems : power receiving system; trunk in-house wiring; lighting system; telephone/interphone system; internet system

Mechanical systems : air-conditioning and ventilation system; water supply and drainage system; sanitary installations; water tank beneath the floor (60m<sup>3</sup>)

### < B. Transmitter House and Antenna Foundations >

#### (1) Construction of a new transmitter house (RC single story)

Floor area: 36 m<sup>2</sup>

#### (2) Eaves height : GL +4.5 m

#### (3) Auxiliary systems for the building

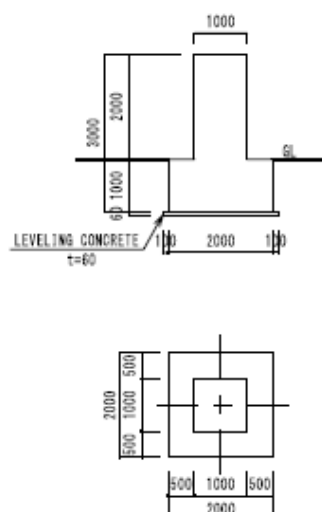
Electrical systems : lighting

Mechanical systems : ventilation

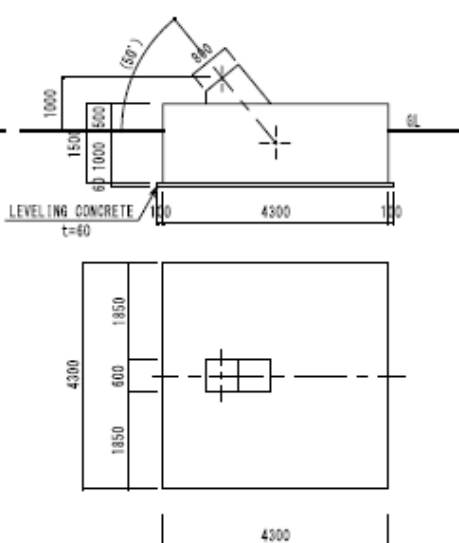
#### (4) Foundation work

- Antenna : one site
- Element : four sites
- Stay cable : three sites

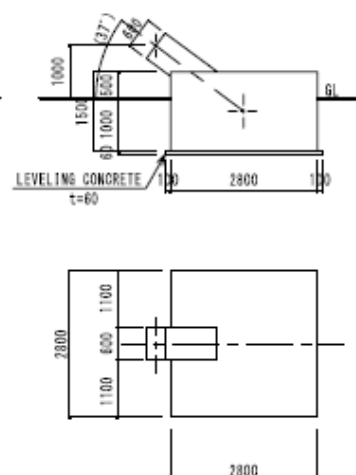
#### Antenna foundation



#### Element foundation



#### Stay cable foundation



## 2) Structural Plan

The type of structure of each new building will be a RC rigid frame, single story structure.

## 3) Finishing Plan

### ① Outline

As Tuvalu is surrounded by sea with a high level of rainfall in the rainy season, the priority specification for the finishing materials is salt-resistance. The selection of finishing materials which are durable and easy to repair and which have a low maintenance requirement is an important element of the Project as most of the materials will require importation.

### ② Roof Type

A steel sheet roof appears to be the popular choice for existing buildings in Tuvalu. However, many such roofs show signs of repair (replacement) or are corroded. The use of a steel sheet roof is unsuitable in regard to making the roof salt-resistant as the steel sheets are liable to corrosion. The planned roof for the radio station building is a pitched asphalt single roof with a wooden truss because of the required salt-resistance performance and the following reasons.

The reasons for the selection of a pitched roof with a wooden truss are listed below.

- Good water repellence (less likely to cause rainwater leakage) and ease of collecting rainwater
- Better insulation of the rooms below from the sound of falling rain

Apart from the roof type mentioned above, a deck roof will be adopted at the satellite antenna site, elevated water tank site and transmitter house. There will be no parapet around these roofs for the good runoff of rainwater. The waterproof layer of the roof will also be designed so that it extends outward by 1 m above the external walls to prevent the incursion of rainwater into the building. A simple water leakage test will be conducted to confirm the water-tightness of the waterproof layer.

### ③ Specifications and Finishing for Various Rooms

- The sound insulation/absorption performance is considered for each studio in the radio station building
- The specifications for rooms other than the studios are given below.

Floor : hard vinyl chloride tiles

Skirting board	: hard vinyl chloride skirting board
Walls	: plaster board with a paint finish (wood base)
Ceiling	: decorative plaster board (wood base)

In the case of the toilets, machine room and other parts of the building, a suitable finish for each room will be determined in view of the purpose of use.

- A ladder will be installed for the MW antenna and the elevated water tank for the purpose of maintenance.

#### 4) Building Services

##### ① Specifications for the Air-Conditioning Units

An air-conditioning and ventilation system is planned for the radio broadcasting building and the transmitter house. The air-conditioning ducts serving the radio broadcasting building will be quiet sound-absorbing ducts designed to reduce the air ventilation noise. The outdoor air-conditioning units will be salt-resistant. Salt resistance will also be considered for the indoor air-conditioning units because of the circulation of briny air through the system. The system design will ensure proper ventilation to prevent condensation.

##### ② Electrical Installations

With the commissioning of the Fongafale Power Station constructed with Japan's grant aid in 2006, the power supply situation in Funafuti has much improved although the overall power supply capacity is still insufficient. In view of such situation, electrical and lighting equipment and systems with a low power consumption will be planned.

#### 5) Water Tank Plan

Tuvalu has no water supply system and the amount of water supplied by the desalination plant is insufficient. It is a common local practice for public buildings and private houses to have their own water tank to store rainwater. The Government of Tuvalu has been promoting the installation of a water tank at each public building as part of its disaster preparation. The radio station building to be constructed under the Project will be provided with a water tank so that water can be supplied to the neighbourhood at the time of a disaster and the minimum storage capacity of which is calculated to be 18 m<sup>3</sup> according to the relevant PWD regulations. However, the Government of Tuvalu aims at achieving a water tank storage capacity of 60 m<sup>3</sup> for all public facilities in preparation for a disaster. In response to the request made by the Government of Tuvalu, the storage capacity of the water tank of the radio station building is planned to be 60 m<sup>3</sup>. Because of the limited

ground space at the planned construction site, this water tank will be constructed under the high floor of the radio station building in view of the effective use of the available space. The design will incorporate proper waterproofing measures to ensure that the studios, office and other rooms in the building do not suffer from dampness.

#### (4) Equipment Plan

##### 1) MW Antenna System

In accordance with the contents of the application to the ITU, the planned height of the new antenna mast is 45 m. An umbrella-type base insulation antenna has been selected as the planned antenna type as described earlier based on cost, past performance records and electrical efficiency. Radial earthing (grounding) devices will be buried in the ground under the antenna mast in a radial fashion from the antenna mast position to maintain the propagation efficiency of the broadcast radio waves. Given the proximity of the antenna site to the runway, a meeting was held with stakeholders, including the Civil Aviation Authority of Tuvalu and Air Fiji, Ltd. and it was agreed that a distance of 175 m would be secured between the centre of the antenna and the nearest centre line of the runway. An aircraft warning light will be installed on the antenna mast to assist the safe operation of aircraft.

##### ① Distance from the Runway

The planned MW antenna site under the Project adjoins the airport runway. The survey results confirmed that the distance from the centre line of the runway to the central part of the antenna site would be 175 m. Consequently, a meeting was held with stakeholders, including Tuvalu's Aviation Department, on the suitability of the planned site. At this meeting, the construction of an antenna at the planned site was accepted so long as the above distance would be maintained because (i) there is not an alternative site, (ii) the Telecom antenna (some 40 m high located some 70 m from the edge of the runway) and other facilities have been constructed within the 200 m zone from the runway and (iii) there are no concrete statutory provisions regarding the construction of various facilities near the runway in Tuvalu.

##### ② Antenna Site

The planned antenna site (90m x 120m) is situated on wetland (part of it is a pond) at the opposite side of the play ground from the existing transmitter house. In determining the actual location of this site, careful consideration was given to minimising any environmental impacts by avoiding construction work along the coastline as much as possible in order to preserve the natural stone landscape. Another consideration was maintenance of the maximum possible distance from the play ground. The resulting site is further south from

the site proposed by the preliminary survey. The geological survey findings indicate that there is a top soil layer of some 50 cm deep which is supported by firm coral bedrock. This will make the installation of a deep grounding rod difficult and there will accordingly be a radial grounding system with a circular shape of a 45 m radius.

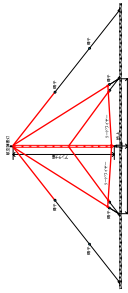
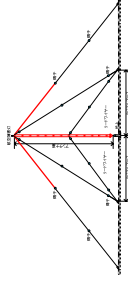



③ Contents of the Application to the ITU

Tuvalu made an application to the ITU in March, 2008 to change its radio broadcasting specifications to a frequency of 621 kHz, a transmission output of 10 kW and an antenna height of 45 m. It has been confirmed that registration with the ITU Head Office has been completed based on the said specifications. The fact that the planned MW antenna site is situated on wetland next to a pond means excellent ground conductivity, boosting the antenna efficiency. It will, therefore, be possible for the planned MW radio broadcasting to cover entire Tuvalu with the registered value at the ITU. There is a possibility of night-time interference by radio broadcasting using the same frequency from New Zealand in the southern end of Tuvalu's territory or vice-versa. This will necessitate flexible setting of the transmission output and careful management of the radio broadcasting operation.

④ Design Concept Regarding the Antenna Type

The antenna type will be a decisive factor in the calculation of the output level which will cover entire Tuvalu but which will not cause much interference for nearby countries. On the ground that the entire Tuvalu would be covered by the radio broadcasting system adopting the registered specifications with the ITU, three different antenna types (T-type antenna, umbrella-type centrally insulated antenna and stayed antenna with a capacitance hat) for MW antenna were compared and analysed to determine a suitable site. The analysis results are shown in Table 2.2-1. Even though all three types could be built on the site referred to in ② above, the umbrella-type centrally insulated antenna was thought to be suitable initially from such viewpoints as the cost, electrical efficiency, past performance records and ease of maintenance. However, this type of antenna requires a high voltage and high frequency antenna element at its base, necessitating perimeter fencing of some 90 m in diameter for security. Given that the ground of the planned antenna site is firm coral stone, difficult work to erect such extensive fencing would mean a substantial increase of the overall cost. It is, therefore, concluded that an umbrella-type base insulated antenna presents a superior option because of the much smaller scale of the fencing of some 5 m in diameter at the base and almost comparable performance to a centrally insulated antenna. As such, an umbrella-type base insulated antenna will be selected as the new broadcasting antenna under the Project.

Table 2.2-1 Comparison of Different MW Antenna Types

Antenna Type	Umbrella: Centrally Insulated (Length: 30 m x 4 lines)	Umbrella: Base Insulated (Length: 30 m x 4 lines)	Stayed with Capacitance Hat ( $\phi$ : 4 m)	Stayed with Capacitance Hat ( $\phi$ : 18 m)	T Type (Horizontal: 90 m x 4 lines (Vertical: 45 m x 4 lines)
Example					
Antenna Impedance	$2.7\Omega - j75$	$6.8\Omega - j123$	$5.2\Omega - j363$	$8.9\Omega - j165$	$7.2\Omega - j28$
Q (The smaller the value is, the better)	28	18.1	69.8	18.5	4
VSWR $\pm 7.5$ kHz (The smaller the value is, the better)	3.5	2.4	5.5	2.2	1.8
Efficiency (Assumed Conductivity at Radial Grounding Part: $\delta=3\text{ms/m}$ ) (The larger the value is, the better)	43 %	42 %	41 %	46 %	47 %
Painting of the Tower (by the User)	Easy	Easy	Difficult	Difficult	Easy
Replacement of Cables and Elements (by the User)	Impossible	Impossible	Impossible	Impossible	Possible
Cost	1	1	1.3	2.3	2.2
Maintenance Cost	Every 10 Years	Replacement of Cables (by the Manufacturer)		As Left	As Left (Cost is approximately double )
	Every Year	Painting (by the User)		As Left (Cost is approximately 1.2 times higher)	As Left (Cost is approximately double)

2) 10 kW MW Transmitter

In principle, an output of up to 10 kW as applied to the ITU will be used to cover entire Tuvalu without causing radio interference with other countries. There will be no public broadcasting services in Tuvalu other than the planned MW radio broadcasting service and parts of the transmission system will be duplicated to ensure the reliability of the MW radio broadcasting system at the time of disaster. However, as it is anticipated that this system will have few breakdowns, there will be no full-scale reserve system to replace the regular system.

3) Power Source for Transmitter and Air-Conditioning Systems

The existing commercial power supply to the radio station building and transmitter house suffers from voltage drop below the permissible range due to the concentration of loads. To avoid data loss and any adverse impacts on the broadcasting equipment by such unstable power supply, the power source for the radio station building will be switched at the expense of the Tuvalu side to a substation equipped with a larger capacity transformer and an AVR (automatic voltage regulator) will be installed in the building. An emergency generator will be installed inside the transmitter house to ensure continual radio broadcasting even when the commercial power supply is lost. This generator will be accompanied by a fuel tank enabling continual operation of the generator for some two hours when the commercial power supply source is out of action due to a disaster.

In regard to the air-conditioning systems, a low noise-type central air-conditioning system will be installed to serve the studios in the radio station building to avoid noise incursion during programme recording sessions. Meanwhile, a separate-type system will be installed in the office and other rooms of the radio station building and the transmitter house.

4) Master Control Room System

The master control room will have a system which is capable of centrally monitoring and controlling the non-linear editing system at the radio station through the in-house network and of switching the programmes to be broadcast. In consideration of the organizational set-up and numerical strength of the existing TMD staff members, the minimum necessary range of equipment will be installed for unmanned operation. A STL transmission system using FM waves will be planned for programme transmission from the master control room to the transmitter house.

5) ON AIR Studio System and Production Studio System

In consideration again of the organizational set-up and numerical strength of the existing TMD staff members, the minimum configuration of studios will be planned, consisting of



two ON AIR studios and one production studio as in the case of the existing systems. Active efforts will be made to facilitate the shared use of sound sources and other programme materials between studios through networking so that programmes can be efficiently produced by the present operational system with the minimum duplication of equipment. There will be a function to enable the Disaster Prevention Bureau, etc. to have direct telephone connection to the studios with a view to swiftly broadcasting the latest news and disaster information.

6) Editing System

One complete editing system will be procured for the purpose of editing the programme materials recorded in the studio, gathered news materials, unedited interview tapes and others to produce actual programmes. With the availability of this editing system, the studios will be exclusively used for programme recording, resulting in an improved operating rate of the studios to ensure the smooth production of news programmes.

7) News Gathering Equipment

Based on the TMD's intention to diversify its programme range to include disaster prevention reporting and outdoor live broadcasting, the procurement of a news car equipped with a radio transmitter, portable digital recorder and other equipment required for news gathering was considered. However, in view of the facts that the principal purpose of the Project is to set up a MW radio broadcasting system and that the use of a new car will be quite limited apart from the reporting of a disaster, it has been decided that such a news car will not be included in the scope of the Project and that only news gathering equipment will actually be procured under the Project.

8) Maintenance Equipment and Tools

The minimum range of instruments and special tools will be procured for the purpose of the routine maintenance and inspection of the MW transmitter, MW antenna system, studio equipment and other systems/equipment to be procured under the Project.

9) Spare Parts and Consumables

Spare parts will be procured under the Project in the quantities required for the first year of operation or for the repair of breakdowns. One year's supply of medium (CD-R) will also be procured for use for the operation testing of the studio equipment during the installation period, OJT and start-up of MW radio broadcasting when all of the new MW broadcasting facilities become operational.

### 2.2.3 Basic Design Drawings

The broadcasting equipment, etc. to be procured and provided under the Project and the relevant basic design drawings are shown below.

#### (1) List of Equipment

Table 2.2-2 List of the Planned Equipment

No.	Description	Quantity
<b>1</b>	<b>MW Antenna System</b>	<b>1 lot</b>
1.1	Antenna System	1 set
1.2	OB Lighting System with Remote Controller	1 set
1.3	Radial Earth	1 set
1.4	Antenna Tuning Unit (ATU) Compartment with Automatic Tuning System	1 set
1.5	Feeder	1 set
<b>2</b>	<b>10kW Medium Wave Transmitter</b>	<b>1 lot</b>
2.1	10kW Medium Wave Transmitter	1 set
2.2	Output Change-over Switch (U-link)	1 set
2.3	10kW Dummy Load	1 set
2.4	Programme Input Equipment (PIE) Rack	1 lot
(1)	Audio Processor Amplifier	1 set
(2)	Control Panel (Input Select Switch, Meter Panel and Monitor Switcher)	1 set
(3)	Monitor Amplifier	1 set
(4)	Monitor Speaker	1 set
(5)	ON AIR Monitor Receiver with Receiving Antenna	1 set
(6)	Audio Jack Panel	1 set
(7)	NFB Panel	1 set
(8)	Rack	1 set
<b>3</b>	<b>Power Supply Equipment and Air Conditioning for Transmitter</b>	<b>1 lot</b>
3.1	35kVA Engine Generator with Fuel Tank	1 set
3.2	Control Panel with Automatic Change-over Switch	1 set
3.3	35kVA Automatic Voltage Regulator & Primary Distribution Board (PDB)	1 set
3.4	35kVA Isolation and Lightning Protection Transformer	1 set
3.5	Air Conditioning	2 sets
<b>4</b>	<b>Master Control System</b>	<b>1 lot</b>
4.1	Mixer for Master Control	1 set
4.2	Limiter / Compressor	1 set
4.3	ADA	1 set
4.4	Monitor Panel with VU Meter and Speaker	1 set
4.5	AJB and Patching Cable	1 set
4.6	Graphic Equalizer	1 set
4.7	Radio Receiver	1 set
4.8	Receiving Antenna	1 set
4.9	Equipment Rack with NFB Panel	2 sets
4.10	Non-linear Editing System	1 set
4.11	Control Table for Non-linear Editing System	1 set
4.12	Non-liner Software	1 set

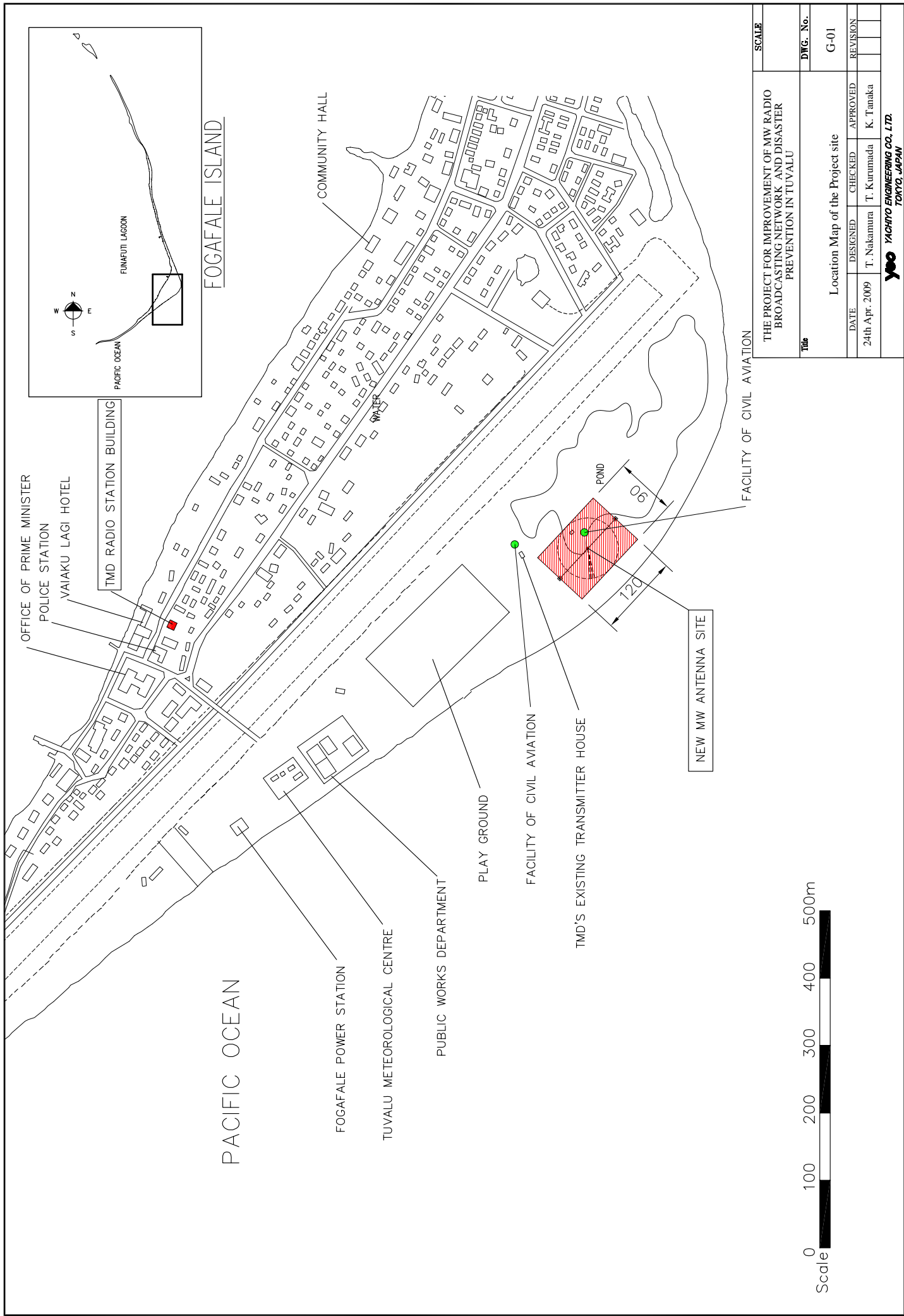
No.	Description	Quantity
4.13	UPS for CPU	1 set
4.14	HUB	1 set
4.15	STL Transmitter with Antenna and Mast	1 set
4.16	STL Receiver with Antenna and Mast	1 set
4.17	Room to Room Interphone Terminal	6 sets
4.18	ON AIR Light with Control Switch	3 sets
4.19	AVR for Master and Studio	1 set
4.20	In House Monitor Amplifier	1 set
4.21	In House Monitor Speaker with Volume Control Panel	6 sets
4.22	Round shape wall clock (Crystal drive)	12 sets
4.23	Earth Materials for Equipment Ground	1 set
4.24	Operation Chair	1 set
<b>5</b>	<b>ON AIR Studio System</b>	<b>2 lots</b>
	(each comprising)	
5.1	Audio Mixer with Back up Power Supply	1 set
5.2	Telephone Pick Up	1 set
5.3	Non-linear Editing System	1 set
5.4	Non-linear Software	1 set
5.5	UPS for CPU	1 set
5.6	Stereo Monitor Speaker with Amplifier	1 set
5.7	Headphone	3 sets
5.8	Headphone Amplifier	1 set
5.9	Microphone for DJ with Wind Screen	1 set
5.10	Microphone Boom Stand for DJ	1 set
5.11	Microphone for Guest	2 sets
5.12	Microphone Table Stand for Guest	2 sets
5.13	Control Table	1 set
5.14	Operation Chair for DJ	1 set
5.15	Chair for Guest	2 sets
<b>6</b>	<b>Production Studio System</b>	<b>1 lot</b>
6.1	Audio Mixer with Back up Power Supply	1 set
6.2	CD Recorder	2 sets
6.3	Digital Portable Recorder	1 set
6.4	Telephone Pick Up	1 set
6.5	Non-linear Editing System	1 set
6.6	Non-linear Software	1 set
6.7	UPS for CPU	1 set
6.8	Graphic Equalizer	1 set
6.9	Effecter	1 set
6.10	Stereo Monitor Speaker	1 set
6.11	Monitor Amplifier	1 set
6.12	Stereo Audition Monitor Speaker with Amplifier	1 set
6.13	Headphone	2 sets
6.14	Studio Monitor Speaker (wall mount type)	1 set
6.15	Monitor Amplifier for Studio Monitor Speaker	1 set
6.16	Talk Back Speaker	1 set
6.17	Amplifier for Talk Back Speaker	1 set

No.	Description	Quantity
6.18	Condenser Microphone	4 sets
6.19	Dynamic Microphone	15 sets
6.20	Microphone Carrying Case	1 set
6.21	Microphone Boom Stand	4 sets
6.22	Microphone Table Stand (Gooseneck Type)	15 sets
6.23	Microphone Cable (20m)	10 sets
6.24	Microphone Cable (10m)	10 sets
6.25	Studio Connector Plate	1 set
6.26	Equipment Rack with NFB Panel	1 set
6.27	Control Table for Audio Mixer	1 set
6.28	Control Table for Non-linear Editing System	1 set
6.29	Operation Chair	3 sets
6.30	Table for Guest	1 set
6.31	Chair for Guest	5 sets
<b>7</b>	<b>Editing System</b>	<b>1 lot</b>
7.1	Editing Mixer	1 set
7.2	CD Recorder	2 sets
7.3	Cassette Tape Recorder	1 set
7.4	Non-linear Editing System	1 set
7.5	Control Table for Non-linear Editing System	1 set
7.6	Non-linear Software	1 set
7.7	UPS for CPU	1 set
7.8	Stereo Monitor Speaker with Amplifier	1 set
7.9	Headphone	1 set
7.10	Line Transformer Box	1 set
7.11	Equipment Rack with NFB Panel	1 set
7.12	Operation Chair	1 set
<b>8</b>	<b>Equipment for News Gathering</b>	<b>1 lot</b>
8.1	Radio Transceiver for Base Station with Antenna	1 set
8.2	Digital Portable Recorder with Microphone	3 sets
8.3	Handy Talky	3 sets
<b>9</b>	<b>Maintenance Equipment and Tools</b>	<b>1 lot</b>
9.1	Distortion Meter/Oscillator	1 set
9.2	Audio Attenuator	1 set
9.3	Oscilloscope	1 set
9.4	Frequency Counter	1 set
9.5	Circuit Tester	2 sets
9.6	Impedance Bridge, Receiver/Generator	1 set
9.7	Field Strength Meter	1 set
9.8	High Voltage Probe	1 set
9.9	Tool Kit	2 sets
9.10	Storage Rack	4 sets
9.11	Safety Belt	3 sets
9.12	Safety Belt (Long Type)	3 sets
<b>10</b>	<b>Spare Parts</b>	<b>1 lot</b>
10.1	PA Module for Transmitter (1pc each type)	1 set
10.2	RF Driver Unit for Transmitter	1 set

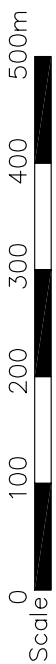
No.	Description	Quantity
10.3	Power Supply Module for Transmitter (1pc each type)	1 set
10.4	Control Board for Transmitter	1 set
10.5	Monitor Board for Transmitter	1 set
10.6	Power FET for PA Module	1 set
10.7	Printed Board for AVR Control	1 set
10.8	Maintenance Kit for Antenna System	1 set
<b>11</b>	<b>Consumable Parts</b>	<b>1 lot</b>
11.1	Fan unit for Transmitter	5 sets
11.2	Air Filter for Transmitter	5 sets
11.3	Fuse for Transmitter	5 sets
11.4	Surge Absorber for Isolation Transformer	5 sets
11.5	Lamp for OB Lightning System	5 sets
11.6	Fuse for PIE	5 sets
11.7	Fuse for AVR	5 sets
11.8	CD-R	3,000 pcs
11.9	Memory chip for Digital Portable Recorder	20 pcs

(2) Basic Design Drawings

Drawing No.	Title
G-01	Location Map of the Project Site
G-02	Layout of the New MW Antenna Site
A-01	Plot Plan of the New Radio Station Building
A-02	Elevation of the New Radio Station Building
A-03	Roof Plan of the New Radio Station Building
A-04	Plan of the New Transmitter House
Sy-01	Block Diagramme of the 10 kW MW Transmitter System
Sy-02	Block Diagramme of the Master Control System
Sy-03	Block Diagramme of the ON AIR Studio System
Sy-04	Block Diagramme of the Production Studio System
Sy-05	Block Diagramme of the Editing System
Sy-06	Block Diagramme of the Equipment for News Gathering
Sy-07	Block Diagramme of the Non-Linear Editing Network
Sy-08	Block Diagramme of Room to Room Interphone
Sy-09	Block Diagramme of the In-House Monitor System
Sy-10	Block Diagramme of the ON AIR Tally System
L-01	Floor Layout of the Radio Broadcasting Section
L-02	Equipment Layout of the ON AIR Studio System



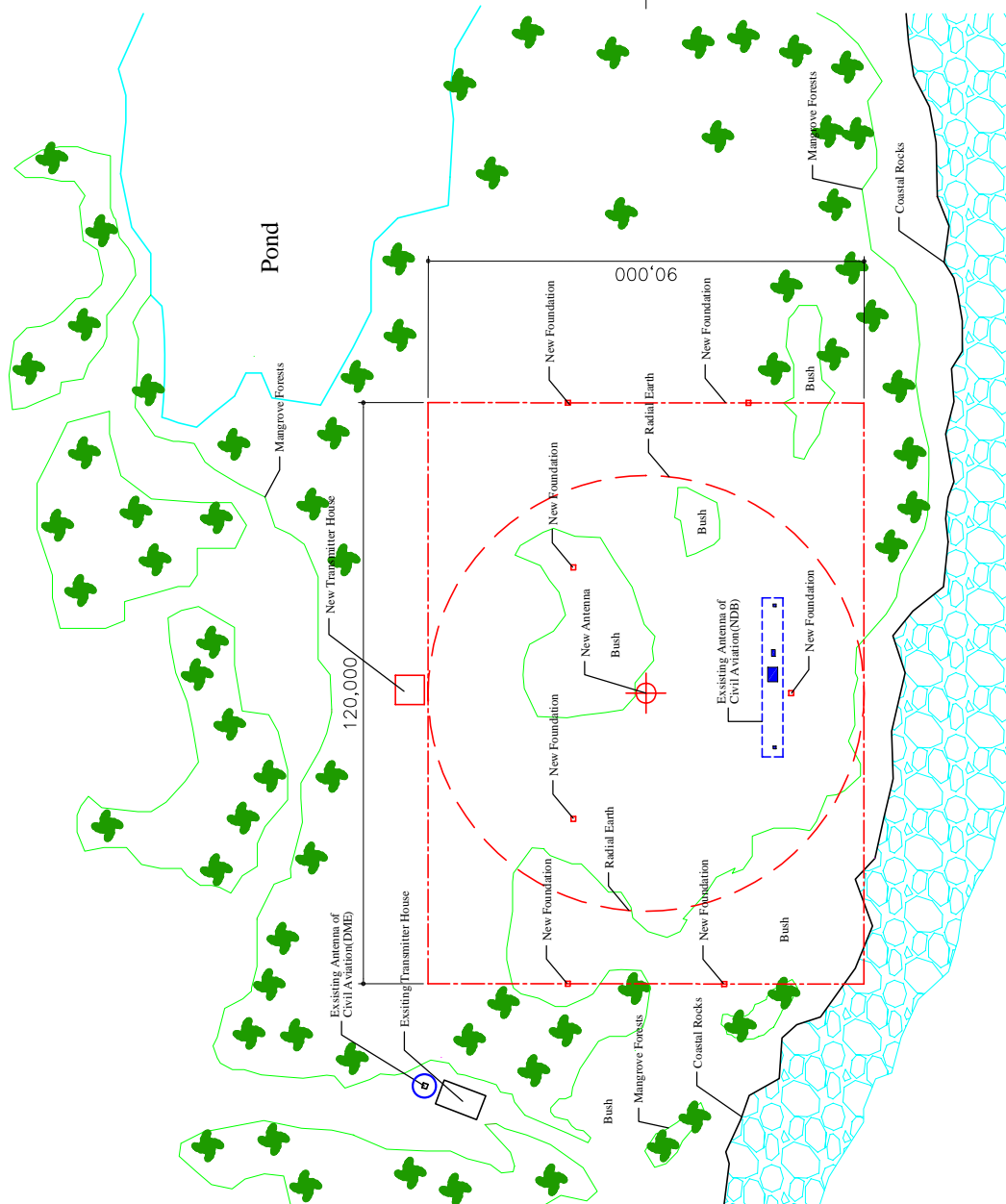
THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU					SCALE
Title					
Location Map of the Project site					
DATE	DESIGNED	CHECKED	APPROVED	REVISION	DWG. No.
24th Apr. 2009	T. Nakamura	T. Kurumada	K. Tanaka		G-01
Y&E YACHTING ENGINEERING CO., LTD. TOKYO, JAPAN					



Runway Edge Line

Runway Center Line

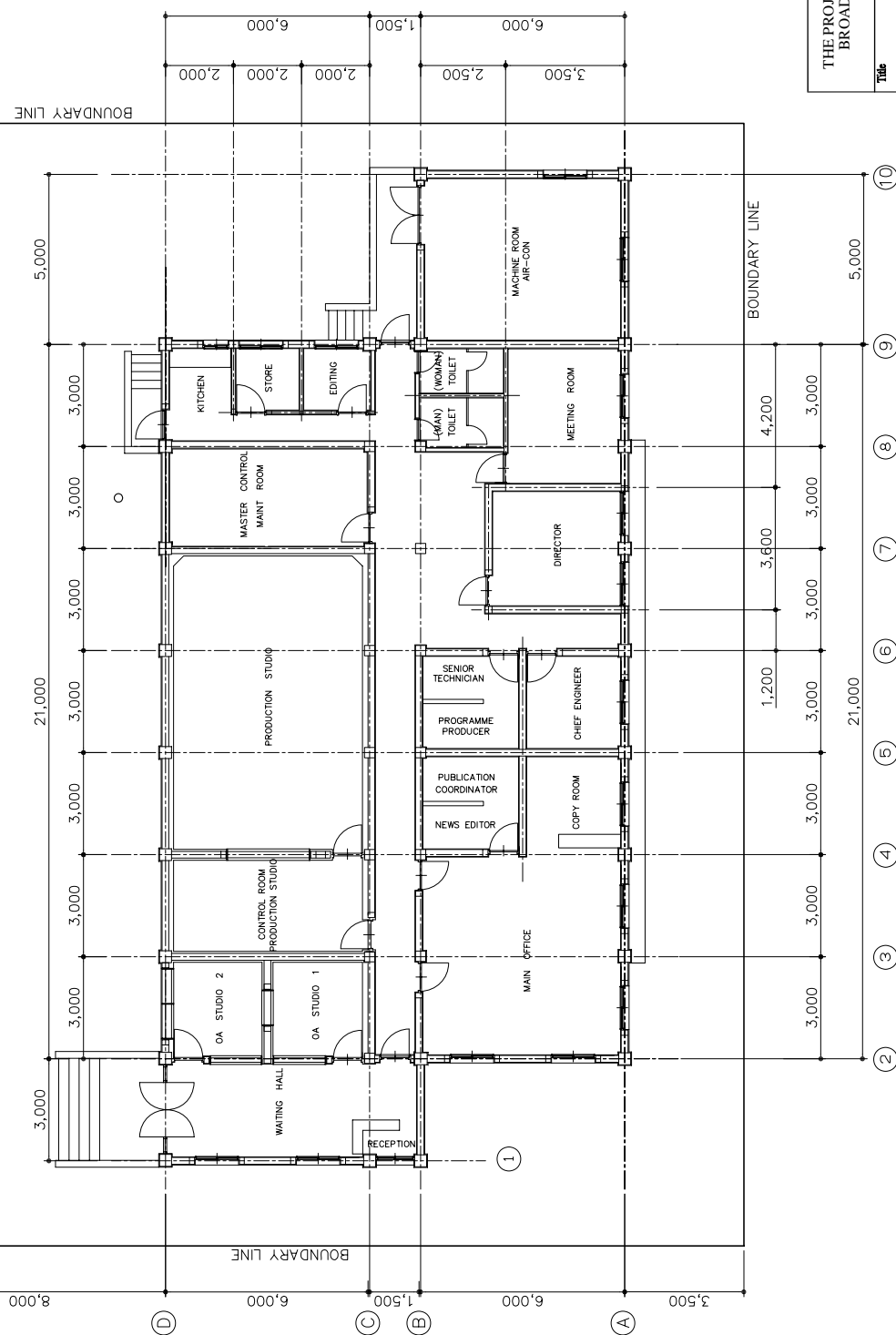
Runway Edge Line



THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU						SCALE
Title						
Layout of the New MW Antenna site						DWG. No. G-02
DATE	DESIGNED	CHECKED	APPROVED	REVISION		
24th Apr. 2009	T. Nakamura	T. Kurumada	K. Tanaka			
YEO YACHTO ENGINEERING CO., LTD. TOKYO, JAPAN						

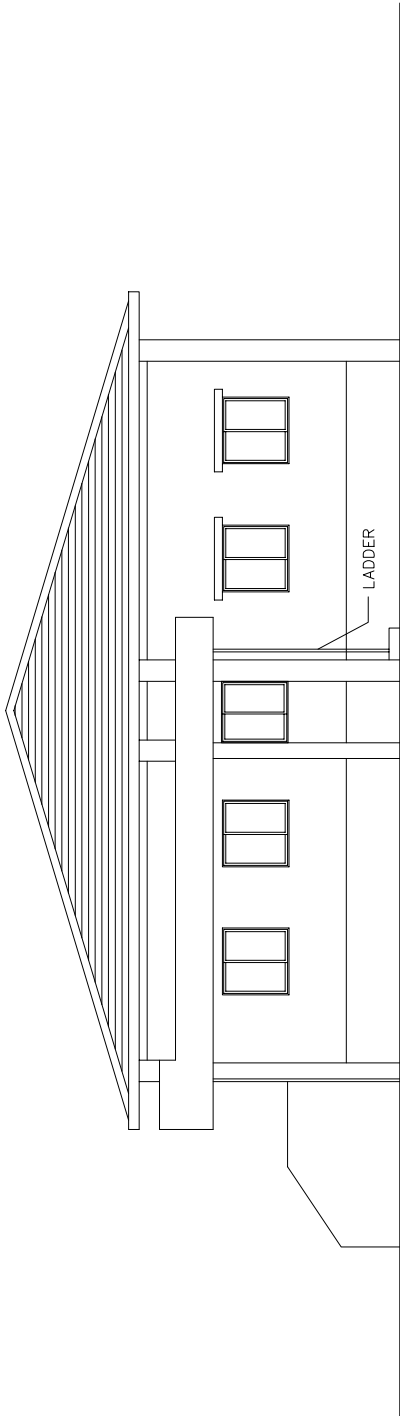
ROAD

BOUNDARY LINE

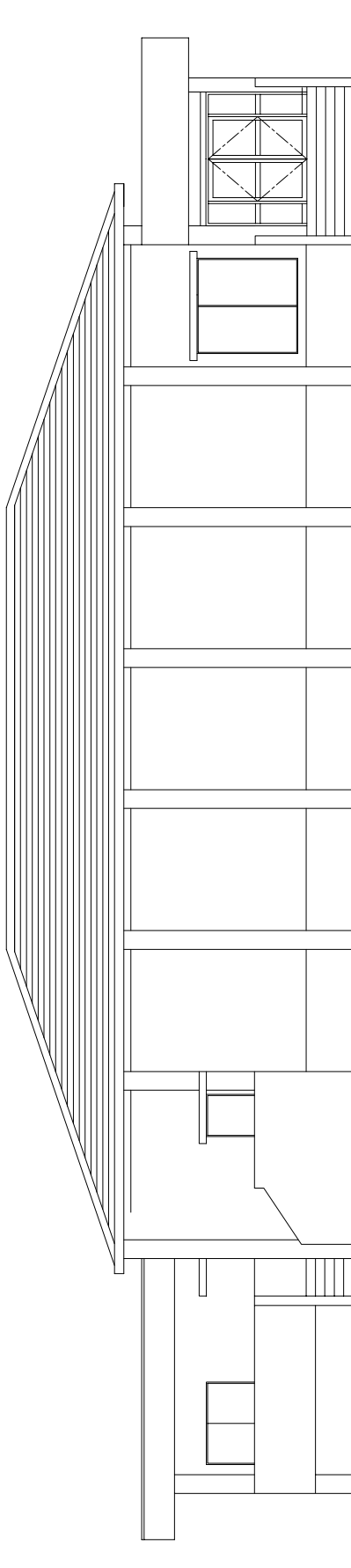


THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU					SCALE
Title					
Plot Plan of the New Radio Station Building					
DWG. No. A-01					
DATE	DESIGNED	CHECKED	APPROVED	REVISION	
24th Apr. 2009	T. Nakamura	T. Kurumada	K. Tanaka		
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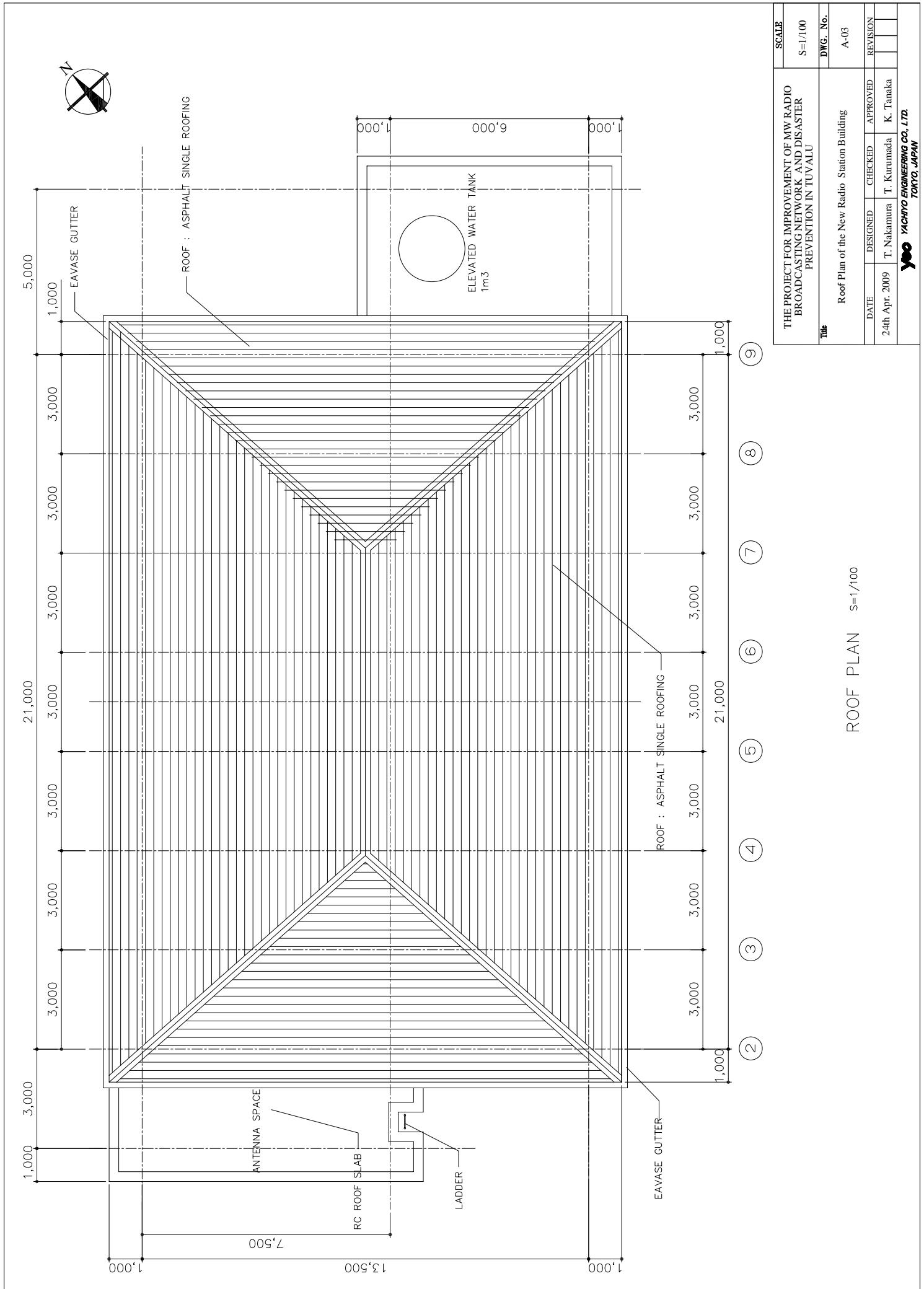


O LINE ELEVATION S=1/100



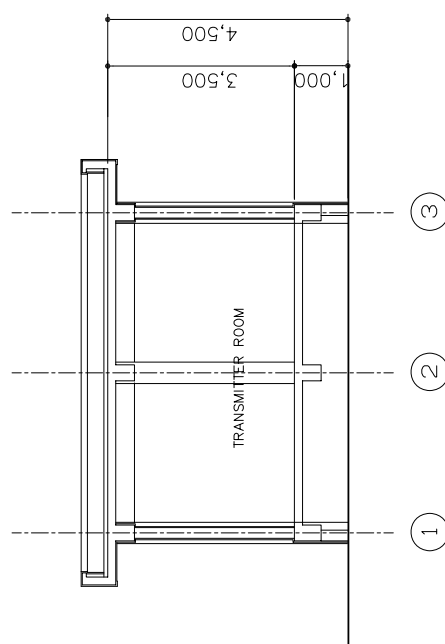
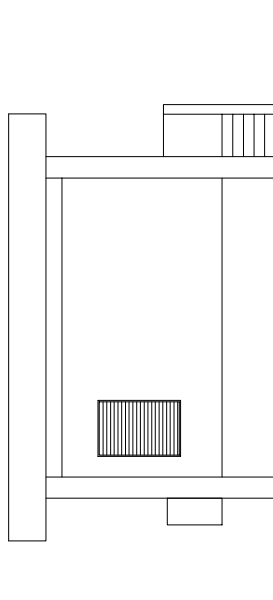
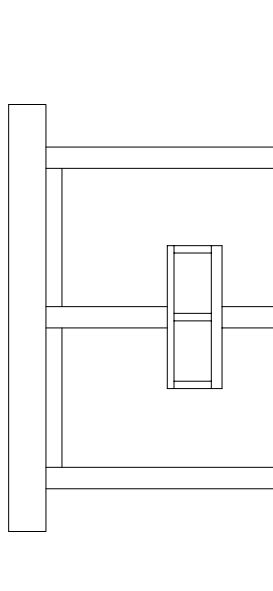
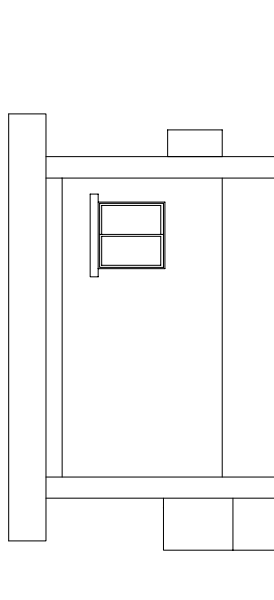
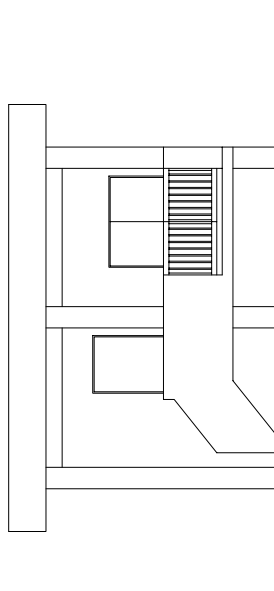
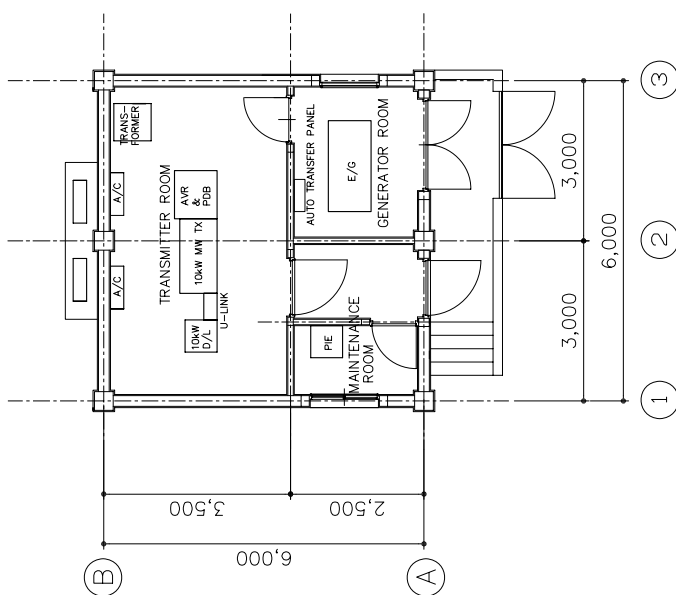
D LINE ELEVATION S=1/100

THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE S=1/100	
Elevation of the New Radio Station Building				DWG. No. A-02	
DATE	DESIGNED	CHECKED	APPROVED	REVISION	
24th Apr. 2009	T. Nakamura	T. Kurumada	K. Tanaka		
<div><div>YEO</div><div>YACHYO ENGINEERING CO., LTD.</div><div>TOKYO, JAPAN</div></div>					

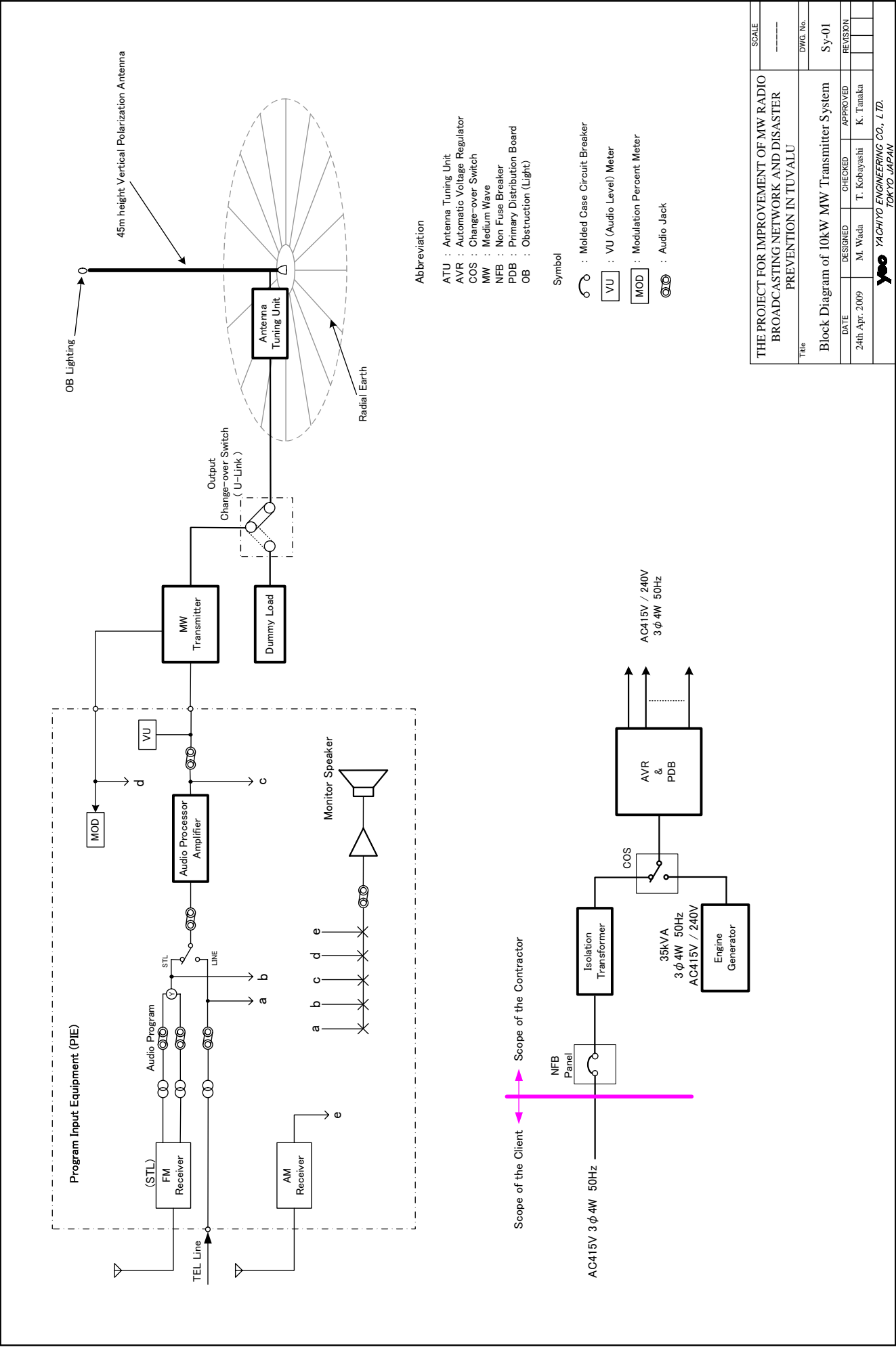


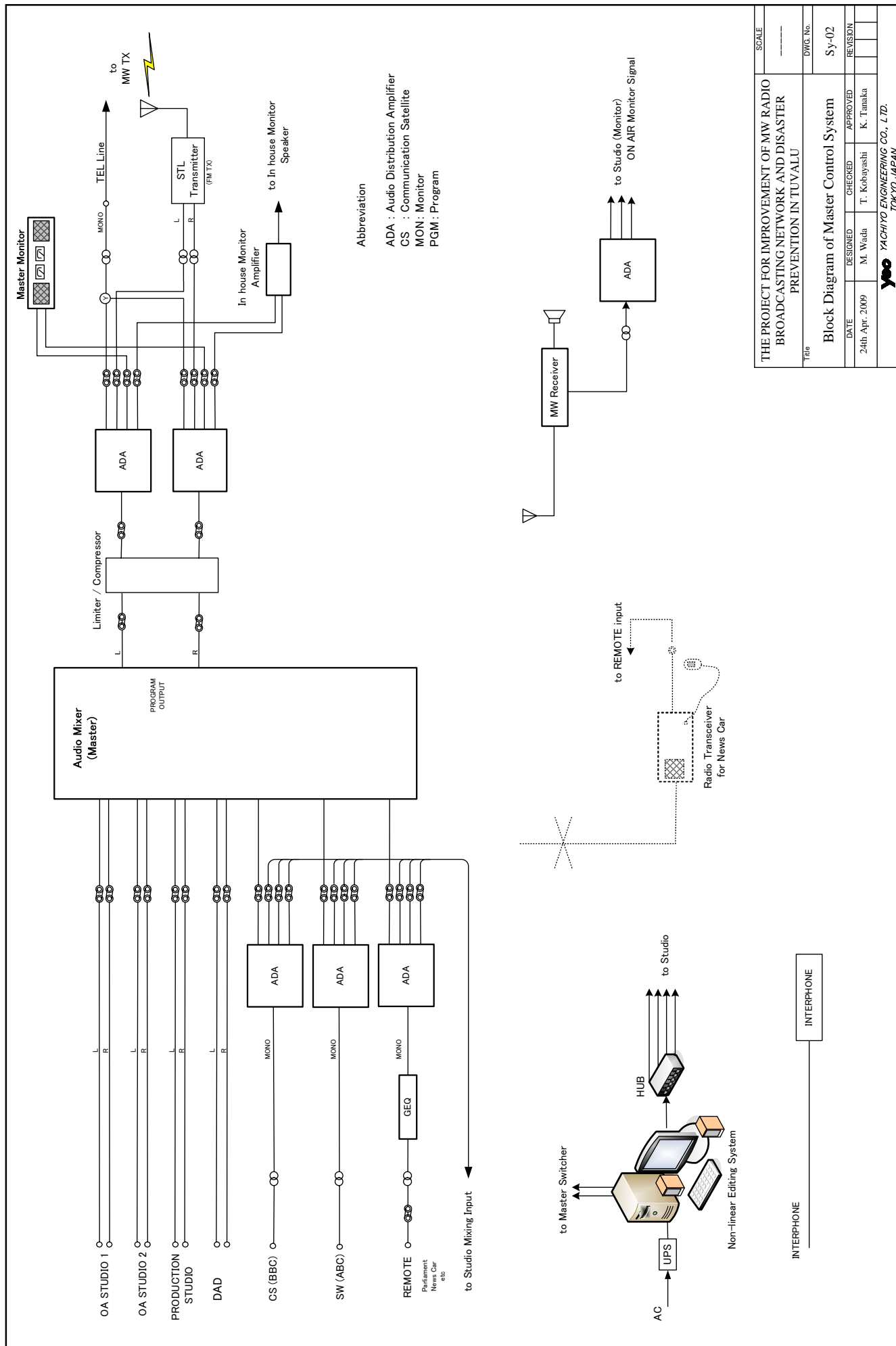
THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE S=1/100	
Title Roof Plan of the New Radio Station Building				DWG. No. A-03	
DATE 24th Apr. 2009	DESIGNED T. Nakamura	CHECKED T. Kurumada	APPROVED K. Tanaka	REVISION	
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ROOF PLAN S=1/100

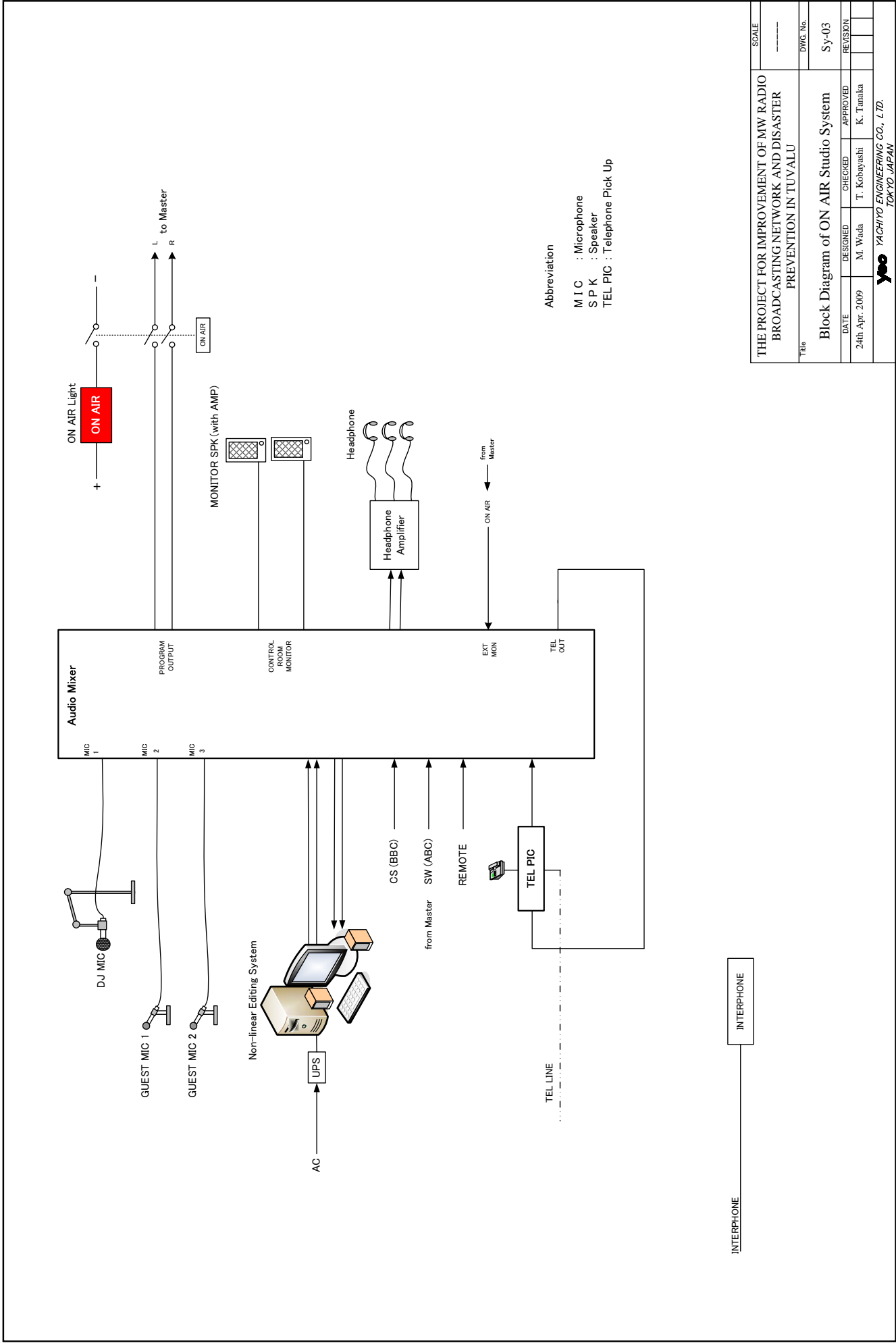


<p align="center"><b>THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU</b></p>					
<p align="center"><b>Title</b></p>					
<p align="center">Plan of the New Transmitter House</p>					
<p align="center"><b>DWG. No.</b></p>		<p align="center">A-04</p>			
<p align="center"><b>SCALE</b></p>		<p align="center">S=1/100</p>			
<p align="center">DATE</p>		<p align="center">DESIGNED</p>		<p align="center">CHECKED</p>	
<p align="center">24th Apr. 2009</p>		<p align="center">T. Nakamura</p>		<p align="center">T. Kunumada</p>	
<p align="center">REVISION</p>		<p align="center">APPROVED</p>		<p align="center">K. Tanaka</p>	

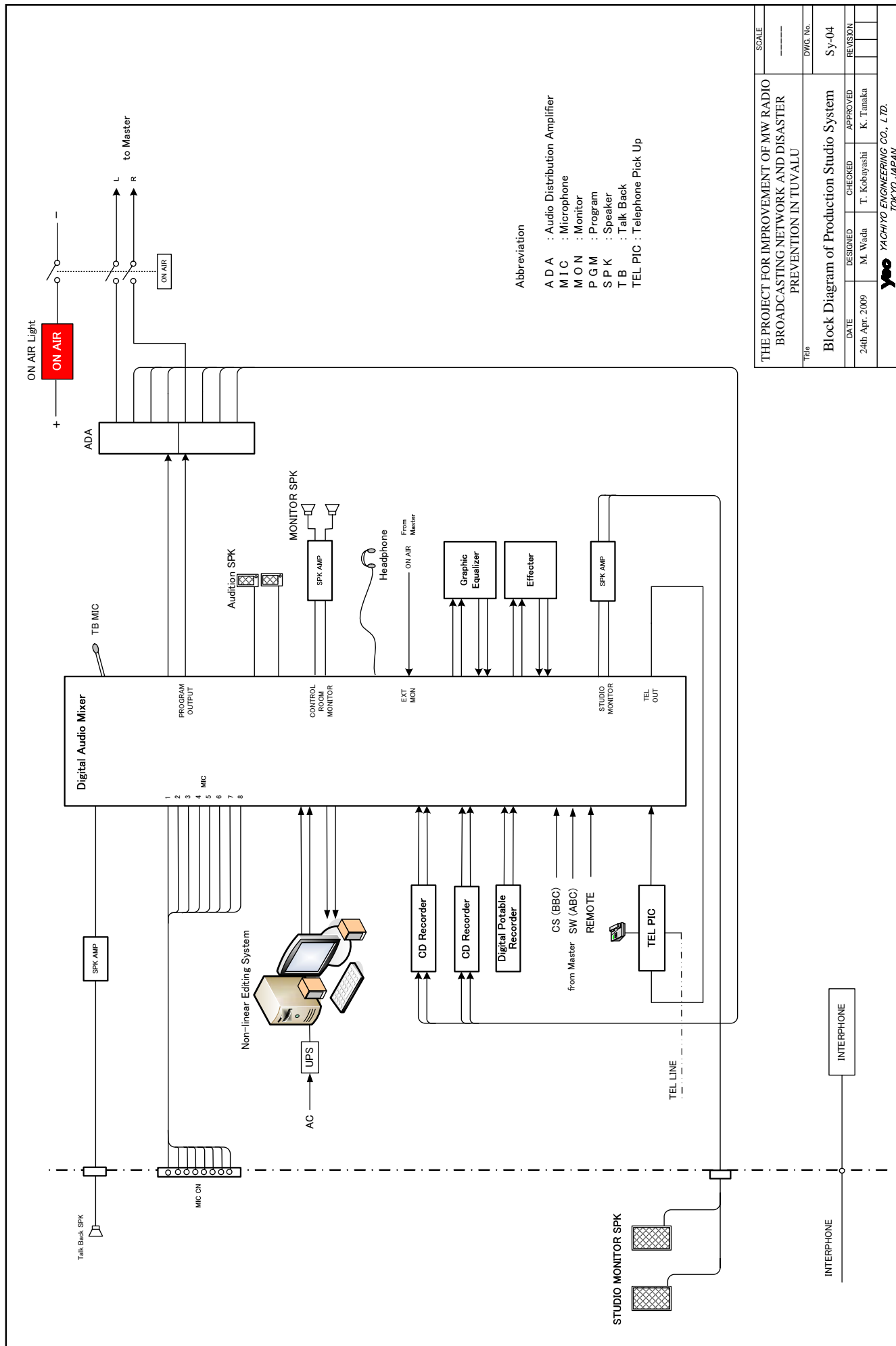




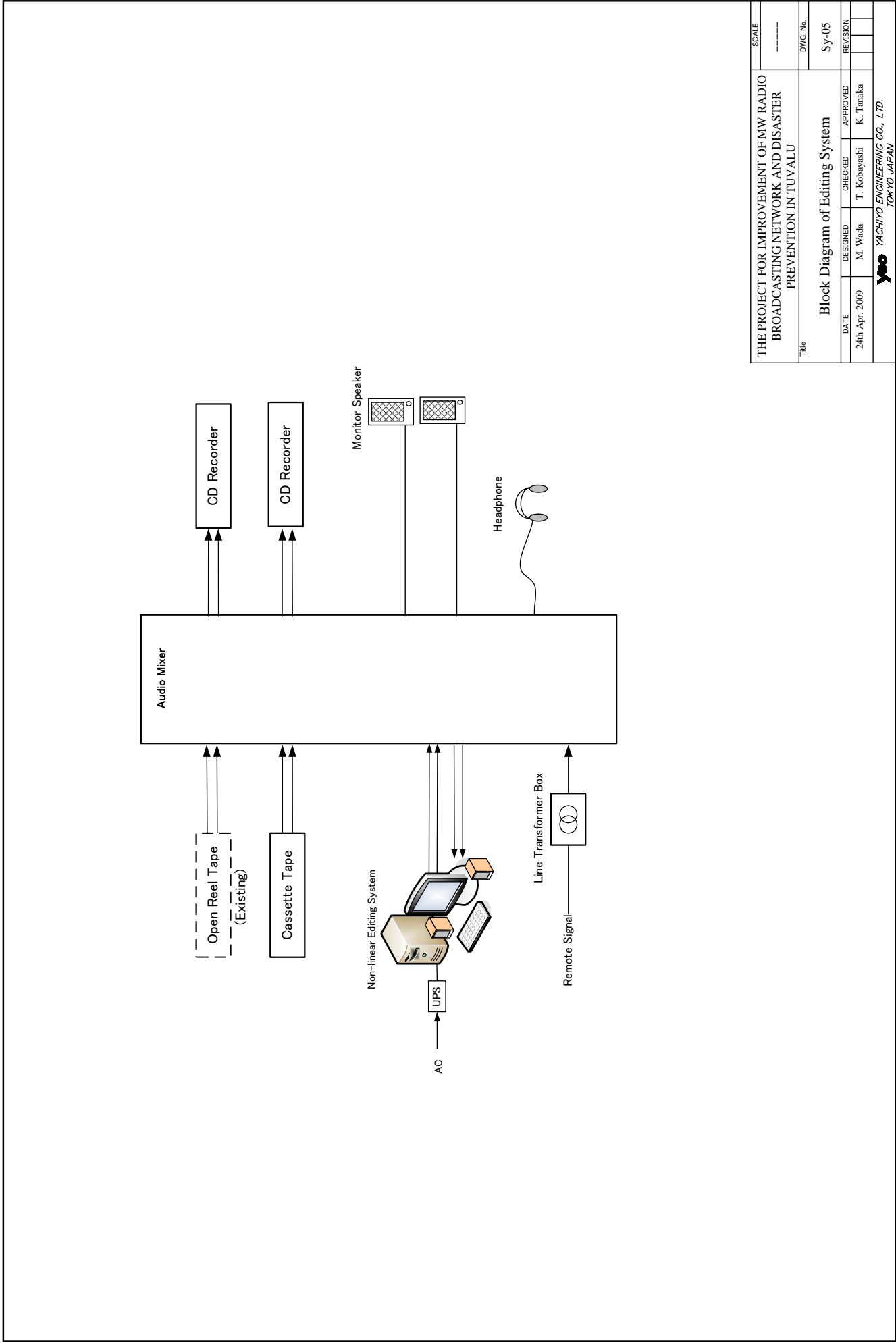
THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE	
Title				DWG. No.	
Block Diagram of Master Control System					Sy-02
DATE	DESIGNED	CHECKED	APPROVED	REVISION	
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Title				DWG. No.
Block Diagram of ON AIR Studio System				Sy-03
DATE	DESIGNED	CHECKED	APPROVED	REVISION
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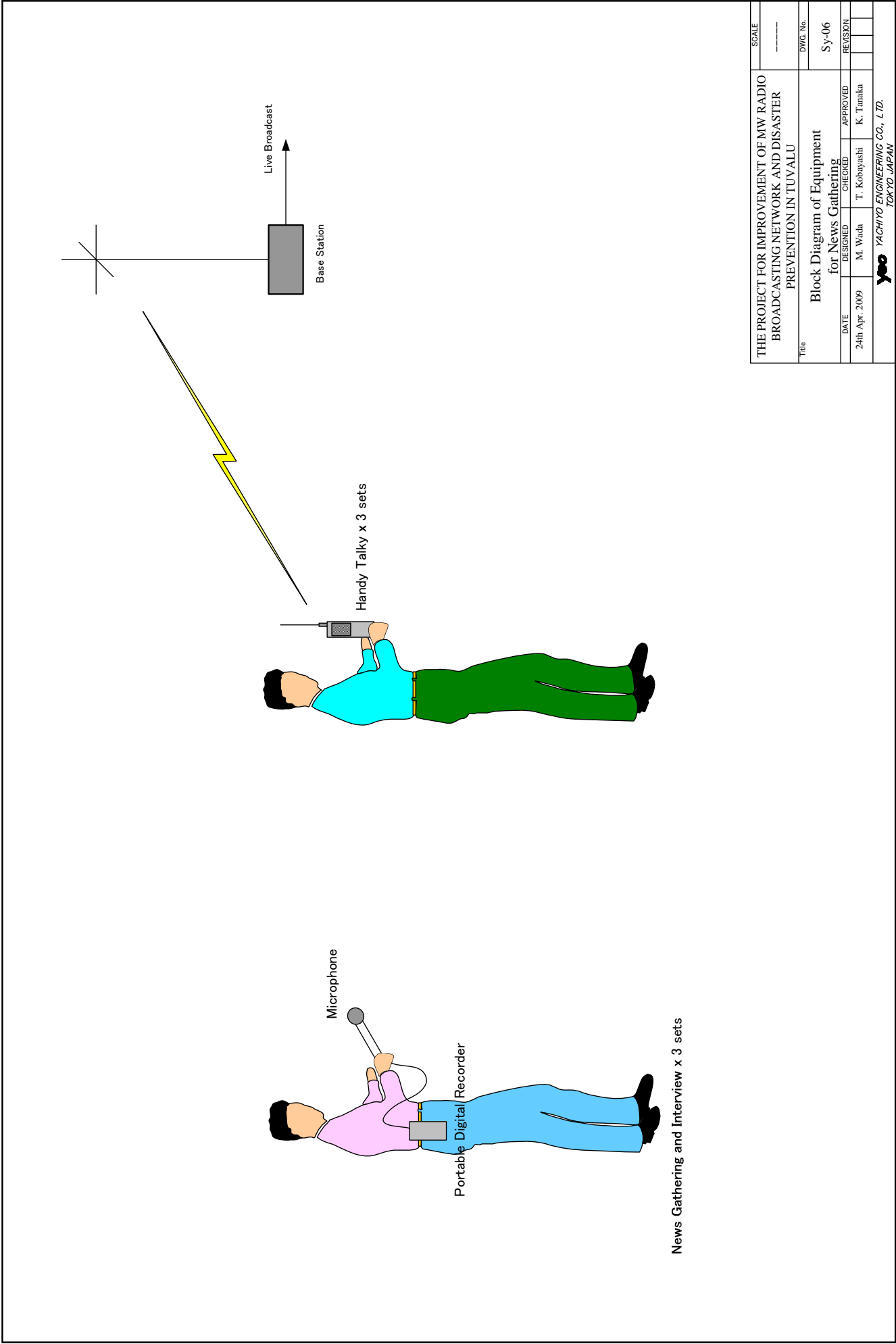


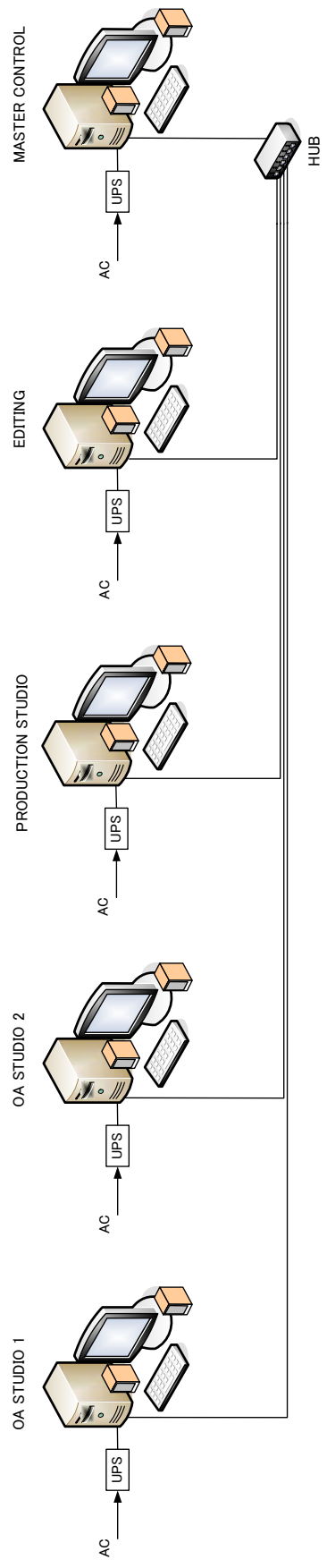
THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE
File				DWG. No.
Block Diagram of Production Studio System				Sy-04
DATE	DESIGNED	CHECKED	APPROVED	REVISION
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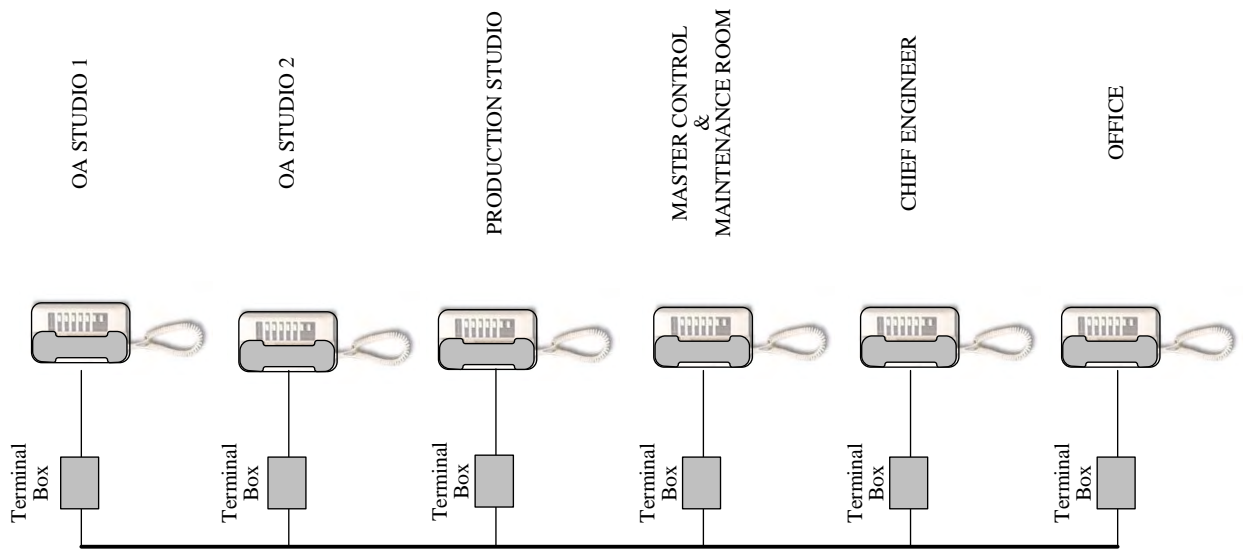
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Title				DWG. No.
Block Diagram of Editing System				Sy-05
DATE	DESIGNED	CHECKED	APPROVED	REVISION
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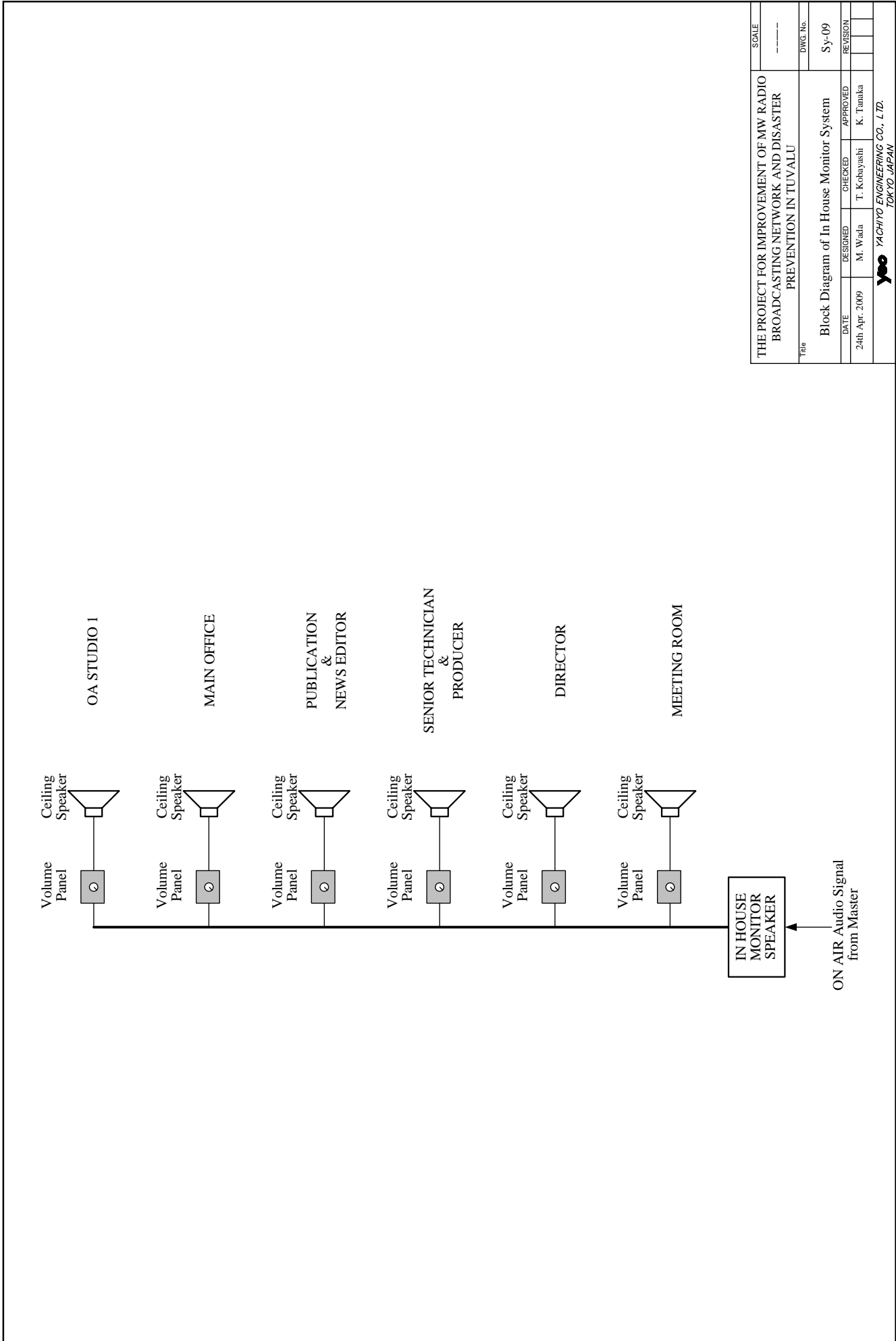




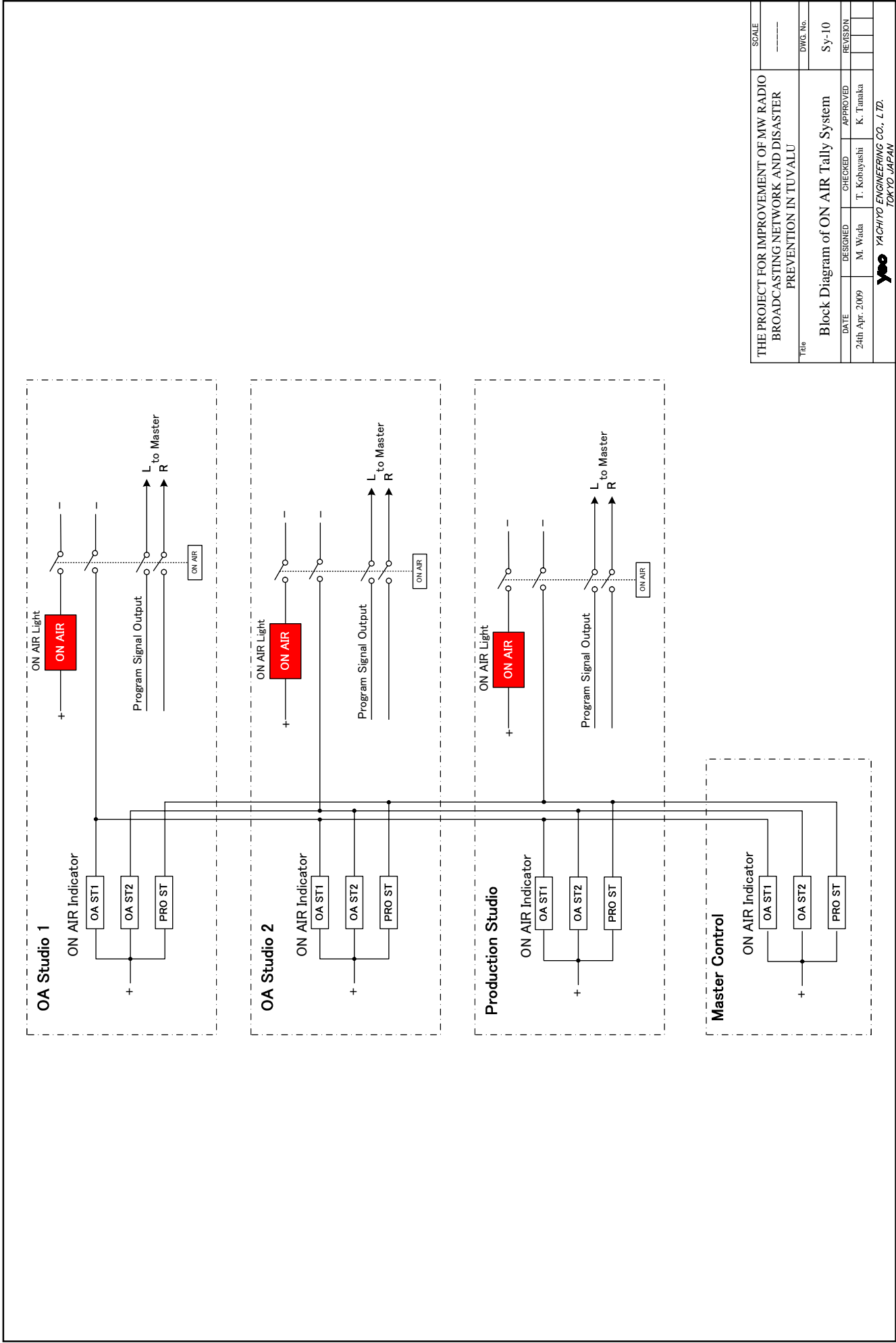
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File				DWG. No.
Block Diagram of Non-linear Editing Network				Sy-07
DATE	DESIGNED	CHECKED	APPROVED	REVISION
24th Apr. 2009	M. Wada	T. Kobayashi	K. Tanaka	
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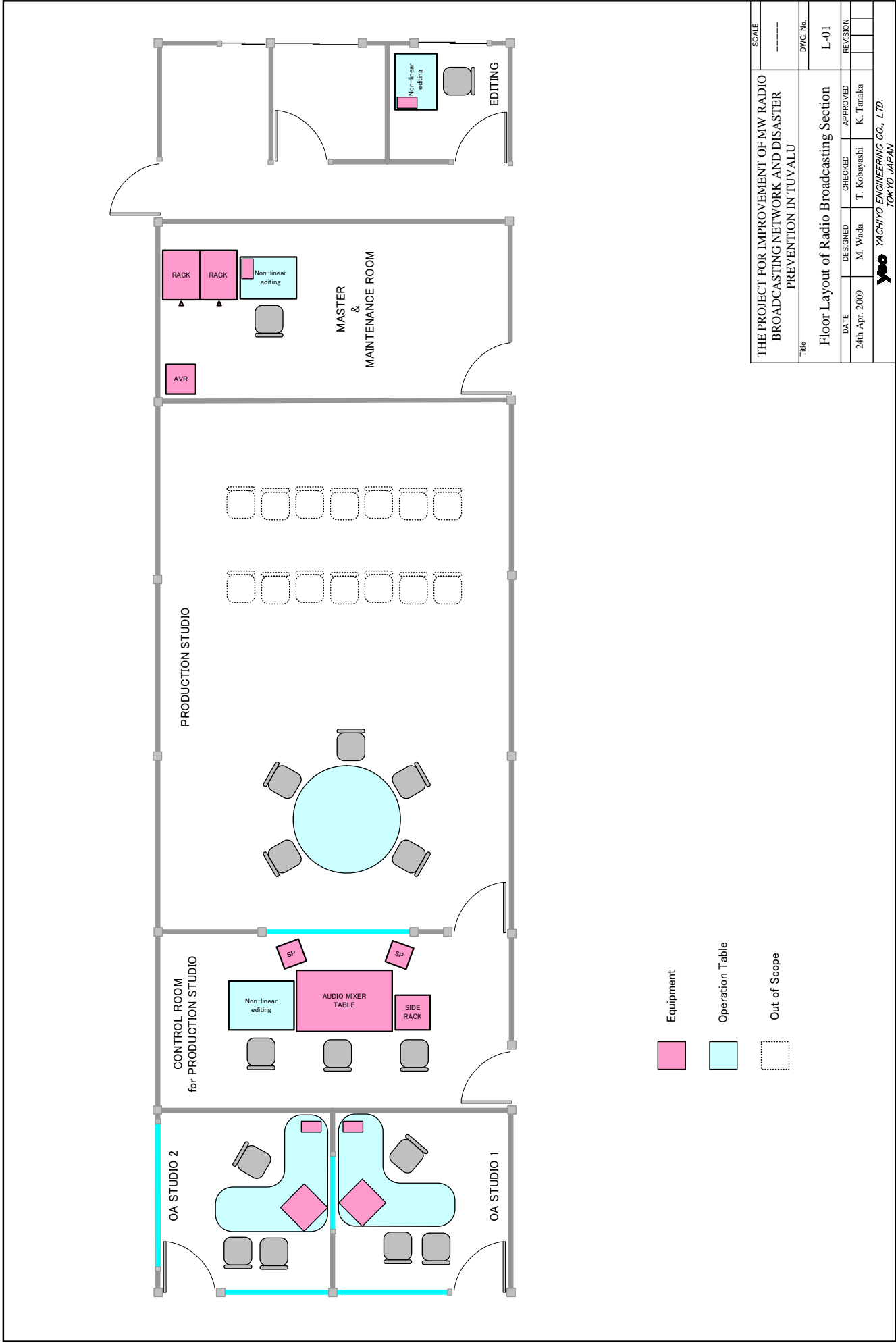
THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE
Title				DWG. No.
Block Diagram of Room to Room Interphone				Sy-08
DATE	DESIGNED	CHECKED	APPROVED	REVISION
24th Apr. 2009	M. Wada	T. Kobayashi	K. Tanaka	
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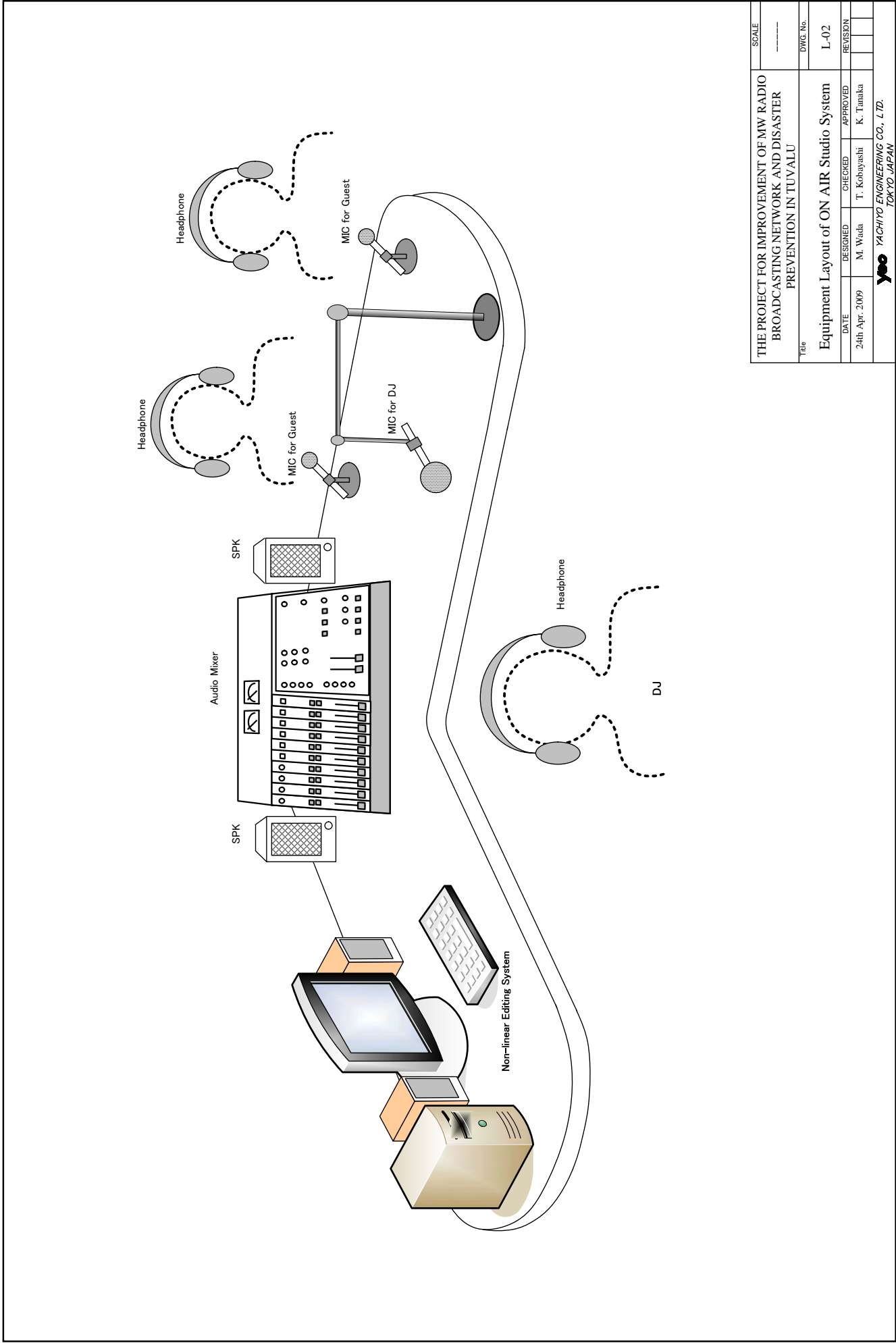
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Title				DWG No.
Block Diagram of In House Monitor System				Sy-09
DATE	DESIGNED	CHECKED	APPROVED	REVISION
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THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE	
File				DWG. No.	
Block Diagram of ON AIR Tally System				Sy-10	
DATE	DESIGNED	CHECKED	APPROVED	REVISION	
24th Apr. 2009	M. Wada	T. Kobayashi	K. Tanaka		
yoo				YACHIYO ENGINEERING CO., LTD.	
				TOKYO JAPAN	



THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE
Title				DWG. No.
Floor Layout of Radio Broadcasting Section				L-01
DATE	DESIGNED	CHECKED	APPROVED	REVISION
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THE PROJECT FOR IMPROVEMENT OF MW RADIO BROADCASTING NETWORK AND DISASTER PREVENTION IN TUVALU				SCALE
Title				DWG. No.
Equipment Layout of ON AIR Studio System				L-02
DATE	DESIGNED	CHECKED	APPROVED	REVISION
24th Apr. 2009	M. Wada	T. Kobayashi	K. Tanaka	
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## **2.2.4 Implementation Plan**

### **2.2.4.1 Implementation Policy**

The Project will be implemented under the grant aid scheme of the Government of Japan and will, therefore, be implemented after approval of its implementation by the Government of Japan and the completion of the E/N as well as the G/A between the two countries. The basic issues and important points regarding the implementation of the Project are described here.

#### **(1) Project Implementing Body**

The project implementing body on the Tuvalu side will be the Office of the Prime Minister. The TMD is a department of this Office and the section responsible for project implementation at the TMD will be the Technical Bureau which will also be responsible for the operation and maintenance of the equipment. It will be necessary for the Technical Division to maintain close contact with the Japanese consultant and contractor and to select a person to be in charge of the Project to ensure the smooth implementation of the Project.

#### **(2) Consultant**

A Japanese consultancy firm will conclude a design and supervision agreement with the Office of the Prime Minister to properly proceed with the equipment procurement and installation work for the Project. This consultant will also be responsible for the preparation of the tender documents and will conduct the tender on behalf of the Office of the Prime Minister which is the project implementing body.

#### **(3) Contractor**

A Japanese contractor selected by the Tuvalu side through an open tender in accordance with the grant aid scheme of the Government of Japan will conduct the construction of the planned buildings, etc., procurement of equipment and construction materials, installation of equipment and provision of technical guidance. As it will be necessary for the contractor to provide an after-service, including the supply of spare parts and handling of equipment breakdowns, it should establish a communication link with the Office of the Prime Minister to function in the period after the handing-over of the equipment and buildings to the Tuvalu side.

#### **(4) Necessity for the Dispatch of Japanese Engineers**

As much of the equipment to be procured under the Project requires a high level of technical competence for its installation and post-installation adjustment and testing, it will be necessary for the contractor to dispatch Japanese engineers to conduct quality management, technical



guidance and schedule control. TMD staff members already have the general technical capability to operate and maintain broadcasting equipment using the existing PCs and, therefore, no special technical problems are anticipated in regard to the maintenance of such equipment. However, they are unfamiliar with the operation and maintenance of the latest equipment and it will be necessary for the contractor to dispatch Japanese engineers of the manufacturers of the equipment provided under the Project to conduct OJT when the newly procured equipment is installed.

#### **2.2.4.2 Implementation Conditions**

While the recruitment of workers (labourers) in Tuvalu for the construction work is possible, there are not many local skilled workers or engineers with the technical expertise required for schedule, quality and safety control/management. It will, therefore, be necessary for the Japanese contractor to dispatch engineers and/or skilled workers from Japan as required. In regard to the minimum range of construction machinery which is necessary for the construction of the planned buildings and the inland transportation and installation of the equipment, procurement from a neighbouring third country will be planned as this cannot be procured in Tuvalu.

The submission of environmental impact data on the concrete aggregates to be imported to the Agricultural Bureau of Tuvalu for approval will be necessary.

#### **2.2.4.3 Scope of Works**

The Japanese side will be responsible for the construction of the new radio station building and new transmitter house and also for the procurement and installation of the equipment while the Tuvalu side will be responsible for the removal of the existing equipment, establishment of power supply and telephone lines and other work. Table 2.2-3 shows the division of the work between the two sides.

Table 2.2-3 Division of Work

Work Item		Japan	Tuvalu	Remarks
1	Procurement of equipment	O		See Table 2.2-2 for the list of the planned equipment
2	Transportation to the project site	O		Destination: temporary storage yard near the project site
3	Tax exemption and customs clearance at the port of landing		O	
4	Provision of a temporary storage yard near the project site		O	
5	Construction of a new radio station building and new transmitter house	O		Including temporary work roads
6	Installation, adjustment and test operation of equipment	O		Including the installation of radial earth
7	Initial guidance on the operation of equipment/systems (including equipment for this guidance work)	O		
8	Weeding and removal of obstacles from the new antenna site		O	Must be completed prior to the foundation work by the Japanese side
9	Removal of the existing equipment and cables (including the work to relocate the existing studios and master control room)	(Advice)	O	Must be completed prior to the construction work by the Japanese side
10	Demolition of the existing radio station building and ground levelling	O		As above
11	Provision of a place for the disposal of the removed equipment, etc.		O	As above
12	Securing of commercial power supply (including power lines from the existing substation to the new radio station building and new transmitter house and arrangement of an emergency power source at the new radio station building)	(Advice)	O	As above
13	Securing of two telephone lines to the new radio station building and a back-up programme transmission line from the studios to the new transmitter	(Advice)	O	Must be completed prior to the equipment installation work by the Japanese side
14	Implementation of test broadcasting	(Advice)	O	
15	Installation of the existing satellite receiving dish on the roof of the new radio station building		O	
16	Erection of perimeter fencing and a gate at the new radio station building site		O	

Note: O indicates the side responsible for the work concerned.

## **2.2.4.4 Consultant Supervision**

### **(1) Basic Principles for Work Supervision and Procurement Supervision**

The consultant will be obliged to form a project team to be responsible for the Project and also to smoothly conduct the detailed design work and work supervision work based on Japan's Grant Aid Guidelines as well as the approved contents of the basic design. The consultant will dispatch expert engineers in accordance with the progress of the construction work, equipment installation work, on-site testing and adjustment and other aspects of the Project to supervise the contractor in order to ensure that the schedule, quality, completed amount and safety control/management is conducted as planned. The consultant will also be responsible for the pre-shipment inspection of the equipment to prevent any problems after the delivery of the equipment to the project site.

The important points for work supervision and procurement supervision are explained next.

#### **1) Schedule Control**

The consultant will request that the contractor observe the work completion date clearly indicated in the contractor agreement and will conduct weekly and monthly progress checks. When the consultant detects a possibility of a delay of the contractor's work, it will remind the contractor of such possibility and request that the contractor submit and implement a plan (measures) to rectify the situation. Comparison between the planned work schedule and actual progress will primarily be conducted on the basis of the following matters.

- ① Confirmation of the amount of completed work (manufacture of equipment at a plant; amount of equipment shipped from a plant)
- ② Confirmation of the amount of delivered equipment and materials
- ③ Confirmation of the actual number and man-hours of engineers, skilled workers and labourers

#### **2) Quality and Completed Work Amount Management**

The consultant will conduct quality and completed work amount management in the following manner to ensure that the quality and completed work amount clearly indicated in the relevant agreement are fully met.

- ① Checking of the equipment specifications
- ② Checking of the shop drawings and working drawings of the equipment
- ③ Witnessing of the plant inspection or checking of the plant inspection results
- ④ Checking of the installation manuals
- ⑤ Checking of the equipment test operation, adjustment, testing and inspection manuals

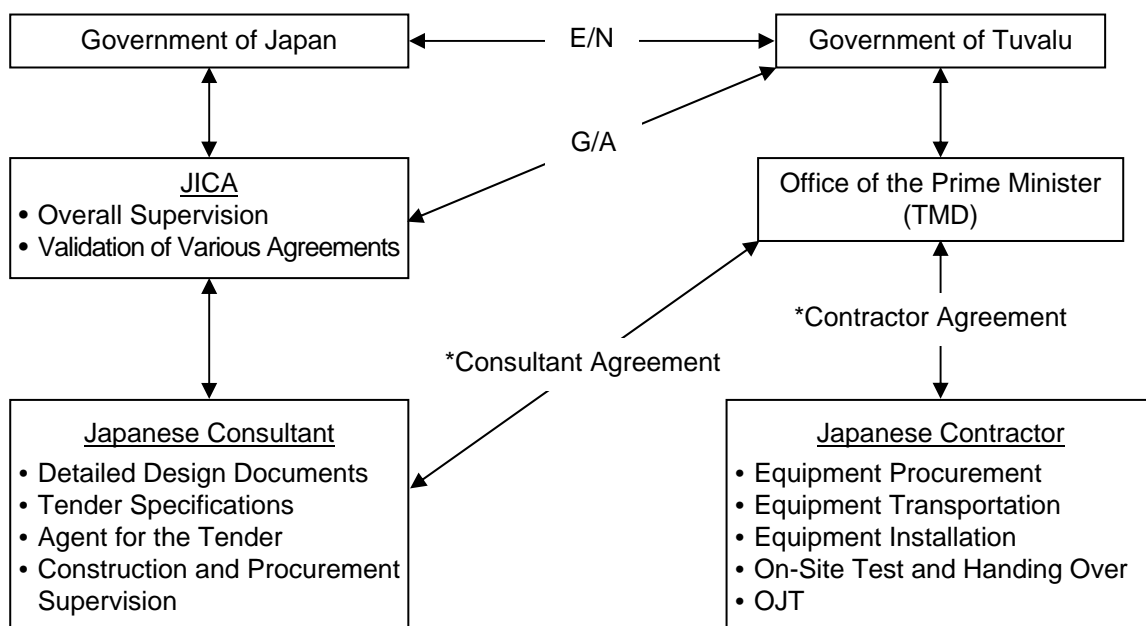
- ⑥ Supervision of the on-site equipment installation work and witnessing of the test operation, adjustment, testing and inspection of the equipment

### 3) Labour Management

The consultant will fully consult the safety manager of the contractor to prevent any labour accidents and injury or accidents involving third parties during the construction work period. The most important points relating to on-site safety supervision are listed below.

- ① Preparation of work safety management rules and selection of a safety manager
- ② Establishment of travelling routes for work vehicles and transport machinery and strict enforcement of safe driving
- ③ Implementation of welfare measures and rest days for labourers
- ④ Security measures for all personnel during the project period

Fig. 2.2-3 shows the relationship between the parties involved in the Project.



\* Note : Both the consultant agreement and the equipment procurement agreement (contractor agreement) must be validated by the JICA.

Fig. 2.2-3 Project Implementation System

### (2) Work Supervisor

The contractor will procure and deliver the equipment and will also conduct the equipment installation work. As the contractor must ensure that the local subcontractor properly understands the work schedule, quality and completed work amount control and the required safety measures as set forth in the contractor agreement, it will dispatch an engineer(s) with previous experience of similar work abroad to Tuvalu to provide appropriate guidance for the local subcontractor.

#### 2.2.4.5 Quality Control Plan

The progress and quality of the construction work will be checked using the working drawings. In the case of concrete, a test piece for each concrete section will be sampled after mixing and its strength will be checked by a compression testing machine. The quality of the reinforcing bars will be checked with the mill sheet. In regard to other materials, the specifications will be confirmed using a sample or catalogue prior to their actual use. In regard to equipment, a factory inspection before shipment will determine whether or not the equipment meets the technical specifications, dimensions, function and electrical/mechanical characteristics specified in the relevant tender documents. At the installation, the Acceptance Test for handing-over will be conducted for each equipment so that normal operation/functioning can be checked after actual installation.

#### 2.2.4.6 Procurement Plan

The equipment to be procured under the Project is not manufactured in Tuvalu and will be procured from either Japan or a third country as shown in Table 2.2-4.

Table 2.2-4 Feasible Equipment and Material Procurement Sources

No.	Item	Procurement Source		
		Japan	Tuvalu	Third Country
1	MW Antenna System	O	-	-
2	10kW Medium Wave Transmitter	O	-	O
3	Power Supply Equipment and Air-Conditioning for Transmitter	O	-	-
4	Master Control System	O	-	O
5	ON AIR Studio System	O	-	O
6	Production Studio System	O	-	O
7	Editing System	O	-	O
8	Equipment for News Gathering	O	-	O
9	Maintenance Equipment and Tools	O	-	O
10	Spare Parts	O	-	O
11	Consumable Parts	O	-	O

Should the Project actually be implemented, it is believed that the guarantee period offered by the equipment manufacturers will be one year. It will be necessary for the Tuvalu side to continually appropriate the budget for the procurement of consumable and other parts in the post-project period to ensure the proper operation and maintenance of the new equipment.

#### **2.2.4.7 Operational Guidance Plan**

The TMD has been operating and maintaining the existing equipment, including analogue broadcasting equipment, and its technical staff members have sufficient technical expertise to operate and maintain the said equipment. However, they are not very familiar with the operation and maintenance of the latest digital equipment to be procured under the Project. It will, therefore, be necessary for Japanese engineers to provide technical guidance by means of OJT and others on the operation and maintenance of the new equipment and how to conduct routine checks and to deal with breakdowns after the installation, adjustment and test operation of the equipment by the Japanese side. The subject matters of this guidance will include a series of operations, from studio recording work to the transmission of radiowaves from the antenna via the master control room and the transmitter

#### **2.2.4.8 Implementation Schedule**

The planned project implementation schedule based on Japan's Grant Aid Guidelines is shown in Table 2.2-5. As the construction work and equipment installation work will proceed side by side after the detailed design, the required period to complete the Project, including the detailed design, will be 16.0 months.

Table 2.2-5 Project Implementation Schedule

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Detailed Design and Tender	■ (Field check)	■ (Preparation of the tender documents)	■ (Approval by the Tuvalu side)	■ (PQ and preparation of the tender)	■ (Tender and evaluation)												
																	(Sub-Total: 4.5 months)
Construction Work	■ (Preparatory work)	■ (Earth work)	■ (Foundation work)	■ (Structural work)	■ (Masonry work)	■ (Roof and exterior finishing work)	■ (Interior finishing work)	■ (Electrical installation work)	■ (Air-conditioning and ventilation work)	■ (Exterior work)	■ (Inspection and handing over)						
																	(Sub-Total: 10.0 months)
Equipment Procurement and Installation	■ (Preparation of the production drawings and working drawings and their approval by the Tuvalu side)	■ (Manufacture of equipment)	■ (Transportation x 2)	■ (Equipment installation)	■ (Adjustment, testing and OJT)												
																	(Sub-Total: 11.5 months)

## 2.3 Obligations of the Recipient Country

The scale of the buildings and specifications of the equipment under the Project are planned not to exceed the current manpower, technical capability and maintenance capability of the TMD. Among the undertakings of the Tuvalu side listed in Table 2.2-3 - Division of Work, the removal or relocation of the existing equipment, etc. will be conducted by staff of the TMD while weeding and the removal of obstacles at the new antenna site will be conducted by staff of the Public Works Department. Meanwhile, the removal of existing power cables and telephone lines will be conducted by the Tuvalu Electricity Corporation (TEC) and Tuvalu Telecommunications Corporation (TTC) respectively. It is judged that all of this work can be conducted with little difficulty. In addition, the Government of Tuvalu will be responsible for the following matters.

- (1) Exemption of the equipment, etc. required for the Project and Japanese nationals dispatched to Tuvalu in connection with the Project from customs duties and internal taxes and accordance of various facilities to Japanese nationals to assist the execution of their assignment
- (2) Exemption of the equipment and materials to be procured under the Project and Japanese corporations and Japanese nationals from business tax and other internal taxes
- (3) Bearing of the commission for the opening of an account and for the A/Ps at a Japanese bank handling foreign exchange
- (4) Bearing of all expenses other than those to be borne by Japan's grant aid necessary for the implementation of the Project
- (5) Appointment of local engineers to which operation and maintenance skills will be transferred under the Project and witnessing of the progress check of the construction work and inspection of the performance and functions of the equipment
- (6) Ensuring of the appropriate use and maintenance of the facilities and equipment which are constructed or procured by Japan's grant aid

For the implementation of the Project, including those matters listed above, the Tuvalu side will be required to finance the cost described later in 2.5.1.1. It has already been confirmed that the Office of the Prime Minister will secure the necessary budget to cover such cost. Given the fact that the size of the required funding is not particularly large compared to the normal funding size for the maintenance of public facilities in the annual budget, it is judged that this financial requirement will not be a problem or burdensome for the implementation of the Project.

## **2.4 Project Operation Plan**

### **(1) Maintenance System**

In order for the TMD to properly perform the functions expected of a public broadcaster, it will be necessary for the TMD to allocate a sufficient budget for the procurement and renewal of the equipment in a systematic manner. The maintenance plan for the equipment to be procured under the Project will, therefore, incorporate the periodic renewal of equipment. Table 2.4-1 shows such plan.

Consumables, such as air-filters for the MW transmitter and electric lamps for the OB lighting, which require periodic replacement because of constant use will be replaced every year or up to



every five years. The fuses and fan units, etc. for the equipment will be replaced as soon as they are worn or damaged. The MW transmitter proper, programme input equipment and other principal equipment will be renewed en-masse 10 years after use in consideration of their depreciation period and technological innovation.

Table 2.4-1 Maintenance Plan

Timing of Renewal	Subject Parts
Every year - every five years	Air filters; electric lamps for OB lighting; various (printed) boards; UPS
Worn or damaged	Fuses; fan units; surge absorber for isolation transformer
After 10 years	MW transmitter; programme input equipment; studio equipment

## (2) Daily Checks

The improved reliability and durability of electronic equipment and the decreased number of components due to technological innovation in recent years have resulted in fewer incidents of the malfunctioning of equipment. Because of such an improved state of operation, the interval for equipment maintenance work is becoming longer in Japan. Nevertheless, daily and periodic checks/inspections are still essential to ensure the effective use of equipment over a long period of time. These inspections are particularly important for organizations like the TMD which cannot frequently renew equipment because of financial constraints. Accordingly, it is imperative to formulate the minimum maintenance standards for daily and periodic checks to consolidate a system to prevent equipment breakdowns. Table 2.4-2 shows the daily and periodic check items of the equipment to be procured under the Project and the instruments which will be required for checking.

Table 2.4-2 Equipment Check Items and Required Instruments

Type of Check	Check Item	Required Instruments
Daily check; pre-work check	Visual check of various meters and fault displays	Audio monitor
	Visual check of connections	Tool set
Six month check (characteristic test)	Measuring of the characteristics of audio equipment (frequency characteristic; S/N ratio); distortion; level diagramme	Distortion meter/ oscillator; oscilloscope
	Power source; various voltage levels	Oscilloscope; tester; high voltage probe
Annual check (characteristic test)	Transmission frequency antenna characteristics receiving field strength	Frequency counter Impedance bridge Field strength meter

## (3) Spare Parts

Table 2.4-3 shows the detailed spare parts to be procured by the TMD in the five year period after the implementation of the Project. The replacement/renewal of various cables and microphones almost every year will be required because of their frequent use for news gathering, interviews and programme recording. Quantities equivalent to one year's supply or to conduct the

repair of the first breakdowns will be procured under the Project. Technology transfer by Japanese engineers to TMD engineers or those of other related government offices in Tuvalu is planned as part of the OJT which will be conducted during the on-site construction period on how to replace such spare parts as the air filter for the transmitter. It is highly desirable for the TMD to secure sufficient funds to procure spare parts every year to continue appropriate maintenance.

Table 2.4-3 Spare Parts

(Unit: A\$)

Item	Unit Cost (A\$)	Every Year		Every 3 Years		Every 5 Years	
		Quantity	Amount (¥)	Quantity	Amount (¥)	Quantity	Amount (¥)
Cables	140	3	420				
Microphones	290	3	870				
Headphones	290	3	870				
Switch and connector, etc.	710	1	710				
Fan unit for transmitter	710	1	710				
Air filters for transmitter	710	2	1,420				
Various fuses	290	5	1,450				
Lamps for OB lighting	1,430	3	4,290				
Surge absorber for isolation transformer	1,430	1	1,430				
PA modules	1,430		0	3	4,290		
RF driver units	1,430		0	3	4,290		
Power supply modules	1,430		0	3	4,290		
Various control boards	1,430		0	3	4,290		
Power transistors	1,430		0	3	4,290		
UPS	2,860					5	14,300
Total			12,170		21,450		14,300

#### (4) Consumable Parts

One necessary consumable for the operation of a radio station is a medium (CD-R) to record programmes and audio materials. Table 2.4-4 shows the required quantity of CD-Rs after the implementation of the Project. 3,000 CD-Rs will be provided under the Project to assist the start-up of the new radio station. This quantity is based on the assumption that work will be necessary to convert and copy the programmes and audio materials recorded in the old format and stored by the TMD to the new format for storage on CD-R up to the third year of the start of the new radio station. From the fourth year onwards, the quantity of CD-Rs required is estimated to be 2,000 a year because of the decreased amount of such conversion work.

Table 2.4-4 Annual Consumption of CD-Rs

(Unit: A\$)

Item	Unit Cost (A\$)	Second Year		Third Year		Fourth Year Onwards	
		Quantity	Amount (¥)	Quantity	Amount (¥)	Quantity	Amount (¥)
CD-Rs (recording medium)	1	3,000	3,000	3,000	3,000	2,000	2,000
Total			3,000		3,000		2,000

## 2.5 Project Cost Estimation

### 2.5.1 Initial Cost Estimation

The breakdown of the cost to be borne by the Tuvalu side based on the division of work between the two countries is shown in the table below based on the estimation conditions given.

#### 2.5.1.1 Cost to be Borne by the Tuvalu Side

The estimated project cost for the Tuvalu side is approximately A\$ 35,840 (approximately ¥2.35 million).

- ① Weeding and removal of obstacles from the new antenna site: A\$ 12,000 (approx. ¥0.79 million)
  - Replanting of mangroves : A\$ 23/person/day x 432 person-days = A\$ 9,936
  - Weeding : A\$ 23/person/day x 87 person-days = A\$ 2,001
- ② Securing of commercial power supply (including the supply of cables for power lines from the existing substation to the new radio station building and new transmitter house and arrangement of an emergency power supply source at the new radio station building): A\$ 2,000 (approx. ¥0.13 million)
  - Cable : A\$ 14/m x 100 m = A\$ 1,400
  - kWh meter : A\$ 100
  - Installation work : A\$ 50/person/hour x 10 person-hours = A\$ 500
- ③ Securing of two telephone lines to the new radio station building and back-up programme transmission line from the studios to the new transmitter house: A\$ 300 (approx. ¥0.02 million)
  - A\$ 100/line x 3 lines = A\$ 300
- ④ Erection of perimeter fencing and a gate at the new radio station building site: A\$ 9,500 (approx. ¥0.62 million)
  - Fencing : A\$ 900 (foundation work)  
A\$ 5,500 (net fencing)
  - Gate : A\$ 200 (entrance gate)  
A\$ 2,900 (sliding gate for garages)
- ⑤ Arrangement fee for the A/P facility: A\$ 12,040 (approx. ¥0.79 million)

### 2.5.1.2 Estimation Conditions

- ① Timing of estimation : April, 2009
- ② Foreign exchange rates : US\$ 1 = ¥96.08  
A\$ 1 = ¥65.61
- ③ Construction and procurement periods: The detailed design, facility construction and equipment procurement and installation periods are those shown in the Project Implementation Schedule (Table 2.2-5).

### 2.5.2 Operation and Maintenance Cost

For the sound management of the TMD for many years to come, it will be necessary to renew the equipment to be procured under the Project in due course. The maintenance plan for the equipment must, therefore, take the periodic equipment renewal cost into consideration in addition to the routine maintenance cost of the existing and new equipment.

#### (1) Conditions for Maintenance Cost Estimation

The operating expenditure and income of the TMD are estimated based on the conditions described below.

##### 1) Expenditure

The equipment to be procured under the Project will commence operation in 2011 and the annual maintenance cost is estimated in the following manner.

##### ① Personnel Cost (for Additional Staff Members)

The technical section of the TMD currently consists of one chief engineer, one senior technician and two technicians. The TMD plans to recruit an additional technician in 2010 which is one year before the completion of the Project. This team of five technical staff members will be responsible for the maintenance of the MW radio broadcasting system under the leadership of the chief engineer and conscious efforts will be made at the same time to improve the skills of young technicians. The personnel cost of an additional technician is estimated to be some A\$ 8,000 a year from 2010.

##### ② Building Maintenance

Table 2.5-1 shows the estimated maintenance cost of the electrical and air-conditioning systems at the new radio station building and new transmitter house and also the

maintenance cost of the new antenna mast, all of which will be constructed under the Project. The inspection and maintenance of the air-conditioning units will be of particular importance to ensure the proper functioning of the transmitter which generates much heat while painting of the antenna mast will be essential to prevent salt damage in view of the coastal location of the mast.

Table 2.5-1 Building Maintenance Cost

Item	Unit Cost (¥)	(Unit: A\$)	
		Quantity	Amount (¥)
Air-conditioning unit inspection	4,300	1	4,300
Water tank cleaning	700	1	700
Pump repair	1,400	1	1,400
Electrical repair	1,400	1	1,400
Painting (antenna mast)	11,400	1	11,400
Total			19,200

### ③ Reserve Fund for Equipment Renewal

The equipment to be procured under the Project will commence operation in 2011. It is desirable for the Tuvalu side to set aside some money to create a reserve fund (A\$1,715,000; see Table 2.5-2) with a view to the renewal of the principal equipment in 2020 after 10 years of operation. Given the present financial situation of the TMD, such saving may be made in the form of a grant or allocation from the special budget of the Government of Tuvalu. Table 2.5-2 shows the breakdown of the equipment renewal cost after 10 years of operation.

Table 2.5-2 Equipment Renewal Cost

Item	Unit Cost	(Unit: A\$)	
		Quantity	Amount
Transmitter (partial renewal)	714,000	1	714,000
Stay cables (insulators)	143,000	1	143,000
Master control room & studio equipment	786,000	1	786,000
Air-conditioning units	29,000	1	29,000
Emergency generator	43,000	1	43,000
Total			1,715,000

### ④ Training Cost

The TMD will require a training budget for not only improvement of the maintenance skills of the technicians as mentioned earlier but also for the general development of its human resources, including improved know-how and broader social knowledge for reporters (journalists) and announcers. Table 2.5-3 shows the future cost of training in which the TMD will regularly participate.

Table 2.5-3 Training Cost

(Unit: A\$'000)

Training Programme (No. of Trainees)	2009	2010	2011	2012	2013	2014	2015	2016	2017
1. Overseas training in the radio broadcasting field using Tuvalu's own funds (1)	10,000		10,000		10,000		10,000		10,000
2. Workshop held in Fiji by the Pacific Islands News Association (PINA) (2)	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
3. Overseas training in the radio broadcasting sector using an ODA scholarship (1)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Total	16,000	6,000	16,000	6,000	16,000	6,000	16,000	6,000	16,000

## 2) Income

The current main income sources of the TMD are radio broadcasting operation, including parliamentary broadcasting paid by the government, and radio advertisements (CM) as well as a copying and binding service as part of the TMD's businesses. With the completion of the Project, additional income can be anticipated from the rental of a public address system for parliamentary broadcasting and various events organized by the government. There is no definite plan to restart the newspaper publication business which is currently suspended.

## 3) Government Subsidy

The government subsidy at the level of FY 2007 is expected to continue as shown in Table 2.5-4. At present, the personnel cost of the TMD is paid by the government as its staff members are classified as public servants. Any shortfall is met by the special account of the government on application.

## (2) Estimation Results

Table 2.5-4 shows the projected income and expenditure up to 2020, i.e. 10 years after the completion of the Project, when principal equipment is scheduled for renewal. According to this table, while the income from advertising shows a trend of a minor increase due to the expected growth of the GDP and other reasons, the overall annual deficit will steadily increase due to the increased personnel cost following the recruitment of an additional technician as a result of the recommencement of MW radio broadcasting under the Project and the increased maintenance cost of the new radio station building and equipment. It will, therefore, be necessary for the Government of Tuvalu to meet this annual deficit and also to secure the necessary budget to renew the MW radio broadcasting system in 2020.

Table 2.5-4 Financial Plan (Projection)

(Unit: A\$ '000)

No	Year	2008	2009	2010	1	2	3	4	5	6	7	8	9	10
	Item				Completion of the Project									
<b>A.</b>	<b>Operating Income</b>													
(1)	Parliamentary Broadcasting	34.0	10.0	10.0	10.0	10.4	10.9	11.4	11.9	12.4	12.9	13.5	14.1	14.7
(2)	Radio Advertisements	55.0	55.0	55.0	56.2	57.9	59.6	61.4	63.2	65.1	67.1	69.1	71.2	73.3
(3)	Copying and Binding Service	22.5	26.8	28.0	29.2	30.5	31.8	33.2	34.7	36.2	37.8	39.5	41.2	43.0
(4)	Publication of Newspaper	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(5)	PA Service	0.0	0.0	0.0	5.0	5.1	5.3	5.4	5.6	5.7	5.9	6.1	6.2	6.4
(6)	Other	5.5	6.5	6.8	7.1	7.4	7.7	8.1	8.4	8.8	9.2	9.6	10.0	10.4
	<b>Sub-Total A</b>	<b>120.0</b>	<b>101.3</b>	<b>99.8</b>	<b>107.5</b>	<b>111.4</b>	<b>115.3</b>	<b>119.5</b>	<b>123.8</b>	<b>128.3</b>	<b>132.9</b>	<b>137.7</b>	<b>142.8</b>	<b>147.9</b>
<b>B.</b>	<b>Operating Expenditure</b>													
(1)	Personnel Cost and Allowances	165.2	206.3	223.4	233.2	243.5	254.2	265.4	277.0	289.2	302.0	315.2	329.1	343.6
(2)	Travel Expenses	7.3	12.1	12.6	13.2	13.8	14.4	15.0	15.7	16.4	17.1	17.8	18.6	19.4
(3)	Telephone and Internet Charges	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
(4)	<b>Maintenance Cost</b>	<b>4.3</b>	<b>3.5</b>	<b>2.2</b>	<b>3.0</b>	<b>36.8</b>	<b>36.8</b>	<b>57.2</b>	<b>35.8</b>	<b>50.1</b>	<b>57.2</b>	<b>35.8</b>	<b>35.8</b>	<b>57.2</b>
1)	Buildings (Radio Station Building and Transmitter House)	1.8	1.8	0.5	0.0	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2
2)	Spare Parts for Radio Broadcasting Equipment	1.2	1.2	1.2	0.0	11.6	11.6	33.0	11.6	25.9	33.0	11.6	11.6	33.0
3)	Vehicle and Fuel (including Fuel for Emergency Generator)	1.3	0.5	0.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4)	Consumables	-	-	-	0.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
(5)	Office Expenses and PC Renewal Cost	10.0	8.0	8.0	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
(6)	Training Expenses	0.0	16.0	6.0	16.0	6.0	16.0	6.0	16.0	6.0	16.0	6.0	16.0	6.0
	<b>Sub-Total B</b>	<b>188.3</b>	<b>247.4</b>	<b>253.7</b>	<b>276.1</b>	<b>310.7</b>	<b>332.1</b>	<b>354.3</b>	<b>355.2</b>	<b>372.4</b>	<b>402.9</b>	<b>385.6</b>	<b>410.2</b>	<b>436.9</b>
C	Operating Profit: A - B = C	-68.3	-146.1	-153.9	-168.6	-199.4	-216.7	-234.8	-231.4	-244.1	-270.0	-247.8	-267.5	-289.0
D	<b>Government Subsidy</b>	<b>68.3</b>	<b>146.1</b>	<b>153.9</b>	<b>168.6</b>	<b>199.4</b>	<b>216.7</b>	<b>234.8</b>	<b>231.4</b>	<b>244.1</b>	<b>270.0</b>	<b>247.8</b>	<b>267.5</b>	<b>289.0</b>
E	Balance after Subsidy: E = C + D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F	<b>Reserve Fund (for Equipment Renewal)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>171.5</b>	<b>171.5</b>	<b>171.5</b>	<b>171.5</b>	<b>171.5</b>	<b>171.5</b>	<b>171.5</b>	<b>171.5</b>	<b>171.5</b>	<b>171.5</b>
	<b>Accumulated Amount of Reserve Fund</b>				<b>171.5</b>	<b>343.0</b>	<b>514.5</b>	<b>686.0</b>	<b>857.5</b>	<b>1,029.0</b>	<b>1,200.5</b>	<b>1,372.0</b>	<b>1,543.5</b>	<b>1,715.0</b>

## **2.6 Important Points Regarding Project Implementation**

The tax exemption procedure for the equipment to be procured under the Project will proceed in the following manner. The Tuvalu side must ensure the swift implementation of this procedure as any delay may have an adverse impact on the progress of the Project.

<Tax exemption procedure>

- ① Prior to the shipment of the procured equipment, the Japanese contractor will submit a copy of the E/N to the Customs Division of the Ministry of Finance and Economic Planning via the project implementing body in Tuvalu for the purpose of tax exemption registration.
- ② Prior to the arrival of the procured equipment at the Port of Funafuti, the Japanese contractor will submit (i) the original bill of loading and (ii) the original commercial invoices to a customs clearance agent (CCA) in Tuvalu.
- ③ The CCA will prepare the necessary customs clearance documents and submit them to the Customs Division for approval.
- ④ After approval by the Customs Division, the cargo subject to tax exemption will undergo the customs clearance stage.



## **CHAPTER 3**

# **PROJECT EVALUATION AND RECOMMENDATIONS**

## CHAPTER 3 PROJECT EVALUATION AND RECOMMENDATIONS

### 3.1 Project Effects

Current Situation and Problems	Remedial Measures Under the Project	Direct Effects and Extent of Improvement	Indirect Effects and Extent of Improvement
<ul style="list-style-type: none"> <li>The present FM radio broadcasting to distant atolls is made via a satellite link using a relay transmitter on each atoll. Although the system frequently fails due to inadequate maintenance, the limited transport access to distant atolls means that broadcasting can be suspended for several months at a time.</li> <li>The existing MW radio broadcasting system with a transmitter which is not functioning due to fire and an antenna which has been brought down by strong wind is beyond repair as spare parts are no longer available.</li> <li>The existing radio station building is suffering from rainwater leakage and a poor state of the windows and doors due to deterioration. As a result, programme recording operation is affected by outside noise, making it difficult to secure an adequate programme quality.</li> <li>The frequent breakdowns of the programme-making equipment makes it difficult to swiftly supply the public with information.</li> </ul>	<p>The following buildings will be constructed along with the procurement (and installation) of the equipment, etc. listed below.</p> <p>&lt; Buildings &gt;</p> <ul style="list-style-type: none"> <li>Radio station building</li> <li>Transmitter house</li> </ul> <p>&lt; Equipment, etc. &gt;</p> <ul style="list-style-type: none"> <li>MW antenna system</li> <li>10 kW MW transmitter</li> <li>Power supply equipment with air-conditioning for the transmitter</li> <li>Master control system</li> <li>ON AIR studio system</li> <li>Production studio system</li> <li>Editing system</li> <li>News gathering equipment</li> <li>Maintenance equipment and tools</li> <li>Spare parts</li> <li>Consumable parts</li> </ul>	<p>1) Restoration of MW Radio Broadcasting</p> <p>The recommencement of MW radio broadcasting will expand Tuvalu's radio broadcasting service to cover entire Tuvalu replacing the present unstable FM coverage of Funafuti Atoll and six distant atolls, making it possible to provide a continuous and uninterrupted radio broadcasting service to all people of Tuvalu.</p> <p>2) Enhancement of Public Broadcasting</p> <p>The range of new equipment to be provided under the Project will make it possible to produce important programmes for the people of Tuvalu, such as those on health and education, as well as disaster warnings, fulfilling the obligation of a public radio broadcasting service to provide a diverse range of programmes for the people of Tuvalu.</p> <p>3) Reduction and Improvement of Maintenance Work</p> <p>Unlike the present FM radio broadcasting service via a satellite link, the maintenance cost for facilities on distant atolls will not be required, making the overall maintenance work for the broadcasting system much easier.</p>	<p>1) Educational Effect of Public Broadcasting</p> <p>As a public radio broadcasting service, diverse educational programmes can be broadcast to the people of Tuvalu, improving the daily lives of people through their improved awareness of disaster prevention, health and safety requirements.</p> <p>2) Mitigation of Damage by Natural Disasters</p> <p>The newly restored MW radio broadcasting service will be able to widely transmit information to the people of Tuvalu, making it possible for people to receive vital information on disaster prevention in advance. Consequently, it can be expected that damage caused by natural disasters in Tuvalu will be mitigated.</p>

## 3.2 Recommendations

In order to proceed with the Project as planned, it will be necessary for the Tuvalu side to conduct the following.

### (1) Securing of the Necessary Staff Members and Their Training

At present, the TMD provides its radio broadcasting service for approximately nine hours a day. The hours of this broadcasting service and the number of programmes produced in-house are expected to increase in the coming years in line with the growth of the country. The TMD will be required to secure the necessary personnel strength to offer high quality programmes for the people of Tuvalu. For the upgrading of the programme-making capacity of its staff members, the TMD must continually provide training opportunities.

### (2) Implementation of the Obligations of the Tuvalu Side

- 1) Provision of a temporary storage yard near the project site
- 2) Weeding and removal of any obstacles from the new antenna site
- 3) Removal of the existing equipment and cables (including the work to relocate the existing studios and master control room)
- 4) Provision of a place for the disposal of the removed equipment, etc.
- 5) Securing of commercial power supply (including power lines from the existing substation to the new radio station building and new transmitter house and arrangement of an emergency power source at the new radio station building)
- 6) Securing of two telephone lines to the new radio station building and a back-up programme transmission line from the studios to the new transmitter
- 7) Installation of the existing satellite receiving dish on the roof of the new radio station building
- 8) Erection of perimeter fencing and a gate at the new radio station building site

### (3) Maintenance Capability

The TMD has been operating and maintaining the existing equipment, including analogue broadcasting equipment, and its technical staff members have sufficient technical expertise to operate and maintain the said equipment. However, they are not very familiar with the operation and maintenance of the latest digital equipment to be procured under the Project. It will, therefore, be necessary for Japanese engineers to provide technical guidance by means of OJT on

the operation and maintenance of the new equipment, including how to operate instruments to find equipment failures, how to conduct quality management and how to replace parts.

(4) Implementation of Maintenance Work

It will be necessary for the Tuvalu side to regularly obtain spare parts for the equipment in its possession, including the new broadcasting equipment procured under the Project, and to change the parts as necessary in order to prevent broadcasting failure and to ensure the long service life of the equipment.

(5) Building Maintenance

The present maintenance system must be preserved to maintain the new radio station building and new transmitter house. Careful attention must be paid to the quality of the power supply and air-conditioning, taking the required environment for programme-making and equipment operation into consideration.

(6) Promotion of the Production of Educational Programmes

The training currently provided by the TMD should continue to further improve the skill level of its staff members so that educational programmes on health and other subjects can be produced in-house in greater number.

## **APPENDICES**

## **APPENDIX 1**

### **MEMBER LIST OF THE STUDY TEAM**

## 1. Member List of the Study Team

Name	Work Assignment	Position
Mr. Osamu MAKINO	Team Leader	Senior Advisor JICA
Mr. Yoshiro MASUDA	Project Coordinator	Transportation and ICT Division3 Transportation and ICT Group Economic Infrastructure Dept., JICA
Mr. Kiyofusa TANAKA	Project Manager/ Structure & Radio Broadcasting Planning	Yachiyo Engineering Co., Ltd.
Mr. Masuo WADA	Equipment Planning/ Operation & Maintenance Planning	Yachiyo Engineering Co., Ltd.
Mr. Takashi NAKAMURA	Building Planning	Yachiyo Engineering Co., Ltd.
Mr. Teruo KURUMADA	Steel Tower Facility/ Environment	Yachiyo Engineering Co., Ltd.
Mr. Tatsuya KOBAYASHI	Procurement & Construction Planning/ Cost Estimation	Yachiyo Engineering Co., Ltd.
Mr. Yoshio NAKAGAWA	Social Condition Research	Yachiyo Engineering Co., Ltd.

**APPENDIX 2**

**STUDY SCHEDULE**



## 2. Study Schedule

### (1) Field Survey Schedule of the Study Team

No.	Date		JICA	Consultant Team						Stay at
				Project Manager/ Structure & Radio Broadcasting Planning	Equipment Planning / Operation & Maintenance Planning	Building Planning	Steel Tower Facility / Environment	Procurement & Construction Planning / Cost Estimation	Social Condition Research	
				Kiyofusa TANAKA	Masuo WADA	Takashi NAKAMURA	Teruo KURUMADA	Tatsuya KOBAYASHI	Yoshio NAKAGAWA	
1	08 Mar.	Sun		Trip [Tokyo (21:30) → Brisbane (07:10)+1, JL761]						On board
2	09 Mar.	Mon		Trip [Brisbane (23:40) → Nadi (05:15)+1, FJ920]						On board
3	10 Mar.	Tue	Trip [Tokyo (13:55)→Seoul (16:35),KE704] Trip [Seoul (19:20) → Nadi (08:25)+1, KE137]	Trip [Nadi (07:00) → Suva (07:30), FJ007] Trip [Suva (09:15) → Funafuti (11:35), FJ281] • Courtesy call to Office of the Prime Minister (OPM) and Tuvalu Media Department (TMD), and Submission of and discussion on the Survey schedule, Inception Report and Questionnaires • Survey of TMD's existing facilities and financial status • Meeting with Sub-Contractor for Survey of social conditions						Funafuti
4	11 Mar.	Wed	Trip [Nadi → Suva (Land route ) • Meeting at JICA Fiji Office	• Survey at the site • Discussion with TMD • Courtesy call to Public Works Department, Tuvalu Telecom, Ministry of Education and Sports, and Department of Disaster Management						Funafuti
5	12 Mar.	Thu	Trip [Suva(09:15) → Funafuti (11:35), FJ281] • Courtesy Call to OPM and TMD • Survey at the site	• Survey at the site • Discussion with Tuvalu Electricity Corporation • Courtesy call to Department of Meteorological Service and Department of Civil Aviation						Funafuti
				• Survey at the site • Meeting with Sub-Contractor for Topographic Survey and Soil Investigation						
6	13 Mar.	Fri	• Discussion with Ministry of Finance and Economic Planning and Department of Foreign Affaires and Labour • Meeting with TMD on M/D	• Survey at the site						Funafuti
7	14 Mar.	Sat	• Survey of social conditions and facilities at the port						Funafuti	
8	15 Mar.	Sun	• Sorting of Data and information collected • Internal meeting						Funafuti	
9	16 Mar.	Mon	• Discussion of M/D with TMD	• Same as left • Survey at the site						Funafuti
10	17 Mar.	Tue	• Signing of M/D with TMD	• Courtesy call to Central Statistics Division and Department of Lands & Survey		• Confirmation of the progress of Topographic survey and Soil investigation • Preparation of Equipment Specifications and Drawings		(Same as Project Manager)	Funafuti	
			Trip [Funafuti (12:20) → Suva (14:40), FJ280]							
11	18 Mar.	Wed	• Report to Embassy of Japan in Fiji and JICA Fiji office • Courtesy call to AusAID Trip[Suva → Nadi (Land route)	• Discussion with TMD • Survey at the site • Preparation of Equipment Specifications and Drawings • Courtesy call to Ministry of Finance and Economic Planning						Funafuti
12	19 Mar.	Thu	Trip [Nadi (10:30)→Tokyo (17:00),FJ302]	• Discussion with TMD • Preparation of Equipment Specifications and Drawings • Courtesy call to Ministry and Education and Sports • Confirmation of the progress of Topographic survey and Soil investigation						Funafuti
13	20 Mar.	Fri		• Discussion with TMD • Preparation of Equipment Specifications and Drawings • Courtesy call to Police Office, Department of Disaster Management, and Princes Margaret Hospital • Confirmation of the progress of Topographic survey and Soil investigation						Funafuti
14	21 Mar.	Sat		• Preparation of Field Report • Confirmation of the progress of Topographic survey and Soil investigation						Funafuti
15	22 Mar.	Sun		• Preparation of Field Report						Funafuti

No.	Date		JICA	Consultant Team					Stay at	
				Project Manager/ Structure & Radio Broadcasting Planning	Equipment Planning / Operation & Maintenance Planning	Building Planning	Steel Tower Facility / Environment	Procurement & Construction Planning / Cost Estimation		Social Condition Research
				Kiyofusa TANAKA	Masuo WADA	Takashi NAKAMURA	Teruo KURUMADA	Tatsuya KOBAYASHI		Yoshio NAKAGAWA
16	23 Mar.	Mon		• Meeting with OPM and TMD on Field Report	• Same as left • Review of the results for Topographic survey and Soil investigation				Funafuti	
17	24 Mar.	Tue		• Signing with TMD on Field Report	• Supplemental surveys				Funafuti	
18	25 Mar.	Wed		• Discussion with Civil Aviation	Ditto				Funafuti	
19	26 Mar.	Thu		Trip [Funafuti (12:20) → Suva (14:40), FJ280]					• Supplemental surveys	Suva
20	27 Mar.	Fri		• Meeting with Sub-Contractor for Topographic survey and Soil investigation • Courtesy call to local contractors and Collection of price quotations				Ditto	Suva	
21	28 Mar.	Sat		• Market surveys		• Market surveys			Ditto	Suva
22	29 Mar.	Sun		• Internal meeting and sorting of Data		Ditto			Ditto	Suva
23	30 Mar.	Mon		• Courtesy call to Fiji Aviation Office, etc. • Market surveys		• Obtaining the report from Sub-Contractor for Topographic survey and Soil investigation • Courtesy call to local contractors and Collection of price quotations			Trip [Funafuti (16:00) → stay on ship]	Suva/ On ship
24	31 Mar.	Tue		• Courtesy call to donors • Market surveys		• Courtesy call to local contractors and Collection of price quotations • Market surveys			Trip [Arriving at Niulakita (06:00)] • Survey of existing FM facilities • Measure Radio receiving level. • Interviewing Trip [Niulakita (11:00) → stay on ship]	Suva/ On ship
25	01 Apr.	Wed		• Report to Embassy of Japan in Fiji and JICA Fiji Office					Trip [Arriving at Nukulaelae (06:00)] • Survey of existing FM facilities Trip [Nukulaelae (18:00) → stay on ship]	Suva/ On ship
26	02 Apr.	Thu		Trip [Suva (06:05) → Nadi (06:35), FJ004] Trip [Nadi (09:15) → Brisbane (11:15), FJ921]					Trip [Arriving at Funafuti (06:00)]	Brisbane/ Funafuti
27	03 Apr.	Fri		Trip [Brisbane (08:55) → Tokyo (16:45), JL762]					• Sorting of Data and information	Funafuti
28	04 Apr.	Sat							Ditto	Funafuti
29	05 Apr.	Sun							Ditto	Funafuti
30	06 Apr.	Mon							• Supplemental surveys	Funafuti
31	07 Apr.	Tue							Trip [Funafuti (12:20) → Suva (14:40), FJ280] Tri [Suva (18:30) → Nadi (19:00), J024]	Nadi
32	08 Apr.	Wed							Trip [Nadi (20:40) → Brisbane (22:55), FJ921]	Brisbane
33	09 Apr.	Thu							Trip [Brisbane (08:45) → Tokyo (17:05), JL762]	

(2) Explanation of Draft Final Report

No.	Date		JICA	Consultant Team		Stay at
				Project Manager/Structure & Radio Broadcasting Planning	Procurement & Construction Planning / Cost Estimation	
				Kiyofusa TANAKA	Tatsuya KOBAYASHI	
1	26 Jul.	Sun	<b>Trip [Tokyo (21:10) → Brisbane (07:05+1), JL761]</b>			On board
2	27 Jul.	Mon	<b>Trip [Brisbane (11:30) → Nadi (17:00), FJ920]</b>			Nadi
3	28 Jul.	Tue	<b>Trip [Nadi (06:15) → Suva (06:45), FJ005]</b> <b>Trip [Suva (09:15) → Funafuti (11:35), FJ281]</b> ・ Courtesy calls to OPM and TMD ・ Explanation and discussion of Draft Final Report			Funafuti
4	29 Jul.	Wed	・ Survey for confirming the plan of the project ・ Signing of the M/D with OPM and TMD ・ Survey at Funafuti Port			Funafuti
5	30 Jul.	Thu	<b>Trip [Funafuti (12:20) → Suva (14:40), FJ280]</b>			Suva
6	31 Jul.	Fri	・ Report to Embassy of Japan in Fiji and JICA Fiji Office <b>Trip [Suva (18:00) → Nadi (18:30), FJ018]</b>			Nadi
7	01 Aug.	Sat	<b>Trip [Nadi (08:15) → Brisbane (10:30), FJ921]</b>			Brisbane
8	02 Aug.	Sun	<b>Trip [Brisbane (08:45) → Tokyo (17:05), JL762]</b>			

## **APPENDIX 3**

### **LIST OF PARTIES CONCERNED IN THE RECIPIENT COUNTRY**

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

<u>Name of Organization</u>	<u>Position</u>
<b>Office of the Prime Minister</b>	
Mr. Solofa Uota	Acting Secretary to Government
<b>Department of Foreign Affairs and Labour</b>	
Ms. Corinna Ituaso Laafai	Bilateral and Regional Affairs Officer
<b>Department of Civil Aviation</b>	
Mr. Vitoli F. Iosefa	Civil Aviation Officer
Mr. Uinga Paelate	Assistant Civil Aviation Officer
<b>Department of Disaster Management</b>	
Mr. Sumeo Silu	Disaster Coordinator
<b>Tuvalu Media Department</b>	
Mrs. Melali Taape	Director
Mr. Stanley Manao	Chief Engineer
Mr. Telaulini Niuatui	Senior Technician
Mr. Joshua Tui Tapasei	Technician
Mr. Suitupu Setema	Technician
<b>Department of Meteorological Service</b>	
Mr. Niko Iona	Aerology Officer
<b>Ministry of Finance and Economic Planning</b>	
Mr. Amosa Tau	Acting Director of Planning and Budget
Ms. Sunema Simati	Acting Director of Planning and Budget
Mr. Stephen Boland	Budget Management Specialist
<b>Department of Customs</b>	
Mr. Salesi Safega	Director of Customs
<b>Central Statistics Division</b>	
Mr. Semu Malona	Government Statistician

**Ministry of Education and Sports**

Mr. Michel Noa	Senior Education Officer
Mr. Teake Esene	Sport Officer

**Department of Transport and Tourism, Ministry of Communication,  
transportation and Tourism**

Mr. Pusinelli Laafia	Secretary to Communication
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**Public Works Department, Ministry of Public Utilities and Industries**

Mr. Ampelosa Tehulu	Director
Mr. Fakasa Tofinga	Acting Housing Officer
Mr. Greg Wolff	Water and Sanitation Adviser, AusAID (PACTAM)

**Department of Lands & Survey, Ministry of Natural Resources & Lands**

Mr. Faatasi Malologa	Director
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**Princess Margaret Hospital**

Dr. Puakena Boreham	Medical Superintendent
Dr. Pelesala Kaleia	Physiotherapist

**Police Office**

Mr. Tipelu Kauani	Superintendent
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**Tuvalu Telecommunications Corporation**

Mr. Simeti Lopati	General Manager
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**Tuvalu Electricity Corporation**

Mr. Mafalu Lotolua	General Manager
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**New Zealand Airways**

Mr. Warwick Daldy	Principal Technician
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**Airports Fiji Limited**

Mr. Vula C. Seru	Manager ATM
Mr. Kelepi Dainaki	Aeronautical Technical Officer

**Fiji Broadcasting Corporation Limited**

Mr. Riyaz Sayed - Khaiyum	Chief Executive Officer
Mr. Apisai Bakani	Director Engineering & Technical Services

**AusAID in Fiji - Suva Office**

Ms. Lily-Anne Homasi

Assistant Programme Manager (Tuvalu)  
Development Cooperation Section

**Center for Global Environmental Research, National Institute for Environmental Studies**

Mr. Hiroya Yamano

Doctor

**Embassy of Japan in Fiji**

Mr. Tatsushi Matsuo

First Secretary  
Economic Cooperation

**JICA Fiji Office**

Mr. Juichiro Sasaki

Resident Representative

Mr. Nariaki Mikuni

Senior Representative

Ms. Hiroko Sannomaru

Assistant Resident Representative

**JICA Specialist**

Mr. Kazuyoshi Ogawa

Adviser

## **APPENDIX 4**

### **MINUTES OF DISCUSSIONS**



Minutes of Discussions  
On  
Preparatory Survey (for Basic Design)  
on  
the Project for Improvement of Medium Wave Radio Broadcasting Network and Disaster Prevention  
in  
Tuvalu

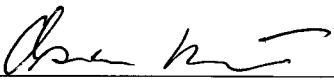
Based on the results of the Preliminary Study, the Government of Japan decided to conduct a Preparatory Survey (for Basic Design) on "The project for Improvement of Medium Wave Radio Broadcasting Network and Disaster Prevention" (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

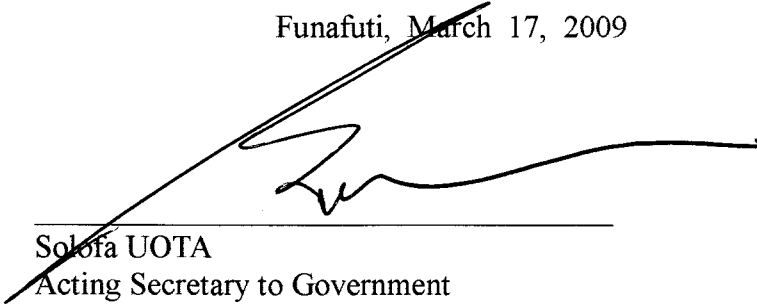
JICA sent to the Government of Tuvalu the Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Dr. Osamu MAKINO, Senior Advisor, JICA, and is scheduled to stay in the country from March 10 to March 26, 2009.


The Team held discussions with the officials concerned of the Government of Tuvalu and conducted the field survey at the study areas.

In the course of the discussions and field survey, both sides have confirmed the main items described in the attached sheets. The Team will proceed to further works and prepare the Preparatory Survey (for Basic Design) report.

Funafuti, March 17, 2009

  
\_\_\_\_\_  
Osamu MAKINO  
Leader  
Basic Design Study Team  
Japan International Cooperation Agency

  
\_\_\_\_\_  
Solofa UOTA  
Acting Secretary to Government  
Office of the Prime Minister  
Tuvalu

  
\_\_\_\_\_  
Melali Taape  
Director  
Tuvalu Media Department (TMD)  
Office of the Prime Minister  
Tuvalu







## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to provide necessary equipment to TMD for reliable and stable Medium Wave radio broadcasting service to all islands in Tuvalu.

### 2. Project Site

The Project site is located in Fogafale Island, Funafuti Atoll shown in Annex-1 and Annex-2

### 3. Responsible and Implementing Organization

The responsible and implementing organization is Office of the Prime Minister which TMD belongs to. The organization chart is shown in Annex-3.

### 4. Items requested by the Government of Tuvalu

The components of the Project requested by the Government of Tuvalu are as follows:

- (1) Radio Station (300m<sup>2</sup>)
- (2) Medium Wave Antenna System
- (3) Medium Wave Transmitting Facilities
- (4) Automatic Voltage Regulator (AVR)
- (5) Master Control Room
- (6) Studio Equipment
- (7) Cable and Spare Parts

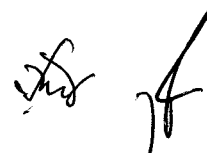
The Team explained the Tuvalu side to prioritize the above requested items from the viewpoint of technical and financial viability, sustainability and cost-effectiveness. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

### 5. Japan's Grant Aid Scheme

The Government of Tuvalu side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Tuvalu as explained by the Team and described in Annex-4 and Annex-5.

### 6. Schedule of the Study

- 6-1 The consultants will proceed to undertake further studies in Tuvalu until March 26, 2009.
- 6-2 JICA will prepare a draft report in English and dispatch a mission to Tuvalu in order to explain its contents around the end of July, 2009.
- 6-3 In case that the contents of the report are accepted in principle by the Government of Tuvalu, JICA will complete the final report and send it to the Government of Tuvalu by the beginning of November, 2009.



7. Other Relevant Issues

- 7-1 The Tuvalu Civil Aviation's Non-Directional Beacon (NDB) and Distance Measuring Equipment (DME) are located adjacent to the proposed site for the new Antenna of MW radio. The Government of Tuvalu will inform JICA Fiji Office of final decision of relocation of those two (2) antennas **by 17<sup>th</sup> April 2009**.
- 7-2 The Japanese side explained that the distance between the center of the base of the new Antenna and the center of runway is assumed to be approximately 180m. The distance between the said two (2) points would be confirmed upon a result of Topographic Survey by the Team **by 26<sup>th</sup> March 2009**.
- 7-3 The Government of Tuvalu shall inform Civil Aviation Authority of Fiji Island (CAAFI) of the location and height of the proposed new Antenna at the Project site.
- 7-4 TMD will inform the people in Tuvalu of the role of MW radio for disaster prevention by contributing the new MW radio facilities to Tuvalu through the Project. The Tuvalu side also requests assistance under disaster prevention from the Japanese side. The Team will convey this message to the relevant department of JICA.
- 7-5 The Government of Tuvalu shall submit answers to the questionnaire given by the Team **before 20<sup>th</sup> March 2009**.
- 7-6 The Government of Tuvalu will allocate sufficient budget and qualified staff to properly and effectively operate and maintain the Equipment. The necessary staff and budget will be proposed by the Team after analyzing work based on TMD's reports and plans. It will be a prerequisite for the Project to be implemented that the Government of Tuvalu shall guarantee the staff and budget allocation. The Government of Tuvalu will report the progress of the staff and budget allocation to JICA **by the end of June 2009**.
- 7-7 TMD shall remove the existing equipment before construction works by the Japanese side. In case that existing TMD's equipment is required to be used with the Equipment after the completion of the Project, the TMD shall shift those existing equipment to proper locations.
- 7-8 The Government of Tuvalu indicated, in **Annex-6**, the detailed procedure of exempting customs duties, internal taxes and other fiscal levies which may be imposed in Tuvalu with respect to the supply of the products and services for the Project.
- 7-9 The Government of Tuvalu shall ensure prompt reimbursement of sales tax and any other tax/levies concerning local procurement of goods and services under the Project by a Japanese contractor, provided all necessary documents are submitted by him.
- 7-10 The Tuvalu side and the Japanese side confirmed that the Environmental Impact Assessment is not required for the facilities to be constructed under the Project.
- 7-11 Regarding the sand and gravel to be used for the Project, the Japanese side agreed that from the environmental point of view, a Japanese contractor shall submit necessary analysis data of such materials to the Department of Agriculture for approval during the construction period.
- 7-12 The Government of Tuvalu shall provide power supply from the existing substation to the

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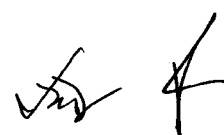
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new Radio Station Building and the new Transmitter House. Back-up power supply for the new Transmitter House will be provided by the Japanese side while back-up power supply for the new Radio Station Building will be provided by the Tuvalu side.

- 7-13 The Tuvalu side requested OB-Van for the purpose of disaster related media live coverage on the Project. However the Team understands its priority is less than the Radio Station Building and other equipment. JICA will assess the appropriateness of the request according to TMD's activity plan.

(End)

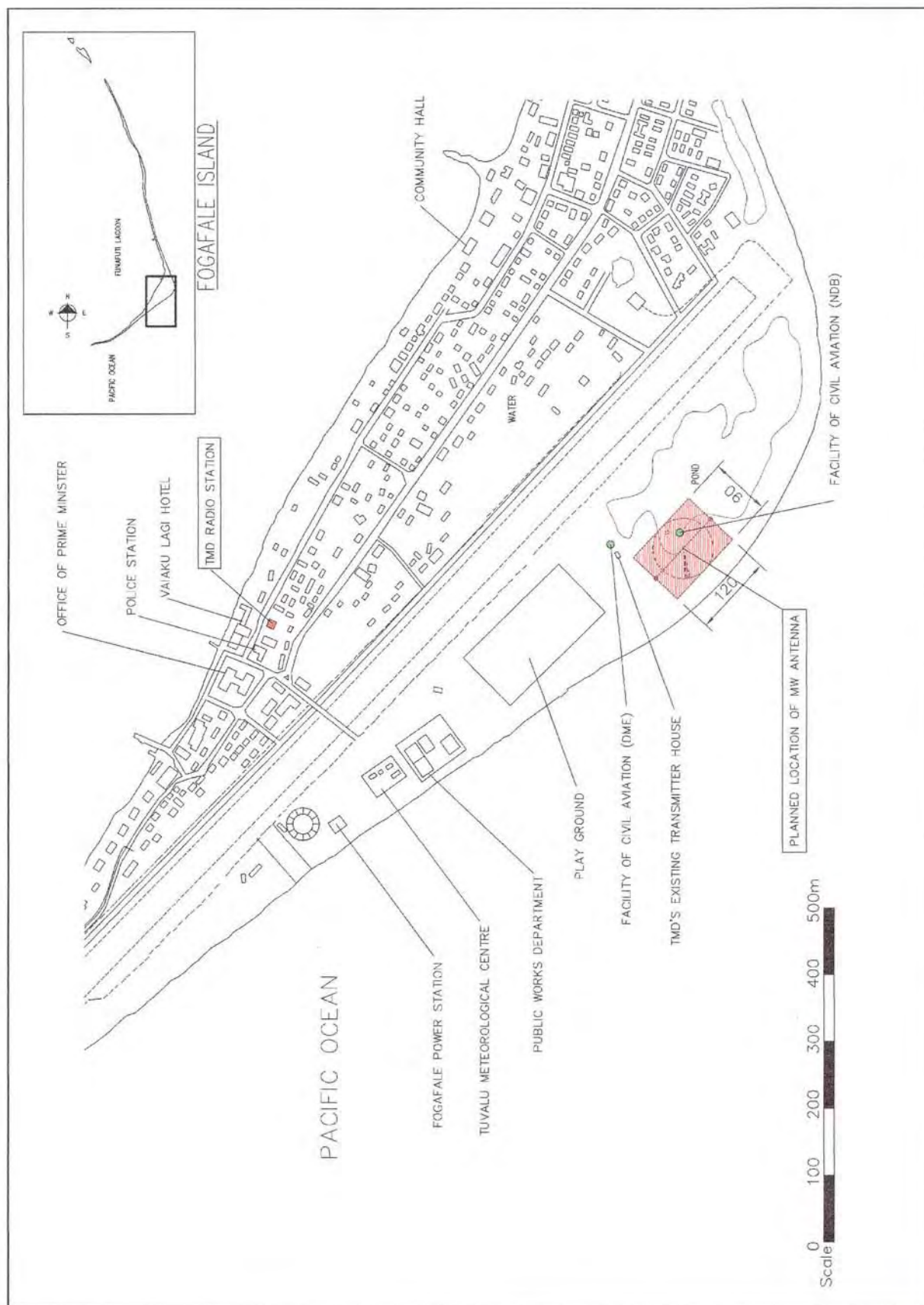
Annex – 1	Map of Tuvalu
Annex – 2	Site of the Project
Annex – 3	Organization Charts
Annex – 4	Japan's Grant Aid Scheme
Annex – 5	Major undertakings to be taken by each Government
Annex – 6	Procedures for Tax Exemption





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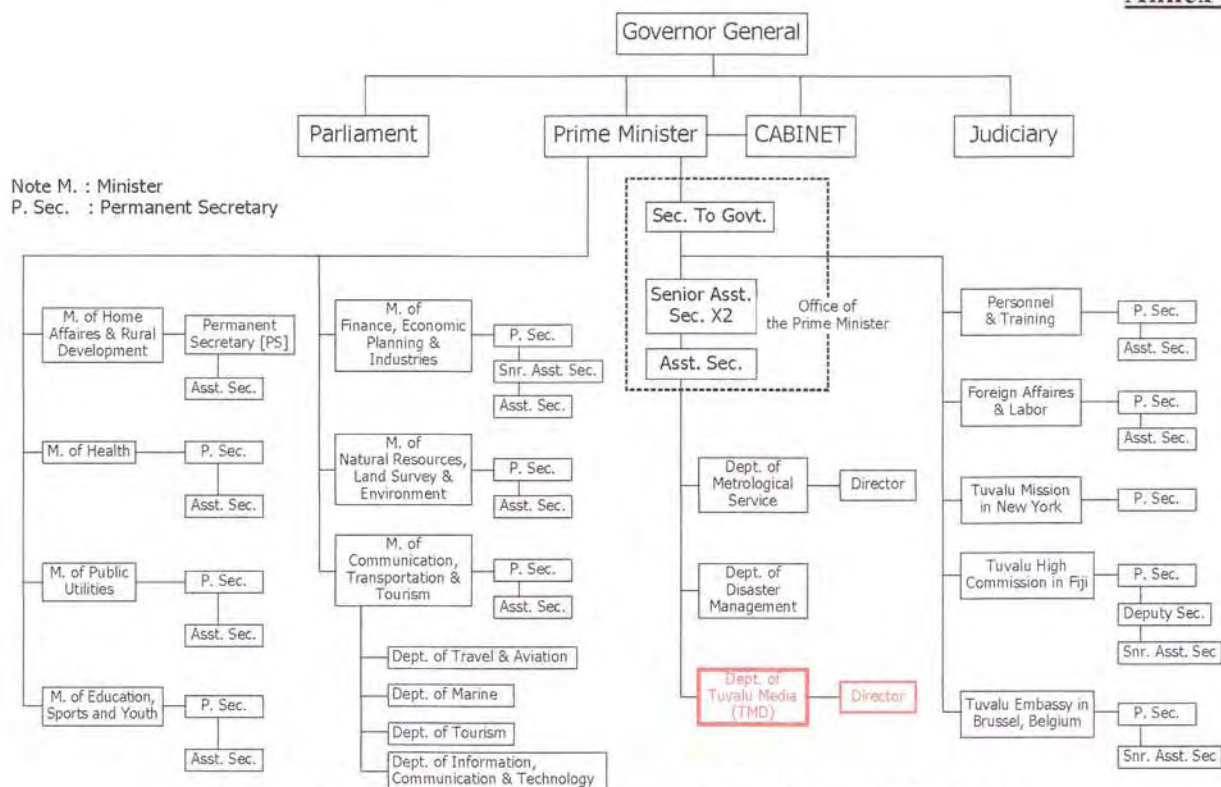
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Handwritten signatures and initials.





**Organization Chart of Office of the Prime Minister**



**Organization Chart of TMD**

## Japan's Grant Aid Scheme

The Grant Aid scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles 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

(1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

(2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Governments of Japan and the recipient country.

Finally, for the smooth implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

### 2. Basic Design Study

(1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

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



- c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- d) Preparation of a basic design of the Project
- e) Estimation of costs of the Project

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure 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 in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firms(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consulting firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

### 3. Japan's Grant Aid Scheme

(1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

- (2) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed.

However in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

- (3) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments 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, consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of

Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

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

(5) Undertakings required of 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 the following:

- 1) To secure land necessary for the sites of the Project prior to commencement of the construction.
- 2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- 3) To ensure all the expenses and prompt execution for customs clearance at the port of disembarkation of the products purchased under the Grant Aid.
- 4) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.
- 5) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(6) "Proper Use"

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

(7) "Re-export"

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

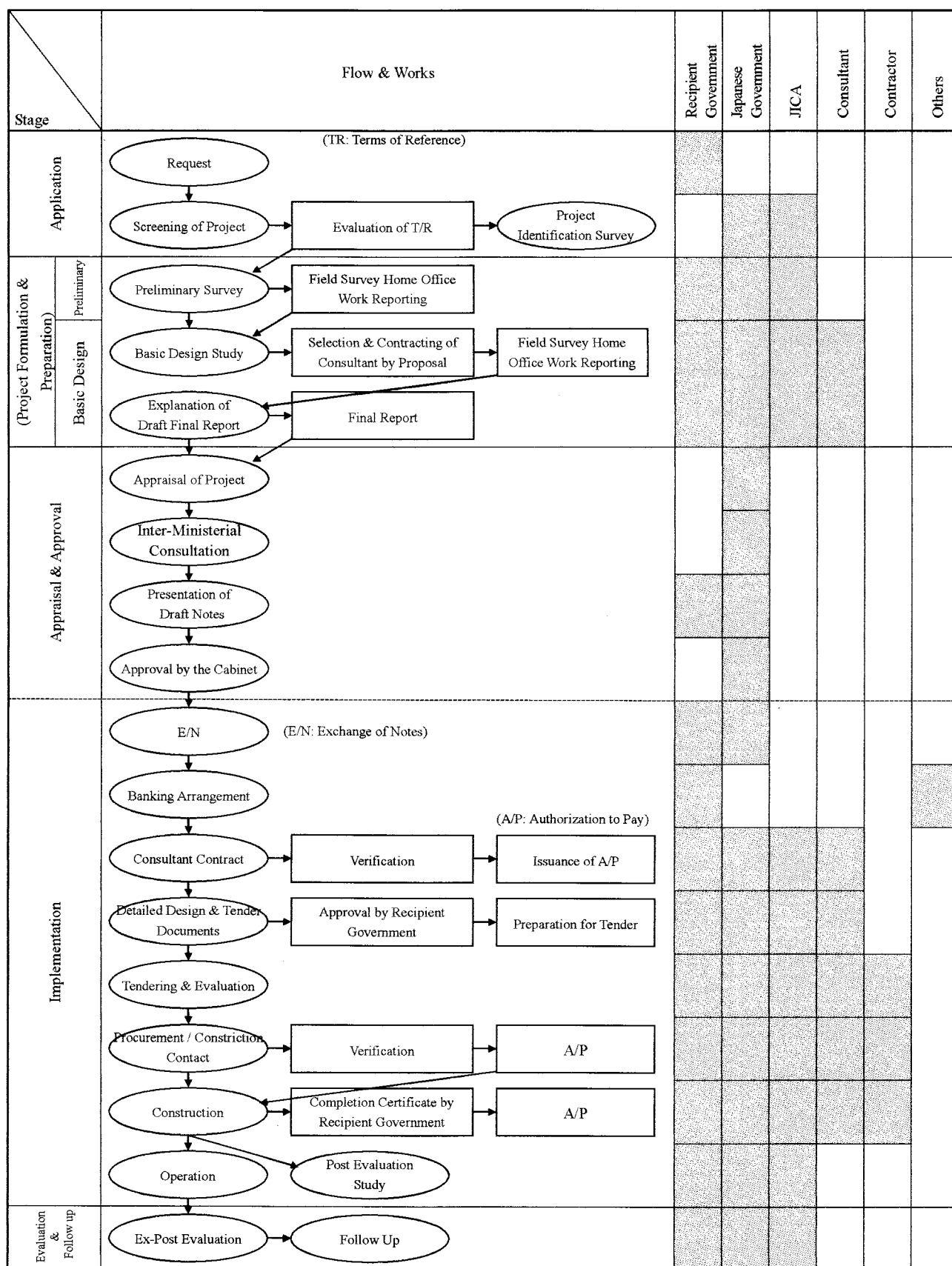
(8) Banking Arrangements (B/A)

- 1) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan 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.
- 2) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay 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 commission to the Bank.

## Flow Chart of Japan's Grant Aid Procedures



Note: This chart shows the procedures in case of the Basic Design Study will include preparation of detailed specification of equipment

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Handwritten signature and mark.

**Major Undertakings to be taken by Each Government**

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure land		•
2	To clear, level and reclaim the site when needed		•*
3	To construct gates and fences in and around the site		•**
4	To construct the parking lot	•	
5	To construct roads		
	1) Within the site	•	
	2) Outside the site		•
6	To construct the building	•	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1) Electricity		
	a. The distributing line to the site		•
	b. The drop wiring and internal wiring within the site	•	
	c. The main circuit breaker and transformer	•	
	2) Water Supply		
	a. The city water distribution main to the site		•
	b. The supply system within the site (receiving and elevated tanks)	•	
	3) Drainage		
	The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	•	
	4) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		•
	b. The MDF and the extension after the frame/panel	•	
	5) Furniture and Equipment		
	a. General furniture		•
	b. Project equipment	•	
8	To bear the following commissions of the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		•
	2) Payment commission		•
9	To ensure unloading and customs clearance at port of disembarkation in recipient country		
	1) Marine (Air) transportation of the products from Japan to the recipient	•	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		•
	3) Internal transportation from the port of disembarkation to the project site	•	
10	To accord Japanese nationals, whose service may be required in connection with the supply of the products and the services under the verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		•
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		•
12	To maintain and use properly and effectively the facilities contracted and equipment provided under the Grant Aid		•
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		•

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

\* Demolishing of the existing building that is standing on the same site will be covered by the Grant Aid including leveling work.

\*\* Fence for the new Antenna is necessary for the security reason and will be covered by the Grant Aid.

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**Procedures for Tax Exemption**

1. Before shipment of the Equipment, the Japanese Contractor shall submit a photocopy of the Exchange of Notes to Department of Customs, Ministry of Finance and Economic Planning through the responsible organization of the Tuvalu side on the Project for registration of the Tax exemption.
2. Before arrival of the Equipment at a port in Tuvalu, the Japanese Contractor shall submit i) Original Bill of Lading and ii) Original Invoice for transporting the Equipment to Custom Clearing Agent (CCA) in Tuvalu.
3. CCA prepares custom forms of the Equipment and submit to Department of Customs for approval.
4. After approval by the Department of Customs, Cargos of the Equipment will be released.



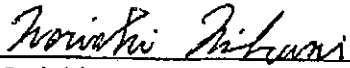
**Minutes of Discussions**  
**on**  
**Preparatory Survey (for Basic Design)**  
**on**  
**the Project for Improvement of Medium Wave Radio Broadcasting Network and Disaster Prevention**  
**in**  
**Tuvalu**  
**(Explanation of Draft Final Report)**

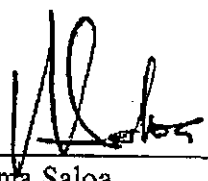
In March 2009, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey (for Basic Design) Team on "The Project for Improvement of Medium Wave Radio Broadcasting Network and Disaster Prevention" (hereinafter referred to as "the Project") to the Government of Tuvalu (hereinafter referred to as "GOT"), and through discussions, field survey, and technical examination of the results in Japan, JICA prepared a draft final report of the Preparatory Survey.

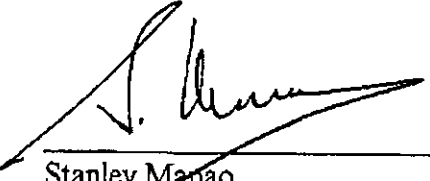
In order to explain and to consult with the concerned officials of the GOT on the components of the draft final report, JICA sent to the GOT the Draft Final Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Nariaki MIKUNI, Senior Representative, JICA Fiji Office from July 28 to 30, 2009.

In the course of the discussions, both sides confirmed the main items described on the attached sheet.

Funafuti, July 29, 2009

  
\_\_\_\_\_  
Nariaki MIKUNI  
Leader  
Preparatory Survey Team  
Japan International Cooperation Agency

  
\_\_\_\_\_  
Kelesoma Saloa  
Acting Senior Assistant Secretary  
Office of the Prime Minister  
Tuvalu

  
\_\_\_\_\_  
Stanley Manao  
Director (Acting)  
Tuvalu Media Department (TMD)  
Office of the Prime Minister  
Tuvalu

## ATTACHMENT

### 1. Components of the Draft Final Report

The GOT side has agreed and accepted in principle the components of the draft final report and the draft detailed specifications of the equipment explained by the Team.

### 2. Japan's Grant Aid Scheme

The GOT side understands the Japan's Grant Aid scheme and the necessary undertakings to be taken by the GOT as explained by the Team and described in the Minutes of Discussions signed by both the sides on March 17, 2009.

### 3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed items and send it to the GOT by the beginning of November, 2009.

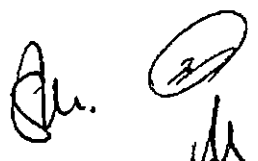
### 4. Other Relevant Issues

- (1) Both sides confirmed that Non-Directional Beacon (NDB) and Distance Measuring Equipment (DME) will be relocated to the place between PWD office and Sports Ground. Therefore there is no problem for location issue of the Project.
- (2) Both sides agreed the components of the Project as shown in Annex-1, especially focusing the following issues:
  - Structural design of the new Radio Station Building by 2 stories will not be considered.
  - 60m<sup>3</sup> of water cistern under the new building will be included in the Project for the sake of disaster prevention.
  - News Car System is replaced to Equipment for News Gathering excluding OB-Van.
- (3) The GOT side agreed to apply for budget allocation from national treasury annually to operate and maintain the equipment described on the draft final report as a part of subsidy to Tuvalu Media Department (hereinafter referred to as "TMD").
- (4) Both sides confirmed that the following undertakings shall be taken by the GOT side at its expense.
  - Tax exemption and custom clearance of the Equipment at the port of disembarkation.
  - Securing store yard for unloading containers of the Equipment near the Project site.
  - Bush clearing and Removal of Obstacles in the Project site for the new Antenna.
  - Removal work of the existing equipment and cables including Shifting work of the existing studios and Master Control System for Temporary broadcasting.

- Securing of yard for rubbish.
  - Provision of Power Supply from the existing substation to the new Radio Station Building and the new Transmitter House including a back-up power supply for the new Radio Station Building.
  - Provision of additional two (2) Telephone Lines to the new Radio Studios and Program line between Studios and Transmitter for back up.
  - Test Broadcasting (On Air).
  - Installation of the existing Satellite Receiving Antenna on the new Radio Station Building.
  - Construction of Fences and Gates around the new Radio Station Building.
- (5) Both sides agreed that the draft detailed specifications of the equipment are confidential and should not be duplicated or released to other parties in order to secure the fairness of the tender of the Project.
- (6) Both sides agreed that the Project Cost Estimation, as attached in **Annex-2**, should never be duplicated or released to other parties before the signing of all the Contract(s) for the Project.
- (7) Both sides agreed that Public Works Department (PWD) shall observe the construction work for information sharing and the maintenance of the buildings and facilities of the Project.

Annexes:

1. Component of the Project
2. Project Cost Estimation





## Component of the Project

No.	Description	Q'ty	
1	MW Antenna System	1	Lot
2	10 kW Medium Wave Transmitter	1	Lot
3	Power Supply Equipment and Air Conditioning for Transmitter	1	Lot
4	Master Control System	1	Lot
5	ON AIR Studio System	2	Lots
6	Production Studio System	1	Lot
7	Editing System	1	Lot
8	Equipment for News Gathering	1	Lot
9	Maintenance Equipment and Tools	1	Lot
10	Spare Parts	1	Lot
11	Consumable Parts	1	Lot



Cost Estimation of the Project

This page is closed  
due to the confidentiality.