

BASIC DESIGN STUDY
ON
THE PROJECT FOR IMPROVEMENT
OF
SHORTWAVE RADIO BROADCASTING NETWORK
IN
MONGOLIA

FEBRUARY 2002

JAPAN INTERNATIONAL COOPERATION AGENCY
PACIFIC CONSULTANTS INTERNATIONAL
NISSOKEN ARCHITECTS/ENGINEERS

PREFACE

In response to a request from the Government of Mongolia, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Shortwave Radio Broadcasting Network and entrusted the study to the Japan International Cooperation Agency (JICA).

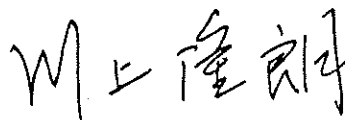
JICA sent to Mongolia a study team from June 23 to August 1, 2001.

The team held discussions with the officials concerned of the Government of Mongolia, 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 Mongolia 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 Mongolia for their close cooperation extended to the teams.

February 2002

Handwritten signature in black ink, consisting of a stylized 'M' followed by the Japanese characters '上 隆 朗' (Takao Kawakami).

Takao Kawakami
President
Japan International Cooperation Agency

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Improvement of Shortwave Radio Broadcasting Network in Mongolia.

This study was conducted by the joint venture between Pacific Consultants International and Nissoken Architects/Engineers, under a contract to JICA, during the period from June 2001 to February 2002. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Mongolia 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,

葛西隆

Takashi Kasai
Project manager,
Basic design study team on the Project for Improvement of
Shortwave Radio Broadcasting Network
The joint venture between Pacific Consultants International
and Nissoken Architects / Engineers



LEGEND

-   : PROJECT SITES
(SW TRANSMITTING STATIONS)
-  : MAIN ROADS

SCALE

0 100 200 300 400 500km



PROJECT SITE LOCATION MAP

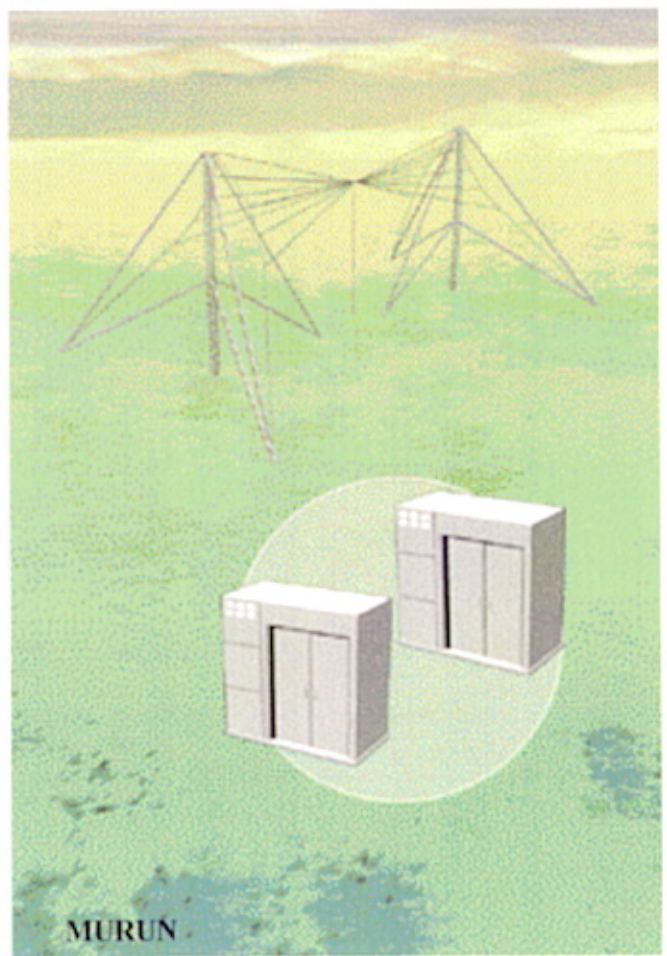
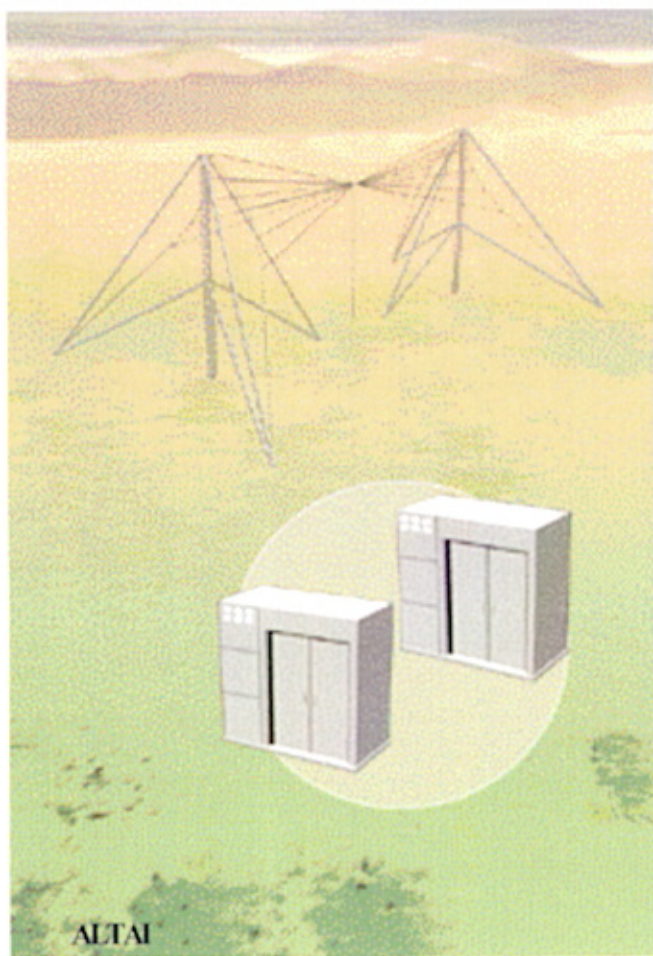
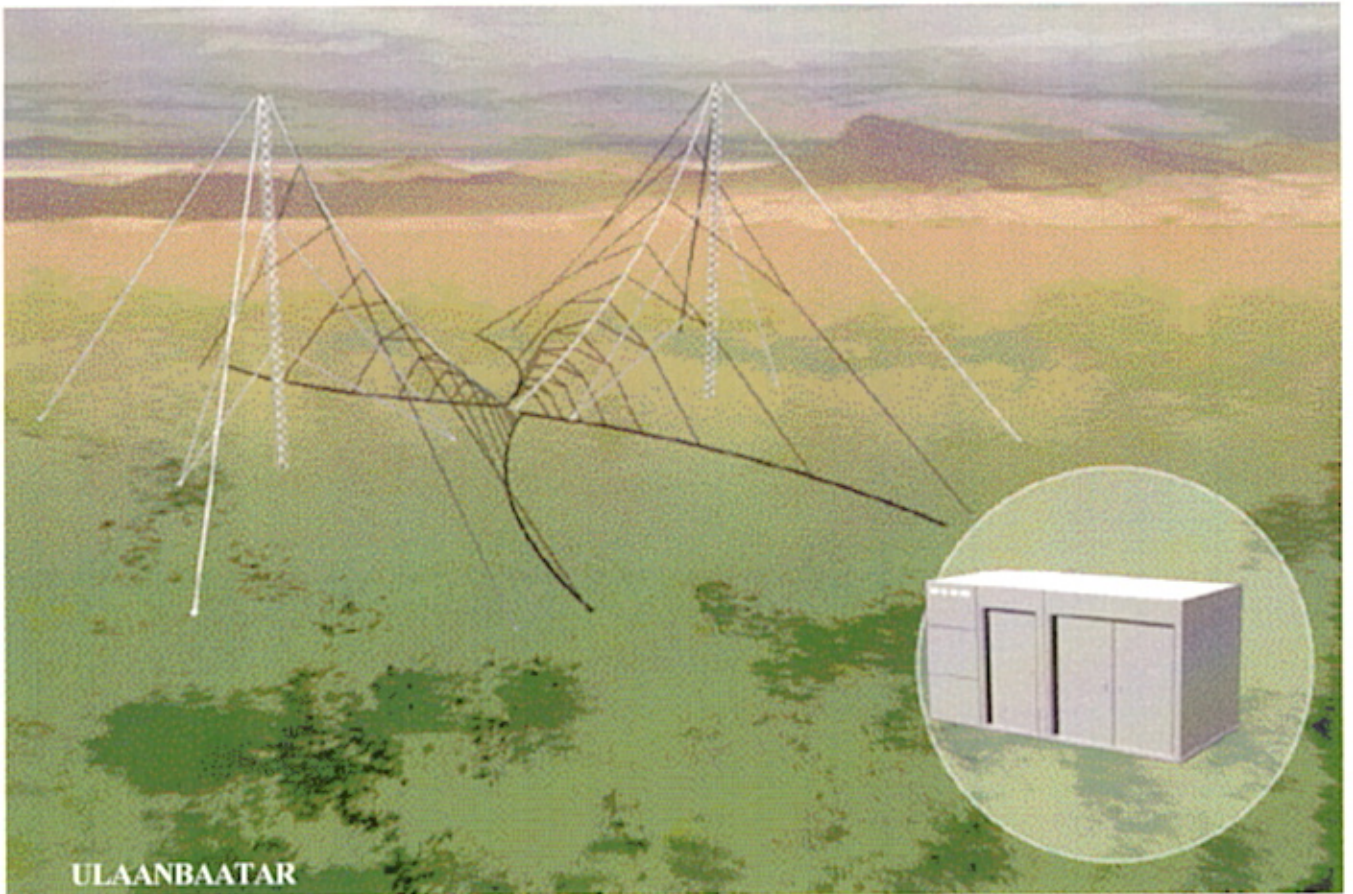


IMAGE OF COMPLETED SHORTWAVE TRANSMITTING SYSTEMS

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Abbreviation

ABU	Asia-Pacific Broadcasting Union
BD	Basic Design Study
BHN	Basic Human Needs
DD	Detailed Design
EIA	Environmental Impact Assessment
EOJ	Embassy of Japan
FM	Frequency modulation
ITU	International Telecommunications Union
JICA	Japan International Cooperation Agency
LW	Long-wave
MW	Medium-wave
MOFA	Ministry of Foreign Affairs of Japan
MOFE	Ministry of Finance and Economy of Mongolia
MOI	Ministry of Infrastructure
MRTC	Mongolian Radio & Television Technical Center of Transmission System
MRTV	Mongolian Radio & Television
ODA	Official Development Assistance
O&M	Operation and Maintenance
PTA	Post and Telecommunications Authority
RX	Receiver
SSN	Sun spot number
STL	Studio-to-Link
SW	Short-wave
TX	Transmitter

SUMMARY

Although a national development policy concerning the public-broadcasting sector has not been established in Mongolia, the Government of Mongolia puts priority on providing all nationals with the information related to national development. Subjects that are considered important include promotion of market economy policies, distribution of information required to complement school education, promotion of distance learning, and provision of information such as agricultural information, weather forecasts, and disaster prevention information.

In Mongolia, the Ministry of Infrastructure (MOI) has the jurisdiction over the broadcasting sector. Under supervision of MOI, Mongolian Radio & Television (MRTV) is taking overall charge of radio broadcasting. Mongolian Radio & Television Technical Center of Transmission System (MRTC) is positioned inside MRTV and is taking charge of operation and maintenance of the transmitting equipment.

MRTV had received assistance from the former Soviet Union since 1960 for installation of a wide variety of radio transmitting equipment, and operated short wave, medium wave, and long wave radio broadcasting from the seven (7) existing transmitting stations. Comparatively large-scale transmitting equipment that was made in the former Soviet Union with sufficient capacity to cover the whole nation was installed at these transmitting stations. However, the majority of these equipment are out of order due to technical failures and, in other cases, the equipment has almost reached the limit of its useful life. Such situation is seen mostly in long wave transmitting systems. Due to financial difficulties of MRTV, the spare parts indispensable for continuous operation of the transmitting equipment is difficult to purchase. Furthermore, the long wave transmitting equipment consumes a lot of electricity, and the electricity expense is a heavy burden to MRTV.

Under these circumstances, most of the existing transmitting equipment that are somehow operable must be operated at about half load of their capacities, resulting in a quick decrease in the broadcasting service area recently. Current total service area of the radio broadcasting brought by short wave, medium wave, and long wave can cover only about 47% of the total land area. Thus a measure of information distribution to the nomads is being lost and at the same time, the residents of the provincial areas cannot listen to the radio broadcast that is a vital medium indispensable to everyday life.

The Government of Mongolia selected three (3) stations, each located in Ulaanbaatar City of Central Aimag, Altai City of Govi-Altai Aimag, and Murun City of Khuvsgul Aimag, from the existing transmitting stations as sites for procurement and installation of new short wave transmitting systems in order to recover the service area by short wave broadcasting. The Government of Mongolia then requested the Government of Japan to conduct a study on the Project for Improvement of Short wave Radio Broadcasting Network (hereinafter called "the Project") under the Grant Aid scheme of the Government of Japan.

In response to the request, the Government of Japan decided to entrust the basic design study to Japan International Cooperation Agency (JICA). Accordingly, JICA dispatched the basic design study mission to Mongolia from June 23 to August 1, 2001. The study mission held discussions regarding the contents of the request with the implementation agency of the Project, MRTV. Furthermore, the study mission conducted field surveys at the study area and collected necessary data and information.

In a country like Mongolia, with a vast area and a range of high mountains, short wave radio broadcast, which launches radio waves towards the sky and utilizes the reflective wave from the ionosphere, is effective to cover a large service area. This advantage enables the distribution of information through radio broadcasting to the nomads who spend most of the year in remote areas, and the residents who live in the provincial areas. Furthermore, short wave transmitting equipment has the ability to transmit radio waves to distant locations with comparatively small electric power consumption; therefore, the electricity expense, which comprises a large portion of operation and maintenance expense, can be reduced. It was concluded that the nationwide broadcasting network could be improved by installing the short wave transmitting systems suitable for long distance broadcasting at the three (3) existing transmitting stations. Consequently, the procurement and installation of the short wave transmitting systems at the three (3) existing transmitting stations was decided as the scope of the Japanese assistance.

With due consideration to the result of field surveys and analysis in Japan, appropriate contents and scale of the Project including the aforesaid scope of assistance were determined by the study mission, after careful cost estimation of the Project. The above study is integrated into the basic design and the implementation plan of the Project. On this basis, JICA dispatched the draft basic design explanation mission to Mongolia from November 19 to December 5, 2001. As a result of carrying out explanations and discussion, basic agreement was obtained among the Governments regarding the content of the draft basic design.

The Government is responsible for public radio broadcasting service, and therefore, it is necessary to avoid the situation where broadcast is interrupted due to failure or fault of the transmitting equipment. For that purpose, the configuration of the system shall consider a stand-by transmitting system that starts-up immediately in the event of failure of the normally operated transmitter. Such a main/standby system is indispensable.

It is also necessary to secure adequate kinds and appropriate quantity of spare parts in order to respond to emergencies since the two (2) of the transmitting stations to be installed with new equipment are located at remote locations and all three (3) are under severe natural environments. In addition, an emergency power generator for use in case of power failure is required where the commercial power supply is unreliable.

The basic design was carried out based on the above points and was finalized as shown in the table below after discussion with the Mongolian side. The existing short wave transmitting equipment installed in the Ulaanbaatar transmitting station is rated at 100kW, but the actual

output power is assumed to be around 50kW. Therefore, it was decided to supply one (1) unit of 50kW transmitting equipment by the Project at the Ulaanbaatar station.

Transmitting Station	Ulaanbaatar	Altai	Murun
Operation system	Quasi-operation switching system	Main/Standby system	Main/Standby system
Rated power output (kW)	50	10	10
Numbers of transmitters (Units)	1	2	2
Auxiliary equipment (Sets)	1	1	1
Antenna system (Sets)	1	1	1
Emergency diesel generator (Units)	0	1	0
Cabling materials (Sets)	1	1	1
Studio-to-link (STL) system	To be provided under the Project	Existing STL to be used	Existing STL to be used
Spare parts	For 3 years	For 3 years	For 3 years

Since the effects of the Project are expected to continue over a long period, the equipment to be procured under the Project shall be reliable and widely procured, and shall be robustly made. Furthermore, it is also essential that it is easy to carry out operation and maintenance of the equipment. From the above viewpoints, it was judged to adopt a proven technology and select equipment that has many proven operation records, rather than equipment that applies highly advanced technologies. Therefore, it was decided to proceed with the above policy.

It was decided to include training in the initial operation of the equipment, and a “soft component” training program concerning operation and maintenance of the equipment, since technology transfer to the MRTV staff is indispensable in the transition from the former Soviet Union-made equipment to Japanese-made equipment.

Since equipment transportation, foundation work, and installation work are difficult under the severe natural conditions in the winter, it is necessary to concentrate on the site work in the summer season. Consequently, the implementation period of each stage will be as follows; preparation of the bid documents by the Consultant is about 3.6 months; procurement and installation of the equipment is about 12.6 months; and the soft component training program is about 3.3 months after the acceptance test and inspection. Considering some parts of the site work to be carried out in parallel, the total implementation period will be about 17.5 months.

In the event that the Project is carried out under the Japanese Grant Aid, estimated cost to be borne by the Mongolia side is approximately 5 million Japanese Yen.

When implementing this Project, it will be necessary to modify or repair some parts of the floor, wall, etc. of the existing buildings because the equipment to be procured under the Project will be installed inside these existing transmitting stations. Moreover, it will be necessary to remove the existing short wave antennas in connection with installation of the new short wave antennas at Altai and Murun transmitting stations. Implementation agency MRTV understands the details of such works to be borne by the Mongolian side. MRTV has also expressed that it can complete those works to meet the overall Project schedule, by taking budgetary measures for

spending 43.8 million Tg. on their works. For reference, 43.8 million Tg. accounts for only 2.1% of the overall operation and maintenance expense (2,087 million Tg.) that MRTC spent for the transmitting stations in the fiscal year 2000; therefore, it is assumed such amount is comparatively easy to be allocated.

Effects (or benefits) expected to be achieved by carrying out the Project are as stated below.

- Recovery of radio broadcasting service area will offer an information gathering measure through the radio broadcasting to the residents who reside in remote areas. Current total service area of the radio broadcasting brought by short-, medium-, and long wave is only about 65% of the total population and 47% of the total land area. The above ratios can be recovered to 94% of the population and 93% of the land area.
- At the existing radio transmitting stations, electricity expense alone comprises about 80% of operation and maintenance expenses. The electricity expense can be reduced by installation of the power-saving short wave transmitting equipment. For instance, in order to cover the same service area as the present operation, the annual electricity expense will be reduced by about 27.3 million Tg. (about 38%).
- The installation of the up-to-date transmitting equipment at the three (3) transmitting stations, and the reinforcement of program transmitting (STL) system for the Ulaanbaatar transmitting station will improve stability and reliability of program transmission, thus improving the trust from the listener in the radio broadcast.
- Technology transfer to the Mongolian side will be accomplished by the "soft component" regarding operation and maintenance of the transmitting equipment, and by instruction on the initial operation of the equipment.

The residents in the remote areas will be able to listen to the radio broadcasts; therefore, the following needs will be fulfilled, and the expected effects of the Project will be realized.

- Efficient economic activity is promoted by timely information to be provided to the residents regarding trends of demands, prices of crops and livestock, and information on dealing the products.
- By promptly providing forecasts on natural disasters (heavy snow or "Zud") to the residents, it will help them to take necessary measures which may contribute to reduce economic losses of agriculture and livestock.
- Improvement of educational level of the population, especially the youth, is expected by providing increased of education opportunities.

The above-stated effects are expected to be brought by the Project, and at the same time, it will widely contribute to the improvement of Basic Human Needs (BHN) for the population. From these points, the validity of carrying out the Project by Japanese Grant Aid is confirmed.

Regarding the operation and maintenance staff, no additional personnel will be required by the implementation of the Project, so the existing operation and maintenance organization can sufficiently handle the new transmitting systems.

As for the expense for operation and maintenance, the anticipated electricity expense for operation of short wave transmitting system in a year is 71.9 million Tg. and the expense for procurement of spare parts in a year is estimated as 66.7 million Tg. These expenses add up to 138.6 million Tg. However, this is only 6.6% of the total expenditure of 2,087 million Tg. in the fiscal year 2000; therefore, it cannot be considered as a heavy burden.

MRTV revealed that it would study the need for and timing of retirement of very old transmitters at the seven (7) existing transmitting stations. This is because the radio broadcasting network will be highly improved by implementing the Project, to the extent where the service area will cover almost the whole country. More specifically, commissioning of the short wave transmitting systems procured under the Project will be made sometime at the end of 2003; accordingly, the existing transmitting equipment can be retired gradually from the year 2004 up to a complete shutdown targeted in the year 2006.

MRTV estimates the electricity expense for operation of transmitting systems installed at the seven (7) transmitting stations as 570 million Tg. in the year 2002. Although this amount increases in the year 2003/2004, due to temporary operation of the existing transmitting systems combined with the new transmitting systems, it is expected to decrease after the year 2005 assuming that retirement of the existing transmitting systems will be carried out gradually.

According to the provisional estimate, the electricity expense for the year 2006 will decrease to 64% of that for the year 2002, and 204 million Tg. is assumed to be saved. On the other hand, the sum of electricity expense and procurement cost of spare parts for the new transmitting systems in 2006 is assumed at 138.6 million Tg. This means that the saved amount is 47% larger than the sum of the major expenses.

Since the reduction of electricity expense by implementation of the Project is large as stated above, it is expected that managing the operation and maintenance expense of transmitting equipment will be easier, and that operation and maintenance situation can be improved.

The following matters need to be taken care of during the implementation of the Project, and it is expected that the Project can be carried out more smoothly and effectively by solving them.

- A suitable framework that assures a smooth transition to the operation of the Japanese-made equipment shall be established by the Mongolian side. Such framework shall be accomplished not only by merely utilizing the opportunities of the “soft component” operation and maintenance training program, and initial operation instruction, but also by performing in-house and continuous educational training.

- It is also important to make programs attractive for the listeners of radio broadcasts, as a measure for enhancing the effect of the Project implementation.

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