No.

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
IMPROVEMENT
OF
SW AND MW RADIO BROADCASTING STATIONS
IN
THE KINGDOM OF NEPAL

JUNE, 2005

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to a request from the Government of the Kingdom of Nepal, the Government of Japan decided to conduct a basic design study on the Project for Improvement of SW and MW Radio Broadcasting Stations and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Nepal a study team from January 9 to February 11, 2005.

The team held discussions with the officials concerned of the Government of Nepal, 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 Nepal in order to discuss a draft basic 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 the Kingdom of Nepal for their close cooperation extended to the teams.

June 2005

Seiji Kojima
Vice President
Japan International Cooperation Agency

June, 2005

Letter of Transmittal

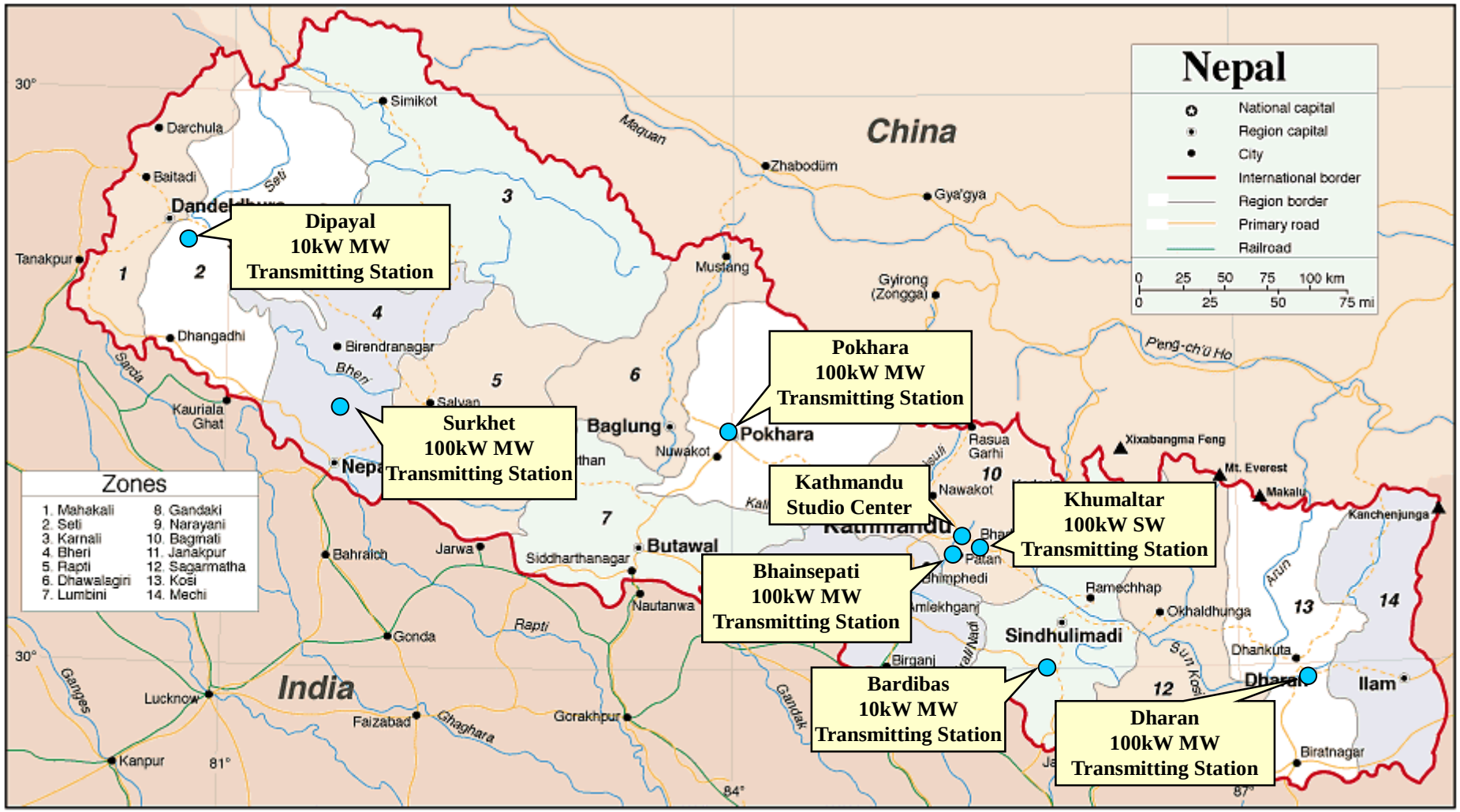
We are pleased to submit to you the basic design study report on the Project for Improvement of SW and MW Radio Broadcasting Stations in the Kingdom of Nepal.

This study was conducted by NHK Integrated Technology Inc., under a contract to JICA, during the period from December, 2004 to June, 2005. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Nepal and formulated the most appropriate basic 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,

Akira Nagase
Chief Consultant,
Basic design study team on
the Project for Improvement of
SW and MW Radio Broadcasting Stations
NHK Integrated Technology Inc.



Project Sites

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Abbreviations

A/C	:	Air Conditioner
ACP	:	Automatic Control Panel
ADA	:	Analog Audio Distribution Amplifier
ADC	:	A/D Converter
AES	:	Audio Engineering Society
AF	:	Amperes Frame
APS	:	Automatic Program Control System
AR	:	Audio Recorder
AT	:	Amperes Trip
CD	:	CD Player
CRT	:	Cartridge Tape Recorder
CST	:	Cassette Tape Recorder
DAC	:	D/A Converter
DAR	:	Digital Audio Reference Signal
DAW	:	Digital Audio Workstation
DDA	:	Digital Audio Distribution Amplifier
E/G	:	Engine Generator
EFF	:	Audio Effector
EIAJ	:	Standards of Electric Industries Association of Japan
FB	:	Fold Back
FM	:	Frequency Modulation
HYBD	:	Telephone Hybrid
IEC	:	International Electrotechnical Commission
IP	:	Interphone
ISO	:	Industrial Organization for Standardization
ITU-R	:	International Telecommunication Union-Radio Communication Sector
JIS	:	Japan Industrial Standards
LAN	:	Local Area Network
MCCB	:	Moulded Case Circuit Breakers
MOIC	:	Ministry of Information and Communication
MPPW	:	Ministry of Physical Planning and Works
NTV	:	Nepal Television
OECD	:	Organization for Economic Cooperation and Development
ORT	:	Open Reel Tape Recorder
PDB	:	Power Distribution Board
PIE	:	Program Input/Monitoring Equipment
PPS	:	Pulses per Second
RNE	:	Radio Nepal
SP	:	Speaker
TC	:	Time Code
TDA	:	Time Code Distribution Amplifier
TPN	:	Triple Pole Neutral
WRC	:	World Radiocommunication Conference

Summary

The Kingdom of Nepal is a land-locked country bordering with Tibet to the north across the precipitous mountains of Himalayas and with India to the east, west, and south. The national land area is 147,000 km^2, and the population is 24.74 million (2003/04, Nepal Census Indicator). While Nepalese is the official language, Nepal is a multiethnic country inhabited by the peoples of Newar, Limbu, Tamang, Thakali, etc. using their own languages. The land is generally divided into the northern mountainous area with the elevation of 5,000 m or more, the central area around the Kathmandu Basin with the elevation of 600 m to 5,000 m, and the southern area called Terai with the elevation of 300 m or less. The northern area contains more than 240 mountains with the elevation of 6,000 m or more. The landscapes in the central area include cities, villages, and terraced fields on hillsides. The southern area is a farm belt. Geographically, the country belongs to the subtropical climate zone, but the climate varies greatly from region to region due to diversified topography. The climate is generally continental, with the rainy monsoon season from June to September and the dry winter from November to February. The administration of the country is divided into 5 development regions: Far-west (regional capital: Dipayal), Mid-west (Birendranagar), West (Pokhara), Central (Kathmandu), and East (Dhankuta), and these regions are farther divided into 14 zones and finally 75 districts.

Nepal has a large percentage of poor people due to the combined effect of factors such as (i) underdevelopment, (ii) high population growth rate, and (iii) inland location. The socioeconomic development plan for poverty reduction in Nepal was first launched in 1956, and it is under way of the Tenth 5-year Plan (2002-2007) at present.

Major goal of the Tenth 5-year Plan is poverty reduction, including the reduction of the percentage of poor people from 38% to 30% in 5 years. Strategies to achieve this goal have been developed around the 4 pillars of (i) achievement of high economic growth with emphasis on local economies, (ii) effective provision of basic social services and improvement of economic infrastructure, (iii) mainstreaming of poor people, women, etc. into the process of development, and (iv) good governance.

One of the “4 pillars”, “effective provision of basic social services and improvement of economic infrastructure,” extends to the improvement of fundamental infrastructure. A target defined thereof is “to extend radio broadcast services to all citizens.” This reflects the recognition that provision of equal access to information is a means to alleviate poverty. With respect to Radio Nepal (RNE), the Plan states, “Radio Nepal would be developed as national broadcasting body and satellite and computer technologies will be adopted to expand its broadcasting service.” It also states, “The existing broadcasting system of Radio Nepal should be improved and expanded to cover whole people in Nepal.”

The broadcasting services in Nepal are operated under the authority of the Ministry of Information and Communication (MOIC). Radio broadcasting is conducted by Radio Nepal (RNE) and private FM radio companies (36 stations). The latter have been approved since 1994. TV broadcasting is conducted by Nepal Television (NTV) and private TV companies (2 stations).

Radio Nepal, a public radio station established in 1951, is the only nationwide broadcasting service provider in Nepal. Its broadcasting services are conducted according to the National Communication Policy stipulated by MOIC in 1992. It is an independent organization that is not controlled by the government or any political party with respect to the contents of programs. At the beginning, the scale of operation was as small as 4.5 hours a day of broadcasting using a 250W SW transmitter. A 100kW SW transmitter was installed in 1968 with the assistance from Australia to commence the nationwide service. SW broadcasting can easily be affected by fading and interference, resulting in unstable reception, and SW receivers cost more than MW receivers. For these reasons, a plan for the development of the national broadcasting network using MW broadcasting was formulated in the 6th 5-year Plan (1980-1985) for the purpose of realizing the stable broadcasting services to all citizens and the popularization of radio receivers. The grant-aid assistance "The Project for Development of MW Radio Broadcasting Network" in 1981-82 and "The Project for Expansion and Development of MW Radio Broadcasting Network (Phase 2)" in 1988-89 constructed MW transmitting stations in 6 locations (Bhainsepati, Pokhara, Bardibas, Dharan, Surkhet, and Dipayal) and the Studio Center in Kathmandu. As a result, the service area of the MW broadcasting network expanded about 75% of the national population, and broadcasting time increased to 114 hours/week.

In Nepal, most of the land is occupied by mountainous and hilly areas, where rural villages in underdeveloped infrastructure are scattered in complicated terrains. The missions of broadcasting media in Nepal are (i) the development of capable human resources and (ii) the improvement and expansion of information and communication infrastructure. While the promotion of national development requires the development of capable human resources, the literacy rate of adults in Nepal is as low as 48.6% (2002, Central Bureau of Statistics), and enhancement of education is needed to improve the literacy rate. Of the approximately 110,000 teachers engaged in primary education, less than a half of them, i.e., about 51,000 have official teacher's certificates (2002, Central Bureau of Statistics). Because the training of skilled teachers is the prerequisite for the development of capable human resources, the Government of Nepal established the Primary Teacher Training Center (PTTC) to improve the ability of teachers, and is conducting the specialist education program to improve the skill of teachers via distance education. This distance education program is implemented using the broadcasting network of RNE. Furthermore, distance education programs targeted at the general public covering improvement of agricultural techniques, literacy education, health and hygiene education, etc. are conducted using the broadcasting network of RNE. In

addition to the broadcasting media, distance education using telecommunication infrastructure is also planned, however, due to the underdevelopment of telecommunication infrastructure, education and information activities for citizens need to depend on broadcasting media. Although the TV broadcasting network of NTV has the population coverage of about 50%, the diffusion of TV sets is concentrated to large cities such as Kathmandu and Pokhara, and the national average of the diffusion rate is as low as 4.5% on the household basis. On the other hand, low priced (about 150 Rp. to 600 Rp.) radio receivers are diffused approximately 53% (2002, Central Bureau of Statistics) of households. Radio broadcasting bears the important role as the only means for distributing information in Nepal, particularly in remote areas with underdeveloped road infrastructure.

The equipment and facilities of RNE have been used for periods exceeding their life time and they are kept operable through the admirable maintenance efforts by RNE, however, the operation is unstable due to aging of equipment and the inability to procure spare parts. Furthermore, the Maoist attack on Bardibas Transmitting Station in April 2002 resulted in destruction of broadcasting and other facilities. The population coverage of the national MW radio broadcasting network of RNE dropped from 75% in 1991 to 48% at present. As the allocated frequencies for MW broadcasting of RNE by International Telecommunication Union (ITU) are only for current 6 stations, expansion of the MW broadcasting network is extremely difficult. Therefore, mountainous areas of outside of MW broadcasting service are now covered by SW broadcasting from Khumaltar Transmitting Station located outskirts of Kathmandu, but SW broadcasting is not functioning sufficiently due to shortage of vacuum tubes of SW transmitters. RNE constructed 8 FM transmitting stations to serve to the areas outside of MW broadcasting service, instead of SW broadcasting, but sufficient coverage of areas outside of MW broadcasting service has not been achieved due to the damage from the Maoist attack on 3 of these FM stations and the shortage of funds causing delay in subsequent construction.

To achieve the goal of “providing radio broadcasting services to all citizens,” stipulated in the Tenth 5-year Plan, RNE recognizes the urgent need for improving radio broadcasting equipment/facilities. Under such circumstance that it is extremely difficult to achieve this improvement using its own resources, the Government of Nepal requested the Government of Japan to implement a grant aid project to recover the function of RNE’s broadcasting service.

In response to this request, the Government of Japan sent the Basic Design Study Team on “The Project for Improvement of SW and MW Radio Broadcasting Stations” to Nepal from January 8 to February 12, 2005 to conduct a study to verify the appropriateness of the Project and to formulate the basic design of the necessary and optimal contents. The study team discussed with the relevant persons of the Nepali side to reconfirm the contents of request, and conducted field survey at the project sites.

The contents of the project request originally included (1) the renewal of 50kW SW transmitter and

transmitting antenna facility in Khumaltar SW Transmitting Station, (2) the renovation of building and renewal of 10kW MW transmitter in Bardibas MW Transmitting Station, and (3) the procurement of vacuum tubes for other MW transmitting stations. However, the Nepali side submitted further request including the renewal of aged studio equipment and the renewal of emergency generators used as standby units.

Based on the understanding of problems in the request and considering population coverage, degree of deterioration of equipment, and other factors, it was decided that the equipment procurement and building renovation would be the minimal extent to answer the request of the Nepali side and put priorities on the list prepared by the Nepali side. The following Table summarizes the final contents of request with their priorities and the changes from the original request.

Priority	Contents of Request	Comparison with original request
1.	Procurement of spare vacuum tubes for Khumaltar 100kW SW Transmitting Station	Changed
2.	Overall facility renovation and renewal of transmitting equipment at Bardibas 10kW MW Transmitting Station	Not changed
3.	Renewal of transmitting equipment and partial facility renovation at Bhainsepati 100kW MW Transmitting Station	Changed
4.	Renewal of transmitting equipment and partial facility renovation at Pokhara 100kW MW Transmitting Station	Changed
5.	Procurement of spare vacuum tubes for Dharan 100kW MW Transmitting Station, Surkhet 100kW MW Transmitting Station, and Dipayal 10kW MW Transmitting Station	Changed
6.	Renewal of studio equipment in Kathmandu Studio Center	Added newly
7.	Renewal of studio equipment at Pokhara 100kW MW Transmitting Station	Added newly
8.	Renewal of studio equipment in Dhankuta Regional Studio	Added newly
9.	Renewal of emergency generators at Kathmandu Studio Center, Bhainsepati 100kW MW Transmitting Station, and Pokhara 100kW MW Transmitting Station	Added newly

After returning to Japan, the study team examined the appropriateness, necessity, and socioeconomic effect of the Project, and formulated the optimal contents of the Project. This Project is positioned as a supplementary technical support to the attainment of the goals of the Tenth 5-year Plan. It was decided that this Project will not consider new expansion and enrichment, but will implement the items needed with extreme urgency for restoring the original broadcasting capabilities of RNE (broadcasting for 114 hours per week and necessary production of 200 programs per week) and establishing the broadcasting network covering the whole country.

With respect to the renewal of SW transmitting facilities, the renewal of the transmitting facilities themselves were deferred because the decisions made at the World Radiocommunication Conference in 2003 (WRC-03) were to be observed and the decisions concerning SW transmitters would be revised at the Conference in 2007 (WRC-07). Instead, elongation of life time will be pursued through procurement of

vacuum tubes. The renewal of the studio equipment in Dhankuta Regional Studio was excluded from the Project, because the equipment was found to be in good conditions and the urgency of need was considered low.

The study team summarized the above considerations in the Draft Basic Design Report. The study team again visited Nepal from April 23 to 30, 2005 to explain the draft contents of the report to relevant persons of the Nepali side and to obtain final confirmation of the contents of the Project through discussion. The outline of this Project is as follows.

Priority of Request	Requested Project Site Contents of Request	Major Equipment and Building Facilities To be included in the Project
1.	Khumaltar 100kW SW Transmitting Station Procurement of spare vacuum tubes	Spare vacuum tubes for existing 100kW SW transmitter
2.	Bardibas 10kW MW Transmitting Station Overall renovation of facilities and renewal of equipment	(Equipment) Solid state type 10kW MW transmitter, lightning protector, 30kVA isolation transformer, 10kW dummy load, program input/monitoring equipment, program receiving equipment, measuring equipment, interphone system, etc. (Facility) Power source equipment including 100kVA emergency generator and 100kVA automatic voltage regulator, building finishings, electrical installations including lighting, fire alarm, receptacles, etc., air conditioning and ventilation system, water supply pump, etc.
3.	Bhainsepati 100kW MW Transmitting Station Pokhara 100kW MW Transmitting Station Renewal of transmitter and partial renovation of facilities	(Equipment) Solid state type 100kW MW transmitter, lightning protector, 250kVA isolation transformer, program input/monitoring equipment, program receiving equipment, measuring equipment, interphone system. (Facility) Air conditioning and ventilation system.
4.	Dharan 100kW MW Transmitting Station Surkhet 100kW MW Transmitting Station Dipayal 10kW MW Transmitting Station Procurement of spare vacuum tubes	(Equipment) Spare vacuum tubes for existing 100kW and 10kW MW transmitters. *Note: The spare vacuum tubes for MW transmitters will be used also for the standby transmitters
5.	Kathmandu Studio Center Continuity Studio in Pokhara 100kW MW Transmitting Station Renewal of studio equipment	(Equipment) Equipment for Production Studios 1 and 2, equipment for Music Studio, equipment for SW Studio, equipment for Announce Studio, equipment for Master Control Room, etc.
6.	Kathmandu Studio Center Bhainsepati 100kW MW Transmitting Station Pokhara 100kW MW Transmitting Station Renewal of emergency generators	(Facility) 100kVA emergency generators (all stations), feeder panels, automatic voltage regulators (30kVA at Kathmandu Studio Center, 400kVA at Bhainsepati and Pokhara Transmitting Stations).

In case this Project is implemented under Japan's grant aid cooperation, detailed design takes 5 months, facility renovation and procurement of the equipment takes 12 months, i.e., 17 months in total. The total project cost is estimated approximately 927.3 million Japanese yen (Approx. 925.6 million Japanese yen to be borne by the Japanese side and approx. 1.17 million Rp. equivalent to about 1.7 million Japanese yen to be borne by the Nepali side).

The implementation of this Project will be supervised by the Ministry of Information and Communication and the project implementing agency will be Radio Nepal. The project cost to be borne by the Nepali side can be obtained adequately from the operating budget. The setup for the implementation of the Project has already been established. There will be no problems in operation and maintenance after the completion of this Project.

The effects expected from the implementation of this Project are as follows.

(1) Direct Effects

(i) Expansion of broadcasting service area

The population coverage area of MW broadcasting will be expanded from 48% (before the Project) to 75% (after the Project). The citizens that are not covered by MW broadcasting will be covered by SW broadcasting, realizing the provision of broadcasting services to all people in Nepal.

(ii) Reduction of broadcast interruption (breakdown) time

The occurrence of transmitter failures (about 400 hours in the past 2 years), failures and troubles during program production (66 times in the past 2 years), and broadcast interruption during power failures will be reduced sharply and the continuation of stable broadcasting will be realized.

(iii) Increase in broadcasting time

Continuous broadcasting from 5:00 to 23:00 including 2 hours from 11:00 to 13:00, in which broadcasting is currently interrupted for maintenance of aged transmitters will be realized. The daily broadcasting time will increase from 16 hours/day (before the Project) to 18 hours/day (after the Project).

(2) Indirect Effects

(i) Economic and industrial activities and poverty reduction will be promoted through the improvement of access to information in remote areas inhabited by many poor people specially.

(ii) Living environment will be improved through the enhancement of availability of information concerning health and hygiene, education, agriculture, and social and public welfare, as well as cultural and international information.

(iii) Increase of certified primary school teachers through enhanced teacher training system using radio broadcasting.

(iv) Balance of payment in RNE will be improved through the reduction of operation and maintenance cost of renewed equipment.

CONTENTS

Chapter 1 Background of the Project

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1-1 Background of the Project

The broadcasting services in the Kingdom of Nepal (hereinafter referred to as "Nepal") are operated under the authority of the Ministry of Information and Communication (MOIC). Radio broadcasting is conducted by Radio Nepal (hereinafter referred to as "RNE"), which operates the only national network in Nepal, and private FM radio companies (36 stations), which have been approved since 1994. TV broadcasting is conducted by Nepal Television (NTV) and private TV companies (2 stations).

RNE was established in April 1951. At the beginning, the scale of operation was as small as 4.5 hours a day of broadcasting service covering just Kathmandu Basin with a 250W SW transmitter. A 5kW SW transmitter was introduced in 1956 with the assistance from the U.K., and a 100kW SW transmitter was installed with the assistance from Australia in 1968 to commence the nationwide service. SW broadcasting can easily be affected by fading and interference, resulting in unstable reception, and SW receivers cost more than MW receivers. For these reasons, a plan for the development of the national broadcasting network using MW broadcasting was formulated in the Sixth 5-year Plan (1980-1985) for the purpose of realization of stable services to all citizens and the promotion of popularization of radio receivers. 6 MW transmitting stations, i.e. Bhainsepati, Pokhara, Bardibas, Dharan, Surkhet and Dipayal, and the Studio Center in Kathmandu were constructed through the grant-aid assistance "The Project for Development of MW Radio Broadcasting Network" in 1981-82 and "The Project for Expansion and Development of MW Radio Broadcasting Network (Phase 2)" in 1988-89. As a result, the service area of the MW broadcasting network covered about 75% of the national population and broadcasting time increased to 114 hours/week.

In Nepal, most of the land is occupied by mountainous and hilly areas, where rural villages with underdeveloped infrastructure are scattered in complicated terrains. The missions of broadcasting media in Nepal are (i) the development of capable human resources and (ii) the improvement and expansion of information and communication infrastructure. While the promotion of national development requires the development of capable human resources, the literacy rate of adults in Nepal is as low as 48.6% (2002, Central Bureau of Statistics), and enhancement of education is needed to improve the literacy rate. Of the approximately 110,000 teachers engaged in primary education, less than a half of them, i.e., about 51,000 have official teacher's certificates (2002, Central Bureau of Statistics). Because the training of skilled teachers is the prerequisite for the development of capable human resources, the Government of Nepal established the Primary Teacher Training Center (PTTC) to improve the ability of teachers, and is conducting the specialist education program to improve the skill of teachers via distance education. This distance education program is implemented using the broadcasting network of RNE. Furthermore, distance education programs targeted at the general public covering improvement of agricultural techniques, literacy

education, health and hygiene education, etc. are conducted using the broadcasting network of RNE. In addition to the broadcasting media, distance education using telecommunication infrastructure is also planned, however, due to the underdevelopment of telecommunication infrastructure, education and information activities for citizens need to depend on broadcasting media. Although the TV broadcasting network of NTV has the population coverage of about 50%, the diffusion of TV sets is concentrated to large cities such as Kathmandu and Pokhara, and the national average of the diffusion rate is as low as 4.5% on the household basis. On the other hand, low priced (about 150 Rp to 600 Rp) radio receivers, are diffused 53% of households (2002, Central Bureau of Statistics). Radio broadcasting bears the important role as the only means for distributing information in Nepal, particularly in remote areas with underdeveloped road infrastructure.

The equipment and facilities of RNE have been used for periods exceeding their life time and they are kept operable through the admirable maintenance efforts by RNE, however, the operation condition is unstable due to aging of equipment and the inability to procure spare parts. Furthermore, the Maoist attack on Bardibas Transmitting Station in April 2002 resulted in destruction of broadcasting and other facilities. The population coverage area of the national MW radio broadcasting network of RNE dropped from 75% in 1991 to 48% at request. As the allocated frequencies for MW broadcasting to RNE from International Telecommunication Union (ITU) are only for current 6 stations, expansion of the MW broadcasting network is extremely difficult. Therefore, mountainous areas outside of MW broadcasting service are now covered by SW broadcasting from Khumaltar Transmitting Station located near Kathmandu, but SW broadcasting is not functioning sufficiently due to shortage of vacuum tubes of SW transmitters. RNE constructed 8 FM transmitting stations to serve to the areas outside of MW broadcasting service, instead of SW broadcasting, but sufficient coverage of areas outside of MW broadcasting service has not been achieved due to the damage from the Maoist attack on 3 of these FM stations and the shortage of funds causing delay in subsequent construction.

To achieve the goal of “providing radio broadcasting services to tall citizens”, stipulated in the Tenth 5-year Plan, RNE recognizes the urgent need for improving radio broadcasting equipment/facilities. Under such circumstance that it is extremely difficult to carry out this improvement using its own resource, the Government of Nepal requested the Government of Japan to implement the Project for Improvement of SW and MW Radio Broadcasting Stations (hereinafter referred to as “the Project”) to recover the function of RNE’s broadcasting service by Japan’s grant aid assistance.

1-2 Contents of the Request

The contents of the Project request originally included (i) the renewal of 50kW SW transmitter and transmitting antenna facility in Khumaltar SW Transmitting Station, (ii) the renovation of building and renewal of 10kW MW transmitter in Bardibas MW Transmitting Station, and (iii) the procurement of vacuum tubes for other MW transmitting stations. However, the Nepali side submitted further request including the renewal of aged studio equipment and the renewal of emergency generators used as standby units.

Based on the understanding of problems in the request and considering population coverage, degree of deterioration of equipment, and other factors, it was decided that the equipment procurement and building renovation will be the minimal extent to answer the request of the Nepali side and put priorities on the list prepared by the Nepali side. Table 1-2-1 summarizes the final contents of request with their priorities and the changes from the original request.

Table 1-2-1: Contents of Request with Priorities and Changes

Priority	Contents of Request	Comparison with original request
1.	Procurement of spare vacuum tubes for Khumaltar 100kW SW Transmitting Station	Changed
2.	Overall facility renovation and renewal of transmitting equipment at Bardibas 10kW MW Transmitting Station	Not changed
3.	Renewal of transmitting equipment and partial facility renovation at Bhainsepati 100kW MW Transmitting Station	Changed
4.	Renewal of transmitting equipment and partial facility renovation at Pokhara 100kW MW Transmitting Station	Changed
5.	Procurement of spare vacuum tubes for Dharan 100kW MW Transmitting Station, Surkhet 100kW MW Transmitting Station, and Dipayal 10kW MW Transmitting Station	Changed
6.	Renewal of studio equipment in Kathmandu Studio Center	Added newly
7.	Renewal of studio equipment at Pokhara 100kW MW Transmitting Station	Added newly
8.	Renewal of studio equipment in Dhankuta Regional Studio	Added newly
9.	Renewal of emergency generators at Kathmandu Studio Center, Bhainsepati 100kW MW Transmitting Station, and Pokhara 100kW MW Transmitting Station	Added newly

1-3 Reasons for Changes of the Contents Requested

(1) Changes in the Request Concerning SW Transmitters

With respect to the renewal of SW transmitting facilities of Khumaltar transmitting station in the original request, it was changed that the renewal of transmitting facilities should be postponed and elongation of life time through procurement of vacuum tubes should be pursued in accordance with the following reasons:

(i) As a result of World Radiocommunication Conference in 2003 (WRC-03), it was adopted a resolution that "to encourage the inclusion in all HF (SW) broadcasting transmitters put into service after 1st January 2004 of the capability to offer digital modulation".
However, radio receivers for SW digital modulation system is not diffused at all in Nepal.

(ii) Because the resolution of WRC-03 concerning the modulation system of SW transmitters would be revised at World Radiocommunication Conference in 2007 (WRC-07), any renewal plan of SW transmitters should be re-examined according to the resolution after revision.

(iii) Renewal of SW transmitting facility costs a pretty penny and makes it difficult to implement another request items such as renewal of transmitter and renovation of facility at Bardibas transmitting Station.

(2) Renewal of Transmitting Equipment at Bhainsepati 100kW MW Transmitting Station and Pokhara 100kW MW Transmitting Station

The facilities and equipment in Bhainsepati and Pokhara MW Transmitting Stations were constructed and procured by the Japanese grant aid assistance "The Project for Development of MW Radio Broadcasting Network" (hereafter referred to as "Phase 1") in 1981-82. Because the vacuum tube-type 100kW MW transmitters in these stations, manufactured in 1982, have already become out of manufacture, it is at high risk that these transmitters would become inoperable within several years. Although RNE had been concerned much about this situation, RNE did not request the renewal of facilities and requested the procurement of vacuum tubes instead, because RNE considered that the main request concerning renewal of SW transmitting facility would cost a huge amount and this cost would be near to top ceiling according to the scale of Japanese grant-aid cooperation. The change in this request reflects the revision of priority resulting from the change of the request (1) as above.

(3) Procurement of Spare Vacuum Tubes for MW Transmitters

The original request concerning the procurement of spare vacuum tubes for MW transmitters included those for 5 stations: Bhainsepati, Pokhara, and Surkhet, Dharan and Dipayal MW Transmitting Stations.

Latter 3 stations were constructed in 1988-89 by Japanese grant aid assistance “The Project for Expansion and Development of MW Radio Broadcasting Network (Phase 2)” (hereafter referred to as “Phase 2”). As mentioned above (2), it was changed to the introduction of solid-state type transmitters for the former 2 stations, this request was changed to cover the latter 3 stations.

(4) Renewal of Studio Equipment in Kathmandu Studio Center and Continuity Studio in Pokhara MW Transmitting Station

The above-mentioned Phase 1 project included the construction of Kathmandu Studio Center and the procurement of studio equipment, in addition to the provision of MW transmitting facilities. A studio was also constructed in Pokhara Transmitting Station and studio equipment was also procured. Most of the studio equipment consists of analog type, which has become so obsolete that even the procurement of spare parts has become impossible. Deterioration due to aging is remarkable, as 23 years has passed since procurement. For the purpose of addressing the frequent occurrence of equipment failures, the Nepali side invited tenders several times in the past to procure spare parts for these equipment on its own expenses, but tenders were unsuccessful because all the spare parts were out of manufacture. RNE emphasized that the improvement of studio equipment was not included in the original request because of the same reason as (2) above, despite the fact that the need for improvement was as important and serious as the improvement of aged SW and MW transmitting facilities.

RNE included the improvement of studio equipment as the new request, because the studio equipment has the same importance as the transmitters in Bhainsepati and Pokhara and this inclusion was prompted by the abandonment of the renewal of SW transmitter.

(5) Renewal of Emergency Generators

The emergency generators at Kathmandu Studio Center and Bhainsepati and Pokhara MW Transmitting Stations, listed at the end of the additional request, have been used for 23 years alike MW transmitters and studio equipment. The appearance of these units is kept in good conditions under the favor of diligent maintenance performed by RNE. However, failures have occurred frequently in the past, including a major failure that caused interruption of broadcasting in April 2001. Although tenders were invited several times for procurement of spare parts to address the frequent occurrence of failures, there were no applicants. RNE emphasized the possibility that interruption of broadcasting may occur during power failure, because repair would be impossible when malfunctioning of the generator should have occurred. To avoid such incidents, RNE strongly requested the procurement of generators in combination with the renewal of other equipment.

Chapter 2 Contents of the Project

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2-1 Basic Concept of the Project

2-1-1 National Development Objectives and the Project Goals

The Tenth 5-year Plan (Poverty Reduction Strategy Paper) 2002-2007 complied by the National Planning Commission of Nepal is ongoing as the super-ordinate plan of this Project. In this Plan, the improvement of fundamental infrastructure is positioned as a part of "effective provision of basic social services and improvement of economic infrastructure," that is one of the "4 pillars" of poverty reduction strategy. A target defined in this Plan is "to extend radio broadcasting services to all citizens." This reflects the recognition that provision of equal access to information is a means to alleviate poverty.

The Tenth 5-year Plan points out that managers of broadcasting companies should "clarify the liabilities and responsibilities of government and private broadcasting services to develop, expand and operate their activities in a competitive and coordinated manner," while the government agencies in charge of broadcasting should "maintain the environment for the maximum possible expansion of services of the private sector." With respect to RNE, which is the implementing body of this Project, the Tenth 5-year Plan states, "Radio Nepal would be developed as national broadcasting body and satellite and computer technologies will be adopted to expand its broadcasting services." It also states, "The existing broadcasting system of Radio Nepal should be improved and expanded to cover the whole Nepal."

Although being intended to provide supplementary technical support to the attainment of the goals of the Tenth 5-year Plan, this Project is to restore the original functions of existing facilities and equipment of RNE to a reasonable minimal extent. It is not considered new expansion and enrichment in this Project. Among the various problems in the broadcasting facilities of RNE, this Project implements the following 3 items, which are in extreme urgent need:

i) Extension of the service life of the SW transmitter and the MW transmitters through procurement of spare vacuum tubes.

ii) Building renovation and equipment renewal of Bardibas MW Transmitting Station damaged by the Maoist attack.

iii) Renewal of equipment and partial renovation of facilities that were improved through Phase 1 grant aid assistance from Japan.

It is necessary to provide technical instructions concerning the appropriate operation of the transmitting equipment and studio equipment that are newly procured in the execution of the above items, to deploy technical personnel enabling appropriate operation and maintenance of equipment, and to secure the budget

for the operation of the target facilities. Execution of these items will be reflected to achieve the direct effects of expanding broadcasting area coverage and service time. It is also expected that these achievements would lead to the indirect effects including the expansion of beneficiary population having access to radio broadcast services, the contribution to stabilization of administration and education, and the improvement of the operation and maintenance capabilities of RNE.

2-1-2 Outline of the Project

This Project chiefly covers the hardware improvement of equipment and facilities concerning the above-mentioned 3 items. The major components (equipment and facilities) provided for each project site are summarized as follows:

(1) Khumaltar 100kW SW Transmitting Station

(Equipment): Procurement of spare vacuum tubes for existing 100kW SW transmitter

(Facility): None

(2) Bardibas 10kW MW Transmitting Station

(Equipment): Renewal of 10kW solid state MW transmitter and its ancillary equipment (lightning protector, 30kVA isolation transformer, etc.), 10kW dummy load, output exchanger, program input/monitoring equipment, program receiving equipment (1 of 2 existing equipment), measuring equipment assembly, interphone system, etc.; procurement of spare vacuum tubes for existing standby 10kW MW transmitter.

(Facility): Overall facility renovation.

(Major renovation work)

- Building work

  Replacement of vinyl floor tiles, new installation of interior partition wall, replacement of ceiling boards, renewal of fixture, renovation of roof, repair of exterior wall panel joints, etc.

- Building Equipment work:

  Renewal of high-voltage incoming panel, emergency generator, fire alarm system, and air conditioning system; partial renewal of lighting fixtures, water supply system, receptacles, switches, etc.

(3) Bhainsepati 100kW MW Transmitting Station

(Equipment): Renewal of 100kW solid state MW transmitter, its ancillary equipment (lightning protector, 250kVA isolation transformer, etc.), program input/monitoring equipment, program receiving equipment (1 of 2 existing equipment), measuring equipment assembly, interphone system, etc.; procurement of spare vacuum tubes for existing standby 10kW MW transmitter.

(Facility): New installation of partition wall, renewal of emergency power generator and ancillary power source system, and new installation of air conditioning system.

(4) Pokhara 100kW MW Transmitting Station

(Equipment): Renewal of 100kW solid state MW transmitter, its ancillary equipment (lightning protector, 250kVA isolation transformer, etc.), program input/monitoring equipment, program receiving equipment (1 of 2 existing equipment), measuring equipment assembly, interphone system, etc.; procurement of spare vacuum tubes for existing standby 10kW MW transmitter; renewal of continuity studio equipment.

(Facility): New installation of partition wall, renewal of emergency power generator and ancillary power source system, and new installation of air conditioning system.

(5) Dharan 100kW MW Transmitting Station

(Equipment): Procurement of spare vacuum tubes for existing 100kW MW transmitter and for existing standby10kW MW transmitter.

(Facility): None.

(6) Surkhet 100kW MW Transmitting Station

(Equipment): Procurement of spare vacuum tubes for existing 100kW MW transmitter and for existing standby 10kW MW transmitter.

(Facility): None.

(7) Dipayal 10kW MW Transmitting Station

(Equipment): Procurement of spare vacuum tubes for existing 10kW MW transmitter and for existing standby10kW MW transmitter.

(Facility): None.

(8) Kathmandu Studio Center

(Equipment): Renewal of equipment for 2 production studios, equipment for music studio, equipment for SW studio (SW program production studio), equipment for announce studio, and equipment for master control room.

(Facility): Renewal of emergency power generator and ancillary power source system.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Basic Design Policy

(1) Basic Policies in Equipment Design

- The main aim of the Project is to enable RNE to continue operation as the national broadcasting station, including 114 hours of broadcasting time and necessary production of about 200 programs per week respectively. Namely, the basic policies in overall equipment design will not include the enrichment and expansion of equipment, but will focus on the restoration of deteriorated equipment to a reasonable minimal extent.
- Because the resolution for SW transmitter modulation system is being revised at the World Radiocommunication Conference in 2007 (WRC-07), it needs to be reconsidered after decision of the revised requirements. It will be attempted the elongation of life time of existing SW transmitter through procurement of spare vacuum tubes in this Project.
- With respect to MW broadcasting equipment, this Project intends to restore population coverage area from current 48% to about 75%. In addition, it tries to minimize broadcast downtime, which occurred frequently during last 2 years recording a total of about 400 hours, and to reconstruct the system needed for stable broadcasting services.
- With respect to studio equipment, the existing equipment that has become considerably obsolete or deteriorated will be reexamined and replaced totally with the equipment that can meet the needs of the time. In addition, the Project tries to minimize on-air faults, which occurred as many as 66 times during last 2 years, and to establish the system for stable program production and transmission.
- If there are existing equipment that can be used in new system, such equipment will be utilized wherever possible.

(2) Basic Policies in Facility Renovation Design

No facilities will be newly constructed in this Project, and all works are renovation of existing facilities. The basic policies in the facility renovation design for each transmitting station and the studio center are as follows:

- The renovation design for Bardibas 10kW MW Transmitting Station will aim at the restoration of the functions that the facility originally possessed. No changes or addition to the functions will

be included in principle.

- The design will conform to the operating organization of RNE and avoid undue burden on operation and maintenance cost.
- Renovation will be limited to the reasonable minimal extent in accordance with the functions of the equipment that will be renewed or newly procured.
- The design will be developed paying sufficient consideration to the natural conditions in Nepal and the project sites.
- The compatibility with existing facilities will be ensured in the planning of building equipment works.

2-2-1-2 Design Policy towards Given Conditions

(1) Policy towards Natural Conditions

In view of the general natural conditions in Nepal and local features of each project site, equipment design and facility renovation design will be developed paying attention to the following points:

- The altitude of the project sites is about 800 m at Pokhara Transmitting Station and about 1,300m both at Bhainsepati Transmitting Station and at Kathmandu Studio Center. Accordingly, emergency generators should be selected from the appropriate models suitable to low atmospheric pressure, considering the lowering of power generating efficiency.
- Because semiconductors are used in the newly procured solid state MW transmitters, it will be necessary to maintain room temperature within specified limits and to prevent dust from outside. The air conditioning systems for transmitter rooms at Bardibas, Bhainsepati, and Pokhara Transmitting Stations should be designed to meet the meteorological conditions of respective project sites, and the newly constructed partition walls defining air-conditioned zones should be designed to have sufficient heat insulation and air tightness.

(2) Policy towards Social Conditions

While the facilities to be renovated were formerly constructed under the grant aid cooperation from Japan 23 years or 14 years ago, no considerable changes have occurred since the time of construction in lifestyle, historical and cultural traditions, and other social conditions. Consequently, renovation plans should aim at the restoration of the functions of facilities to the original conditions. No changes should be made in architectural styles, such as the external appearance of buildings.

(3) Policy towards Construction Conditions

1) Applicable Design Standards and Permissions

The design standards applicable to buildings in Nepal are specified in Nepal National Building Code issued in 1994 (partly in 2003) by the Department of Urban Development and Building Construction, Ministry of Physical Planning and Works (MPPW). However, because the renovation works in this Project do not involve alteration of floor area, appearance, or accommodation capacity of facilities, the compliance with this Code need not be considered at this time.

2) Situation Concerning Labor and Construction Works

The number of national holidays in Nepal is 22 days in a year (2005), which is largely similar to the number in Japan including summer and winter holidays. In addition, the Labor Law of Nepal stipulates 13 days of paid holidays each year and the basic working time of 42 hours per week. In general, holiday is Saturdays only. The project work schedule should appropriately reflect such labor customs and other considerations specific to Nepal.

(4) Policy towards Use of Local Contractors

There are about 150 A-class registered building construction companies in Nepal, and they are capable of performing appropriate renovation works under the supervision and guidance of Japanese contractors. For the renovation works in this Project, the use of local subcontractors will be positively promoted, with an additional merit of technology transfer. On the other hand, equipment installation works may not be implemented by means of contracting with local companies, because the installation of broadcasting equipment involves very special expertise. However, the use of local electricians, who may assist in these works under the guidance of Japanese engineers can be expected.

(5) Policy towards Operation and Maintenance Abilities of RNE

As mentioned in Subsection 2-2-1-1 before, the ultimate design goals are to conform to the operating organization of RNE, which is the implementing body of this Project, and to avoid undue burden on operation and maintenance cost. These will be the yardsticks for decisions concerning the forms of equipment and facilities, the materials used, construction methods, and all other aspects of design.

(6) Policy towards Grading of Facility and Equipment

1) Policies towards Specification of Facilities

As mentioned in Subsection 2-2-1-1 before, renovation aims at restoration of the functions that the

facilities originally had but have lost due to aging and the destructive activities of antigovernment groups. No addition of new functions or alteration of grades will be made.

2) Policies towards Specification of Equipment

- The specifications for the equipment procured in this Project will be comparable to those of the systems adopted in past grant-aid cooperation projects for RNE and the equipment procured in such projects.
- Introduction of the equipment using new technologies will be planned based on the past cases of introduction to private broadcasting stations (Kantipur FM, Image Channel FM, etc.) in recent years.
- Whatever possible, equipment will be selected so that RNE will be able to procure spare parts through its own resources. Sharing of spare parts will be facilitated through unification of models.
- Reflecting the trend of the times, this Project will mainly procure digital equipment in place of analog equipment that has gone out of production. There will be no problems in the handling of digital equipment, as RNE has independently been introducing some digital equipment in recent years and has sufficient knowledge about how to use the equipment.
- According to functions and performance, broadcasting equipment is classified into 3 grades: broadcast, professional, and consumer use. While broadcasting stations have been using the highest (broadcast) grade equipment of conventional type, recent progress of digital technologies has resulted in the emergence of professional-grade equipment that is nearly equivalent to broadcast-grade equipment in terms of functions and performance, and such equipment is now often introduced to broadcasting stations. This Project will partly make use of professional-grade equipment as appropriate for the purpose of use.

(7) Policy toward Method of Construction, Procurement and Schedule

1) Policies towards the Methods of Facility Renovation

The renovation plan for each facility does not include addition of new functions or alteration of functions. Building structures such as pillars and beams are not renovated. Renovation of finishes will not include intact finishes and the finishes in the rooms that are not directly related to the renewal of transmitting and broadcasting equipment. Consequently, the plans concerning the methods of facility renovation will aim at the conservation of the original design of facilities and ensuring the continuity between renovated parts and existing parts.

2) Policies toward the Methods of Equipment Procurement

RNE is placing great reliance on Japanese products, because of the fact that the Japanese products procured in the Phase 1 project have been working well for 23 years and because of satisfactory aftercare servicing. Thus, RNE intends all items procured in this Project to be Japanese products. However, some of the items to be procured in this Project should not necessarily be Japanese products in view of the comparison of functions, performance, and cost. Although the equipment in this Project will basically be procured from Japan, procurement from a third country, such as Europe, the U.S., and Canada will also be considered, based on specific evaluation of flexibility of use, cost, and other factors.

3) Policies toward Work Schedule

Work schedule will be planned paying attention to the following points:

- Because the project sites are located at large distances from one another, concurrent execution of similar works at 2 or more locations will cause lowering of cost performance in the planning of manpower and work resources. Therefore, plans should be made so that neither facility renovation works nor equipment installation works will proceed concurrently at 2 or more sites.
- Plans should be made so that equipment installation work will begin after the completion of facility renovation work. A situation in which facility renovation work and equipment installation work proceed concurrently at a site should be avoided.
- While facility renovation work and equipment installation work at a site will be performed by different contractors and completed at different times according to their respective specifications and design drawings, both works shall be executed under the close coordination to allow consistent and organic performance of functions.

2-2-2 Basic Plan

2-2-2-1 Validation of the Contents of Request

The following summarizes the result of validation concerning the items in the final request.

(1) Procurement of spare vacuum tubes for Khumaltar 100kW SW Transmitting Station

RNE is deferring the renewal of SW transmitters, because it has been complying with the decisions of World Radiocommunication Conference (WRC-03), and a revision of these decisions is planned at WRC-07 in 2007.

Khumaltar 100kW SW Transmitting Station was constructed in 1968. Although the facility and equipment have been superannuated considerably, the 100kW SW transmitter (U.S. made in 1981) in use at present has been operated for about 85,000 hours, and the standby 100kW SW transmitter (U.S. made in 1977) currently ceasing its operation on account of no spare tubes, had been operated for about 90,000 hours, which reveals the fact that both of the transmitter have not reached the expected life time of 100,000 hours. These SW transmitters, therefore, are expected to be operational for about another three to five years at least in consideration of RNE's annual broadcasting hours of about 6,000, if spare vacuum tubes (missing completely at present) are procured appropriately and the both transmitters are used alternately.

(2) Facility renovation and equipment renewal at Bardibas 10kW MW Transmitting Station

Bardibas Transmitting Station, attacked by the Maoist in April 2002, needs total renovation on interior partition walls, floor finishes, ceilings, doors, etc. because of the severe damage. Fortunately, damage to building structures is not serious, and the building needs not be reconstructed. The emergency generator, air conditioning system, switching boards, lighting fixtures, and other accessory equipment of the building have also been damaged and need renewal. The joints of exterior wall panels show aging deterioration, and should be repaired together with the renovation of the interior.

About a half of the broadcasting equipment has suffered decisive damage. The main 10kW MW transmitter has been burnt leaving nothing but the blackened casing, and repair is completely impossible. The program input/monitoring equipment, measuring equipment, dummy load, etc. have been rendered inoperable as a result of blasting. These equipment needs renewal, as well as the solid-state type transmitter and its ancillary equipment including lightning protector, insulation transformer, etc.

The standby 10kW transmitter is operated currently in an unstable condition with occasional interruption of transmission, but it can be used as the standby transmitter in succession. The antenna matching unit, transmission antenna, program receiving equipment, and some other equipment can also be used in succession.

While a radial earths system consisting of 120 copper wires is buried in the ground under the antenna mast, these were cut at about 130 points when the military dug trenches for defense after the Maoist attack. The repair of the radial earths system should be carried out by the Nepali side, and must be completed before the beginning of the facility renovation work at Bardibas Transmitting Station.

(3) Renewal of transmitting equipment and facility renovation at Bhainsepati 100kW MW Transmitting Station and Pokhara 100kW MW Transmitting Station

These two transmitting stations, as well as Kathmandu Studio Center, were constructed in Phase 1, and

have been operated since 1983. While the transmitters at these stations have been used for 23 years, their external appearance remains very good, thanks to the diligent maintenance performed by RNE. However, these equipment have been used for a period longer than the expected life time of 100,000 hours, the transmission output power has dropped to 75-80% of the rated output, and the downtime during past 2 years has been over 400 hours at either of these stations. In view of these facts, the need for urgent equipment renewal is extremely high. These stations need procurement of new solid state type 100kW MW transmitters and its ancillary equipment including lightning protectors, isolation transformers, etc, as well as renewal of program input/monitoring equipment, measuring equipment, interphone systems, etc., which are showing malfunction and loss of performance due to superannuating.

Semiconductor-based solid-state transmitters, requested newly in this Project, are sensitive to dust and require air conditioning systems and airtight rooms, unlike vacuum tube type transmitters using cooling fan systems. Therefore, the transmitting machine rooms of the 2 transmitting stations need renewal including installation of partition walls at appropriate positions to improve air conditioning efficiency and air conditioners near the new transmitters.

(4) Procurement of spare vacuum tubes for Dharan 100kW MW Transmitting Station, Surkhet 100kW MW Transmitting Station, and Dipayal 10kW MW Transmitting Station

These 3 MW transmitting stations were constructed in Phase 2, simultaneously with Bardibas Transmitting Station and Dhankuta Regional Studio. The transmitters have been used for 14 years since first operation in 1991, but they are maintained in good conditions and can be used for 7 or 8 years in succession. However, although there is no need for the transmitters themselves to be replaced, replenishment of spare vacuum tubes is needed because there are no spare vacuum tubes and the ones currently in use are approaching the end of their life time.

While solid state type MW transmitters will be installed at Bardibas, Bhainsepati, and Pokhara Transmitting Stations, these stations will continue to use the existing vacuum tube type 10kW MW transmitters as standby. Procurement of the spare vacuum tubes for these standby transmitters should also be considered.

(5) Renewal of studio equipment at Kathmandu Studio Center, Continuity Studio in Pokhara Transmitting Station, and Dhankuta Regional Studio

Kathmandu Studio Center consists of 5 studios such as Production Studio-1, Production Studio-2, Music Studio, SW Studio (for SW program production), and Announce Studio, and the Master Control Room. About 80% of the equipment used in these rooms has been operated since 1983, and almost all shows significant loss of performance due to aging, causing serious difficulty in program production.

The Nepali side invited tenders several times in the past to procure the spare parts of equipment through its own budget for the purpose of tackling frequent failures of equipment, but such attempts were unsuccessful because the spare parts were out of production.

Because all studios are in full operation, closure of any one studio due to deterioration of equipment would make it extremely difficult to produce about 200 programs needed for 114 hours a week broadcasting. The maintenance records show that temporary interruption of program production due to equipment failure occurred 66 times during past 2 years, although none of these occasions resulted in interruption of broadcasting. Thus, the need for urgent equipment renewal is extremely high. All studios and the Master Control Room need total renewal of equipment.

About 80% of the equipment used in the continuity studio in Pokhara was also produced in 1982. Similarly to Kathmandu Studio Center, the studio in Pokhara also needs basically total renewal. On the other hand, RNE assigned the lowest priority to Dhankuta Regional Studio in the request for renewal of studio equipment. The equipment in this studio is newer than that of Kathmandu and Pokhara studios by about 8 years, and a majority of equipment is maintained in good conditions. Renewal of equipment in this studio, therefore, is not included in this Project.

(6) Renewal of emergency generators at Kathmandu Studio Center, Bhainsepati Transmitting Station, and Pokhara Transmitting Station

The generator at Kathmandu Studio Center has trouble in the automatic startup circuit. While manual startup is the only way to operate this unit, it does not always start normally. Furthermore, it operates with abnormal sounds. The generators at Bhainsepati and Pokhara stations also have similar problems, in addition to water leakage from the radiator and malfunction of the revolution indicator. The maintenance records kept by RNE show that each of these units has been repeating a considerable number of failures. Thus, these generators are not able to function reliably as the standby power source.

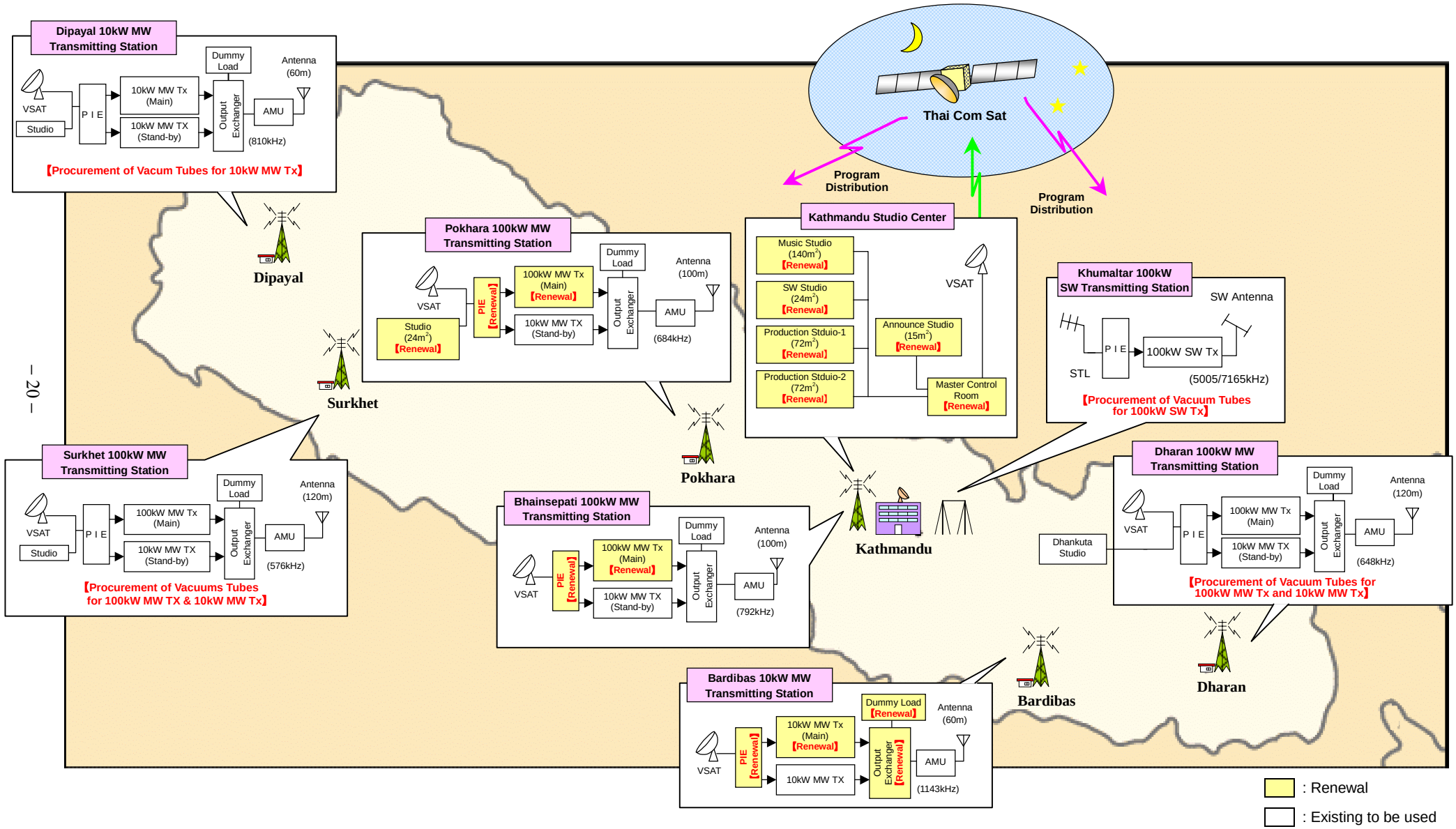
The studio equipment and the solid state MW transmitters that will be newly installed in this Project cannot deliver their full performance without a stable supply of power. A failure of the generator may cause interruption of broadcasting during a power failure, potentially disabling RNE from serving as a broadcasting enterprise. To avoid such emergency, renewal of generators will be conducted as requested. Accessory power source equipment such as automatic switching units will also be covered by the Project.

Table 2-2-1 shows the comparison on the contents of request and the scope of the Project explained in this section.

Table 2-2-1: Contents of Request and Scope of the Project

Priority of Request	Requested Project Site Contents of Request	Appropriateness as the Project	Major Equipment and Facilities To be included in the Project
1.	Khumaltar 100kW SW Transmitting Station Procurement of spare vacuum tubes	Appropriate	Spare vacuum tubes for existing 100kW SW transmitter
2.	Bardibas 10kW MW Transmitting Station Overall renovation of facilities and renewal of equipment	Appropriate	(Equipment) Solid state type 10kW MW transmitter, lightning protector, 30kVA isolation transformer, 10kW dummy load, program input/monitoring equipment, program receiving equipment, measuring equipment, interphone system, etc. (Facility) Power source equipment including 100kVA emergency generator and 100kVA automatic voltage regulator, building finishings, electrical installations including lighting, fire alarm, receptacles, etc., air conditioning and ventilation system, water supply pump, etc.
3.	Bhainsepati 100kW MW Transmitting Station Pokhara 100kW MW Transmitting Station Renewal of transmitter and partial renovation of facilities	Appropriate	(Equipment) Solid state type 100kW MW transmitter, lightning protector, 250kVA isolation transformer, program input/monitoring equipment, program receiving equipment, measuring equipment, interphone system. (Facility) Air conditioning and ventilation system.
4.	Dharan 100kW MW Transmitting Station Surkhet 100kW MW Transmitting Station Dipayal 10kW MW Transmitting Station Procurement of spare vacuum tubes	Appropriate	(Equipment) Spare vacuum tubes for existing 100kW and 10kW MW transmitters. *Note: The spare vacuum tubes for MW transmitters will be used also for the standby transmitters.
5.	Kathmandu Studio Center Continuity Studio in Pokhara 100kW MW Transmitting Station Dhankuta Regional Studio Renewal of studio equipment	Appropriate (except for Dhankuta Regional Studio)	(Equipment) Equipment for Production Studios 1 and 2, equipment for Music Studio, equipment for SW Studio, equipment for Announce Studio, equipment for Master Control Room, etc.
6.	Kathmandu Studio Center Bhainsepati 100kW MW Transmitting Station Pokhara 100kW MW Transmitting Station Renewal of emergency generators	Appropriate	(Facility) 100kVA emergency generators (all stations), feeder panels, automatic voltage regulators (30kVA at Kathmandu Studio Center, 400kVA at Bhainsepati and Pokhara Transmitting Stations).

Fig. 2-2-1: Outline of the Project for Improvement of SW and MW Radio Broadcasting Stations in the Kingdom of Nepal



2-2-2-2 Basic Design of the Equipment

(1) General Conditions for the Equipment Plan

The transmitting equipment, studio equipment, and related equipment procured in this Project should be selected to meet the following general conditions:

1) Applicable Recommendations and Standards

The equipment should comply with the recommendations and standards of the following organizations, which were used in past assistance and are receiving wide international acceptance as the standards in electrical and telecommunication fields.

i) International Telecommunication Union-Radio Communication Sector (ITU-R)
ii) Audio Engineering Society (AES)
iii) International Electrotechnical Commission (IEC)
iv) Japan Industrial Standards (JIS)
v) Standards of Electric Industries Association of Japan (EIAJ)
vi) International Organization for Standardization (ISO)

2) Environmental Conditions for Operation of Equipment

i) Ambient temperature: 0°C - 40°C
ii) Room temperature: 0°C - 40°C

3) Power Voltage and Frequency

i) Power supply for operation of equipment: 400V/230V, 3-phase 4-wire, 50Hz
ii) Acceptable voltage fluctuation of municipal power supply: 400 V ± 20% 3-phase

4) Other Basic Conditions

i) Because the ease of operation and maintenance is an essential factor for improving the reliability of equipment, highly reliable systems should be constructed by selecting the equipment using the same parts and finishes whenever possible.

ii) The availability of procurement of spare parts and spare modules should be guaranteed at least for 10 years. When spare parts and spare modules go out of production, alternatives with equivalent or better performance should be available.

iii) Safety during equipment maintenance should be maximally ensured from both electrical and mechanical aspects, such as protective covers on energized parts, power source terminal panels, revolving parts of motors, etc. to prevent direct contact with human body and other

hazard protection measures.

(2) Equipment for Transmitting Stations

The transmitting stations of RNE are manned facilities attended continuously by engineers needed for operation and maintenance. These stations are designed according to the concept that basic procedures such as the startup and stopping of transmitters, selection between main and standby transmitters, selection and switching of program input, and the switching from emergency to commercial power supply after recovery from power failure continue to be performed manual operation. This is considered to have resulted in the improvement of the technical skill of Radio Nepal personnel, which contributed to the ability to continue operation over nearly a quarter of a century.

The same concept will be adopted in this Project, aiming at the ability to continue operation for a longer time. The grade of equipment will be selected based on the same principles as before. Broadcast-grade equipment with backup capabilities will continue to be adopted to achieve the primary aim of minimizing interruption of broadcasting due to equipment failures.

The outlines of the equipment and systems to be procured in this Project are as follows:

1) MW Transmitters

The existing transmitters at all transmitting stations to be renewed MW transmitters are in compliance with the output power and frequency allocations of ITU-R as shown in Table 2-2-2. The renewed transmitters should have the same output power and frequency as the existing transmitters.

Table 2-2-2: Output Power and Frequency

Name of Transmitting Station	Output Power	Frequency
Bhainsepati 100kW MW Transmitting Station	100kW	792 kHz
Pokhara 100kW MW Transmitting Station	100kW	684 kHz
Bardibas 10kW MW Transmitting Station	10kW	1143 kHz

Both the 100kW and 10kW MW transmitters to be procured should be semiconductor-based full solid-state type. The method of modulation should be adopted digital modulation system.

This type MW transmitter has the following advantages:

- Better maintenance support which lasts for a longer period can be expected because the world wide technical trends have moved to the digital modulation system.
- The uniformity of the monthly operation and maintenance expenditure of the radio station can be realized using solid state type transmitter because large power vacuum tubes, high

voltage transformers, and so on have become unnecessary.

- The decrease of the operation expenses of the radio station can be realized due to the synthetic efficiency of the transmitter without the large power vacuum tubes.
- A operation hindrance doesn't arise even if about 10% of the total number of the power amplifier breaks down in power amplification part because it is compensated by other power amplifiers.
- Durability against lightning surge is improved because the power amplification part is combined by many solid state power amplifiers in series and obtained it's output power. Hence the surge is divided into each solid state power amplifier evenly.
- A protection circuit of the solid state power amplifier is set up against any unusual impedance change in the transmitting antenna.
- The part using the high voltage is limited, and safe maintenance work can be done.

To protect solid state type transmitters from sand and dust, the operating environment of transmitters will be improved by the use of a closed air-conditioning cooling system instead of the existing duct cooling system.

At the time of a power failure, the transmitter should be able to continue broadcasting by recognizing the switching to the standby power supply and automatically reducing the output power from 100kW to 20kW. However, Bardibas Transmitting Station using a 10kW transmitter, 10kW output power will be continued during operation using the standby power supply system. A complete breakdown of these transmitters will be addressed by the use of an existing standby 10kW transmitter, and no new standby transmitters will be procured for this purpose.

2) Dummy Load and Output Exchanger for 10kW Transmitter

The 10kW dummy load and output exchanger for Bardibas Transmitting Station, which were destroyed by Maoists, will be renewed. At Bhainsepati and Pokhara Transmitting Stations, existing Dummy Load and Output Exchanger will be used in succession.

3) Transmitting Antenna

Existing transmitting antennas will be used in succession at all transmitting stations.

4) Program Input/Monitoring Equipment (PIE)

This equipment is used for controlling broadcast program signals and feeding to the transmitter at a stable level. Similarly to the existing equipment, the audio processors in the PIE should be a dual system consisting of main and standby lines to avoid interruption of broadcasting due to

equipment failure. The PIE should have the capabilities of program input line switching, monitoring/adjustment of audio input level, audio monitor, display of transmitter output power/modulation factor, notice of power failure/recovery, etc., and be assembled in a rack. Consequently, the separate control console used in the existing equipment will be removed.

While Bardibas Transmitting Station needs procurement of 2 sets (main and standby) of audio processor, only 1 set for main use will be procured for Bhainsepati and Pokhara Transmitting Stations respectively, and existing audio processors will be used as standby.

To cope with unexpected accidents hindering the reception of programs, CD players for emergency use will be provided to all transmitting stations covered by the Project.

5) Program Receiving Equipment

The transmitting stations continue to use the VSAT program receiving equipment that receives the programs sent from Kathmandu Studio Center via satellites. However, one of the 2 all-wave receivers procured by Phase 1 project currently used as standby program receiving equipment has become inoperable due to aging, will be renewed (common to all transmitting stations covered by the Project).

6) Measuring Equipment

A distortion meter, an oscilloscope, an audio attenuator, and a frequency meter will be procured. These equipment will be assembled in a rack so that the operation condition of the transmitter can be checked continuously.

7) Interphone System in Transmitting Stations

The interphone system that has been installed to connect various rooms to facilitate transmitting operation works will be renewed. While a 4-wire system is adopted at present, a 2-wire system is sufficient, considering the contents and form of operation at transmitting stations. Interphone terminals will be installed at the following locations:

- Bhainsepati Transmitting Station
  Transmitter control room, power supply room, manager's room, office rooms (6), and maintenance room: (Total 10 Terminals)
- Pokhara Transmitting Station
  Transmitter control room, studio control room, power supply room, library, manager's room, office rooms (3), and maintenance room: (Total 9 Terminals)

- Bardibas Transmitting Station

  Transmitter control room, power supply room, manager's room, office room, and maintenance room: (Total 5 Terminals)

8) Vacuum Tubes

Vacuum tubes will be procured from Eimac Co. in the U.S., which is the only company in the world manufacturing made-to-order vacuum tubes. All vacuum tube model numbers listed hereunder are of the Eimac products.

- Vacuum Tubes for 100kW SW Transmitter (SW-100A) at Khumaltar SW Transmitting Station

  Type of Tubes used:

	Type	Quantity
Power Amplification part	4CV50000E	2 tubes
Exciter part	4CX1500A	2 tubes

  Although the manufacturer-guaranteed life time of vacuum tubes for Power Amplification part is 3,000 hours, it is assumed that these tubes can be used for approximately 6,000 hours based on past operation records (3,000 to 8,000 hours of operation). It is also assumed that the vacuum tubes for Exciter part can be used for approximately 10,000 hours, according to past operation records. The minimum quantities of vacuum tubes necessary for the operation of the SW transmitters for the period of at least another three years will be procured in this Project, by which both of the transmitters in use and standby become operational and SW broadcasting service is anticipated to be able to continue about three to five years from now on until the remaining life of the SW transmitters. Because RNE's annual broadcasting hour is about 6,000 hours at present, the quantities of vacuum tubes for Power Amplification part and Exciter part needed for 3 years operation are calculated as follows:

  Quantity to be procured:

Power Amplification part	4CV50000E	6 tubes (3 sets)
Exciter part	4CX1500A	4 tubes (2 sets)

- Vacuum Tubes for 100kW MW Transmitters at Dharan and Surkhet MW Transmitting Stations

  Type of Tubes used:

	Type	Quantity
Power Amplification part	4CX35000C	2 tubes
Modulation part	4CX35000C	2 tubes

The manufacturer-guaranteed life time of vacuum tubes for Power Amplification part is 9,000 hours. Because past operation records show large variation in actual lifetime from 15,000 hours to 40,000 hours, it is assumed that these tubes can be used for approximately 20,000 hours, which is generally accepted as the life time of vacuum tubes. It will be procured vacuum tubes in quantities needed for the remaining life time of the transmitter, which is expected to be about 7 years according to the operation time up to the present (about 70,000 hours) and the operation records at Bhainsepati and Pokhara Transmitting Stations in this Project. In addition, vacuum tubes for the standby 10kW transmitters used during power failure and during the failure of 100kW MW transmitter will be procured (1 set for each station).

Quantity to be procured:

Power Amplification part	4CX35000C	4 tubes (2 sets)
Modulation part	4CX35000C	4 tubes (2 sets)
Standby 10kW Transmitter	4CX5000R	4 tubes (1 set)

- Vacuum Tubes for 10kW MW Transmitters at Dipayal MW Transmitting Station

Type of Tubes used:

	Type	Quantity
Power Amplification part	4CX5000R	2 tubes
Modulation part	4CX5000R	2 tubes

The transmitters at Dipayal station are kept in the best condition among the 6 MW transmitting stations, because the main and the standby 10kW transmitters are operated alternately and the operation time of each transmitter is relatively short. Although the transmitters are expected to operate for 10 more years, it will be procured vacuum tubes in quantities considering the operation of transmitters for 7 years in succession, similarly to Dharan and Surkhet Transmitting Stations in this Project. Vacuum tubes for the standby transmitter will not be procured.

Quantity to be procured:

Power Amplification part	4CX5000R	4 tubes (2 sets)
Modulation part	4CX5000R	4 tubes (2 sets)

Bhainsepati, Pokhara, and Bardibas Transmitting Stations will continue the use of existing 10kW standby transmitters, but the opportunity to use of existing standby transmitters is considered to be limited because the newly procured transmitters will have high stability and reliability and will not need the use of standby transmitter during power failure time.

However, 1 set of vacuum tubes for Power Amplification part and Modulation part (4CX5000R, 4 tubes) will be procured for each station for emergency use during the complete failure of main transmitters.

Table 2-2-3 summarizes the scope of improvement for all transmitting stations covered by the Project.

Table 2-2-3: Summary on Improvement of Transmitting Stations

: Scope of the Projec

Equipment \ Project sites	Khumaltar SW Transmitting Station	Bhainsepati 100kW MW Transmitting Station	Pokhara 100kW MW Transmitting Station	Bardibas 10kW MW Transmitting Station	Dharan 100kW MW Transmitting Station	Surkhet 100kW MW Transmitting Station	Dipayal 10kW MW Transmitting Station
100kW SW Radio Transmitter	Existing to be used (Spare Vacuum Tubes to be Procured)	—	—	—	—	—	—
100kW MW Radio Transmitter (main)	—	To be renewed	To be renewed	—	Existing to be used (Spare Vacuum Tubes to be procured)	Existing to be used (Spare Vacuum Tubes to be procured)	—
Lightning Protector for 100kW MW Radio Transmitter	—	To be renewed	To be renewed	—	Existing to be used	Existing to be used	—
Isolation Transformer for 100kW	—	To be renewed	To be renewed	—	Existing to be used	Existing to be used	—
100kW Dummy Load	Existing to be used	Existing to be used	Existing to be used	—	Existing to be used	Existing to be used	—
10kW MW Radio Transmitter (main)	—	—	—	To be renewed	—	—	Existing to be used (Spare Vacuum Tubes to be procured)
Lightning Protector for 10kW MW Radio Transmitter (main)	—	—	—	To be renewed	—	—	Existing to be used
Isolation Transformer for 10kW	—	—	—	To be renewed	—	—	Existing to be used
10kW MW Radio Transmitter (Standby)	—	Existing to be used (Spare Vacuum Tubes to be procured)	Existing to be used (Spare Vacuum Tubes to be procured)	Existing to be used (Spare Vacuum Tubes to be procured)	Existing to be used (Spare Vacuum Tubes to be procured)	Existing to be used (Spare Vacuum Tubes to be procured)	Existing to be used (Spare Vacuum Tubes to be procured)
Lightning Protector for 10kW MW Radio Transmitter (standby)	—	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used
10kW Dummy Load	—	—	—	To be renewed	—	—	Existing to be used
Output Exchanger	Existing to be used	Existing to be used	Existing to be used	To be renewed	Existing to be used	Existing to be used	Existing to be used
Antenna Matching Unit	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used
Transmitting Antenna	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used
Obstruction Lamp	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used	Existing to be used
Transmitter Control Console	—	To be disposed	To be disposed	To be disposed	Existing to be used	Existing to be used	Existing to be used
Program Input/Monitoring Equipment	Existing to be used	To be renewed	To be renewed	To be renewed	Existing to be used	Existing to be used	Existing to be used
(Audio Processor)	—	To be partly renewed (Concurrently with the existent facility)	To be partly renewed (Concurrently with the existent facility)	To be renewed	Existing to be used	Existing to be used	Existing to be used
Program Receiving Equipment	Existing to be used	Existing to be used (To be partly renewed)	Existing to be used (To be partly renewed)	Existing to be used (To be partly renewed)	Existing to be used	Existing to be used	Existing to be used
Measuring Equipment	Existing to be used	To be renewed	To be renewed	To be renewed	Existing to be used	Existing to be used	Existing to be used
Communication Equipment	Existing to be used	Existing to be used	Existing to be used	To be renewed	Existing to be used	Existing to be used	Existing to be used
Interphone System	—	To be renewed	To be renewed	To be renewed	Existing to be used	Existing to be used	Existing to be used
CD Player	—	To be newly procured	To be newly procured	To be newly procured	—	—	—

(3) Studio Equipment

1) Concept of the Procurement of Studio Equipment

The studio equipment that was procured in Phase 1 consists of analog and monaural equipment, but in terms of the grade of equipment, these are broadcast-grade high-class equipment that was made to order. These equipment are designed to withstand prolonged continuous operation, reduce the occurrence of failures, consider the ease of operation and repair, and have sufficient backup capabilities to cope with equipment failures. The fact that the equipment has been operating for 23 years since the commencement of operation proves the reliability of these equipment and recognize the high technical skill of RNE personnel.

However, the development of technologies that progressed after procurement of these equipment has been remarkable. In particular, the progress of digital technologies resulted in the widespread availability of professional-grade equipment that has functions and performance largely equivalent to broadcast-grade equipment and can be used for broadcasting services.

In view of this situation, the procurement of studio equipment in this Project will be conducted according to the following principles:

i) Grade of Equipment

Although the broadcast-grade equipment will mainly be procured to compose studio system equipment, professional-grade equipment with sufficient performance and functions will also be introduced according to the purpose of use.

ii) Specifications for Equipment

Although the digital equipment will mainly be procured, some analog equipment will also be procured for live broadcasting considering the easiness to cope with emergency broadcasting during equipment failures. RNE personnel are accustomed to the characteristics of both analog and digital equipment. They do not persist to procure only for digital equipment but also intend to procure some analog equipment, such as audio mixers, based on their experience. The standard functions included in digital equipment and the functions that can be introduced easily will be incorporated as much as possible to facilitate effective program production.

iii) Audio Signal Format

Concerning audio signal format of produced programs, monaural audio signals are adopted for SW and MW broadcasting at preset. Considering the procurement of monaural-only equipment is difficult and RNE's future plan to commence FM broadcasting, programs will be produced in stereo signals and converted to monaural signals in the program sending

portion of the Master Control Room before transmission. The audio signals within each studio will continue to be adopted analog signals because of the ease of handling. However, the audio signals sent between the studios and the Master Control Room will be converted to digital signals to prevent transmission loss of quality.

iv) Quantities of Equipment

In Phase 1, the quantities of equipment procured were set to achieve "complete standby capabilities" so that each studio would be able to deal with any failures, considering the reliability (frequency of failures) of equipment at that time. Considering that it can procure equipment with much improved performance and reliability at preset, the quantities of equipment procured for each studio will be limited to the minimum needed for program production and operation. The existing equipment procured by RNE which can be included as a part of studio system will be used as much as possible.

2) Equipment for Program Production

The outline of the equipment for program production to be procured for Kathmandu Studio Center and the Continuity Studio in Pokhara Transmitting Station is as follows:

(a) Audio Recording Equipment

As the audio recording equipment, record player, cartridge tape recorder/player, open reel tape recorder, cassette tape recorder, and CD player are used currently in each studio. The equipment other than cassette tape recorder and CD player have become out of production, and procurement of these equipment is extremely difficult. While digital audio tape recorder and CD recorder are commonly used as audio recording equipment, though not used in RNE studios, these may soon become out of production. Therefore, the audio media that can be used in the future include cassette tape recorder, CD player, MD recorder, DVD, magneto-optical disk (MO) recorder, and semiconductor memory recorder. Among them, semiconductor memories emerging as the mainstream of audio media and CD media with high cost performance will be employed in this Project. Semiconductor memory recorder will be employed for the renewal of cartridge tape recorder/player and open-reel tape recorder/player. This recorder has advantages such as that ① no mechanical parts and maintenance-free, ② long recording time is realized by the progress of data compression technology, and ③ standardize to use of conventional contact control or RS232C control. Because cartridge tape recorder/players are also used for emergency broadcasting during troubles, semiconductor memory recorders will be used for emergency transmission taking advantage of low power, instantaneous startup, and the ease of insert

control.

(b) Audio Mixer

The studios performing live broadcasting (Announce Studio, Production Studios 1 and 2, SW Studio, and Pokhara Studio) will be equipped with analog mixers, which provide the ease of emergency operation during failures and are used in many live broadcast studios in the world. The redundancy of power supply will be ensured to avoid interruption of live broadcasting. The number of input channels will be 12 CH, similarly to the existing equipment. Though music studio is mainly used for the production of music programs, it will be procured a professional-grade digital mixer that can flexibly perform multiple recording, editing, etc. The number of input channels will be 24CH similarly to the existing mixer.

(c) Digital Audio Workstation (DAW)

At present, the process of program production consists of program recording, tape editing, and packaging using open-reel tapes, cassette tapes, etc., and is performed with very low efficiency. Following the introduction of digital equipment, it shall be realized efficient program recording, editing, and library construction using digital audio workstations (DAW), which have already been used in private broadcasting stations in Nepal. The DAW will consist of general-purpose device including a professional-use personal computer, digital interface, CD-R/W drive and application software, etc. While the performance of editing application software depends greatly on CPU clock speed, a usual personal computer with 2 GHz clock speed is sufficient to provide appropriate operating environment. The required hard disk space is 130 GB, assuming 10 GB for the OS and applications, 30 GB for working memory, and 90 GB for temporary storage. Therefore, an ordinary 160 GB model will be used.

(d) Microphones

Microphones will be renewed in quantities that have become unusable due to aging. The number of microphones to be renewed in each studio is as follows:

Production Studio-1	:	4 sets (Condenser Microphone, 2 types)
Production Studio-2	:	4 sets (Condenser Microphone, 2 types)
Music Studio	:	10 sets (Condenser Microphone, 3 types)
SW Studio	:	2 sets (Condenser Microphone, 2 types)
Announce Studio	:	2 sets (Condenser Microphone, 2 types)
Pokhara Studio	:	2 sets (Condenser Microphone, 2 types)

Table 2-2-4 shows the outline of Kathmandu Studio Center and the Continuity Studio in Pokhara Transmitting Station in terms of the purpose of use and characteristics of the equipment to be renewed, the volume of program production, studio operation time, etc.

In addition, the program send-out switcher (8 inputs/8 outputs), which is used for manual switching of program inputs from Kathmandu Studio, programs produced in Pokhara Studio (2 hours a day), outside broadcasting, etc., according to the program schedule and sending to program input/monitoring equipment will be renewed in Pokhara Studio.

Table 2-2-4: Outline of Studio Facilities after the Project

	Kathmandu Studio Center					Pokhara Studio
Studio Type	Production Studio-1	**Production Studio-2**	**Music Studio**	**SW Studio**	**Announce Studio**	**Continuity Studio**
Studio Floor	72m^2	72m^2	140m^2	24m^2	15m^2	24m^2
Purpose of Use	Production of informational, religious, cultural, sport, entertainment programs, etc.	Production of educational programs for adults (science & technology, human right education, remote education, public awareness), programs for children, etc.	Production of music programs (classic music, traditional music, modern music, folk songs in various local languages), musical programs, etc.	Production of SW broadcasting programs (programs for the inhabitants of mountainous area)	Live broadcasting of news, informational programs, etc.	Live broadcasting of news, informational programs, etc.
	Live broadcasting and recording of audience participation programs (phone-in)	Live broadcasting and recording of audience participation programs (phone-in)	Live broadcasting of classic music (2 hours) (twice a year)	Live broadcasting of news in Sherpa and Urdu languages and programs for the inhabitants of mountainous area (2 hours/day)	Live broadcasting of audience participation programs (phone-in)	Live broadcasting of audience participation programs (phone-in)
	Editing and dubbing of programs	Editing and dubbing of programs	Editing and dubbing of programs	Editing and dubbing of recorded programs		Editing and dubbing of programs
Function of Equipment to be Renewed	Original studio functions will be maintained	Original studio functions will be maintained	Original studio functions will be maintained	Original studio functions will be maintained	Original studio functions will be maintained	Original studio functions will be maintained
	Considering live broadcasting, audio mixer will be an analog type (stereo) with 12 inputs, similarly to the existing equipment.	Considering live broadcasting, audio mixer will be an analog type (stereo) with 12 inputs, similarly to the existing equipment.	Because music programs are produced mainly in this studio, audio mixer will be a digital type (stereo) that can flexibly perform multiple recording, editing, etc. The number of inputs will be 24, similarly to the existing equipment.	Considering live broadcasting, audio mixer will be an analog type (stereo) with 12 inputs, similarly to the existing equipment.	Considering live broadcasting, audio mixer will be an analog type (stereo) with 12 inputs, similarly to the existing equipment.	Considering live broadcasting, audio mixer will be an analog type (stereo) with 12 inputs, similarly to the existing equipment.
	Audio media will be changed to cassette tape recorder, CD player, and audio recorder (1 set each).	Audio media will be changed to cassette tape recorder, CD player, and audio recorder (1 set each).	Audio media will be changed to cassette tape recorder, CD player, and audio recorder (1 set each).	Audio media will be changed to cassette tape recorder, CD player, and audio recorder (1 set each).	Audio media will be changed to cassette tape recorder, CD player (1 set each). 2 sets of audio recorder will be procured to deal with unexpected accidents during live broadcasting.	Audio media will be changed to cassette tape recorder, CD player, and audio recorder (1 set each).
	2CH telephone hybrid for interactive participation of audience will be procured.	2CH telephone hybrid for interactive participation of audience will be procured.			2CH telephone hybrid for interactive participation of audience will be procured.	2CH telephone hybrid for interactive participation of audience will be procured.
	Digital audio workstation will be introduced to facilitate efficient program recording, editing, and library of program.	Digital audio workstation will be introduced to facilitate efficient program recording, editing, and library of program.	Digital audio workstation will be introduced to facilitate efficient program recording, editing, and library of program.	Existing digital audio workstation will be used in succession.		Digital audio workstation will be introduced to facilitate efficient program recording, editing, and library of program.
	Audio effector with echo, compression, limiter, and other functions will be renewed.	Audio effector with echo, compression, limiter, and other functions will be renewed.	Audio effector with echo, compression, limiter, and other functions will be renewed.	Audio effector with echo, compression, limiter, and other functions will be renewed.	Audio effector with echo, compression, limiter, and other functions will be renewed.	Audio effector with echo, compression, limiter, and other functions will be renewed.
	Announcer cough box will be renewed.	Announcer cough box will be renewed.	Fold back system for instrument players will be added.	Announcer cough box will be renewed.	Announcer cough box will be renewed.	Announcer cough box will be renewed.
	Signals for program production within studio will be analog, and those sent to and from Master Control Room and other studios will be converted to digital signals by A/D converters to prevent transmission deterioration of signals.	Signals for program production within studio will be analog, and those sent to and from Master Control Room and other studios will be converted to digital signals by A/D converters to prevent transmission deterioration of signals.	Signals for program production within studio will be analog, and those sent to and from Master Control Room and other studios will be digital signals (mixer input/output) to prevent transmission deterioration of signals.	Signals for program production within studio will be analog, and those sent to and from Master Control Room and other studios will be converted to digital signals by A/D converters to prevent transmission deterioration of signals.	Signals for program production within studio will be analog, and those sent to and from Master Control Room and other studios will be converted to digital signals by A/D converters to prevent transmission deterioration of signals.	Analog signals will be used within the studio.
Number of Programs Produced	8.25 programs/day	10 programs/day	300 programs/year	6 programs/day	145 minutes newscasting/day	
Studio Operation hour	11.5 hours/day	11 hours/day	110 hours/month	7 hours/day	17 hours/day	2 hours/day (live)

3) Equipment for Master Control Room of Kathmandu Studio Center

Master control system will be renewed. Similarly to existing system, this system will be able to receive programs from studios, outside locations, and other broadcasting stations; send programs to transmitting stations according to the program schedule; and monitor the audio quality of broadcast programs and broadcasting conditions. The existing VSAT system for distributing programs to each transmitting station will be used in succession. The master control system will consist of the following components:

(a) Program Send out Switcher

The program send out switcher, which sends programs at the planned time on the planned day of the week according to the broadcast program schedule will be renewed. Similarly to existing equipment, an analog switcher will be adopted. However, its control will be digital control using the APS described below to prevent accidents of interruption of broadcasting, which were caused frequently by manual switching. The send out switcher will have 16 inputs and 16 outputs. The monitor switcher (8 inputs / 1 output) to check send out programs also will be procured.

(b) Automatic Program Control System (APS)

RNE is striving for improving efficiency in sending of programs to cope with the diversification of programs including news and other live programs, dramas, informational programs, talk shows, etc. Although RNE is currently using demonstration software (random purchase of specific applications) on a trial basis for the purpose of staff training, it has not established the methods for systematic operation of program organization, program recording, program registration, automatic sending, library recording, etc. The automatic program control system (APS) will be introduced to support diversification of programs and improvement of efficiency.

APS should have the functions such as capable of programming, registration, and sending for systematic operation.

(c) Program Distribution Equipment

Signal distribution, convert and control equipment needed for the processing of audio signals for the compensation of characteristics, level adjustment, and distribution of the analog and digital audio signals of programs produced in the studios and those sent from outside, convert analog signals to digital (A/D converter) and convert digital signals to analog (D/A converter), etc will be renewed.

(d) Radio Wave Monitoring Equipment

All-wave receivers to monitor the radio broadcast wave of Bhainsepati Transmitting Station and Khumaltar Transmitting Station will be renewed. While the existing equipment consists of 2 sets of receivers, only one that has become out of order due to aging will be renewed.

(e) Program Monitoring Equipment

The existing monitor speaker installed in each room for the purpose of monitoring broadcast programs and the existing long-time recording equipment for continuous recording of all broadcast programs, which is the responsibility of a broadcasting station, will be used in succession.

(f) Clock System

The existing clock system (quartz oscillation type) has become uncontrollable due to lightning damage, and the clocks in various rooms are not synchronized. The clock system will be renewed, because synchronization of the clocks in all studios is necessary for appropriate program production and sending. The master clock will be installed in the Master Control Room, and the standard signals of accurate time will be sent from this clock to the slave clocks in the studios. Unlike the existing clock system using thermostat-controlled quartz oscillator, the new system will be based on GPS-calibrated quartz oscillation utilizing the synchronization of time between the high-precision standard at the ground base and GPS satellites. Similarly to the present system, the time tone signals will use Japanese style tones. Slave clocks will be installed at the following locations:

- Production Studio-1, Production Studio-2, Music Studio, SW Studio, Master Control Room: 2 sets each.
- Media Convert Room, Dressing Room, Reception Counter, Program Censorship Room: 1 set each.

(g) Room-to-Room Interphone Equipment

To facilitate the series of tasks from program production to sending out, the room-to-room interphone system will be renewed and improved. Similarly to existing equipment, a 4-wire system will be adopted. Interphone terminals will be installed in Production Studio-1, Production Studio-2, Music Studio, SW Studio, Press Room (separate building), News Room (separate building), Old Studio Master Room (separate building), Power Room, Building Equipment Room, Media Convert Room, Maintenance Room, Dressing Room,

Program Censorship Room, Library, and Reception Counter: 15 locations in total.

(h) Measuring Equipment

Existing measuring equipment will be used in succession. However, a spectrum analyzer will be procured for the maintenance of the VSAT system, which is the program distribution mechanism via satellite developed independently by RNE for the purpose of sending programs from Kathmandu Studio Center to each transmitting station.

4) Media Convert System for Kathmandu Studio Center

The more than 60,000 programs recorded on cartridge tapes or open-reel tapes and stored in the library need to be converted to new media. CD-R is the most appropriate format for this purpose, considering the storage of programs that will be produced in the future and cost effectiveness. While CD recorders are going out of production, a computer with a CD-R/W drive will be procured and broadcast programs will be loaded into the computer. This system will facilitate the library of digitized program and the preparing and searching of library data base, helping efficient utilization of programs including secondary use. Production of CDs for playback will also be simplified.

5) Outdoor Recording Equipment for Kathmandu Studio Center

As for outdoor recording equipment, the use of the existing equipment in outdoor broadcasting vans will be continued. During the period of this field survey for basic design, a state of emergency was declared and domestic and international telephone lines failed for about a week. The only available means of telecommunication in this period was satellite telephones owned by the Embassy of Japan and JICA Kathmandu office. All telephones used by RNE were cut off, and broadcasting was continued in a state of confusion. Although RNE personnel are dispatched to the sites of disasters, riots, etc., it is impossible to report the incidents from locations lacking telephone services. To support the ability of RNE to continue broadcasting under any circumstances as the national broadcasting station, emergency outdoor recording equipment including microphones, IC recorders, transceivers, and satellite telephones will be procured.

6) Program Censorship Equipment for Kathmandu Studio Center

RNE has a program censorship department, which is required to conduct prior censorship to ensure that programs have been produced according to the broadcasting policies of Nepal and do not contain banned words or inappropriate contents. While this procedure has been conducted using open real tape recorders and cassette tape recorders, CD players and audio recorders will be procured because the produced programs will be recorded in semiconductor memory cards and

CDs.

7) Local Area Network in Kathmandu Studio Center (Introduction of LAN)

The efficiency of the tasks of program recording, packaging, sending, archiving, etc. will be improved in terms of time, management, and cost by the use of data recording media. The effectiveness will further enhanced by networking among studios and Master Control Room to facilitate data exchange of programs, materials, etc. Because the equipment planned to be procured will have network interfaces as standard features, such networking can be realized simply by installing LAN cables and switching hubs. Audio programs with narrow bandwidth can be exchanged easily over a 100Base/T (transmission speed 12.5 Mbyt/sec) system. The exchange of programs among studios and Master Control Room over a network to improve the efficiency in terms of time, cost, and management will be realized by the Project.

8) Uninterrupted Power Supply (UPS)

To protect the clock system, an APS and a DAW, etc. using computers from the damage due to power failure, small-scale UPS units (1kVA to 2kVA) will be procured for the studios and Master Control Room of Kathmandu Studio Center and the Continuity Studio in Pokhara Transmitting Station respectively.

(4) Spare Parts

To ensure the smooth continuous execution of maintenance services, the availability of the spare parts for the equipment procured in this Project must be guaranteed for at least 10 years.

1) Principles Concerning Spare Parts

The following principles will be adopted in the selection of spare parts:

- Spare parts which can be replaced easily by RNE personnel must be procured.
- Priority will be given to the procurement of items requiring periodical replacement due to mechanical wear, such as relays, select switches, magnetic heads, revolving parts, faders, and variable resistors.
- Certain spare parts, mainly including circuit boards and modules used in major equipment, will be procured so that operation would not be impeded for at least 1 year after completion of the Project.

2) Spare Parts for Transmitters

Transmitters to be procured should possess redundant systems. Any failure will be addressed by

the use of standby modules, and no new standby transmitters will be procured. Major spare parts are as follows:

(a) Power Amplification Stage

The acceptable limit is defined as 90% of the transmitter output power, and the difference from the number of power amplification modules operating during transmission at rated output power will be procured as standby modules.

(b) Modules used in Exciter stage

Because modules used in exciter stage of transmitters usually do not have redundant systems, 1 module each of A/D converter, modulation encoder, high-frequency driver, and transmitter controller will be supplied as the standby modules to be used at the time of failure.

(c) Expendable Supplies

Fuses, fans, filters, transistors, etc. will be procured. A knife and knife receivers (3 sets, 12 pieces) for existing output exchanger will be procured.

3) Standby Equipment and Spare Parts for Studio Equipment

(a) Supply of Standby Equipment

Because the studio equipment covered by this Project will be procured in minimal quantities, 1 set each of CD player, cassette tape recorder, and audio recorder will be procured as standby equipment to be used at the time of failure.

(b) Audio Mixer

Faders, select switches, variable resistors, etc. will be procured as the spare parts for audio mixers.

(c) IC Memory (256MB)

One 256 MB of IC memory can record approximately 120 minutes of audio program. Assuming that the recording hour in each studio is 6 hours a day in average, each studio will need 3 memory cards for recording, 3 for editing, and 3 for sending out: 9 IC memory cards in total. Therefore, 50 IC memory cards in total: 45 IC memory cards will be procured for 5 studios plus 5 spare cards (1 for each studio).

(d) CD-R

The 60,000 open-reel tapes and cartridge tapes (30 minutes each) stored in the library need to be converted on CDs. CDs in quantities needed for this purpose will be procured. While a CD-R can normally store 70 minutes of programs, the use of compression technology enables the recording of about 5 times as much programs (350 minutes).

Therefore, each CD-R can store 11 programs, and about 5,500 CD-Rs are sufficient for the conversion and recording of all open-reel tapes and cartridge tapes in the library.

(e) Other Spare Parts

As for other spare parts, fuses, power supply modules, fans, general-use connectors (BNC, XLR, TRS), switches, etc. will be procured.

(5) Coverage Area of medium wave broadcasting service

The following are a predicted current population coverage on the basis of the actual field intensities of each medium wave transmitting station measured during site survey and the basis of operation data of each transmitter confirmed at the site survey; and a predicted future population coverage after completion of this Project. (The coverage area is defined as the area with more than 60dBμV/m in field intensity. The total population of Nepal is set at 24.74million according to the Nepal Census Indicator of the year 2003/04.)

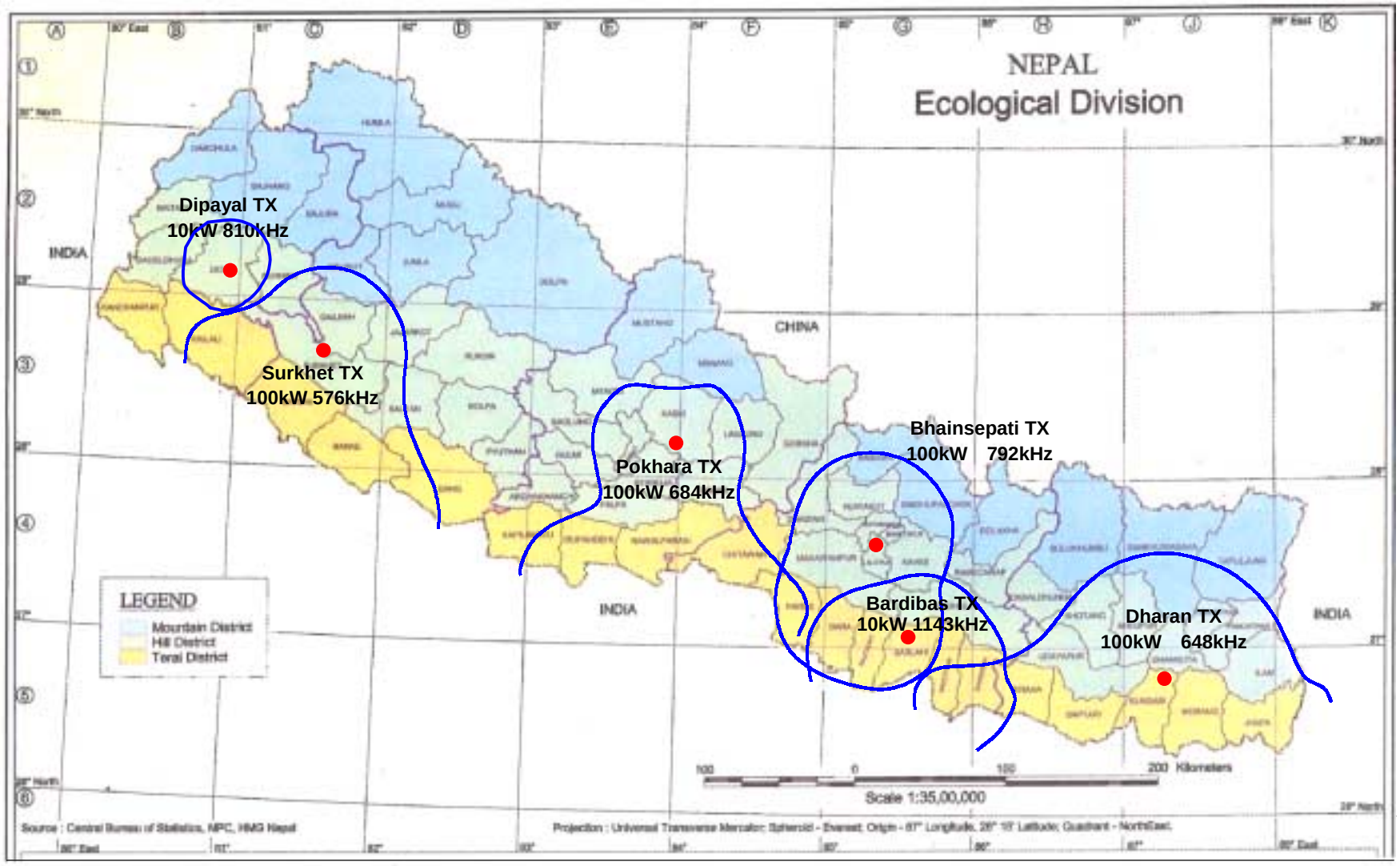
- Predicted current population coverage:

  Approximately 48% of the Nepalese population (Beneficial population: approximately 11.87million)

- Predicted future population coverage after completion of this Project: (refer to Fig. 2-2-2)
  Approximately 75% of the Nepalese population (Beneficial population: approximately 18.55million)

It is assumed that implementation of this Project expands beneficial population who will enjoy medium wave broadcasting service by 27% (about 6.68million people) by enlarging the coverage area currently having got smaller because of deterioration of existing transmitting facilities.

Fig. 2-2-2: Expected MW Broadcasting Services Area (After the Project)



(6) List of Planned Equipment

Table 2-2-5 shows the list of the planned equipment for SW and MW transmitting stations and Table 2-2-6 shows the list of studio equipment for Kathmandu Studio Center and the Continuity Studio in Pokhara Transmitting Station.

Table 2-2-5: List of SW & MW Transmitting Equipment

No.	Equipment Name	Description	Grade	Q'ty	Remark
1. Khumaltar SW Transmitting Station					
(1)	Vacuum Tubes for 100kW SW Transmitter	Type: 4CV50000E for PA	Broadcast	6 pcs	SW-100A TX
(2)	Vacuum Tubes for 100kW SW Transmitter	Type: 4CX1500A for Exciter	Broadcast	4 pcs	SW-100A TX
2. Bhainsepati 100kW MW Transmitting Station					
(1)	100kW MW Radio Transmitter	Solid State Type Digital Modulation, air forced cooling system	Broadcast	1 set	792kHz
(2)	Lightning Protector	50Ωinput/50Ωoutput	Broadcast	1 set	
(3)	Isolation Transformer	250kVA with lightning protection	Broadcast	1 set	
(4)	Indoor Feeder Cable	120D type Coaxial Cable (50Ω), 10m	Broadcast	1 set	TX ~existing Output Exchanger
(5)	Program Input/Monitoring Equipment				
	Audio Processor	0~10dB Adjustable, compression ratio 1/10 1/30 variable	Broadcast	2 sets	1: existing to be used
	Input Select Switcher	4 inputs, 1 output	Broadcast	1 set	
	Monitor Speaker	12 inputs monitor	Broadcast	1 set	
	Monitor Amplifier		Broadcast	1 set	
	TX Monitor Panel	TX Output power, Failure detection	Broadcast	1 set	
	Operation Panel	TX Control, Alarm	Broadcast	1 set	
	Audio Jack Panel		Broadcast	1 set	
	Modulation Detector	Amplitude Modulation Ratio 0~100%	Broadcast	1 set	MW Band
	Audio Jack Panel		Broadcast	1 set	
	CD Player	2ch analog /1ch digital outputs	Professional	1 set	for emergency
	Rack Assembly	EIA size, with Power Supply	Professional	1 set	
(6)	Measuring Equipment				
	Distortion Meter	Audio Level, Distortion, Oscillator	Broadcast	1 set	
	Oscilloscope	100MHz, 2CH, 2mV~100V	Broadcast	1 set	
	Audio Attenuator	Audio Band	Broadcast	1 set	
	Frequency Meter	10Hz ~600MHz	Broadcast	1 set	
	Rack Assembly	EIA size, with Power Supply	Broadcast	1 set	
(7)	All Band Receiver	AM/FM/SW	Professional	1 set	
(8)	Interphone System	2 wire system, 10 Terminals	Broadcast	1 set	
(9)	Spare Parts/module & Accessories	Including Knife & Knife Receiver	Broadcast	1 lot	For existing Output exchanger
(10)	Vacuum Tube	Type: 4CX5000R for existing 10kW TX	Broadcast	4 pcs	
(11)	Installation Materials			1 lot	
3. Pokhara 100kW MW Transmitting Station					
(1)	100kW MW Radio Transmitter	Solid State Type Digital Modulation, air forced cooling system	Broadcast	1 set	684kHz
(2)	Lightning Protector	50Ωinput/50Ωoutput	Broadcast	1 set	
(3)	Isolation	250kVA with lightning protection	Broadcast	1 set	

No.	Equipment Name	Description	Grade	Q'ty	Remark
(4)	Indoor Feeder Cable	120D type Coaxial Cable (50Ω), 10m	Broadcast	1 set	TX ~ existing output Exchanger
(5)	Program Input/Monitoring Equipment				
	Audio Processor	0~10dB Adjustable, compression ratio 1/10 ~ 1/30 variable	Broadcast	2 sets	1: existing
	Input Select Switcher	2 inputs, 1 output	Broadcast	1 set	
	Monitor Speaker	10 inputs monitor	Broadcast	1 set	
	Monitor Amplifier		Broadcast	1 set	
	TX Monitor Panel	TX Output power, Failure detection	Broadcast	1 set	
	Operation Panel	TX Control, Alarm	Broadcast	1 set	
	Modulation Detector	Amplitude Modulation Ratio 0~100%	Broadcast	1 set	MW Band
	Audio Jack Panel		Broadcast	1 set	
	CD Player	2ch analog /1ch digital outputs	Professional	1 set	for emergency
	Rack Assembly	EIA size, with Power Supply	Broadcast	1 set	
(6)	Measuring Equipment				
	Distortion Meter	Audio Level, Distortion, Oscillator	Broadcast	1 set	
	Oscilloscope	100MHz, 2CH, 2mV~100V	Broadcast	1 set	
	Audio Attenuator	Audio Band	Broadcast	1 set	
	Frequency Meter	10Hz ~600MHz	Broadcast	1 set	
	Rack Assembly	EIA size, with Power Supply	Professional	1 set	
(7)	All Band Receiver	AM/MW/SW	Professional	1 set	
(8)	Interphone System	2 wire system, 9 Terminals	Broadcast	1 set	
(9)	Spare Parts/module & Accessories	Including Knife & Knife Receiver	Broadcast	1 lot	For existing Output Exchanger
(10)	Vacuum Tube	Type: 4CX5000R for existing 10kW TX	Broadcast	4 pcs	
(11)	Installation Materials			1 lot	
4. Bardibas 10kW MW Transmitting Station					
(1)	10kW MW Radio Transmitter	Solid State Type Digital Modulation, air forced cooling system	Broadcast	1 set	1143kHz
(2)	10kW Dummy Load		Broadcast	1 set	
(3)	Output Exchanger	2 inputs: 10kW Transmitter (Main, Stand-by) 2 outputs: Antenna and Dummy Load	Broadcast	1 set	
(4)	Lightning Protector	50Ωinput/230Ωoutput	Broadcast	1 set	
(5)	Isolation Transformer	30kVA	Broadcast	1 set	
(6)	Indoor Feeder Cable	Square type Aluminum Cable (230Ω), 6m	Broadcast	1 set	TX ~ Output Exchanger
(7)	Program Input/Monitoring Equipment				
	Audio Processor	0~10dB Adjustable, compression ratio 1/10 ~ 1/30 variable	Broadcast	2 sets	
	Input Select Switcher	3 inputs, 1 output	Broadcast	1 set	
	Monitor Speaker	11 inputs monitor	Broadcast	1 set	
	Monitor Amplifier		Broadcast	1 set	
	TX Monitor Panel	TX Output power, Failure	Broadcast	1 set	
	Operation Panel	TX Control, Alarm	Broadcast	1 set	
	Modulation Detector	Amplitude Modulation Ratio 0~100%	Broadcast	1 set	MW Band
	Audio Jack Panel		Broadcast	1 set	
	CD Player	2ch analog /1ch digital outputs	Professional	1 set	for emergency
	Rack Assembly	EIA size, with Power Supply	Professional	1 set	
(8)	Measuring Equipment				
	Distortion Meter	Audio Level, Distortion, Oscillator	Broadcast	1 set	
	Oscilloscope	100MHz, 2CH, 2mV~100V 150mm, 2CH	Broadcast	1 set	
	Audio Attenuator	Audio Band	Broadcast	1 set	
	Frequency Meter	10Hz ~600MHz	Broadcast	1 set	

No.	Equipment Name	Description	Grade	Q'ty	Remark
	Rack Assembly	EIA size, with Power Supply	Broadcast	1 set	
(9)	All Band Receiver	AM/FM/SW	Professional	1 set	
(10)	SSB Transceiver	25W	Broadcast	1 set	Communication
(11)	Interphone System	2 wire system, 5Terminals	Broadcast	1 set	
(12)	Spare Parts/Module & Accessories		Broadcast	1 lot	
(13)	Vacuum Tube	Type: 4CX5000R for existing 10kW TX	Broadcast	4 pcs	
(14)	Installation Materials			1 lot	
5. Dharan 100kW MW Transmitting Station					
(1)	Vacuum Tube	Type: 4CX35000C for existing 100kW TX	Broadcast	8 pcs	
(2)	Vacuum Tube	Type: 4CX5000R for existing 10kW TX	Broadcast	4 pcs	
6. Surkhet 100kW MW Transmitting Station					
(1)	Vacuum Tube	Type: 4CX35000C for existing 100kW TX	Broadcast	8 pcs	
(2)	Vacuum Tube	Type: 4CX5000R for existing 10kW TX	Broadcast	4 pcs	
7. Dipayal 10kW MW Transmitting Station					
(1)	Vacuum Tube	Type: 4CX5000R for existing 10kW TX	Broadcast	8 pcs	

Table 2-2-6: List of the Studio Equipment

No.	Equipment Name	Description	Grade	Q'ty	Remark
1. Kathmandu Studio Center					
(1) Production Studio-1					
(a)	Sub Control Room				
1)	12CH Analog Audio Mixer	Input 8mono /4stereo Output 4stereo 3mono	Broadcast	1 set	Redundant Power Supply
2)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	1 set	Remote control function
3)	Cassette Tape Recorder	2ch stereo INPUTS/OUTPUTS	Broadcast	1 set	Remote Control
4)	CD Player	2ch analog /1ch digital outputs	Professional	1 set	with Remote Control
5)	Digital Audio Work Station	General purpose computer, Window XP, CD/RW 160G HDD, 17"LCD	Professional	1 set	with Speaker
6)	Audio Effecter	analog and AES/EBU input analog and AES/EBU output	Professional	1 set	
7)	A/D Converter	2×2analog inputs, 2AES/EBU output	Broadcast	1 set	
8)	D/A Converter	2 AES/EBU, 2×2analog outputs	Broadcast	1 set	
9)	Digital Audio Distribution Amplifier (DDA)	1input, 4outputs	Broadcast	1 set	
10)	Analog Audio Distribution Amplifier (ADA)	1input, 4outpurs	Broadcast	1 set	
11)	Time Code Distribution Amplifier (TDA)	1input,4outpurs	Broadcast	1 set	
12)	Frame for 7) ~ 11)	Redundant Power supplies	Broadcast	1 set	
13)	Telephone Hybrid	2ch Digital hybrid	Broadcast	1 set	
14)	Bantam Patch Panel	Bantam 48points	Broadcast	1 set	For Analog audio
15)	Bantam Cable	0.3/0.6/0.9m	Broadcast	1 set	10sets each
16)	Patch Panel	WE Patch 26Points	Broadcast	1 set	For Digital audio
17)	Patch Cable	0.3/0.5/1.0m	Broadcast	1 set	5sets each
18)	Monitor Speaker	Powered Monitor, 60W, 50-20kHz	Broadcast	1 pair	
19)	Headphone	Dynamic type	Broadcast	2 sets	
20)	CN Plate	EIA	Broadcast	1 set	
21)	8 Port HUB	100B/T 8 Ports	Professional	1 set	
22)	UPS	1kVA	Professional	1 set	
23)	System Rack	EIA size, with Power Supply	Broadcast	1 set	
24)	Console	EIA size, with Power Supply	Broadcast	1 set	
25)	On-Air Tally Logic	REC/STBY/OA	Broadcast	1 set	
26)	On-Air Tally panel (On-Air)	LED type	Broadcast	4 sets	
27)	On-Air Tally panel (Stand-by)	LED type	Broadcast	1 set	
28)	Chair			2 sets	
(b)	Studio Floor				
1)	Announcer Cough Box	T-bar Fader Phantom power QUE/ON-AIR Tally	Broadcast	1 set	
2)	Condenser Microphone	Unidirectional, 20-20kHz, Maximum 140dB.S.P.L	Broadcast	1 set	for Talk
3)	Condenser Microphone	Unidirectional 30-20kHz, Maximum 137dB.S.P.L	Broadcast	3 sets	for Music Instruments
4)	Microphone Cable	L4E20/10/5m	Broadcast	1 set	4sets each
5)	Microphone Stand	Boom Stand	Professional	4 sets	

No.	Equipment Name	Description	Grade	Q'ty	Remark
6)	Talk Back Speaker	Powered Monitor 60W, 60-20kHz	Broadcast	1 pair	
7)	CN Plate	W262×H120mm	Broadcast	7sets	
8)	Announcer Table	Re-cover of Table cloth	professional	1 set	Existing to be used
(2) Production Studio-2					
(a) Sub Control Room					
1)	12CH Analog Audio Mixer	Input 8mono /4stereo Output 4stereo 3mono	Broadcast	1 set	Redundant Power Supply
2)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	1 set	Remote Control function
3)	Cassette Tape Recorder	2ch stereo INPUTS/OUTPUTS	Broadcast	1 set	with Remote Control
4)	CD Player	2ch analog /1ch digital outputs	Professional	1 set	with Remote Control
5)	Digital Audio Workstation	General purpose computer Window XP, CD/RW 160G HDD, 17"LCD	Professional	1 set	with Speaker
6)	Audio Effecter	analog and AES/EBU input analog and AES/EBU output	Professional	1 set	
7)	A/D Converter	2×2analog inputs 2 AES/EBU output	Broadcast	1 set	
8)	D/A Converter	2 AES/EBU input 2x2analog outputs	Broadcast	1 set	
9)	Digital Audio Distribution Amplifier (DDA)	1input 4outputs	Broadcast	1 set	
10)	Analog Audio Distribution Amplifier (ADA)	1input 4outpurs	Broadcast	1 set	
11)	Time Code Distribution Amplifier (TDA)	1input 4outpurs	Broadcast	1 set	
12)	Frame for 7) ~ 11)	Redundant Power supplies	Broadcast	1 set	
13)	Telephone Hybrid	2ch Digital hybrid	Broadcast	1 set	
14)	Bantam Patch Panel	Bantam 48points	Broadcast	1 set	for Analog Audio
15)	Bantam Cable	0.3/0.6/0.9m	Broadcast	1 set	10sets each
16)	Patch Panel	WE Patch 26Points	Broadcast	1 set	for Digital Audio
17)	Patch Cable	0.3/0.5/1.0m	Broadcast	1 set	5 sets each
18)	Monitor Speaker	Powered Monitor 60W, 50-20kHz	Broadcast	1 pair	
19)	Headphone	Dynamic type	Broadcast	2 sets	
20)	CN Plate	EIA	Broadcast	1 set	
21)	8 Port HUB	100B/T 8 Ports	Professional	1 set	
22)	UPS	1kVA	Professional	1 set	
23)	System Rack	EIA size, with Power Supply	Broadcast	1 set	
24)	Console	EIA size, with Power Supply	Broadcast	1 set	
25)	On-Air Tally Logic	REC/STBY/OA out	Broadcast	1 set	
26)	On-Air Tally panel (On-Air)	LED type	Broadcast	4 sets	
27)	On-Air Tally panel (Stand-by)	LED type	Broadcast	1 set	
28)	Chair		General	2 sets	
(b) Studio Floor					
1)	Announcer Cough Box	T-bar Fader Phantom power QUE/ON-AIR Tally	Broadcast	1 set	
2)	Condenser Microphone	Unidirectional, 20-20kHz, Maximum 140dB.S.P.L	Broadcast	1 set	for Talk
3)	Condenser Microphone	Unidirectional 30-20kHz, Maximum 137dB.S.P.L	Broadcast	3 sets	for Music Instruments

No.	Equipment Name	Description	Grade	Q'ty	Remark
4)	Microphone Cable	L4E 20/10/5m	Broadcast	1 set	4sets each
5)	Microphone Stand	Boom Stand	Professional	4 sets	
6)	CN Plate	W262×H120mm	Broadcast	7 sets	
7)	Talk Back Speaker	Powered Monitor 60W, 60-20kHz	Broadcast	1 pair	
8)	Announcer Table	Re-cover of Table Cloth	Professional	1 set	Existing to be used
(3) Music Studio System					
(a) Sub Control Room					
1)	24CH Digital Audio Mixer	Input 24ch analog 2digital Output 12analog 2digital	Professional	1 set	
2)	IEEE1394 Interface		Professional	1 set	for DAW
3)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	1 set	Remote Control function
4)	Cassette Tape Recorder	2ch stereo INPUTS/OUTPUTS	Broadcast	1 set	with Remote Control
5)	CD Player	2ch analog /1ch digital outputs	Professional	1 set	with Remote Control
6)	Digital Audio Workstation	General purpose computer Window XP, CD/RW 160G HDD, 17"LCD	Professional	1 set	with Speaker
7)	Audio Effecter	analog and AES/EBU input analog and AES/EBU output	Professional	1 set	
8)	Digital Audio Distribution Amplifier (DDA)	1input 4outputs	Broadcast	1 set	
9)	Analog Audio Distribution Amplifier (ADA)	1input 4outpurs	Broadcast	1 set	
10)	Time Code Distribution Amplifier (TDA)	1input 4outpurs	Broadcast	1 set	
11)	Frame for 8) ~ 10)	Redundant Power supplies	Broadcast	1 set	
12)	Bantam Patch Panel	Bantam 48points	Broadcast	1 set	for Analog audio
13)	Bantam Cable	0.3/0.6/0.9m	Broadcast	1 set	10sets each
14)	Patch Panel	WE Patch 26Points	Broadcast	1 set	for Digital audio
15)	Patch Cable	0.3/0.5/1.0m	Broadcast	1 set	5sets each
16)	Monitor Speaker	Powered Monitor 100W, 50-30kHz	Broadcast	1 pair	
17)	Headphone	Dynamic type	Broadcast	2 sets	
18)	CN Plate	EIA	Broadcast	1 set	
19)	8 Port HUB	100B/T 8 Ports	Professional	1 set	
20)	UPS	1kVA	Professional	1 set	
21)	System Rack	EIA size, with Power Supply	Broadcast	1 set	
22)	Console	EIA size, with Power Supply	Broadcast	1 set	
23)	On-Air Tally Logic	REC/STBY/OA	Broadcast	1 set	
24)	On-Air Tally panel (On-Air)	LED type	Broadcast	4 sets	
25)	On-Air Tally panel (Stand-by)	LED type	Broadcast	1 set	
26)	Chair			2 sets	
(b) Studio Floor					
1)	Condenser Microphone	Unidirectional, 20-20kHz, Maximum 140dB.S.P.L	Broadcast	2 sets	for Talk
2)	Condenser Microphone	Unidirectional 30-20kHz, Maximum 137dB.S.P.L	Broadcast	4 sets	for Instruments
3)	Condenser Microphone	Unidirectional 30-20kHz, Maximum 137dB.S.P.L	Broadcast	4 sets	for Vocal
4)	Microphone Cable	L4E20/10/5m	Broadcast	1 set	10sets each
5)	Microphone Stand	Boom Stand	Professional	6 sets	

No.	Equipment Name	Description	Grade	Q'ty	Remark
6)	Microphone Stand	Floor Stand	Professional	2 sets	
7)	Studio Monitor	Powered Monitor 100W, 50-20kHz	Broadcast	1 pair	
8)	Fold Back System	10 outputs with headset	Professional	1 set	
9)	CN Plate	W262×H120mm	Broadcast	13 sets	
10)	8Ch Multi box	8ch, 30m cable with Reel	Broadcast	2 sets	
11)	FB Speaker	Powered Monitor 100W, 50-20kHz	Broadcast	1 pair	
(4) SW Studio System					
(a)	Sub Control Room				
1)	12CH Analog Audio Mixer	Input 8mono /4stereo Output 4stereo 3mono	Broadcast	1 set	Redundant Power Supply
2)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	1 set	Remote Control function
3)	Cassette Tape Recorder	2ch stereo INPUTS/OUTPUTS	Broadcast	1 set	with Remote Control
4)	CD Player	2ch analog /1ch digital output	Professional	1 set	with Remote Control
5)	Audio Effecter	analog and AES/EBU input analog and AES/EBU output	Professional	1 set	
6)	A/D Converter	2x2analog inputs 2 AES/EBU outputs	Broadcast	1 set	
7)	D/A Converter	2 AES/EBU inputs 2x2analog outputs	Broadcast	1 set	
8)	Digital Audio Distribution Amplifier (DDA)	1input 4outputs	Broadcast	1 set	
9)	Analog Audio Distribution Amplifier (ADA)	1input 4outpurs	Broadcast	1 set	
10)	Time Code Distribution Amplifier (TDA)	1input 4outpurs	Broadcast	1 set	
11)	Frame for 6) ~ 10)	Redundant Power supplies	Broadcast	1 set	
12)	Bantam Patch Panel	Bantam 48points	Broadcast	1 set	for Analog audio
13)	Bantam Cable	0.3/0.6/0.9m	Broadcast	1 set	10sets each
14)	Patch Panel	WE Patch 26Points	Broadcast	1 set	for Digital audio
15)	Patch Cable	0.3/0.5/1.0m	Broadcast	1 set	5sets each
16)	Monitor Speaker	Powered Monitor 20W, 65-18kHz	Broadcast	1 pair	
17)	Headphone	Dynamic type	Broadcast	2 sets	
18)	CN Plate	EIA	Broadcast	1 set	
19)	8 Port HUB	100B/T 8 Ports	Professional	1 set	
20)	System Rack	EIA size, with Power Supply	Broadcast	1 set	
21)	Console	EIA size, with Power Supply	Broadcast	1 set	
22)	On-Air Tally Logic	REC/STBY/OA	Broadcast	1 set	
23)	On-Air Tally panel (On-Air)	LED type	Broadcast	4 sets	
24)	On-Air Tally panel (Stand-by)	LED type	Broadcast	1 set	
25)	Chair			2 sets	
(b)	Studio Floor				
1)	Announcer Cough Box	T-bar Fader Phantom power QUE/ON-AIR Tally	Broadcast	1 set	
2)	Condenser Microphone	Unidirectional, 20-20kHz, Maximum 140dB.S.P.L	Broadcast	1 set	
3)	Condenser Microphone	Unidirectional 30-20kHz, Maximum 137dB.S.P.L	Broadcast	1 set	
4)	Microphone Cable	L4E 20/10/5m	Broadcast	1 set	2sets each

No.	Equipment Name	Description	Grade	Q'ty	Remark
5)	Microphone Stand	Boom Stand	Professional	2 sets	
6)	Talk Back Speaker	Powered Monitor 20W 65-18kHz	Broadcast	1 pair	
7)	CN Plate	W262xH120mm	Broadcast	3 sets	
8)	Announcer Table	Re-cover of Table Cloth	Professional	1 set	Existing to be used
(5) Master Control					
(a)	Control Room				
1)	Master Timing Generator System	DARS/LTC/PPS out, Redundant Automatic changeover	Broadcast	1 set	
2)	Master Clock Driver	PPS/LTC driver for Clock, 6GPS outputs	Broadcast	1 set	
3)	GPS Receiver	12 Obiting Satellites, TC&PPS RS232Cout, Timing Accurate to 10ms	Broadcast	1 set	
4)	Analog Clock	TC or PPS input	Broadcast	13sets	
5)	Digital Clock	TC or PPS input	Broadcast	1 set	
6)	UPS	1kVA for clock system	Professional	1 set	
7)	12CH Analog Audio Mixer	Input 8mono /4stereo Output 4stereo 3mono	Broadcast	1 set	Redundant Power Supply
8)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	3 sets	
9)	Cassette Tape Recorder	2ch stereo INPUTS/OUTPUTS	Broadcast	1 set	with Remote Control
10)	CD Player	2ch analog /1ch digital outputs	Professional	1 set	with Remote Control
11)	Automatic Program Control System (APS)	Program Resistor, Search, Send-out function with 17" display	Broadcast	1 set	
12)	Compressor/Limiter	input -20/+4dBm 600Ω Balance	Broadcast	1 set	
13)	Audio Effecter	analog and AES/EBU input analog and AES/EBU output	Professional	1 set	
14)	A/D Converter	2x2analog inputs 2 AES/EBU outputs	Broadcast	1 set	
15)	D/A Converter	2 AES/EBU inputs 2x2analog outputs	Broadcast	1 set	
16)	Analog Audio Distribution Amplifier (ADA)	1input 4outputs	Broadcast	1 set	
17)	Digital Audio Distribution Amplifier (DDA)	1input 4outputs	Broadcast	1 set	
18)	Time Code Distribution Amplifier (TDA)	1input 4outpurs	Broadcast	1 set	
19)	Frame for 14) ~ 18)	Redundant Power supplies	Broadcast	1 set	
20)	Bantam Patch Panel	Bantam 48points	Broadcast	1 set	for Analog audio
21)	Bantam Cable	0.3/0.6/0.9m	Broadcast	1 set	15 sets each
22)	Patch Panel	WE Patch 26Poinsts	Broadcast	1 set	for Digital audio
23)	Patch Cable	0.3/0.5/1.0m	Broadcast	1 set	10 sets each
24)	Program send-out switcher	16×16 Stereo Matrix	Broadcast	1 set	
25)	Monitor Switcher	8×1 Stereo Switcher	Broadcast	1 set	
26)	8 Port HUB	100B/T 8 Ports	Professional	1 set	
27)	UPS	2kVA for studio system	Professional	1 set	
28)	System Rack	EIA size, with Power Supply	Broadcast	1 set	
29)	VU Meter	600/10k, -20/0/+4dBm input	Broadcast	1 set	
30)	Telephone Hybrid	2ch Digital hybrid	Broadcast	1 set	
31)	All Band Receiver	AM/FM/SW	Professional	1 set	with Antenna
32)	Monitor Speaker	Powered Monitor 60W, 50-20kHz	Broadcast	1 pair	For sub-control
33)	Monitor Speaker	Powered Monitor 60W, 50-20kHz	Broadcast	1 pair	For master
34)	Headphone	Dynamic type	Broadcast	2 sets	
35)	On-Air Tally Logic	REC/STBY/OA	Broadcast	1 set	

No.	Equipment Name	Description	Grade	Q'ty	Remark
36)	On-Air Tally panel (On-Air)	W390xH150x120mm	Broadcast	4 sets	
37)	CN Plate	EIA	Broadcast	1 set	
38)	Console	EIA size, with Power Supply	Broadcast	1 set	
39)	Room to Room Intercom	4wire system, 15 Terminals	Broadcast	1 set	
40)	UPS	1kVA for Interphone system	Professional	1 set	
41)	Chair			2 sets	
(b)	Studio Floor				
1)	Announcer Cough Box	T-bar Fader Phantom power QUE/ON-AIR Tally	Broadcast	1 set	
2)	Condenser Microphone	Unidirectional, 20-20kHz, Maximum 140dB.S.P.L	Broadcast	1 set	
3)	Condenser Microphone	Unidirectional 30-20kHz, Maximum 137dB.S.P.L	Broadcast	1 set	
4)	Microphone Stand	Boom Stand	Professional	2 sets	
5)	Microphone Cable	L4E 20/10/5m	Broadcast	1 set	2sets each
6)	Talk Back Speaker	Powered Monitor 20W, 65-18kHz	Broadcast	1 pair	
7)	CN Plate	W262xH120mm	Broadcast	3 sets	
8)	Announcer Table	Re-cover of Table Cloth	Professional	1 set	Existing to be used
(6)	**Media Convert System**				
1)	Digital Audio Workstation	General purpose computer Window XP, CD/RW 160G HDD, 17"LCD	Professional	1 set	with Speaker
2)	Cassette Tape Recorder	2ch stereo INPUTS/OUTPUTS	Broadcast	1 set	
3)	CD Player	2ch analog /1ch digital outputs	Professional	1 set	
4)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	1 set	
5)	Monitor Speaker	Powered Monitor 10W, 80-13kHz	Broadcast	1 pair	
6)	Headphone	Dynamic type	Broadcast	1 set	
7)	Chair			1 set	
(7)	**Outdoor Recording Equipment**				
1)	Portable IC recorder	24bit A/D D/A, Recording time: 60min. or more	Professional	2 sets	with Carrying Case
2)	Dynamic Microphone	Unidirectional Sensitivity -55dB	Professional	2 sets	
3)	Headphone	Dynamic type	Broadcast	2 sets	
4)	Battery	Nickel metal-hydride Type	Professional	2 sets	
5)	Battery Charger for the above		Professional	2 sets	
6)	Satellite Telephone (RX/TX)	Inmarsat Satellite, with external Antenna	Professional	1 set	
7)	VHF Transceiver	159.0MHz, Output Power: 5W	Broadcast	5 sets	
(8)	**Program Censorship Room**				
1)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	1 set	
2)	CD Player	2CH analog/1CH digital outputs	Professional	1 set	
3)	Monitor Speaker	Powered Monitor 10W, 80-13kHz	Broadcast	1 set	
4)	Simple Source Selector	2 Input, 1Output, Phone Output	Professional	1 set	
5)	Headphone	Dynamic type	Broadcast	1 sets	
(9)	**Maintenance Tool & Spare Parts**				
1)	Spectrum Analyzer	C Band	Professional	1 set	
2)	Monitor Speaker	Powered Monitor 10W, 80-13kHz	Broadcast	1 pair	

No.	Equipment Name	Description	Grade	Q'ty	Remark
3)	Audio Checker	2ch, XLR in, XLR/TRS out, 1kHz tone	Professional	1 set	
4)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	1 set	
5)	Cassette Tape Recorder	2ch stereo INPUT/OUTPUT	Broadcast	1 set	with Remote Control
6)	CD Player	2ch analog /1ch digital outputs	Professional	1 set	with Remote Control
7)	CD-R		Professional	5500pcs	
8)	IC memory (256M)		Professional	50 pcs	
9)	Spare Parts			1 lot	
10)	Instillation Materials			1 lot	
2. Pokhara Transmitting Station					
(1) Continuity Studio					
(a) Sub Control Room					
1)	12CH Analog Audio Mixer	Input 8mono /4stereo Output 4stereo 3mono	Broadcast	1 set	Redundant Power Supply
2)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	1 set	Remote Control function
3)	Cassette Tape Recorder	2ch stereo INPUTS/OUTPUTS	Broadcast	1 set	with Remote Control
4)	CD Player	2ch analog /1ch digital outputs	Professional	1 set	with Remote Control
5)	Digital Audio Workstation	Intel 2GHz Window XP, CD/RW 160G HDD, 17"LCD	Professional	1 set	with Speaker
6)	Audio Effecter	analog and AES/EBU input analog and AES/EBU output	Professional	1 set	
7)	VU Meter	600/10k, -20/0/+4dBm input	Broadcast	1 set	
8)	Analog Audio Distribution Amplifier (ADA)	1input 4outputs	Broadcast	7 sets	
9)	Frame for the above ADA	Redundant Power supplies	Broadcast	1 set	
10)	Telephone Hybrid	2ch Digital hybrid	Broadcast	1 set	
11)	Bantam Patch	Bantam 48point	Broadcast	1 set	
12)	Bantam Cable Panel	0.3/0.6/0.9m	Broadcast	1 set	10sets each
13)	Monitor Speaker	Powered Monitor 60W 50-20kHz	Broadcast	1 pair	For sub-control
14)	Monitor Speaker	Powered Monitor 60W 50-20kHz	Broadcast	1 pair	For master
15)	Headphone	Dynamic type	Broadcast	2 sets	
16)	Program send-out switcher	8×8 Stereo Matrix	Broadcast	1 set	
17)	Room to Room Intercom	2wire system, 9Terminals	Broadcast	1 set	
18)	CN Plate	EIA	Broadcast	1 set	
19)	8 Port HUB	100B/T 8Ports or more	Professional	1 set	
20)	UPS	2KVA	Professional	1 set	
21)	All Band Receiver	AM/FM/SW	Professional	1 set	with Antenna
22)	System Rack	EIA size, with Power Supply	Broadcast	1 set	
23)	Console	EIA size, with Power Supply	Broadcast	1 set	
24)	On-Air Tally Logic	REC/STBY/OA	Broadcast	1 set	
25)	On-Air Tally panel (On-Air)	LED type	Broadcast	1 set	
26)	On-Air Tally panel (Stand-by)	LED type	Broadcast	1 set	
27)	Chair			2 sets	

No.	Equipment Name	Description	Grade	Q'ty	Remark
b) Studio Floor					
1)	Announcer Cough Box	T-bar Fader Phantom power QUE/ON-AIR Tally	Broadcast	1 set	
2)	Condenser Microphone	Unidirectional, 20-20kHz, Maximum 140dB.S.P.L	Broadcast	1 set	
3)	Condenser Microphone	Unidirectional 30-20kHz, Maximum 137dB.S.P.L	Broadcast	1 set	
4)	Microphone Stand	Boom Stand	Professional	2 sets	
5)	Microphone Cable	L4E 20/10/5m	Broadcast	1 set	2sets each
6)	Talk Back Speaker	Powered Monitor 20W, 65-18kHz	Broadcast	1 pair	
7)	CN Plate	W262xH120mm	Broadcast	3 sets	
8)	Announcer Table	Re-cover of Table Cloth	Professional	1 set	Existing to be used
(2) Maintenance Tool & Spare Parts					
1)	Monitor Speaker	Powered Monitor 10W, 80-13kHz	Broadcast	1 pair	
2)	Audio Checker	2ch, XLR in, XLR/TRS out, 1kHz tone	Professional	1 set	
3)	Audio Recorder	Input 2analog 1digital Output 2analog	Professional	1 set	
4)	Cassette Tape Recorder	2ch stereo INPUTS/OUTPUTS	Broadcast	1 set	with Remote Control
5)	CD Player	2ch analog /1ch digital outputs	Professional	1 set	with Remote Control
6)	CD-R		Professional	500 pcs	
7)	IC memory (256M)		Professional	10 pcs	
8)	Spare Parts		General	1 lot	
9)	Installation Materials			1 lot	

2-2-2-3 Basic Design of Facility Renovation

(1) Basic Policies towards Renovation Plan

The renovation plans for each Transmitting Station and the Studio Center have been developed observing the following basic policies:

① With respect to the renovation of Bardibas Transmitting Station, the basic aims of renovation design are to restore the facility to the conditions before the damage from blasting and burning by Maoists, and to improve the indoor operating environment to the minimal extent needed for ensuring the adequate functioning of the newly procured transmitter. Deterioration of the facility due to aging will be repaired only if such deterioration is apt to affect adversely the performance of the newly procured transmitter. Pillars, beams, and other building structures will not be included in the renovation plan, because they are not significantly damaged from the attack nor deteriorated by aging.

② The transmitters newly procured for Pokhara and Bhainsepati Transmitting Stations need maintenance of room temperature within a specified range and prevention of dust from outside. Accordingly, air conditioning equipment will be newly installed for these transmitters. In

addition, partition walls with light gauge steel framework will be installed in the existing transmitter rooms to make a space for the new transmitters and ensure efficient air conditioning. Furthermore, emergency generator and related electrical installations will be renewed as they are significantly deteriorated.

③ In Kathmandu Studio Center, the emergency generator and related electrical installations will be renewed, because the remarkable deterioration of these elements is exerting direct adverse effect on the production of broadcast programs. While deterioration of the metal roof and partial failure of air conditioning system are noted in this facility, these will not be included in the renovation plan, as these are not causing direct effect on the production of broadcast programs.

④ Renovation will be conducted using building materials and construction practice that are available in Nepal as much as possible, considering the ease of future maintenance by RNE. In case the use of any products that are not readily available in Nepal are necessary, common items with simple and clear specifications and mechanisms will be selected, paying sufficient attention to the availability of spare parts and the ease of maintenance.

⑤ In selecting the methods and scope of renovation, it is important to ensure that the works will not cause significant limitation to the broadcasting functions of active transmitting stations and the program production activities of the Studio Center. Accordingly, renovation plans should be developed paying sufficient attention to the protection of existing facilities and equipment, as well as the method of rerouting during removal and installation of power supply equipment.

⑥ As some of the existing cables and the equipment attached to buildings will continue to be used in the future, the removal related to facility renovation will be conducted on the cost of the Japanese side. However, the transportation of removed items away from the site and their disposal will be borne by the Nepali side. The scope of work concerning the removal of useless articles conducted by the Japanese side will be limited to the discharge to specified locations within each site.

(2) Floor Plan

The renovation works in this Project will not include the alteration of the functions of facilities or the alteration of room areas except for transmitter rooms. With respect to transmitter rooms, existing transmitter rooms will be partitioned with airtight walls and equipped with air conditioning system to secure the environment needed for operation of the newly procured transmitters. The new layout of transmitter room will be designed to improve air conditioning efficiency by minimizing the room area and installing semi-air tight doors in the openings leading to adjacent rooms.

The table below shows the room arrangement before and after renovation in Bardibas, Bhainsepati, and Pokhara Transmitting Stations, indicating the need for renovation works in each room. The description concerning the rooms in Kathmandu Studio Center is omitted, because the works in the Center involve only the renewal of emergency generator and the renovation of related part.

Table 2-2-7: Room List of Facilities that will be Renovated

Facilities	Before renovation		After renovation		Renovation
	Rooms	Room area (m^2)	Rooms	Room area (m^2)	
Bardibas Transmitting Station	Transmitter room	69.0	Transmitter room	45.0	Yes
			Unpacking area	24.0	Yes
	Dummy load area	42.0	(No change)		Yes
	Transmitter control room	27.0			Yes
	Sand trap room	6.0			Yes
	Power supply room	36.0			Yes
	Maintenance room	18.0			Yes
	Station manager room	13.5			Yes
	Office room	13.5			Yes
	Toilet/shower	13.5			Yes
	Night duty room	12.6			-
	Kitchen	5.4			Yes
	Entrance hall/corridor	31.5			Yes
	Total	288.0		288.0	-
Pokhara Transmitting Station	Transmitter room	91.8	Transmitter room	67.6	Yes
			Unpacking area	24.2	Yes
	Spare transmitter room	36.0	(No change)		Yes
	Dummy load room	16.5			Yes
	Antenna turning unit room	17.6			-
	Blower room	18.1	Chamber room	18.1	Yes
	Transmitter control room	36.0	(No change)		-
	Power supply room	72.0			Yes
	Studio	24.0			-
	Sound lock	10.0			-
	Studio sub-control room	20.0			-
	Air conditioning room	24.0			-
	Maintenance Room	30.0			-
	Stock room	18.0			-
	Pump room	36.0			-
	Office rooms & manager's room	60.0			-
	Toilet	12.0			-
	Kitchen	20.0			-
	Night duty room	12.0			-
	Library	16.0			-
	Corridor, entrance	78.0			-
	Total	648.0		648.0	-
Bhainsepati Transmitting Station	Transmitter room	91.8	Transmitter room	67.6	Yes
			Carrying-in area	24.2	Yes
	Spare transmitter room	36.0	(No change)		Yes
	Dummy load room	16.5			Yes
	Antenna matching room	17.6			-
	Blower room	18.1	Chamber room	18.1	Yes
	Transmitter control room	36.0	(No change)		-
	Power supply room	72.0			-
	Air conditioning room	24.0			-
	Maintenance Room	30.0			-
	Stock room	36.0			Yes
	Pump room	36.0			-
	Office room & manager's room	100.0			-
	Toilet	12.0			-
	Kitchen	20.0			-
	Night duty room	12.0			-
	Corridor, entrance	90.0			-
	Total	648.0		648.0	-

(3) Sectional Plan

The partition walls that are newly installed in transmitter rooms will be made of light gauge steel framework and gypsum board facings, for easy construction and short term of work.

The partition wall between the transmitter room and the transmitter control room will be designed to have a glass screen in part, so that the interior of the transmitter room can be monitored from the transmitter control room. The doors leading to the transmitter room will be of semi-air tight to prevent the ingress of dust.

For other rooms receiving renovation, the materials used for the finishes of walls, floors, and ceilings will basically be the same quality as the existing elements.

(4) Structural Plan

Building structures in all facilities have no significant deterioration or damage, and none needs renovation. Renovation works should be conducted avoiding inadvertent damage to these intact structures.

(5) Building Equipment Plan

1) Basic Policies in Building Equipment Design

Equipment attached to buildings represents a large part of the renovation plan in this Project. The following is the basic policies in the design of major building equipment.

① Power Supply Equipment

The power supply equipment of existing facilities consists of 3-phase, 4-wire 400V/230V, 50Hz commercial power supply and emergency generators. Renovation of both the main and emergency power supplies will be conducted aiming at the safety, stability, and consistent startup of power supply.

② Emergency Generator

The specifications for the generator should be 3-phase, 4-wire, 400V/230V, 50Hz, automatic startup with a rechargeable battery. It should be able to start within 40 seconds. The capacity of the generator should be determined based on detailed survey of existing loads and considering the loss of performance due to altitude and stable startup at low temperature during winter. The control unit, automatic startup unit, automatic recharging unit, voltage regulator, rechargeable battery for startup, and other units will be accommodated in the generator unit, and full automatic control will be provided to perform power failure detection, engine starting, power supply, and engine stopping after the end of power failure,

in the same way as the existing equipment. The existing oil tank for the generator will be used.

③ Feeder Panel

The feeder panel that provides electricity from commercial and emergency power sources to distribution boards will have the same circuit configuration as the existing equipment, and a branch circuit breaker for supplying power to the newly installed air conditioning control panel will be added. In Pokhara and Bhainsepati Transmitting Stations, where the existing transmitters are receiving commercial power supply only, switchers will be added so that the transmitters will be able to receive emergency power supply as well.

④ Automatic Voltage Regulator (AVR)

The existing commercial power supply is 3-phase, 4-wire, 400V, 50Hz. Because the voltage fluctuation measured on site was within 20%, the input voltage fluctuation range of the AVR should be 400V ± 20%. The type of equipment will be the same as existing one (natural cooling, induction type, contact-less), because local maintenance personnel are accustomed to it, and output fluctuation range will be 400V ± 1.5%, similar to existing one.

⑤ Air Conditioning Equipment

While the temperature of the transmitter room is currently maintained by ambient air cooling using a ventilation fan, air conditioning equipment will be installed to maintain the operating environment of the new transmitter. Three air conditioners that can perform cooling operation throughout the year will be installed. Two of them will be operated all the time, and the other one will be reserved for better reliability. The system will be designed so that fan cooling can be used in case of the failure of air conditioners in the transmitter room. To minimize dust ingress to the transmitter room, a blower for pressurizing the interior of the room will be installed.

2) Bardibas Transmitting Station

(a) Electrical Installations

a) High-voltage Receiving Panel

As the existing high-voltage receiving panel has been broken completely, commercial power supply is connected to the low-voltage transformer without passing through a safety device. This situation is very dangerous, and the system will be renewed. The capacity of the newly installed vacuum circuit breaker will be 12kV, 600 A, similar to existing one.

b) Emergency Generator

The existing generator which has the problems of poor insulation, oil and liquid leakage, and unstable startup due to fire damage caused by blasting will be renewed in this Project. The newly installed generator will have automatic starter for commercial and emergency power supplies and be capable of full automatic operation. The generator will have the same capacity (100kVA) as the existing generator.

c) Feeder Panel

The feeder panel, which has the problems of unstable operation and ill-fitted case door due to blasting will be renewed in this Project. The newly installed feeder panel will have 2 lines of switchers between commercial and emergency power supplies and 1 line of switcher to the dummy load, similarly.

d) Main Distribution Board

The main distribution board, which similarly has the problems of poor insulation, burning in the board, and ill-fitted case door due to blasting will be renewed in this Project.

e) Automatic Voltage Regulator (AVR)

The automatic voltage regulator, which has the problems of unstable startup and ill-fitted case door due to blasting will be renewed by this Project. The capacity of the newly installed voltage regulator will be 100kVA, similar to existing one.

f) Lighting Fixtures

The fixtures that were directly damaged from blasting and fire, as well as the general lighting fixtures and cables having difficulty in removal and reattachment during replacement of ceiling and those being out of order due to aging deterioration will be renewed in this Project. Existing emergency lighting fixtures central by controlled will be changed to self-controlled fixtures using rechargeable batteries, which are charged at normal times and turn on automatically at the time of power failure.

g) Fire Alarms

The fire alarm system, which was damaged by the disaster and does not perform well will be totally renewed in this Project.

(b) Mechanical Equipment

a) Water Supply System

One of the pumps in the reservoir-integrated water supply pump unit is broken and the

water supply pipe has cracks and leakage. Because spare parts are not available in the market, the unit will be renewed as a whole. The newly installed water supply pump unit will have the same capacity as existing one, and be capable of automatic alternate parallel operation using 2 units for each pump, like existing system. The capacity of the reservoir will be 2 m^3, similar to existing.

b) Drainage System

Because the drainage line from the septic tank has been cut to pieces by military trenches and does not work, an infiltration tank will be installed newly and drain pipes will be rerouted.

c) Air Conditioning System

Air conditioners newly installed in the transmitter room will be air-cooled ceiling-mounted units with sufficient capacity to handle the heat from transmitters. Two air conditioners in the existing control room will be renewed.

d) Ventilation Equipment

The transmitter room will be equipped with a ventilation fan controlled by a temperature regulator so that transmitters can be cooled at the time of failure of the air conditioners in the transmitter room. In addition, the room will be pressurized by a blower, which will be operated at all times to supply the air via an air filter. The ventilation fan for emergency use should have a sufficient air flow capacity to maintain the acceptable room temperature of 40℃ when the ambient temperature is 35℃. The blower pressurizing the room should have the capacity of 1 turnover/hour of the room volume.

e) Other

The boiler room has suffered severe damage to distribution board, water heater, ceiling ventilation fan, etc., in addition to interior finishings. These will be renewed, because repair is difficult. Items that are not easily removed and reattached, as well as socket outlets and switches broken by blasting will also be renewed.

3) Pokhara and Bhainsepati Transmitting Stations

(a) Electrical Installations

a) Emergency Generator

The existing generators, which has the problems of unstable startup, oil leak, radiator water leak, heater malfunction (Pokhara), etc. due to considerable aging will be renewed in this Project. The newly installed generator will have automatic starter for

commercial and emergency power supplies and be capable of full automatic operation. The generator will have the same capacity (100kVA) as the existing generator.

b) Feeder Panel

The feeder panel, which has the problems of unstable automatic switching operation, malfunction of the switcher (Bhainsepati), etc. due to considerable aging will be renewed in this Project. The newly installed feeder panel will have 2 lines of switchers between commercial and emergency power supplies and 1 line of switcher to the dummy load.

c) Automatic Voltage Regulator (AVR)

The automatic voltage regulator will be renewed in this Project, because the existing unit has the problems of unstable operation, malfunction of bypass circuit (Pokhara), ill-fitted case door (Bhainsepati), etc. due to aging, which are likely to cause adverse effect on broadcasting equipment. The capacity of the newly installed voltage regulator will be 400kVA, similar to existing equipment.

(b) Mechanical Equipment

a) Air Conditioning System

The air conditioners newly installed in the transmitter room will be air-cooled floor-mounted units of direct blow type with plenum chambers having sufficient capacity to handle the heat from transmitters.

b) Ventilation System

The newly installed ventilation fans for treating the heat from transmitters during emergencies should have a sufficient air flow capacity to maintain the acceptable room temperature of 40℃ when the ambient temperature is 33.4℃ in Pokhara and 30.3℃ in Bhainsepati. The blower pressurizing the room at normal times should have the capacity of 1 turnover/hour of the room volume in each transmitting station.

4) Kathmandu Studio Center

(a) Electrical Installations

a) Emergency Generator

The existing generator, which has the problems of unstable startup, radiator water leak, heater malfunction, etc. due to considerable aging will be renewed in this Project. The newly installed generator will have automatic starter for commercial and emergency power supplies and be capable of full automatic operation. The generator

will have the same capacity (100kVA) as the existing one.

b) Feeder Panel

The feeder panel will be renewed in this Project, because the existing unit has the problems of unstable automatic switching operation and ill-fitted case door due to considerable aging, which are likely to cause adverse effect on broadcasting equipment. The newly installed feeder panel will have 2 lines of switchers between commercial and emergency power supplies and 1 line of switcher to the dummy load.

c) Automatic Voltage Regulator (AVR)

The automatic voltage regulator will be renewed in this Project, because the existing unit has the problems of unstable startup, malfunction of lightning protector and ill-fitted case door due to aging, which are likely to cause adverse effect on broadcasting equipment. The capacity of the newly installed voltage regulator will be 30kVA, similar to existing one.

(6) Construction Material Plan

1) Bardibas Transmitting Station

(a) Floors

PVC tile flooring in the control room, transmitter room, entrance and corridor that were damaged severely from blasting will be replaced totally.

(b) Interior Walls

Because wall finishes have been blown away and fallen apart as the result of explosion, except for those in limited areas such as toilets and shower rooms, these will be repaired. The light gauge steel framework of walls will be repaired mainly in the control room, transmitter room, and generator room, where the steel parts are deformed or missing. As the transmitter room will require new installation of air conditioning equipment in conjunction with the introduction of solid state transmitters, partition walls made of light gauge steel framework and plaster board facings will be installed in the room, paying attention to the cost effectiveness and efficiency of air conditioning in the relevant area.

(c) Ceilings

In addition to the ceiling panels directly damaged by explosion and fire, those deformed and blown off by air blasts traveling behind the ceiling will be replaced including suspension system. The ceilings adjacent to the walls requiring repair will also be included in the renovation plan. A new suspended ceiling will be installed in the newly partitioned

transmitter room to improve heat insulation.

(d) Doors and Windows

Not only those directly damaged by explosion and fire, but also many doors and windows have the problems of difficulty in opening/closing and failure of locks due to aging. Doors and windows will be repaired as necessary to maintain air tightness, improve air conditioning performance, and enhance security.

(e) Fitted Furniture

Fitted furniture in the boiler room, such as the sink and suspended cupboards, has been damaged by air blasts. These will be renewed.

(f) Roof

While the folded sheet metal on the roof has been installed in 2 layers for the purpose of improving heat insulation performance, the both layers of sheet metal in some places have been penetrated by explosives hitting the roof, leaving holes up to 5 cm in diameter. The upper layer shows considerable aging deterioration of the PVC surface finish, and rust is observed in more than 20 places. It is highly liable that the entire roof will be affected by rust in the very near future. Because repairing of holes and re-coating of the upper surface will not be sufficient to prevent re-development of rust within 5 or 6 years, the roof will be reformed by covering the existing roof with folded sheet metal of the same type and shape as that used in the present roof. The metal parts covering the ridge and the PVC gutters at the edge of the roof will also be included in the renovation plan, because they are deteriorated considerably.

(g) Exterior Walls

With respect to the ALC (autoclaved lightweight concrete) panels comprising exterior walls, cracks and peels will be repaired and joints and coating will be renovated totally.

(h) Other

Rust on the metal parts of exterior finishes will be treated by rust removal and painting, if it is on the surface of thick metal such as shape steel. Rusted steel parts with a thickness of about 0.8 mm or less, such as parapets, will be renewed, because the lowering of strength due to rust is significant.

2) Pokhara and Bhainsepati Transmitting Stations

(a) Interior Walls

A partition wall will be installed in the existing transmitter room. This wall will be a dry construction wall having a glass screen in a part, and be positioned to secure the room area

appropriate for the newly procured transmitter.

(b) Doors

The doors connecting the newly partitioned transmitter room and adjacent rooms lack sufficient air tightness, and some allow ventilation through louvers. These doors will be replaced with semi-air tight doors or moved to different positions. Because the transmitting station building is located almost directly underneath the transmission antenna, steel doors are grounded via the steel frames for the purpose of releasing induced current that develop in the metal parts of the building during transmission. However, many of the mesh-formed grounding conductors connecting the door and the frame have been broken, and this situation is dangerous. These grounding conductors will be renewed to prevent the hazard of induced current.

(c) Other

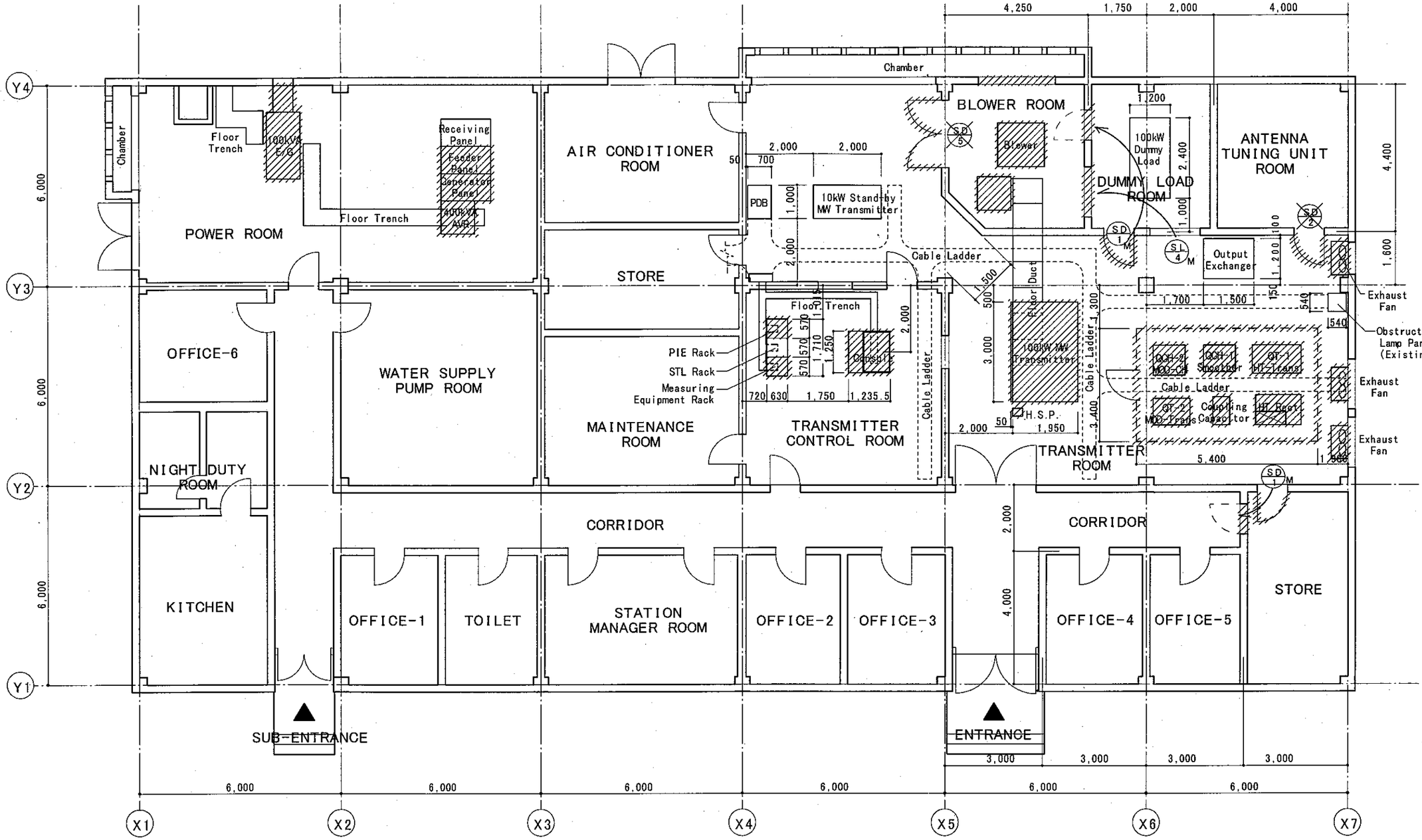
The concrete foundation for the emergency power generator will be reconstructed to make the foundation appropriate for the newly procured generator.

3) Kathmandu Studio Center

In conjunction with the renewal of emergency generator, the concrete foundation for the installation of this generator will be reconstructed.

2-2-3 Basic Design Drawings

The basic design drawings listed below are shown on the following pages.



LEGEND

- Equipment or Building Elements to be Demolished
- SD 2 — Doors to be Demolished
- SD 1 M — Doors or Louvers to be Shifted (Arrowhead shows the new Location.)

Fig.2-2-3: BHAINSEPATI 100kW MW TRANSMITTING STATION DEMOLITION PLAN

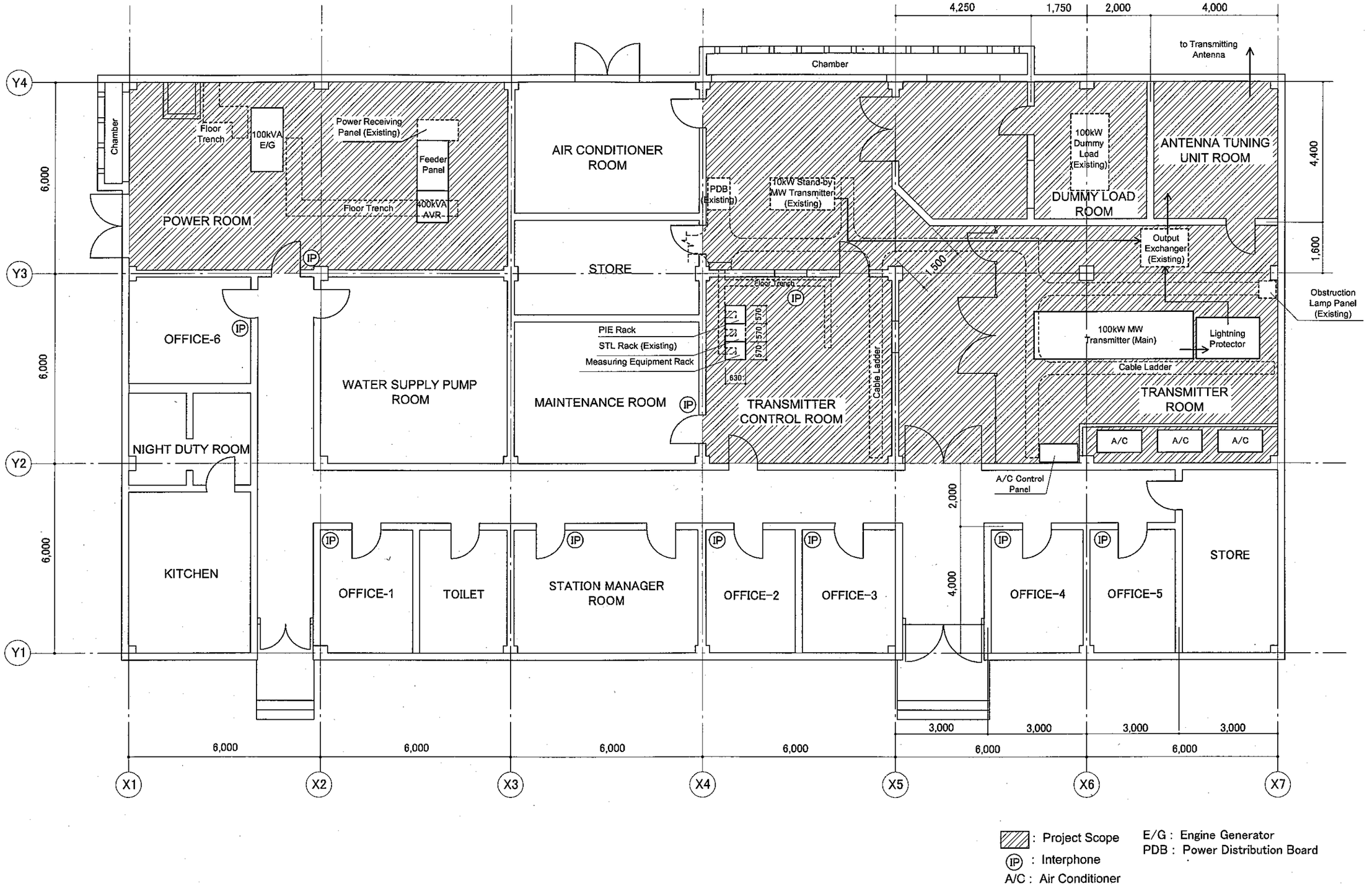


Fig. 2-2-4: BHAINSEPATI 100kW MW TRANSMITTING STATION EQUIPMENT LAYOUT

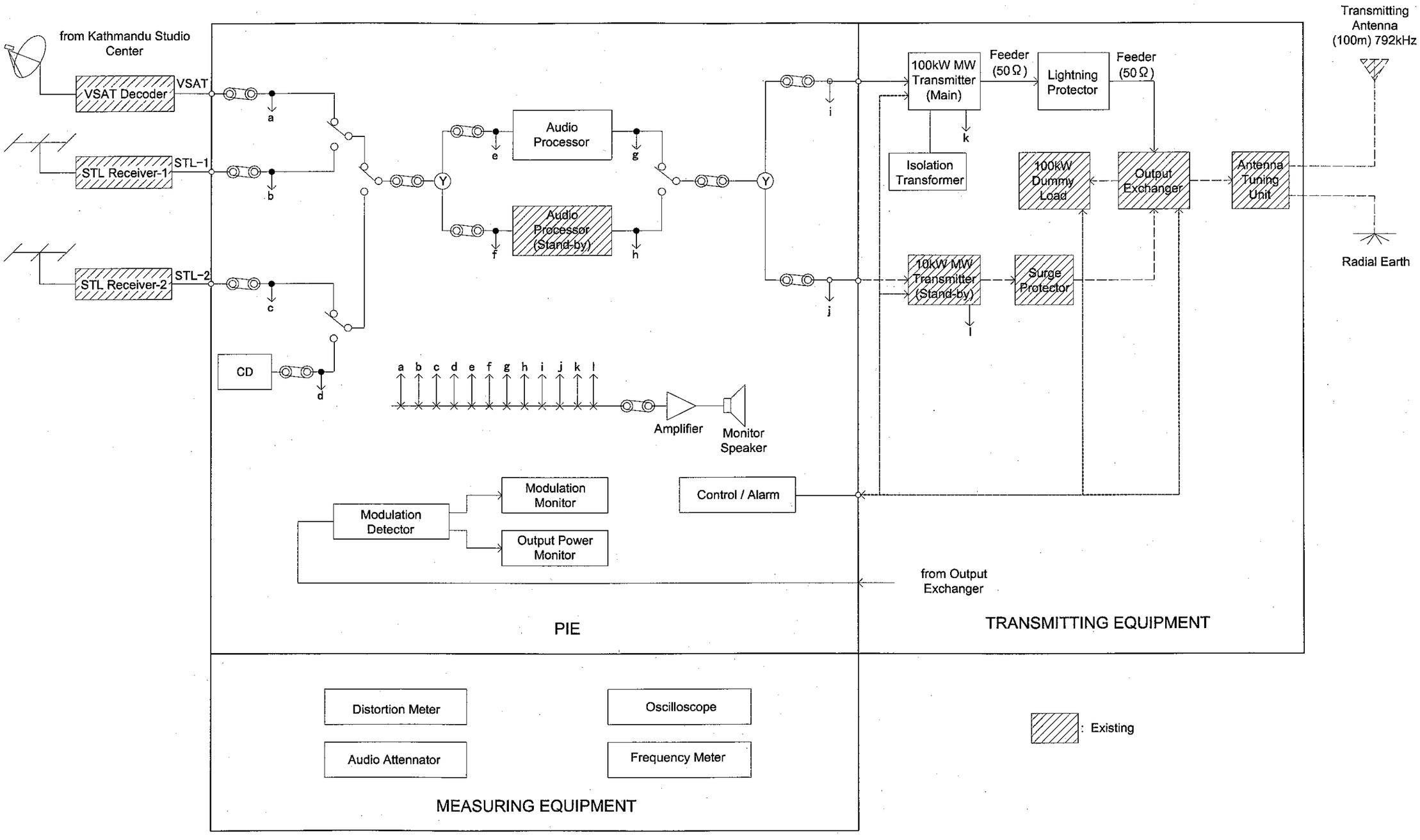


Fig. 2-2-5: BHAINSEPATI 100kW MW TRANSMITTING STATION SCHEMATIC DIAGRAM

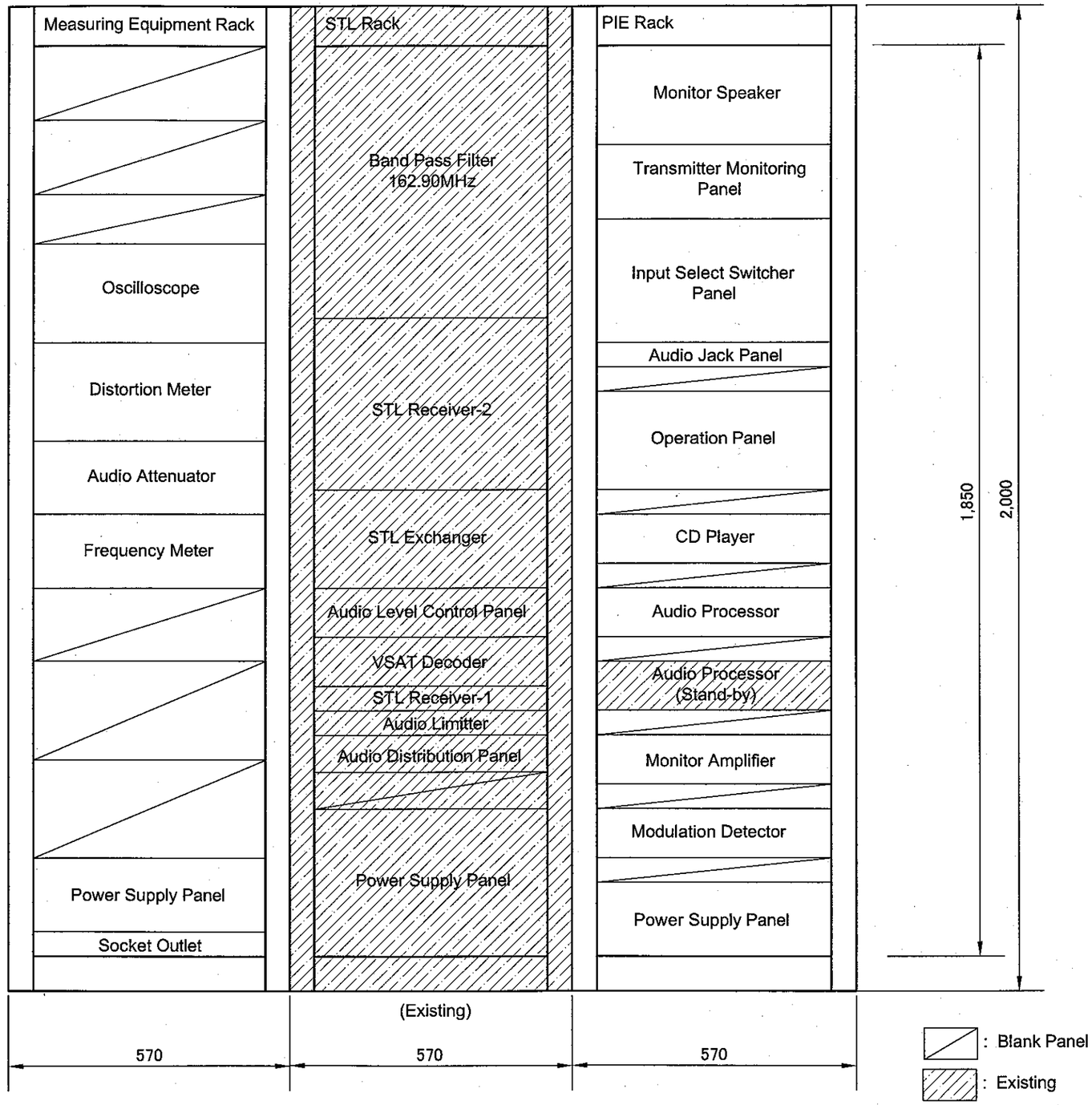


Fig.2-2-6: BHAINSEPATI 100kW MW TRANSMITTING STATION EXTERNAL VIEW OF PIE RACK & MEASURING EQUIPMENT RACK

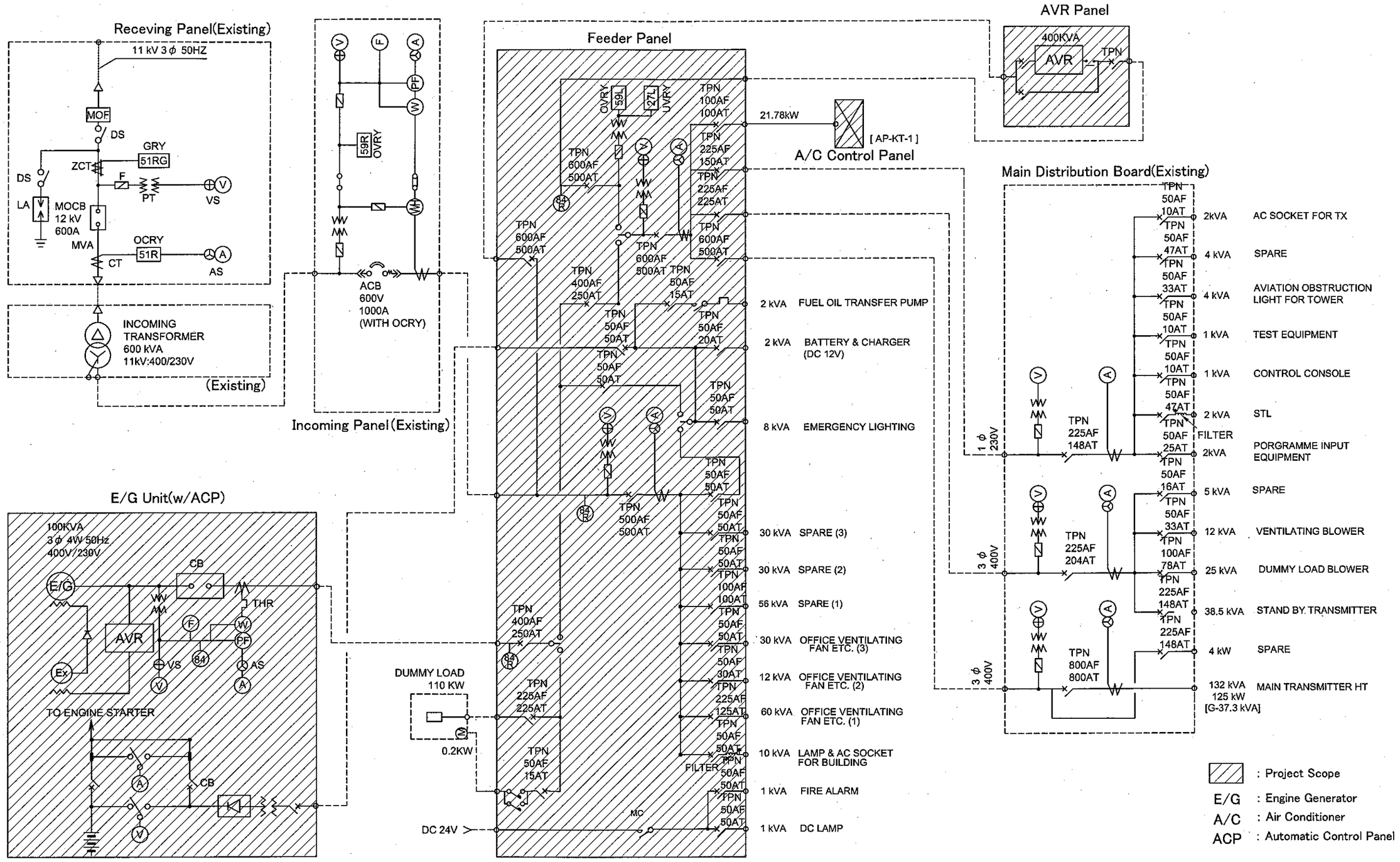
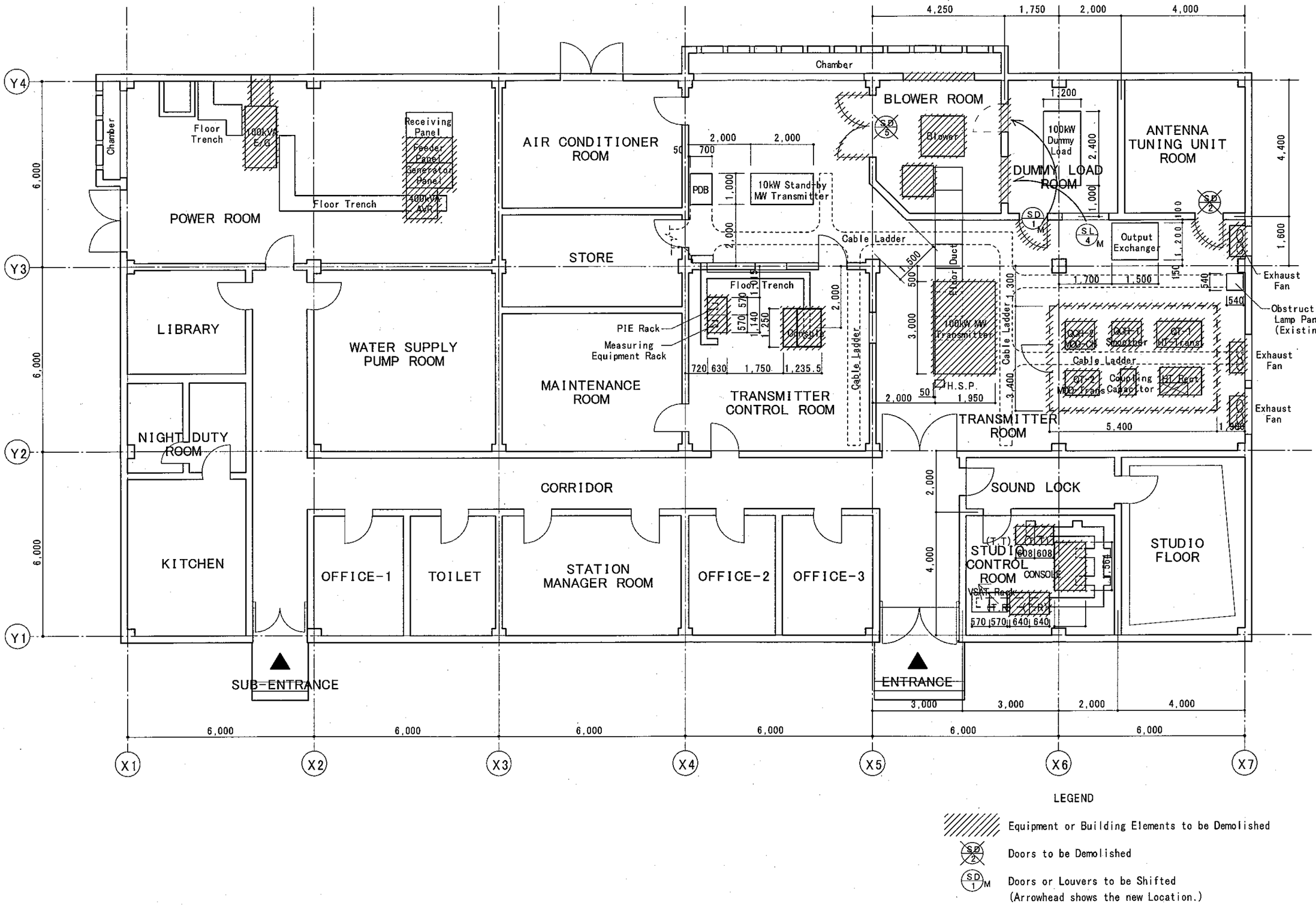


Fig 2-2-7: BHAINSEPATI 100kW MW TRANSMITTING STATION SINGLE LINE DIAGRAM



LEGEND

Equipment or Building Elements to be Demolished

Doors to be Demolished

Doors or Louvers to be Shifted
(Arrowhead shows the new Location.)

Fig.2-2-8: POKHARA 100kW MW TRANSMITTING STATION DEMOLITION PLAN

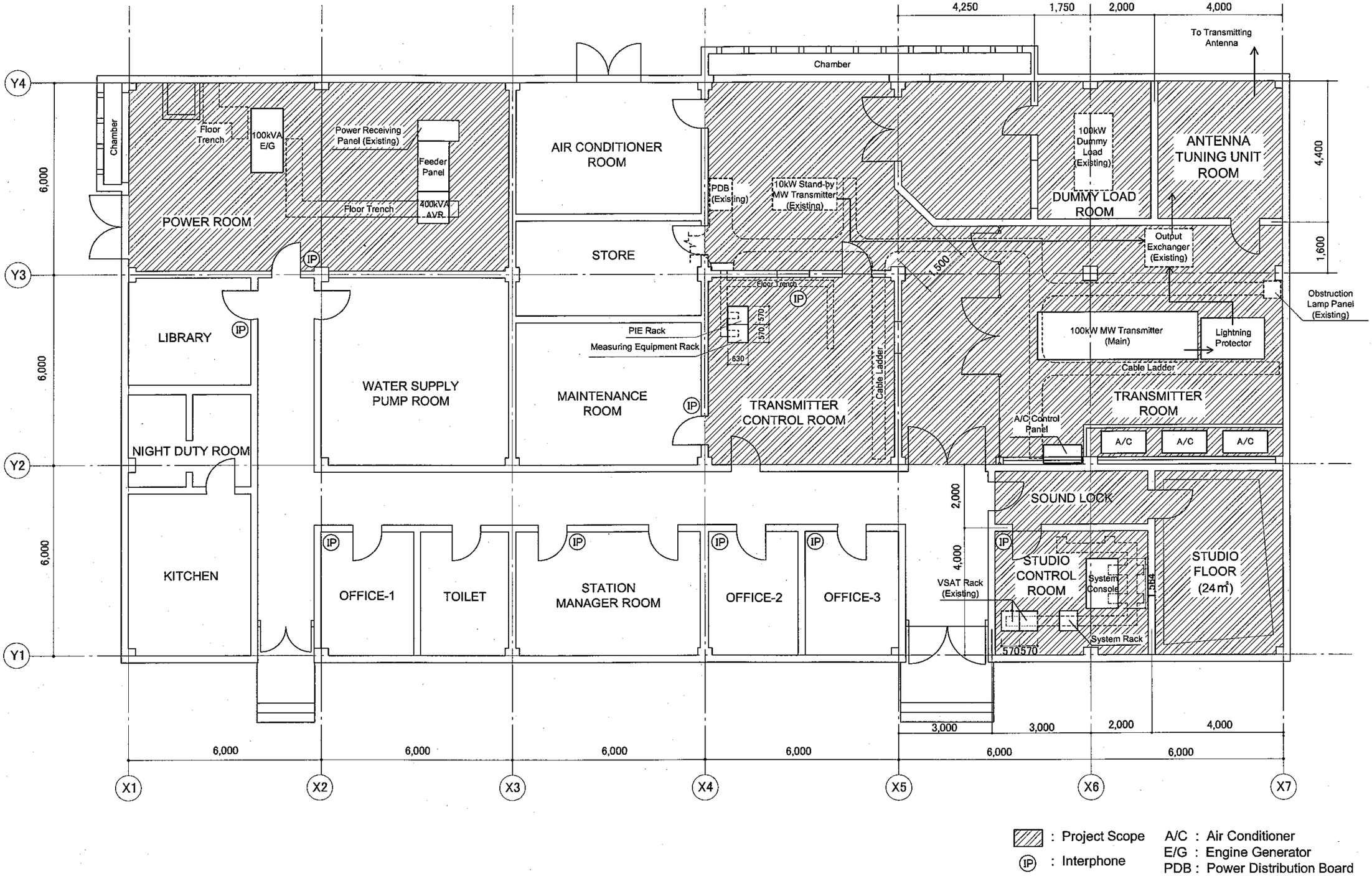


Fig. 2-2-9: POKHARA 100kW MW TRANSMITTING STATION EQUIPMENT LAYOUT

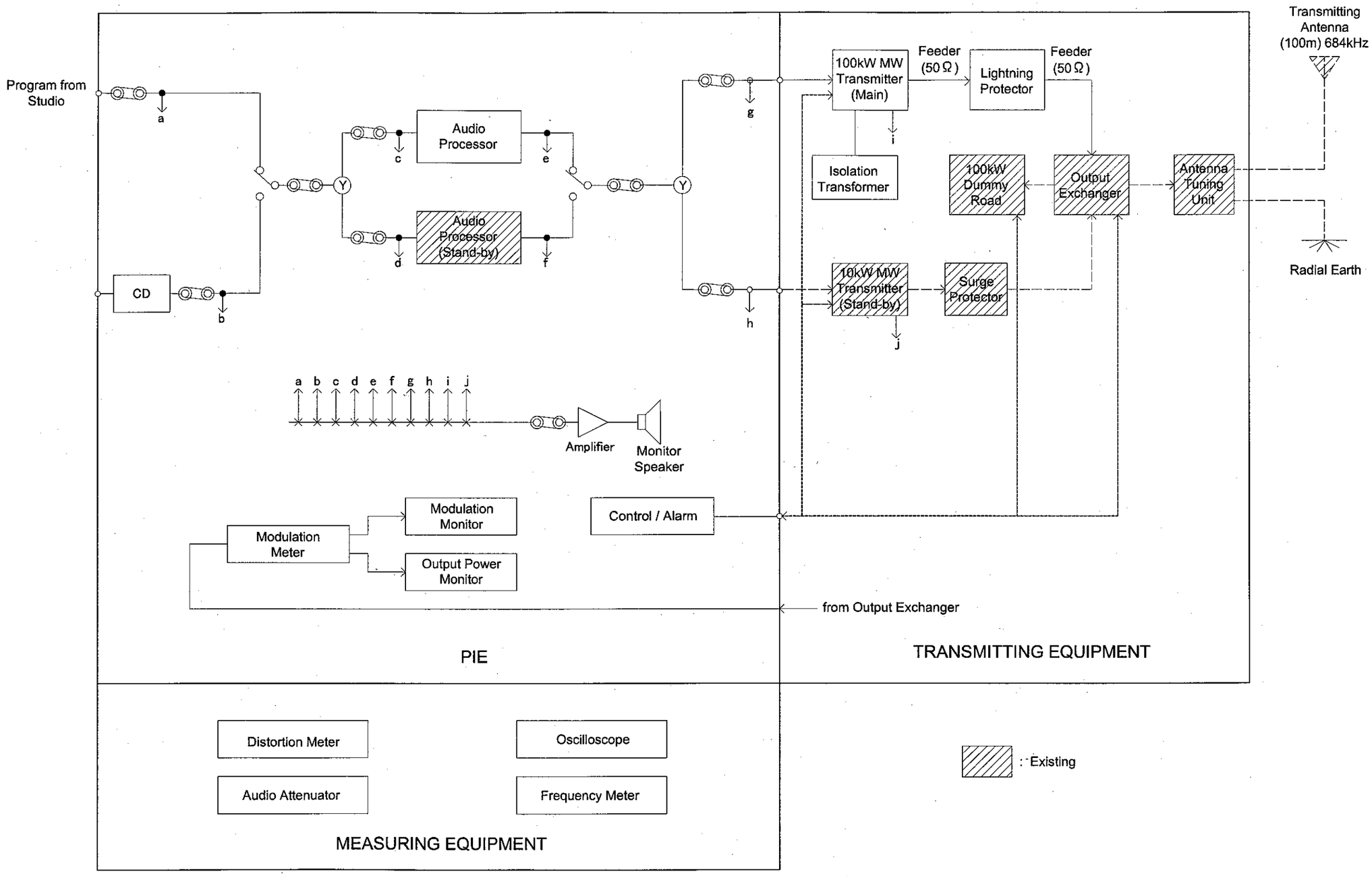


Fig. 2-2-10: POKHARA 100kW MW TRANSMITTING STATION SCHEMATIC DIAGRAM

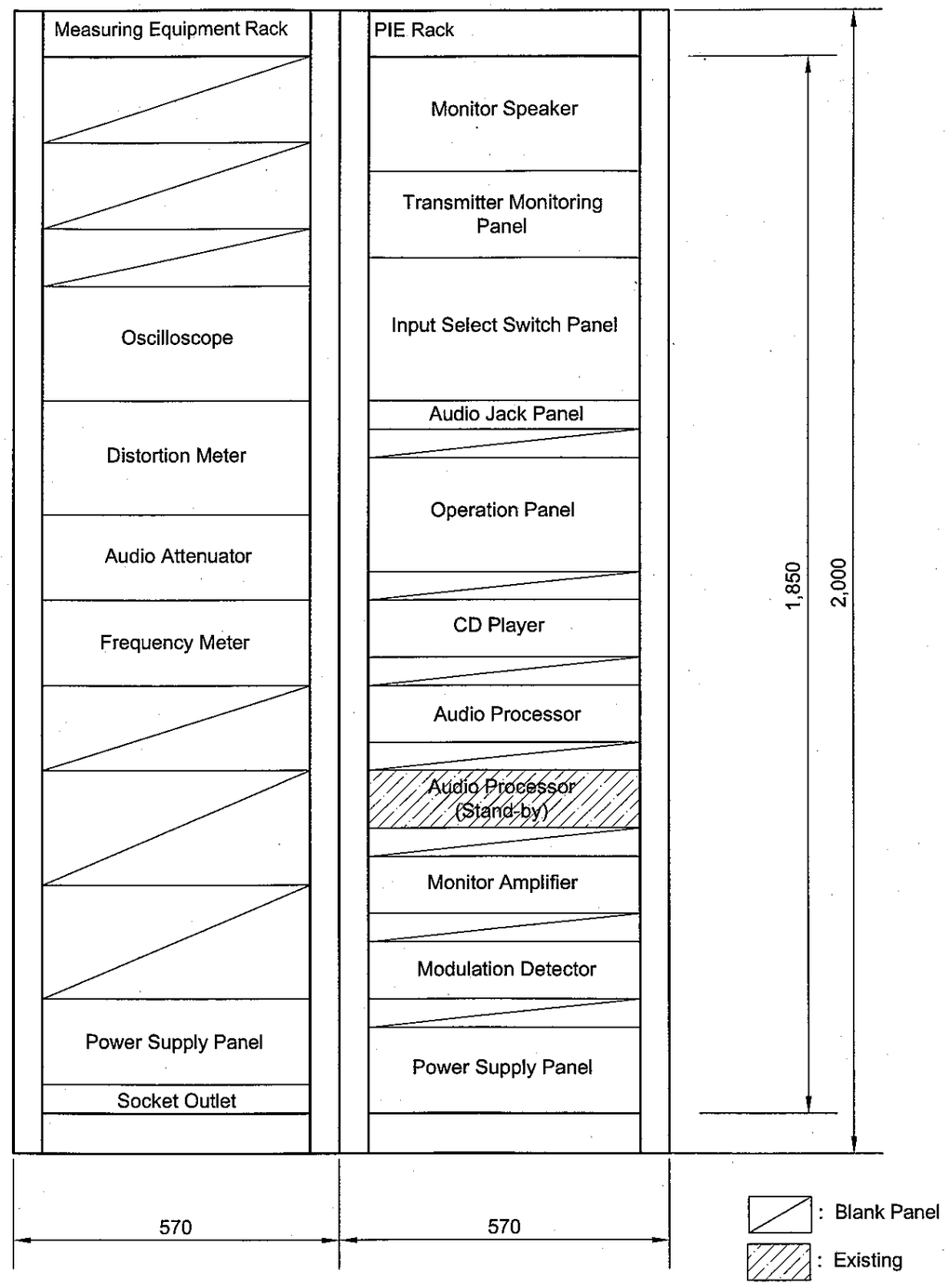


Fig. 2-2-11: POKHARA 100kW TRANSMITTING STATION EXTERNAL VIEW OF PIE RACK & MEASURING EQUIPMENT RACK

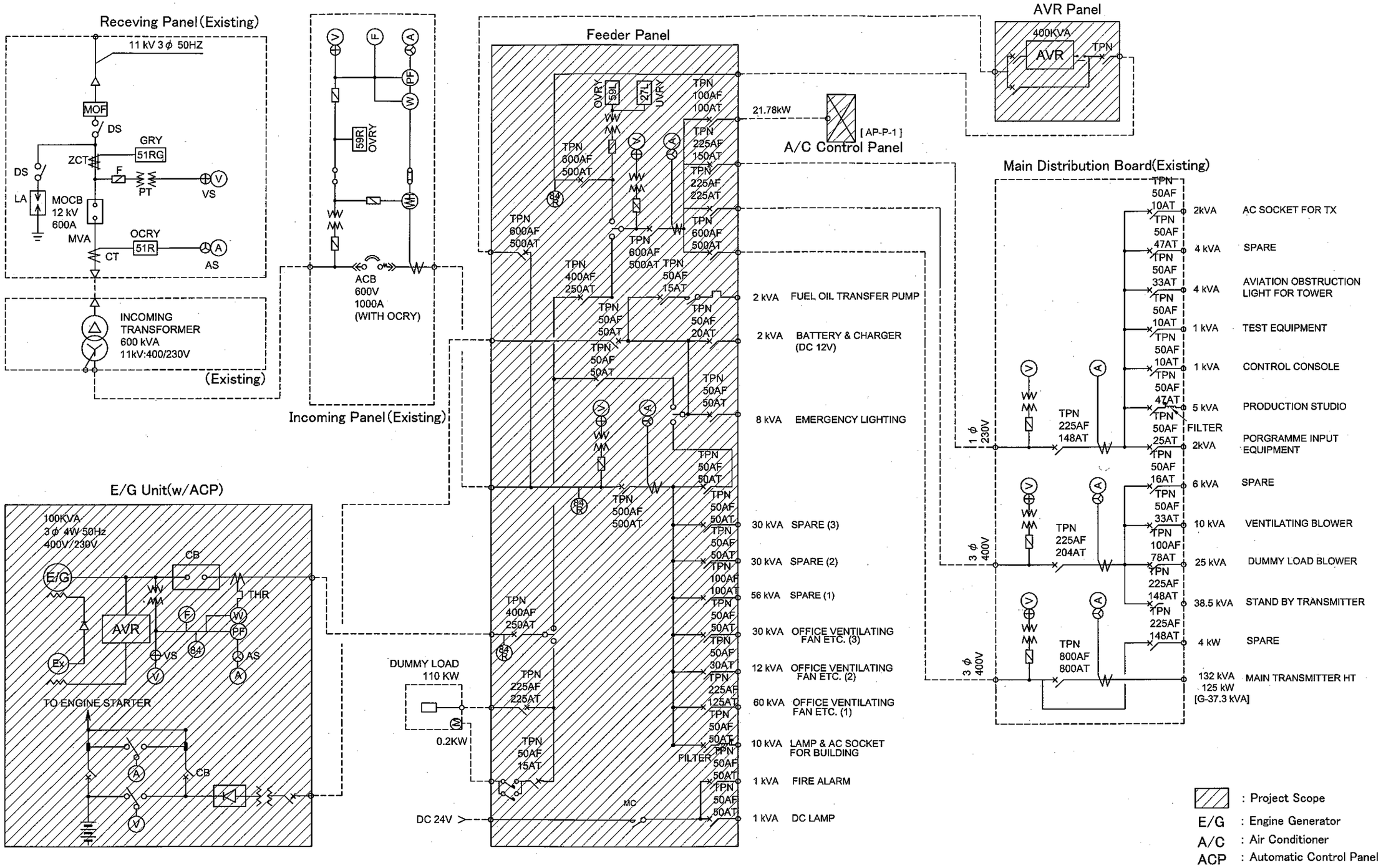
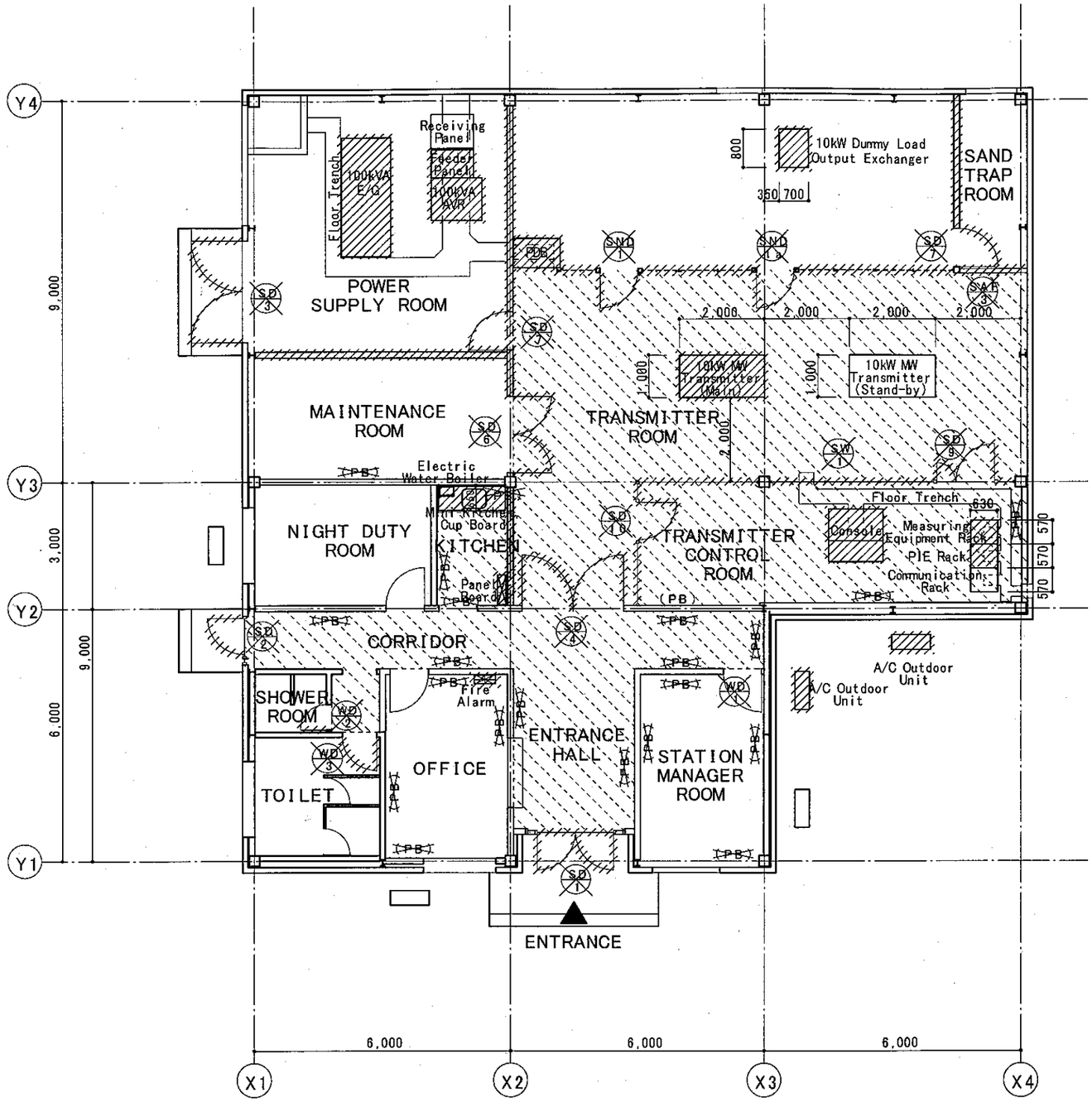
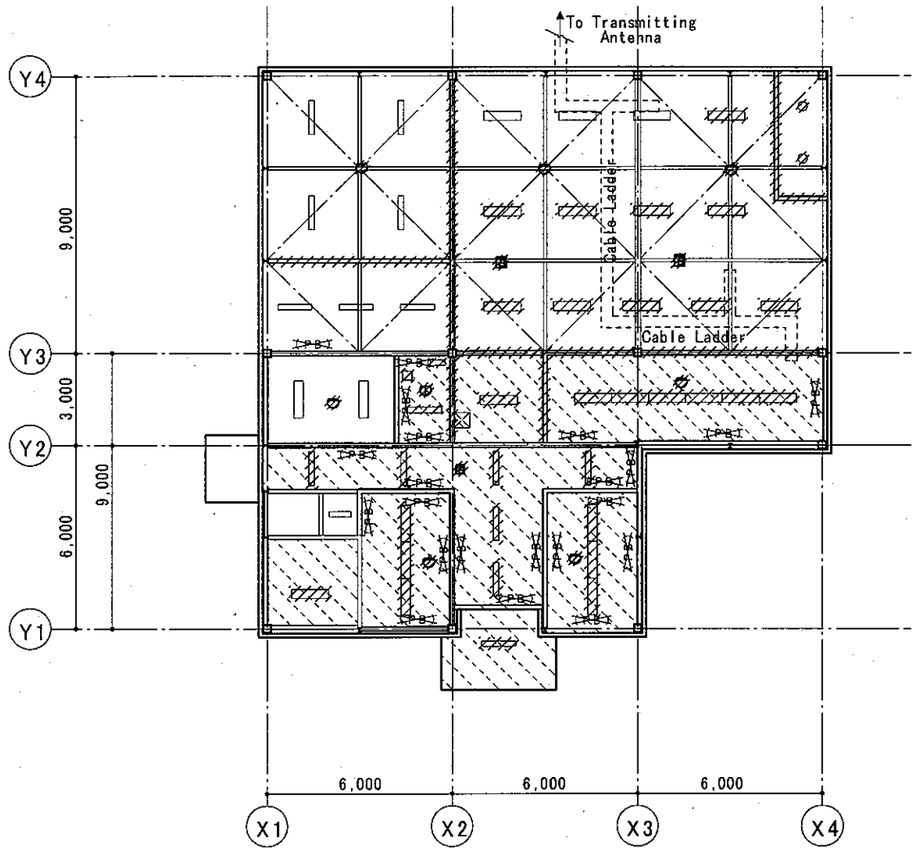


Fig 2-2-12: POKHARA 100kW TRANSMITTING STATION SINGLE LINE DIAGRAM



FLOOR PLAN

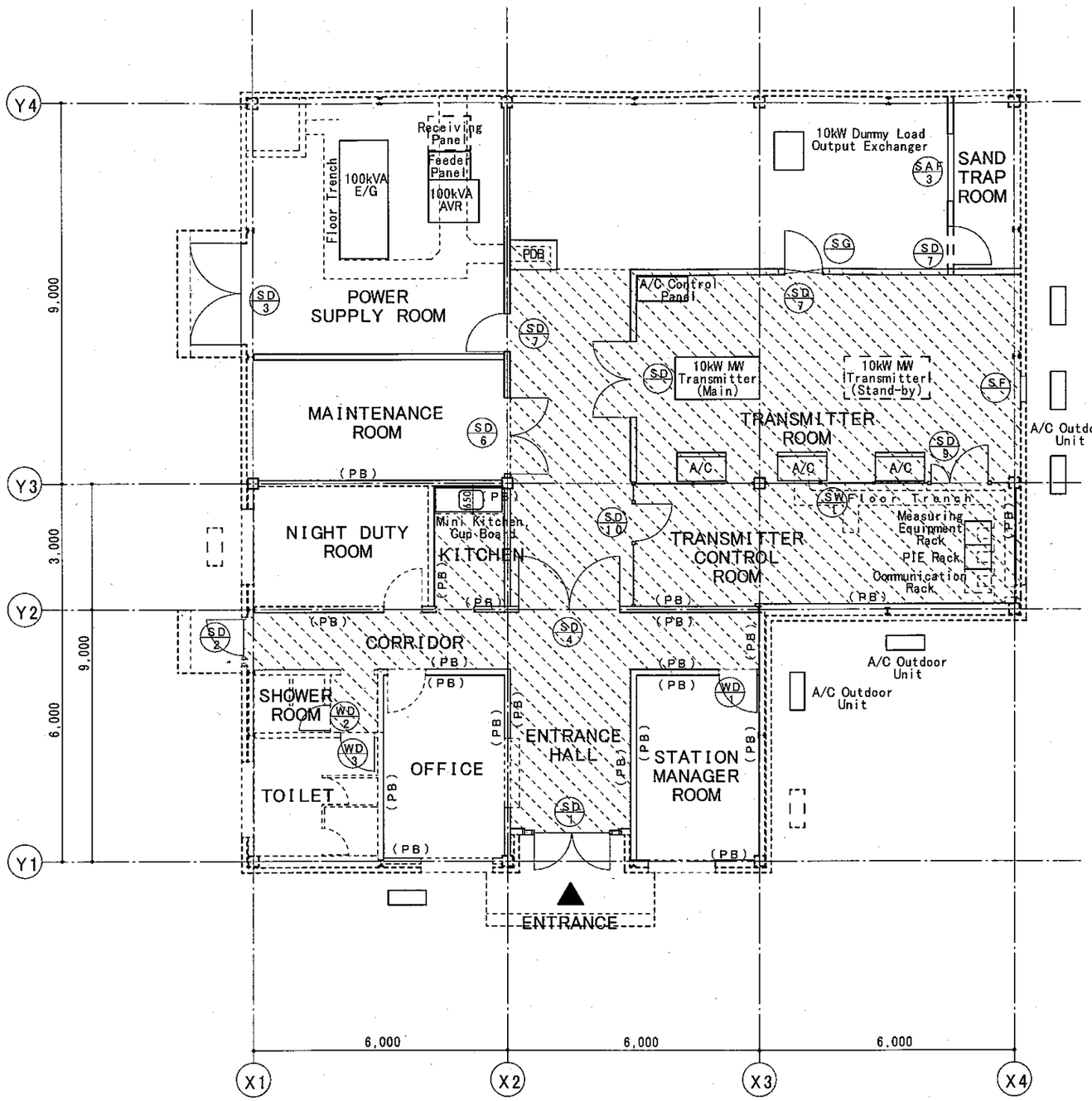


REFLECTED CEILING PLAN

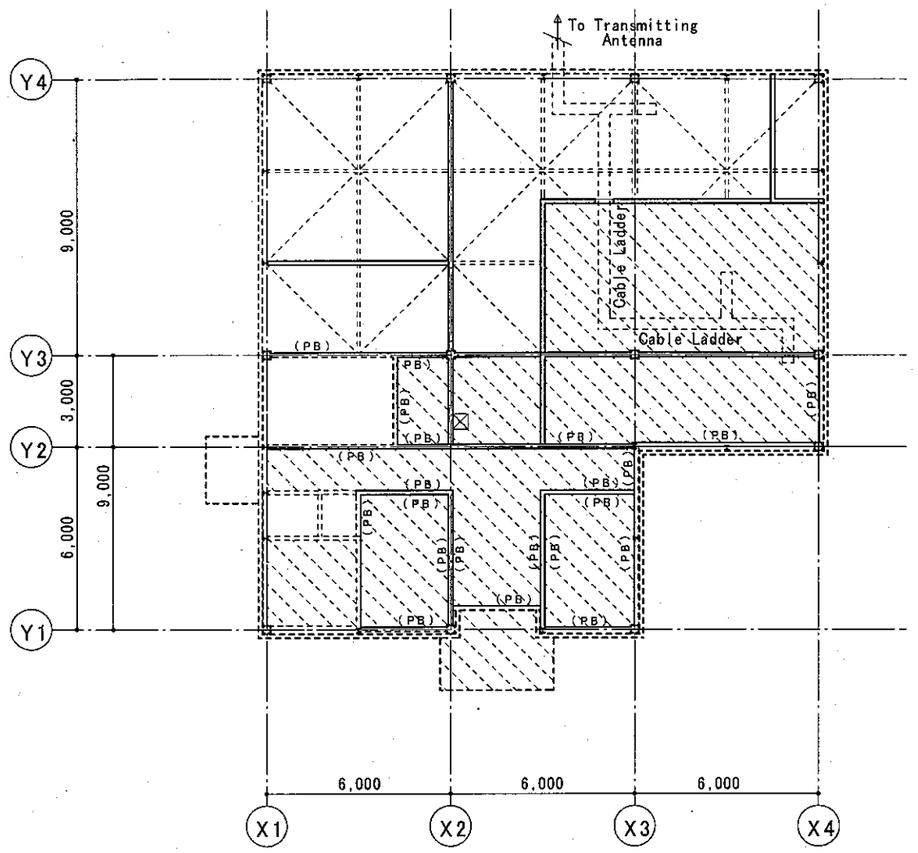
LEGEND

- Equipment or Building Elements to be demolished
- Extent of Floor or Ceiling Finish to be demolished
- SD 2 — Doors or Windows to be demolished
- PB — Wall Plaster Board to be demolished
- Heart Detector to be demolished
- Smoke Detector to be demolished

Fig.2-2-13: BARDIBAS 10kW MW TRANSMITTING STATION DEMOLITION PLAN



FLOOR PLAN

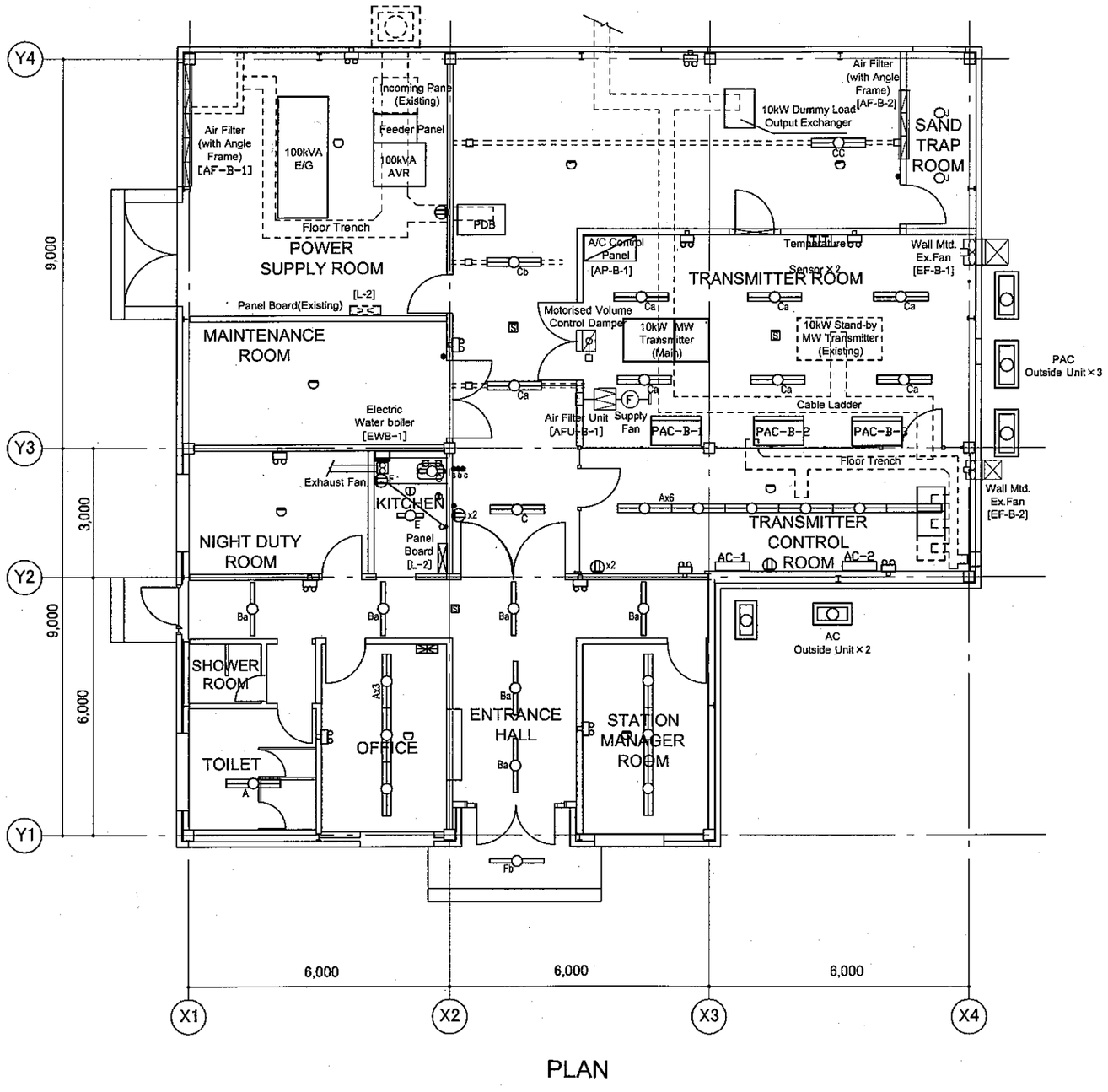


REFLECTED CEILING PLAN

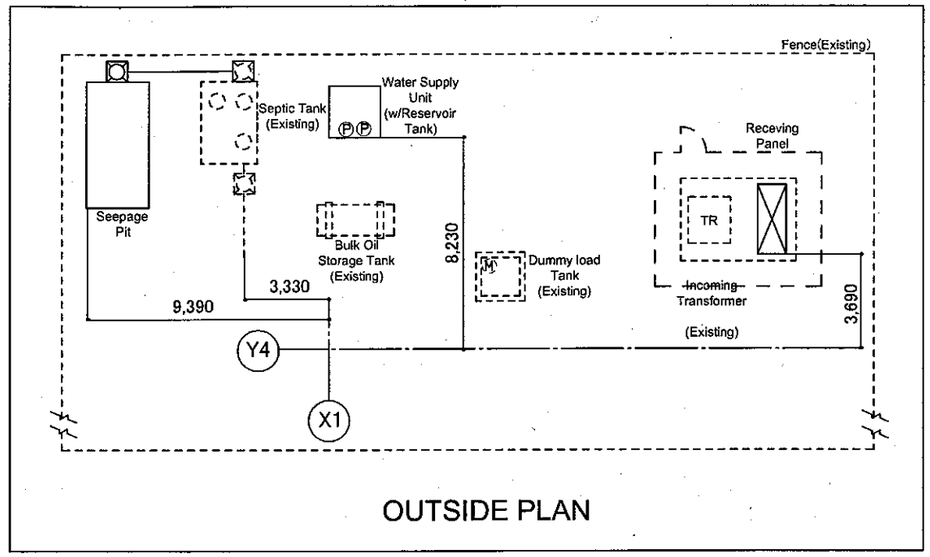
LEGEND

- Extent of Floor or Ceiling Finish to be installed newly
- SD 2 — Doors or Windows to be installed newly
- (PB) — Wall Plaster Board to be installed newly
- ------- Broken Line shows the existing Equipment or Building Elements.

Fig.2-2-14: BARDIBAS 10kW MW TRANSMITTING STATION BUILDING RENOVATION PLAN (1)



PLAN



OUTSIDE PLAN

LEGEND

PAC	:	Air Conditioner (Year-Round Cooling Type)
AC	:	Air Conditioner (Heat Pump Type)
⊕	:	Fixed Temperature Spot Type Heat Detector (Water proof)
⊖	:	Rate of Rise Spot Type Heat Detector
○	:	Fixed Temperature Spot Type Heat Detector
S	:	Smoke Detector
	:	Emergency Lighting
C	:	Fluorescent Lanp 40w × 2
Fb	:	Fluorescent Lanp 40w × 1
	:	Incandescent Lamp
	:	Race Way (40 × 30)

[Note] 1. Symbol —— Stands for Existing

Fig. 2-2-15: BARDIBAS 10kW TRANSMITTING STATION BUILDING RENOVATION PLAN (2)

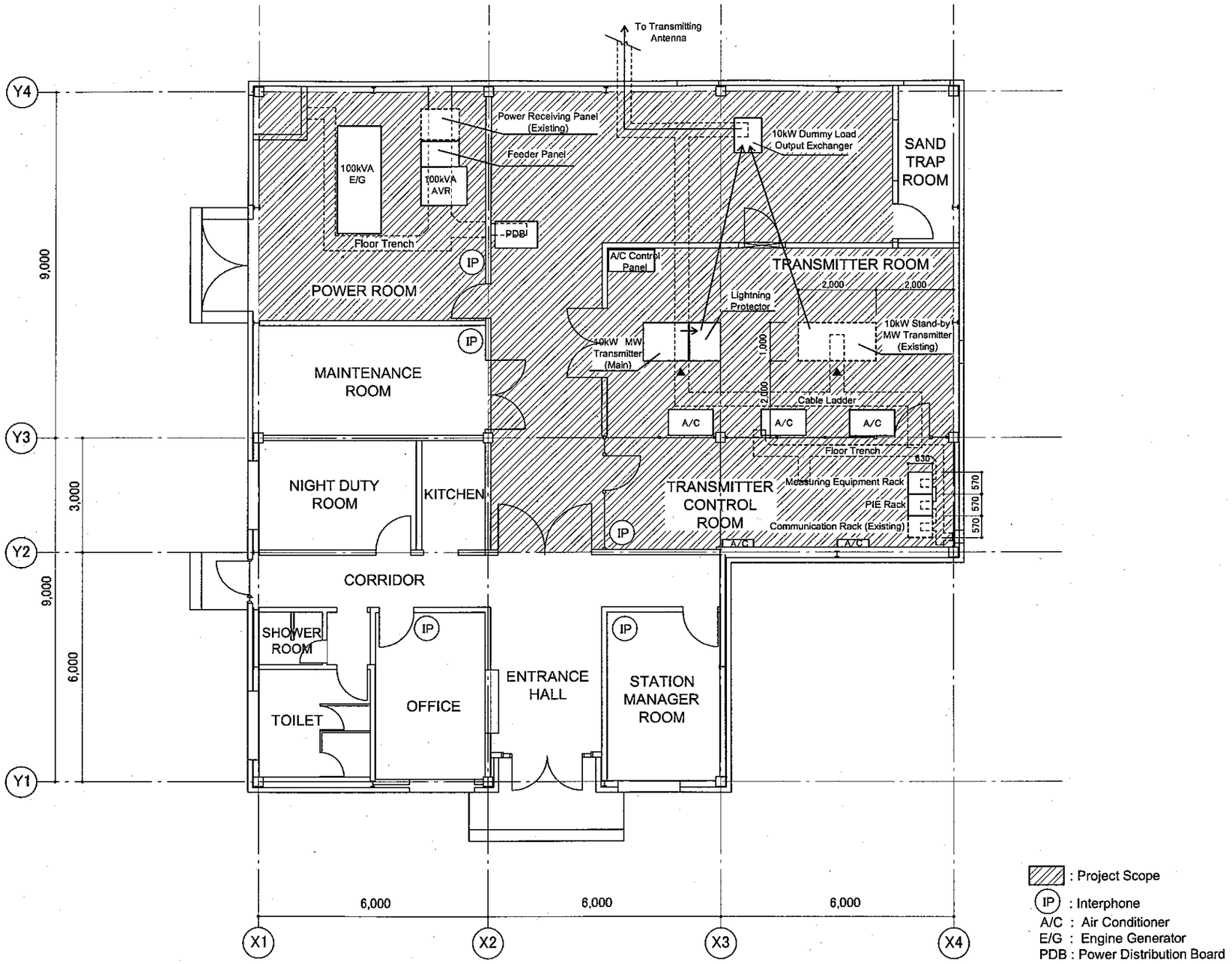


Fig. 2-2-16: BARDIBAS 10kW MW TRANSMITTING STATION EQUIPMENT LAYOUT

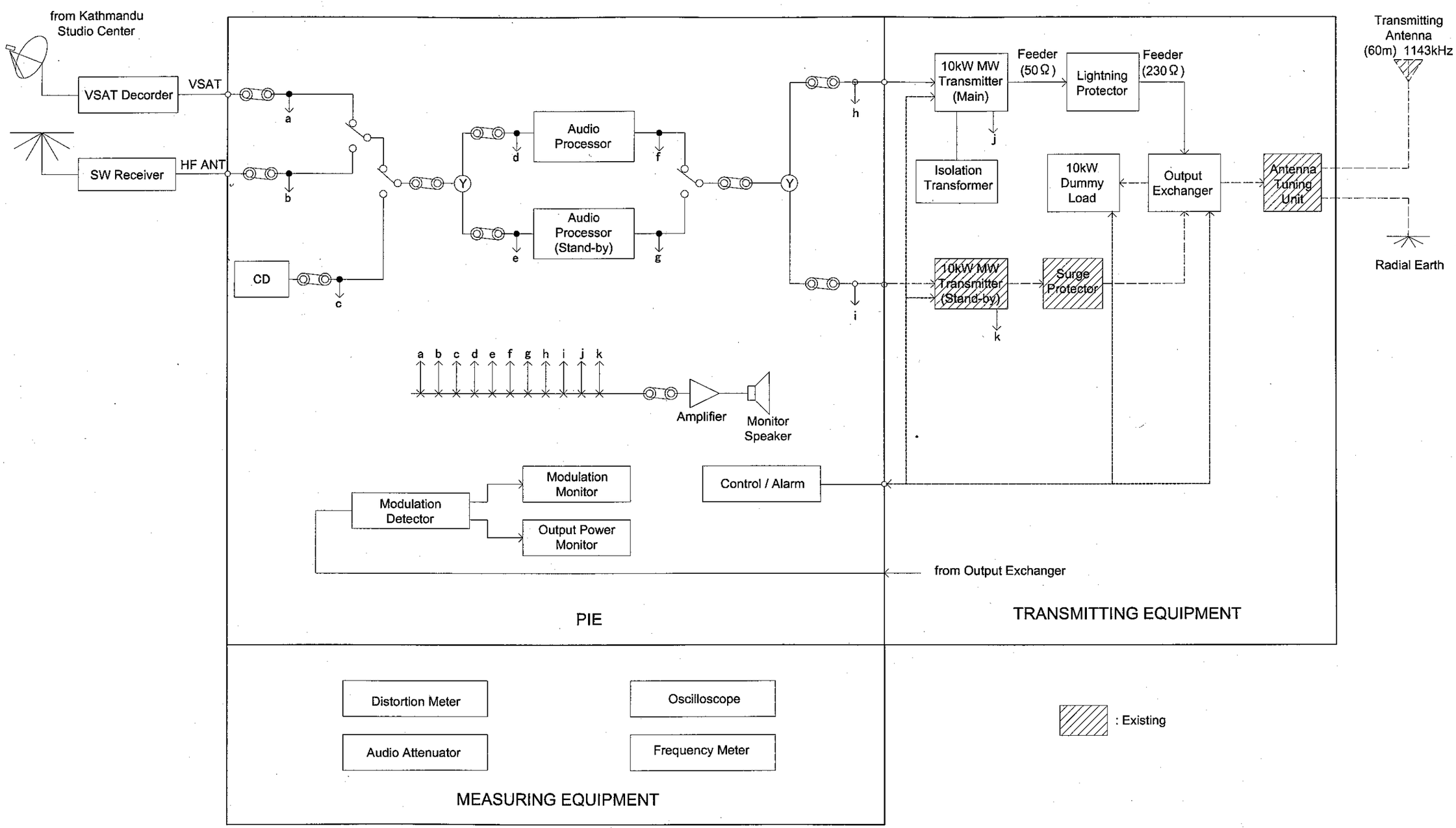


Fig. 2-2-17: BARDIBAS 10kW MW TRANSMITTING STATION SCHEMATIC DIAGRAM

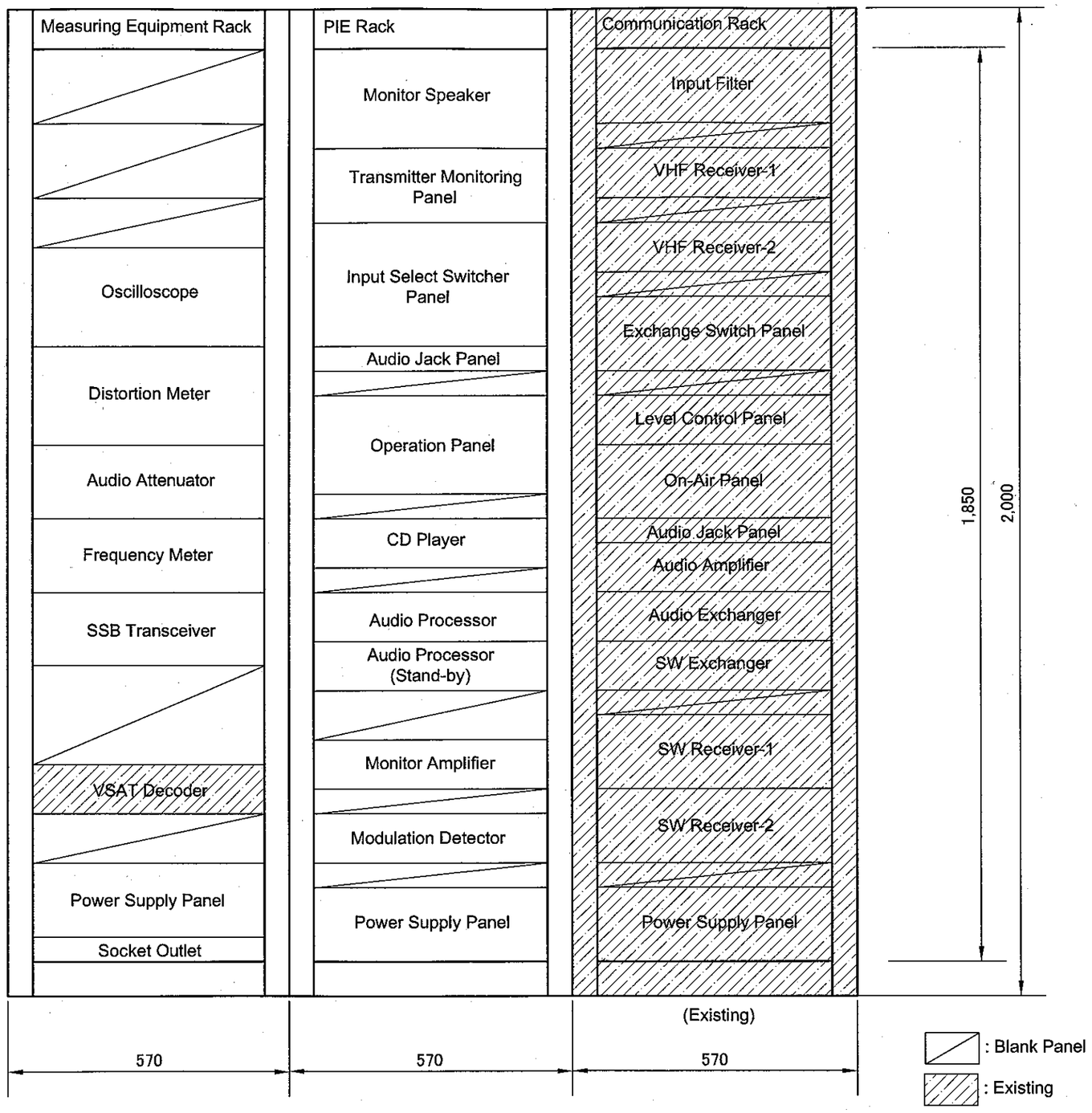


Fig. 2-2-18: BARDIBAS 10kW MW TRANSMITTING STATION EXTERNAL VIEW OF PIE RACK & MEASURING EQUIPMENT RACK

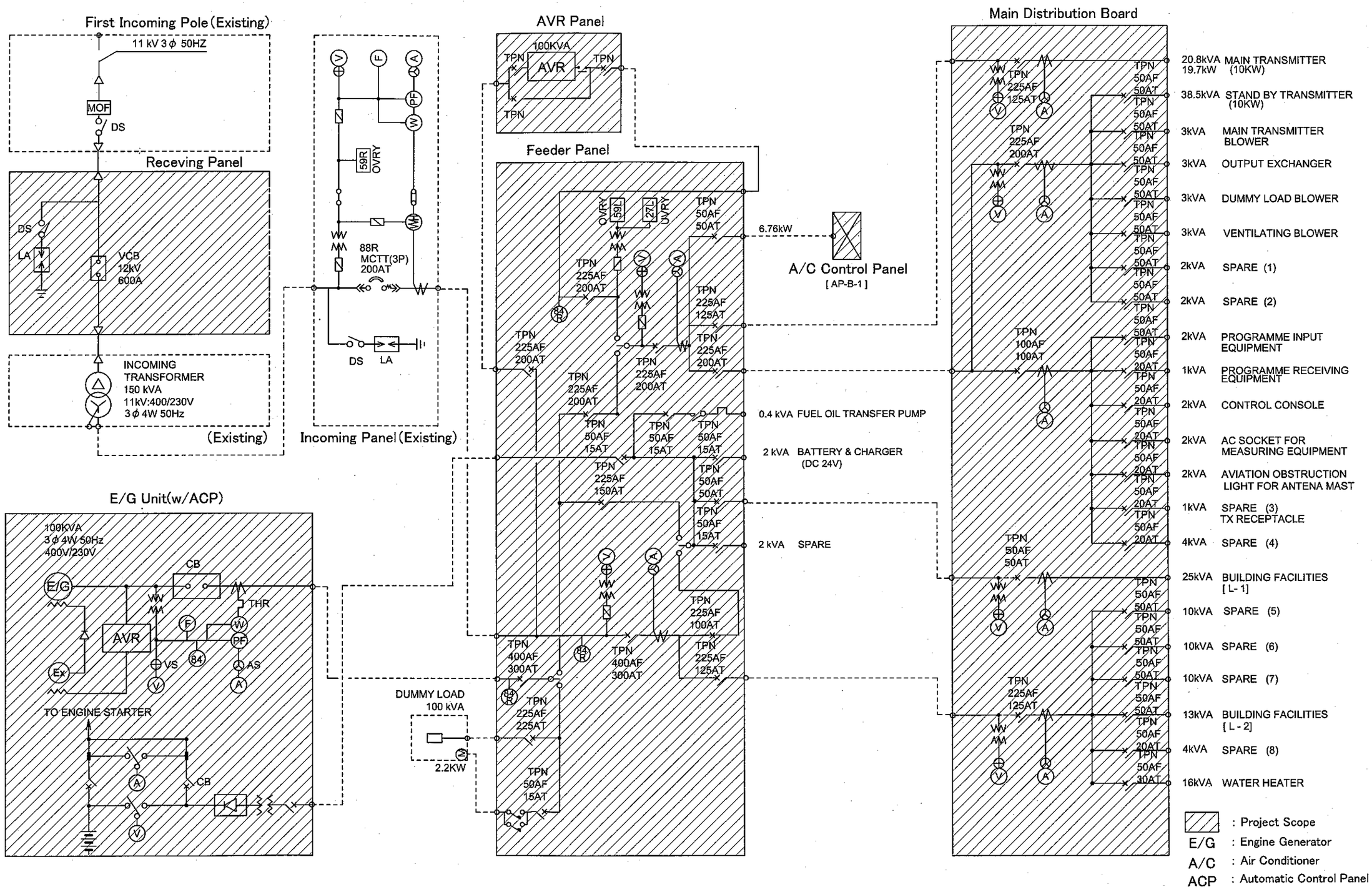


Fig 2-2-19: BARDIBAS 10kW TRANSMITTING STATION SINGLE LINE DIAGRAM

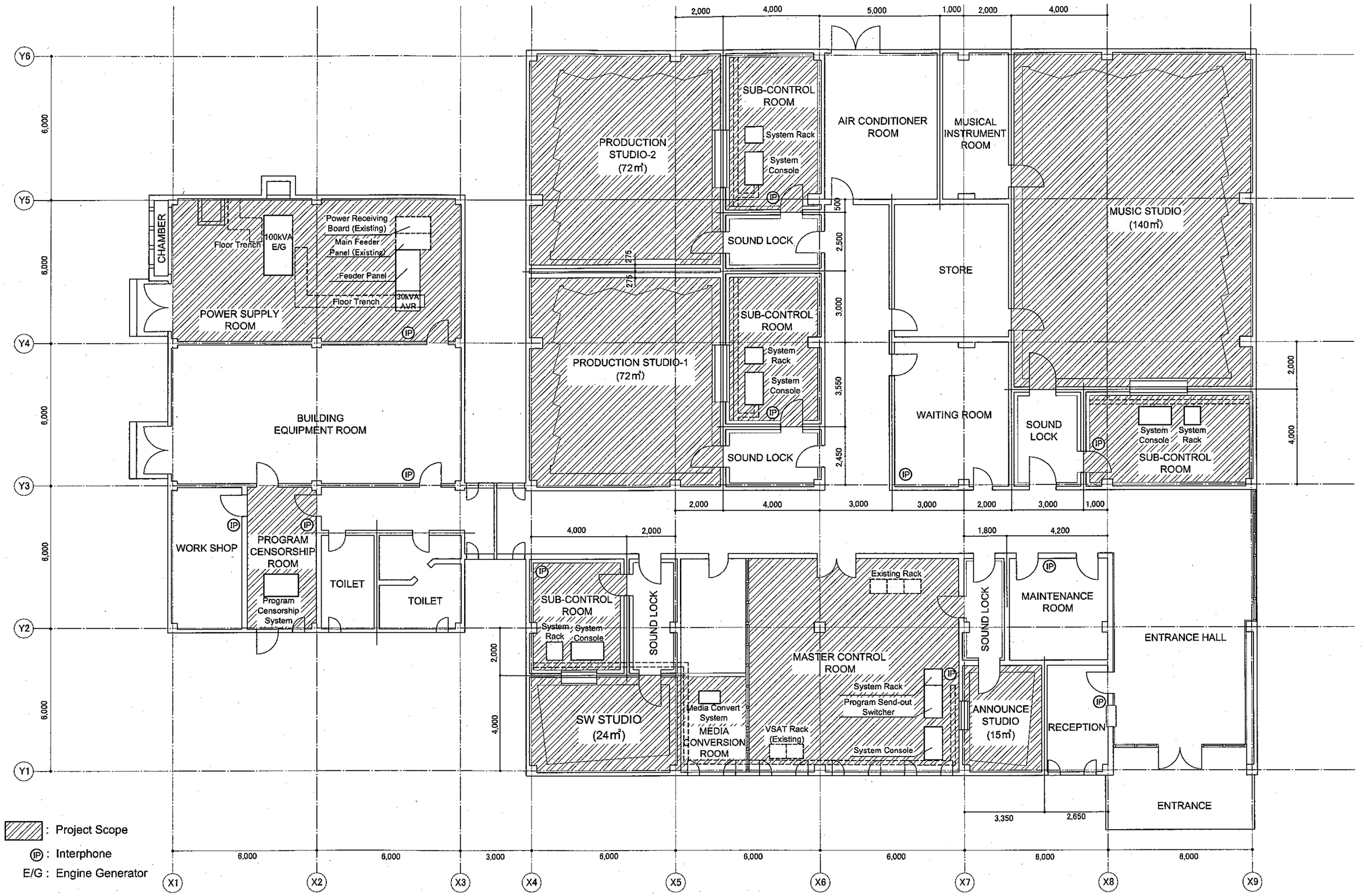
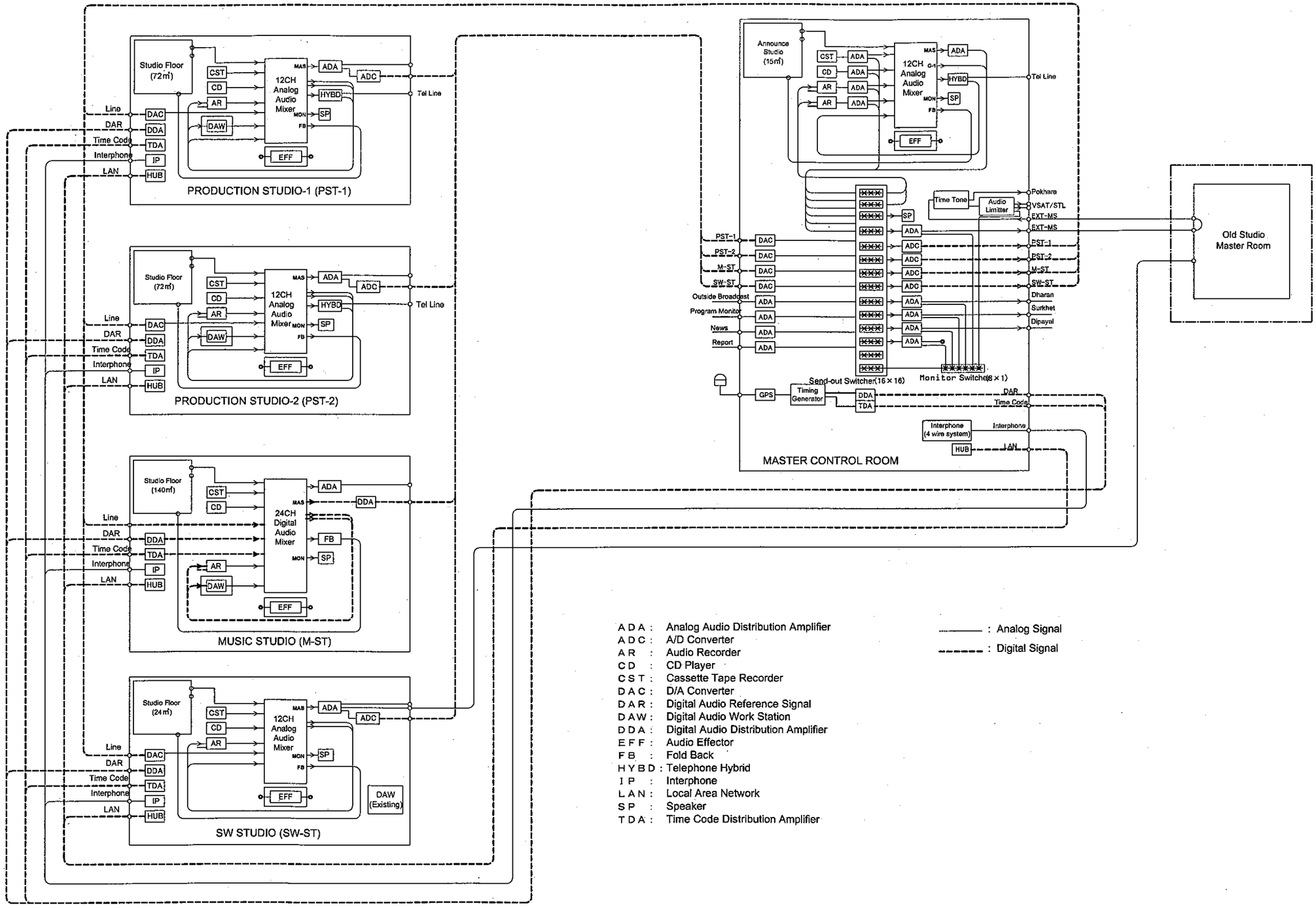


Fig. 2-2-20: KATHMANDU STUDIO CENTER EQUIPMENT LAYOUT



ADA : Analog Audio Distribution Amplifier
ADC : A/D Converter
AR : Audio Recorder
CD : CD Player
CST : Cassette Tape Recorder
DAC : D/A Converter
DAR : Digital Audio Reference Signal
DAW : Digital Audio Work Station
DDA : Digital Audio Distribution Amplifier
EFF : Audio Effector
FB : Fold Back
HYBD : Telephone Hybrid
IP : Interphone
LAN : Local Area Network
SP : Speaker
TDA : Time Code Distribution Amplifier

——— : Analog Signal
- - - - - - : Digital Signal

Fig. 2-2-21: KATHMANDU STUDIO CENTER SCHEMATIC DIAGRAM

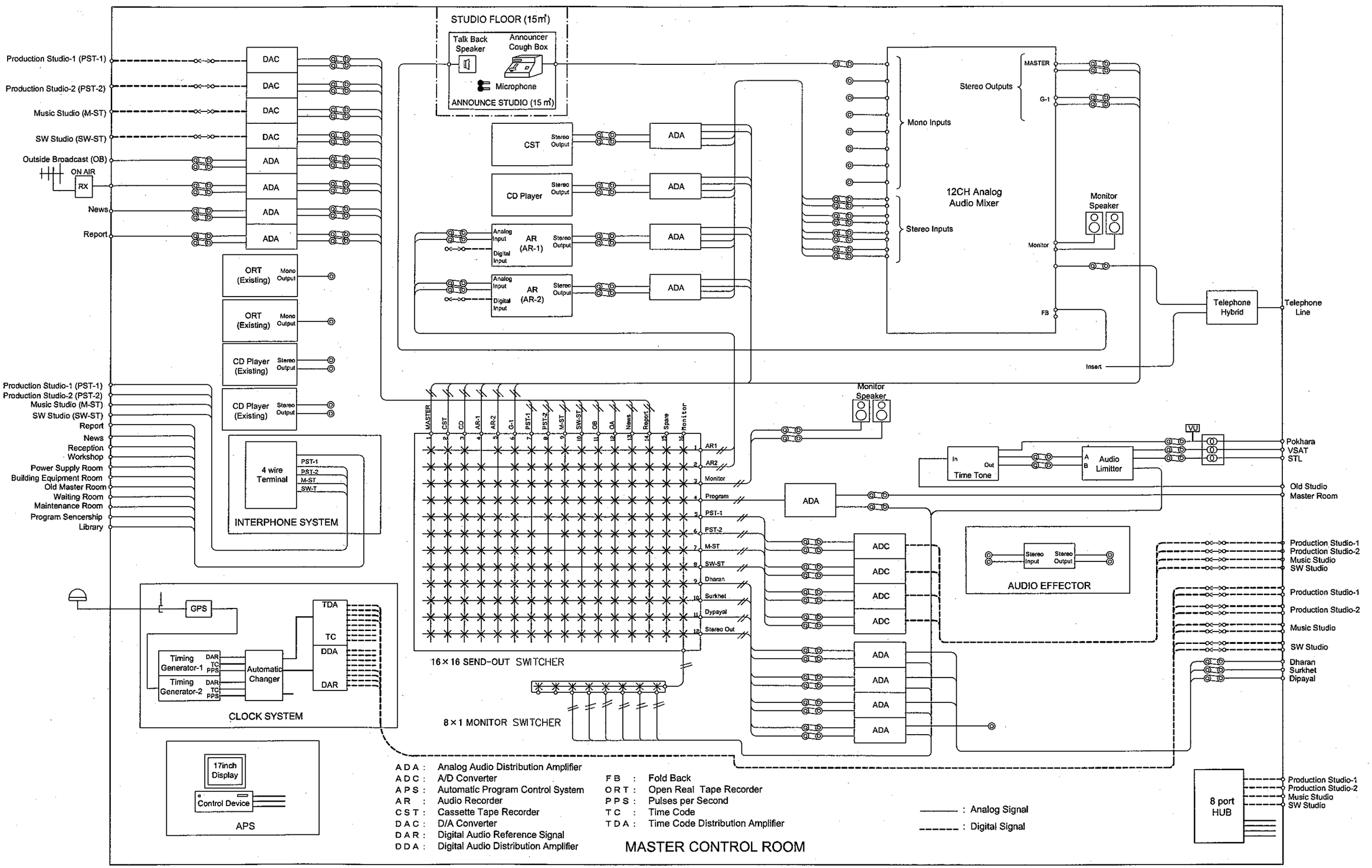


Fig. 2-2-22: KATHMANDU STUDIO CENTER SCHEMATIC DIAGRAM OF MASTER CONTROL ROOM

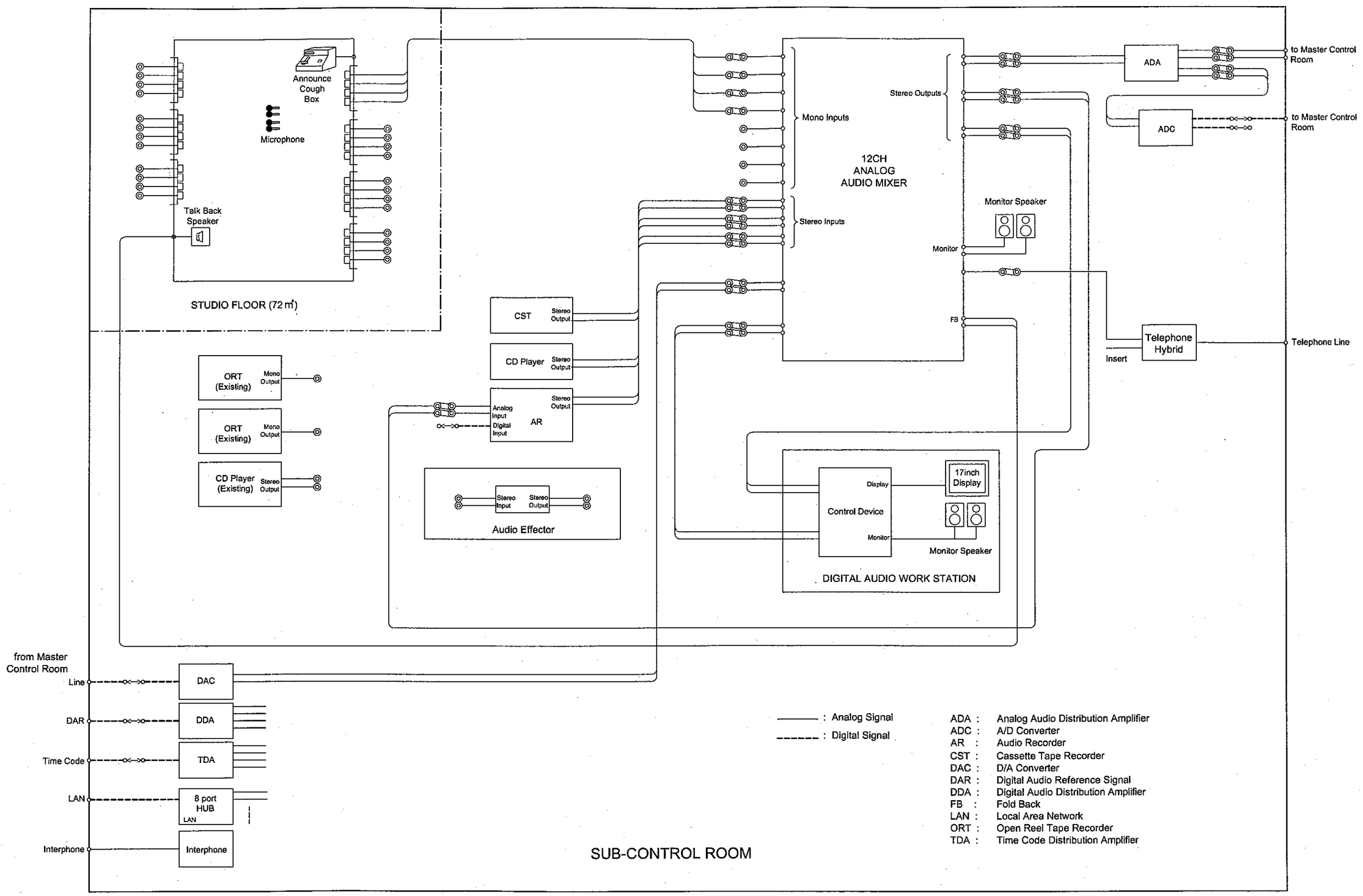


Fig. 2-2-23: KATHMANDU STUDIO CENTER SCHEMATIC DIAGRAM OF PRODUCTION STUDIO-1

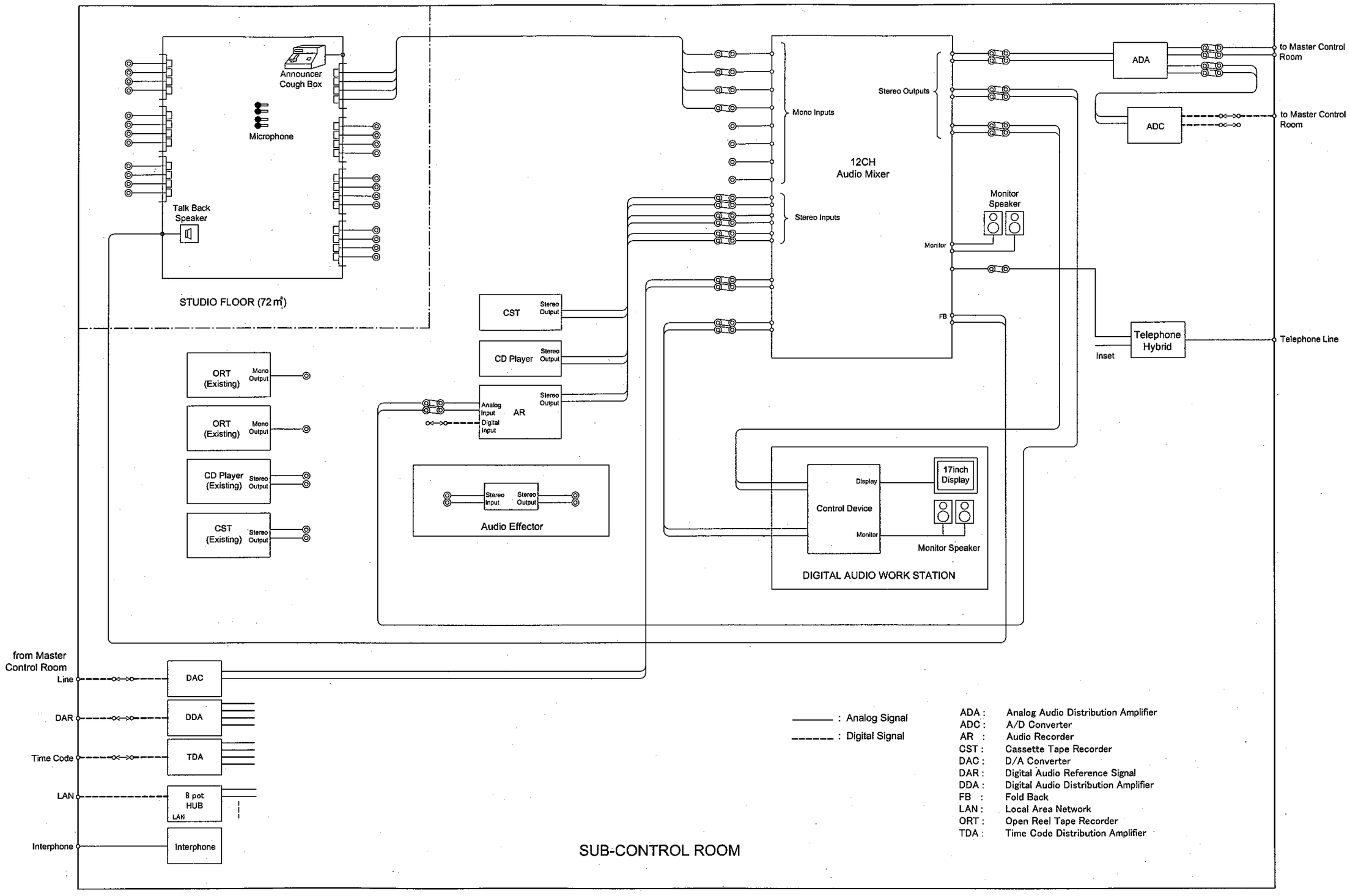


Fig. 2-2-24: KATHMANDU STUDIO CENTER SCHEMATIC DIAGRAM OF PRODUCTION STUDIO-2

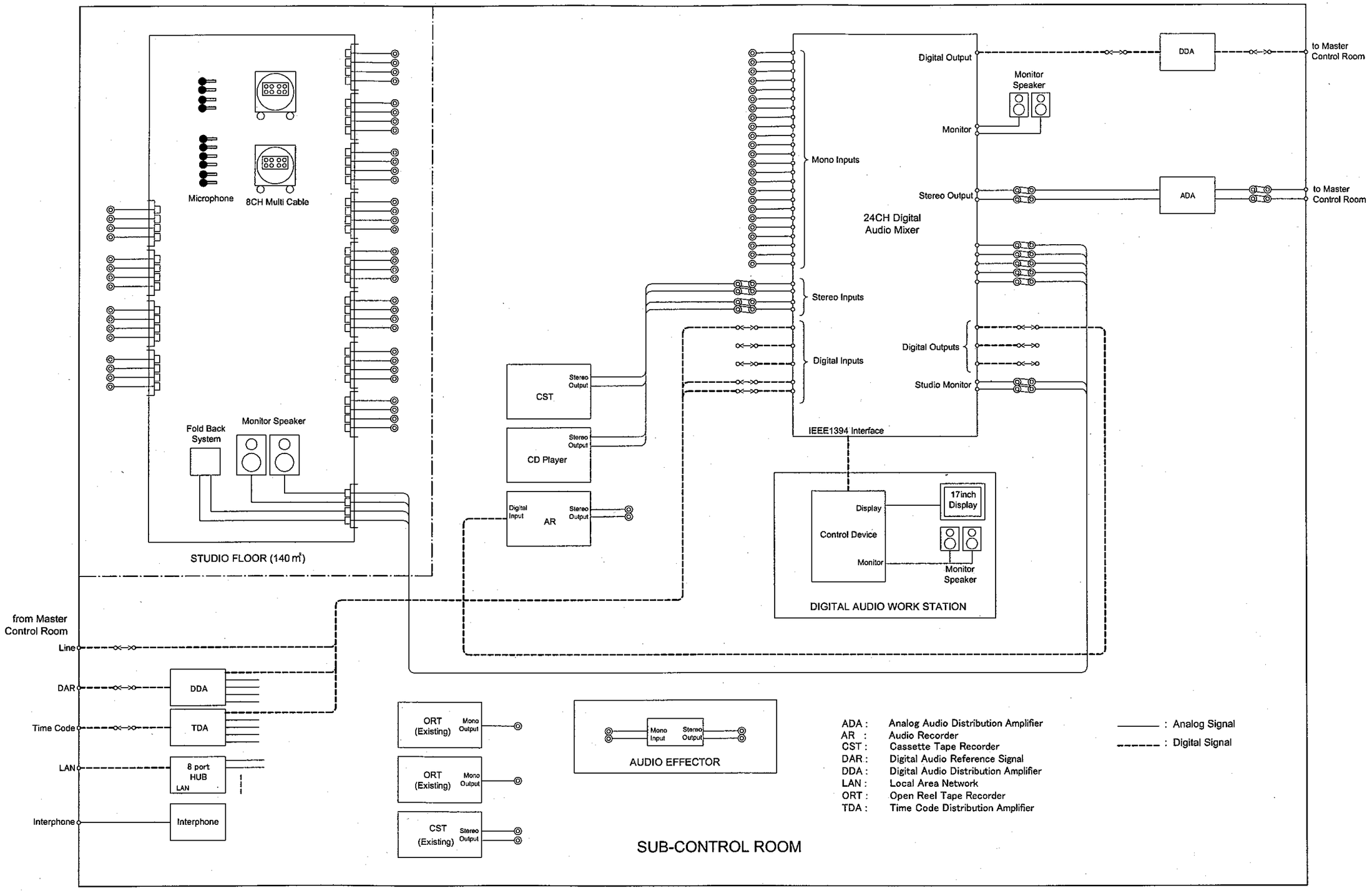


Fig. 2-2-25: KATHMANDU STUDIO CENTER SCHEMATIC DIAGRAM OF MUSIC STUDIO

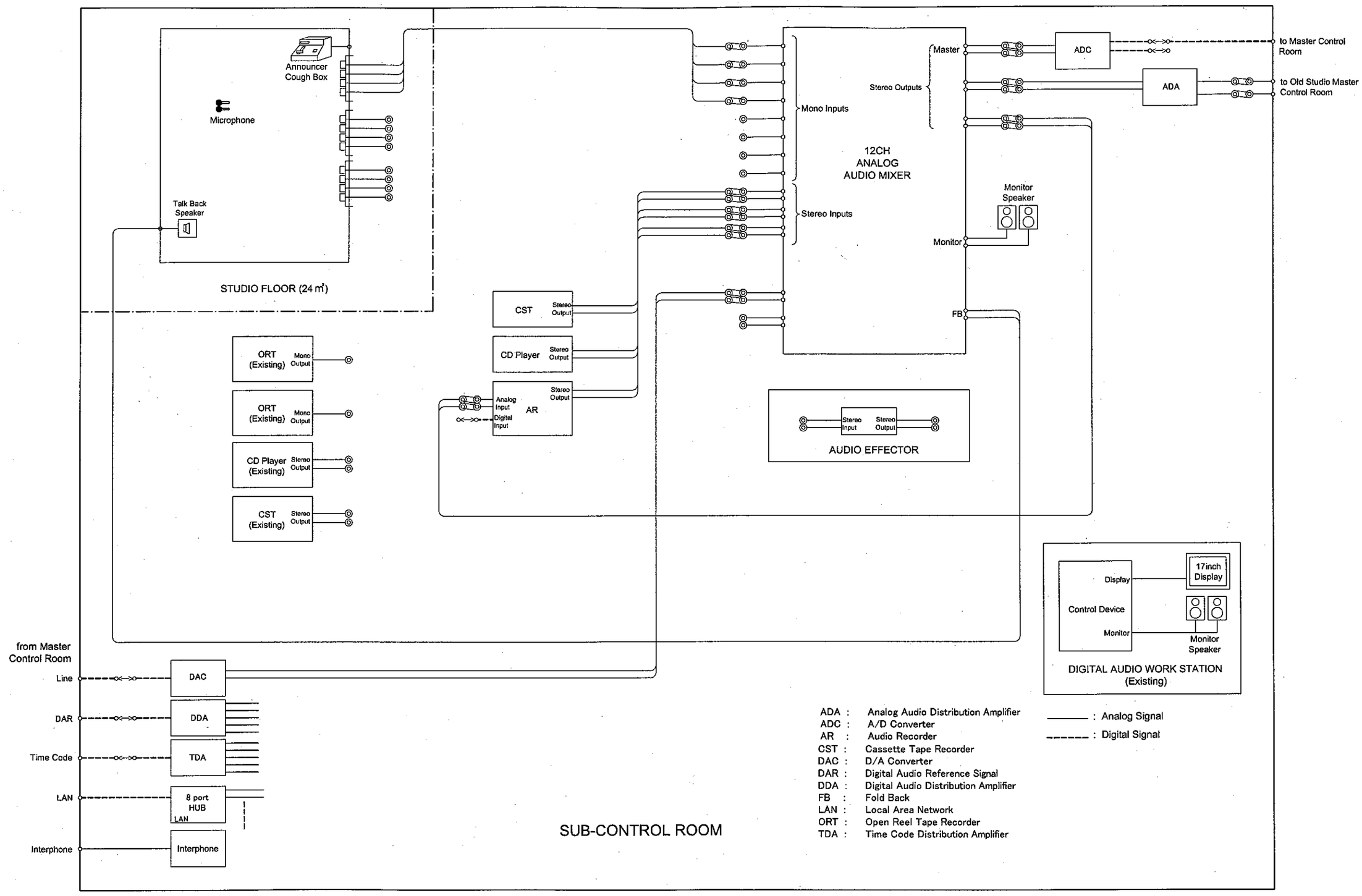


Fig. 2-2-26: KATHMANDU STUDIO CENTER SCHEMATIC DIAGRAM OF SW STUDIO

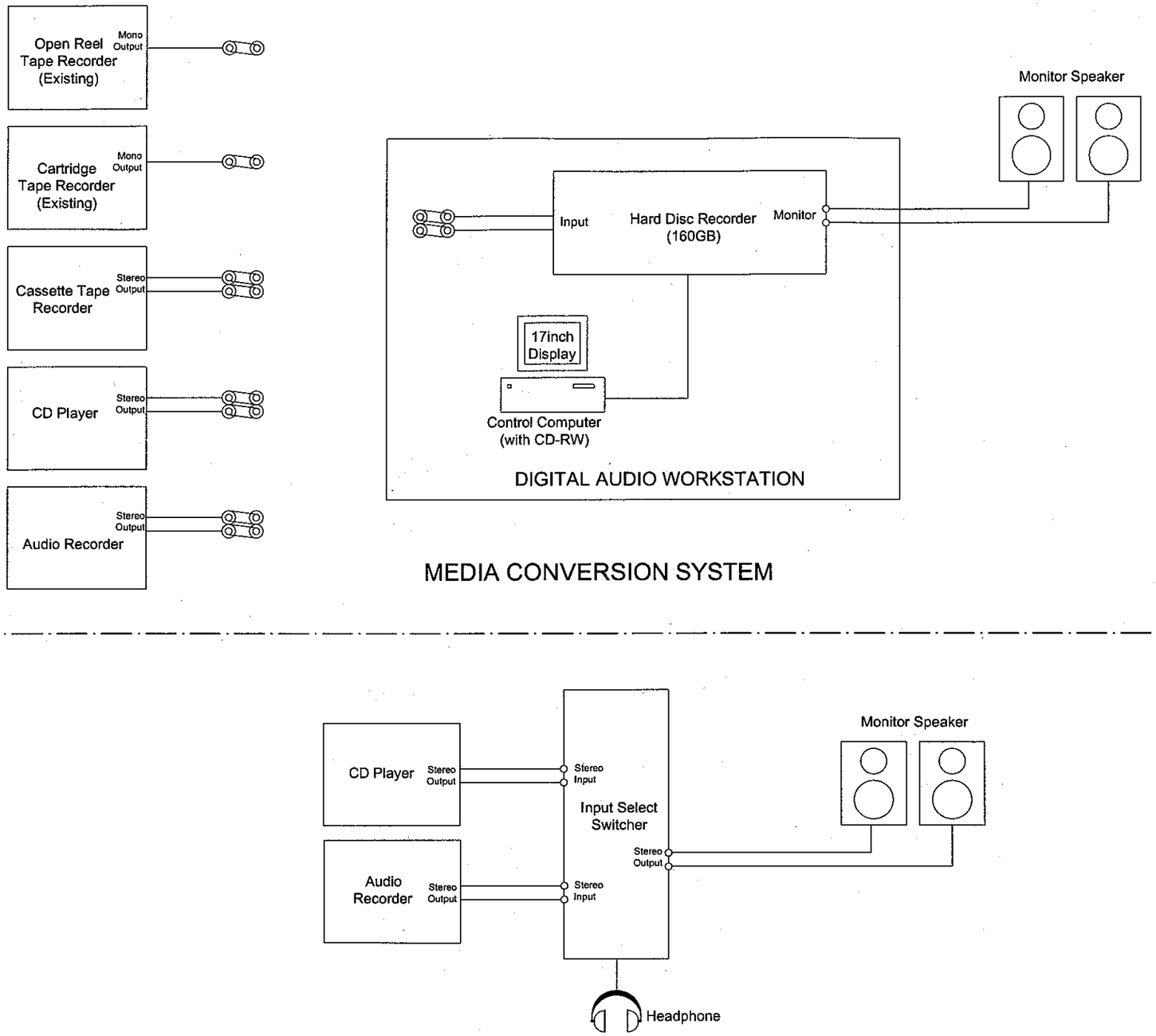
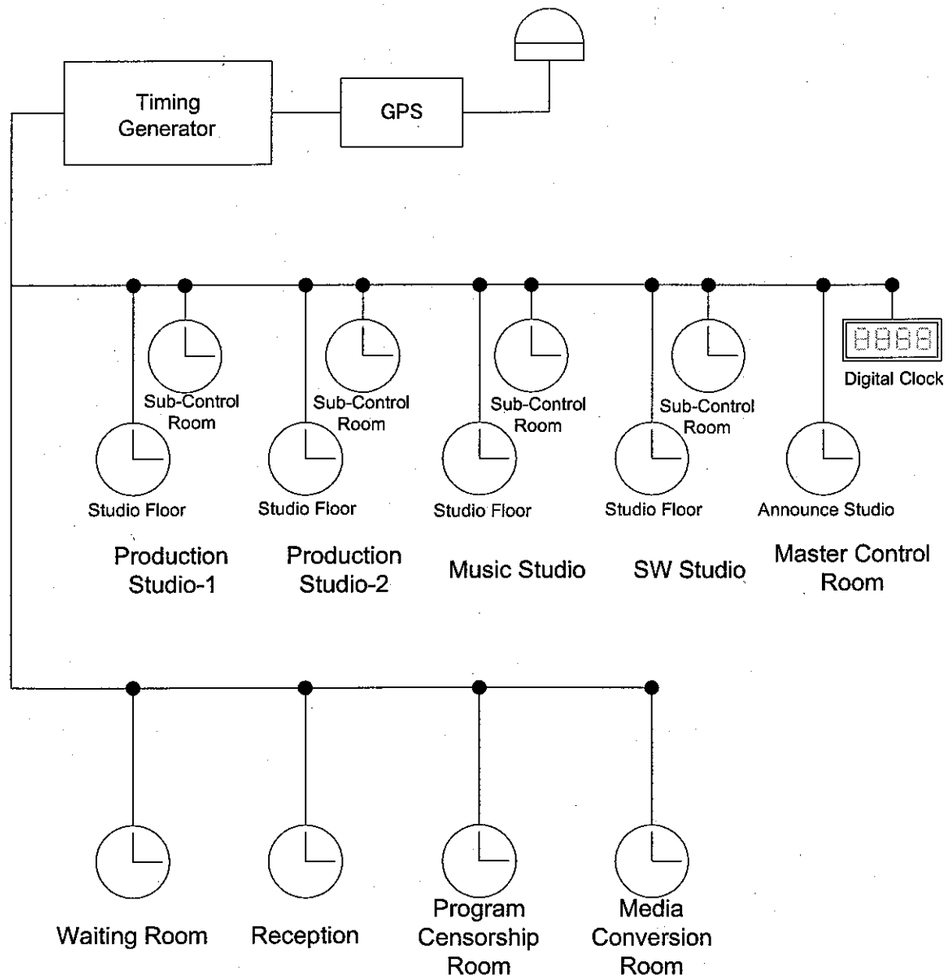
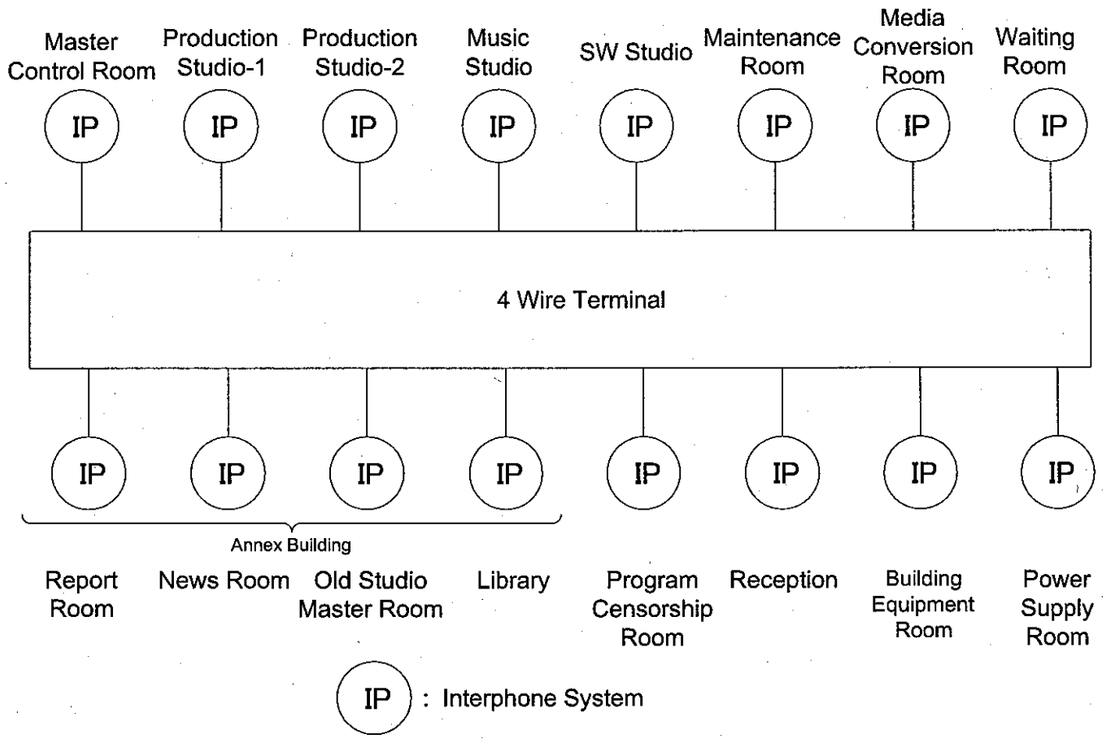


Fig. 2-2-27: KATHMANDU STUDIO CENTER SCHEMATIC DIAGRAM OF MEDIA CONVERT SYSTEM AND PROGRAM CENSORSHIP SYSTEM



CLOCK SYSTEM



INTERPHONE SYSTEM

Fig. 2-2-28: KATHMANDU STUDIO CENTER SCHEMATIC DIAGRAM OF CLOCK SYSTEM AND INTERPHONE SYSTEM

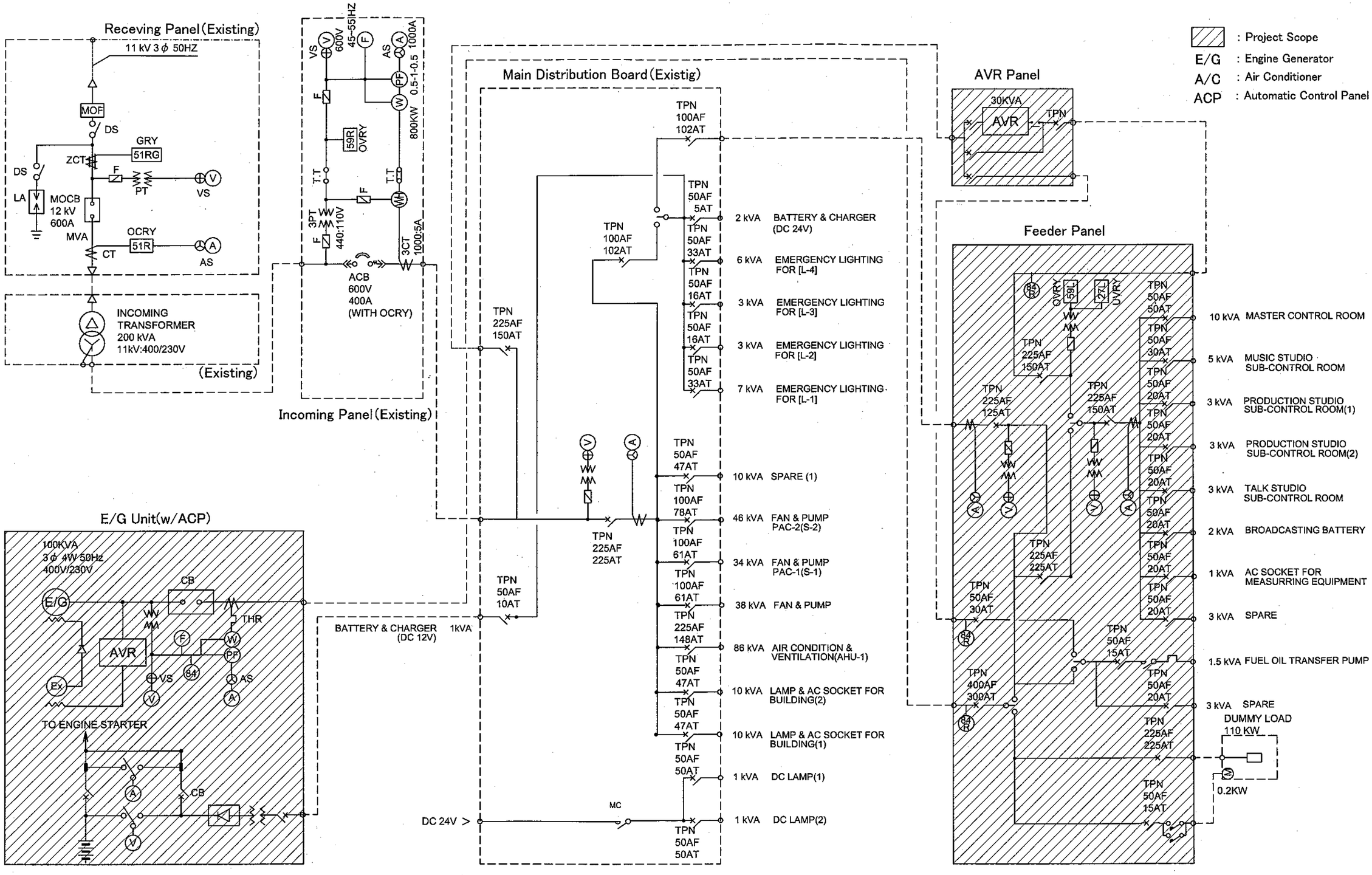


Fig 2-2-29: KATHMANDU STUDIO CENTER SINGLE LINE DIAGRAM

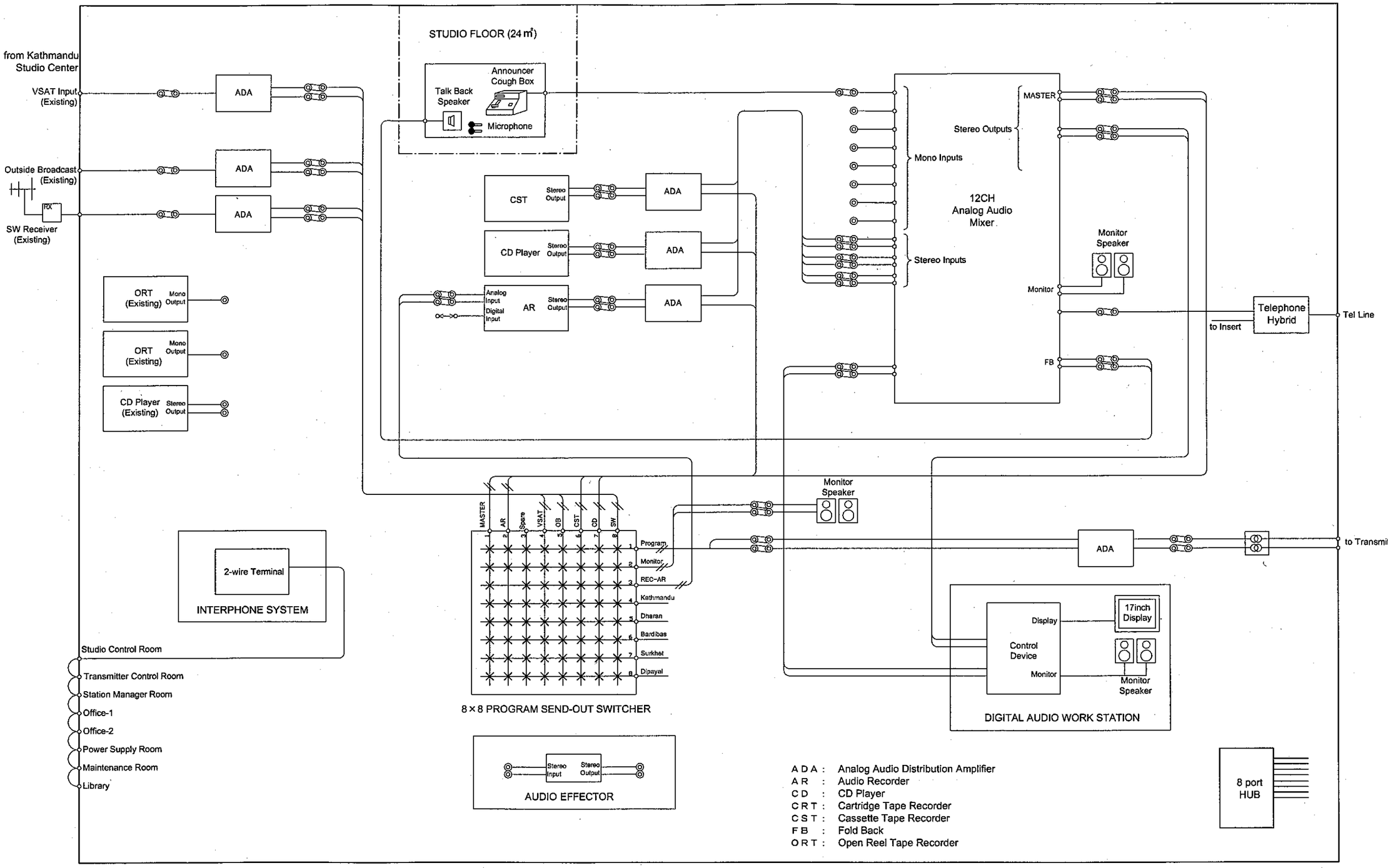


Fig. 2-2-30: POKHARA 100kW MW TRANSMITTING STATION SCHEMATIC DIAGRAM OF CONTINUITY STUDIO

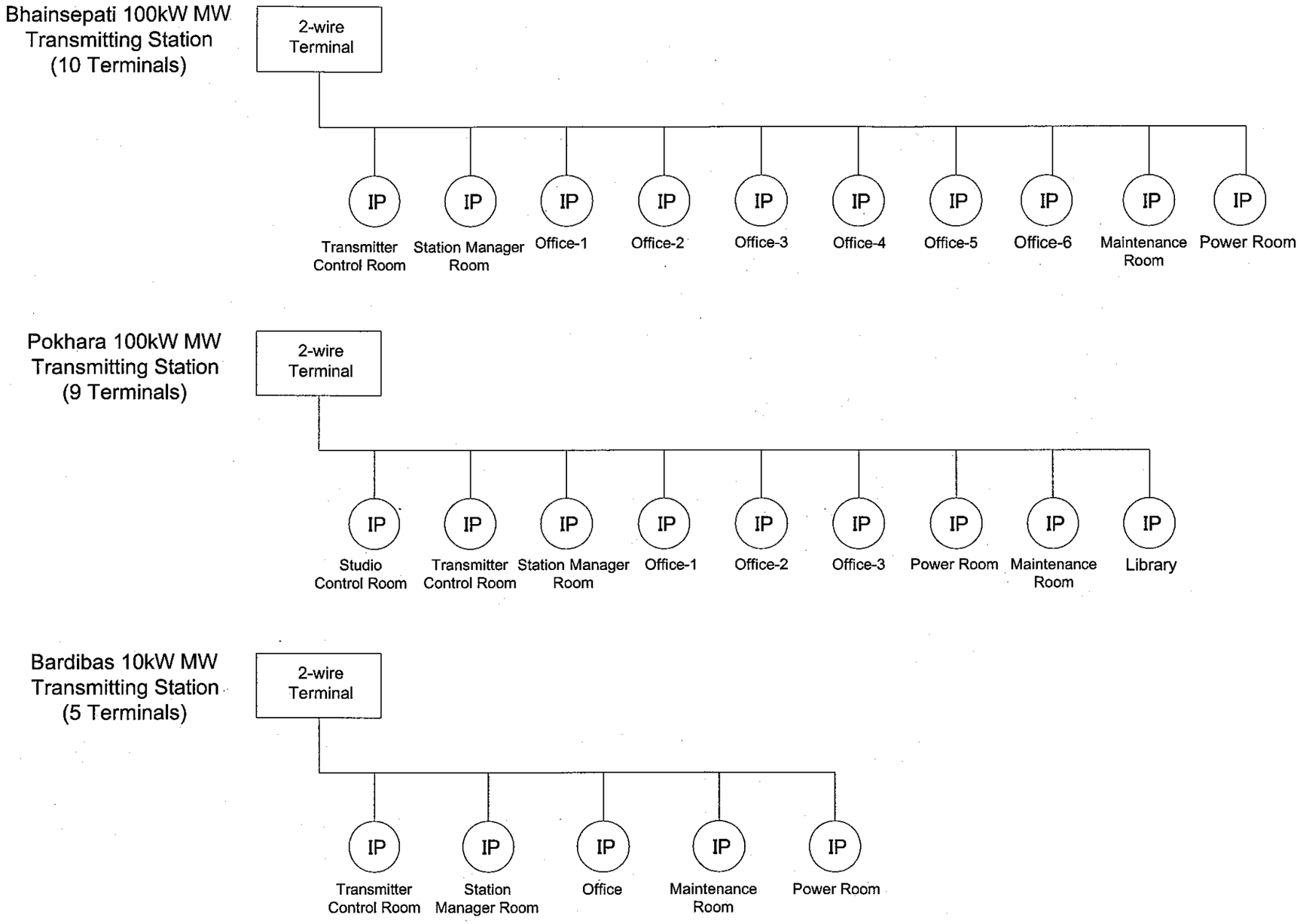


Fig. 2-2-31: SCHEMATIC DIAGRAM OF INTERPHONE SYSTEM (FOR TRANSMITTING STATIONS)

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Implementation Setup

1) Implementation Procedure

This Project will be implemented according to the framework of the Grant Aid Scheme of the Government of Japan. Therefore, it shall be implemented, following Cabinet decision by the Government of Japan and the Exchange of Notes (E/N) between the governments of both countries. Following the E/N, the project implementing agency shall conclude an agreement with the consultant, which shall then enter into the detailed design for the project components of facilities and equipment.

Tender documents prepared by the consultant shall be distributed to prospective tenderers after approval has been obtained from the project implementing agency and the Government of Japan and the announcement of tender. Since the Project consists of two differing components of equipment supply/installation and facility renovation, it is common for specialist contractors to be selected separately by tender for each component. The tender for the project works up to the signing of contracts shall be implemented in Japan. Meanwhile, concerning the consultant agreement, it is normal to be concluded in Nepal.

The contractor decided by the tender for facility renovation shall first start the work. Then the company contracted to supply equipment shall start manufacturing of the equipment and make site installation thereof following the completion of the renovation works. Until the total completion of these works, RNE must consolidate the operation and maintenance setup and secure the necessary operating budget and manpower.

2) Role of Each Organization in Project Implementation

The roles and important duties of each organization concerned with the project implementation are summarized in the following paragraphs.

(a) Project Implementing Agency

The project implementing agency is Radio Nepal (RNE) under the supervision of the Ministry of Information and Communications (MOIC). In order to ensure full understanding of the grant aid system and the smooth implementation of the Project, RNE must maintain close communications with all related agencies on the Nepali and Japan sides and appropriately coordinate work in all stages of the Project. Moreover, the MOIC (the responsible Ministry) should make the utmost effort in order to secure sufficient budget for

carrying out the scope of works of Nepali side and enabling RNE to conduct appropriate operation and maintenance.

RNE and the MOIC should place emphasis on implementing the following items:

- Securing of budget for the scope of works done by Nepali side and formulation and implementation of the construction schedule that complies with the overall project schedule;
- Identification and handling of all the procedures that need to be followed on the Nepali side during the project period; and
- Understanding and arrangement of permits and authorizations connected with the Project, and provision and coordination of relevant information with the consultant

(b) Consultant

Following the Exchange of Notes (E/N) between the governments, RNE shall conclude a consultant service agreement for detailed design and supervision works with the Japanese consultant, and the Government of Japan shall verify this agreement. Following the verification, the consultant shall implement survey and discussions concerning the contents of the detailed design in Nepal with RNE, and then shall commence the detailed design according to this basic design study report. The consultant shall compile the findings of the detailed design into the design drawings and specifications, and shall also prepare the instructions to tender, draft contracts, general contract conditions and other tender documents and obtain approval thereof from RNE.

In the tender stage, the consultant shall act on behalf of RNE in carrying out all tender affairs up to the signing of contracts between RNE and contractors including advertisement of tender, distribution of tender documents, answer to questionnaire, opening of bids, contract negotiations, and so on. Moreover, in the consultant supervision stage, the consultant shall implement all supervisory service from renovation work of facilities and procurement of equipment through to installation, adjustment and handing over. In this Project, one of the most important tasks of the consultant is to act as a coordinator on the interface and work schedule between the facility renovation works and equipment installation works.

(c) Contractors

The contractor to carry out the facility renovation works must be a construction company that is registered based on the Japanese Construction Industry Law. Similarly, the contractor to supply and install equipment shall be selected from Japanese general trading

companies that possess ample experiences in this field. These conditions shall be stipulated in the tender announcement, and open tender shall decide the contractors for both work components. The contractors shall complete the renovation, procurement and installation of facilities and equipment that comply with the specifications prepared by the consultant within the respective contract periods. When handing over the buildings and equipment, the contractors shall submit adequate maintenance manuals.

Therefore, the basic contracting procedure for the Project is separate ordering to two contractors for the facility and equipment components. However, in the event where special circumstances dictate that both project components must be implemented simultaneously or where the contents of works are complexly intertwined, it may be deemed conditional for both contractors to respond to the tender as a joint operation.

(2) Need for Dispatch of Engineers

1) Equipment Installation Works

Almost all the broadcast equipment planned for procurement in the Project will be manufactured in Japan or third countries and transported to Nepal in whole or disassembled form. Following to the arrival in Nepal, it will be necessary to implement installation, assembly and adjustment work. Because these disassembly and assembly works are based on know-how specific to the equipment manufacturing sector, sophisticated expertise is required in order to adjust and test equipment after installation, and the installation works entail a series of handing over procedures including explanation and education of handling methods and inspection of quantities, etc., it is essential that engineers be dispatched from the manufacturer for the installation work. The details and number of engineers to be dispatched and the period of dispatch shall be kept to a minimum, and installation work shall be implemented while carrying out OJT training on methods of operations and maintenance of equipment to the RNE engineering staff and local technicians. In addition, engineers dispatched from Japan will organize a 30-day training course in maintenance and operation of digital equipment provided under this Project for the RNE engineering staff after completion of the installation work.

2) Facility Renovation Works

(a) Skilled Roof Workers

The metal roofing used on the roof of Bardibas Transmitting Station is rustproof type long-size roll-folded sheet metal procured from Japan. Because the same material cannot be procured in Nepal and the roofing needed for renovation must have the same shape as the existing folded sheet metal, the material used in this Project will also be procured from

Japan. For the purpose of improving work accuracy and shortening production time, the folded sheet metal will be produced at the manufacturer's factory into the final sections and sizes suitable to transportation, just to be imported and assembled on site.

At the project site, the delivered roofing will be installed to cover the existing folded sheet metal on the roof. Particularly delicate work is needed in the installation of folded sheet metal to prevent rainwater leakage from joints. Accurate execution of this work cannot be expected without the technical guidance of specialized skilled roof workers dispatched from the manufacturer of the metal roofing. The dispatch of Japanese skilled roof workers is indispensable.

(b) Skilled Metal Workers

The destroyed partition walls of Bardibas Transmitting Station has been made using light gauge steel frames, which cannot be obtained in Nepal. Many of the finishing materials including broken doors and ceiling substructure were made in Japan. Accordingly, it is important to use Japanese product for the renovation of these broken finishes from the standpoint of product quality and accuracy of work. Execution of appropriate work using these metal-based materials to achieve required quality and functions will absolutely need on-site guidance on techniques and working practice given from Japanese skilled workers having thorough understanding thereof.

2-2-4-2 Implementation Conditions

(1) Natural Conditions

According to the result of survey on the rainfall, temperature, humidity, wind velocity, and frequency of earthquakes around the project sites, there are no natural conditions that demand particular attention in relation to the facility renovation works and the equipment installation works. However, the transportation of materials and equipment to Pokhara Transmitting Station and the renovation works and equipment installation works at this site should preferably be executed avoiding the period from June to September, when the monthly rainfall exceeds 600 mm.

(2) Social Conditions

In Nepal, the antigovernment organization of Maoists frequently call for "Bandh." Bandh means a general strike. When Bandh is announced, citizens fearing retribution from Maoists avoid driving cars, and schools, stores and private firms are all closed, and the functions of a city is paralyzed completely. While the call for a Bandh by Maoists is made at irregular intervals, Bandh not always

takes place simultaneously nationwide, because the relative strength of the Government and Maoist varies regionally. Bandh takes place on different days for different periods depending on localities. In addition to Bandh, traffic blockade (road blockade) called "Chakka jam" also occurs frequently.

According to the hearing from local construction firms, they voluntarily suspend works and material transportation when Bandh or blockade is announced. During several years in the past, their works were affected by Bandh and blockade for up to 120 days a year.

It is uncertain that the present situation may be improved quickly before the execution of works in this Project. Consequently, sufficient attention must be paid to the above-mentioned special situation of Nepal in planning of the term of site works and transportation of materials and equipment.

(3) Equipment and Materials Procurement

Only limited construction materials are produced in Nepal, such as cement, aggregate for concrete, bricks, and timber. For many other items, Nepal depends on importation from India, Thailand and China. Although some ordinary buildings may be constructed using these materials that are available in Nepal, this Project involves the renovation of facilities requiring high reliability and durability, and the source of materials and equipment used in such works must be determined after sufficient examination of the compatibility and coherence with the building materials used in existing facilities.

With respect to emergency generators and other building equipment, the Nepali side is placing very much reliance on Japanese products, and they strongly want to procure Japanese products in this Project. In view of this fact, it is considered that procurement and production of building equipment in Japan would be the first choice, but such equipment tends to be expensive, reflecting the high standard of product quality required. Consequently, it is also considered that procurement of third country products should be selected after sufficient examination of the specifications, quality and ease of maintenance of equipment.

In the case of the procurement of made-to-order products and the materials and equipment that are not available in Nepal, it has been reported that importation via local agencies takes considerable time. Therefore, it is desirable that the contractors executing the work directly procure building materials and equipment after sufficient research regarding importation procedures and the time required.

(4) Operation of Existing Facilities

The renovation works at transmitting stations and Kathmandu Studio Center need to be executed without interrupting broadcasting and program production functions in principle. At present, broadcasting time is from 5 a.m. to 11 a.m. and from 1 p.m. to 11 p.m., i.e. for 16 hours a day in total. Thus, it is extremely difficult to complete renovation works and installation works using only the period when broadcasting is turned off. In planning of the methods and schedules of renovation and

installation works, it is needed to have sufficient prior discussion with the RNE side with regard to duration of works, work hours in a day, scope and method of work, etc., and develop plans for efficient execution of works minimizing the need for interruption of broadcasting and program production functions, based on mutual understanding.

(5) Securing of Safety

During the work period, the contractors and the consultants shall strive to secure safety by obtaining the latest information concerning public order around and en route to the project sites. If deemed that safety cannot be secured, countermeasures shall be determined upon holding discussions with agencies of the Government of Japan (Embassy of Japan in Nepal, JICA Nepal Office, Ministry of Foreign Affairs, JICA Headquarters) and the Government of Nepal (MOIC, RNE).

2-2-4-3 Scope of Works

The scope of works to be done by Japanese and Nepali sides respectively are shown in Table 2-2-8 below, in case the Project is implemented under Japan's grant aid.

Table 2-2-8: Major Undertakings of Each Government

No.	Items	To be Covered by Grant Aid	To be Covered by Nepali side
(Broadcast Equipment-related Items)			
1.	Procurement of equipment, installation at project sites, and adjustment after installation	●	
2.	Removal of existing transmitting equipment at Bhainsepati and Pokhara Transmitting Stations	●	
3.	Removal of studio equipment to be renewed in Kathmandu Studio Center and the studio in Pokhara Transmitting Station	●	
4.	Restoration of the disrupted radial earths and backfilling of security trenches at Bardibas Transmitting Station		●
5.	Removal, carrying out, and disposal of the equipment to be renewed at Bardibas Transmitting Station		●
6.	Carrying out and disposal of removed transmitting equipment and studio equipment at Bhainsepati Transmitting Station, Pokhara Transmitting Station and Kathmandu Studio Center		●
(Facility Renovation-related Items)			
1.	Facility renovation at Bardibas, Bhainsepati and Pokhara Transmitting Stations	●	
2.	Renovation related to emergency generator at Kathmandu Studio Center	●	
3.	Removal works associated with facility renovation (removal to specified places in the premises)	●	
4.	Securing of spaces for temporary works, such as field office and materials yard		●
5.	Carrying out and disposal of building materials and facility equipment removed by contractors		●
6.	Procurement of needed furniture, fixtures, telephones, and other accessory equipment other than that covered by the Japanese side		●
(Others)			
1.	Acquisition of all the legal authorizations required in Nepal		●
2.	Securing the safety of consultants and contractors during work period		●
3.	Exemption of tariffs and taxes on building materials and transmitting equipment		●
4.	Issue of the authorization to pay and payment of bank commissions arising from issue and revision hereof		●
5.	Appropriate and efficient maintenance and operation of the provided facilities and equipment		●
6.	Execution of other undertakings of Nepali side defined in the E/N		●

2-2-4-4 Consultant's Supervision

(1) Basic Concept of Supervision

To ensure the smooth execution of the Project, the consultant shall organize a project team to manage the implementation of detailed design and supervision works based on the purport of the basic design. The basic concept of the supervision work shall be as follows.

1) Carry out fine-tuned adjustments between the parties in charge to ensure that no discrepancies arise between the facility renovation and equipment installation work, and make the utmost effort to ensure completion of the works on schedule.

2) Appropriately report on work progress to related agencies in both countries to ensure there are no discrepancies in their understanding of work status. Moreover, give prompt responses and advice to inquiries from contractors.

3) Be prepared to offer technical transfer to officials on the Nepali side in order to realize the effects of the grant aid. Moreover, always be ready to offer adequate and appropriate explanations concerning not only the design concept of facilities and equipment but also execution methods and technology, etc.

(2) Contents of Consultant's Supervision

The contents of the supervision work to be implemented by the consultant are as follows.

1) Contract-related Service

The consultant shall implement such contract-related services as: preparation of detailed design and tender documents, pre-qualification examination of contractors, handling of bidders from advertisement of tender through to opening of bids, assessment of tenders and selection of contractors, holding of contract negotiations, and witnessing of the contracts, etc., and report on the progress and results of such events to RNE at appropriate points.

2) Screening of Items Submitted by Contractors

The consultant shall review execution plans, work schedules, working drawings, shop drawings, technical materials and samples, etc. and approve them upon confirming their compliance with design drawings and specifications, etc.

3) Supervision of Work

The consultant shall dispatch supervisors to the project sites at appropriate points during the execution period to monitor whether the works are being implemented according to the

specifications and drawings and to give the necessary instructions. Moreover, the consultant shall constantly monitor in detail the work progress and offer appropriate advice and guidance to the contractors. The consultant shall prepare monthly reports of work progress and inform the parties related thereto.

4) Cooperation Regarding Payment Approval Procedures

Concerning contract fees to be paid to contractors during and after the works, the consultant shall examine all requests for payment, etc. that are submitted by the contractors, and issue the necessary certificates.

5) Inspections and Witnessing

The consultant shall implement or witness: pre-shipment inspections of equipment at the plant, various tests implemented on site or at test agencies, and acceptance inspection on completion of the work. The consultant shall give approval when the inspection results comply with specifications and design documents, or issue proper instructions to contractors if nonconformities are found. Test results shall be compiled into the monthly reports and fed back to the related parties.

6) Assistance of Handing Over Procedures

In addition to compiling the acceptance inspection report, the consultant shall review and approve the locks, spare parts and equipment manuals and maintenance manuals, etc. that are handed over by the contractors and provide pertinent advice to the client concerning the operation and maintenance of facilities and equipment.

(3) Supervision Staffing Plan

The Project is a combined undertaking incorporating facility renovation and equipment supply/installation, and the transmitting stations and studio center planned for renovation are technical facilities that require highly sophisticated supervision work. The consultant supervision must be advanced while maintaining close communications with Nepali government agencies and the contractors of both facility renovation and equipment to ensure that overall work conditions are continually understood, to coordinate with requirements on the equipment side, and to uphold the work schedule while at the same time securing quality of the buildings. Accordingly, it is essential that permanent supervisors of building expertise are dispatched to the project sites to manage the renovation work, and that building equipment supervisors are dispatched as required.

Similarly, equipment supervisors will be dispatched to the sites during the term required for the installation and handover as well as temporary supervisors to be dispatched for transmitting equipment

and studio equipment. Requirements for the selection of supervision staff in both fields shall be possession of abundant experience, appropriate technical judgment, broad perspective and coordinating ability.

2-2-4-5 Quality Control Plan

The consultant shall carry out quality control based on the purport of the basic design during the project execution stage. The JIS definition of quality control, i.e. 'the structure of means for economically producing goods or services of quality that complies with customer requirements', shall be adopted as the basic line of the project execution. The consultant shall implement the following quality control work:

(1) Quality Control on Supply / Installation of Equipment

The consultant will provide the contractors with appropriate guidance to entirely assure the quality of the equipment procured in this Project, by carrying out detailed surveillance on all the stages of the Project from the tender, installation, adjustment and inspection, and completion and handover. Among the all processes, the following is five important points in terms of quality control.

- Tendering
- Manufacturing of equipment
- Shipping and transportation
- Installation work in Nepal
- Adjustment, acceptance test and handover of the equipment

The priority issues at each of the above five stages are summarized below.

1) Tendering

At the tendering stage, the consultant will examine in detail if the systems proposed by tenderers comply with the specifications provided for under the tender documents.

2) Manufacturing of Equipment

The consultant will confirm in detail the conformity of the technical documents, drawings, samples, and others submitted by the equipment vendors to the standards stated in the specifications. At the stage of shipping from the factory, the consultant will request for and confirm the functional test results and electric characteristics data thereby scrutinizing the completeness of the system.

3) Shipping and Transportation

The consultant entrust the following verifications to a reliable, third-party inspection organization,

in prior to shipment of cargo.

- Comparison of the contract equipment list with the shipping documents
- Comparison of the shipping documents with the equipment
- Issuance of inspection certificates

Furthermore, in the aspect of transportation, the consultant will confirm if the transportation route is appropriate, and if necessary measures are in place for minimizing a possibility of accident during transportation, and provide adequate recommendation on rerouting, etc. as necessary.

4) Installation Work in Nepal

During the installation stage, it is no exaggeration to say that execution of safe, accident-free works is the ultimate key to successful installation of equipment. The consultant will provide guidance from this standpoint after prior confirmation of the details of work plan proposed by the contractor, such as planning an unforced schedule, allocating appropriate staff, work procedures, etc., so that the works will be smoothly carried out without any accident.

5) Adjustment, Acceptance Test and Handover of the Equipment

After the installation, adjustment and inspection of the equipment are completed, the consultant will confirm if the original functions and electric characteristics of the equipment are reproduced, by comparing the test data taken at the sites and at the factory before shipment. Further, the consultant will provide the contractor with sufficient guidance on the handover of equipment, suggesting, for example, that the contractor confirm the numbers on the contract equipment list and prepare a detailed spare parts list, so as to transfer adequate technical information to the Nepali side.

(2) Quality Control on Renovation of Facilities

1) Concrete

The quality control of concrete at Bardibas Transmitting Station will be conducted regarding the following items. Because concrete works in other project sites are minimal, the same concrete mixing plan as that used at Bardibas Transmitting Station will be used, and only the confirmation of cement shipping certificate and factory performance table will be conducted.

- Cement:
  Details in cement shipping certificate and factory performance table are checked to confirm the quality of cement.

- Determination of mixing ratio:
  Mixing ratio of ingredients is determined by test mixing so that specified strength and workability is achieved.
- Concrete strength:
  Compressive strength of 4-week old material is confirmed by a public testing organization.
- Concrete laying:
  Slump test is performed before concrete laying to confirm the achievement of specified workability.
- Curing after laying:
  Appropriate curing using water spray after laying is confirmed.

2) Reinforcing Bars

Although imported reinforcing bars can be procured in Nepal, manufacturer's "mill sheet" guaranteeing product quality is not supplied in most cases. Because only small amount of reinforcing bars are used, safety will be ensured by increasing the amount of reinforcing bars relative to concrete (steel ratio), and tensile strength tests will be omitted.

3) Metal Doors and Windows

Metal doors and windows will be selected from Japanese products. The compliance with specifications in wind resistance and air tightness will be confirmed by documents proving performance or test certificates.

4) Folded Sheet Metal Roof

The repair of the folded sheet metal roof will be conducted by the method of covering the existing roof, using the roofing material of the same quality and same shape. There is sufficient accumulation of experience and technical expertise in the application of this method in Japan. The manufacturer and contractor will be directed to prepare working drawings and working directions, and product inspection will be conducted before shipping.

2-2-4-6 Procurement Plan

(1) Procurement Plan for the Equipment

Appropriate countries for procurement of equipment are as a rule limited to Japan or the recipient country in grant aid projects. However, broadcasting equipment, which is composed of state-of-the-art electronic components, is not produced in Nepal. Existing equipment at RNE is mainly made in Japan, and RNE places trust in Japanese products because of their performance stability,

reliability, certainty of supply, and follow-up setup (in particular, spare parts supply is guaranteed for 10 years in the case of Japanese equipment). For this reason, all the equipment shall be, in principle, procured from Japan.

However, the equipment to be provided under this Project seems to include those that are no longer manufactured in Japan or that are not necessarily appropriate to procure from Japan in the light of cost performance against the function and capabilities. Although the equipment to be procured in this Project will basically be Japanese products, possibilities of other OECD member states products such as European countries, U.S.A. and Canada, after due examination in the light of versatility and price.

As a matter of fact, all the vacuum tubes for transmitters to be procured at the transmitting stations concerned will be procured from Eimac Co. of U.S.A., the only manufacturer of the product today. Also, audio processor, send out switcher, interphone system, A/D converter, D/A converter, digital audio distribution amplifier, analog audio distribution amplifier, master clock system, Inmalsat communications terminal, etc. are appropriated to adopt OECD country products, considering that the procurement/introduction records of broadcasting company in Nepal and discontinued production situation in Japan.

Table 2-2-9 shows the list of main equipment and its country of product.

Table 2-2-9: List of Main Equipment and Country of Product

Equipment	Country of Product			Reason for Selection and Remarks
	Nepal	Japan	Third Country	
(Transmitter Related Equipment)				
Vacuum Tubes for SW & MW Transmitters			○	Eimac Co. is the only manufacturer of Vacuum Tubes.
MW Transmitters & Ancillary Equipment		○		Security of quality and performance, Certainty of supply, Usage records of RNE
PIE		○		Security of quality and performance, Certainty of supply, Usage records of RNE
Audio Processor		△	○	Security of quality and performances, Conformity to existing Equipment
Measuring Equipment		○		Security of quality and performance, Certainty of supply, Usage records of RNE
Other Ancillary Equipment		○		Security of quality and performance, Certainty of supply
(Studio Related Equipment)				
Audio Mixer		○		Security of quality and performance, Certainty of supply, Usage records of RNE
Audio Effectors		○		Security of quality and performance, Certainty of supply, Usage records of RNE
CD Player		○		Security of quality and performance, Certainty of supply, Usage records of RNE
Cassette Tape Recorder		○		Security of quality and performance, Certainty of supply, Usage records of RNE
Audio Recorder		○		Security of quality and performance, Certainty of supply, Usage records of RNE
Audio Distribution Amplifiers		○		Security of quality and performance, Usage & Diffusion records at broadcasting company in Nepal and the World
A/D, D/A Converter		○		Securing of quality and performance, Usage & Diffusion records at broadcasting company in Nepal and the Worlds
DAW		○		Securing of quality and performance, Certainty of supply
Telephone Hybrid		△	○	Securing of quality and performance, Usage & Diffusion records at broadcasting company in Nepal and the World
Microphones		○		Securing of quality and performance, Certainty of supply, Usage records of RNE
Send Out Switcher		○		Securing of quality and performance, Usage & Diffusion records at broadcasting company in Nepal and the World
Clock System		△	○	Securing of quality and performance, Usage & Diffusion records at broadcasting company in Nepal and the World
Interphone System		△	○	Securing of quality and performance, Usage & Diffusion records at broadcasting company in Nepal and the World
APS		○		Securing of quality and performance, Certainty of supply
Other Ancillary Equipment		○		Securing of quality and performance, Certainty of supply

*Notes: ○: Target Country △: Feasible Country

(2) Procurement Plan for Construction Materials

As mentioned in section 2-2-4-2, except basic items such as reinforcing bars, cement, concrete aggregate, bricks and timber, etc., construction materials are mainly imported from India and other neighboring countries. Accordingly, construction materials in the Project shall as a rule be obtained from local products that include imports, however, import from Japan and third countries shall be resorted to in cases of materials where quality is a concern, materials that are rare, materials for which supply is unstable, or conformity to and integrity with the existing parts are critical. In such cases, operation and maintenance manuals, and ample spare parts shall be provided to avoid the hindrance to the operation and maintenance of facilities. Moreover, expendable materials such as lighting fixtures, socket outlets and switches, etc. shall as far as possible be procured in Nepal.

Table 2-2-10 shows the list of main construction materials and procure sources.

Table 2-2-10: List of Main Construction Materials and Procure Sources

Materials	Procure Source			Reason for Selection and Remarks
	Nepal	Japan	Third Country	
(Building Materials)				
Portland Cement	○			
Sand / Gravel	○			
Reinforcing Bars	○			
Formwork (plywood)	○			
Concrete Block	○			
Timber	○			
Steel Doors and Windows		○		Securing of quality and performance / certainty of supply (hereinafter referred to as 'Quality & Certainty')
Steel Partition		○		Local procurement is impossible
Wooden Doors and Windows	○			
Hardware		○		Quality & Certainty
Sheet Glass		○		Quality & Certainty
Paint		○		Quality & Certainty
Light Gauge Steel Furring		○		Local procurement is impossible
Plaster Board		○		Quality & Certainty
Rockwool Acoustic Board	○			
Glass Wool		○		Local procurement is impossible
PVC Tile		○		Quality & Certainty
Porcelain Tile	○			
Kitchen Sink Unit		○		Quality & Certainty
Ceiling Hatch		○		Quality & Certainty
Roofing Materials		○		Quality & Certainty
Calking Material		○		Quality & Certainty
ALC Repair Material		○		Local procurement is impossible
(Building Equipment Materials)				
Large-Size Air Conditioners		○	△	Local procurement is impossible
Small-Size Air Conditioners		△	○	Quality & Certainty
Duct	○			
Ventilation Machines		○		Quality & Certainty
Piping Material		○		Quality & Certainty
Pumps		○		Quality & Certainty
Water Heater		○		Quality & Certainty
Lighting Fixtures	○		△	
Power Panelboards		△	○	Quality & Certainty
Automatic Voltage Regulator		△	○	Quality & Certainty
Cables and Wires		○		Quality & Certainty
Conduit Wire (PVC, metal)		○		Quality & Certainty
Diesel Engine Generator		△	○	Quality & Certainty
Socket Outlets	○			

*Notes: ○: Main source △: Supplementary source

(3) Equipment Transportation Plan

Nepal is a land-locked country and it is common to unload cargo from Japan or a third country in India. The ports of unloading in India are Kolkata, for container vessels, and Haldia for conventional ships. The equipment will be land transported from Kolkata to Raxaul in India, which has the border with Birganj in Nepal, where customs clearance will be carried out. The equipment will then be transported on land from Birganj to each of the project sites. Construction materials on conventional ships will be transported by 6-ton trucks and most of the transmitting and studio equipment will depend on container shipping using trailers.

The total time required to transport the equipment procured in Japan to the project sites is approximately two months with the breakdown as follows:

- Japan - Kolkata Port 30-40 days
- Unloading and transshipment at Kolkata Port 2-3 days
- Kolkata Port – Raxaul National Border 7-10 days
- Customs Clearance at India/Nepal 2-3 days
- Birganj - Kathmandu 3-4 days
- Birganj - Pokhara 3-4 days
- Birganj - Bardibas 2-3 days

Furthermore, the following documents may seem necessary for import procedures in Birganj.

1) Commercial invoice (To be prepared by the shipper and reflect exactly the same contents with the import cargo manifest approved by the receiver)
2) Packaging specifications
3) Insurance policy
4) Certificate of origin
5) Bill of Lading (Original)
6) Request for approval of border crossing (To be issued by the receiver to the Nepali Consulate in Kolkata)
7) Consignee's approval letter (To be issued by the receiver to the National Border Customs Office to notify the office of the receiver's approval of the customs clearance or transportation contractors)

Maoist and student movements can be mentioned as cautions in terms of transportation. If road

closure, so called Bandh, or traffic hindrance called Chakka jam occurs, transportation may get difficult. The contractors must pay full attention to such tendencies and plan the transportation accordingly, on the other hand, the executing agency is required to take all possible measures to assure the safety of equipment during transportation in the country.

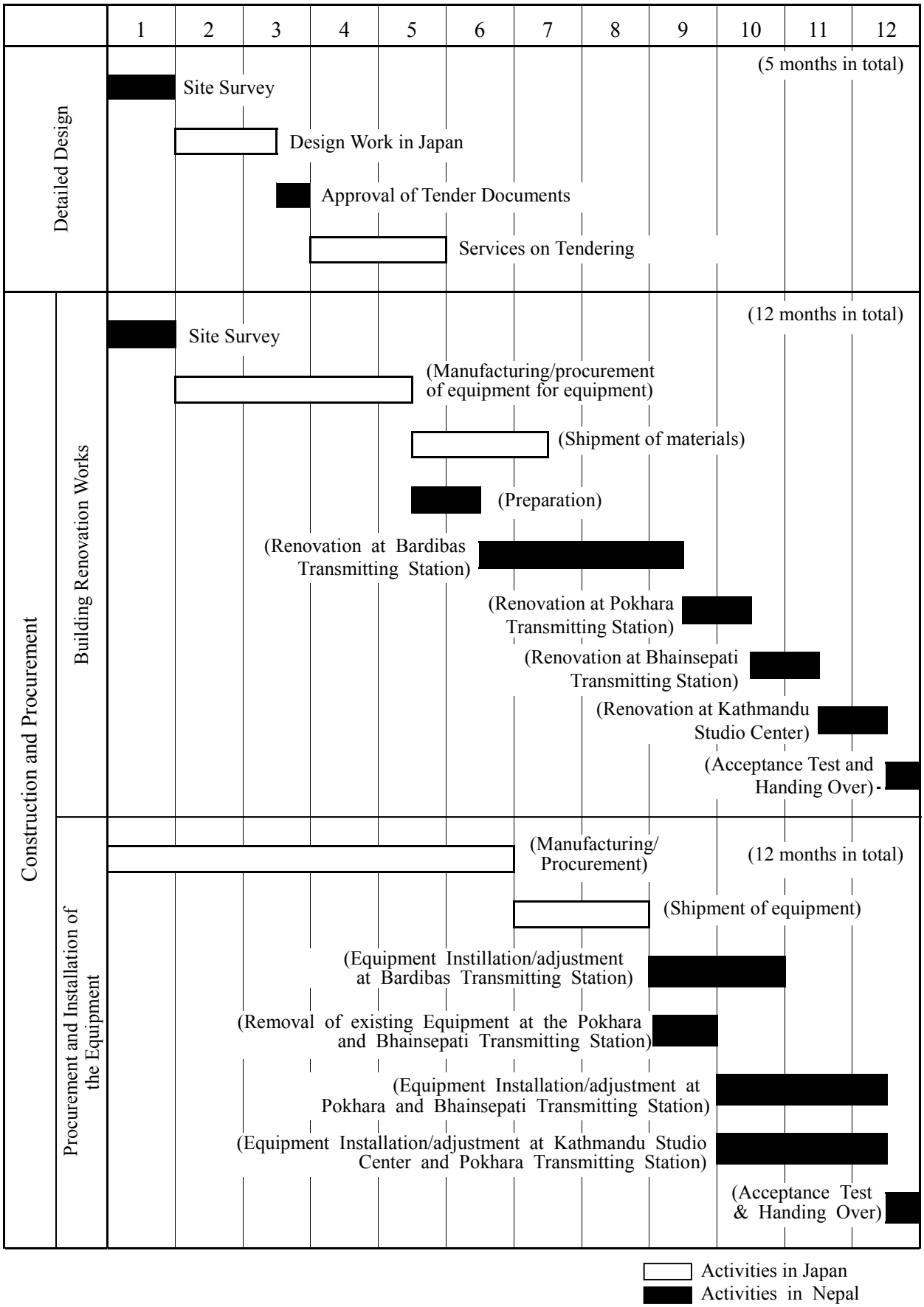
2-2-4-7 Implementation Schedule

The following is the implementation schedule of this Project. (refer to Table 2-2-11)

(1) Detailed design and tendering : 5 months
(2) Facilities renovation : 12 months
(3) Equipment procurement / installation works : 12 months

(2) and (3) will start simultaneously. Therefore, the total period needed for completion of the Project is 17 months.

Table 2-2-11: Project Implementation Schedule



2-3 Obligations of Recipient Country

The obligations of the Nepali side in the event where the Project is implemented under Japan's grant aid are as follows.

(1) Re-connect of the Radial Earths System and Backfilling of Security Trenches at Bardibas Transmitting Station

While a radial earths consisting of 120 cooper wires is buried in the ground under the antenna mast, most of these were cut when the military soldier to guard the station dug trenches for defense after the Maoist attack. Re-connect of the radial earths should be performed by the Nepali side following the Minutes of Discussions; and this work must be completed before the commencement of the facility renovation work at Bardibas Transmitting Station.

Furthermore, since working right beneath the MW transmitting antenna is extremely hazardous considering exposure to electromagnetic waves, the area under the antenna mast where the radial earths are buried must be isolated as a restricted zone, and the re-connect work must be scheduled for and carried out during the periods of broadcasting off-air time. After completion of re-connection of the radial earths, the trenches must be backfilled to normal as soon as possible.

(2) Clearance, Transfer and Disposal of the Equipment to be renewed at Bardibas Transmitting Station

Installation of the equipment at Bardibas Transmitting Station will start after the renovation works have been completed. RNE must clear all the equipment to be replaced well before the start of renovation works, since the installation and renovation will be carried out by different contractors. This excludes, however, those machines and materials other than broadcasting related equipment, such as emergency generator, distribution board, partition walls, finish materials, etc., that are in the scope of the renovation works; These are to be removed by the renovation contractor.

The renovation contractor is responsible for removal and disposal of the facility wastes to the point in the site designated by RNE, and RNE takes the responsibility of following transfer and disposal of the facility wastes and equipment to be replaced.

(3) Clearance, Transfer and Disposal of the Equipment and Facilities to be renewed at Bhainsepati Transmitting Station, Pokhara Transmitting Station and Kathmandu Studio Center

As for Bhainsepati Transmitting Station and Pokhara Transmitting Station where transmitters will be renewed in addition to Bardibas Transmitting Station, the installation contractor will remove the existing transmitters and then the renovation contractor will carry out renewal of emergency generators and construction of air conditioners and partition walls. After these renovation works are completed,

the new transmitters and incidental facilities will be installed and adjusted. While both the installation and renovation contractors are in charge of clearance of their respective equipment and finish materials, they are, similarly to the Bardibas Transmitting Station, only responsible for carrying the equipment and wastes to the point within the site designated by RNE, and RNE shall take the rest of the transfer and disposal works. The studio equipment in the transmitting studios at Kathmandu Studio Center and Pokhara Transmitting Station, too, will be removed and transferred by the installation contractor to the location designated by RNE and then shall be carried out and disposed of by RNE.

(4) Securing of Space for Temporary Work (site office, materials stockyards, etc.)

Equipment to be imported from Japan or third countries and construction materials for the renovation works require space for temporary work. It is appropriate to allot an area within the premise of the building to be renovated as such space. RNE should make the utmost effort to secure that space.

(5) Procurement of Furniture, Appliances and Incidental Facilities, such as Telephones, not covered by the Grant Aid

All furniture and appliances needed in the said transmitting stations and studios are basically desks, chairs and the like. Therefore, it is deemed that the existing furniture, appliances and also incidental facilities such as telephones are sufficient.

(6) Acquisition of All Legal Authorizations in Nepal

In Nepal, although legal regulations and authorization systems for facilities construction have been developed, none of these mention about renovation work of buildings so far. Establishment of relevant laws may have an impact on the contents and the implementation schedule of this Project, therefore, RNE must pay careful attention to the latest status of the legal matters and keep the Japan side updated as necessary. RNE shall promptly proceed with any necessary application procedures in order to acquire due license.

(7) Securing of Safety of the Consultant and Contractors during the Project Implementation

If the Japanese consultant and/or Japanese contractors ever incur any damage or harms by a Nepali anti-governmental organization, not only this Project but also the entire grant-aid program of the Government of Japan for Nepal may be terminated. The Government of Nepal must pay particular attention to and prepare specific policies for assuring of safety of the Japanese consultant and contractors at any times during the project implementation, considering the fact that the relevant sites in this Project spread all over the country. Specifically, it is desirable that allover safety measures be taken in cooperation of the Nepali military with regard to the assuring of safety during the land

transportation of the imported equipment and materials within the country and the guarding of the accommodation of contractors.

(8) Exemption of Tariffs / Taxes on the Import of Construction Materials and Broadcast Equipment

RNE must obtain sufficient information on the exemption of tariffs and taxes with regard to the import of construction materials and broadcast equipment, such as the detailed procedures, documents to be submitted and time required for completion of each process, by hearing out from the related ministries and agencies well in advance. As a matter of fact, there is a report on one of the preceding grant aid projects in Nepal in which the implementing agency allocated a portion of its annual budget for the tarrif to be exempted, whereas the tarrif rate was approximately 1% of the CIP price. It is therefore important for RNE to consult with the related ministries and agencies beforehand so as to fully understand the system.

(9) Issue of Authorization to Pay and Payment of Bank Commissions therefor

The authorization to pay is usually issued in a banking arrangement concluded between the representative bank on the recipient side and the representative bank on the Japanese side. However, it is not an absolute requirement for the Nepali side to select a representative bank; it is possible for a government agency concerned with the assistance to conclude the banking arrangement with the Japanese bank.

Concerning the bank commission, the Nepali side will need to prepare a sum equivalent to 0.1% of the total grant, and since the amount of commission is by no means small, it will need to display due care and attention when raising these funds.

(10) Appropriate and Efficient Operation and Maintenance of Project Facilities and Equipment

The succeeding chapter will discuss in detail the adequate and efficient operation and maintenance of the facilities and equipment to be provided in the Project.

(11) Execution of Other Obligations stated in the Exchanged Notes

RNE shall obtain a copy of the E/N immediately after the signing thereof, and ascertain the obligations of the recipient country. If there is any uncertainty about it, RNE shall hear out with the Ministry of Finance, in charge of foreign assistance in Nepal.

Estimated expenses for the works to be carried out by Nepali side are as follows;

• Re-connect of radial earths of existing transmitting antenna and backfilling of all the trenches under antenna mast in Bardibas station	:	170,000 Rp.
• Removal and disposal of destroyed equipment in Bardibas station	:	210,000Rp.
• Disposal of withdrew equipment in Bhainsepati station	:	220,000 Rp.
• Disposal of withdrew equipment in Pokhara station	:	260,000 Rp.
• Disposal of withdrew equipment in Kathmandu Studio Center	:	310,000 Rp.
Total		1,170,000 Rp.

(1.7 million Japanese Yen, 1 Rp. = 1.48 Japanese Yen)

2-4 Project Operation Plan

2-4-1 Staffing of RNE

Organization of RNE consists of Technical Division, Program Production Division and Administration Division. The total number of staff as of January 2005 is 688, including 572 proper employees, 55 contractors, and 61 temporary local correspondents. The Engineering Division is composed of the Studio Operation Department, Engineering Development Department, and Engineering Planning Department. The Studio Operation Department is in charge of managing the Kathmandu Studio Center, whereas the Engineering Development Department manages all the local transmitting stations including Khumaltar SW Transmitting Station and Bhainsepati MW Transmitting Station. Table 2-4-1 shows the organization and staff members of RNE. In addition, following Table 2-4-2 shows the organization and staff members at the transmitting stations to be covered under this Project.

Table 2-4-1: Composition of the Total RNE Proper Staff

Division	No. of personnel	Department	No. of personnel	Section	No. of personnel
Executive Director					1
Engineering Division	174	Studio Operation Department	30	Operation of studios	25
				Maintenance	5
		Engineering Development Department	132	Khumaltar SW Transmitting Station	23
				Bhainsepati MW Transmitting Station	16
				Local Transmitting Station	81
				Maintenance	12
		Engineering Planning Department			11
Program Production Division	153	Program Department	64	Program Production	55
				Listeners survey	5
				Tape Storage	4
		News Department	61	Nepali News	14
				News in Foreign Language	22
				Local News	15
				Local communications	10
		Music Department	28	Classic Music	10
				Modern Music	18
Administration Division	245	Sales Department			3
		Administration Department			220
		Finance Department			17
		Education and Training Department			5
Total					572

Table 2-4-2: Composition of Staff at the Transmitting Stations

Transmitting Station	No. of personnel	Section	No. of personnel	Staff	No. of personnel
Khumaltar SW Transmitting Station	33	Engineering Division	23	Director	1
				Chief Engineer	1
				Senior Engineer	2
				Technicians	19
		Administration Division	10	Chief Accountant	1
				Personnel in charge of General Affairs	2
				Personnel in charge of miscellaneous duties	5
				Driver	2
Bhainsepati 100kW MW Transmitting Station	26	Engineering Division	16	Director	1
				Senior Engineer	2
				Technicians	13
		Administration Division	10	Chief Accountant	1
				Personnel in charge of General Affairs	2
				Personnel in charge of miscellaneous duties	5
				Driver	2
Pokhara 100kW MW Transmitting Station	45	Engineering Division	30	Director	1
				Chief Engineer	1
				Senior Engineer	2
				Technicians	17
				Announcer	6
				Assistant Announcer	3
		Administration Division	15	Chief Accountant	1
				Personnel in charge of General Affairs	3
				Personnel in charge of miscellaneous duties	10
				Driver	1
Bardibas 10kW MW Transmitting Station	25	Engineering Division	17	Director	1
				Chief Engineer	1
				Senior Engineer	1
				Technicians	14
		Administration Division	8	Chief Accountant	1
				Personnel in charge of General Affairs	2
				Personnel in charge of miscellaneous duties	4
				Driver	1
Total					129

The technical level of engineering staff in RNE is very high. Their excellent maintenance capacity is evident in the fact that the equipment in Bhainsepati Transmitting Station, Pokhara Transmitting Station and Kathmandu Studio Center is kept very clean and still operational in good condition after 23 years of use. This also proves that they have major policies in every aspects of operation of transmitting station and studio equipment.

The engineering staff works in three shifts, fulfilling daily maintenance duties based on the maintenance manuals prepared by RNE.

- Preventive Maintenance

  (Daily duties)

  Confirmation of voltage fluctuation of city power supply before commencement of broadcasting, confirmation of operation of engine generator before commencement of broadcasting, cleaning and power check, wiring check, confirmation of operation of remote control of each equipment using broadcasting off-air time (11:00-13:00), etc.

  (Transmitting equipment)

  Confirmation of operation of Output Exchanger, confirmation of input signal level to the transmitter, check of each Meter in the transmitter, etc.

  (Studio equipment)

  Filling oil into the equipment, degaussing of the magnetic heads of cassette tape recorders, cartridge tape recorders, open-reel tape recorders

- Repair of Equipment

  Moving anomalous equipment into the maintenance room in order to repair it by engineering staff themselves, changing modules or parts. (In Japan, it is common to send such equipment directly to the maker instead of repairing by themselves, which has in a way degraded technical level of Japanese engineers.)

The operation/maintenance record (log book) at each transmitting station and studio articulates the failures and the consequent maintenance activities along with the daily broadcasting status for the past decade. Such a series of efforts has been to date a large contributing factor to the sound equipment management and hence the continued program production activities.

Where digital technology is concerned, operation of the digital equipment to be procured under this Project will not pose a problem, considering the facts that digital equipment such as CD players, DAW etc. has been partly introduced in the past five years and that the engineering staff constantly strive for improving their technical levels through exchange with engineers working at NTV and private broadcasting companies

which now mainly depend on digital equipment. In addition, the introduction of digital equipment will not change the method of program production and transmission. Furthermore, a 30-day training course in operation and maintenance of digital equipment will be conducted to RNE engineering staff members after completion of the installation work. Taking into consideration a high technical level of the RNE engineering staff, the planned training will enable RNE fully to operate and maintain the equipment procured under this Project.

From the above, it is deemed that the current engineering staff is capable enough to carry out the operation of new transmitting and studio equipment to be procured under the Project and hence there is no need to hire additional staff.

2-4-2 Project Maintenance Plan

2-4-2-1 Maintenance of Transmitting Equipment, Studio Equipment and Building Equipment

Daily maintenance, regular inspections, repairs in the event of breakdown, and parts replacement, etc. are needed with respect to the transmitter, studio equipment building equipment such as electrical installations, plumbing and air conditioning system, etc. The life time of equipment is definitely extended, breakdowns and accidents are prevented, and the safety and functions of facilities can be improved by conducting normal operation, periodical inspections, and preventive maintenance activities such as lubrication, adjustments, cleaning and touchup repairs, etc. In regular inspections, it is necessary to disassemble equipment and replace expendable parts according to maintenance manuals.

RNE will need to thoroughly understand the networking and capacities of all equipment systems newly installed in the transmitting station, and prepare and operate setups to prevent accidents in advance. For this reason, it is vitally important to appoint the maintenance staff, give them on-the-job training from the installation and adjustment stage, and have them well versed in the equipment systems by the time of handing over. Concerning regular inspections and repairs, as with building facilities, maintenance manuals shall be prepared and inspection methods explained at the time of handing over.

The regular inspection and maintenance items that will be required for transmitting equipment, studio equipment and building equipment after completion of the Project are indicated in Table 2-4-3, Table 2-4-4, Table 2-4-5.

Table 2-4-3: Transmitter Regular Inspection and Maintenance Items

Classification	Equipment or Region	Inspection/Maintenance Item	Inspection Cycle				
			Day	Week	Month	Half year	Year
Transmitter	Power supply section	Power supply voltage	○				
		Connection of main power supply terminal cable, contact of the magnet contactor				○	
		Ground terminal					○
	Air cooling section	Airflow check		○			
		Blower abnormal noise and vibration			○		
		Air filter dirt, washing with water				○	
	Control section	Transmitter changeover control (coaxial switcher, U-link)		○			
		Interlock inspection					○
	Power amplifier	Surface temperature, check with bare hands			○		
		Cleaning of radiator fins				○	
		Internal visual inspection, discoloring, etc.					○
	Output coaxial section	Feeder and elbow surface temperature, looseness of feeder connection				○	
		Visual/aural combiner surface temperature					○
	Exciter section	Cooling fan abnormal noise and vibration			○		
		Fit of modules, internal visual inspection of modules, discoloring, etc.				○	
	Frame	Internal cleaning			○		
		Visual inspection of internal parts			○		

Table 2-4-4: Studio Equipment Regular Inspection and Maintenance Items

Classification	Inspection/Maintenance Item	Inspection Cycle			
		Day	Month	Half year	Year
Master Control Room	Confirmation of audio level	○			
	Measuring of frequency characteristics				○
	Measuring of distortion characteristics				○
	Measuring of noise level				○
	Confirmation of fan in each equipment			○	
	Cleaning				○
Clock System	Accuracy of master timing generator		○		
	Accuracy of slave clock at each studio		○		
Audio Mixer	Check on behavior of all channel faders			○	
	Confirmation of Audio level	○			
	Measuring of frequency characteristics				○
	Measuring of distortion characteristics				○
Audio Recorder	Confirmation of Audio level	○			
CD Player	Confirmation of Audio level	○			
Cassette Tape Recorder	Confirmation of Audio level	○			
Audio Work Station	Confirmation of Audio level	○			
	Confirmation of operation (Hardwear & Softwear)			○	
APS	Confirmation of operation (Hardwear & Softwear)			○	

Table 2-4-5: Building Equipment Regular Inspection and Maintenance Items

Classification	Equipment or Region	Inspection / Maintenance Item	Inspection Cycle				
			Day	Week	Month	Half year	Year
Building equipment	Power board Automatic voltage regulator	Check for noise, vibration, and odor	○				
		Confirmation of operation within rated values, internal cleaning			○		
		Check of thermal discoloring of parts and wiring, insulation resistance measurement, measuring device calibration					○
	Emergency generator equipment (engine)	Inspection of lubrication oil and fuel leaks, inspection of looseness in and tightening of nuts and bolts, check of exhaust gas color, inspection of noise and electric wiring	○				
		Battery inspection, fan belt tightness inspection, lubrication oil level inspection, oil filter inspection			○		
		Radiator fan and engine parts cleaning, starter motor inspection, electric ribbon heater inspection					○
	Emergency generator equipment (generator)	Check for noise and vibration, confirmation of voltage and frequency	○				
		Inspection and cleaning of control panel and operating panel			○		
		Measurement of insulation resistance, measurement of ground resistance, power transmission test					○
	Fire alarm system	Inspection of external appearance and damage, confirmation of display lights illumination	○				
		Inspection of switches and fuses, internal cleaning			○		
		Measurement of insulation resistance, manual operation test					○
	Water supply pump unit	Check for noise, vibration and leaks, confirmation of voltage, current and operation	○				
		Inspection of switches and fuses, inspection of automatic controller			○		
		Cleaning and overhaul, inspection of looseness in and tightening of nuts and bolts					○
	Septic tank	Check for cracks and damage	○				
		Check for infiltration by foreign objects			○		
		Removal of sludge					○
	Electric water boiler	Inspection of water leaks	○				
		Cleaning and adjustment			○		
		Measurement of insulation resistance					○
	Air conditioners	Check for noise, vibration and leaks	○				
		Filter cleaning, inspection and cleaning of drain base and drainage pipe			○		
		Cleaning of indoor and outdoor units, outdoor unit fins, measurement of insulation resistance					○
	Ventilation fans	Check for noise and vibration	○				
		Inspection of looseness in bolts			○		
		Cleaning					○
	Air filters	Filter cleaning			○		
		Air filter replacement					○

2-4-2-2 Maintenance of Facilities

Maintenance of building facilities mainly consists of everyday cleaning and repairs and parts replacement with respect to wear, damage and deterioration of interior and exterior finishings. Concerning regular inspection items and repair methods, the contractors shall prepare maintenance manuals and explain inspection methods, etc. based on guidance from the consultant at the time of building handing over. When preparing the manuals, ample consideration shall be given to the operating setup on the RNE side and economic and construction conditions in Nepal to ensure that sustained and effective maintenance is realized.

2-4-3 Cost Saving Effect by the Project

In this Project, MW transmitters will be renewed at 3 transmitting stations as a main target hereof, and it will bring a big saving effect to RNE's economical situation. For the evaluation of the electricity charge, operating hours of the transmitting equipment are assumed properly and power consumption of the newly installed air-conditioners are calculated by assuming that the transmitter rooms are under the normal conditions.

(1) Estimation of Power Consumption

To calculate the difference of power charge between before and after the project implementation, annual power consumption of MW transmitters and incidental machines for the 3 stations are shown in Table 2-4-6.

Table 2-4-6: Power Consumption of MW Transmitting Equipment before and after the Project

Bardibas MW Transmitting Station

System	Capacity (kVA)		Operating Hours (h)	Load Factor	Annual Consumption (kWh)	
	Before	After			Before	After
Transmitter	38.5	20.8	6,045	1.0	232,733	125,736
Ventilation Fan	1.1	—	6,045	0.6	3,990	—
Air-conditioner	—	7.7	6,045	0.6	—	27,928
Ventilation Fan in Permanent Use	—	0.3	8,352	1.0	—	2,506
Total annual power consumption					236,723	156,170

*The power factor of the renewed transmitter is assumed as 0.95 (19.7kW/0.95→ 20.8kVA).

Bhainsepati and Pokhara MW Transmitting Station (respectively)

System	Capacity (kVA)		Operating Hours (h)	Load Factor	Annual Consumption (kWh)	
	Before	After			Before	After
Transmitter	260	132	6,045	1.0	1,571,700	797,940
Ventilation Fan	6.5	—	6,045	0.6	23,576	—
Air-conditioner	—	25.1	6,045	0.6	—	91,038
Ventilation Fan in Permanent Use	—	0.3	8,352	1.0	—	2,506
Total annual power consumption					1,595,276	891,484

*The power factor of the renewed transmitter is assumed as 0.95 (125kW/0.95 → 132kVA).

(2) Saving Effect on the Operation Cost

Annual electricity cost for the said transmitting equipment is estimated according to the power consumption shown on the Table above. The unit cost of electricity power complies with the tariff of Nepal Electricity Company as of February, 2005 (refer to Table 2-4-7). As a rough guide to determining the budget for the category, the aggregate total of the above-mentioned power tariff is adopted as shown in Table 2-4-8, Table 2-4-9 below.

Table 2-4-7: Tariff of Power Charge

Power Receiving Rate	Basic Charge	Metered Charge
11kV	180 Rp./kVA/Month	7.9 Rp./kWH

Table 2-4-8: Tariff of Electricity Contract Demand

Station	Contract Demand
Bardibas	150kVA
Bhainsepati	600kVA
Pokhara	600kVA

Table 2-4-9: Power Charge on MW Transmitting Equipment before and after the Project

Bardibas MW Transmitting Station

Stage	Charging Item	Calculation of Charge	Annual Charge
Before	Basic Charge	150kVA×180Rp.×12 Months	324,000Rp.
	Metered Charge	236,723kWH×7.9Rp.	1,870,112Rp.
	Total		2,194,112Rp.
After	Basic Charge	150kVA×180Rp.×12 Months	324,000Rp.
	Metered Charge	156,170kWH×7.9Rp.	1,233,743Rp.
	Total		1,557,743Rp.

Bhainsepati and Pokhara MW Transmitting Station (respectively)

Stage	Charging Item	Calculation of Charge	Annual Charge
Before	Basic Charge	600kVA×180Rp.×12 Months	1,296,000Rp.
	Metered Charge	1,595,276kWH×7.9Rp.	12,602,680Rp.
	Total		13,898,680Rp.
After	Basic Charge	600kVA×180Rp.×12 Months	1,296,000Rp.
	Metered Charge	891,484kWH×7.9Rp.	7,042,724Rp.
	Total		8,338,724Rp.

A remarkable cost saving can be expected after the completion of the Project, as shown in the Table 2-4-10 below.

Table 2-4-10: Power Charge Savings through Refurbishment of MW Transmitting Equipment

Station	Annual Cost (Rp.)		Annual Saving	
	Before	After	Rp.	US$
Bardibas	2,194,112	1,557,743	636,369	8,789
Bhainsepati	13,898,680	8,338,724	5,559,956	76,795
Pokhara	13,898,680	8,338,724	5,559,956	76,795
Total of the 3 Transmitting Stations			11,756,281	162,379

* Exchange rate of local currency to 1 US$ is assumed to be 72.4 Rp. as of February, 2005.

2-4-4 Management Costs after Completion of the Project

The management costs of RNE after the Project are estimated at 166,432,000 Rp. (about 246 million yen) per annum. The breakdown of the costs are as follows:

(1) Personnel expenses

The current number of employees of 688 (consisting of permanent members of 572 and other employees of 116) will manage to operate and maintain RNE without increase in the number of employees even after the Project is completed.

The annual personnel expenses, therefore, will remain the same as the one in the year 2003/2004, amounting 68,975,000 Rp. (102 million yen).

(2) Cost of program production

The number of programs to be produced annually remains unchanged.

The annual production cost, therefore is estimated at 4,287,000 Rp. (6.3 million yen), the same amount spent in the year 2003/2004.

(3) Cost of electric power

The actual amount paid for electric power and use of satellite in the year 2003/2004 was 60,649,000 Rp. (89.8 million yen), but as mentioned above the expense for power supply will be reduced by 11,756,000 Rp. (17.4 million yen) offer the completion of the Project. Then, annual expenses for electric power will come to 48,892,000 Rp. (72.4 million yen).

(4) Maintenance cost

A budget for periodical check and preventive maintenance of the equipment is required to continue a stable broadcasting service. Broadcasting stations normally set aside an annual budget for maintenance corresponding to one percent of the price of the equipment they own.

When this normal practice is applied, the cost required for the maintenance of the equipment provided under the Project is estimated at 4,324,000 Rp. (6.4 million yen).

The actual maintenance cost of the year 2003/2004 was 16,240,000 Rp. (24 million yen, which is considered enough amount.

The maintenance cost will be reduced by replacement of the equipment under the Project but it will remain the same amount of 16,240,000 Rp. (24 million yen) as the year 2003/2004 to provide against an emergency case.

(5) Other expenses

The same amount of 28,038,000 Rp. (41.5 million yen) spent in the year 2003/2004 will be allocated for the following expenses: satellite rental, maintenance of vehicles, stationeries, extension and renovation of building, utilities, etc.

In light of the fact that the total amount of income in the year 2003/2004 was about 183,945,000 Rp. (272 million yen), security of the above management costs after the Project is fully prospective.

It is hoped that RNE makes its best effort to renew the facilities and equipment of the remaining transmitting stations at its own budget in future, by keeping the same level of income and by saving maintenance budget, plus the estimated reduction (11,756,000 Rp. (17.4 million yen)) of the expense for electric power supply which will be allowed after completion of the Project.

2-5 Outline of the Project Cost

2-5-1 The Project Cost

In case this Project is implemented under the grand aid scheme of the government of Japan, the total project cost is estimated at 927.3 million Japanese Yen. Details of project cost to be born by Japanese side and Nepali side are estimated in accordance with the below conditions are as follows;

(1) The project cost to be born by Japanese side

Approximately 925.6 million

Items		Cost (million Yen)	
Equipment procurement & Installation	Transmitting equipment	(390.7)	607.5
	Studio equipment	(147.0)	
	Vacuum tubes	(69.8)	
Facility Renovation	Renovation of building finishings, renewal of building equipment and emergency generators		228.1
Consultant fee			90.0

This cost estimate is provisional and would be further examined by the Government of Japan for the approval of the grant.

(2) The project cost to be born by the Nepali side

Approximately 1.17million Rp. (1.7 million Japanese Yen)

- Re-connect of radial earths of existing transmitting antenna and backfilling of all the trenches under antenna mast in Bardibas station
- Removal and disposal of destroyed equipment in Bardibas station
- Disposal of removed equipment in Bhainsepati station
- Disposal of removed equipment in Pokhara station
- Disposal of removed equipment in Kathmandu Studio Center

Estimation conditions

Date of cost estimation: February, 2005

Exchange rate: 1US$ = 107.80 Japanese Yen

1Rp. = 1.48 Japanese Yen

Implementation period: refer to Implementation Schedule

Chapter 3 Project Evaluation and Recommendations

Chapter 3 Project Effect and Recommendations

3-1 Project Effect

The effects expected from the implementation of this Project are as follows.

Table 3-1-1: Effects and Improvement Resulting from Project Implementation

Present Situation and Problems	Measures in this Project (Works Covered by Assistance)	Project Effects & Degree of Improvement
The national MW broadcasting network of RNE is suffering from the aging of transmitters and shortage of vacuum tubes, which resulted in the reduction of population coverage to 48%. In particular, the transmitting facilities in Bardibas Transmitting Station were damaged decisively by the Maoist attack (April 2002). At Bhainsepati and Pokhara Transmitting Stations, output power of 100kW MW transmitters has dropped to 75 – 80% and downtime of both transmitters during past 2 years has been over 400 hours. Remote areas outside of MW broadcasting service are covered by SW broadcasting. However, SW broadcasting is not functioning sufficiently due to shortage of vacuum tubes of SW transmitters.	Renewal of 100kW transmitters with ancillary equipment (Bhainsepati and Pokhara MW Transmitting Stations). Renewal of 10kW transmitter with ancillary equipment and renovation of building facilities (Bardibas Transmitting Station). Procurement of vacuum tubes (Dharan, Surkhet, and Dipayal MW Transmitting Stations). Procurement of vacuum tubes (Khumaltar SW Transmitting Station)	The population coverage of the national MW broadcasting network of RNE will be expanded to 75%. The areas outside of MW broadcasting service will be covered by SW broadcasting, resulting in the realization of the nationwide broadcasting network. Continuous broadcasting will be possible including the 2 hours from 11:00 to 13:00, in which broadcasting are currently interrupted for maintenance purposes. The daily broadcasting time will increase from 16 hours/day to 18 hours/day.
Program production facilities have been used for 23 years. Depression of these equipment due to aging is egregious and procurement of spare parts is not available. Failures of equipment with unstable operation have caused interruption of program production 66 times in the past 2 years.	Renewal of program production equipment at Kathmandu Studio Center and Continuity Studio in Pokhara Transmitting Station.	Environment for program production using digital equipment will be improved, enabling the production of high-quality programs and increase in the number of programs produced.
Emergency generators in Bhainsepati, Pokhara, and Bardibas Transmitting Stations and Kathmandu Studio Center are suffering from frequent failures and unstable operation due to aging, and do not function as standby power sources during power failures.	Renewal of emergency generators in Bhainsepati, Pokhara and Bardibas Transmitting Station, and Kathmandu Studio Center.	Interruption of broadcasting, which has been occurring frequently during power failures, will be decreased drastically. Continuation of broadcasting at the time of power failures will be possible.

3-1-1 Direct Effects

(1) Benefited Area

Whole country of Nepal.

(2) Benefited Population

All nationals of Nepal: 24.74 million persons.

(3) Beneficial Effects

① Expansion of broadcasting service area

The population coverage area of MW broadcasting will be expanded from 48% (before the Project) to 75% (after the Project). The citizens that are not covered by MW broadcasting will be covered by SW broadcasting, realizing the provision of broadcasting services to all people in Nepal.

② Reduction of broadcast interruption (breakdown) time

The occurrence of transmitter failures (about 400 hours in the past 2 years), failures and troubles during program production (66 times in the past 2 years), and broadcast interruption during power failures will be reduced sharply and the continuation of stable broadcasting will be realized.

③ Increase in broadcasting time

Continuous broadcasting from 5:00 to 23:00 including 2 hours from 11:00 to 13:00, in which broadcasting is currently interrupted for maintenance of aged transmitters will be realized. The daily broadcasting time will increase from 16 hours/day (before the Project) to 18 hours/day (after the Project).

3-1-2 Indirect Effects

(1) Economic and industrial activities and poverty reduction will be promoted through the improvement of access to information in remote areas inhabited by many poor people specially.

(2) Living environment will be improved through the enhancement of availability of information concerning health and hygiene, education, agriculture, and social and public welfare, as well as cultural and international information.

(3) Increase of certified primary school teachers through enhanced teacher training system using radio broadcasting.

(4) Balance of payment in RNE will be improved through the reduction of operation and maintenance cost of renewed equipment.

3-2 Recommendations

(1) Efforts toward Broadcasting which meets the Needs of People

After the entry of private enterprise for broadcasting was approved in 1994, the number of community FM stations and private FM stations has been showing rapid increase during the recent 2 to 3 years. At present, 56 organizations have obtained the license and 36 of them are actually conducting broadcasting service. RNE itself now rents a part of studios and transmitting facility to a private FM station (Star FM). These facts exemplify the development of radio broadcasting services following the Tenth 5-year Plan. However, RNE staff feels these recent movements as a threat. RNE is losing listeners in competition with private FM stations, and the income from commercials has also been decreasing (about 30% decrease in the past 3 years), as private sponsors that have supported the programs of RNE are moving to other FM stations. Another problem is that the budget allocated by the Government of Nepal is not sufficient for the realization of the Tenth 5-year Plan.

Some of the key persons in RNE asked straightforwardly about the possibility of introduction of FM transmitters, which would provide more competitive power in terms of audio quality. It was also recognized that many of RNE staff felt rivalry and bewilderment toward private FM stations. It is emphasized as one of recommendations that the responsibility of the national broadcasting station to provide information universally to all people does not necessarily mean broadcasting of stereo music pandering young audience, and that the only means to regain sponsors is to produce high-quality programs in terms of contents. The technological innovation, improvement, and expansion indicated in the Tenth 5-year Plan are the challenges that should be achieved within the budget allocated to RNE as the national broadcasting station. Although RNE needs to pursue managerial strategies regarding how to secure necessary financial resources, it should recognize again the mission of the national broadcasting station, in particular considering what should convey to the inhabitants of remote areas (poor people), who use radio broadcasting as the only means of information. On the basis of this recognition, it should place the highest priority on the efforts toward production of high-quality programs that attract many people.

(2) Securing Financial Resources and Self-supported Development

The fact that the facilities and equipment used for over 23 years are kept in clean and good conditions proves that RNE has been performing extremely appropriate operation and maintenance. This is the result of the following factors: ① The future direction of the broadcasting system of RNE was indicated in the 2 times of Japanese grand-aid assistance, which was implemented with exceptionally rich substance and high quality achieving the development of a total system. RNE has made best efforts to ensure appropriate operation of the equipment and facilities provided by the assistance from

the Government of Japan. ② Maintenance has been performed strictly following the maintenance manuals supplied from the Japanese contractors at the time of the completing of the projects. ③ The rule of "no smoking and no outdoor shoes in buildings," introduced during the construction period, is still observed at present, and this has been effective in preventing equipment from dust and elongating the life time of the equipment.

Thus, the equipment procured in this Project is also expected to bear benefits over a long period, similarly to the equipment procured in the past assistance. However, it is practically impossible for RNE to implement the equipment renewal and facility renovation using its own budget. On the other hand, RNE should recognize that the Government of Japan cannot continue the provision of equipment and facilities permanently in the form of grant-aid assistance. From the standpoint of self-supported development, RNE should strive to find the way to secure stable financial resources and carry out the procurement of the equipment using its own budget, through discussion with the Ministry of Information and Communication and other relevant organizations. In particular, while the life time of the SW transmitter in Khumaltar Transmitting Station and the MW transmitters in Dharan, Surkhet, and Dipayal Transmitting Stations will be prolonged by the procurement of vacuum tubes in this Project, these transmitters will need to be renewed in 7 or 8 years in the future. RNE should make various efforts, including the pooling of the fund from the afore-mentioned saving of electric power cost after this Project for use in future renewal.

Transmitting stations have been operated for 15 to 23 years, and alteration of generations of engineers are going on. The experienced engineers who have been working since construction are reaching the retirement age and decreasing gradually. Although digital equipment will be introduced in this Project following the technological progress, the basics of transmission and program production techniques remain the same throughout the times. Reliable technology transfer from experienced engineers to young engineers should be ensured.

(3) Expansion of FM Network

This Project is expected to have significant beneficial effects as mentioned above. In particular, because the Project directly contributes to the Tenth 5-year Plan promoted by the Government of Nepal toward the goal of poverty reduction.

This Project is not focused on the expansion of the facilities of RNE and it is an improvement project concentrated on SW and MW broadcasting services. While the population coverage of MW broadcasting will recover to about 75%, future expansion is very difficult in view of international regulations such as frequency allocation. Therefore, the areas outside of MW broadcasting service should be covered by SW or FM broadcasting. RNE has been constructing FM transmitting stations to cover the areas outside of MW broadcasting services (remote areas with many poor inhabitants),

because FM broadcasting with stable reception and better audio quality is preferred to SW broadcasting with unstable reception. At present, 8 FM transmitting stations are constructed by RNE. The construction of FM transmitting stations in remote areas is very difficult because of topographical problems and the issues of Maoists. However, as RNE identifies itself as the only nationwide broadcasting service provider transmitting information to the inhabitants of remote areas and continues the construction of such stations, this Project will be able to contribute better to the Nepal's national goals of poverty reduction and improvement of living environment.

Appendices

1. Member of the Study Team

(1) Basic Design Study

Name	Assignment	Present Post
Mr. Shinji YOSHIURA	Team Leader	Resident Representative, JICA Nepal Office
Mr. Nobutaka KONDO	Project Coordinator	ICT and Governance Team, Grand Aid Management Department, JICA
Mr. Akira SHIRAI	Chief Consultant / Operation and Maintenance Planning	NHK Integrated Technology Inc.
Mr. Akira NAGASE	Equipment Planning	NHK Integrated Technology Inc.
Mr. Hiroshi SONODA	Procurement Planning / Procurement Cost Estimate	NHK Integrated Technology Inc.
Mr. Yukio HONDA	Facility Designing / Construction Planning / Construction Cost Estimate	NHK Integrated Technology Inc.

(2) Explanation of Draft Basic Design Report

Name	Assignment	Present Post
Mr. Shinji YOSHIURA	Team Leader	Resident Representative, JICA Nepal Office
Mr. Akira NAGASE	Chief Consultant / Operation and Maintenance Planning	NHK Integrated Technology Inc.
Mr. Kenichi OKUNO	Equipment Planning	NHK Integrated Technology Inc.
Mr. Yukio HONDA	Facility Designing / Construction Planning / Construction Cost Estimate	NHK Integrated Technology Inc.

2. Study Schedule

(1) Basic Design Study (January ~ February, 2005)

	Office Members		Consultant			
	Team Leader	Project Coordinator	Chief Consultant/ Operation and Maintenances Planning	Equipment Planning	Procurement Planning/Procurement Cost Estimate	Facility Design/Construction Planning/Construction Cost Estimate
	Shinji YOSHIURA	Nobutaka KONDO	Akira SHIRAI	Akira NAGASE	Hiroshi SONODA	Yukio HONDA
01/08 Sat.		Lv. NARITA → Ar. BANGKOK				
01/09 Sun.		Lv. BANGKOK → Ar. KATHMANDU				
01/10 Mon.	• Courtesy call to EOJ • Meeting with JICA Nepal Office • Courtesy call to MOIC and RNE					
01/11 The.	Lv. KATHMANDU → Ar. POKHARA • Inspection of Pokhara MW TX					
01/12 Wed.	Lv. POKHARA → Ar. KATHMANDU • Explanation and discussion of Inception Report			• Detailed Survey for Pokhara MW TX		
01/13 Thu.				Lv. POKHARA → Ar. KATHMANDU		
	• Discussion on the Contents of the Project • Inspection of Kathmandu Studio Center					
01/14 Fri.	• Inception of Khumaltar SW TX • Inspection of Bhainsepati MW TX					
	• Discussion on the Minutes of Discussion			• Inspection of Bhainsepati MW TX		
01/15 Sat.	• Discussion on the Minutes of Discussion			• Detailed Survey of Khumaltar SW TX		
01/16 Sun.	• Inspection of Private Broadcasting Station (Khantipur, Image Channel)					
	[NAGASE, SONODA] : • Inspection of Kathmandu Studio Center [KONDO, SHIRAI, HONDA] : • Discussion on the Minutes of Discussion					
01/17 Mon.	• Signing of the Minutes of Discussion • Report to EOJ					
01/18 The.		Lv. KATHMANDU → Ar. BANGKGKOKO	Lv. KATHMANDU → Ar. BIRATHNAGAR • Detailed Survey for Dharan MW TX		Lv. KATHMANDU → Ar. JANAKAPUR • Detailed Survey for Bardibas MW Tx	
01/19 Wed.		→ Ar. NARITA	• Detailed Survey for Dhankuta Regional Studio		• Detailed Survey for Bardibas MW Tx	

	Consultant			
	Chief Consultant/ Operation and Maintenances Planning	Equipment Planning	Procurement Planning/Procurement Cost Estimate	Facility Design/Construction Planning/Construction Cost Estimate
	Akira SHIRAI	Akira NAGASE	Hiroshi SONODA	Yukio HONDA
01/20 Thu.	• Detailed Survey for Dharan MW TX		• Detailed Survey for Bardibas MW TX	
01/21 Fri.	Lv. BIRATHNAGAR → Ar. KATHMANDU		• Detailed Survey for Bardibas MW TX	
01/22 Sat.	• Filing of Collected data		Lv. JANAKAPUR → Ar. KATHMANDU	
01/23 Sun.	• Detailed Survey for Bhainsepati MW TX			
01/24 Mon.	• Report the results of site survey to RNE • Discussion of Procurement/Implementation Plan for the Project			
01/25 The.	• Detailed study for organization, budget, staff, etc. of RNE	• Detailed Survey for Kathmandu Studio Center	• Discussion on Procurement /Implementation Plan for the Project • Collation of necessary Data	
01/26 Wed.	• Detailed study for organization, budget, staff, etc. of RNE	• Detailed Survey for Kathmandu Studio Center	• Discussion on Procurement /Implementation Plan for the Project • Collation of necessary Data	
01/27 Thu.	• Discussion on Operation and maintenance system after the Project	• Detailed Survey for Kathmandu Studio Center	• Discussion on Procurement /Implementation Plan for the Project • Collation of necessary Data	
01/28 Fri.	• Study on Donor organization	• Detailed Survey for Bhainsepati Mw Tx	• Detailed Study for Procurement Plan	• Detailed Study for Construction Plan
01/29 Sat.	• Filing of Collected Data			

	Consultant			
	Chief Consultant/ Operation and Maintenances Planning	Equipment Planning	Procurement Planning/Procurement Cost Estimate	Facility Design/Construction Planning/Construction Cost Estimate
	Akira SHIRAI	Akira NAGASE	Hiroshi SONODA	Yukio HONDA
01/30 Sun.	● Supplementary Survey for Bhainsepati MW TX and Khumaltar SW TX			
01/31 Mon.	● Study on Operation and Maintenance Plan	● Study on Equipment Plan	● Study on Cont Estimation (Equipment)	● Study on Cost Estimation (Building)
02/01 The.	● Visit to DEC ● Study on Operation and Maintenance Plan		● Study on Cont Estimation (Equipment)	● Study on Cost Estimation (Building)
02/02 Wed.	● Study on Operation and Maintenance Plan	● Study on Equipment Plan	● Study on TAX, Customs' Duty	● Study on Construction Plan
02/03 Thu.	● Study on Operation and Maintenance Plan	● Study on Equipment Plan	● Study on TAX, Customs' Duty	● Study on Construction Plan
02/04 Fri.	● Confirmation of the Contents of the Equipment		● Study on Procurement Plan	● Study on Construction Plan
02/05 Sat.	● Filing of Collected Data			
02/06 Sun.	● Preparation of the report on the survey results			
02/07 Mon.	● Arrangement of Study Result	● Detailed Survey for Kathmandu Studio Center		● Study of Construction Plan
	● Preparation of the report on the survey results		● Study of Procurement Plan	
02/08 The.	● Explanation and Discussing of the survey result			
02/09 Wed.	● Visit to MOA, MOH, MOE ● Explanation and discussion of the survey result		● Visit to MOF ● Supplementary study for procurement/Implementation Plan	
02/10 Thu.	● Repot to JICA Nepal Office ● Explanation and discussion of the survey result			
	● Report to EOJ			
02/11 Fri.	Lv. KATHMANDU → Ar. BANGKOK Lv. BANGKOK→			
02/12 Sat.	Ar. NARITA			

(2) Explanation of Draft Basic Design (April 2005)

	Office Members	Consultant		
	Team Leader	Chief Consultant/ Operation and Maintenances Planning	Equipment Planning	Facility Design/Construction Planning/Construction Cost Estimate
	Shinji YOSHIURA	Akira NAGASE	Ken-ich OKUNO	Yukio HONDA
04/23 Sat.		Lv. NARITA → Ar. BANGKOK		
04/24 Sun.		Lv. BANGKOK → Ar. KATHMANDU		
04/25 Mon.	• Meeting with JICA Nepal Office, Courtesy Call to MOIC • Explanation and Discussion of Draft Report (RNE)			
04/26 The.	• Courtesy Call to Embassy of Japan • Explanation and Discussion of Draft Report (RNE), Supplementary Survey			
04/27 Wed.	• Explanation and Discussion of Draft Report, Supplementary Survey • Discussion on the Minutes of Discussion			
04/28 Thu.	• Signing of the Minutes of Discussion • Report to EOJ			
04/29 Fri.		Lv. KATHMANDU → Ar. BANGKOK		
04/30 Sat.		→ Ar. NARITA		

3. List of Parties Concerned in Nepal

Ministry of Information and Communications

Secretary	Mr. Mukunda Sharma Poudyal
Joint Secretary	Mr. Sushil Chimire
Under Secretary	Mr. Ramesh Kumar Adhikari
Special Officer	Mr. Mahesh P. Adhikari

Ministry of Finance

Joint Secretary, Foreign Aid Coordination Division	Mr. Madav Dhakal
Under Secretary, Foreign Aid Coordination Division	Mr. Mahesh K. Karki
Foreign Aid Coordination Advisor	Hideo ONO
Custom Inspector, Department of Custom	Mr. Permeshowar Yadav

Distance Education Centre, Ministry of Education and Sports

Deputy Director	Ms. Kamala Pakharel
Technical Officer	Mr. Shiba Kumar Saprota
Engineer	Mr. Hari Khadka

Agriculture Information and Communication Centre, Ministry of Agriculture and Cooperatives

Senior Agriculture Communication Officer	Mr. Suresh Babu Tiwari
Agriculture Communication Officer	Mr. Nil Kantha Sharma

National Health Education, Information and Communication Centre, Ministry of Health

Director	Mr. Babu Ram Koirala
Senior Health Education Officer	Mr. Badri Bahadur Khadka

Department of Urban Development and Building Construction, Ministry of Physical Planning and Works

Director General, Personal Assistance Section	Mr. Raju Phuyal

Department of Hydrology and Meteorology, Ministry of Water Resources

Meteorologist	Mr. Pancha Ratna Shakya

Central Bureau of Statistics, Planning Commission

Section Officer	Mr. Sarad Raj Nepal

Radio Nepal

(Kathmandu Studio Centre)	
Executive Director (assigned until January 26, 2005)	Mr. Shailendra Raj Sharma
Executive Director (assigned from January 26, 2005)	Mr. Tapanath Shukla
Deputy Executive Director	Mr. Ram S. Karki
Director, Planning and Internationals	Mr. Bhairab Bahadur Adhikari
Director, Engineering	Mr. B. P. Shivakoti
Director, Administration	Mr. Purushottam Sapkota
Finance-Chief	Mr. Radha K. Kafle
Chief Engineer	Mr. R. J. Karkee
Deputy Chief Engineer	Mr. Ashok Banskota
Senior Officer	Mr. Dhanendra Bimal
Executive Engineer	Mr. Krishna Chandra Pandel
(Bhainsepati Transmitting Station)	
Deputy Chief Engineer	Mr. Binod Kumar Thapa
Technical Officer	Mr. Suresh Raj Upreti
Technical Officer	Mr. Dibya Ratna Shakya
(Khumaltar Transmitting Station)	
Deputy Chief Technical Officer	Mr. Padma J. Dhakhwa
Deputy Chief Technical Officer	Mr. Madhusudan Thapa
(Pokhara Transmitting Station)	
Deputy Chief Engineer	Mr. Shiva Raj Baral
Senior Technical Officer	Mr. Durga Nath Regmi
(Dharan Transmitting Station)	
Executive Engineer	Mr. Chandra Bhushan Laldas
Senior Technical Officer	Mr. Arun Kumar Shrestha
(Dhankuta Regional Broadcasting Station)	
Executive Program Manager	Mr. K. C. Buddhi Bahadur
Post-Technical Officer	Mr. Surenda Prasad Yadav
Editing Officer	Mr. Milan Rai
(Bardibas Transmitting Station)	
Senior Technical Officer	Mr. Ram Pukar Ram

Technical Assistant	Mr. Shiv Jee Chaudharg
Accountant	Mr. Shreedhar Dhawal

Kantipur FM Pvt. Ltd.

Acting General Manager	Mr. Rajendra B. Singh
Senior Executive Producer	Mr. Prabhat Rimal
Chief-Administration	Mr. Sushil Adhikary

Image Channel Pvt. Ltd.

President / Managing Director	Mr. R. K. Manandhar
Chief Engineer	Mr. Nirmal Pradhanang
Operation Chief	Mr. Sahaj Man Shrestha

Embassy of Japan

Ambassador of Japan	Tsutomu HIRAOKA
First Secretary	Takeshi OSAKA

JICA Kathmandu Office

Resident Representative	Shinji YOSHIURA
Deputy Resident Representative	Fumio IMAI
Assistant Resident Representative	Kenichiro KOBAYASHI

4. Minutes of Discussions

Minutes of Discussions
on the Basic Design Study
on the Project for Improvement
of SW and MW Radio Broadcasting Stations
in the Kingdom of Nepal

In response to the request from His Majesty's Government of Nepal, the Government of Japan decided to conduct a Basic Design Study on "The Project for Improvement of SW and MW Radio Broadcasting Stations" (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Nepal the Basic Design Study Team (hereinafter referred to as "the Team"), headed by Mr. Shinji Yoshiura, the Resident Representative of the JICA Nepal Office, and is scheduled to stay in the country from January 9 to February 11, 2005.

The Team held discussions with the officials concerned of the Government of Nepal and conducted a field survey at the study area.

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

Kathmandu, 17 January, 2005

Shinji YOSHIURA
Leader
Basic Design Study Team
Japan International Cooperation Agency

Shailendra Raj Sharma
Executive Director
Radio Nepal

ATTACHMENT

1. Objective

The objective of the Project is to rehabilitate transmitting equipment of the Radio Nepal (hereinafter referred to as "RNE") as well as its studio equipment to improve the accessibility of Nepali people to information.

2. Project Site

The sites of the Project are shown in **Annex-1**.

3. Responsible and Implementing Organizations

(1) The responsible ministry is the Ministry of Information and Communications.

(2) The implementing agency is the RNE (The organization chart of RNE is shown in **Annex-2**).

4. Items Requested by the Nepal Government

After discussions with the Team, the items described in **Annex-3** were finally requested by the Nepali side. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

(1) The Nepali side understands the Japan's Grant Aid scheme and the necessary measures to be taken by the Government of Nepal explained by the Team as described in **Annex-4**.

(2) The Nepali side will take necessary measures, as described in **Annex-5**, for smooth implementation of the Project, as a condition for the Japan's Grant Aid to be implemented.

6. Schedule of the Study

(1) The consultants will proceed to further study in Nepal by February 11, 2005.

(2) JICA will prepare the draft report in English and dispatch a mission to Nepal in order to explain its contents around the end of April, 2005.

(3) In case that the contents of the report is accepted in principle by the Government of Nepal, JICA will complete the final report and send it to the Government of Nepal by the end of July, 2005.

7. Other Relevant Issues

(1) The Nepali side shall arrange the budget allocation for undertakings to be done by the Nepali side described in Annex-5.

(2) Procurement of the studio equipment was not included in the original request from the Government of Nepal. However, the equipment has become superannuated and the condition

is serious. Japanese side checked the current situation by the site survey and both sides confirmed the necessity of rehabilitation of the equipment in the course of discussion.

(3) The Nepali side will produce such programs which will enlighten and benefit the people by utilizing the studio equipment to be procured in the Project.

(4) The Nepali side has understood that the Japan's Grant Aid Project cannot cover all the requests submitted by the Nepali side in July, 2003, and also understood the need to optimize the components of the equipment from the viewpoint of cost-effectiveness.

(5) The Nepali side shall make maximum effort to improve equipment and facilities of RNE by its own budget in future from the viewpoint of self-reliance.

(6) The Nepali side shall allocate sufficient budget and qualified staff to properly and effectively operate/maintain the equipment and facilities.

(7) The Nepali side shall furnish and/or improve facilities for electricity supply for the equipment to secure transmitting conditions by the Nepali side's expenses.

(8) The Nepali side has confirmed that all the radial earths of Bardibas Transmitting Station shall be reconnected by the Nepali side by the commencement of the Project.

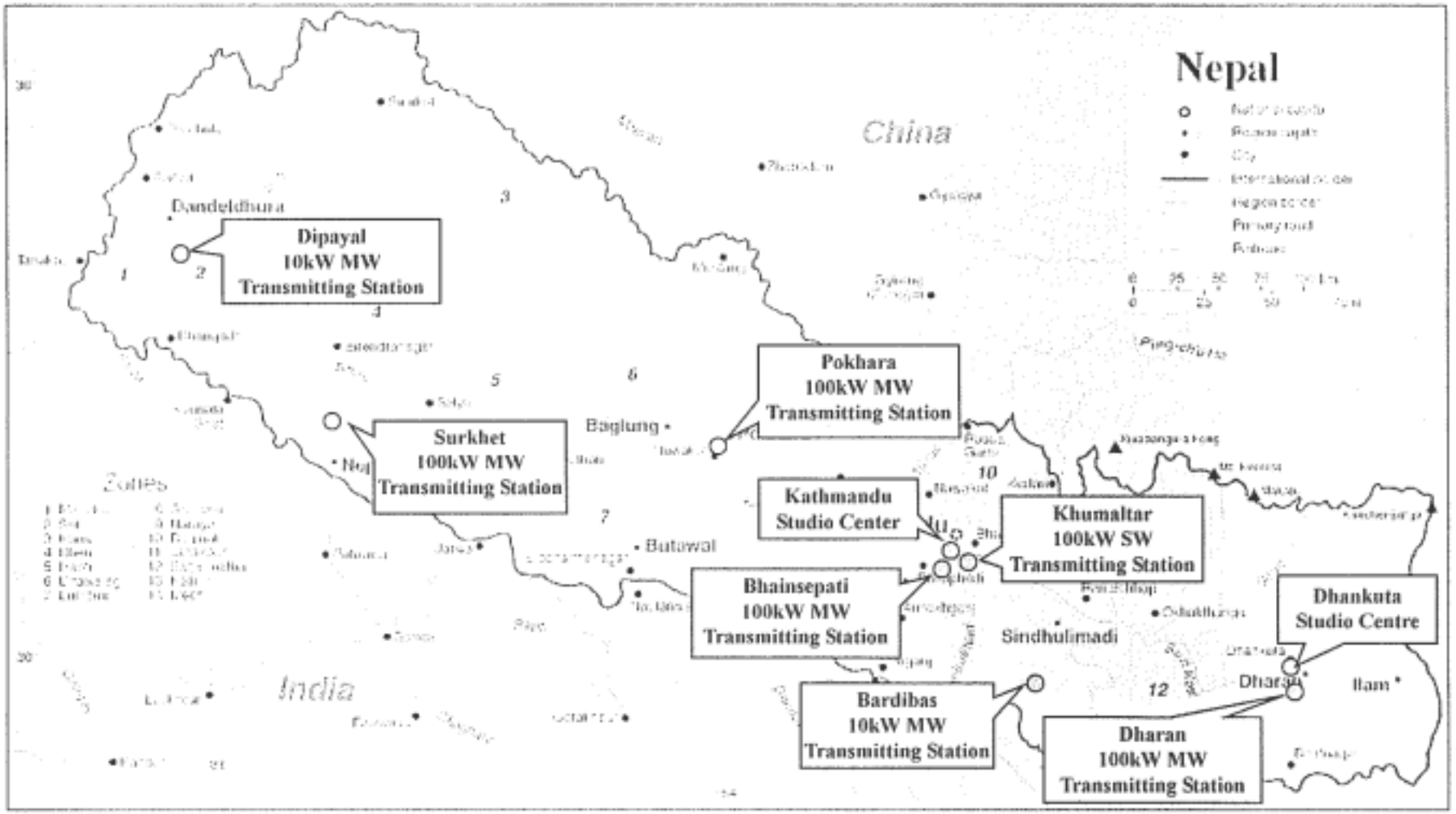
(9) The Nepali side shall ensure prompt tax exemption and customs clearance of the products at the terminal of disembarkation.

(10) The Nepali side shall exempt from VAT concerning local procurement of goods and services under the Project to a Japanese supplier.

(11) The Nepali side shall provide security for Japanese firms in the implementation stage if necessary and for each station to protect the equipment and facilities from subversive acts.

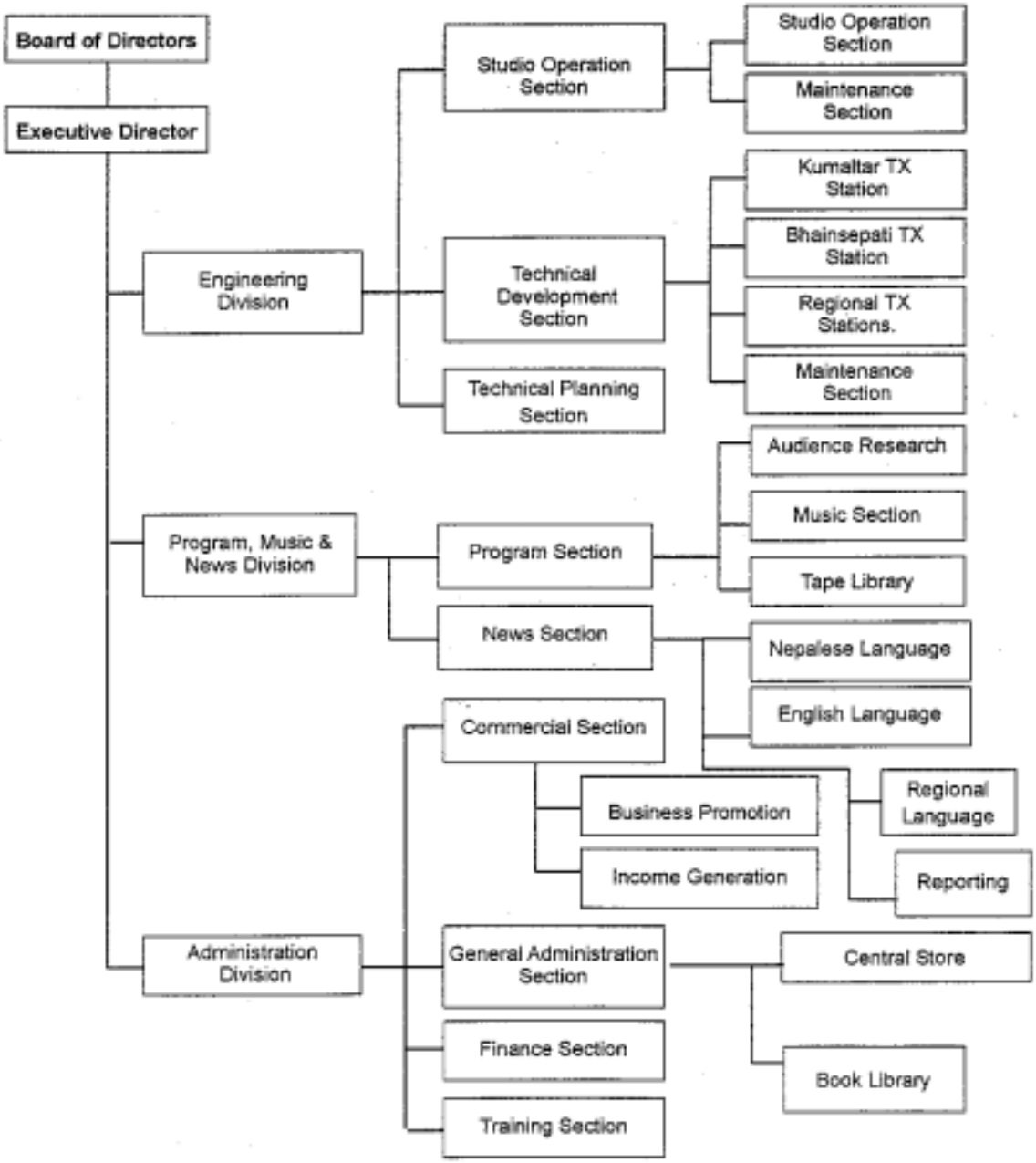
(12) The Nepali side requested that the technical cooperation be carried out by JICA, regarding the operation and maintenance of the procured equipment (studio equipment and transmitter), and the Nepali side has understood that another official request will be necessary to be submitted by the Nepali side to the Japanese side through the Embassy of Japan.

PROJECT SITES



Annex-2

ORGANIZATION CHART OF RADIO NEPAL



Annex-3

COMPONENTS OF THE PROJECT REQUESTED BY NEPALI SIDE

Priority	Description	Quantity
1.	Procurement of vacuum tubes for 100kW SW transmitter of Kumaltar Transmitting Station	1 lot
2.	Rehabilitation of Bardibas Transmitting Station including procurement/installation of solid-state type 10kW MW transmitter and refurbishment of the building	1 lot
3.	Procurement/installation of solid-state type 100kW MW transmitter for Bhainsepati Transmitting Station including improvement of room conditions for new equipment	1 lot
4.	Procurement/installation of solid-state type 100kW MW transmitter for Pokhara Transmitting Station including improvement of room conditions for new equipment	1 lot
5.	Procurement of vacuum tubes for Dharan Transmitting Station (100kW), Surkhet Transmitting Station (100kW) and Dipayal Transmigrating Station (10kW)	1 lot
6.	Rehabilitation of studio equipment for Kathmandu Studio Centre	1 lot
7.	Ditto for Pokhara Transmitting Station	1 lot
8.	Ditto for Dhankuta Studio Centre	1 lot
9.	Renewal of diesel engine generators for Kathumandu Studio Centre, Bhainsepati Transmitting Station and Pokhara Transmitting Station	1 lot

Annex-4

JAPAN'S GRANT AID

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

Japan's Grant Aid scheme is executed through the following procedures:

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

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

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of a basic design of the Project.
- 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 the 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 consulting firm(s). JICA selects (a) firm(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 consultant 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 national disaster, 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, constructing 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:

a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction,

b) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,

c) To secure buildings prior to the procurement in case the installation of the equipment,

d) To ensure all the expenses and prompt excursion for unloading, customs clearance at the

port of disembarkation and internal transportation of the products purchased under the Grant Aid,

e) 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,

f) 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 the 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)

a) 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.

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

(9) Authorization to Pay (A/P)

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

(End)

Annex-5

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 *1)		●
3.	To construct gates and fences in and around the site *2)		●
4.	To construct the parking lot	●	
5.	To construct roads		
	1) Within the site	●	
	2) Outside the site *3)		●
6.	To construct the buildings	●	
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		
	a. The city drainage main (for storm, sewer and others) to the site		●
	b. The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	5) 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	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
8.	To bear the following commissions to the Japanese foreign exchange bank for the 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 country	●	
	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 services may be required in connection with the supply of the products and the services under the verified contact, 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 constructed and equipment provided under the Grant.		●
13.	To bear all the expenses, other than those to be borne by the Grant, 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)