Republic of the Union of Myanmar
Myanma Radio Television (MRTV)

PREPARATORY SURVEY REPORT
ON
THE PROJECT
FOR
EXPANSION OF BROADCASTING EQUIPMENT
OF
MYANMA RADIO AND TELEVISION
IN
THE REPUBLIC OF THE UNION OF MYANMAR

January 2017

Japan International Cooperation Agency (JICA)

NHK Integrated Technology Inc.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey on the Project for Expansion of Broadcasting Equipment of Myanma Radio and Television in the Republic of the Union of Myanmar and entrust the survey to NHK Integrated Technology Inc. and sent the survey team to Myanmar from November 29 to December 23 of 2015 (first field survey) and January 31 to February 6 and February 14 to 27 of 2016 (second field survey).

The team held a series of discussion with the officials concerned of the Government of Myanmar and conducted field surveys at the proposed project areas. As the result of further studies in Japan and through the explanation of the draft outline design report held from October 30 to November 5 of 2016, the present report was finalized.

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

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

January 2017

Akira NAKAMURA

Director General
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Summary

The Republic of the Union of Myanmar (hereinafter referred to as “Myanmar”) has a land area of 67.85km^2 (approx. 1.8 times that of Japan), occupies the western part of the Indochina Peninsula and faces the Andaman Sea and Bay of Bengal to the south. The Ayeyarwady River, which traverses the vast central part of the alluvial plain to the north and south, has become a key element of water transport in the Myanmar and empties into the Andaman Sea. The Arakan mountain range in the west borders India, while the eastern Shan Plateau forms a border with Thailand. The northwest mountainous region is bordered by China and the Salween River, about 2,800 km long, originating from the Tibetan Plateau, runs south of the Shan Plateau from the northeastern part of the Chinese border before emptying into the Maldavan Bay (Andaman Sea) along with the border of Thailand. The population of Myanmar is 51.41 million (announced by the Ministry of Immigration and Population in Myanmar in September 2014) and about 70% of the population is Burmese. The remaining 30% comprise a total of over 130 ethnic minorities, including tribes such as Kachin, Shan, Karen, etc.

Following the transition to civilian rule in 2011, in Myanmar, censorship of publications was abolished in 2012 and private companies were allowed to print newspapers from 2013. The government of Myanmar established “New Media Laws” defining the information public claims against government agencies in 2014 and has been aggressively promoting the relaxation of regulations related to media organizations, etc. Moreover, “Broadcasting Laws” were also established in 2015 to ensure the positioning of the broadcasting business in Myanmar would conform to international standards and a “Public Media Services Bill”, which would mitigate the state administration of state-owned media, is now under discussion in the Federal Parliament.

One of the state-owned broadcasters, Myanma Radio and Television (hereinafter referred to as “MRTV”) plays the role of eliminating information disparities and strengthening and promoting democratization, education, enlightenment, etc. MRTV is also responsible for meeting people’s expectations and increasingly sophisticated requests and improving people’s knowledge and sophistication by providing various high-quality programs. Once the “Public Media Services Bill” is established, MRTV is scheduled to transit from a directly operated state-owned broadcaster to become a public broadcaster; independently operated as a public organization.

MRTV was established in 1939 and currently functions as a subsidiary of the Ministry of Information (hereinafter referred to as “MOI”). MRTV started its business from radio broadcasting only at the time of establishment and in 1980, experimental TV broadcasting got underway, utilizing equipment donated by the Japan Foundation. In 1982, a studio center was constructed and program production equipment procured through Japan grant aid, whereupon full-fledged TV broadcasting got underway.

Along with the relocation of the capital city from Yangon to Nay Pyi Taw in 2006, MRTV constructed the Nay Pyi Taw Broadcasting Center in March 2008 (hereinafter referred to as “NBC”) as the new headquarters of MRTV, utilizing a soft loan from Singapore. Conversely, the Yangon Broadcasting Center (hereinafter referred to “YBC”) continues to operate as a broadcasting center and

the branch office of MRTV. Within the YBC, as well as a TV studio center constructed with Japanese grant aid, there is a radio building built with the aid of the Soviet Union in 1950; both of which are currently operated by lending part of the facilities to the private television broadcaster named MRTV-4. In October 2013, MRTV began self-funded digital terrestrial broadcasting in the three major cities of Nay Pyi Taw, Yangon and Mandalay and is now expanding is broadcasting areas; targeting a complete transition to terrestrial digital broadcasting by 2020. Also, as well as rolling out terrestrial digital broadcasting, MRTV expanded the number of channels from the original two in 2013 and now broadcasts on six (6) channels.

However, the main broadcasting equipment currently used by the TV studio center in YBC was procured by Japan's grant aid project in 1982, has already been operated for more than 30 years, is subject to significant aging and frequent breakdown and it is difficult to obtain spare parts. This means the program production and editing efficiency has declined considerably and prevents YBC from providing programs that meet people's needs from a quality and quantity perspective. MRTV is currently using equipment introduced at the South-East Asia (SEA) Games held in December 2013 to produce programs, but since all this equipment is mainly for recording outdoor programs, it is restricted to provisional use and program production in studios is extremely problematic.

MRTV must also increase the number of self-produced programs significantly for the six-channel broadcasting, which started with the transition of the terrestrial digital broadcasting (DVB-T 2 system) in May 2013. Moreover, MRTV intends to increase the number of channels step-by-step and has formulated a plan to make it eight channels in future. Under present circumstances, however, the number of devices required for in-house coverage is lacking, hence the urgent need to create high-quality programs and broadcasting by improving the broadcasting equipment with digital technology. Against this backdrop, the Government of Myanmar has requested grant aid to the Government of Japan to expand the broadcasting equipment for NBC and YBC.

In response, the Japan International Cooperation Agency (JICA) decided to conduct a survey and dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the Project for Expansion of Broadcasting Equipment of Myanma Radio and Television (hereinafter referred to as "the Project") over 25 days from November 29, 2013 to December 23 (the first field survey), to examine the viability of the Project and formulate the necessary and appropriate project contents. The Team reconfirmed the contents of the request, discussed details of the same with the parties concerned in Myanmar and started a field survey in the Project sites (Yangon and Nay Pyi Taw) as well as collecting relevant data concerning the Project.

The contents of the equipment requested by the Government of Myanmar in October 2013 comprised ten systems with 38 items in YBC and five systems with 19 items of NBC, totaling 15 systems with 57 items of equipment. However, at the beginning of the First Field Survey, MRTV submitted a new equipment list comprising 244 items that changed the main system of requested equipment and materialized and subdivided the contents of equipment significantly. The main contents of the change include the introduction of a file-based recording and playback system instead of the

optical disc recording and playback system originally suggested at the time of the initial request and switching the small satellite relay equipment for a small-sized digital satellite news gathering van (hereinafter referred to as “DSNG-VAN”). The animation production system that was initially requested was withdrawn by MRTV.

The Team confirmed the reason for each requested item of equipment and checked the validity of the request through consultation with MRTV while confirming the current state of the related existing equipment actually in operation. However, the program production flow using the entire newly requested equipment and the approach taken to integrate this equipment with the existing system could not be sufficiently clarified by MRTV and there was a need to discuss and verify again while awaiting the results of a further review of MRTV itself.

The file-based program production, which MRTV intended to newly adopt, had already been partly introduced into the playout system in NBC during the opportunity to open the SEA Games in 2013, however, it was relatively unclear how the program production system in YBC would be linked to the playout system in NBC. Therefore, one important pending item was to perform the field validation to examine system integration using existing equipment, following confirmation of MRTV’s final opinion in this regard.

Conversely, with regard to the studio equipment mainly requested mainly for YBC, the interior finishes in objective rooms for equipment accommodation like Studio No. 1 and related rooms surrounding Studio No. 1 in the TV Building, have intensely deteriorated. As well as interior finishes, some of the building equipment is also aged and not functioning. The air-conditioning system in particular was prone to repeated and frequent failures.

Regarding the Radio Building accommodating Studio A, 65 years have already elapsed since the construction and the deterioration of the entire building is remarkable. Both buildings were not in a state where newly procured equipment could be operated in a proper environment and the details of the building renovation work also had to be closely investigated.

Under these circumstances, the second field survey was conducted by two parties. Initially, a survey on the building renovation plan was conducted by dispatching two experts with sufficient insight into the construction and building equipment works respectively for seven (7) days from January 31 to February 6, 2016. Following the first party, two broadcasting engineers were dispatched for 14 days from February 14-27, 2016 and examined means of verifying the integration of new and old file-based systems in NBC as well as a supplementary investigation on the outline of equipment to be procured and clarification on how responsibilities are demarcated between both Governments.

In the second field survey, MRTV newly requested that the Team include the building renovation work in the scope of works by the Japan side, the work comprising the overall renovation of the interior finishes for rooms such as Studio No. 1 and the related room, where planned equipment was to be accommodated and the restoration of firefighting equipment in the TV Building in YBC. As for water leakage from the roof, which was also observed in the TV Building in the second field survey, MRTV expressed the wish to renovate the roof by themselves. However, MRTV’s own survey revealed that the entire roof covering had to be renewed to prevent ingress of rainwater into the building. With

the technical background and funding shortage in mind, MRTV additionally requested to the Team in May 2016 that the replacement of all the roof covering be included in the work to be performed by the Japan side.

On completion of the field surveys, while taking the contents of the final request into consideration, the Team examined the optimum range, scale, quantity and layout of the equipment from the perspective of MRTV's program production in NBC and YBC, the scope to operate and maintain program production equipment, the relevance and the socioeconomic effects of the Project and formulated the most appropriate Draft Outline Design (hereinafter referred to as "DOD").

In the process of DOD, the radio building of the YBC showed remarkable aging and an inability to maintain appropriate environmental conditions for the broadcasting equipment unless the building were newly constructed, so the requested equipment for Studio A in Radio Building was excluded from the planned equipment. The equipment in the Large Studio in NBC was also excluded from the planned equipment with cost effectiveness in mind.

The Team summarized the contents of the plan in the DOD Report and revisited Myanmar for seven (7) days from October 30 to November 5 of 2016 to explain to the relevant parties on the Myanmar side and reconfirm the contents of the Project through discussion. The objective of the Project is to promote an environment for high broadcasting program production with diverse and expressive quality, by expanding the scope of broadcasting equipment in YBC and NBC of MRTV. In addition, the overall goal for the Project involves helping develop human resources to support democracy promotion and the economic society of Myanmar.

In formulating the contents of the Project, based on three (3) basic concepts which can be drawn from the request from the Myanmar side, i.e. "Rehabilitation of YBC", "Centralized management of program production" and "Reinforced ability to handle outside news gathering", the following three (3) points were set as basic design policies:

① To restore the program production function in the TV building of YBC with a proper and reasonable system

The procurement of major program production equipment is limited to the TV building of YBC and the main basic policy involves reviving the program production function as a broadcast station, as established under Japanese Grant Aid in 1982.

② To introduce state-of-the-art system equipment meeting the trend of the era.

In recent years, a lot of digital equipment used to produce television programs has been replaced by file-based system equipment using computers. With the present status in mind and the relocation of the MRTV headquarters to NBC, the fact that programs are produced at both YBC and NBC, file-based systems and archive systems are requested for both YBC and NBC, a content transmission system for YBC and content network system and format conversion system for NBC constitute essential system equipment to centrally manage program production.

③ To strengthen the external news gathering ability with a view to conveying information on

remote locations widely to the public

The National Races Channel (NRC) which is one of the broadcasting channels of MRTV broadcasts, aims to transmit information from remote locations widely to the public to help reconcile the 135 ethnic groups living in Myanmar. Introducing small-sized DSNG-VAN intended for use in such remote interactive coverage can greatly improve not only NRC but also the capability of news gathering for the other five MRTV channels.

The outline of equipment and building renovation to be procured and executed in the Project is as follows:

＜Procurement of the Equipment for YBC＞

- Equipment for Studio No. 1 1 lot
- Computer Graphics System 1 lot
- Archive System 1 lot
- Contents Transmission System 1 lot
- DSNG-VAN 1 lot
- Maintenance and Measuring Equipment 1 lot

＜Renovation of TV Building of YBC＞

- Renovation of interior finishes of Studio No. 1 and other related rooms (eight in total) where the planned equipment is to be installed
- Renewal of roof covering
- Renovation of building equipment works, such as automatic fire alarm system and indoor hydrant system

＜Procurement of the Equipment for NBC＞

- Contents Network System 1 lot
- Archive System 1 lot
- DSNG-VAN 2 lots
- File Conversion System 1 lot
- Maintenance and Measuring Equipment 1 lot

And the obligations of the Myanmar side for the Project are as follows:

① Preparatory works prior to building renovation of YBC

Removal of the following:

- Existing studio lighting system and related equipment and electrical wiring
- Existing equipment and electrical wiring from the rooms to be renovated and which will house the procured equipment
- Master clock and slave clocks and electrical wiring

② Preparatory works prior to equipment installation for NBC

- Renovation of the existing Archive Room
- Securing the space of the newly introduced equipment for a contents network system and

its electrical wiring route

③ Payment of the customs clearance charge for imported procured equipment

④ Reimbursement of commercial tax to be imposed on local subcontractors engaged by the Japanese supplier

⑤ Issuance of Authorization to Pay (A/P) and payment of banker's commission to the agent bank

⑥ Diversion of existing equipment for the new system

⑦ Securing storage rooms or spaces for the procured equipment

In case the Project is executed as a Japanese Grant Aid program, the total implementation time schedule will be 22 months (six (6) months from the detailed design phase to the tendering phase and 16 months from procurement/installation of the equipment to completion of the Project) and the project cost to be borne by the Myanmar side is estimated at 309,750,000 MMK as stipulated in the Minutes of Discussions (M/D) on November 4, 2016.

The competent authority for the Project is the MOI and MRTV is the executing agency of the Project. As for securing the budget and tax exemption necessary on the Myanmar side, there seems to be no problem since it has been already confirmed through consultation with the Ministry of Planning and Finance (MOPF) when explaining the DOD. In addition, the Project implementation system has already been established and the operation/maintenance of systems and costs can be secured after implementing the Project.

Implementing the Project is expected to have the following effects:

(1) Quantitative Effect

Three years after completing the project, an increase of 111 programs and new production programs totaling 6 channels are expected. The total of 6 channels is expected to increase broadcasting time by 112 hours.

(2) Qualitative Effect

Expressive programs with high quality (talk shows with telops inserted, entertainment programs utilizing virtual video systems, etc.) will be increased and efforts to build the capacity of human resources supporting the economic society will be promoted.

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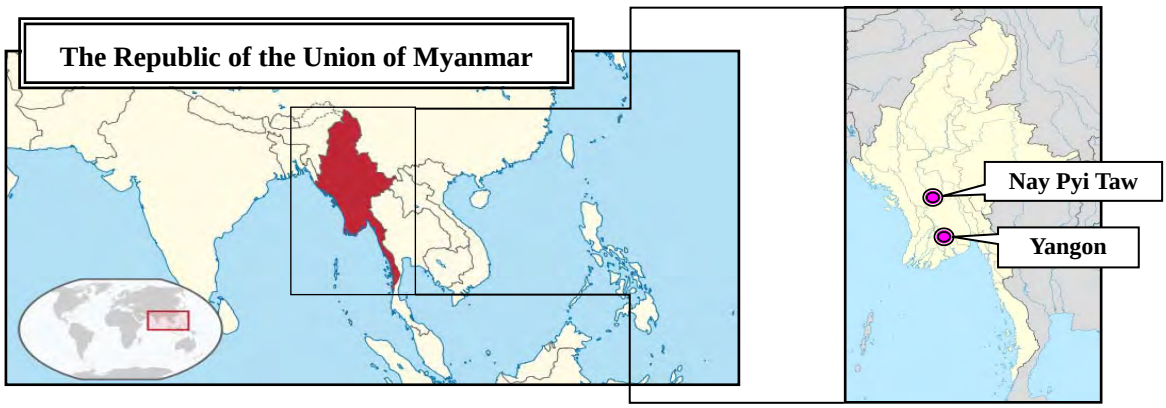
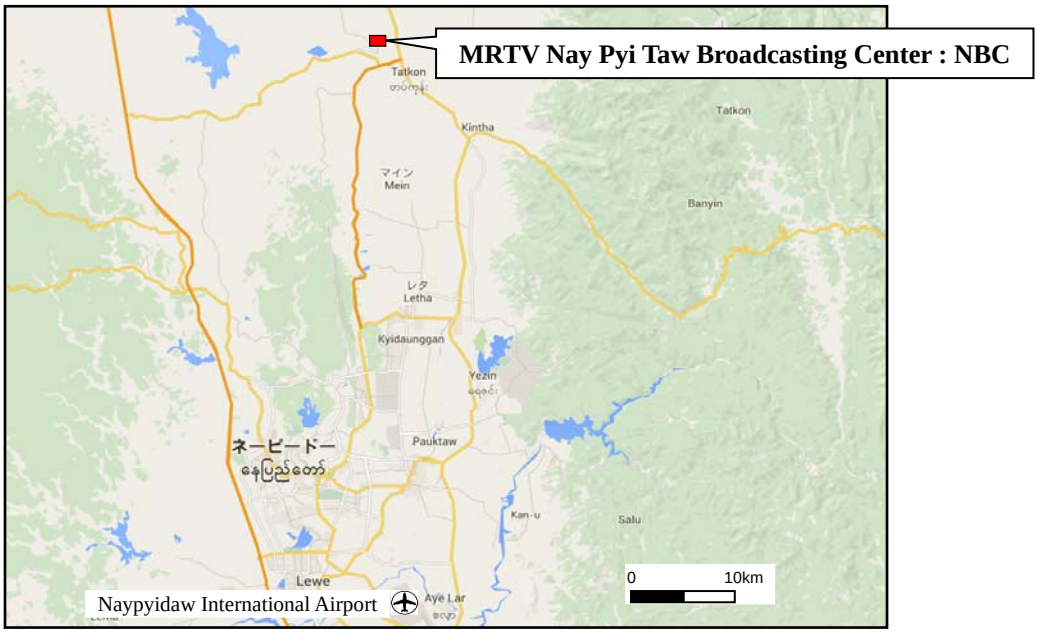
[Appendices]





Source : Wikipedia, Google Map

SITE LOCATION MAP

LIST OF FIGURES AND TABLES

ABBREVIATIONS

AC	Alternating Current
A/P	Authorization to Pay
ASEAN	Association of South-East Asian Nations
B/A	Banking Arrangement
CD	Compact Disc
CPU	Central Processing Unit
DOD	Draft Outline Design
DSNG-VAN	Digital Satellite News Gathering Van
DVB-T2	Digital Video Broadcasting-Second Generation Terrestrial
E/N	Exchange of Notes
ENG	Electronic News Gathering
G/A	Grant Agreement
GOJ	the Government of Japan
GOM	the Government of Myanmar
HD	High Definition
HDD	Hard Disk Drive
ICT	Information and Communication Technology
IPRD	Information and Public Relation Department
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
KVM	Keyboard, Video, Mouse Switch
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LPF	Low-Pass Filter
LTO	Linear Tape-Open
MAM	Media Asset Management
M/D	Minutes of Discussions
MFTB	Myanmar Foreign Trade Bank
MI	Myanmar International
MMK	Myanmar Kyat
MNR	Media Network Room
MOI	Ministry of Information
MOPF	Ministry of Planning and Finance

MOT	Ministry of Transport
MRTV	Myanmar Radio and Television
NBC	Nay Pyi Taw Broadcasting Center
NRC	National Races Channel
OECD	Organization for Economic Cooperation and Development
PC	Personal Computer
PPE	Printing and Publishing Enterprise
PSM Bill	Public Service Media Bill
PVC	Polyvinyl Chloride
QC	Quality Control
RAID	Redundant Arrays of Inexpensive Disks
SD	Standard Definition
SEA Games	South East Asian Games
SMPTE	Society of Motion Picture and Television Engineers
UPS	Uninterruptible Power Supply
VTR	Video Tape Recorder
YBC	Yangon Broadcasting Center

Chapter 1 Background of the Project

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1-1 Background of the Request

One of the state-owned broadcasters, Myanma Radio and Television (MRTV) plays the role of eliminating information disparities and strengthening and promoting democratization, education, enlightenment, etc. MRTV is also responsible for meeting people's expectations and increasingly sophisticated requests and improving people's knowledge and sophistication by providing various high-quality programs.

MRTV was established in 1939 and currently functions as a subsidiary of the Ministry of Information (MOI). MRTV started its business from radio broadcasting only at the time of establishment and in 1980, experimental TV broadcasting got underway, utilizing equipment donated by the Japan Foundation. In 1982, a studio center was constructed and program production equipment procured through Japan grant aid, whereupon full-fledged TV broadcasting got underway.

Along with the relocation of the capital city from Yangon to Nay Pyi Taw in 2006, MRTV constructed the Nay Pyi Taw Broadcasting Center (NBC) in March 2008 as the new headquarters of MRTV, utilizing a soft loan from Singapore. Conversely, the Yangon Broadcasting Center (YBC) continues to operate as a broadcasting center and the branch office of MRTV.

However, the main broadcasting equipment currently used by the TV studio center in YBC was procured by Japan's grant aid project in 1982, has already been operated for more than 30 years, is subject to significant aging and frequent breakdown and it is difficult to obtain spare parts. This means the program production and editing efficiency has declined considerably and prevents YBC from providing programs that meet people's needs from a quality and quantity perspective. MRTV is currently using equipment introduced at the South-East Asia (SEA) Games held in December 2013 to produce programs, but since all this equipment is mainly for recording outdoor programs, it is restricted to provisional use and program production in studios is extremely problematic.

MRTV must also increase the number of self-produced programs significantly for the six-channel broadcasting, which started with the transition of the terrestrial digital broadcasting (DVB-T 2 system) in May 2013. Moreover, MRTV intends to increase the number of channels step-by-step and has formulated a plan to make it eight channels in future. Under present circumstances, however, the number of devices required for in-house coverage is lacking, hence the urgent need to create high-quality programs and broadcasting by improving the broadcasting equipment with digital technology. Against this backdrop, the Government of Myanmar has requested grant aid to the Government of Japan to expand the broadcasting equipment for NBC and YBC.

1-2 Circumstances of the Request

The contents of the equipment requested by the Government of Myanmar in October 2013 comprised ten systems with 38 items in YBC and five systems with 19 items of NBC, totaling 15 systems with 57 items of equipment. However, at the beginning of the First Field Survey, MRTV submitted a new equipment list comprising 244 items that changed the main system of requested equipment and materialized and subdivided the contents of equipment significantly. The main contents of the change include the introduction of a file-based recording and playback system instead of the optical disc recording and playback system originally suggested at the time of the initial request and switching the small satellite relay equipment for a small-sized digital satellite news gathering van (DSNG-VAN). The animation production system that was initially requested was withdrawn by MRTV.

The Team confirmed the reason for each requested item of equipment and checked the validity of the request through consultation with MRTV while confirming the current state of the related existing equipment actually in operation. However, the program production flow using the entire newly requested equipment and the approach taken to integrate this equipment with the existing system could not be sufficiently clarified by MRTV and there was a need to discuss and verify again while awaiting the results of a further review of MRTV itself.

The file-based program production, which MRTV intended to newly adopt, had already been partly introduced into the playout system in NBC during the opportunity to open the SEA Games in 2013, however, it was relatively unclear how the program production system in YBC would be linked to the playout system in NBC. Therefore, one important pending item was to perform the field validation to examine system integration using existing equipment, following confirmation of MRTV's final opinion in this regard.

Conversely, with regard to the studio equipment mainly requested mainly for YBC, the interior finishes in objective rooms for equipment accommodation like Studio No. 1 and related rooms surrounding Studio No. 1 in the TV Building, have intensely deteriorated. As well as interior finishes, some of the building equipment is also aged and not functioning. The air-conditioning system in particular was prone to repeated and frequent failures.

Regarding the Radio Building accommodating Studio A, 65 years have already elapsed since the construction and the deterioration of the entire building is remarkable. Both buildings were not in a state where newly procured equipment could be operated in a proper environment and the details of the building renovation work also had to be closely investigated.

Under these circumstances, the second field survey was conducted by two parties. Initially, a survey on the building renovation plan was conducted by dispatching two experts with sufficient insight into the construction and building equipment works respectively for seven (7) days from January 31 to February 6, 2016. Following the first party, two broadcasting engineers were dispatched for 14 days from February 14-27, 2016 and examined means of verifying the integration of new and old file-based systems in NBC as well as a supplementary investigation on the outline of equipment to

be procured and clarification on how responsibilities are demarcated between both Governments.

In the second field survey, MRTV newly requested that the Team include the building renovation work in the scope of works by the Japan side, the work comprising the overall renovation of the interior finishes for rooms such as Studio No. 1 and the related room, where planned equipment was to be accommodated and the restoration of firefighting equipment in the TV Building in YBC. As for water leakage from the roof, which was also observed in the TV Building in the second field survey, MRTV expressed the wish to renovate the roof by themselves. However, MRTV's own survey revealed that the entire roof covering had to be renewed to prevent ingress of rainwater into the building. With the technical background and funding shortage in mind, MRTV additionally requested to the Team in May 2016 that the replacement of all the roof covering be included in the work to be performed by the Japan side.

1-3 Outlines of the Request

The outline of equipment and building renovation to be procured and executed in the Project is as follows:

＜Procurement of the Equipment for YBC＞

- Equipment for Studio No. 1 1 lot
- Computer Graphics System 1 lot
- Archive System 1 lot
- Contents Transmission System 1 lot
- DSNG-VAN 1 lot
- Maintenance and Measuring Equipment 1 lot

＜Renovation of TV Building of YBC＞

- Renovation of interior finishes of Studio No. 1 and other related rooms (eight in total) where the planned equipment is to be installed
- Renewal of roof covering
- Renovation of building equipment works, such as automatic fire alarm system and indoor hydrant system

＜Procurement of the Equipment for NBC＞

- Contents Network System 1 lot
- Archive System 1 lot
- DSNG-VAN 2 lots
- File Conversion System 1 lot
- Maintenance and Measuring Equipment 1 lot

Chapter 2 Contents of the Project

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2-1 Basic Concept of the Project

2-1-1 Overall Goal and Project Purpose

Following the transition to civilian rule in 2011, in the Republic of the Union of Myanmar (hereinafter referred to as "Myanmar"), censorship of publications was abolished in 2012 and private companies were allowed to print newspapers from 2013. The Government of Myanmar established "New Media Laws" defining the information public claims against government agencies in 2014 and has been aggressively promoting the relaxation of regulations related to media organizations, etc. Moreover, "Broadcasting Laws" were also established in 2015 to ensure the positioning of the broadcasting business in Myanmar would conform to international standards and a "Public Media Services Bill", which will mitigate the state administration of state-owned media, is now under discussion in the Federal Parliament.

One of the state-owned broadcasters, Myanmar Radio and Television (MRTV) plays the role of eliminating the information disparities and strengthening and promoting democratization, education, enlightenment, etc. MRTV is also responsible for meeting people's expectations and increasingly sophisticated requests and improving people's knowledge and sophistication by providing various high-quality programs. Once the "Public Media Services Bill" is established, MRTV is scheduled to transit from the directly operated state-owned broadcaster to become a public broadcaster independently operated as a public organization.

MRTV was established in 1939 and currently functions as a subsidiary of the Ministry of Information. MRTV started its business from radio broadcasting only at the time of establishment and in 1980, experimental TV broadcasting got underway, utilizing equipment donated by the Japan Foundation. In 1982, a studio center was constructed and program production equipment was procured through Japan grant aid, whereupon full-fledged TV broadcasting got underway. With the relocation of the capital in 2006, the main MRTV office was moved to the new capital Nay Pyi Taw as Nay Pyi Taw Broadcasting Center (NBC) in 2008, whereupon Yangon Broadcasting Center (YBC) has functioned as a branch office.

Since almost all the equipment in YBC procured in 1982 had been aging, the equipment procured for the Southeast Asian (SEA) Games held in December 2013 is currently used. However, since most of this equipment is for outdoor news gathering, program production in the studio is very difficult.

In addition, as MRTV is scheduled to increase the number of channels stepwise in future and has a business plan to increase the number of self-produced programs and strengthen independent news programs, the necessary equipment is likely to become insufficient. Under these circumstances, there will be an urgent need to renew and expand such equipment to provide continuous programs of highly expressive quality to people in future. Providing a range of such high-quality programs is expected to allow viewers to cultivate knowledge and intellectual spirit and build human resources to support the economy and society, including the promotion of democratization. The Project to Expand the

Broadcasting Equipment of Myanmar Radio and Television (hereinafter referred to as “the Project”) is intended to meet those challenges

The Project aims to promote an environment for high broadcasting program production with diverse and expressive quality, by expanding the broadcasting equipment in YBC and NBC of MRTV. The overall goal of the Project is also to help develop human resources to support democracy promotion and the economic society of Myanmar.

2-1-2 Outline of the Project

The input and activities necessary to achieve the goals above and the expected output of the Project are summarized as follows:

◆ Input

Japan Side:

〔Equipment〕

＜YBC＞

- Equipment for Studio 1 1 lot
- Computer Graphics System 1 lot
- Archive System 1 lot
- Contents transmission System 1 lot
- Digital Satellite New Gathering Van (DSNG-VAN) 1 lot
- Maintenance and Measuring Equipment 1 lot

＜NBC＞

- Contents Network System 1 lot
- Archive System 1 lot
- DSNG-VAN 2 lots
- File Conversion System 1 lot
- Maintenance and Measuring Equipment 1 lot

〔Renovation of Building: YBC TV building〕

- Renovation of interior finishes of Studio No. 1 and other related rooms (eight in total) where the planned equipment is to be installed
- Renewal of the roof covering
- Renovation of building equipment works, such as automatic fire alarm and indoor hydrant systems

〔Human Resources〕

- Engineers to implement initial guidance and operation training of the equipment to be procured under the Project

Myanmar Side:

〔Works〕

＜YBC＞

- Preparatory works before commencing building renovation works, such as removing all existing equipment, including a studio lighting system, from the relevant eight rooms where the procured equipment is to be installed

＜NBC＞

- Preparatory works before commencing equipment installation works, such as renovating the existing Archive Room

＜Common for YBC and NBC＞

- Securing the primary-side power supply equipment that is suitable to operate the procured equipment
- Securing storage space for the procured equipment once all the installation works are complete

〔Human Resources〕

- Personnel for program production (in the status quo)
- Personnel to operate and maintain program production equipment (in the status quo)

◆ Activities

- Training personnel in charge of program production (in the status quo)
- Securing a program production budget
- Training personnel in charge of operating and maintaining program production equipment (in the status quo)
- Securing a budget to operate and maintain program production equipment

The following output can be expected:

◆ Output

- Quantitative Effect

  Three years after completing the project, an increase of 111 programs and new production programs totaling 6 channels are expected. The total of 6 channels is expected to increase broadcasting time by 112 hours.
- Qualitative Effect

  Expressive programs with high quality (talk shows with telops inserted, entertainment programs utilizing virtual video systems, etc.) will be increased and efforts to build the capacity of human resources supporting the economic society will be promoted.

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

(1) Basic Policy

The equipment finally requested by MRTV has been changed significantly from the original request in 2013. Major changes to the requests: ① A file-based recording and playback system instead of the optical disc system used , ② DSNG-VAN instead of small satellite relay equipment and ③ Renovation of the YBC TV building, can be listed. However, the key change in the request is that the components of each system be concretely proposed to clarify the wide-ranging equipment configuration. In addition, the quantity and grade of equipment has also been expanded well beyond the original request, such as part of the video equipment corresponding to ultra-high image quality called 4K. Under these circumstances and amid significant changes to the request, the basic conditions to execute the outline design of the Project are as follows:

① In consideration of the scrutiny from the Japan side in the process from acceptance of the request and the decision on the preparatory survey, the scope of the cooperation, scale and grade of the equipment should be established within a range not exceeding the initial request amount.

② The equipment to be procured for the Project should avoid duplication of the equipment procured by MRTV for the SEA Games after submission of the initial request, supported with other donors, but ensuring integrity with the same.

③ Introducing system equipment which does not hamper the operation of existing equipment at all.

Among the basic conditions of the above, such as technical matters concerning the scale and grade of equipment in the cooperation object mentioned in ② and ③, as described in detail in the 2-2-2-3 Equipment Plan, here, only the basic concept for setting the scope and component of the equipment is described, keeping the basic conditions of the above item ①.

1) To restore the program production function in the YBC TV building with a proper and reasonable system

YBC’s Radio Building, for which the introduction of the equipment has been requested was constructed under the aid by the Soviet Union in 1950, is aged significantly and not in a condition that can properly operate the equipment to be provided. As for Studio 1 (Large Studio in the original request) having 700m^2 floor areas in NBC, there is no evidence that even once used and it is not expected to be effect that corresponds to the cost to cast. Therefore, the procurement of major program production equipment is limited to YBC TV building and it is a main basic policy to revive the program production function as the broadcast station which was established as part of Japanese Grant Aid in 1982.

2) To introduce state-of-the-art system equipment in line with the era of the trend

Broadcasting equipment is being innovated at breakneck speed. Following the transition from analog to digital, recent years have seen much of the digital equipment used in program production switched for file-based system equipment using a computer. The optical disc recording and playback system initially requested by MRTV is likely to be discontinued during the execution phase of the Project, so that a change of request of MRTV relating to the introduction of file-based equipment can be considered truly reasonable. In addition, with the present status in mind, namely the headquarters of MRTV moving to NBC, programs are produced at both YBC and NBC, file-based systems are requested as archive systems for both YBC and NBC and a content transmission system for YBC and content network and format conversion systems for NBC, are key system equipment to centrally manage program production.

3) To strengthen the ability of outside news gathering with a view to conveying information on remote locations widely to the public

The National Races Channel (NRC), which is one of the MRTV broadcasting channels, broadcasts by dividing the same program of one to two hours in 11 languages for 17 hours from 6 a.m. until 11 o'clock at night daily. To reconcile the 135 ethnic groups living in Myanmar, its mission is to transmit information from remote locations widely to the public. Under current circumstances dictating program production in NRC, news gathering from remote rural areas is conducted via motorcycle or on foot and takes two or three days. Smaller satellite relay systems intended for use in news gathering in remote areas includes a portable satellite relay system and precision machinery with accuracy to within 0.1mm or less while still portable. However, the equipment is weighty and needs to be set up whenever used. With mobility in mind, such as ensuring an initial response system and gathering news smoothly in an emergency, it is desirable to provide a four-wheel drive vehicle equipped with a small satellite relay system. By introducing a DSNG-VAN instead of a small satellite relay system, it can be foreseen that the ability to gather news will be significantly improved; not only for NRC but also all other programs in the remaining five channels.

Summing up the above three basic concepts, the following points constitute the basic policy on outline design for the Project:

- Rehabilitation of YBC
- Centralized program production management
- Enhanced outside news gathering ability

(2) Policy on Natural Environment Conditions

Yangon has a tropical monsoon climate. In May 2008, a cyclone invaded the gulf region, including Yangon and part of the roof of the YBC TV building was damaged. Since the TV building was constructed over 33 years ago, its metal roof is increasingly deteriorating and traces

of water leakage due to this deterioration are increasingly prominent in the dimmer (Rectifier) room on the first floor. Given the abundant Yangon precipitation and such water leakage in the TV building, ensuring an appropriate operational environment for the planned equipment will been renovating the roof covering as part of the responsibility of the Japan side.

Conversely, the entire Midwest regions, including Nay Pyi Taw, are prone to frequent flood damage. In August 2015, significant flooding occurred and a tower of the local MRTV transmitting station reportedly collapsed, although no significant damage in the Tatkon district where NBC is located was reported. As NBC was only built in 2008 and is a robust facility, there is no fear of water leakage within the building. In addition, climbing a gentle slope from the entrance gate, the ground level (GL) surrounding the building is about 2m higher than the area of the entrance gate and the ground floor level of the building is 90cm higher than GL. Moreover, as all the major broadcasting equipment is on the second floor, about 3.6m above the ground floor, sufficient flood measures were taken into account when designing the building.

Since Myanmar is an earthquake-prone country, consideration for earthquakes is also required. When installing YBC and NBC equipment, anchoring to the floor is generally practiced and where multiple racks are lined up, each shall be connected to other racks, as basic seismic measures

As for DSNG-VAN, as aforementioned, vehicles shall be four-wheeled drive, allowing them to negotiate even unpaved roads in suburban or mountainous areas and even in rainy seasons. The vehicles will also feature sufficient air-cooling ability to cool the installed equipment configuration.

(3) Policy on Social Infrastructure

The power supply situation in Myanmar is often sub-optimal and power outages of about 15 to 30 minutes and 2 to 3 times daily were confirmed in YBC during the field survey. One set of 500kVA emergency engine generators is equipped in YBC and two sets of 1,250kVA emergency engine generators (one for redundancy) are equipped in NBC, which operate in the event of power failure. However, it takes about five minutes for the generators to ‘kick-in’ when the power failure occurs. Accordingly, as for systems using computers, such as those for format conversion, computer graphics, etc., an uninterruptible power supply (UPS) will be introduced to prevent data disappearing when the power fails.

(4) Policy on Circumstances of Procurement

Broadcasting equipment has not been manufactured in Myanmar and most of the major broadcast equipment currently used in MRTV includes Japanese products or those of developed Western countries. The equipment planned for the Project is to be selected mainly from Japanese manufacturer’s products in principle, whereas products which outperform Japanese products, or offer equivalent quality at a cheaper price, procurement of the developed Western countries is to be considered. In any case, all the equipment is to be procured in Japan, i.e. even if this includes products from developed Western countries, they are to be procured in Japan through the agent.

All equipment is also to be inspected after the temporary system configuration in the factory in Japan.

Conversely, most of the building materials to be used for renovating the TV building in YBC are available in Myanmar, hence the renovation materials shall be procured there, including imported goods from Japan.

(5) Policy on Usage of Local Companies

Work to install the existing MRTV equipment was carried out by engineers dispatched from each of the manufacturers of system design and construction companies in neighboring countries such as Singapore etc. because the installation process, operational testing method, adjustment and commissioning of the equipment had to comply with the system design or each manufacturer's own specifications. Similarly, when installing the planned equipment for the Project, the work is to be carried out by dispatching skilled technicians from each of the equipment manufacturers. However, skilled workers to assist in the equipment installation work and familiar with electrical related works are to be employed by a local company in Yangon or in Nay Pyi Taw.

As for building renovation works for YBC TV building, engineers dispatched from Japanese construction companies familiar with constructing the broadcast facility and local building engineers who will assist in managing the works are to be selected, who is familiar with relevant works from a construction consultant in Yangon.

(6) Policy on Operation and Maintenance Management

Regarding operation and maintenance management, such as the number of personnel and operational procedures after implementing the Project, no significant change to the present system may be required in NBC, given that the existing ICT network system is now operating. However, in YBC, where manpower planning corresponds to the relatively inefficient analog TV program production, not enough personnel are familiar with the operation of the ICT network system. When operating the planned equipment on completion of the Project, at least two engineers in charge of computer graphics are required as well as at least three engineers for the entire ICT network system, comprising an archive system and content transmission system, etc., i.e. at least five engineers need to be allocated for the ICT network system in YBC[1].

To ensure a sufficient number of engineers familiar with the ICT network system equipment can be nurtured in YBC on completion of the Project, MRTV should capitalize on the technical cooperation of Japan, which is promoted in parallel with the Project. Also in this regard, the initial operational guidance and operational training should be focused on the ICT network system equipment. Such training on ICT network systems is to be carried out for 16 days in NBC and 9 days in YBC respectively, but MRTV is requested to ensure that rookie trainees can receive guidance for as long as possible during the total 25-day training period for the system.

1 It is reported by MRTV, for the purpose of training engineers familiar with the ICT network system, that trainers specializing in ICT network systems would be dispatched from NBC to YBC. MRTV also reported that a certain number of staff who now oversee radio program production will be shifted to TV program production and that training would commence in the near future.

(7) Policy on Setting the Grade of the Equipment

Program production equipment is roughly classified into “Broadcast grade”, “Professional grade” and “Consumer grade”. Since MRTV has to provide stable high-quality programs by using highly robust and user-friendly equipment as the state-owned broadcaster, broadcast grade will be adopted for the planned equipment in principle. Based on the equipment function or with cost-effectiveness in mind, professional equipment may also be adopted.

(8) Policy on Implementation Method and Time Schedule

1) Policy on Implementation Method

The Project is to be implemented in two sites at NBC and YBC. There is also a need to continue broadcast service as usual, even during the installation period for both broadcasting centers. The special characteristics of this work mean it will require time and effort far beyond the installation work for the new building not yet operated. In particular, any broadcast accident such as an extended program interruption will bring the very existence of MRTV trying to spearhead public broadcasting into question and may directly result in the trust of Myanmar people being lost. Therefore, work to install equipment and renovate buildings must be implemented on condition that the continuation of existing broadcasting services shall remain unhindered. Under this premise, the working time, method and details of the work process shall be adjusted and determined periodically through consultation/discussion with the Consultant as well as the relevant MRTV staff during implementation of the work.

2) Policy on Implementation Period

Most of the works in the Project comprise installing equipment in NBC and YBC and renovating the building only in YBC. Although the periods for implementing the works differ at both sites, to reduce the burden on current MRTV broadcast services, the works for both sites must be implemented in parallel and adjusted to finish at the same time. As for the work period on the equipment installation, the following must be taken into account as basic policies:

- The work shall commence after completing preparatory works to be carried out by MRTV, such as removing existing equipment, etc. and completing the building renovation work.
- Work to install a studio lighting system and its motorized batten rigging system will occupy all the room areas of Studio No. 1 and should be implemented before installing any other equipment, to secure the safety of installation works for the main equipment components.
- The newly introduced equipment system shall be connected and integrated to existing equipment once the installation work is complete. Full cares should be taken for the integration to avoid disturbing the current broadcast operation.

In addition, the following notes must be observed at each process of the implementation

period:

① Manufacturing Period and Shipment

When producing and procuring equipment for the Project, it takes about 5.0 months for the studio lighting system and its motorized batten rigging system and about 7.0 months for other equipment. As described above, the installation schedule for studio lighting and its related system differ from that of other equipment and there is limited storage space for procured equipment to be reserved by MRTV. Accordingly, two shipments shall be arranged, whereby the studio lighting and its related system equipment shall be initially transported to the YBC site and the other equipment to YBC and NBC via a second shipment, approximately two months after the first.

② Works to be carried out by Myanmar Side

These shall include preparatory works by MRTV, such as removing the existing equipment and unused cables etc. from the rooms where the planned equipment is to be installed and renovating the existing Archive Rooms in NBC, etc., for which around 1.5 months will be required. To comply with the overall implementation schedule for the Project, MRTV must reliably complete all the requested preparatory works before commencing building renovation work for YBC.

③ Process of Installation Work

The YBC building renovation requires 5.0 months, while the studio lighting system and its related system, to be conducted in parallel with the building renovation work, requires 1.5 months. The building renovation work, includes electrical renovation works, such as related studio lighting system and electrical works to be carried out before the studio lighting system. With this arrangement of electrical renovation work in mind, a proper schedule for the studio lighting and its related system is to be set out in the final six weeks of the building renovation schedule. As soon as completing the building renovation work and studio lighting and its related system, work on installing other equipment is to commence in YBC, which will require 4.0 months, including adjustment and testing operations, acceptance test and inspection, initial operation guidance and operation training. As well as commencing equipment installation in YBC, equipment installation work in NBC is to be commenced in parallel with YBC and the work in NBC also requires 4.0 months.

④ Test and Inspections

While implementing the Project, tests and inspections are to be carried out on the following three occasions:

- Factory inspection:

  To confirm provisional assembly of the equipment in the factory, to be inspected by the Consultant, a sampling test to be carried out

- Pre-shipment equipment inspection:
  To confirm the availability of planned equipment and its conformity with the shipping documents, to be inspected by an inspection company entrusted by the Consultant
- Acceptance test and inspection of the Project:
  Final test and inspection to hand over the work, to be tested and inspected by MRTV and the Consultant

2-2-2 Basic Plan

2-2-2-1 Validation of the Request

(1) Change Status of the Request

The following summarize the main changes made at MRTV's request, in the process from the original request in 2013, requests made during the first and second field surveys and to the additional request on building renovation (renewal of roor covering of TV Building in YBC) in May, 2016.

【Requested Equipment for YBC】

1) Equipment for Studio No. 1
   - Introduction of a file-based recording and playback system instead of an optical disc recording and playback system
   - New addition of a video wall system
   - New addition of a computer graphics system
   - Introduction of a slow-motion picture controller with a function of 1/2 speed below, for one set of HD cameras among 4 sets of HD camera
   - Change in the function for video equipment (HD Camera, Video Production Switcher, Video Monitors, etc.) from 2K to 4K

2) Equipment for Studio A
   - Introduction of a file-based recording and playback system instead of an optical disc recording and playback system
   - Four sets of HD cameras instead of three sets of the same
   - A newly added LED studio lighting system and theater director equipment (smoke generator) etc.
   - Deletion of the computer graphics system

3) Contents Network System
   - No change

4) Computer Graphics System
   - No change

5) Format Conversion System
   - Introduction of a file-based recording and playback system instead of an optical disc recording and playback system

6) Archive System
   - Introduction of a file-based storage system instead of an optical disc recording and playback system
   - A newly added LTO archive system and editing system

7) Master Control System (Content Transmission System)
   - Deletion of optical disc recording and playback system and monitoring equipment
   - Newly added video router

8) Small Satellite Relay Equipment
   - Deletion of three sets of small satellite relay equipment and the new addition of one lot of DSNG-VAN mounted with HD cameras

9) Maintenance and Measuring Equipment
   - Deletion of the disc for archive systems

10) Animation Production System
   - Withdrawal of the system

【Requested Equipment for NBC】

1) Equipment for Large Studio
   - Introduction of a file-based recording and playback system instead of an optical disc recording and playback system
   - New addition of a video wall system
   - New addition of a computer graphics system

2) Archive System
   - Introduction of a file-based recording and playback system instead of an optical disc recording and playback system
   - New addition of an LTO archive system and editing system

3) Small Satellite Relay Equipment
   - Deletion of the two sets of small satellite relay equipment and new addition of two lots of DSNG-VAN mounted with HD cameras

4) Format Conversion System
   - Introduction of a file-based recording and playback system instead of an optical disc recording and playback system

5) Maintenance and Measuring Equipment
   - Deletion of the disc for archive system

【Renovation of Yangon TV Building】

1) Refurbishment of Interior Finishes

Requested Rooms: Renovation is requested for a total of eight rooms; comprising seven rooms in which the planned equipment is to be accommodated and Sound Lock No. 1. For all the rooms, completed refurbishment for the floors, walls and ceilings is requested. The main equipment to be installed in each room is as follows:

- Ground Floor of the Yangon TV building: five rooms
  - Studio No. 1
    Lighting system, video wall system, camera crane equipment, etc.
  - Sub-Control Room No. 1
    Operational consoles for video, audio and lighting control, equipment mounting rack, etc.
  - Store Nos. 3 and 4
    HD cameras, prompter system, video monitors, audio monitors (* Note: This equipment shall be stored in these rooms after recording the programs) and maintenance and measuring equipment
  - Sound Lock No. 1
    (*Note: There is no equipment in the room but to harmonize with other studio-related renovated rooms)
- First Floor of the Yangon TV building: Three rooms
  - Rectifier Room
    Dimmer equipment for studio lighting (Room to be renamed “Dimmer Rack Room”)
  - Radio Relay Equipment Room
    Archive system equipment (Room to be renamed “Archive Room”)
  - Title Preparation Room
    Computer graphics system equipment (Room to be renamed “Computer Graphics Room”)

Contents of the Request: All interior finishes of floors, walls and ceilings are to be refurbished. As for Studio No. 1 and Sub-Control Room No. 1, the introduction of LED lighting fixtures is requested.

2) Renovation of Roof Covering

Contents of the Request: Complete change to the roof covering of the Yangon TV building

3) Renovation of Building Equipment

Contents of the Request: Restoration of the automatic fire alarm system and indoor fire hydrant system which are now in a state of functional outage

(2) Study on the Requested Equipment

As set forth in the aforementioned, it is noted that a file-based recording and playback system (storage system and archive system) is newly requested for many systems instead of an optical disc recording and playback system. In recent years, the broadcasting industry has seen recording media for TV programs change from VTR to optical discs, hard discs, USB media, etc. During this transition, although optical discs were considered the media with most potential for a certain period over VTR, given their disadvantages in terms of recording and playback time, the use of hard disc or USB media has become mainstream in recent industry. With the broadcasting industry in mind, MRTV's request to change from an optical disc recording and playback system to a file-based recording and playback system is considered quite reasonable. The following are summaries of the background of the study to determine the planned equipment and its outlines:

1) Requested Equipment for YBC

① Equipment for Studio No. 1

Studio No. 1, which covers an area of 250m^2, is the typical program production studio symbolizing the YBC and improving its equipment is crucial for the YBC rehabilitation, i.e. restoring YBC program production. The main equipment requested includes that allowing wide-ranging program production, such as HD cameras, camera crane equipment, prompter systems, virtual video systems, video wall systems, video-related equipment, audio-related equipment, lighting systems and intercom systems, etc. As well as this equipment, computer graphics systems are also requested and introducing such equipment paves the way for wide-ranging TV programs in fields of information, education, traditional culture and entertainment, etc. As for newly requested computer graphics systems, there is scope to produce very varied character telop designs, which benefit those hard of hearing. Accordingly, almost all the equipment requested is to be adopted as planned equipment except for the requested functional change to the video-related equipment.

② Equipment for Studio A

Studio A is located in the YBC Radio Building, which was constructed in 1950 with funding from the Soviet Union. The building has existed for 65 years, has aged significantly and no building drawing exists which would be needed to study renovation. Accordingly, when large-scale rehabilitation, including structural reinforcement or reconstruction is performed, Studio A lacks the right environment in which to operate, maintain and manage state-of-the-art studio equipment, which is why equipment for Studio A is not included in the planned equipment.

③ Contents Network System

The Content Network System is equipment capable of storing programs and program materials in the program production process and through centralized control of these

file-based program data, group work by plural program production staff can be made. Programs are broadcast through a program transmission system in NBC and efforts to ensure the consistency of the existing file-based program transmission system in NBC are prioritized, so that the system shall only be provided to NBC and not YBC.

④ Computer Graphics System

The computer graphics system is a device required to describe program content using characters and diagrams comprehensively for TV viewers. The system is to be utilized to create graphic images within a virtual video and video wall system, to be newly introduced as part of the equipment for Studio No. 1. Though MRTV is now introducing a computer graphics system procured by in-house funding, its operation stability is rather low. Accordingly, the system shall be improved by providing two new sets of state-of-the-art computers to target high work efficiency. The system is to be accommodated in the post-production room, since it has sufficient space and the room (Title Preparing Room) should be renamed “Computer Graphics Room”.

⑤ Format Conversion System

The format conversion system is equipment to copy recorded video tape onto an alternative file format for the program data. Although programs recorded on video tape are already stored in YBC, all these tapes have already since been moved to NBC. Accordingly, the system is to be provided to NBC only, since introducing the system to YBC would be meaningless.

⑥ Archive System

The archive system is a device to save programs already produced as well as in future production, including a search function to facilitate reuse of stored programs. Developing this system allows the management of the production program in MRTV to be centralized. Programs to be produced in YBC are transmitted by the optical network line to NBC, then stored in an NBC archive system. Conversely, since there are also cases where part of the program produced in NBC is reused in YBC, an archive system is also introduced in YBC. There is also scope to integrate the operation of both archive systems in YBC and NBC by exploiting ICT (information and communication technology) in future.

⑦ Contents Transmission System (YBC⇒NBC)

This set of systems is referred to as the master control system in the Request. Existing equipment is accommodated in the Media Network Center (MNC) in the Radio Building and transmits programs to NBC utilizing video recording and playback equipment such as VTRs. The new system to be introduced is intended to allow arbitrarily selected program material to be transmitted to NBC, even from other rooms such as studios No. 1 or News Studio not limited to MNC, which means improved

operability of the equipment can be expected.

The system centers on audio/video monitors, a remote control panel and a network system device for room-to-room communication, etc. This equipment is to be provided in Studio No. 1, Archive Room, Computer Graphics Room and the room of Earth Station within the YBC premises. As for the existing rooms of Studio No. 2, News Studio and MNR in YBC, although the system equipment and necessary electrical wiring to the rooms are to be carried out by the Japan side, this equipment and wiring connections shall be provided by the Myanmar side, i.e. by MRTV.[2]

⑧ DSNG (Digital Satellite News Gathering)-VAN

Citing why DSNG-VAN was newly requested instead of small satellite relay equipment, MRTV explained as follows:

- Live broadcasts from remote locations and rapid transmission of news gathering material can be easily achieved without incurring additional satellite connection fees, since MRTV has already concluded an annual contract with a satellite communications company in Thailand and is now using its transponder (satellite radio repeater).
- The radio property of small satellite relay equipment means satellite line communications are likely to be disrupted during torrential rain.
- Small satellite relay equipment involves assembling parts weighing tens of kilograms and taking time for preparatory work.

The small satellite relay equipment originally requested is unsuitable for news reports which have to be conducted rapidly and a vehicle is crucial for moving it around. Accordingly, requested changes in this regard are judged to be very reasonable. For YBC, one small-sized four-wheel-drive vehicle equipped with small satellite communication equipment including a frequency band with high resistance against torrential rain (C-band) and mounted with a parabolic antenna is requested as part of efforts to ensure a rapid reporting system. As for cameras for outdoor news gathering (ENG cameras) to be accommodated in the van, ENG cameras, which MRTV is now reserving, are to be diverted.

⑨ Maintenance and Measuring Equipment

To maintain the planned equipment for YBC properly and take life-extending measures of the same into consideration, maintenance and measuring equipment is planned. Multi-signal analyzing monitor, portable signal generator, spectrum analyzer and audio signal analyzer are the main equipment components.

2 Introducing a content transmission system to the rooms of Studio No. 2, News Studio and MNR, allows the system to be operated quite efficiently. However, these three rooms are currently in operation and used very frequently and installing the equipment will require very delicate and careful adjustment. Accordingly, it is appropriate for the installation work for these three rooms to be conducted by MRTV itself.

⑩ Animation Production System

The animation production system can be covered by a computer graphics system. MRTV withdrawing the system from the request is reasonable.

2) Requested Equipment for NBC

① Equipment for a Large Studio

A large studio covering a floor space of 700m^2 is the largest program production studio of MRTV. Judging from the floor areas, it is presumed that the original studio applications involved the production of the drama program. However, there is no evidence of it having been used even once, despite seven years having elapsed since completion of the building. Moreover, a grid pipe ceiling necessary to hang studio lighting fixtures has not yet been provided. Since many performers, including the drama actor and actress, are living in Yangon, it is unrealistic to produce a drama program in NBC located in Tatkon Township. Equipment for the Large Studio in NBC is to be excluded since an effect equivalent to the cost to cost cannot be estimated.

② Contents Network System

As specified previously, a content network system is to be introduced in NBC. Regarding the propriety for the common use of existing file-based equipment and planned equipment, the potential was confirmed during the second site survey carried out in February 2016.

③ Archive System

As specified previously, the archive system is a device to save the programs previously produced as well as in future production, including a search function to facilitate reuse of the stored program. Developing this system makes it possible to centralized management of the production program in MRTV.

④ DSNG-VAN

As a public broadcaster, MRTV aims to report to Myanmar nationwide swiftly and efficiently on disasters and incidents having occurred in rural areas. To ensure a rapid reporting system, a small-sized four-wheel-drive vehicle equipped with the small satellite communication equipment corresponding to a frequency band, with high resistance to torrential rain (C-band) and mounted with a parabolic antenna is planned. With this in mind, NBC, located in Tatkon, seems to utilize vans more than YBC due to accessibility to rural areas, with two lots of vans now planned. As well as YBC, ENG cameras, which MRTV is now reserving, are to be diverted.

⑤ Format Conversion System

The video recording and playback equipment previously used to produce programs and record them on video tape by YBC in the past was already completed for all manufacturers. As MRTV has maintained the equipment appropriately, several kinds

of such equipment to play back recorded video tapes are now reserved in YBC in an operable state. Accordingly, a format conversion system is to be introduced subject to the condition that all video recording and playback equipment in YBC be relocated to NBC.

⑥ Maintenance and Measuring Equipment

To maintain the planned equipment properly and apply life-extending measures to the same, maintenance and measuring equipment is planned for both NBC and YBC, mainly including a multi-signal analyzing monitor, portable signal generator and spectrum analyzer.

Based on the above study results, an overview of the whole planned equipment for YBC and NBC, to be included as a cooperation subject of equipment, is shown on Fig. 2-1 on the next page. Equipment surrounded by blue lines denotes planned equipment for the Project and equipment surrounded by broken lines denotes existing equipment.

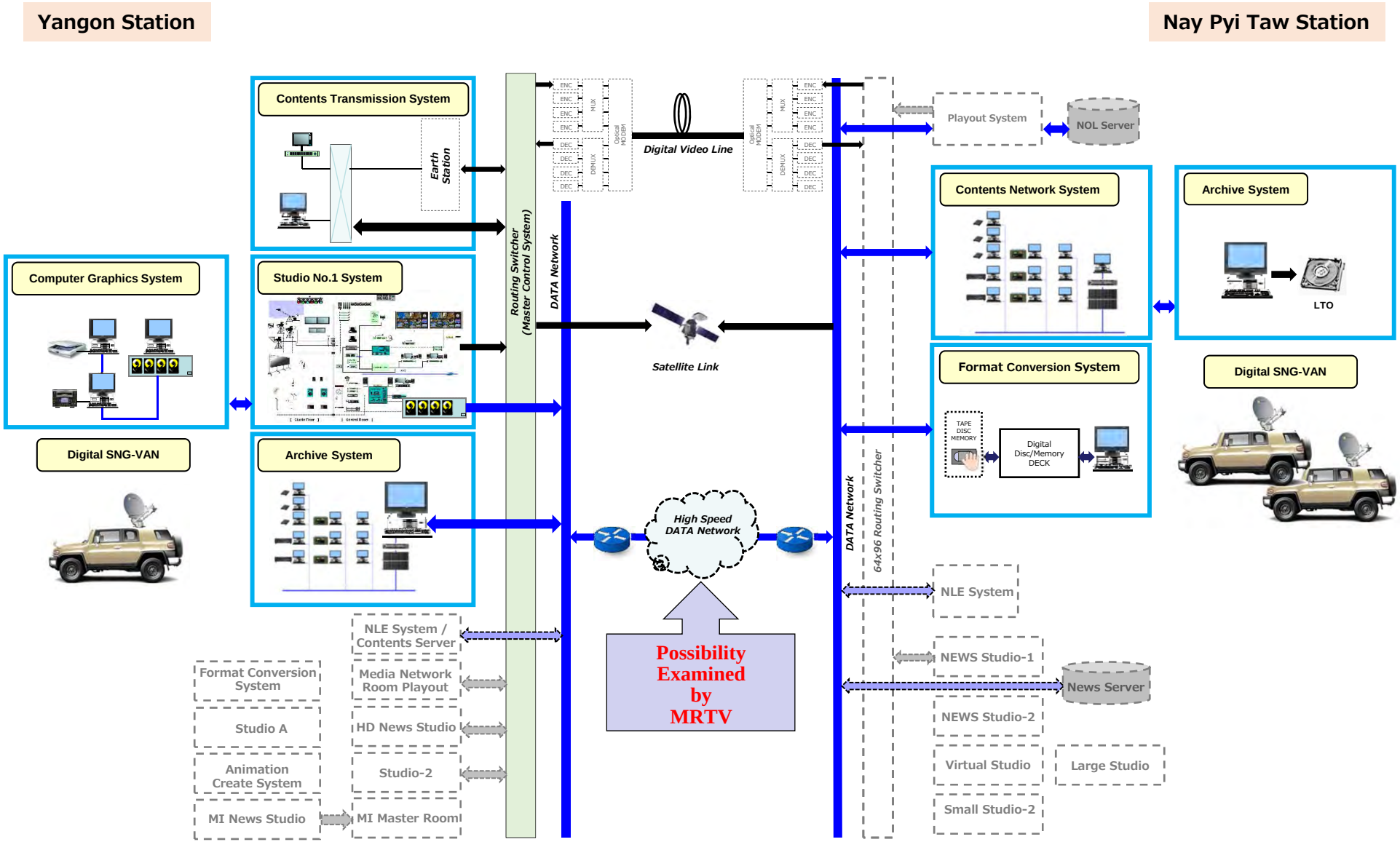


Fig. 2-1 Overview of the Whole Planned Equipment

(3) Study on Building Renovation

1) Present Situation of the Yangon TV Building

The Yangon TV building was constructed in 1984 and financed by Japanese Grant Aid. Although the structure is soundly maintained, the impact of aging, some 32 years after construction, is generally observed in interior finishes of floors, walls and ceilings. In Studio No. 1 in particular, a fundamental room for program production, normal camera work cannot be expected due to deterioration of the vinyl floor tiles in several places as well as considerable peeling of glass wool comprising a base layer of sound absorption walls. As for cyclorama, which is used to produce various lighting effects as a backdrop to show episodes, the paint on the walls has deteriorated to such an extent that sound and lighting effects can no longer be achieved.

As for the roof of the Yangon TV building, wide ribbed metal roofing sheets are laid on steel trusses, which, in turn, are assembled on a concrete roof slab. Damage (small holes) due to aging is observed sporadically on the roofing sheets. As the concrete flat roof slab helps prevent the ingress of rainwater into the building, it has prevented major damage to date, except for the Rectifier Room (dimmer room) on the first floor. However, rainwater leakage into the attic is definitely proceeding and may spread to other rooms. To dispel concerns that rainwater leakage would harm the planned equipment, the roof covering must be completely renovated when executing the Project.

In terms of the building equipment, it is particularly noted that neither the automatic fire alarm system nor the indoor hydrant system are completely functional due to aging. Both are fire-prevention systems and must be recovered when implementing the Project. As for the electrical installations of the Yangon TV building, substation facilities are functioning flawlessly while one of the circuits of the power distribution boards was modified from the original, so that present electrical installations are expected to cover electrical requirements for all the equipment planned for YBC. However, along with the equipment update, renovation such as a newly added transformer and the introduction of LED lighting fixtures are necessary.

Regarding the air-conditioning system of the Yangon TV building, the need for urgent and complete renovation was highlighted by the Japanese study team at the time of the second site survey and MRTV reported completion of renovation in May 2016.

2) Study of the Request

All the building renovation requests for the Yangon TV building are to be included in the scope of works to be performed by the Japan side for the following reasons:

① Ensuring Affinity Between Equipment Design and Building Renovation

The design of the broadcasting buildings should reflect the layout of the broadcasting equipment and its operational conditions. Also for renovation of the buildings, a

detailed design must meet 100% of the design conditions presented from the equipment side. For example, downlights on the ceiling of the sub-control room are to be positioned so that they do not appear on the monitor for the operator to sit in front of the console desk. These requests from the equipment side are normally finalized after the client has approved the equipment layout, while shop drawings for building renovation are to be adjusted even during the construction stage. By making the renovation the responsibility of the Japan side, final adjustment of both the detailed renovation design and equipment layout are consolidated as the responsibility of the Japanese supplier, to ensure no discrepancy in terms of work content and affinity of the overall work.

② Compliance of Implementation Time Schedule

All the renovation work of the building shall be completed when the equipment installation work commences. In the Yangon TV building to be renovated, approximately 700 items of equipment, i.e. about two-thirds of the total planned, are to be installed, so that even a partial failure to complete the building renovation will disrupt the equipment installation schedule. If the building renovation is carried out by the recipient county, delaying the renovation would incur additional costs claimed by the Japanese supplier and could result in departing from the original scheme of the grant aid project. In the Project, since over 1,000 items of varied equipment are procured and imported, manufacturing and transporting the planned equipment is estimated to require approximately seven months and two months, respectively. Conversely, renovating the Yangon TV building will require approximately five months; procuring the building material locally in Myanmar and executing the work within a sufficient time span while manufacturing and transporting the equipment. Accordingly, renovating the building under the responsibility of the Japan side will not disturb the original implementation schedule for installing the equipment.

③ Securing the Same Design Grade for the Building

In the existing Yangon TV building constructed under the Japanese grant aid scheme, appropriate grade design specifications were reflected, reflecting its suitability for program production as the state-owned television broadcast center. This kind of design grade can be observed in the double floor of studios blocking the propagation of sound and studio walls with a high-density sound-absorbing effect by laying base layers of glass wool. The very latest design techniques have been introduced for cyclorama and grid pipe ceilings, etc. in studios. As for firefighting equipment to be renovated in the Project, high-performance Japanese products have been selected. Since the building renovation is intended to ensure the state-of-the-art broadcasting equipment operates flawlessly and provided the rehabilitation of Yangon TV building constructed under Japan grant aid remains one of the pillars of design policy, it is quite reasonable that the Japan side handle the renovation of the Yangon TV building.

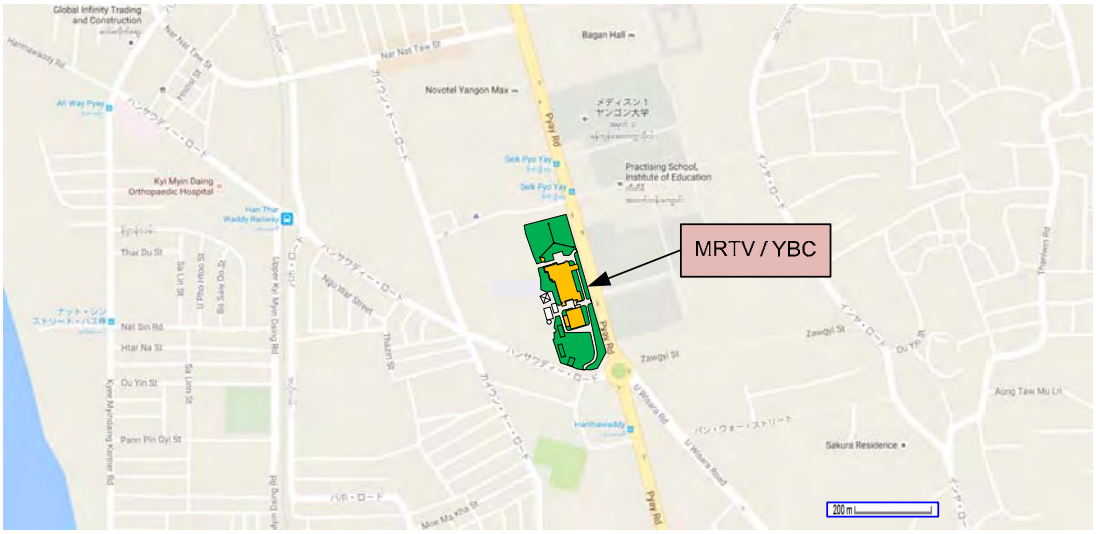
2-2-2-2 Overall Plan

(1) Yangon Broadcasting Center (YBC)

1) Location

The location on the map and geographical latitude and longitude of MRTV YBC are as follows:

- No. 425, Pyay Road, Yangon, Myanmar
- North latitude 16 degrees 48 minutes 53 seconds, East longitude 96 degrees 08 minutes 00 seconds, About 31.0m above sea level



(The figure quoted from Google Map)

Fig.2-2 Project Site (YBC)

2) Situation of the Site

YBC is located approximately centrally in Yangon city and at the corner of the roundabout of the intersection of Pyay Road (the main highway toward Yangon International Airport) and Hanthawaddy Road. The east side of YBC across Pyay Road is an educational district housing numerous trees and accommodating several universities and educational institutions. On the south side of YBC, a railway runs from north to south and to the west, while housing and commercial facilities such as hotels and shopping malls are present. The YBC site houses a Radio Building, Earth Station, a TV transmission tower for terrestrial digital broadcasting and a transmission facility for medium wave radio broadcasting, etc.

3) Suitability as the Site

YBC is the facility with one of the downtown functions in the capital city of Yangon. Although there are some power outages in Yangon city, a commercial power supply is available on site as well as full emergency power supply facilities for the buildings, meaning no infrastructure problem on site. Although the air-conditioning system of the TV building was almost inoperable, it was restored in May 2016 and the environment for the

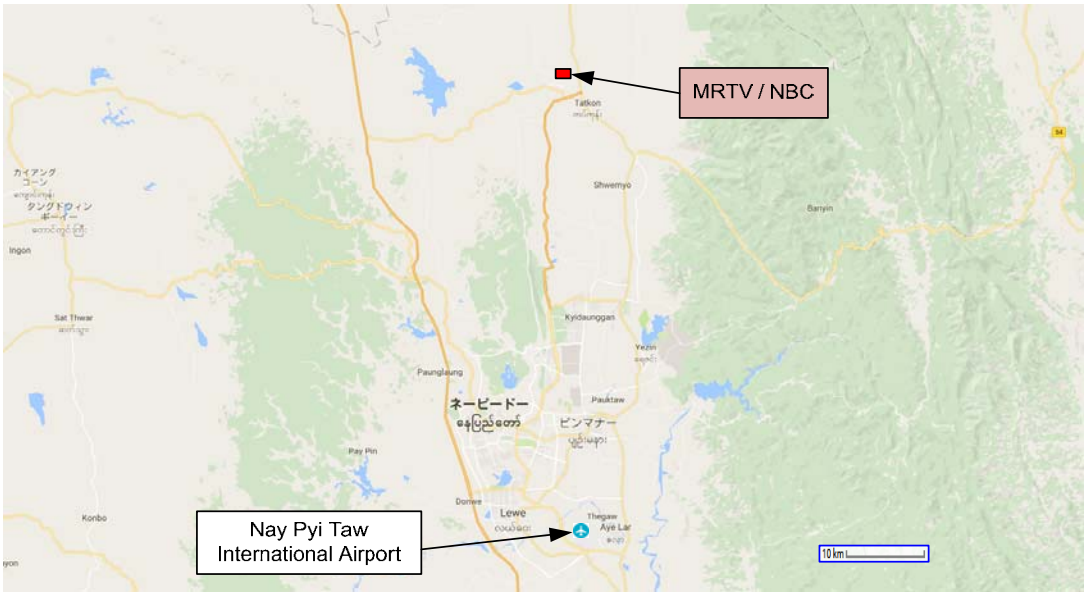
operating conditions of the planned equipment was secured. Security has been protected as the site is surrounded by a solid fence amid compulsory gatehouse inspection for entry into the premises. The site is very convenient for inland transportation, located 15 minutes by car from the Yangon harbor, the port of disembarkation of the planned equipment through maritime transport. However, the site lacks sufficient open space, given that various facilities are constructed within the premises and its proximity to a traffic-choked main road. Moreover, since the entrance gate is rather narrow, loading the planned equipment onto the site is expected to be difficult. MRTV shall consider obtaining permission for occupancy of roads from the relevant authority by confirming the quantities and sizes of the containers accommodating the planned equipment at the time of customs clearance.

(2) Nay Pyi Taw Broadcasting Center (NBC)

1) Location

The location on the map and geographical latitude and longitude of MRTV NBC are as follows:

- Tatkon Township, Nay Pyi Taw District, Myanmar
- North latitude 20 degrees 10 minutes 08 seconds, East longitude 96 degrees 10 minutes 14 seconds, About 164.0m above sea level



(The figure quoted from Google Map)

Fig.2- 3 Project Site (NBC)

2) Situation of the Site

NBC is not located in the center of Nay Pyi Taw but in the town of Tatkon to the north, about 60km from Nay Pyi Taw. The only way to move from Nay Pyi Taw to Tatkon is by car and it takes about one hour on mountain roads by car from the center of Nay Pyi Taw to Tatkon. Tatkon is a small town and home to approximately 40,000 people. NBC is actually located further northwest, about 6km from the village center of Tatkon, surrounded by fields

and grassland and with no shop or dwelling nearby.

3) Suitability as the Site

Nay Pyi Taw is located one hour by plane from Yangon, while NBC is located one hour by car from Nay Pyi Taw. Provided Tatkon does not grow in a city set to expand to a scale of hundreds of thousands in future, it seems almost impossible to produce e.g. audience-participation type programs or dramas and music programs necessary for starring of actors/actresses and singers, in such remote areas surrounded by field and grassland. Accordingly, self-produced and wide-ranging programs are considered impossible under present circumstances at NBC. This is why the request for equipment for Studio No. 1 in NBC is deleted from the planned equipment.

However, it is important to reaffirm NBC as the base for transmitting programs and the central production base for news programs. With advantages not only in terms of program transmission but also news gathering from rural areas, NBC has the geographic benefit of being accessible to multi-ethnic regions encompassing each of the languages, since the Tatkon district is nearer the center of the country than Yangon. In addition, given that editing of the programs produced in YBC has already been transmitted to NBC via optical fiber cable lines, ICT network equipment to be equipped in future by the Myanmar side will have a remarkable impact on program production. It is quite meaningful that file-based systems such as archives, content network systems and file conversion systems will be introduced to NBC as well as DSNG-VAN, which will dramatically improve news gathering in rural areas.

As specified previously in 1-2-1, the Tatkon district where NBC is located is exposed to the Savannah climate and is subject to considerable precipitation during rainy season, although NBC has not suffered any flooding damage to date. Although the annual average temperature in Tatkon district peaks at over 30 degrees or more, it may go as high as 40 degrees or so during the period of intense heat from March to early May. However, buildings within the NBC premises are equipped with complete air-conditioning systems and the temperature can be set in all equipment rooms to facilitate the operation of the equipment. The commercial power supply for NBC is quite stable and no power failure has been recorded since starting the building operation. It is also equipped with an emergency power supply comprising two sets of emergency engine generators of 1,250kVA. Thus, it can be judged that NBC has a suitable environment condition for supplying and installing the planned equipment.

2-2-2-3 Equipment Plan

(1) Design Conditions and Policies Applicable to All Equipment

1) Applicable Recommendations and Standards

For the design of the equipment to be procured and for installation works, the following recommendations and standards widely used internationally as standard in electrical and communication fields will be applicable:

① Industrial Organization for Standardization: ISO
② International Telecommunication Union-Radio Communication Sector: ITU-R
③ International Electro technical Commission: IEC
④ Society of Motion Picture and Television Engineers: SMPTE
⑤ Electronic Industries Alliance: EIA
⑥ Audio Engineering Society: AES
⑦ Japan Industrial Standards: JIS
⑧ Japan Electronics and Information Technology Industries Association: JEITA

2) Power Supply Conditions

Power Supply Voltage : 3-phase, 400V/230V AC±10%
Frequency : 50Hz
Outlet Shape : BF type

3) Equipment Operational Environment

Equipment must be capable of maintaining the following operational environment and shall, in principle, be installed in rooms fully equipped with air-conditioning systems.

Ambient Temperature : 5－40 oC
Relative humidity : 30－80%

(2) Design Policy of the Equipment

1) Basic Design Policy

① Equipment operability and ease of maintenance are key elements dictating the system reliability. Accordingly, components of the system equipment are to be selected from those having been manufactured with parts and finish of equivalent type as far as possible; targeting system construction with high reliability.

② The supply of spare parts and replaceable units must be assured for five years. If the manufacture of spare parts and replaceable units is discontinued, the tender specifications must provide details of substitute equipment supplied with functions equivalent or superior to the original equipment.

2) Grade of the Equipment

The planned equipment shall be of broadcast grade in principle. According to the purpose of use, professional-grade equipment with sufficient performance and functions will also be

incorporated, targeting appropriate and economical constitution of the systems.

3) Basic Specifications of the Video Equipment

In line with MRTV's final request, ultra-high-definition (4K)-compatible equipment was listed for some of the video equipment, such as HD cameras, video production switchers and video monitors, etc. Although 4K-compatible equipment has been put into practical use for some studio equipment in Japan, its penetration remains relatively low, even in Japan. Accordingly, considerable time will still be needed for the penetration of 4K-compatible television sets in Myanmar. Moreover, in the absence of any specific MRTV plan to introduce 4K at the moment, the introduction of 4K-compatible equipment for the Project is considered quite premature.

Considering the trend of time and MRTV's present status, whereby digital terrestrial broadcasting is already underway and high-definition (2K)-compatible equipment has also already been introduced in some studios, all the planned video equipment shall be 2K compatible. As for the program storage capacity of the video server device and archive system, it has been configured with storage capacity capable of handling the program of the day from three hours to ten years, after studying MRTV's operating conditions at present and the volume of programs previously produced (approximately 10,000 Nos.).

4) Securing consistency with the existing equipment and the effective utilization of the Same

In basic policies for selecting the planned equipment during the initial site survey, the first priority was to avoid duplicating equipment procured by MRTV for the SEA Games held in December 2013 in Myanmar. The survey revealed that almost all the equipment procured for the SEA Games was for outdoor news gathering and there was no duplication with the requested equipment. However, it was also revealed that the existing HD cameras and memory recorders procured for the SEA Games are usable for DSNG-VAN and Studio No.1 respectively, whereupon they can be used for the planned systems for DSNG-VANs and Studio No. 1

TV program video tapes reserved by MRTV were produced by analog recording and playback equipment, such as U-Matic, Betacam SP, DVC Pro etc., however, such analog equipment is no longer produced and extending this equipment life would be an issue on the program data conversion to file format. MRTV is requested to maintain the equipment properly and ensure all required maintenance and inspection by the time all the existing TV programs have been converted into file format.

All the planned equipment to be procured should be operated while the operation of existing equipment remains unhindered. In this sense, the system design of each piece of equipment to be procured must include sufficient consideration to avoid impacting on the existing equipment system.

(3) Outline of Equipment to be Procured

Based on the design policy mentioned in 2-2-1, the Design Policy of the Equipment and the Change Status of the Request mentioned in (2) of 2-2-2-1, the equipment to be procured will be classified into the following eight system groups. Table 2-1 shows an outline of the system group comprising the equipment to be procured:

Table 2-1 Outline of System Group of Procured Equipment

System Group	Purpose of Use	Q'ty
Equipment for Studio No. 1	A studio system for program production. The system includes one (1) high-frame rate HD camera, one (1) crane camera, two (2) HD cameras, one (1) video production switcher, one (1) video server, etc. Moreover, a virtual video system, which allows background images produced by a computer graphics system to be inserted and a studio lighting system, including power-saving and long-life LED lamp equipment, should also be procured.	1 set
Computer Graphics System	To produce graphics to be used as backdrops to virtual video systems and title graphics for the opening titles of TV programs. The system will be utilized to produce graphic pictures for use in general programs.	1 set
Archive System	To store programs produced to date on storage device and reuse them by loading from the device through the search function. Presenting this system in NBC and YBC will make it possible to manage programs centrally.	2 sets
Content Transmission System	To transmit programs from major rooms such as Studio No. 1 in YBC to NBC. A room-to-room communication system will also be procured to enable staff to confirm the operational status by discussing among studios and other rooms during content transmission work.	1 set
DSNG-VAN	To collect program materials reporting from local areas and transmit the materials toward NBC and YBC via satellites of Thailand. The vehicle will be equipped with a C-band transmitting-receiving system and an audio/video switching device, etc. Two (2) DSNG-VANs for NBC, one (1) DSNG-VAN for YBC.	3 sets
Content Network System	Equipment for centralized management of editing materials and ready-to-air contents by storing them into storage devices. The system includes functions such as metadata input, quality control and forwarding contents toward existing file-based playout systems.	1 set
Format Conversion System	To convert the recording format to file-based video clips from various analog VTRs to reuse TV programs previously produced by MRTV. After converting the format, the video clips will be forwarded to and stored on the Content Network System.	1 set
Maintenance & Measuring Equipment	To maintain program production equipment and DSNG-VAN.	2 sets

The main equipment[3] in each system is summarized as follows:

[1] Equipment for Studio No. 1

[1-1] HD Studio Camera and the Peripherals

Three (3) HD studio cameras and one (1) HD high-frame-rate camera applicable to playback of slow-motion pictures, shall be procured in Studio No. 1. One of the three HD studio cameras will be combined with a prompter system and the other HD studio camera will be mounted on camera crane equipment allowing various kinds of TV programs to be produced. All HD cameras shall be of broadcast grade and include high-resolution LCD viewfinders and return switch units to monitor video signals. In addition, four (4) camera control units and remote control panels will be installed in the sub-control room, including sufficient operability for stable program production for an extended period.

[1-2] Prompter System

One (1) set of prompter systems shall be procured in Studio No. 1. The prompter system has an LCD display and a half-mirror fixed to the front of the HD studio camera; allowing the announcer to read documents without averting his eyes from the HD studio camera by projecting comment scripts onto the LCD display and half-mirror. The script created by the MRTV staff will then be projected on the LCD display and the half-mirror in advance by prompter control computer, whereupon the announcer will be able to read out the script operating remote controllers by his hand or foot.

[1-3] Standard Camera Lens

Three (3) standard camera lenses shall be procured for the HD studio cameras and the HD high-frame-rate camera. Considering the 250m^2 area of Studio No. 1 and the object size, these lenses shall have an appropriate zoom ratio and focal length for shooting. Three (3) zoom demand controllers and three (3) focus demand controllers will be also procured to control the lens functions by cameramen.

[1-4] Wide-Angle Camera Lens

One (1) wide-angle camera lens shall be procured for the HD studio camera. In comparison to the standard camera lens, this lens includes functions to shoot wider areas and shoot objects from closer proximity. To control the lens functions by a cameraman, one (1) zoom demand controller and one (1) focus demand controller will be also procured as well as the standard camera lens.

[1-5] Studio Camera Pedestal

Three (3) studio camera pedestals shall be procured to mount HD cameras and an HD high-frame-rate camera for smoother moving shots. They shall include an output function of information signals such as accurate pedestal positions and horizontal/vertical angles

3 Equipment priced at over one million Japanese Yen is enumerated as main equipment.

compliant with virtual video systems.

[1-6] Camera Crane Equipment

One (1) piece of camera crane equipment shall be procured to allow objects to be shot from various angles and various camera works, such as moving shots from a high to a lower angle. The crane shall be operated at arm's length and not contact any lighting equipment suspended from motorized battens. Moreover, the camera crane equipment shall be controlled via functions such as zoom/focus operation and panning and tilting of the HD camera fixed to the tip of the crane remotely by a cameraman.

[1-8] Slow-motion Picture Controller

One (1) slow-motion picture controller shall be procured to enable video signals to be played back at half speed or less than original speed. The operating unit shall be a T-bar joystick or a jog dial switch.

[1-9] Virtual Video System

One (1) virtual video system set, including 3D-realtime graphic software, shall be procured. This system enables motion pictures including shots by cameras and pictures related to the video wall to fix into background images by a video processor. The virtual video system can improve production efficiency for various TV programs, since it eliminates the need for conventional program production works, including setting of stages long needed. Moreover, there is also scope to divert background images of electronic data produced to other programs via simple operations such as save, retouch, reuse, etc.

[1-10] Video Production Switcher

One (1) video production switcher shall be procured to switch video signals, add digital effects, adjust video signals and combine source video signals, including HD cameras and a slow-motion controller by keyer. Considering the sorts and quantity of equipment involved as well as system operability, the switcher has 24 or more inputs and 10 or more outputs. It should be noted that the switcher shall include double power units to prevent interruption due to unforeseen accidents during live broadcasting.

[1-11] Video Router

One (1) video router shall be procured to route source signals and output signals optionally in accordance with necessary operation by multiple staff (program director, video engineer, lighting engineer, cameramen, video server engineer, etc.). In case the video production switcher is down during live broadcasting due to faults or malfunctions, this router works as an emergency backup switcher. This router shall include double power units as well as a video production switcher to prevent interruption due to unforeseen accidents during live broadcasting.

[1-12] Multi-viewer

For program production, video source signals must be monitored in the sub-control room

of Studio No. 1, which has normally been done by mounting plural displays for each source individually on a monitor shelf. Conversely, recent advances in large-sized and high-resolution display technology allow multiple pictures to be displayed on a single screen, thus saving space. One (1) multi-viewer display shall be procured to improve the space efficiency of the sub-control room and ensure sufficient space for the other equipment.

[1-13] Video Peripherals

The video system works properly, incorporating the main equipment that functions individually and circuit board cards such as video signal converters and video signal splitters, etc. One (1) set of video peripherals, including the necessary circuit board cards, etc., shall be procured.

[1-14] Computer Graphics System

One (1) computer graphic system set shall be procured in Studio No. 1. One (1) main computer graphic system mentioned below in “2. Computer Graphic System” shall be procured in the Computer Graphic Room, including functions to create, edit, modify and store creating graphic data. The system in Studio No. 1 shall include functions of searching, loading from the main system, creating/modifying a playout list and playout graphic data and shall be connected to the main computer graphic system. The dispersed work by such functional distribution allows for greater efficiency.

[1-15] Video Server Device

VTR tapes have long been a form of mainstream recording media in the broadcasting field, but nowadays, HDD units and memory devices are establishing their presence, by accelerating digitalization and improving computer technology. One (1) video server device shall be procured to record TV program contents produced in Studio No. 1 and play back the stored content data. This server device facilitates program production by communicating content data with other equipment connected through a 10 gigabit Ethernet network.

[1-16] Character Generator Device

One (1) character generator device shall be procured to create characters of Burmese and English and display them on screen during program production. This device shall have functions including characters creation, font and color change, adjusted inclination and transparency and character spacing. The device also allows characters to be displayed one by one smoothly and in accordance with TV program time charts by creating a play out list in advance.

[1-17] Video Wall System

One (1) video wall system with an equivalent large-size display device in an existing NBC news studio shall be procured to make an emotional impression on viewers in terms of

program direction by presenting motion pictures as part of the studio set. The diagonal screen dimensions of this system shall be 130 inches or more; comprising plural display units and the gap dimension between the displays shall be within 1.5mm to display impressive and high-resolution content. Moreover, the system includes a video wall stand to mount display devices stably and shall be a movable structure to meet the conditions of the studio set layout arbitrarily.

[1-18] Intercom System

Program production work is carried out by multiple staff, meaning discussion among the staff is crucial to determine arrangements efficiently within predefined program periods and working procedures. However, it is also crucial to eliminate staff voices from programs during program production. With these conditions in mind, one (1) intercom system shall be procured to allow session groups for each field in charge, i.e. cameraman, lighting staff, directors, etc. The system shall comprise both wired and wireless models considering the working efficiency of the operation staff.

[1-19] Digital Audio Mixer

One (1) digital audio mixer shall be procured for purposes such as switching of audio sources, including microphones and a CD player and controlling and adjusting the audio level and quality during program production. Considering the type and quantity of equipment, in addition to system operability, the mixer shall have 24 or more mic level inputs, 8 or more line level inputs, 16 or more digital inputs and 8 or more analog outputs respectively. It should be noted that the switcher shall include double power units to prevent interruption due to unforeseen accidents during live broadcasting. Besides, one (1) additional backup digital audio mixer will also be procured.

[1-20] Microphones and Microphone Stand

15 handheld microphones, five (5) lavalier microphones, three (3) super directional microphones, 12 wireless microphones and twenty (20) microphone stands, etc. shall be procured to meet a range of program production needs. It is already confirmed that the wireless frequency band of Japanese regulation is available in Myanmar.

[1-21] Audio Peripherals

The audio system works properly by utilizing individual equipment, including a digital audio recorder/player, a telephone hybrid device, which inserts a telephone voice into broadcasting programs and circuit board cards such as audio signal converters and audio signal splitters. One (1) set of audio peripherals, including the necessary circuit board cards, etc., shall be procured.

[1-22] Video Monitors

One (1) set of video monitors shall be procured to monitor pictures in the sub-control room and studio floor during program production. For the sub-control room, a video monitor and

its stand unit for audio engineers and video monitors and a video monitor shelf for video production staff are also procured. Additionally, monitors are individually procured for video engineers, lighting engineers and virtual system engineers since these engineers need to assess their pictures accurately by watching the monitors closely. Floor monitors will also be procured to monitor performers when producing programs.

[1-23] Audio Monitors

One (1) set of audio monitors shall be procured to monitor audio condition in the sub-control room and the studio floor when producing programs. These monitors shall be composed with speakers, amplifiers, etc.

[1-24] Sync Signal Generator

Both video system and audio system do not work normally when noise and signal disturbances occur among devices, when the signal processing timing accidentally shifts from the proper conditions. For this reason, one (1) set of synchronized signal generator shall be procured to synchronize signal processing timing among equipment. Two (2) generators and one (1) changeover unit shall be procured so that if the main generator fails or malfunctions, it will automatically switch to a backup via the changeover unit.

[1-25] Network System Device

Studio No. 1 will install several pieces of equipment compliant with network system connections, i.e. virtual video systems, computer graphic systems, video server devices and character generator devices, etc. One (1) set of network system devices shall be procured to build network system architecture to enable both control and content data signals among equipment to communicate.

[1-26] Studio Lighting System

One (1) set of studio lighting system, comprising a Main Power Cabinet, Dimmer Cabinet, Direct Circuit Split Cabinet, CPU Control Cabinet and Lighting Control Console, shall be procured to generate a stage effect when producing programs in Studio No. 1. The system will feature a hybrid configuration; introducing halogen and LED lamp equipment. The halogen lamp has been the mainstream choice for TV studio lamps to date and offers advantages in terms of the high illumination intensity compared to LED and fluorescent lamps. However, considering the fact that the manufacturing of halogen lamps is likely to be discontinued soon (guaranteed supply period is five (5) years after delivery), it makes sense to procure LED lamps with characteristics including low-power and maintenance-free operation for the studio lighting system, partly for future operations. Additionally, spare halogen lamps shall be procured for double the number of studio lighting sets to cover daily operational requirements for approximately three (3) years[4]

4 A halogen lamp lasts about 3,000 hours, which is equivalent to one year in operation (365 days x 8 hours/day). Accordingly, spare halogen lamps will be provided to cover double the total pieces of studio lighting equipment for two years' operation.

after installation. Spare halogen lamps will be kept as consumables, since they will take time to supply after ordering from the supplier, despite the high urgency.

[1-27] Motorized Batten Rigging System

One (1) set of motorized batten rigging systems shall be procured to adjust the arbitrary height of plural battens suspending the studio lighting equipment and art set. The request from the Myanmar side; intended to ease the burden on lighting technicians, who tend to be female, seems appropriate, accordingly, the motorized batten rigging system will be newly installed instead of the existing manual batten rigging system.

[1-28] Equipment Mount Rack

The majority of the program production equipment comprises the operating unit and the main body. One (1) set of an equipment mounting rack will also be procured to use the space in the sub-control room more efficiently by mounting main bodies in the rack, while operating units shall be mounted in operation consoles, etc. As quake-proof measures, the rack shall be fixed to the concrete floor by anchoring and connected to adjacent racks using dedicated metal clamps.

[1-29] Operation Console and Chair

In most program production works, live broadcasting programs need as much time as the actual programs, while producing prerecorded broadcasting programs need requires two to five times the actual program duration. Accordingly, it is crucial to ensure equipment operability and workers' habitability to reduce operational errors during extended program production work. For that purpose, one (1) set of operation console and chairs with operability and habitability based on human engineering shall be procured

[1-30] Studio Floor Connection Panel

One (1) set of studio floor connection panels shall be procured for the system by relaying cable connections of equipment located in both the studio floor and sub-control room. As with the existing facility, connection panels for the camera, microphone, monitors and lighting equipment shall all be procured.

[1-31] Installation Materials

One (1) lot of installation materials including various cables/connectors, binding materials and equipment mount materials, etc. shall be procured.

Fig. 2-4 overleaf shows a composition diagram of equipment for Studio No. 1 in YBC.

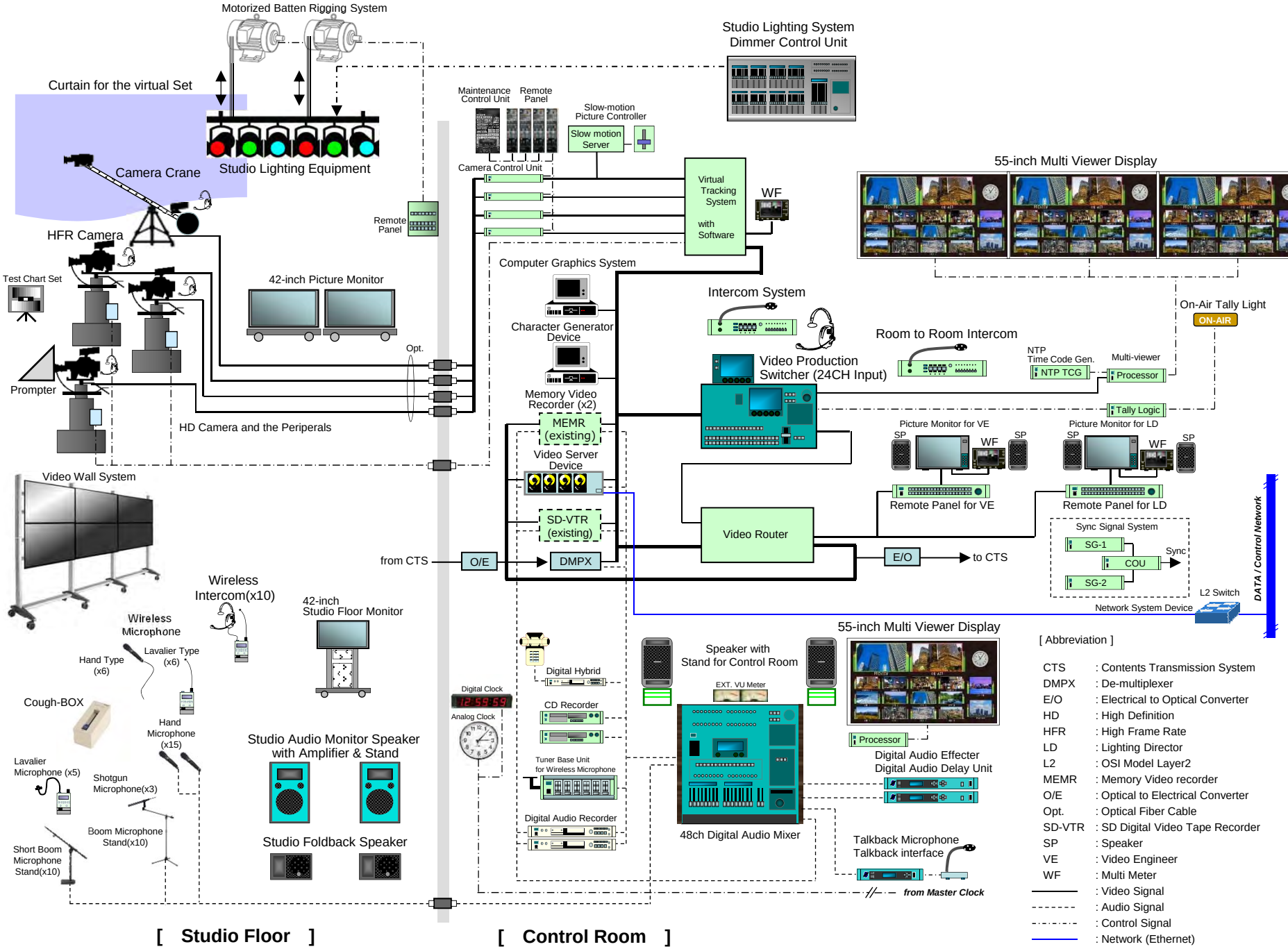


Fig. 2-4 Composition Diagram of Equipment for Studio No.1

[2] Computer Graphics System

[2-1] Graphic Computer Equipment

Two (2) graphic computers shall be procured to produce graphic pictures to be used as backgrounds to virtual video systems and title graphics for the opening titles of TV programs. This equipment is operated in combination with “2-2 Graphics Software” below.

[2-2] Graphic Software

This software will be installed in “2-1 Graphic Computer Equipment” above to produce graphic pictures and title graphics.

[2-3] Graphic Database Server

One (1) graphic database server shall be procured to reuse graphic database contents, including graphic content materials and production contents, etc. efficiently. This server will be accessible from “2-1 Graphic Computer” and “1-14 Computer Graphic System” via the following network system device.

[2-4] Data Storage Device

Two (2) high-capacity data storage devices combined with a “2-3 Graphic Database Server” shall be procured. Similarly to the “2-3 Graphic Database Server”, these devices will be accessible from “2-1 Graphic Computer” and “1-14 Computer Graphic System” via the following network system device.

[2-5] Network System Device

One (1) network system device shall be procured to build network system architecture allowing both control and content data signals to be passed on among equipment such as “2-1 Graphic Computer”, “2-3 Graphic Database Server”, “2-4 Data Storage Device”, etc.

[2-10] Remote KVM Device

One (1) remote KVM device shall be procured to operate the “2-3 Graphic Database Server” and “2-1 Graphic Computer” as client terminals remotely.

[2-12] Uninterruptible Power Supply; UPS

Six (6) UPS units shall be procured to prevent damage and data loss to computers/ servers during power failure. The backup time for the UPSs shall be five (5) minutes or more to ensure a proper shutdown process.

[2-13] Equipment Mount Rack

Two (2) sets of equipment mounting racks shall be procured to install the “2-3 Graphic Database Server”, “2-4 Data Storage Device” and UPSs together in the rack. As quake-proof measures, the rack shall be fixed to the concrete floor by anchoring as well as linking to adjacent racks using dedicated metal clamps.

[2-14] Operation Console

It is crucial to ensure equipment operability and workers’ habitability to reduce operational

errors during extended program production work. For that purpose, one (1) set of an operation console with operability and habitability based on human engineering shall be procured.

Fig. 2-5 on the next page shows a composition diagram of a computer graphics system in YBC.

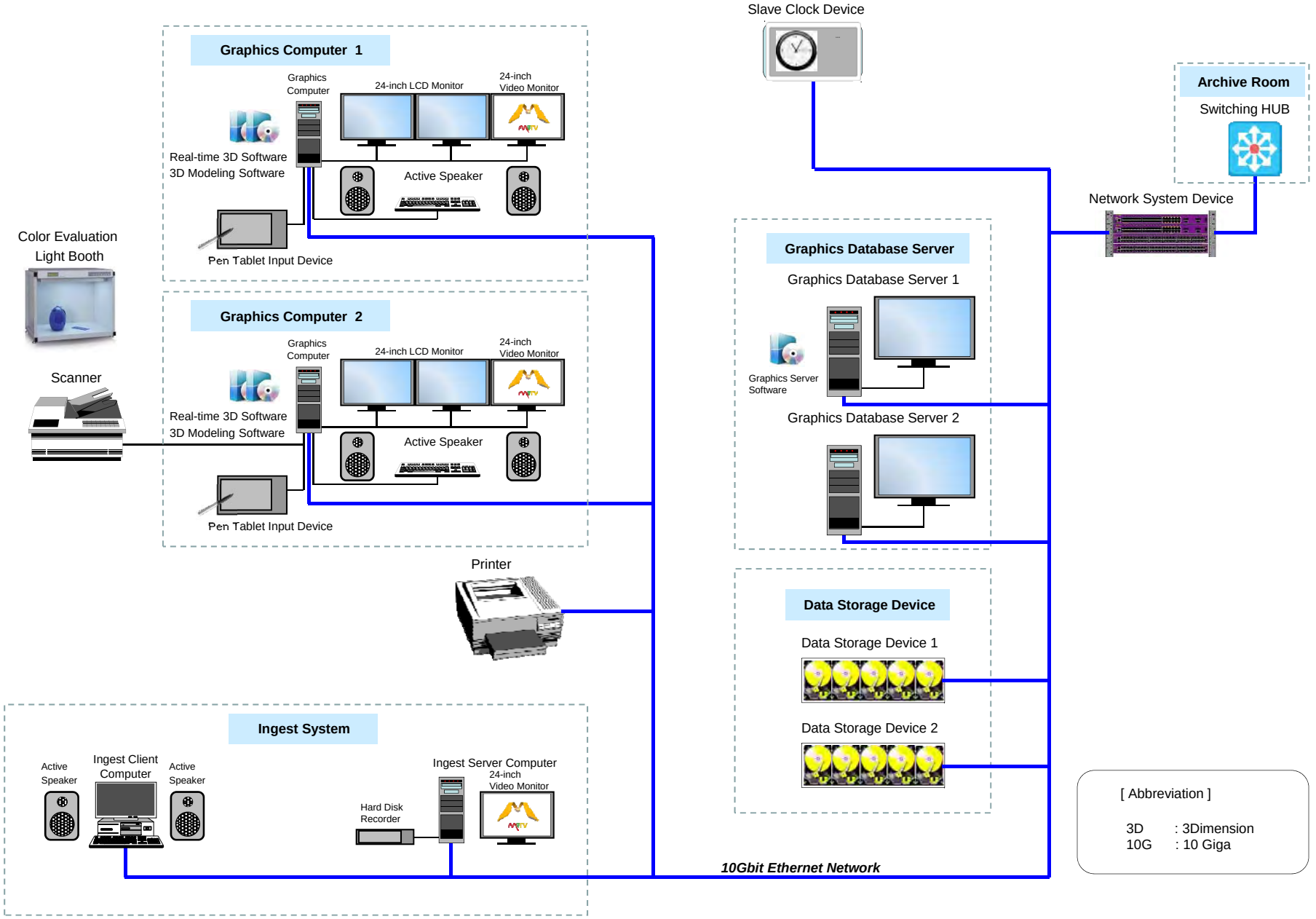


Fig. 2-5 Composition Diagram of Computer Graphics System

[3] Archive System for YBC

[3-1] Material Asset Management (MAM) Server Device

One (1) MAM server device, which manages media assets, shall be procured. This device plays the main role of the archive system in YBC and stores program editing materials and broadcasting programs.

[3-2] Network System Device

One (1) network system device shall be procured, building network system architecture and allowing both control and content data signals to be communicated among equipment such as the “3-1 MAM Server Device”, “3-3 Baseband Ingest System” and “3-4 File Base Ingest System”, etc.

[3-3] Baseband Ingest System

Two (2) sets of baseband ingest systems shall be procured to forward video clips to the “3-1 MAM Server Device”. Video clips are converted to electronic files after capturing audio/video data as baseband signals recorded in existing memory recorders and VTRs.

[3-4] File Base Ingest System

Two (2) sets of file base ingest systems shall be procured to forward video clips to the “3-1 MAM Server Device”. Video clips are converted to electronic files after capturing video clips recorded to memory media, including SD cards.

[3-5] Quality Control (QC) Terminal System

Two (2) sets of QC terminal systems shall be procured to check the quality of video clips stored in the “3-1 MAM Server Device”. This system will be used for video clips and to check whether or not their audio/video signals are normal during playback.

[3-7] Remote KVM Device

One (1) remote KVM device shall be procured to operate the “3-1 MAM Server Device”, “3-3 Baseband Ingest System” and “3-4 File Base Ingest System” remotely.

[3-8] Uninterruptible Power Supply; UPS

10 UPS units shall be procured to prevent damage and data loss to computers/ servers during power failure. The backup time for UPSs shall be five (5) minutes or more to ensure a proper shutdown process.

[3-9] Equipment Mount Rack

Three (3) sets of equipment mounting racks shall be procured to install the “3-1 MAM Server Device” and UPS together in the rack. As quake-proof measures, the rack shall be fixed to the concrete floor by anchoring and connected to adjacent racks by dedicated metal clamps.

[3-10] Operation Console

It is crucial to ensure equipment operability and workers’ habitability to reduce operational

errors during extended program production works. For that purpose, eight (8) sets of operation consoles with operability and habitability based on human engineering shall be procured.

[3-11] Installation Materials

One (1) lot of installation materials, including various cables/connectors, binding materials and equipment mount materials, etc. shall be procured.

Fig. 2-6 on the next page shows a composition diagram of an archive system for YBC.

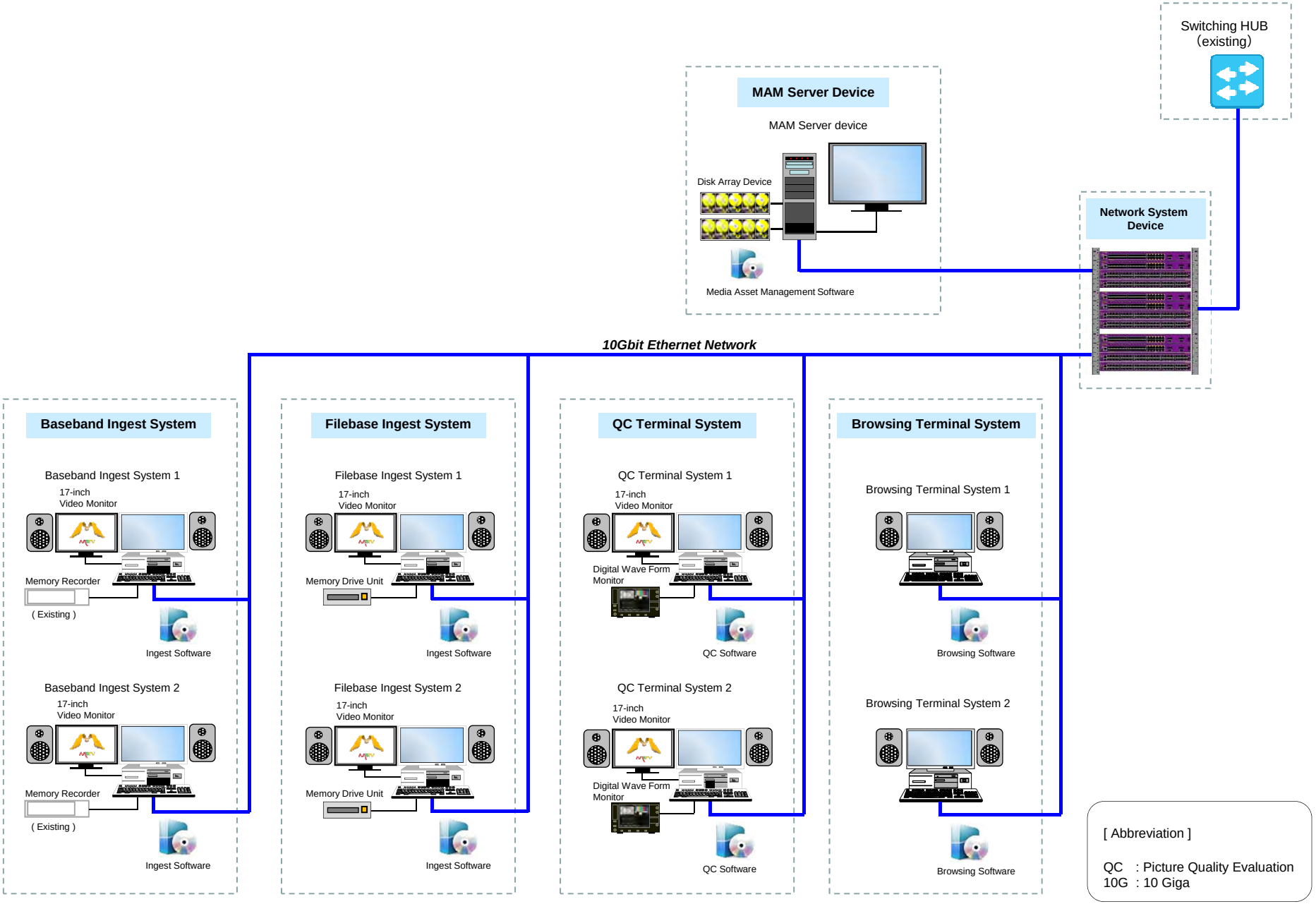


Fig.2-6 Composition Diagram of Archive System for YBC

[4] Archive System for NBC

[4-1] Archive Storage Device

One (1) archive storage device shall be procured to store TV programs mainly transmitted from YBC. This device plays the main role of the archive system in NBC and includes high-capacity storage devices comprising recording media such as LTO tapes and optical discs.

[4-2] Archive Server Device

One (1) archive server device shall be procured as a control computer combined with a "4-1 Archive Storage Device". This device shall include a server function that processes on the archive system in response to operational commands from client terminal devices; including the "4-4 Ingest System" and "4-5 Browsing Terminal System".

[4-3] Network System Device

Four (4) sets of network system device shall be procured to build network system architecture enabling both control and content data signals among equipment, including "4-1 Archive Storage Device", "4-2 Archive Server Device" and "4-4 Ingest System", etc. to communicate.

[4-4] Ingest System

Two (2) sets of the ingest systems with functions such as: (a) capturing video clips recorded in memory devices including SD cards, (b) capturing analog video signals from existing VTRs by remote operation and (c) forwarding video clips to the "4-2 Archive Server Device" after capturing shall be procured.

[4-5] Browsing Terminal System

One (1) remote KVM device shall be procured to operate the "4-2 Archive Server Device", "4-4 Ingest System" and "4-5 Browsing Terminal System" remotely.

[4-6] Remote KVM Device

One (1) remote KVM device shall be procured to operate the "4-2 Archive Server Device", "4-4 Ingest System" and "4-5 Browsing Terminal System" remotely.

[4-7] Video Converter

One (1) video converter shall be procured to match the signal format between the existing equipment and the new archive system. This device shall include a function to convert the analog video signal to a digital HD signal as well as conversion to digital SD (Standard Definition) signal from the digital HD signal.

[4-8] Video Router

One (1) video router shall be procured to match the signal format between existing equipment and a new archive system, likewise a "4-7 Video Converter". Additionally, this device works as a digital HD signal switcher to switch signals arbitrarily using the remote

operational function of the “4-4 Ingest System”, etc.

[4-10] Format Conversion System

MRTV possesses broadcast, professional and consumer grade equipment handling various digital formats. One (1) set of the format conversion system shall be procured to convert existing digital formats to the new digital HD format conforming to SMPTE-292M and/or SMPTE-424M.

[4-12] Wave Form Monitor

One (1) waveform monitor shall be procured to evaluate the signal quality and monitor the input/output signals of the “4-8 Video Router”.

[4-14] Audio/Video Peripherals

The archive system shall be processed in a unified digital HD format signal. One (1) set of audio/video peripherals shall be procured to convert the signal to digital HD format from the existing SD format via audio/video patch bays.

[4-15] Synchronized Signal Generator

One (1) synchronized signal generator shall be procured to generate and distribute synchronized signals to synchronize processing timing among equipment comprising an archive system.

[4-16] Uninterruptible Power Supply; UPS

Six (6) UPS units shall be procured to prevent damage and data loss to computers/servers during power failure. The backup time of the UPSs shall be five (5) minutes or more to ensure a proper shutdown process.

[4-17] Equipment Mount Rack

Three (3) sets of equipment mounting racks shall be procured to install the “4-1 Archive Storage Device”, “4-2 Archive Server Device”, UPSs, etc. together in the rack. As quake-proof measures, the rack shall be fixed to the concrete floor by anchoring as well as connecting to adjacent racks using dedicated metal clamps.

[4-18] Operation Console

It is crucial to ensure equipment operability and workers’ habitability to reduce operational errors during extended program production works. For that purpose, three (3) sets of operation console with operability and habitability based on human engineering shall be procured.

[4-19] Installation Materials

One (1) lot of installation materials, including various cables/connectors, binding materials and equipment mount materials, etc. shall be procured.

Fig. 2-7 on the next page shows a composition diagram of an archive system for NBC.

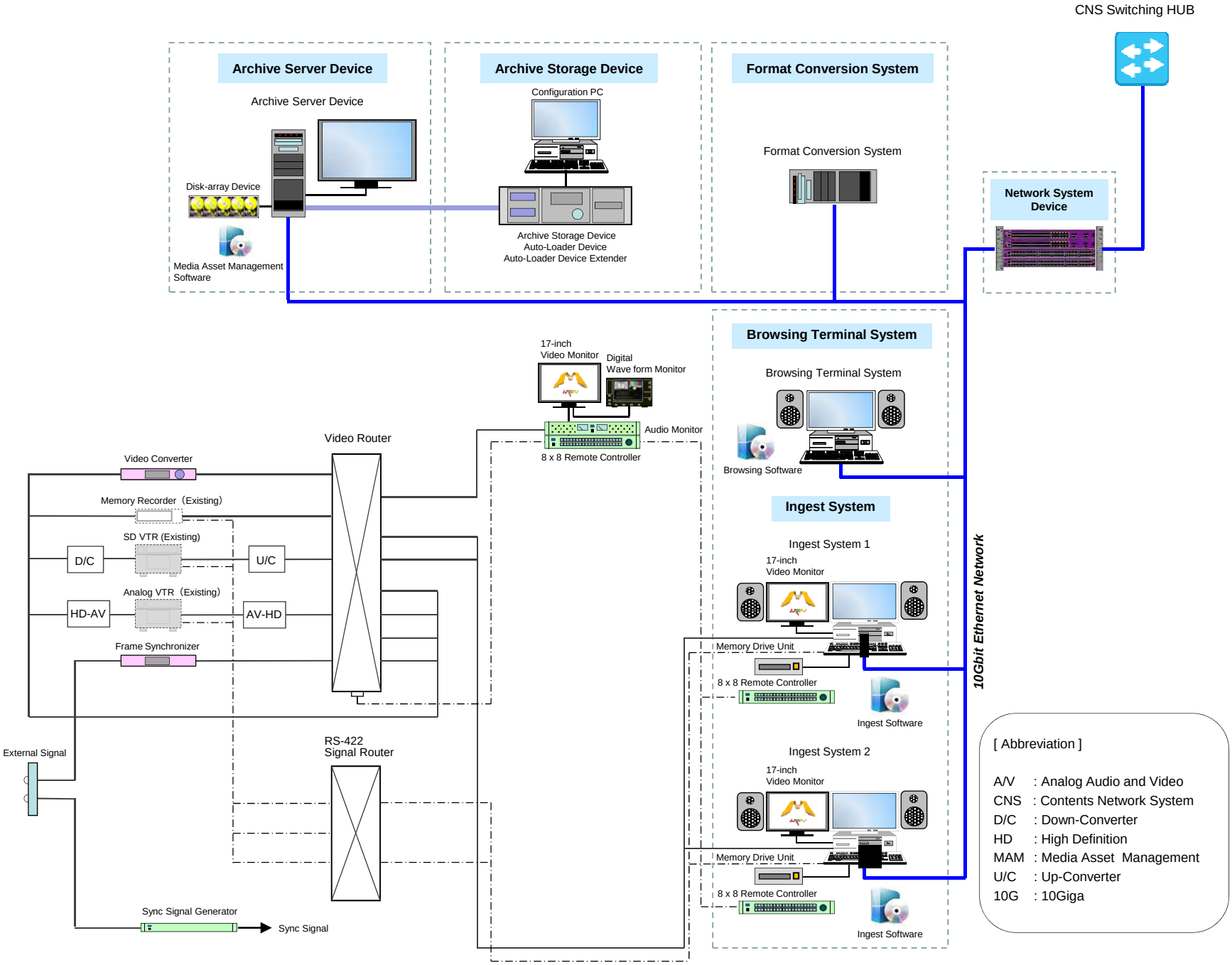


Fig.2-7 Composition Diagram of Archive System for NBC

[5] Contents Transmission System

[5-1] Video Router

One (1) video router shall be procured in the archive room of YBC to select audio/video signals being output from studios and systems in YBC and forward them from YBC to NBC. Additionally, remote control panels of the video router shall be procured to select audio/video signals by remote operation from studios, etc.

[5-2] Audio/Video Monitors

One (1) set of audio/video monitors shall be procured in rooms where the remote control panels of the video router are installed, to check the conditions of the audio/video signals to be transmitted from YBC to NBC.

[5-3] Audio/Video Peripherals

Audio/video signals being output from the studios and systems in YBC shall be collated with the “5-1 Video Router” in the archive room on the first floor of the TV building. In case the transmission distance to the archive room is 100m or more, digital HD signals must be converted to optical signals for transmission. Consequently, one (1) set of audio/video peripherals, including optical converters and splitters, shall be procured to deal with long-distance transmission.

[5-5] Uninterruptible Power Supply (UPS) for Contents Transmission System

Five (5) sets of UPSs for the Content Transmission System shall be provided to prevent interruption during transmission of content to NBC from YBC. The UPS backup time shall be five (5) minutes or more to ensure a proper shutdown process.

[5-6] Room-to-Room Communication System

One (1) set of a room-to-room communication system shall be procured to enable staff to confirm the operational status by discussing among studios and other rooms during work to transmit content. This system is a crucial communication tool, particularly for live broadcasts, when used in combination with the “5-7 Network Device for Room-to-room Communication”.

[5-7] Network Device for Room-to-room Communication

One (1) network device for room-to-room communication to be used in combination with “5-6 Room-to-room Communication System” shall be procured. This device shall be connectable between YBC and NBC through a high-speed network and taking future expandability into consideration.

[5-8] Master Clock System

One (1) set of a master clock system shall be procured as a standard clock in YBC. The master clock system shall be calibrated by receiving time information signals transmitted from Global Positioning System (GPS) satellites through a GPS antenna.

[5-9] Slave Clock Device

One (1) set of slave clock devices to be installed in main rooms, including studios in YBC, shall be procured. The device shall be controlled by a master clock system and comprise four types considering the balance of use and cost as (a) a 3-phase analog slave clock which hardly generates driving sound for the studio floor, (b) an analog slave clock indicating a one-second timepiece for Studio No. 1, (c) a digital slave clock for the sub-control room and (d) an analog slave clock indicating every 30 seconds for the other rooms.

[5-11] Equipment Mount Rack

Three (3) sets of equipment mounting rack shall be procured to install the “5-1 Video Router”, “5-5 Uninterruptible Power Supply (UPS) for Content transmission System”, “5-8 Master Clock System”, etc. together in the rack. As quake-proof measures, the rack shall be fixed to the concrete floor by anchoring and connected to adjacent racks by dedicated metal clamps.

[5-12] Installation Materials

One (1) lot of installation materials, including various cables/connectors, binding materials and equipment mount materials, etc. shall be procured.

As described before, in addition to the rooms for Studio No. 1, Archive Room, Computer Graphics Room and the Earth Station room, the system shall also be introduced for such rooms currently in operation as Studio No. 2, News Studio and MNR; taking effective system operation into consideration. For these three rooms, the equipment and electrical wiring to the rooms shall be supplied by the Japan side, however, but installed and wired by the Myanmar side, i.e. by MRTV.

Fig. 2-8 on the next page shows a composition diagram of the content transmission system in YBC.

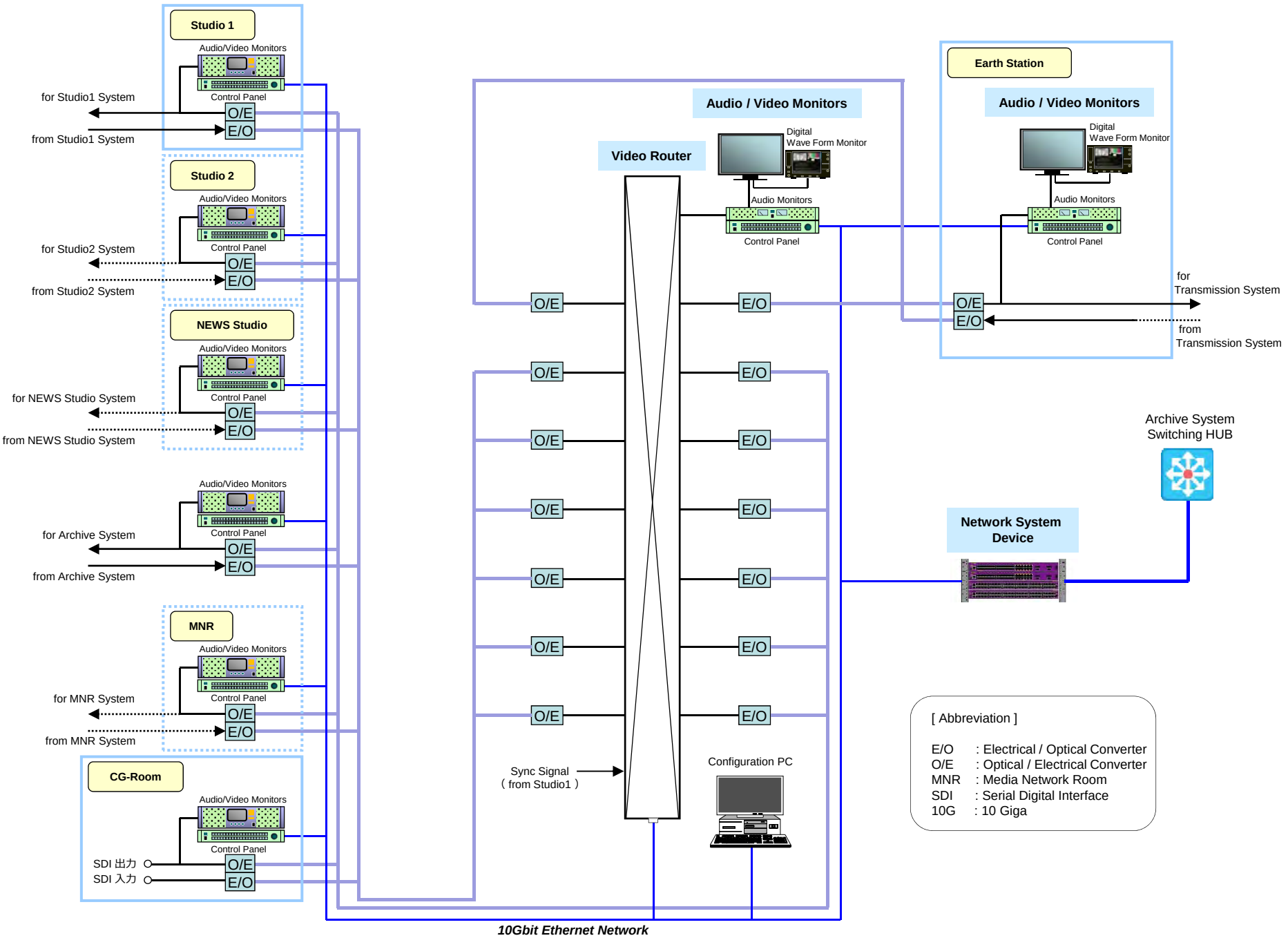


Fig. 2-8 Composition Diagram of Contents Transmission System

[6] Contents Network System

[6-1] Media Asset Management (MAM) Server Device

One (1) MAM server device shall be procured to store program materials for editing and broadcasting programs. These program materials shall be shared by accessing from existing non-linear editing equipment possessed by NBC. Moreover, the broadcasting programs shall also be forwarded to the existing master playout system via the “6-2 Format Conversion System” below.

[6-2] Format Conversion System

One (1) set of a format conversion system shall be procured to interface signal formats of the new archive system with the DVCpro25 format used on the existing master playout system. The signal formats of playout programs shall be converted to DVCpro25 format using format conversion system.

[6-3] Network System Device

One (1) network system device shall be procured to build network system architecture enabling both control and content data signals among equipment such as “6-1 MAM Server Device”, “6-2 Format Conversion System”, etc. to communicate.

[6-4] File Base Ingest System

Two (2) sets of file base ingest systems shall be procured enabling video clips to forward “6-1 MAM Server Device” after capturing video clips recorded to memory media, including SD cards.

[6-5] Baseband Ingest System

Six (6) sets of baseband ingest system shall be procured enabling video clips to forward “6-1 MAM Server Device” after capturing audio/video data as baseband signals recorded in existing memory recorders and VTRs.

[6-6] QC Terminal System

Six (6) sets of QC terminal systems shall be procured to check the quality of video clips stored in the “6-1 MAM Server Device”. This system will be used to check whether or not the audio/video of video clips are normal while playing them back.

[6-7] Browsing Terminal System

Six (6) browsing terminal systems shall be procured to check the program contents and condition of video clips stored in the “6-1 MAM Server Device” by playing back remotely through a network system device.

[6-8] Remote KVM Device

One (1) remote KVM device shall be procured to operate the “6-2 MAM Server Device”, “6-4 File Base Ingest System” and “6-5 Baseband Ingest System” remotely.

[6-9] Room-to-room Communication System

One (1) room-to-room communication system shall be procured to enable staff to confirm the operation status by discussing among main rooms during live broadcasting. The installation sites shall be the Presentation Room and Archive Room in NBC.

[6-10] Network Device for Room-to-room Communication

One (1) network device for room-to-room communication to be used in combination with "6-9 Room-to-room Communication System" shall be procured. This device shall be connectable between YBC and NBC through a high-speed network and taking future expandability into consideration.

[6-11] Uninterruptible Power Supply; UPS

Twenty-five (25) UPS units shall be provided to prevent damage and data loss of computers/ servers during power failure. The backup time for the UPSs shall be five (5) minutes or more to ensure a proper shutdown process.

[6-12] Equipment Mount Rack

Two (2) equipment mounting racks shall be procured to install the "6-1 MAM Server Device" and "6-2 Format Conversion System", etc. together in the rack. As quake-proof measures, the rack shall be fixed to the concrete floor by anchoring as well as connecting to adjacent racks by dedicated metal clamps.

[6-13] Operation Console

It is crucial to ensure equipment operability and workers' habitability to reduce operational errors during extended program production works. For that purpose, twenty (20) operation consoles with operability and habitability based on human engineering shall be procured.

[6-14] Installation Materials

One (1) lot of installation material, including various cables/connectors, binding materials and equipment mount materials, etc. shall be procured.

Fig. 2-9 on the next page shows a composition diagram of the Content Network System in NBC.

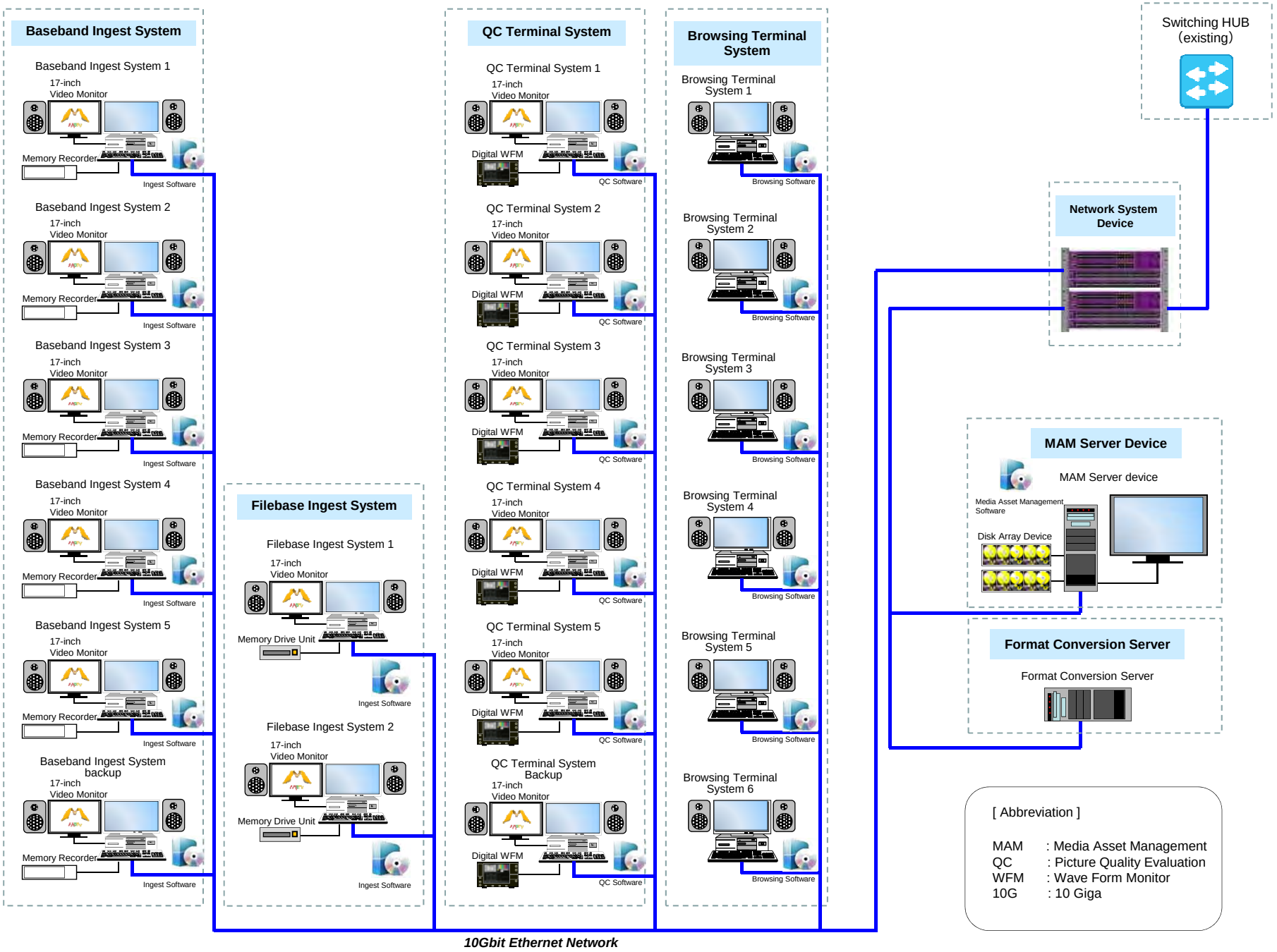


Fig. 2-9 Composition Diagram of Contents Network System

[7] Format Conversion System

[7-1] Format Conversion Terminal Device

Five (5) sets of the format conversion terminal device shall be procured enabling TV programs previously produced by MRTV to be reused on the file base system by converting from various analog VTRs to video clips. This device is the core of the format conversion system and will connect peripheral equipment to convert media and recording formats.

[7-3] Uninterruptible Power Supply (UPS)

Six (6) UPS units shall be provided to prevent damage and data loss of computers/ servers if the power fails. The backup time for the UPSs shall be five (5) minutes or more to ensure a proper shutdown process.

[7-4] Equipment Mount Rack

Two (2) sets of equipment mounting racks shall be provided to install the main unit of a "7-1 Format Conversion Terminal Device", etc. together in the rack. As quake-proof measures, the rack shall be fixed to the concrete floor by anchoring as well as connecting to adjacent racks by dedicated metal clamps.

[7-5] Operation Console

It is crucial to ensure equipment operability and workers' habitability to reduce operational errors during extended program production works. For that purpose, five (5) operation consoles with operability and habitability based on human engineering shall be provided.

Fig. 2-10 on the next page shows a composition diagram of the format conversion system in NBC.

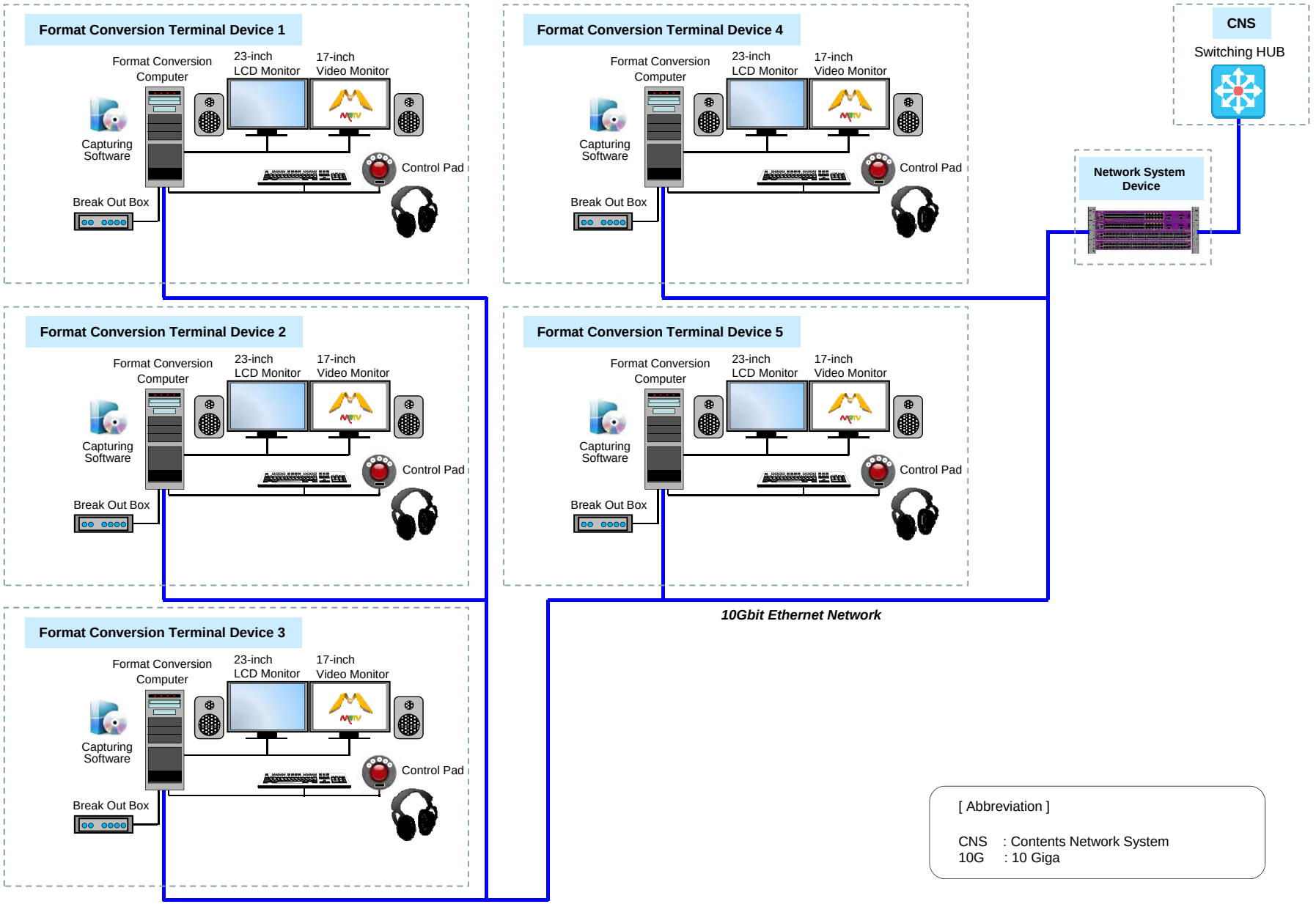


Fig. 2-10 Composition Diagram of Format Conversion System

[8] DSNG-VAN

[8-1-1] Vehicle for DSNG-VAN, YBC

One (1) vehicle for DSNG-VAN to collect program materials reporting on site shall be procured in YBC. The vehicle body shall be a small-size four-wheel-drive type vehicle, equipped with a satellite antenna and equipment, allowing it to run, even on unpaved roads. In addition, the vehicle body shall also be of the left-hand drive type to comply with road traffic regulations of Myanmar as established in 2015.

[8-1-2] Vehicles for DSNG-VAN, NBC

Two (2) sets of vehicles for DSNG-VAN to collect program materials reporting on site shall be procured in NBC. Each vehicle body shall be of the small-size four-wheel-drive type, equipped with a satellite antenna and equipment, allowing it to run, even on unpaved roads. In addition, each vehicle body shall also be a left-hand drive type to comply with the road traffic regulations of Myanmar established in 2015.

[8-2-1] C-Band Transmitter, YBC

One (1) C-band transmitter for satellite relay purposes shall be procured and installed on the “8-1-1 Vehicle for DSNG-VAN, YBC”. The transmitter shall be compliant with the C-band radio waves of the Thaicom satellite used by MRTV.

[8-2-2] C-Band Transmitter, NBC

Two (2) C-band transmitters for satellite relay purposes shall be procured and equipped on “8-1-2 Vehicles for DSNG-VAN, NBC” respectively. The transmitters shall be compliant with the C-band radio waves of the Thaicom satellite used by MRTV.

[8-3-1] C-Band Motorized Antenna, YBC

One (1) C-band motorized antenna for satellite relay purpose shall be procured and equipped on the roof of the “8-1-1 Vehicle for DSNG-VAN, YBC”. The antenna shall be approx. 1.8m in diameter and compliant with the C-band radio waves of Thaicom satellites used by MRTV.

[8-3-2] C-Band Motorized Antenna, NBC

Two (2) C-band motorized antennas for satellite relay purposes shall be procured and equipped on the roof of “8-1-2 Vehicles for DSNG-VAN, NBC” respectively. Antennas shall be approx. 1.8m in diameter and compliant with the C-band radio waves of the Thaicom satellite used by MRTV.

[8-4-1] C-Band Antenna Control Unit, YBC

One (1) C-band antenna control unit shall be procured and equipped on the “8-1-1 Vehicle for DSNG-VAN, YBC” to acquire Thaicom satellite automatically. This device is used in combination with the “8-2-1 C-Band Transmitter, YBC” and “8-3-1 C-Band Motorized Antenna, YBC”.

[8-4-2] C-Band Antenna Control Unit, NBC

Two (2) C-band antenna control units shall be procured and equipped on the “8-1-2 Vehicles for DSNG-VAN, NBC” respectively to acquire a Thaicom satellite automatically. These devices are used in combination with the “8-2-2 C-Band Transmitter, NBC” and “8-3-2 C-Band Motorized Antenna, NBC”.

[8-5-1] Satellite Communication Modem, YBC

Two (2) satellite communication modems for satellite relay purposes shall be procured. One modem shall be equipped on the “8-1-1 Vehicle for DSNG-VAN, YBC” and another in the Earth Station of YBC. The modems shall be compliant with Thaicom satellite Nos. 5 and 6 used by MRTV and be capable of transmitting and receiving L-band radio waves by digital modulation via “8-2-1 C-Band Transmitter, YBC”.

[8-5-2] Satellite Communication Modem, NBC

Three (3) satellite communication modems for satellite relay purposes shall be procured. Two (2) modems shall be equipped on the “8-1-2 Vehicles for DSNG-VAN, NBC” respectively and another shall be installed in the Earth Station of NBC. The modems shall be compliant with Thaicom satellite Nos. 5 and 6 used by MRTV and be capable of transmitting and receiving L-band radio waves by digital modulation via “8-2-2 C-Band Transmitter, NBC”.

[8-7-1] Encoder/Decoder, YBC

Two (2) encoders/decoders shall be procured. One (1) encoder/decoder shall be equipped on the “8-1-1 Vehicle for DSNG-VAN, YBC” and another shall be installed in the Earth Station of YBC. This encoder/decoder shall convert from digital HD signals to IP formats and be connected to peripheral equipment of DSNG-VAN via an IP network.

[8-7-2] Encoder/Decoder, NBC

Three (3) encoders/decoders shall be procured. Two (2) encoders/decoders shall be equipped on the “8-1-2 Vehicles for DSNG-VAN, NBC” respectively and another shall be installed in the Earth Station of NBC. These encoders/decoders shall convert from digital HD signals to IP formats and be connected to the peripheral equipment of DSNG-VAN via an IP network.

[8-9-1] HD Video Wireless Transmission Equipment, YBC

Two (2) sets of HD video wireless transmission equipment comprised two (2) transmitters to be mounted on two (2) existing outside shooting portable HD cameras and two (2) receivers to be equipped on the “8-1-1 Vehicle for DSNG-VAN, YBC”, shall be procured. The usage of wireless digital modulation radio waves instead of conventional camera cables to transmit signals will enable the MRTV staff to collect program materials reporting on site more flexibly. The visible distance for wireless transmission shall be 500m or more.

[8-9-2] HD Video Wireless Transmission Equipment, NBC

Four (4) sets of HD video wireless transmission equipment comprised four (4) transmitters to be mounted on four (4) existing outside shooting portable HD cameras and four (4) receivers to be equipped on the “8-1-2 Vehicles for DSNG-VAN, NBC” respectively shall be procured. The usage of wireless digital modulation radio waves instead of camera cables to transmit signals will enable the MRTV staff to collect program materials reporting on site more flexible. The visible distance of the wireless transmission shall be 500m or more.

[8-10-1] Audio/Video Switcher, YBC

One (1) audio/video switcher for program production purposes shall be procured and equipped on the “8-1-1 Vehicle for DSNG-VAN, YBC”. This switcher shall have both a switching function for video signals and a level adjustment function for audio signals before satellite transmission.

[8-10-2] Audio/Video Switcher, NBC

Two (2) audio/video switchers for program production purposes shall be procured and equipped on the “8-1-2 Vehicles for DSNG-VAN, NBC” respectively. These switchers shall have both a switching function for video signals and a level adjustment function for audio signals before satellite transmission.

[8-11-1] Audio/Video Monitoring Equipment, YBC

One (1) set of audio/video monitoring equipment for program production purposes shall be procured and equipped on the “8-1-1 Vehicle for DSNG-VAN, YBC” to monitor and check audio/video signals to be transmitted and received via the satellite.

[8-11-2] Audio/Video Monitoring Equipment, NBC

Two (2) sets of audio/video monitoring equipment for program production purposes shall be procured and equipped on the “8-1-2 Vehicles for DSNG-VAN, NBC” respectively to monitor and check audio/video signals to be transmitted and received via the satellite.

[8-12-1] Spectrum Analyzer, YBC

One (1) spectrum analyzer shall be procured and equipped on the “8-1-1 Vehicle for DSNG-VAN, YBC” to monitor and check on the frequency distribution situations of L-band radio waves used for satellite relays.

[8-12-2] Spectrum Analyzer, NBC

Two (2) spectrum analyzers shall be procured and equipped on the “8-1-2 Vehicles for DSNG-VAN, NBC” respectively to monitor and check on the frequency distribution situations of L-band radio waves used for satellite relays.

[8-16-1] Installation Materials, YBC

Installation materials for the C-band motorized antenna to be equipped on the roof of “8-1-1 Vehicle for DSNG-VAN, YBC” in addition to the cables, connectors and fixing

materials for equipment, etc. shall be procured.

[8-16-2] Installation Materials, NBC

Installation materials for the C-band motorized antenna to be equipped on the roof of "8-1-2 Vehicles for DSNG-VAN, NBC" in addition to the cables, connectors and fixing materials for equipment, etc. shall be procured.

Fig. 2-11 on the next page shows a composition diagram of DSNG-VAN in YBC and NBC.

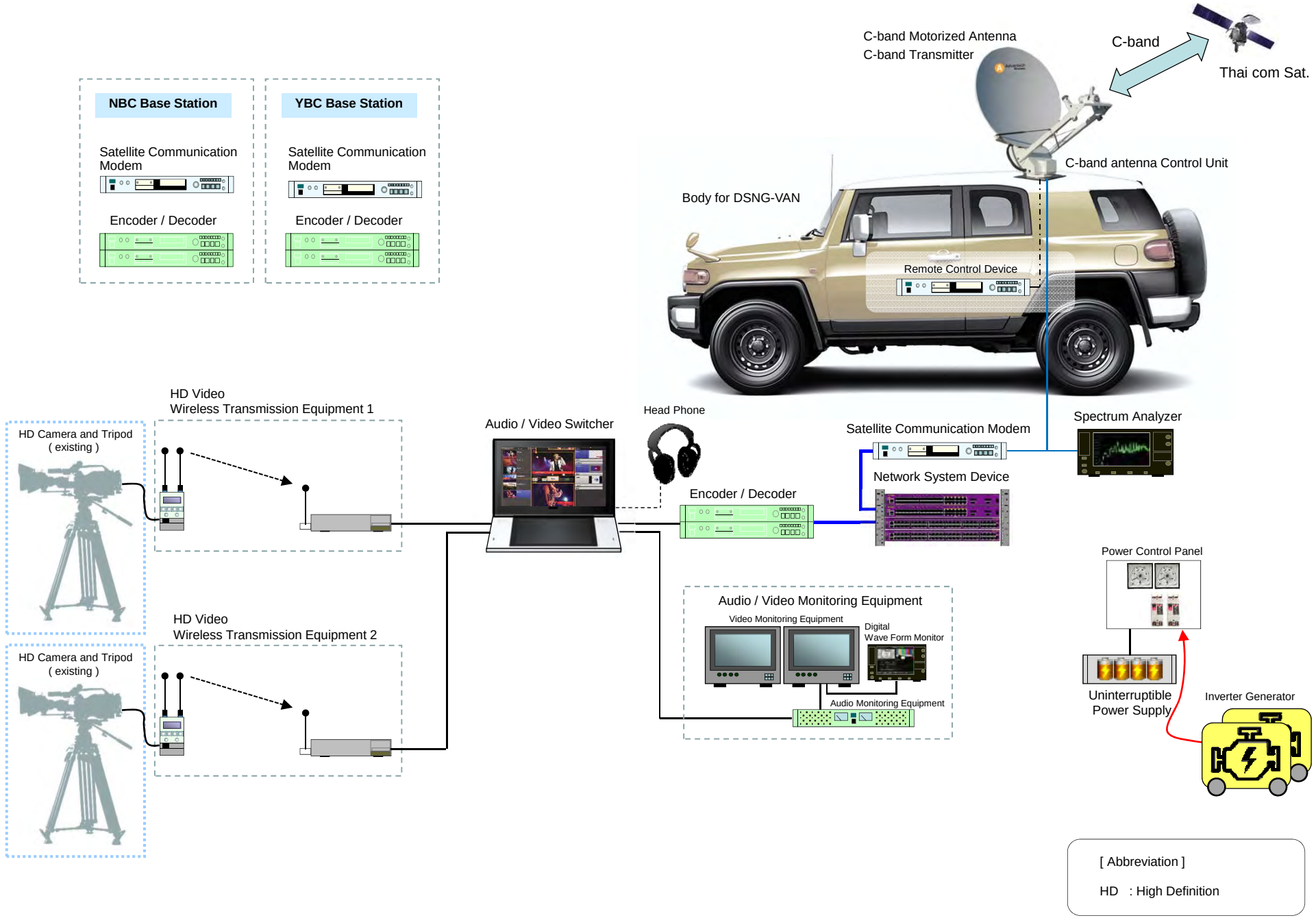


Fig. 2-11 Composition Diagram of DSNG-VAN

[9] Maintenance & Measuring Equipment for YBC

[9-1] Multi Signal Analyzing Monitor

One (1) multi-signal analyzing monitor shall be procured to verify whether or not various signals of the equipment to be newly procured for YBC meet international standards.

[9-2] Portable Signal Generator

One (1) portable signal generator having generating function of various kinds of signals compliant with the international standards shall be procured to verify the characteristics of various new equipment to be procured for YBC.

[9-3] Spectrum Analyzer

One (1) spectrum analyzer shall be procured to monitor and check on the frequency distribution situations of new equipment to be procured for YBC.

[9-4] Audio Signal Analyzer

One (1) audio signal analyzer shall be procured to verify whether or not various signals of new equipment to be procured in Studio No. 1 meet international standards.

[10] Maintenance & Measuring Equipment for NBC

[10-1] Multi Signal Analyzing Monitor

One (1) multi-signal analyzing monitor shall be procured to verify whether or not various signals of the equipment to be newly procured for NBC meet the international standards.

[10-2] Portable Signal Generator

One (1) portable signal generator having generating function of various kinds of signals compliant with the international standards shall be procured to verify the characteristics of various new equipment to be procured for NBC.

[10-3] Spectrum Analyzer

One (1) spectrum analyzer shall be procured to monitor and check on the frequency distribution situations of new equipment to be procured for NBC.

(4) List of Planned Equipment

Table 2-2 lists the planned equipment to be procured for the Project:

Table 2-2 List of Planned Equipment

Item No.	DESCRIPTION	Q'ty	REMARKS
1.	Equipment for Studio No. 1		
1-1	HD Studio Camera and the Peripherals	4 sets	Including one HD, High-Frame-Rate Camera
1-2	Prompter System	1 set	Screen Size: Approx. 20 inch
1-3	Standard Camera Lens	3 sets	
1-4	Wide-angle camera Lens	1 set	
1-5	Studio Camera Pedestal	3 sets	
1-6	Camera Crane Equipment	1 set	
1-7	Floor Monitor Cart	3 sets	(* Note)
1-8	Slow-motion Picture Controller	1 set	
1-9	Virtual Video System	1 set	
1-10	Video Production Switcher	1 set	2ME type. Input: 24 or more, Output: 10 or more
1-11	Video Router	1 set	Input/Output: totally 96 or more
1-12	Multi-viewer	1 set	
1-13	Video Peripherals	1 set	
1-14	Computer graphics system	1 set	
1-15	Video Server Device	1 set	Storage Capacity: 3TB or more
1-16	Character Generator Device	1 set	
1-17	Video Wall System	1 set	Screen Size: 130 inch or more
1-18	Intercom System	1 set	
1-19	Digital Audio Mixer	1 set	Mic Input: 24 or more, Line Input: 8 or more
1-20	Microphone and Microphone Stand	1 set	
1-21	Audio Peripherals	1 set	
1-22	Video Monitors	1 set	(*)
1-23	Audio Monitors	1 set	
1-24	Synchronized Signal Generator	1 set	BB/Tri Sync Outputs: 6 or more
1-25	Network System Device	2 sets	Should be adapted to L2 switching (*)
1-26	Lighting System	1 set	Main Source: 3-phase/4-wire, 230V AC/410V AC, 50Hz
1-27	Motorized Batten Rigging System	1 set	Should be adapted to DMX connectors
1-28	Equipment Mount Rack	1 set	
1-29	Operation Console and Chair	1 set	
1-30	Studio Floor Connection Panel	1 set	
1-31	Installation Materials	1 lot	
2.	Computer Graphics System		
2-1	Graphic Computer Equipment	2 sets	Number of CPU Cores: 10 or more
2-2	Graphic Computer Software	2 sets	Functions: Creation/Editing/Playout of contents playlists
2-3	Graphic Database Server	1 set	Number of CPU Cores: 4 or more
2-4	Data Storage Device	2 sets	Should be a RAID configuration
2-5	Network System Device	2 sets	Should be adapted to L2 switching (*)

Item No.	DESCRIPTION	Q'ty	REMARKS
2-6	Scanner	1 set	(*)
2-7	Printer	1 set	(*)
2-8	Color Evaluation Light Booth	1 set	(*)
2-9	Ingest System	1 set	(*)
2-10	Remote KVM Device	1 set	(*)
2-11	Slave Clock Device	1 set	(*)
2-12	Uninterruptible Power Supply (UPS)	6 units	Capacity: 1.5kVA or more. (*).
2-13	Equipment Mount Rack	2 sets	
2-14	Operation Console	1 set	
2-15	Installation Materials	1 lot	
3.	Archive System for YBC		
3-1	Material Asset Management (MAM) Server Device	1 set	Number of CPU Cores: 8 or more
3-2	Network System Device	1 set	Should be adapted to L2/L3 switching (*)
3-3	Baseband Ingest System	2 sets	Number of CPU Cores: 4 or more (*)
3-4	File Base Ingest System	2 sets	Number of CPU Cores: 4 or more (*)
3-5	QC Terminal System	2 sets	Number of CPU Cores: 4 or more (*)
3-6	Browsing Terminal System	2 sets	(*)
3-7	Remote KVM Device	1 set	(*)
3-8	UPS	10 units	Capacity: 1.5kVA or more
3-9	Equipment Mount Rack	3 sets	
3-10	Operation Console	8 sets	
3-11	Installation Materials	1 lot	
4.	Archive System for NBC		
4-1	Archive Storage Device	1 set	LTO-7 or Optical Disc
4-2	Archive Server Device	1 set	Number of CPU Cores: 6 or more
4-3	Network System Device	4 sets	Should be adapted to L2 switching (*)
4-4	Ingest System	2 sets	Number of CPU Cores: 4 or more (*)
4-5	Browsing Terminal System	1 set	Number of CPU Cores: 4 or more (*)
4-6	Remote KVM Device	1 set	(*)
4-7	Video Converter	1 set	Should conform to SMPTE 292M/299M
4-8	Video Router	1 set	Number of Inputs/Outputs: 8 or more for each
4-9	RS-422 Signal Router	1 set	
4-10	Format Conversion System	1 set	
4-11	Video Monitors	1 set	(*)
4-12	Wave Form Monitor	1 set	
4-13	Audio Monitors	1 set	(*)
4-14	Audio/Video Peripherals	1 set	
4-15	Synchronized Signal Generator	1 set	Should conform to SMPTE 292M
4-16	UPS	6 units	Capacity: 1.5kVA or more. (*).
4-17	Equipment Mount Rack	3 sets	
4-18	Operation Console	3 sets	
4-19	Installation Materials	1 lot	
5.	Contents Transmission System		
5-1	Video Router	1 set	Input: 16 or more, Output: 16 or more
5-2	Audio/Video Monitors	1 set	

Item No.	DESCRIPTION	Q'ty	REMARKS
5-3	Audio/Video Peripherals	1 set	
5-4	Network System Device	1 set	(*)
5-5	UPS for Contents Transmission System	5 sets	Capacity: 1.5kVA or more (*)
5-6	Room to Room Communication System	1 set	
5-7	Network Device for Room to Room Communication	1 set	(*)
5-8	Master Clock System	1 set	Time calibration by GPS (*)
5-9	Slave Clock Device	1 set	Type: Embedded power and drive signal
5-10	UPS for Master Clock System	1 unit	(*)
5-11	Equipment Mount Rack	3 sets	
5-12	Installation Materials	1 lot	
6.	Contents Network System		
6-1	MAM Server Device	1 set	Number of CPU Cores: 8 or more
6-2	Format Conversion Server	1 set	
6-3	Network System Device	1 set	Should be adapted to L2/L3 switching (*)
6-4	File Base Ingest System	2 sets	Number of CPU Cores: 4 or more (*)
6-5	Baseband Ingest System	6 sets	Number of CPU Cores: 4 or more (*)
6-6	QC Terminal System	6 sets	Number of CPU Cores: 4 or more (*)
6-7	Browsing Terminal System	6 sets	Number of CPU Cores: 4 or more (*)
6-8	Remote KVM Device	1 set	(*)
6-9	Room to Room Communication System	1 set	
6-10	Network Device for Room to Room Communication	1 set	
6-11	UPS	25 units	Capacity: 1.5kVA or more (*)
6-12	Equipment Mount Rack	2 sets	
6-13	Operation Console	20 sets	
6-14	Installation Materials	1 lot	
7.	Format Conversion System		
7-1	Format Conversion Terminal Device	5 sets	Number of CPU Cores: 10 or more
7-2	Network System Device	1 set	(*)
7-3	UPS	6 units	Capacity: 1.5kVA or more (*)
7-4	Equipment Mount Rack	2 sets	
7-5	Operation Console	5 sets	
7-6	Installation Materials	1 lot	
8.	DSNG-VAN		
8-1-1	Vehicle for DSNG-VAN, YBC	1 set	Four-wheel drive, Horsepower: 300 HP or more
8-1-2	Vehicle for DSNG-VAN, NBC	2 sets	Four-wheel drive, Horsepower: 300 HP or more
8-2-1	C-Band Transmitter, YBC	1 set	Transmission Output: 300W or more
8-2-2	C-Band Transmitter, NBC	2 sets	Transmission Output: 300W or more
8-3-1	C-Band Motorized Antenna, YBC	1 set	Diameter: Approx. 1.8 m. Should not protrude from vehicle width
8-3-2	C-Band Motorized Antenna, NBC	2 sets	Diameter: Approx. 1.8 m. Should not protrude from vehicle width
8-4-1	C-Band Antenna Control Unit, YBC	1 set	
8-4-2	C-Band Antenna Control Unit, NBC	2 sets	
8-5-1	Satellite Communication Modem, YBC	2 sets	
8-5-2	Satellite Communication Modem, NBC	3 sets	

Item No.	DESCRIPTION	Q'ty	REMARKS
8-6-1	L-Band Splitter, YBC	1 set	
8-6-2	L-Band Splitter, NBC	2 sets	
8-7-1	Encoder/Decoder, YBC	2 sets	
8-7-2	Encoder/Decoder, NBC	3 sets	
8-8-1	Network System Device, YBC	2 sets	(*)
8-8-2	Network System Device, NBC	3 sets	(*)
8-9-1	HD Video Wireless Transmission Equipment, YBC	2 sets	Freq. Band: 5GHz, Transmission output: from 50 to 350mW (Variable)
8-9-2	HD Video Wireless Transmission Equipment, NBC	4 sets	Freq. Band: 5GHz, Transmission output: from 50 to 350mW (Variable)
8-10-1	Audio/Video Switcher, YBC	1 set	
8-10-2	Audio/Video Switcher, NBC	2 sets	
8-11-1	Audio/Video Monitoring Equipment, YBC	1 set	
8-11-2	Audio/Video Monitoring Equipment, NBC	2 sets	
8-12-1	Spectrum Analyzer, YBC	1 set	Measurable Band: from 9kHz to 2GHz
8-12-2	Spectrum Analyzer, NBC	2 set	Measurable Band: from 9kHz to 2GHz
8-13-1	Inverter Generator, YBC	2 sets	(*)
8-13-2	Inverter Generator, NBC	4 sets	(*)
8-14-1	UPS, YBC	1 unit	(*)
8-14-2	UPS, NBC	2 units	(*)
8-15-1	Equipment Mount Rack, YBC	1 set	
8-15-2	Equipment Mount Rack, NBC	2 sets	
8-16-1	Installation Materials, YBC	1 lot	
8-16-2	Installation Materials, NBC	2 lots	
9.	Maintenance & Measuring Equipment for YBC		
9-1	Multi Signal Analyzing Monitor	1 set	Measurable Function: PIC/WFM/EYE/STATUS/LOUDNESS
9-2	Portable Signal Generator	1 set	Should conform to SMPTE 424M/292M/259M/170M
9-3	Spectrum Analyzer	1 set	Measurable Band: from 9kHz to 2GHz
9-4	Audio Signal Analyzer	1 set	Should include 400Hz HPF and 30kHz LPF
9-5	Spectrometer	1 set	(*)
9-6	Clamp Meter	1 set	(*)
9-7	Insulation Meter	1 set	(*)
9-8	Maintenance Tool Kit	1 set	(*)
9-9	Clear Soft Case for Drawings	1 set	(*)
10.	Maintenance & Measuring Equipment for NBC		
10-1	Multi Signal Analyzing Monitor	1 set	Measurable Function: PIC/WFM/EYE/STATUS/LOUDNESS
10-2	Portable Signal Generator	1 set	Should conform to SMPTE 424M/292M/259M/170M
10-3	Spectrum Analyzer	1 set	Measurable Band: from 9kHz to 2GHz
10-4	Clamp Meter	1 set	(*)
10-5	Insulation Meter	1 set	(*)
10-6	Maintenance Tool Kit	1 set	(*)
10-7	Clear Soft Case for Drawings	1 set	(*)

Note: Equipment listed in the table above should be fundamentally broadcast grade. However, it should be acceptable under the Project to provide professional-grade equipment marked with "*" without any further functional distinctions between broadcast- and professional-grade equipment.

2-2-2-4 Building Renovation Plan

(1) Interior Renovation

1) Studio No. 1

Although the building structure is well maintained, defects and damage are observed in the interior walls, floors and grid pipe ceiling, etc., which means the present interior finishes of Studio No. 1 are inappropriate; not only in light of forming a suitable environment in which to operate and maintain the planned equipment but also from the visual perspective of the room. For this room in particular, renovation linked with a studio lighting system is crucial and also involves installing a new wiring duct for the system and replacing an aging catwalk as part of the renovation work. The main interior renovation items are as follows:

- Floor : All the PVC floor tiles are to be changed for new ones
- Skirting : Repainted
- Wall : Soundproof wall completely renewed
  Repainted on the upper part of the wall from the grid ceiling
  Cyclorama repainted
- Ceiling : Safety net on the grid ceiling renewed
  Catwalk renewed
- Others : All the exposed steel surfaces, such as steel stairs, steel doors and frames, etc. and all the exposed wood surfaces were repainted
  (*Note: This treatment was applied to all the renovated rooms)

2) Sub-Control Room No. 1

Defects such as peeling of PVC floor tiles, loss of wall boards and dirt on the ceiling, etc. are observed in the room, meaning it is an inappropriate environment for installing and operating the latest equipment. A free access floor is newly introduced for this room to facilitate equipment wiring. The ceiling lights are to be repositioned according to the equipment layout. Equipment racks to be set along with the wall and positioned on the opposite side of the room entrance, will become a thermal reservoir, so that the positions of the air-conditioning outlets will also change according to the equipment layout. The main interior renovation items are as follows:

- Floor : Tile carpet flooring on the free access floor (150mm high), PVC floor tiles applied only for the portion of the entrance door opening
- Wall : Complete renewal of sound-absorbing walls (wooden rib finish on glass cloth finished glass wool base layer for wainscot, glass wool board finish on upper side of the walls)
- Ceiling : Complete renewal of rock wool board’s ceiling
  Repositioned lighting fixtures and air-conditioning outlets on the ceiling

3) Sound Lock for Studio No. 1 and Store Nos. 3 and 4

Stores Nos. 3 and 4 are not suitable for accommodating the planned equipment since PVC floor tiles are peeling and the walls and ceilings are dirty. These rooms, alongside the Sound Lock for Studio No. 1 and with the same finishing conditions, are renovated as follows:

- Floor : Complete renewal of PVC floor tiles
- Wall : Repainted
- Ceiling : Repainted

4) Rectifier Room (Dimmer Room)

As well as aging, the building sustained significant damage to interior finishes as ceilings, walls and floors due to rainwater leakage. As the dimmer rack and power distribution board for the studio lighting system are to be newly installed in the room, full care should be taken to consider the position of rainwater leakage, where the wiring duct traverses the roof slab. Appropriate mortar risers are to be provided surrounding the slab opening for the wiring duct and a proper waterproofing treatment must be applied to the gaps between the risers and the duct.

- Floor : Complete renewal of PVC floor tiles
- Wall : Repainted
- Ceiling : Repainted
- Others : Waterproofing treatment at the point where the wiring duct traverses the roof slab as mentioned above

5) Radio Relay Equipment Room and Title Preparation Room (Post-Production Room)

Archive system equipment and computer graphics equipment are to be installed in the existing Radio Relay Equipment Room and Title Preparation Room, respectively. Both rooms shall have the entire interior renovated as was done for the other rooms. As well as Sub-Control Room No. 1, free access flooring is to be introduced to these rooms to ensure easy wiring connection with equipment.

- Floor : Tile carpet flooring on the free access floor (100mm high), PVC floor tiles applied only for the portion of the entrance door opening
- Wall : Repainted
- Ceiling : Repainted

(2) Renovation of the Roof

All the aged existing steel roofing sheets are to be removed and a new galvalume ribbed steel sheet installed. As for the base of the roofing, existing steel trusses shall be reused.

(3) Renovation of Building Equipment

To protect safer operating conditions for the planned equipment, renovation of building equipment is mainly introduced for fire protection, since the systems have now stopped their function completely. The main renovation of the building equipment is as follows:

1) Restoration of Automatic Fire Alarm System

Fire alarm system components such as fire alarm panels fitted in the existing Building Manager Office and all the rooms' fire detectors, have been completely renewed. Particularly for smoke detectors on the ceiling of Studio No. 1, they shall be changed to air pipe type differential distribution sensors[5].

2) Restoration of Indoor Hydrant System

All the components of the indoor hydrant system, such as the fire pump unit in the machine Room of the annex building, fire hydrant boxes fitted in six locations (one for Store No. 1 on the ground floor, one for the air-conditioning machine room on the first floors and four locations of corridors on the ground and first floors), piping connected to all the facilities are to be renewed.

3) Renovation of Electrical Installations

Alongside the introduction of a new studio lighting system for Studio No. 1 and interior renovation, some renovation is also required as well as restoration work for the firefighting system. The following works are to be executed:

① Expansion of Transformer

To obtain the power source for the studio lighting system with an electric lifting device, one set of transformers of 3-phase 3-wire 210V30kVA is to be provided in the annexed substation and electrical wiring is to be provided for the operation panel of the electric lifting device in Studio No. 1, as preparatory work for installing a studio lighting system.

② Introduction of LED Lighting Fixtures

In addition to the ceiling lights in Studio No. 1, all the lighting fixtures in the rooms earmarked for renovation are to be changed to LED lighting fixtures.

③ Cable Tray and Cable Ladders for Studio Lighting System

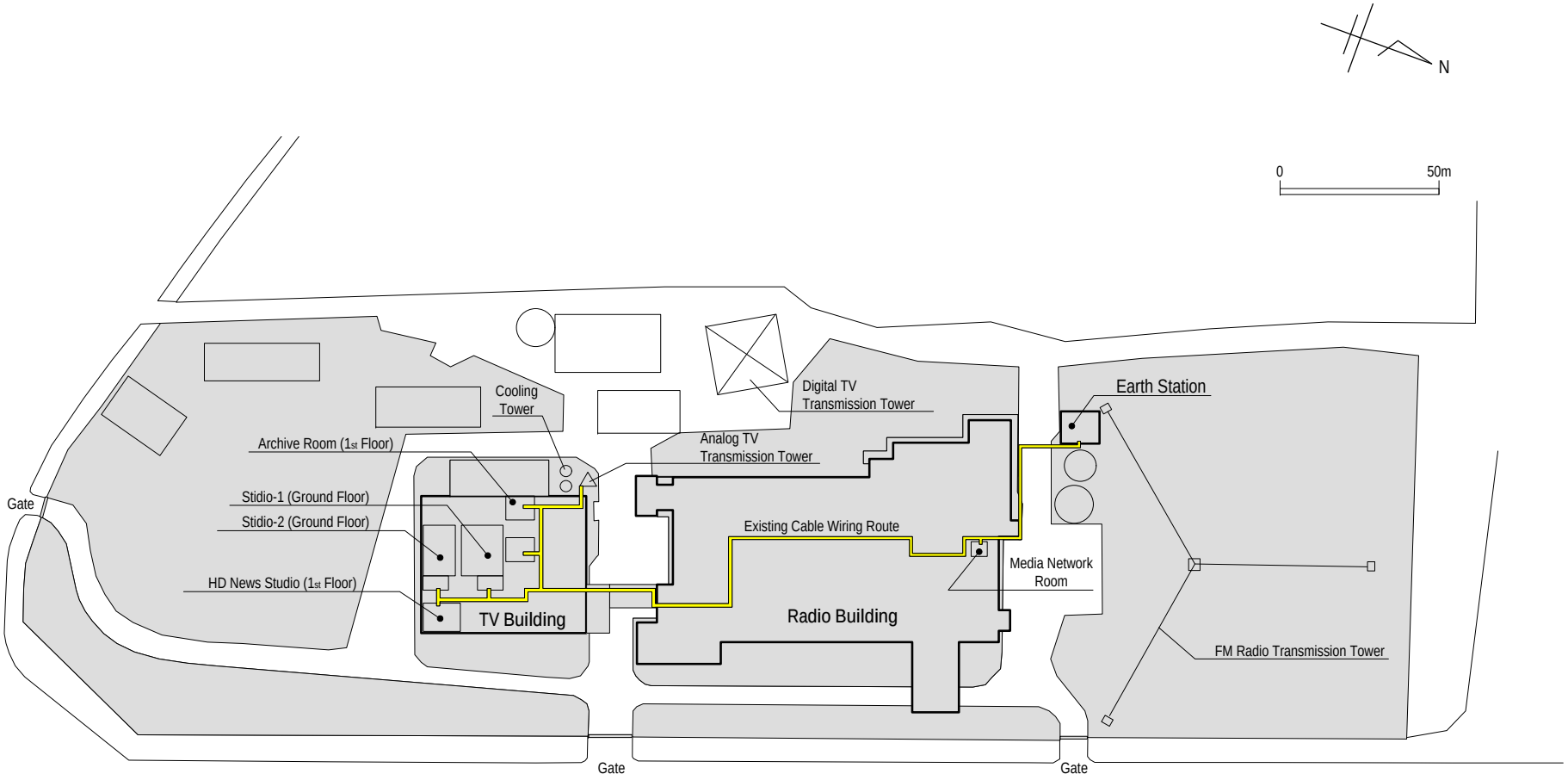
The existing wiring duct is to be removed and a new wiring tray for an electrical lifting device is to be installed. In the vertical position along the wall, a cable ladder is to be installed in the position of the operation panel of the studio lighting system.

5 An air pipe type differential distribution sensor is a kind of high-performance heat detector that can alert up to "less than 15m high." and employed in generally high spaces, such as gymnasium ceilings.

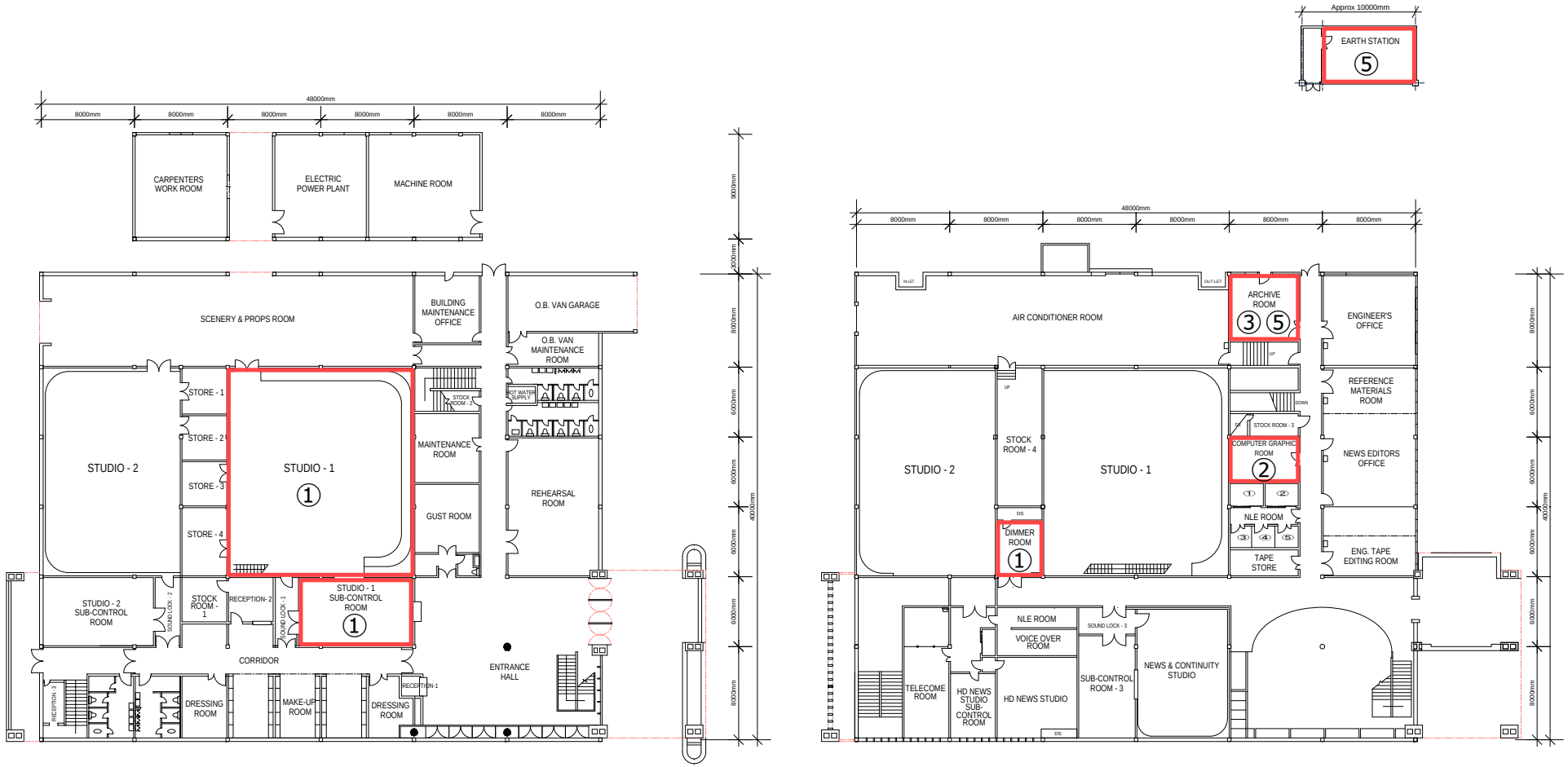
2-2-3 Outline Design Drawing

This section shows outline design drawings for the planned equipment, including building renovations from the next page. The drawing numbers and titles are as follows:

Drawing 1: <YBC> Site Layout Plan
Drawing 2: <YBC> Rooms for Installation of the Planned Equipment
Drawing 3: <YBC> Overall Block Diagram of the Audio/Visual System
Drawing 4: <YBC> Overall Block Diagram of the Network System
Drawing 5: <YBC> Block Diagram of the Room-to-Room Intercom System
Drawing 6: <YBC> Block Diagram of the Clock System
Drawing 7: <YBC> Studio No. 1 Floor Layout
Drawing 8: <YBC> Studio No. 1 Sub-Control Room Layout
Drawing 9: <YBC> Block Diagram of the Studio No. 1 Video System
Drawing 10: <YBC> Block Diagram of the Studio No. 1 Audio System
Drawing 11: <YBC> Block Diagram of the Studio No. 1 Intercom system
Drawing 12: <YBC> Studio No. 1 Layout above Grid Pipes for Studio Lighting
Drawing 13: <YBC> Studio No. 1 Button Layout for Studio Lighting
Drawing 14: <YBC> Computer Graphics Room Layout
Drawing 15: <YBC> Block Diagram of the Computer Graphics System
Drawing 16: <YBC> Archive Room Layout
Drawing 17: <YBC> Block Diagram of the Archive System
Drawing 18: <YBC> Block Diagram of the Content transmission System
Drawing 19: <YBC> Earth Station Room Layout
Drawing 20: <NBC> Rooms for Installation of Planned Equipment
Drawing 21: <NBC> Overall Block Diagram of the Audio/Visual/Network System
Drawing 22: <NBC> Block Diagram of the Room-to-room Intercom system
Drawing 23: <NBC> Master Control Room Layout
Drawing 24: <NBC> Content Network System Layout
Drawing 25: <NBC> Block Diagram of the Content Network System
Drawing 26: <NBC> Archive Room Layout
Drawing 27: <NBC> Block Diagram of the Archive System
Drawing 28: <NBC> Block Diagram of the Format Conversion System
Drawing 29: <YBC/NBC> Block Diagram of DSNG-VAN
Drawing 30: <YBC> Building Renovation Drawing 1 (Site Map & Site Layout Plan)
Drawing 31: <YBC> Building Renovation Drawing 2 (Ground Floor Plan)
Drawing 32: <YBC> Building Renovation Drawing 3 (First Floor Plan)
Drawing 33: <YBC> Building Renovation Drawing 4 (Section & Roof Plan)



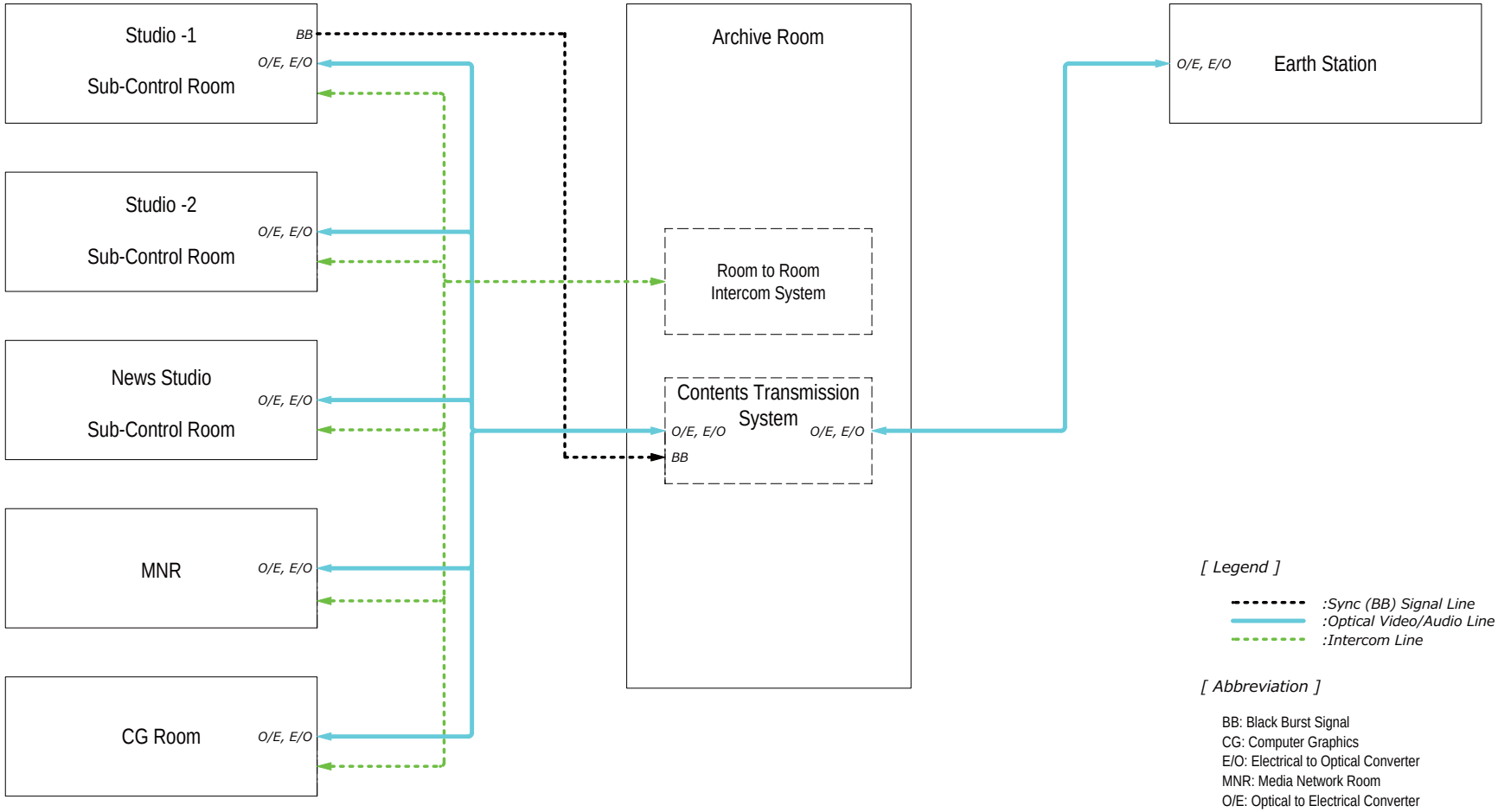
Drawing-1: <YBC> Site Layout Plan



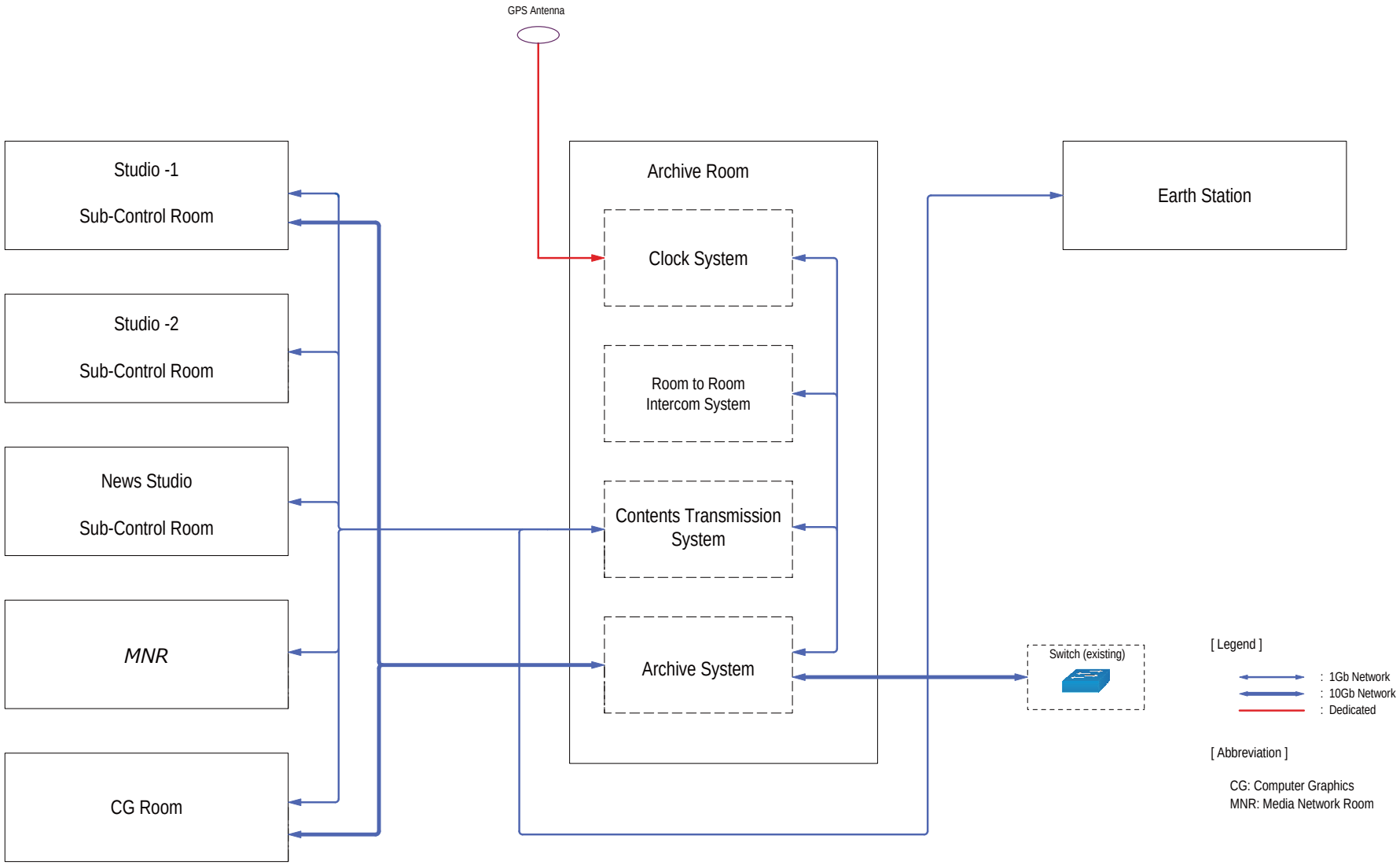
GF 1F

SYS No.	System	Location
①	Studio 1	Studio 1, Studio 1 Sub-Control Room, Dimmer Room
②	Computer Graphics System	Computer Graphic Room
③	Archive System in Yangon Broadcasting Center	Archive Room
⑤	Contents Transmission System	Archive Room, Earth Station

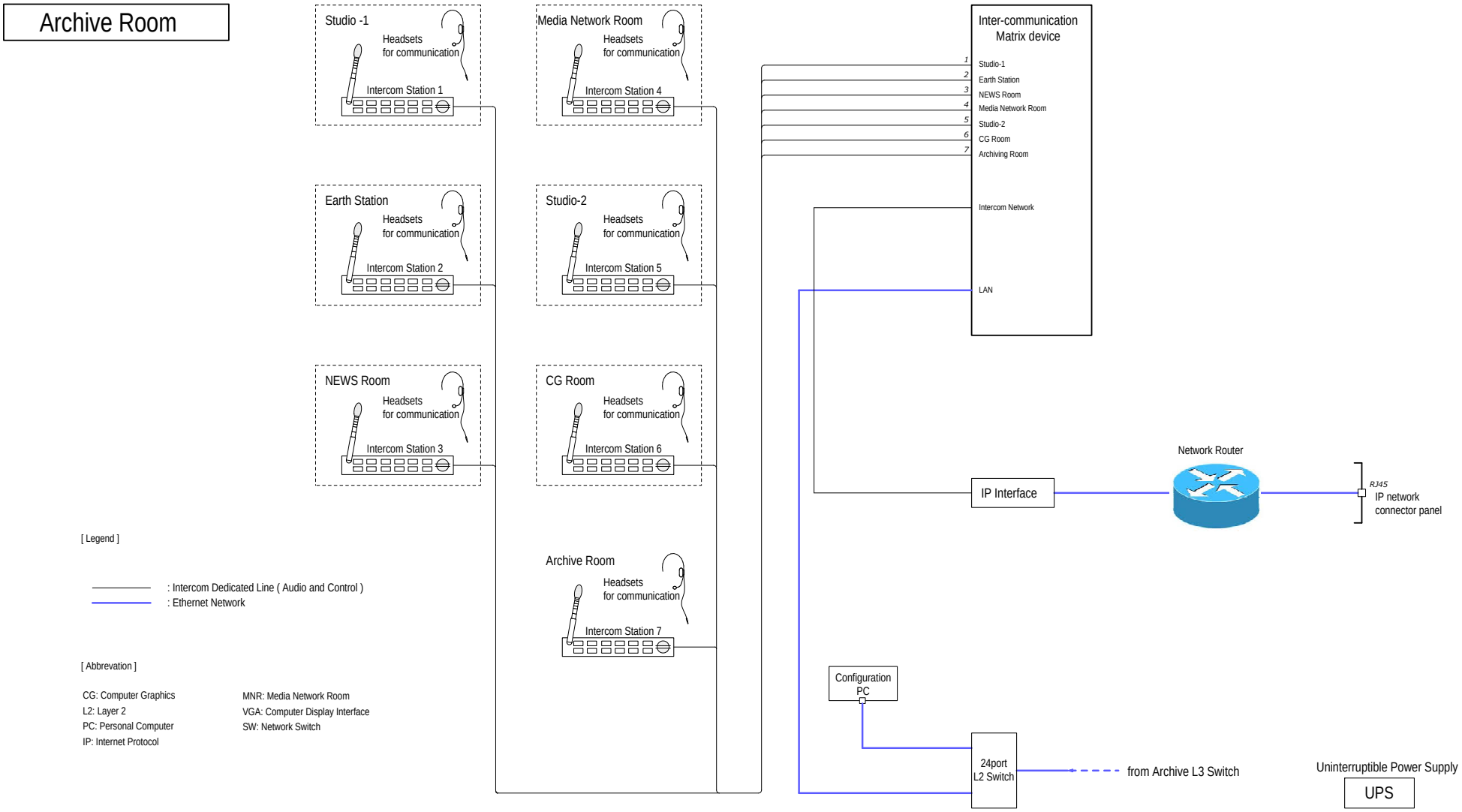
Drawing-2: Rooms for Installation of Planned Equipment



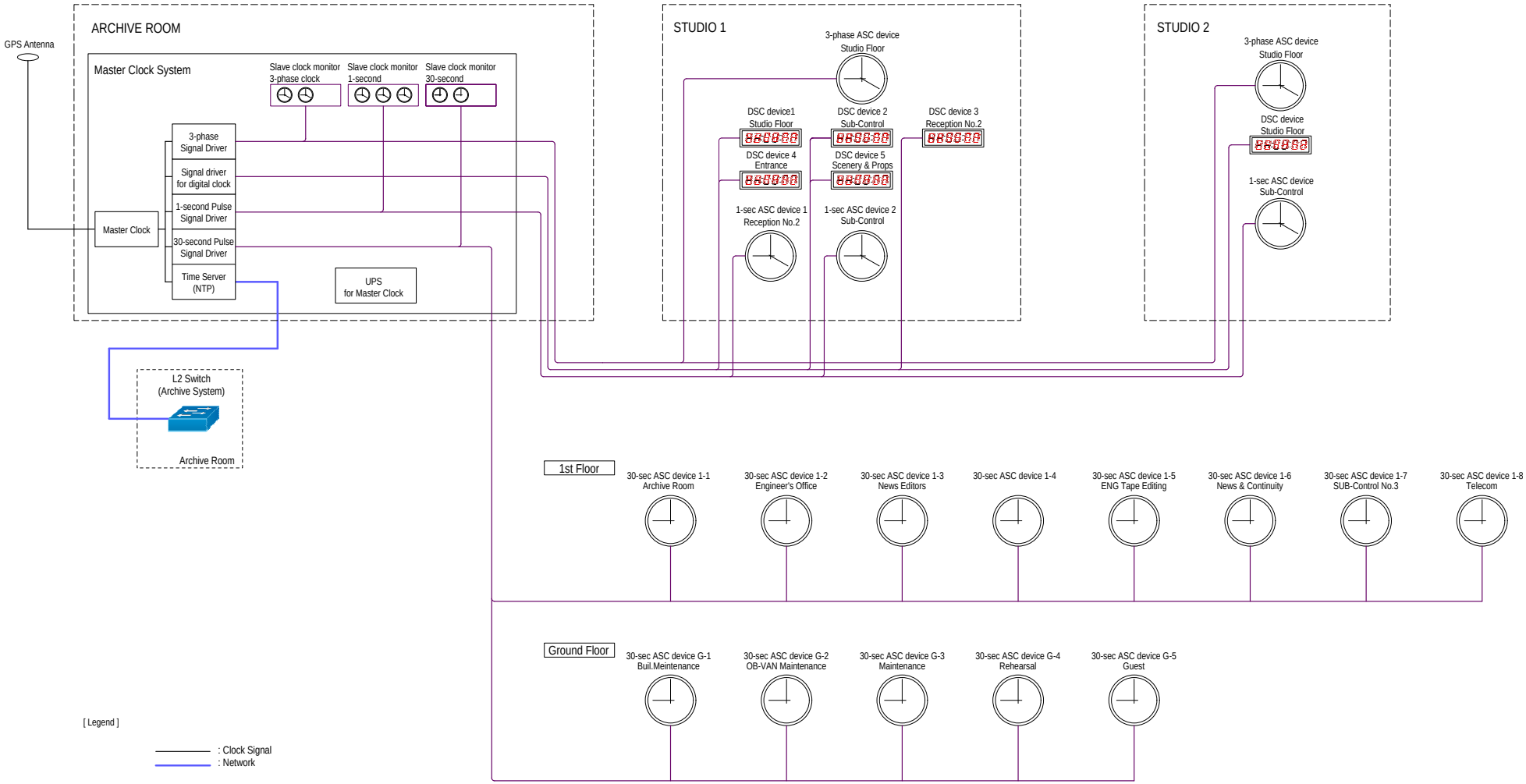
Drawing-3: <YBC> Overall Block Diagram of Audio/Visual System



Drawing-4: <YBC> Overall Block Diagram of Network System



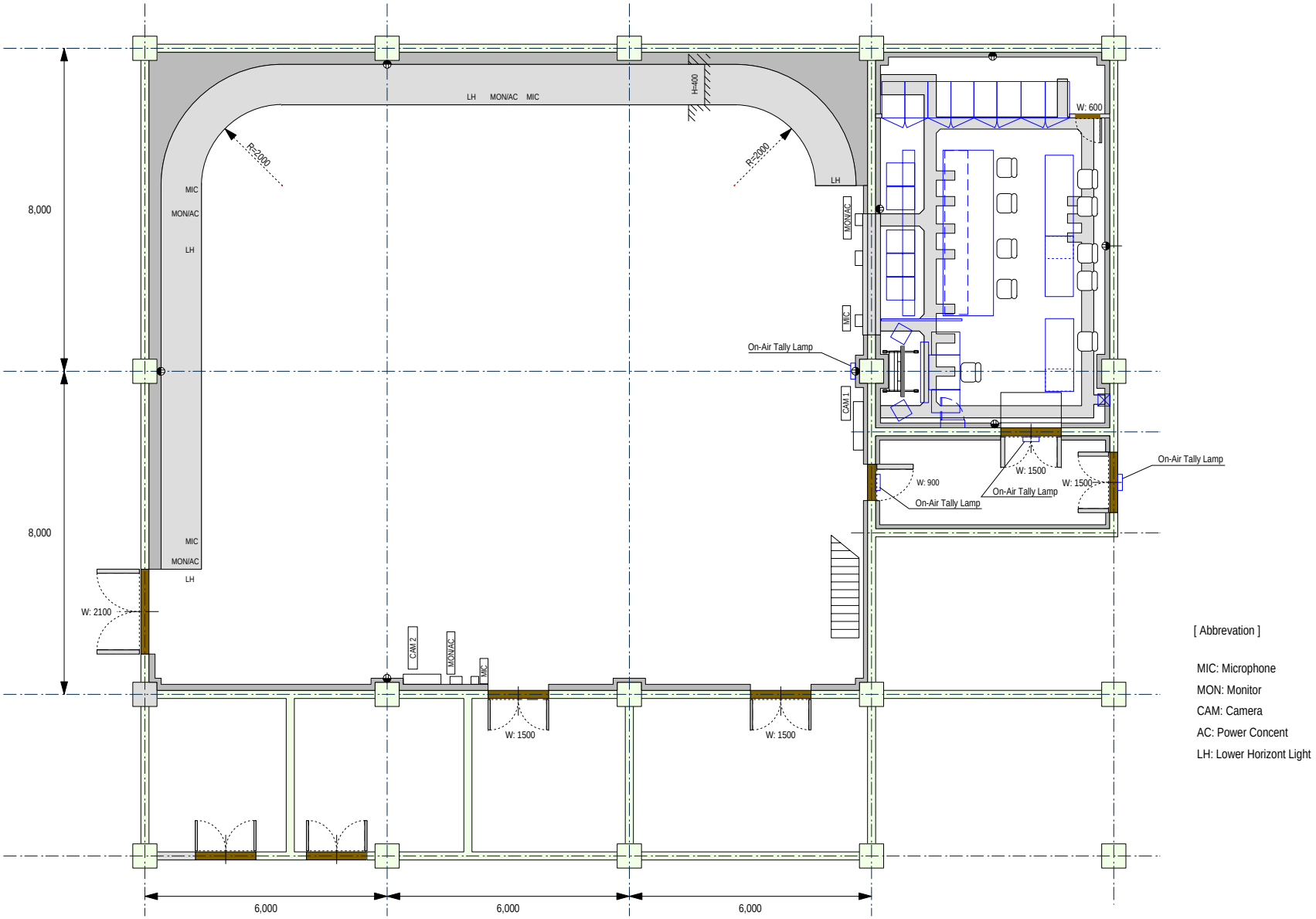
Drawing-5: Block Diagram of Room to Room Intercommunication System



[Abbreviation]

ASC: Analog Slave Clock
BCD: Binary Coded Decimal
CG: Computer Graphics
CNS: Contents Network System
DSC: Digital Slave Clock
L2: Layer 2 (OSI Model)
NTP: Network Time Protocol
sec: Second

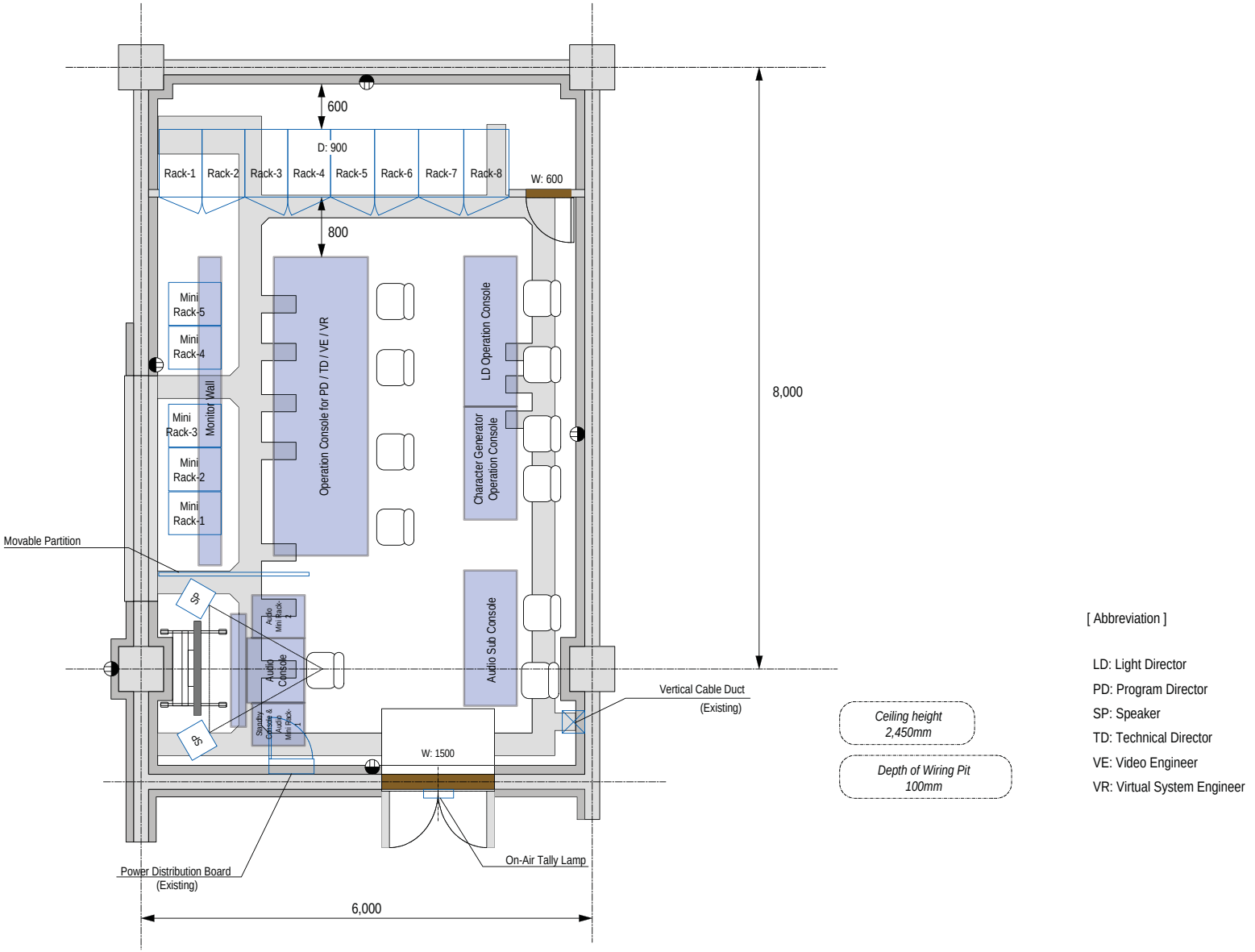
Drawing-6: <YBC> Block Diagram of Clock System



[Abbrevation]

MIC: Microphone
MON: Monitor
CAM: Camera
AC: Power Concent
LH: Lower Horizont Light

Drawing-7: Studio No.1 Floor Layout



Drawing-8: <YBC> Studio No.1 Sub-Control Room Layout

Sub-Control Room

Video Monitor for Video Operation Console x 3 lot

ANT

1-sec ASC Device 1

1-sec ASC Device 2

DSC Device 3 03:00

DSC Device 5 03:00

DSC Device 4 03:00

DSC Device 2 03:00

Clock Signal Panel

Studio Floor

3-phase ASC Device

DSC Device 1 03:00

HD Camera and Peripherals

Wide Angle Camera Lens

Camera Crane Equipment

Camera Cable CAM 4

HD Camera and Peripherals

HD High Frame Rate Camera

Standard Camera Lens

Camera Cable

VR I/F

Studio Camera Pedestal

CAM 1

HD Camera and Peripherals

Standard Camera Lens

Camera Cable CAM 2

VR I/F

Studio Camera Pedestal

CAM 3

HD Camera and Peripherals

Prompter System

Camera Cable

Standard Camera Lens

VR I/F

Studio Camera Pedestal

Camera Patch Panel

CAM 1

CAM 2

CAM 3

Video Monitor for Floor

42"

Video Monitor for Floor

42"

42"

Low Type Floor Monitoring Cart

High Type Floor Monitoring Cart

Control PC of Prompter System

PC MON

HDMI

Control PC

Video Wall System

Studio Floor Connection Panel

A/V Monitor CN Plate

FL MON1

FL MON2

Video Wall Control Equipment

PC MON

Video Wall Control PC

from Intranet HUB

Network System Device

10Gb LAN

L2 Switch

Slow-motion Picture Controller

21" Monitor

PC MON

Slow PGM MON

Server System for Slow-motion Control

Slow-motion Controller

Camera Control Unit

CCU 1

PGM VIR PGMC

Camera Control Unit

CCU 2

PGM VIR PGMC

Camera Control Unit

CCU 3

PGM VIR PGMC

Camera Control Unit

CCU 4

PGM PGMC

Master Setup Unit

MSU

Video Monitor

MON

SWITCHER

ROUTER

MONITOR

Video Monitor for VR

VR MON

Multi Meter for VR

WF

Virtual Video System

Video Monitor (Rack Mount Type)

MON MON

Memory Video Recorder 1 (existing)

MEMR1 (existing) PGM

Memory Video Recorder 2 (existing)

MEMR2 (existing) PGM

Video Server Device

VS PGM

SD-VTR (existing)

D/C

SD VTR (existing) PGM

U/C

Multi-viewer

TC

CAM1 CAM2 CAM3 CAM4 VR MEMR1 MEMR2 VS SD-VTR TG TG K CG CG K VR K EXT 1 EXT 2 EXT 3 EXT 4 CB DME AUX ME PST PGM AIR

Operation Panel with Menu Dispaly

Menu Display

Video Production Switcher

MENU PGM PST ME AUX DME

DDA to Title Genelator Equipment to Computer Graphics Equipment

DDA to Title Genelator Equipment to Computer Graphics Equipment

TV tuner Receiver for Air Monitor (Analog-TV, Digital-TV)

TUNER

Video Signal Switcher

MPX PGM

Audio from Audio System

MPX EMG

Audio from Audio System

EMG Changeover

DDA

Output Connector Panel

DDA HD-SDI to Archive Room (CTS)

DDA PGM VE WFM

DDA BKUP

DDA SD-SDI

D/C

D/A

VDA ANALOG

Video Monitor for Audio Console

Mixer Multi Viewer

Multi Meter for VE

WF

Video Monitor for VE

VE MON

Multi Meter for LE

WF

Video Monitor for LE

LD MON

PGM

PGM

Multi-viewer

TC

CAM1 CAM2 CAM3 CAM4 VR MEMR1 MEMR2 VS SD-VTR PST PGM

Video Router

EMG VE MON LD MON FL MON1 FL MON2 VIRP V VIRP K RET1 RET2 SLOW MEMR1 MEMR2 VS SD-VTR

Title Generator System

PST PGM

PC MON

Tiling Computer System

TG NEXT

Computer Graphics System

PST PGM

PC MON

Graphics PC

CG NEXT

NTP Time Code Generator

REF TC

Sync Signal Generator

SG-1

SG-2

Change Over Unit

CHANGE OVER

SWITCHER

ROUTER

MONITOR

NETWORK

External Line CN Plate

from Archive Room (CTS)

EXT 1 EXT 2 EXT 3 EXT 4 TRUNK TRUNK

FS DMPX Audio to Audio System

FS DMPX Audio to Audio System

FS DMPX Audio to Audio System

FS DMPX Audio to Audio System

FS DMPX Audio to Audio System

FS DMPX Audio to Audio System

SWITCHER

ROUTER

MONITOR

[Legend]

: Video

: Radio Frequency

: Control

: Audio

: Time Code

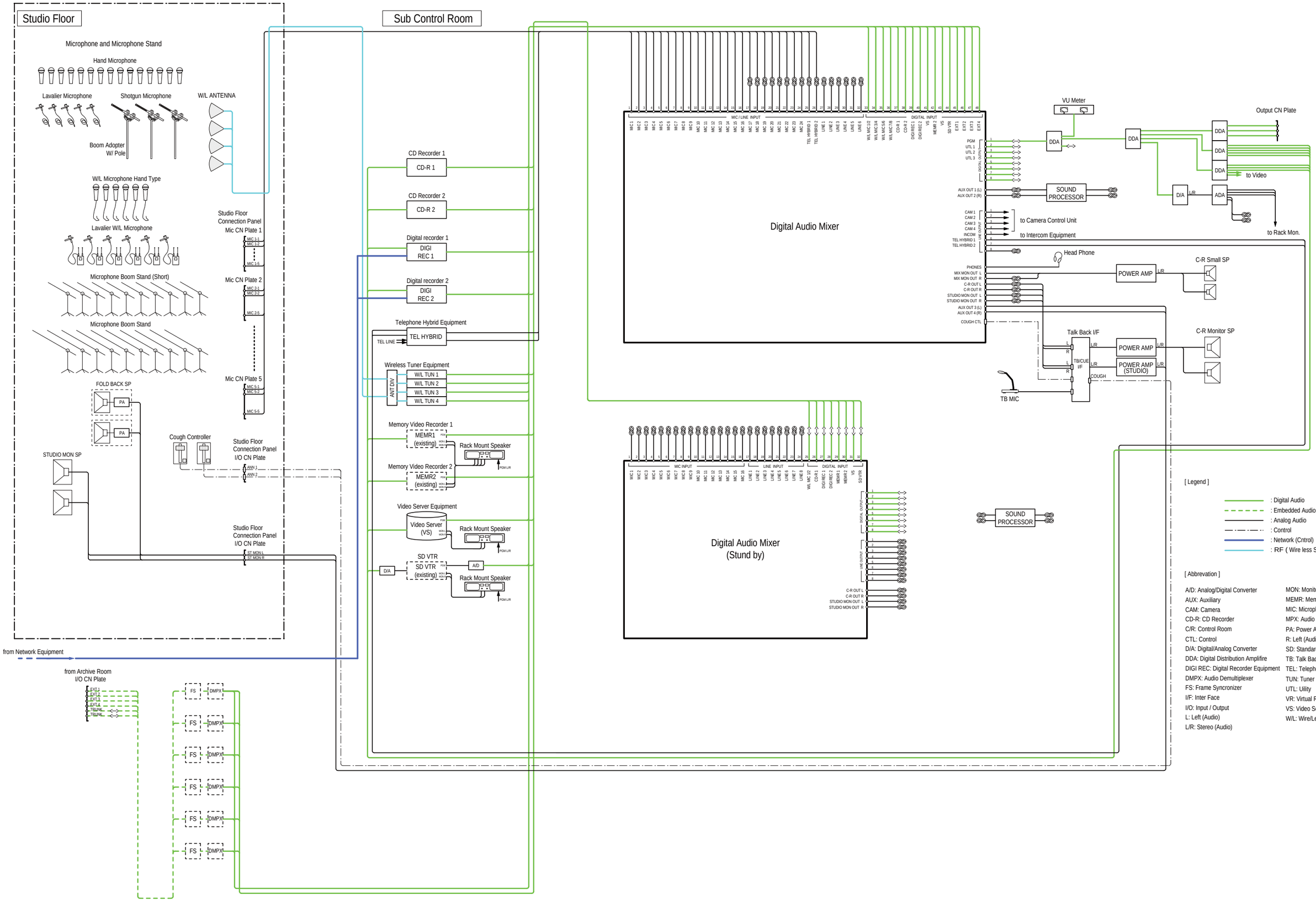
: Clock Signal

: Network

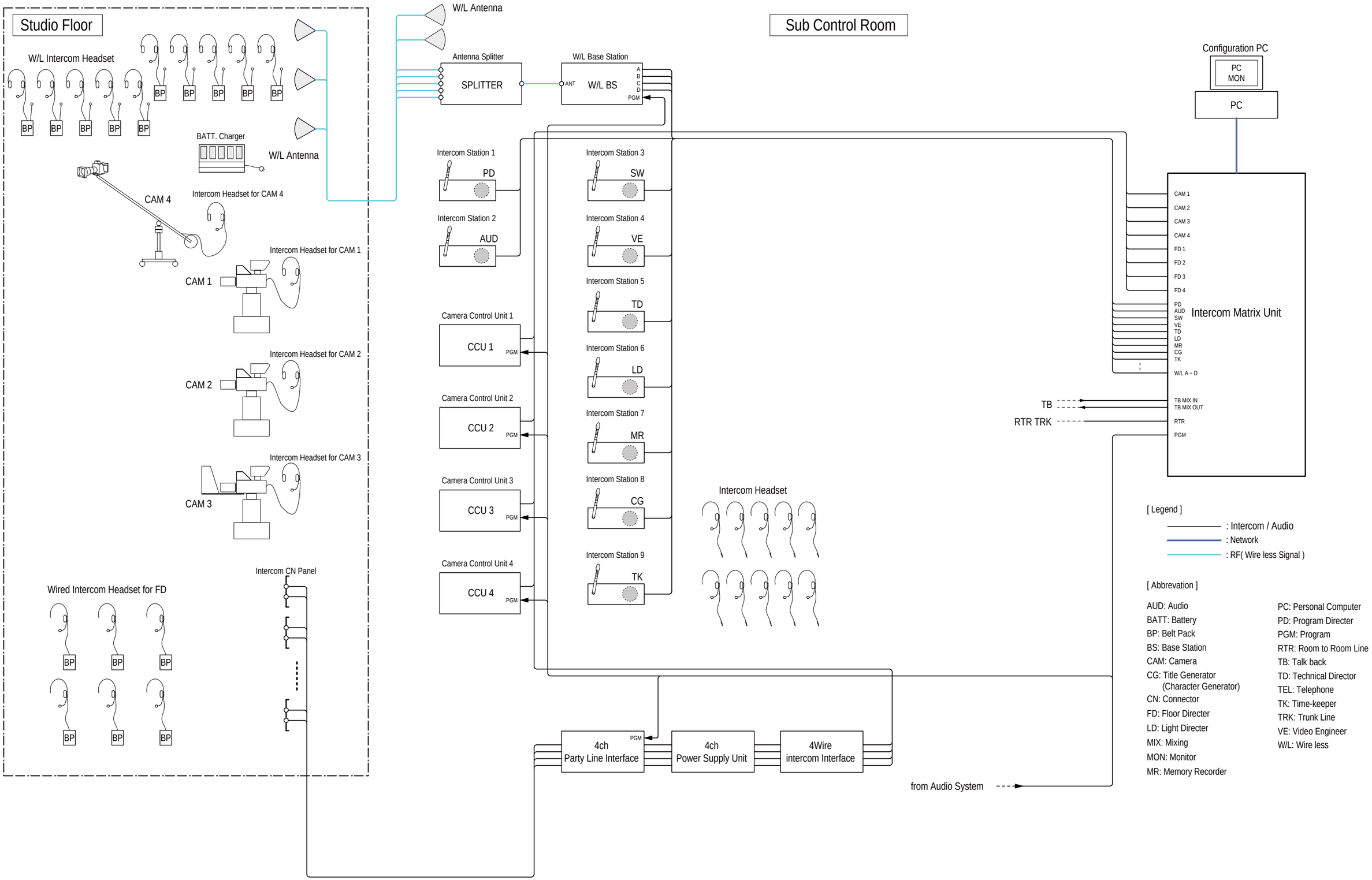
[Abbrevation]

AIR: Broadcasting wave
ANT: Antenna
AUX: Auxiliary
ASC: Analog Slave Clock
BKUP: Backup Equipment
CAM: Camera
CB: Color Bar
CCU: Camera Control Unit
CG: Computer Graphics
CTS: Contentsu Transmission System
D/C: Down Converter
DDA: Digital Distribution Amplifire
DME: Digital Multi Effect
DMPX: Audio Demultiplexer
DSC: Digital Slave Clock
EMG: Emergency
EXT: External
FS: Frame Synchronizer
I/F: Interface
K: Key Signal (ex. TG K)
LD: Lighting Director
M/E: Mixer / Effect
MEMR: Memory Recorder
MPX: Audio Multiplexer
MON: Monitor
MSU: Master Setup Unit
PC: Personal Computer
PD: Program Director
PGM: Program
PST: Preset
REM: Remote
SD: Standard Definition
SG: HD Digital Sync Generator
TC: Time Code
TG: Title Charactor Generator
U/C: Up-Converter
HDMI: PC Display Signal
VIR: Virtual Studio System
VE: Video Engineer
VS: Video Server
WF: Digital Multi-Format Waveform Monitor
3D: 3 Dimention
10Gb: 10 Gigabit

Drawing-9: <YBC>Block Diagram of Studio No.1 Video System



Drawing-10: <YBC> Block Diagram of Studio No.1 Audio System



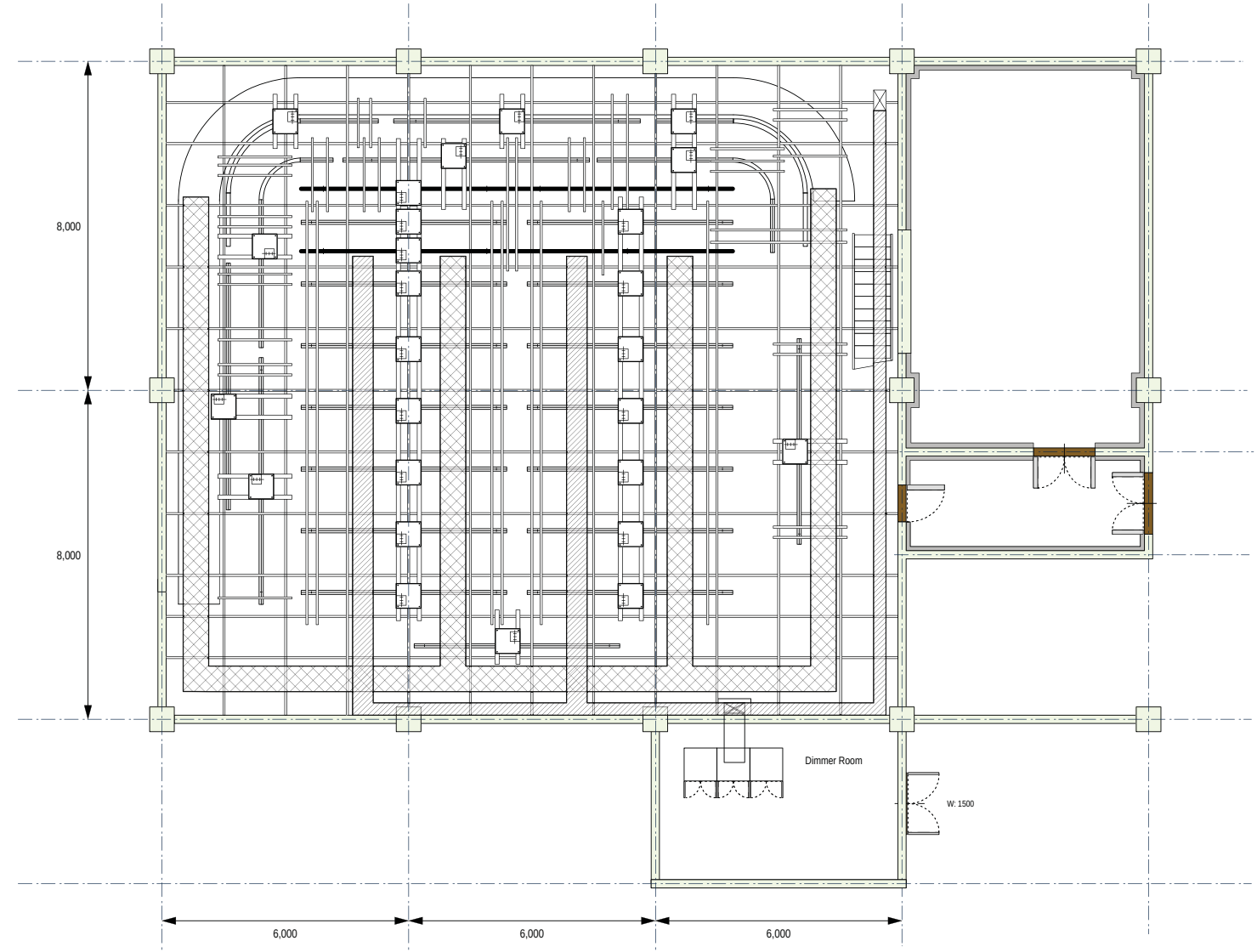
[Legend]

: Intercom / Audio
: Network
: RF(Wire less Signal)

[Abbrevation]

AUD: Audio
BATT: Battery
BP: Belt Pack
BS: Base Station
CAM: Camera
CG: Title Generator (Character Generator)
CN: Connector
FD: Floor Directer
LD: Light Directer
MIX: Mixing
MON: Monitor
MR: Memory Recorder
PC: Personal Computer
PD: Program Directer
PGM: Program
RTR: Room to Room Line
TB: Talk back
TD: Technical Director
TEL: Telephone
TK: Time-keeper
TRK: Trunk Line
VE: Video Engineer
W/L: Wire less

Drawing-11: Block Diagram of Studio No.1 Intercommunication System



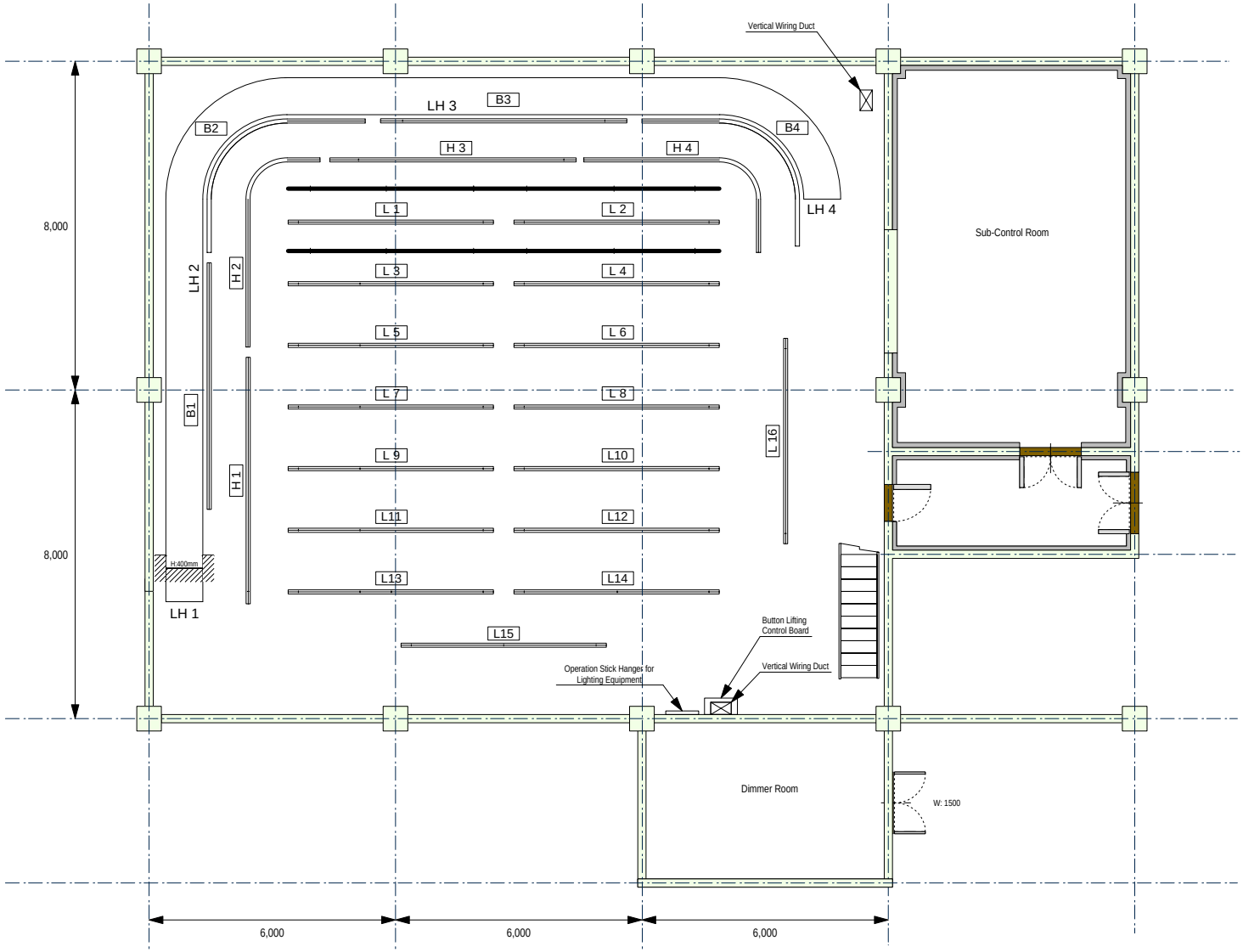
Legend of Drawing

: Cat-Walk Path to be Newly Installed

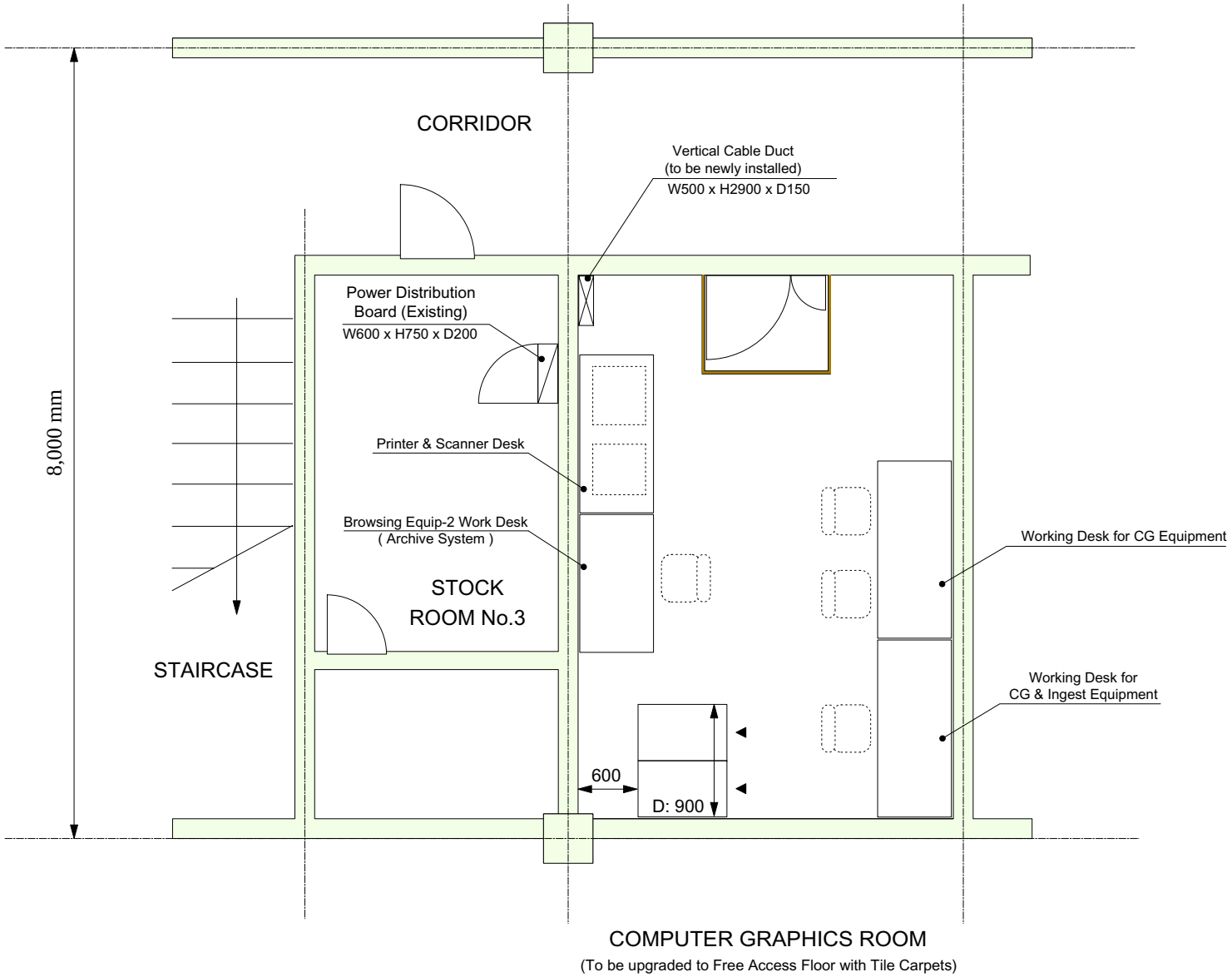
: Power Cable Duct to be Newly Installed

*Note: Existing grid pipes should be used.

Drawing-12: Studio No.1 Layout above Grid Pipe for Studio Lighting



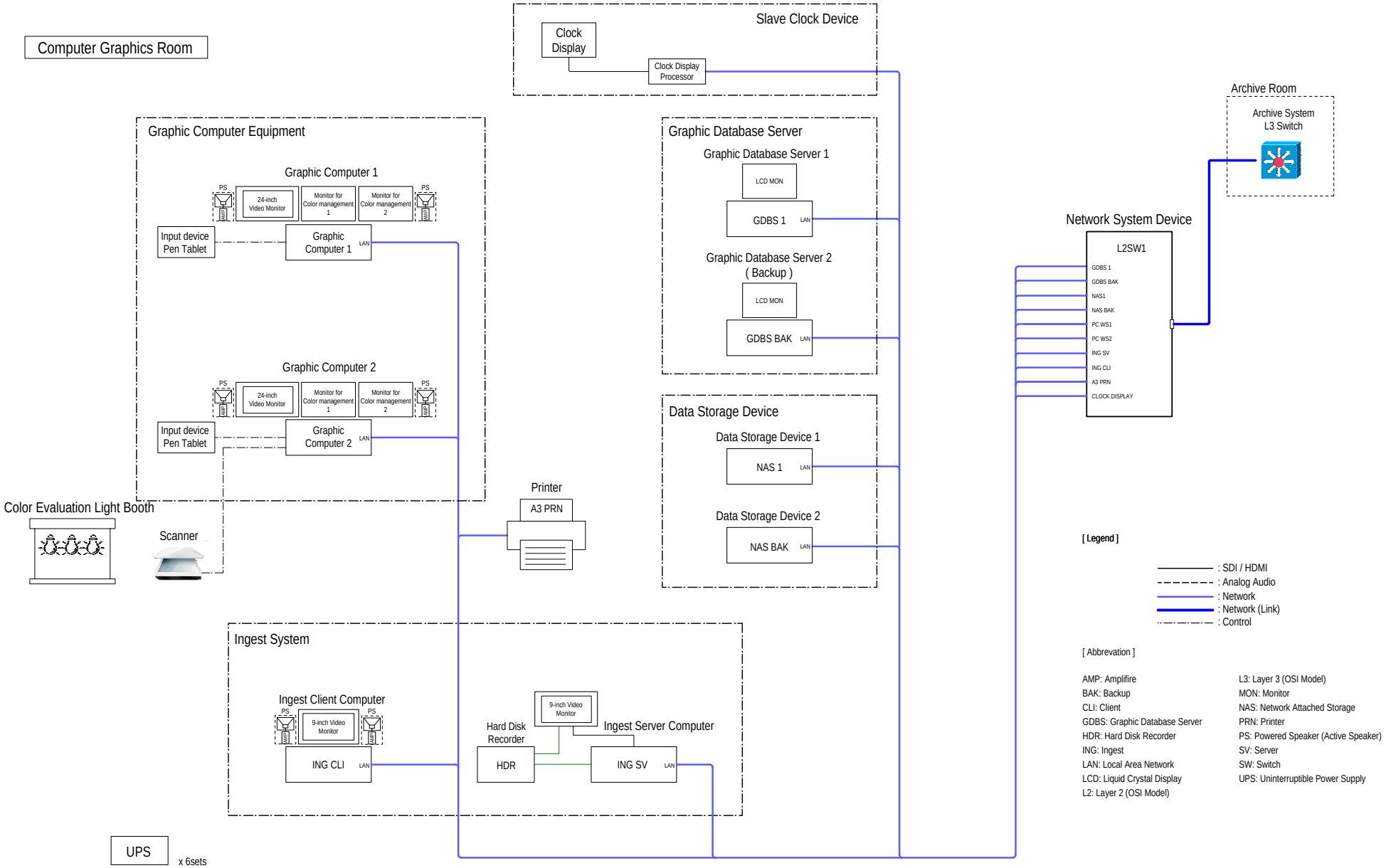
Drawing-13: Studio No.1 Equipment Layout for Lighting/Button Lifting System



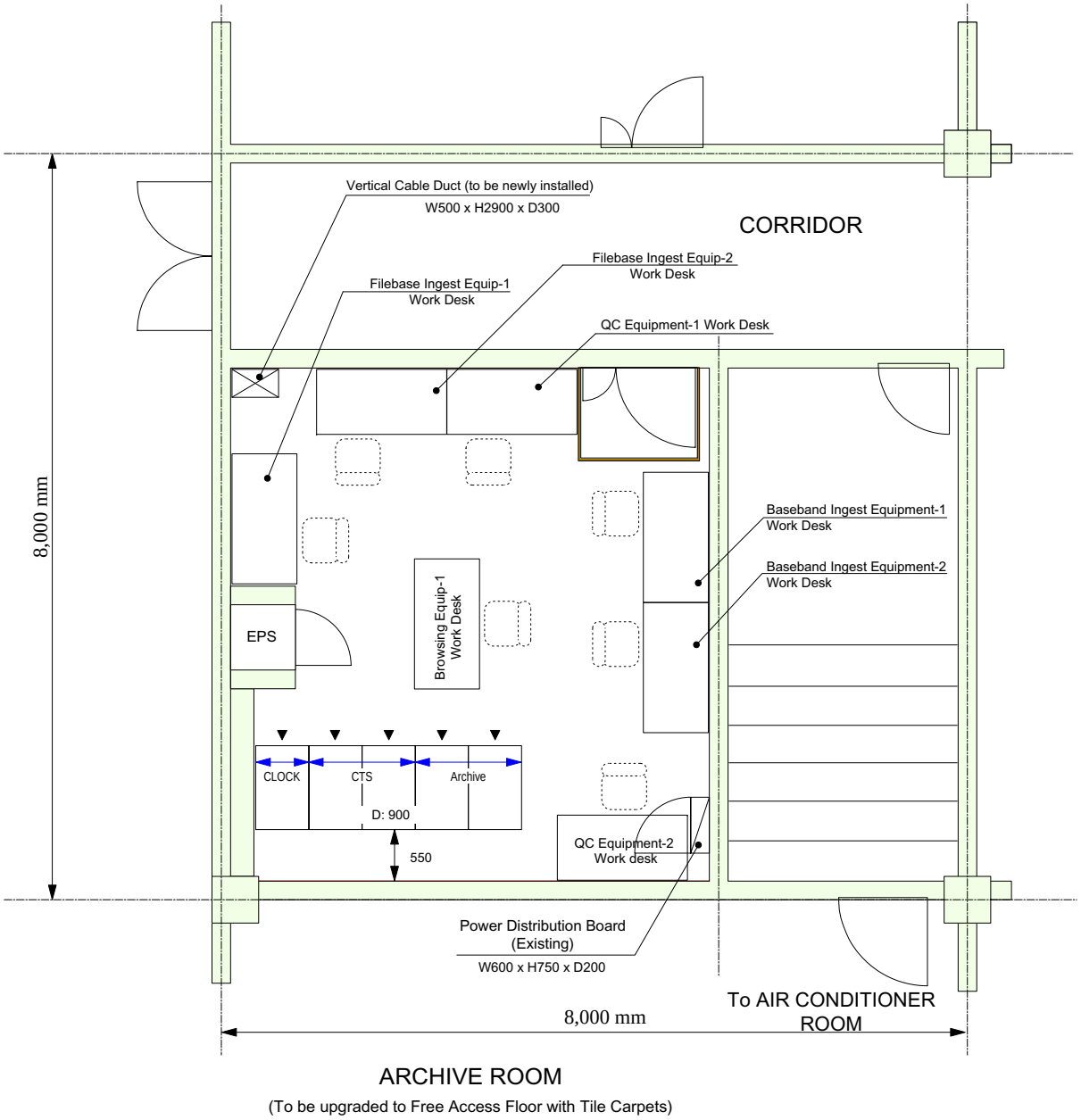
[Abbreviation]

CG: Computer Graphics

Drawing-14: Computer Graphics Room Layout



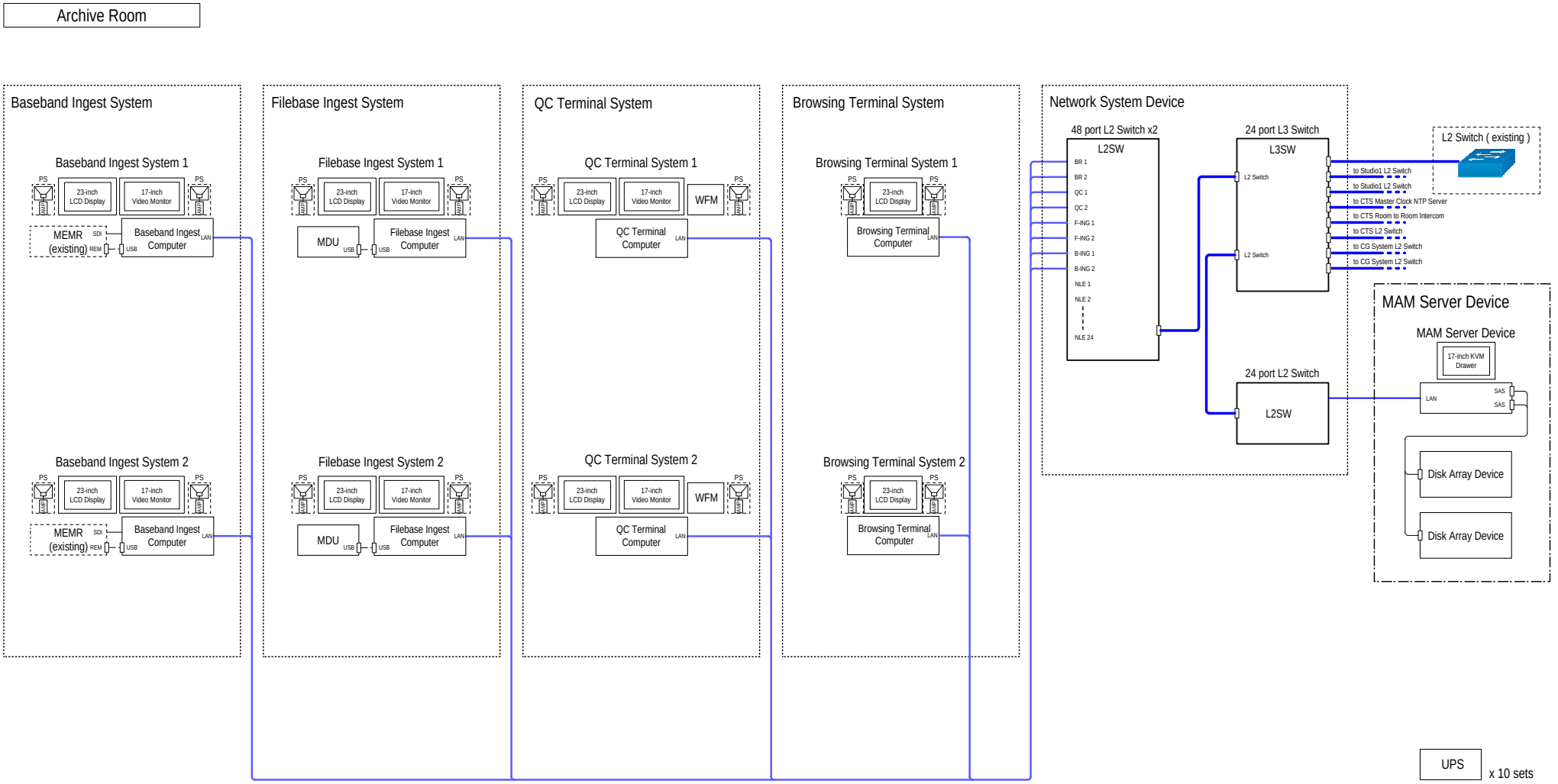
Drawing-15: <YBC> Block Diagram of Computer Graphics System



[Abbreviation]

CTS: Contents Transmission System

Drawing-16: Archive Room Layout



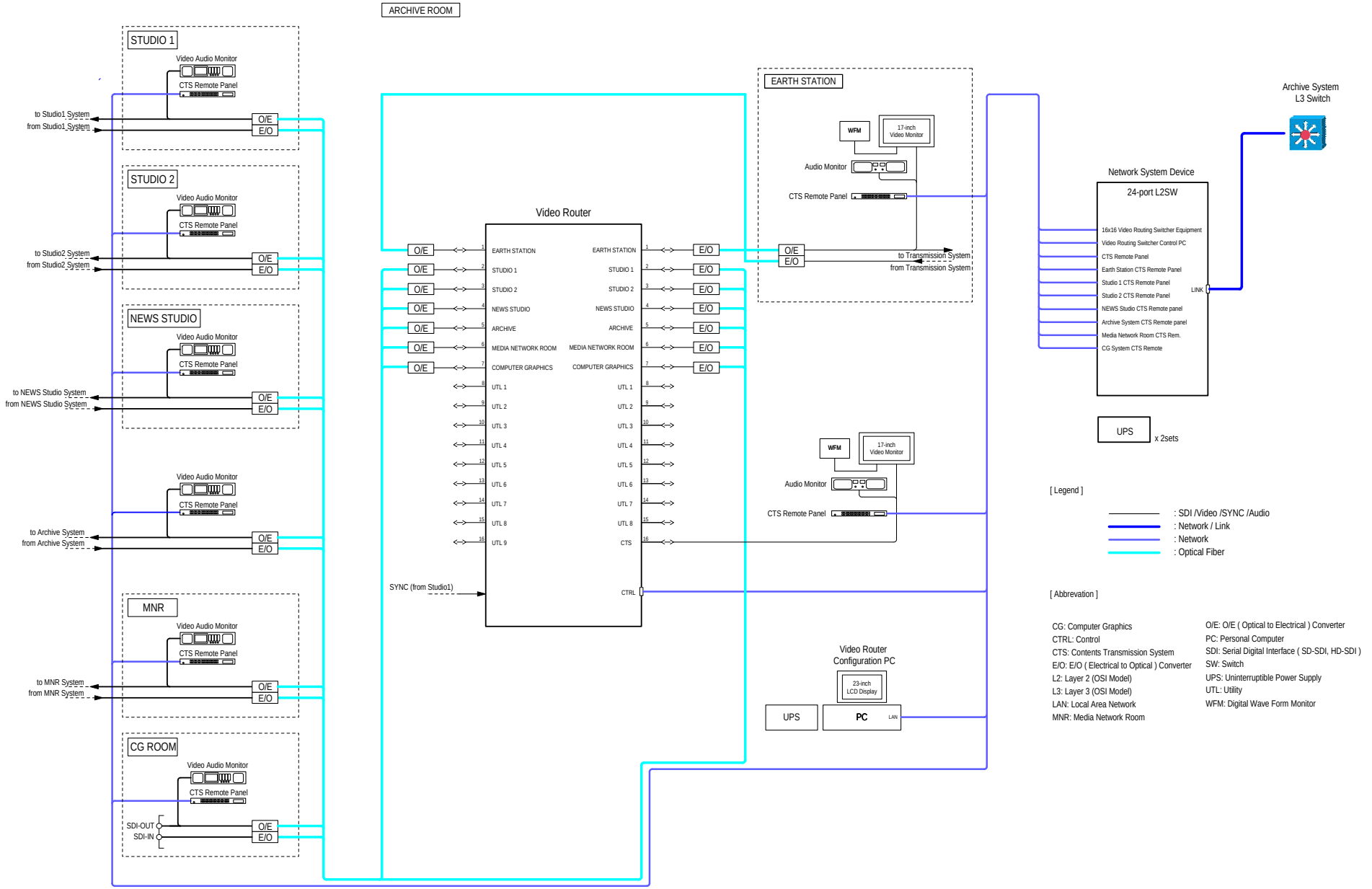
[Legend]

: Network (Link)
: Network
: SDI / HDMI / SAS
: Control

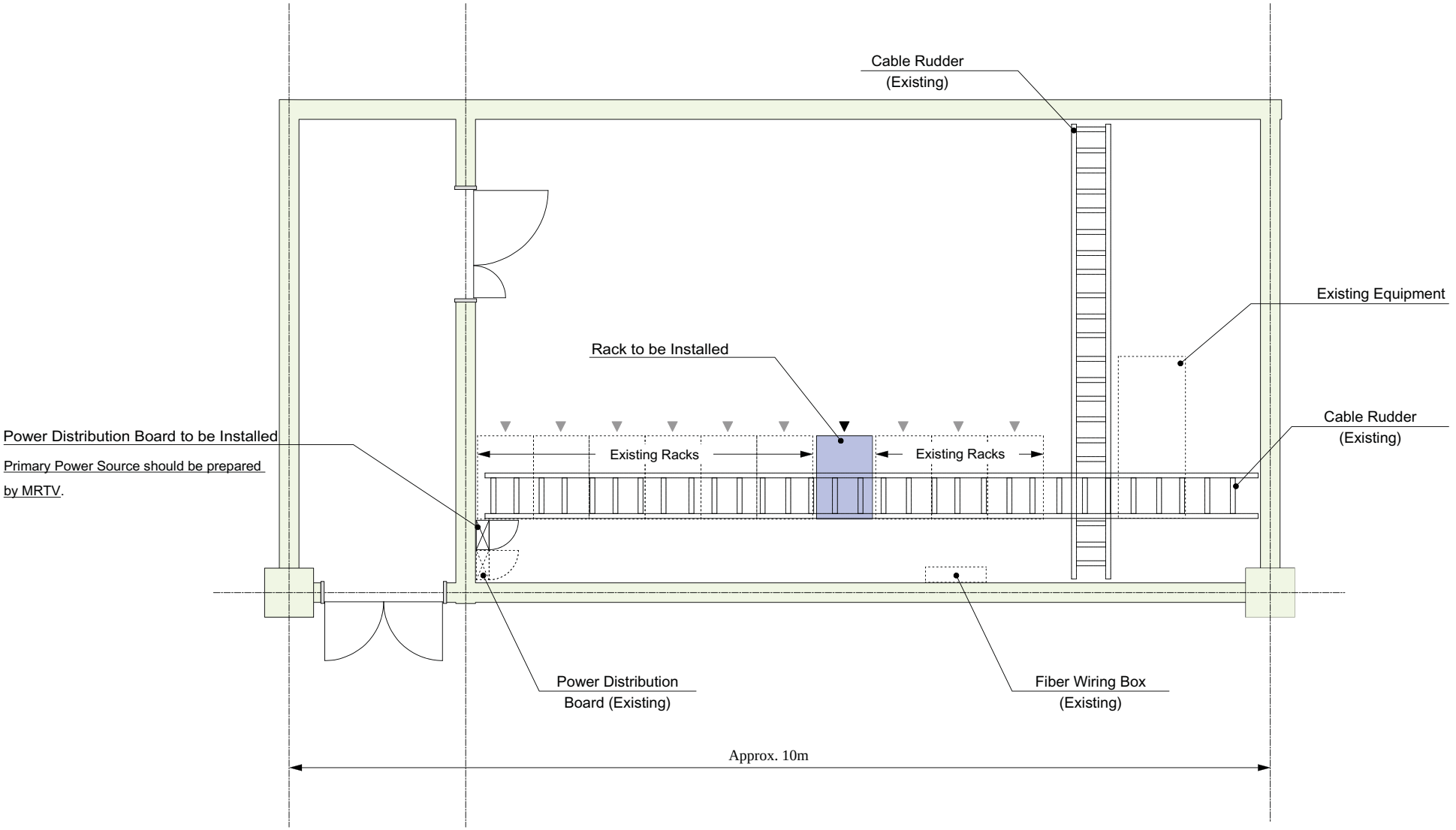
[Abbrevation]

AMP: Amplifire
BR: Browsing
B-ING: Baseband Ingest
CG: Conputer Graphics
F-ING: File Ingest
KVM: Keyboard, Video, Mouse switch
L2: Layer 2
L3: Layer 3
LAN: Local Area Network
MAM: Media Asset Management
MEMR: Memory Recorder
MDU: Memory Drive Unit
NLE: Non Linear Editing System
PS: Powerd Speaker (Active Speaker)
QC: Quality Check
SAS: Serial Attached SCSI
SDI: Serial digital Interface
UPS: Uninterruptible Power Supply
WFM: Digital Wave Form Monitor

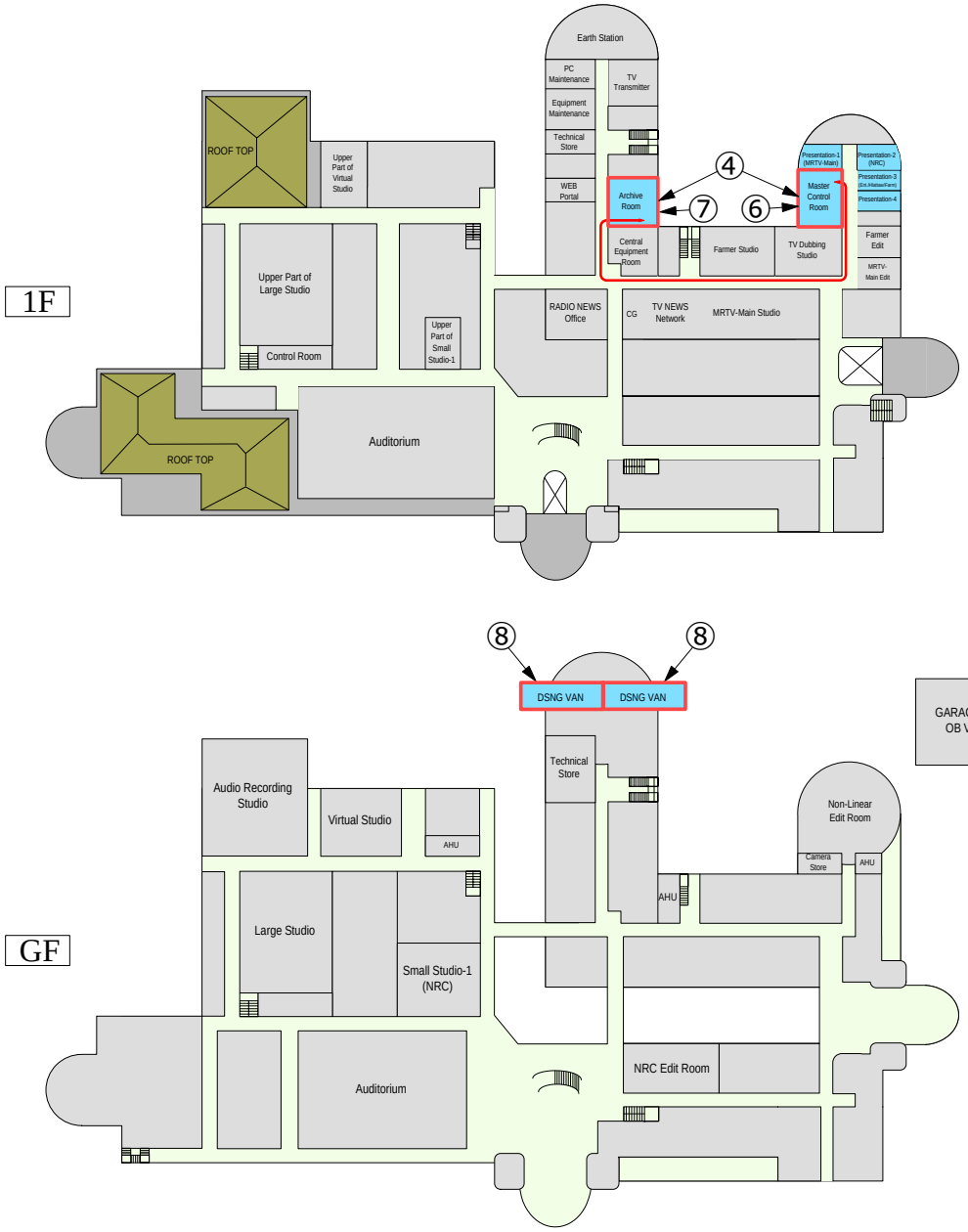
Drawing-17: <YBC> Block Diagram of Archive System



Drawing-18: <YBC> Block Diagram of Contents Transmission System



Drawing-19: <YBC> Earth Station Room Layout



SYS No.	System	Location
④	Archive System	Master Control Room, Archive Room
⑥	Contents Network System	Master Control Room
⑦	Format Conversion System	Archive Room
⑧	Digital SNG-VAN	Digital SNG-VAN Garage

[Legend]

Wiring Routes between Rooms

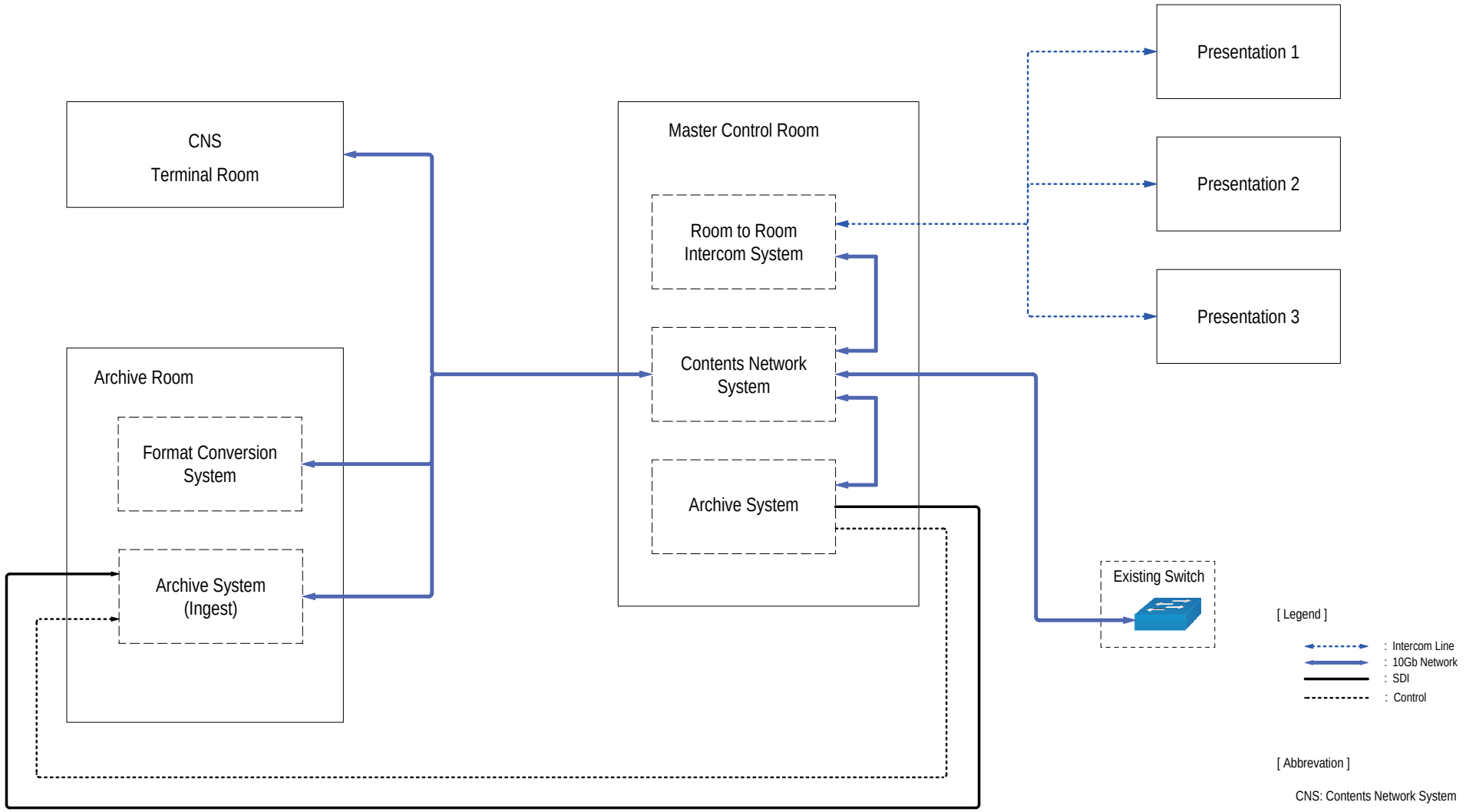
Places Related to the Project

[Abbreviation]

AHU : Air Handling Unit

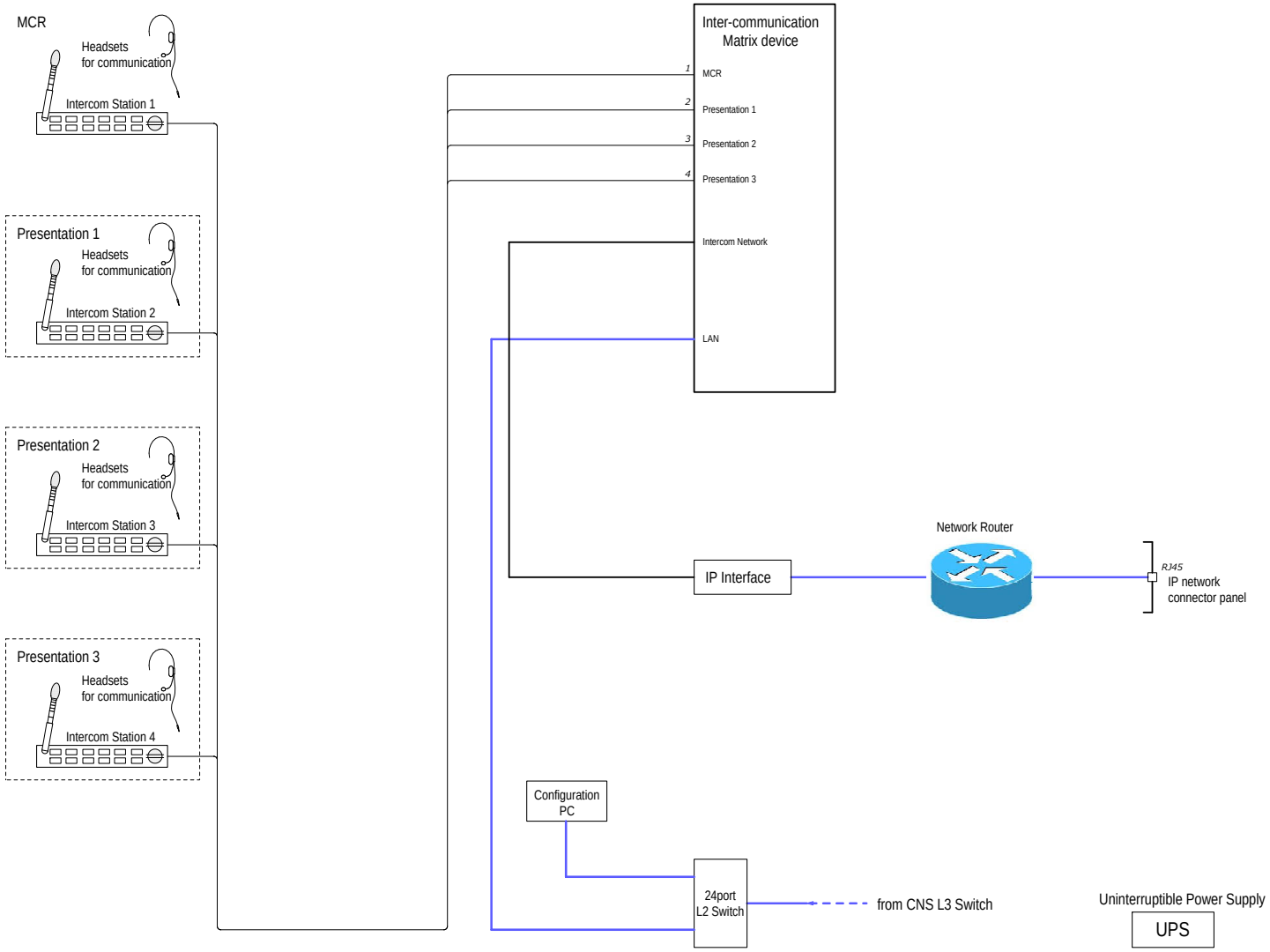
NRC : National Races Channel

Drawing-20: <NBC> Room for Installation of Planed Equipment



Drawing-21: <NBC> Overall Block Diagram of Audio/Visual/Network System

Master Control Room



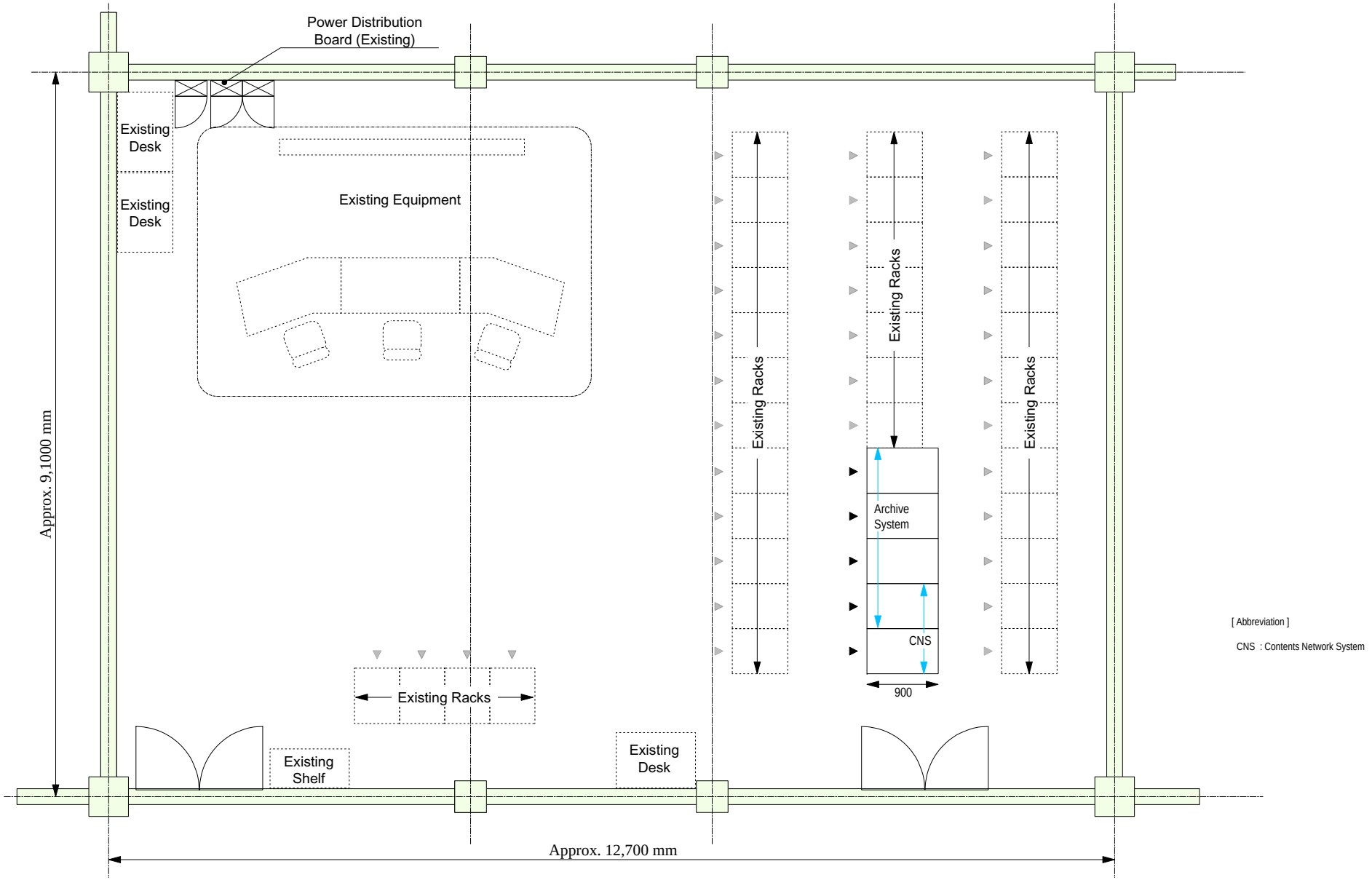
[Legend]

: Intercom Dedicated Line
: Ethernet Network

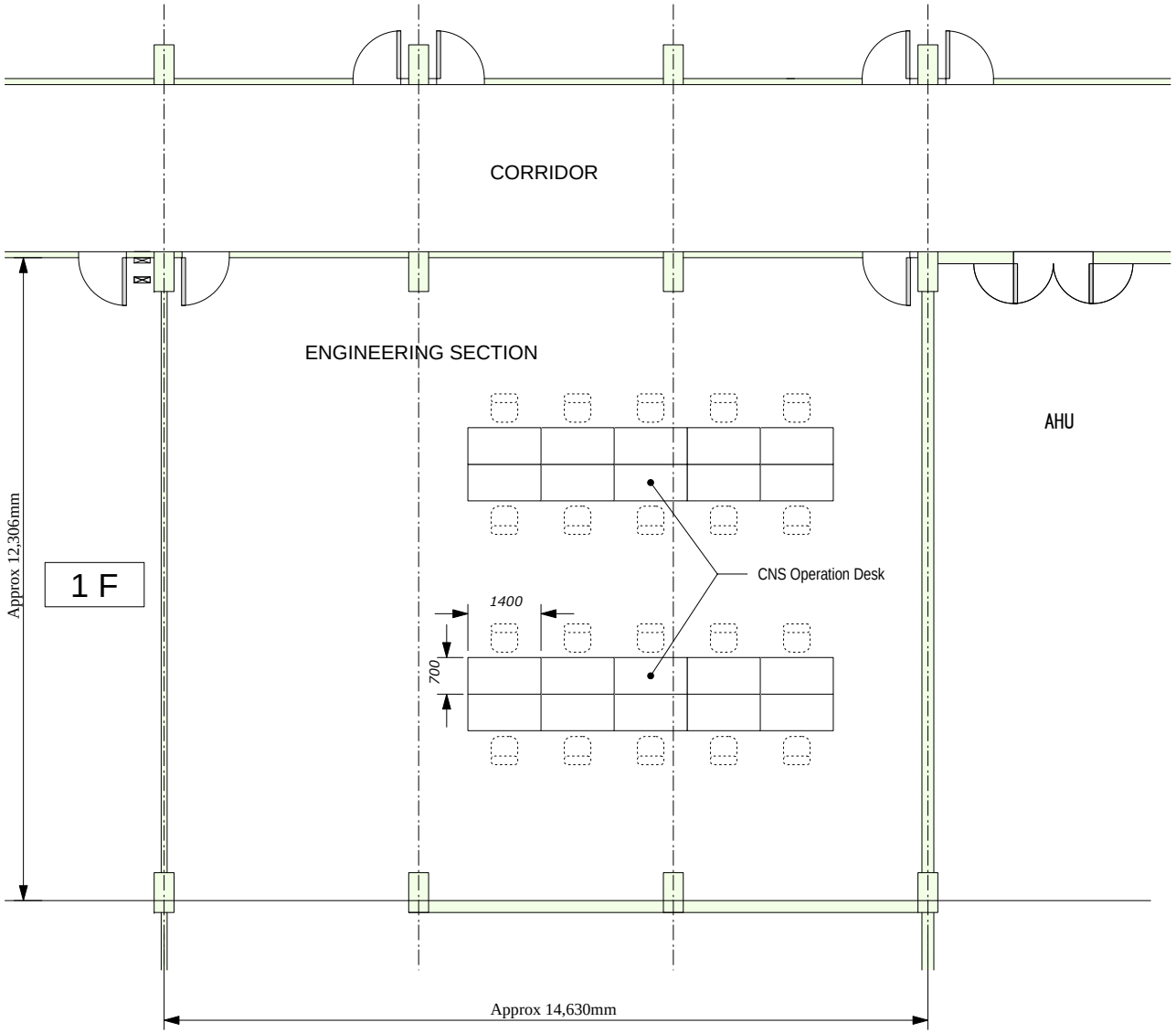
[Abbrevation]

CNS: Contents Network System
IP: Internet Protocol
L2: Layer 2
PC: Personal Computer

Drawing-22: <NBC> Block Diagram Room to Room Intercommunication System



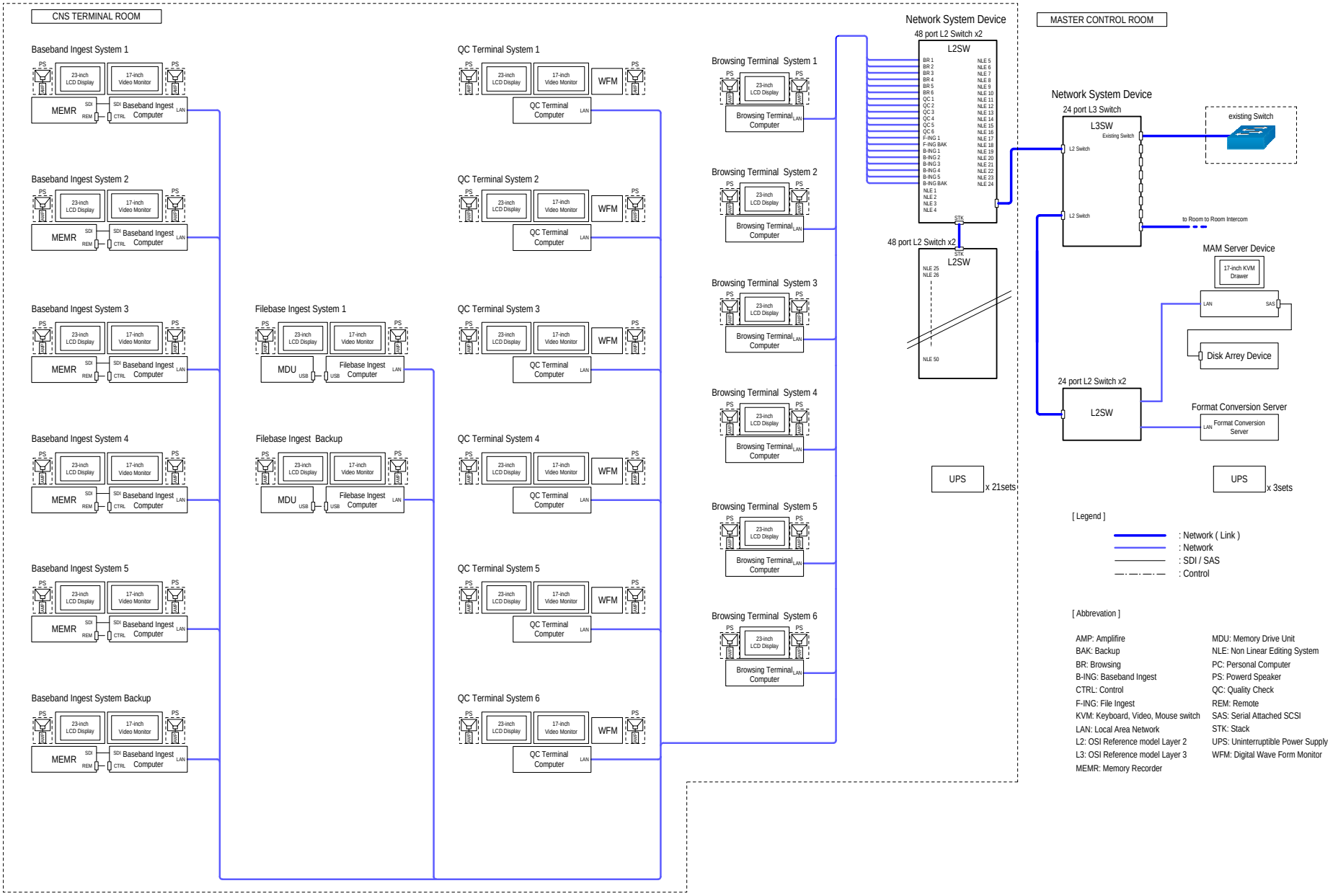
Drawing-23: <NBC> Master Control Room Layout



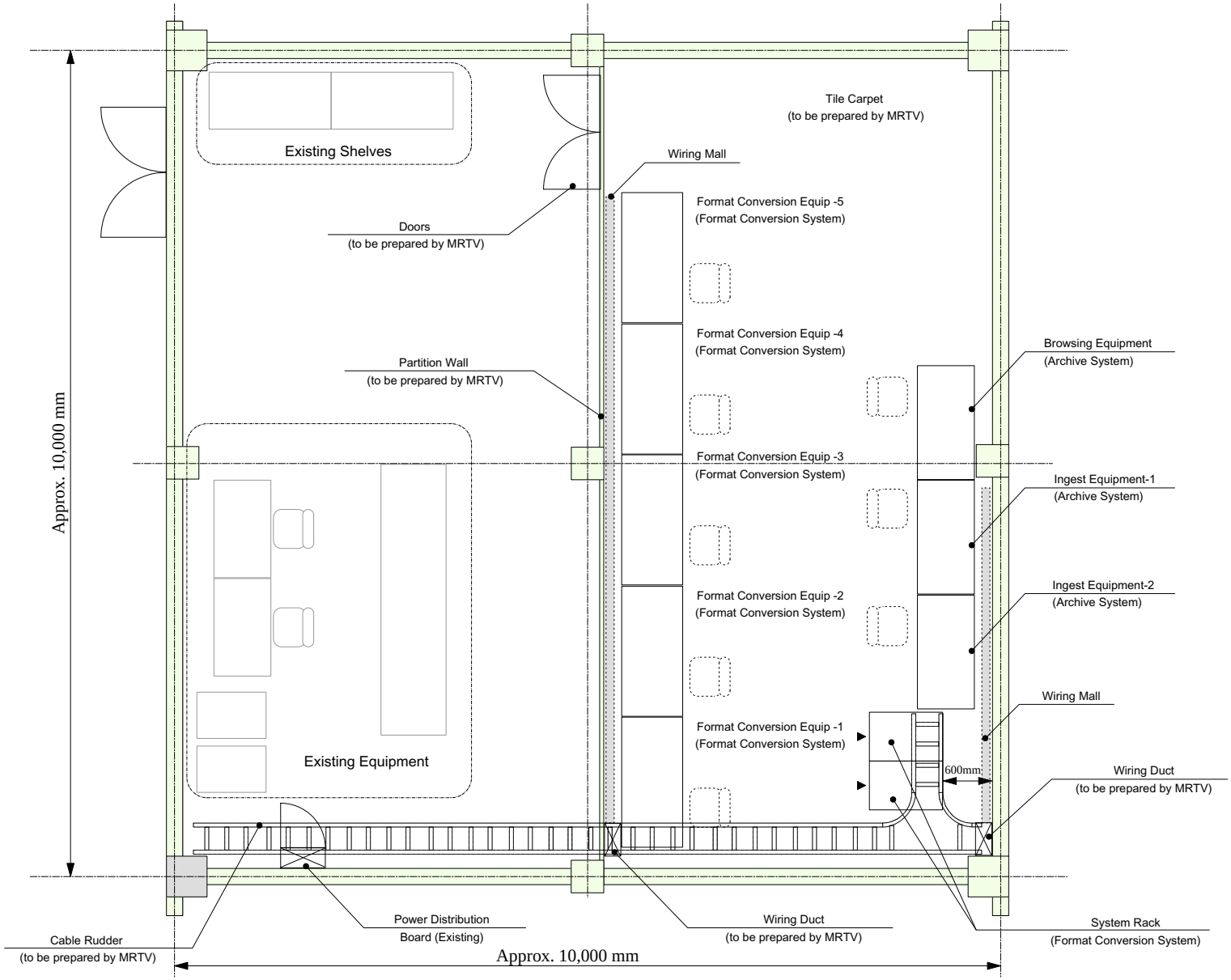
[Abbreviation]

AHU : Air Handling Unit
CNS : Contents Neteork System

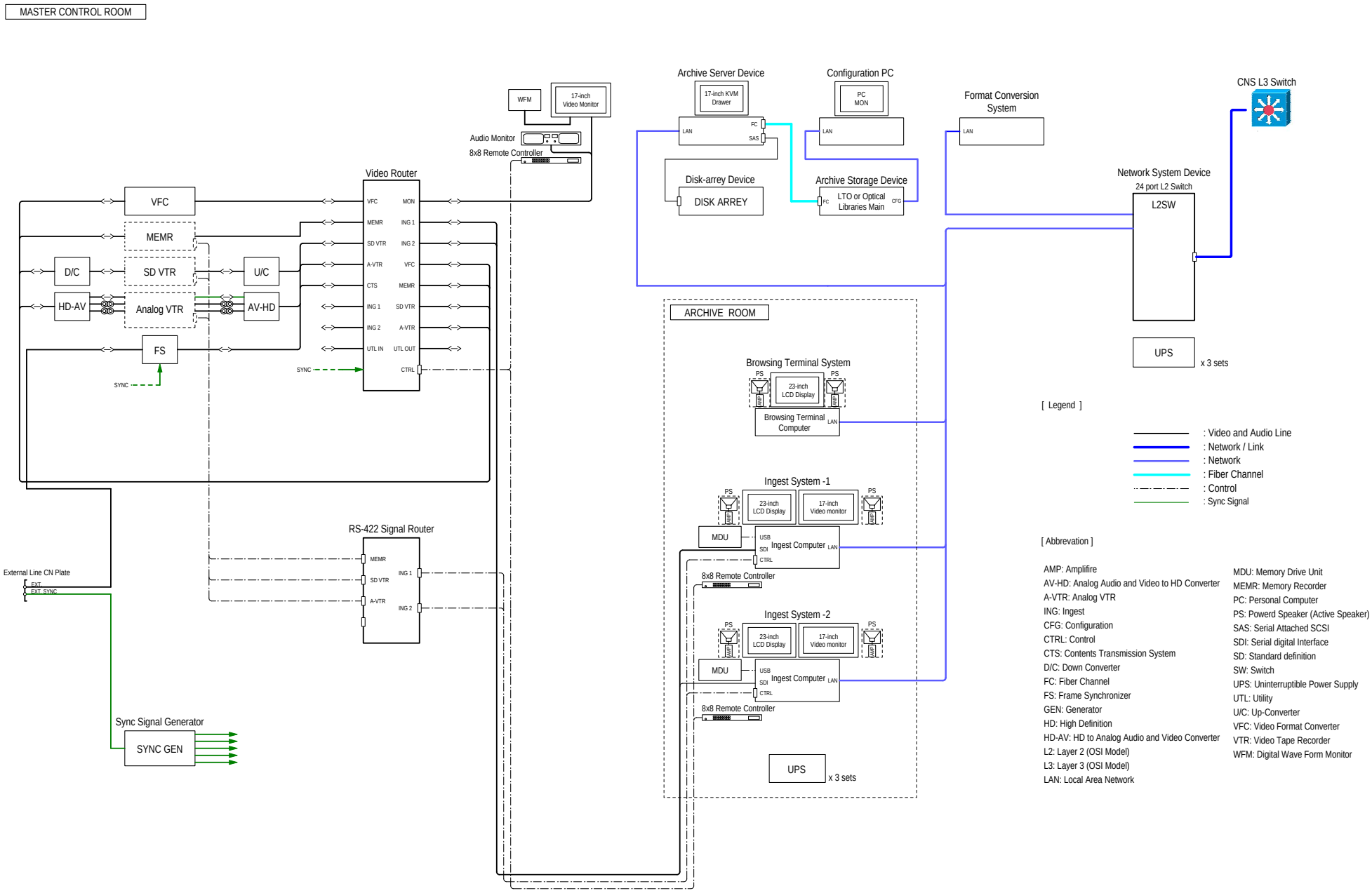
Drawing-24: <NBC> Contents Network System Layout



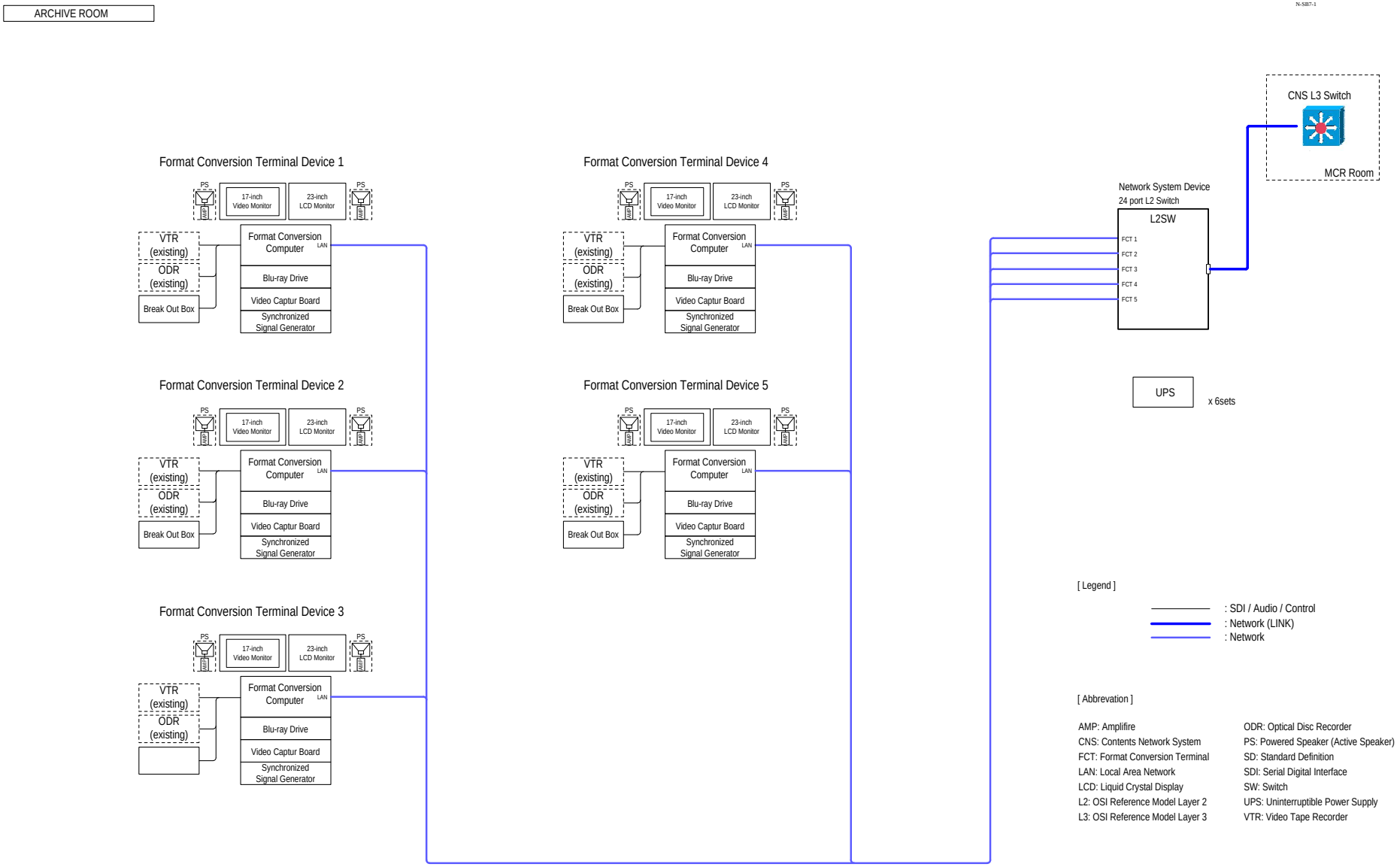
Drawing-25: <NBC> Block Diagram of Contents Network System



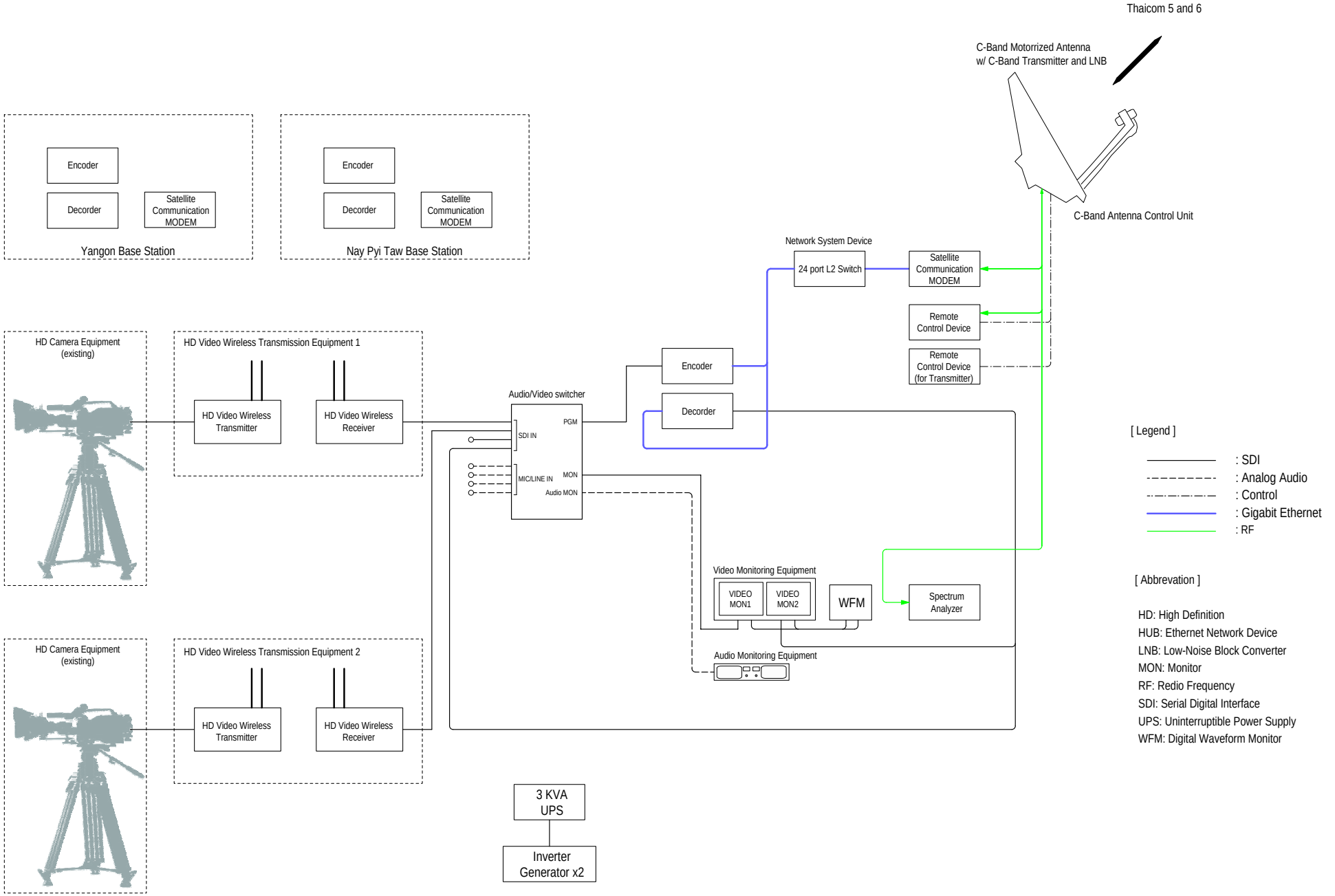
Drawing-26: Archive Room Layout in Nay Pyi Taw Station



Drawing-27: <NBC> Block Diagram of Archive System



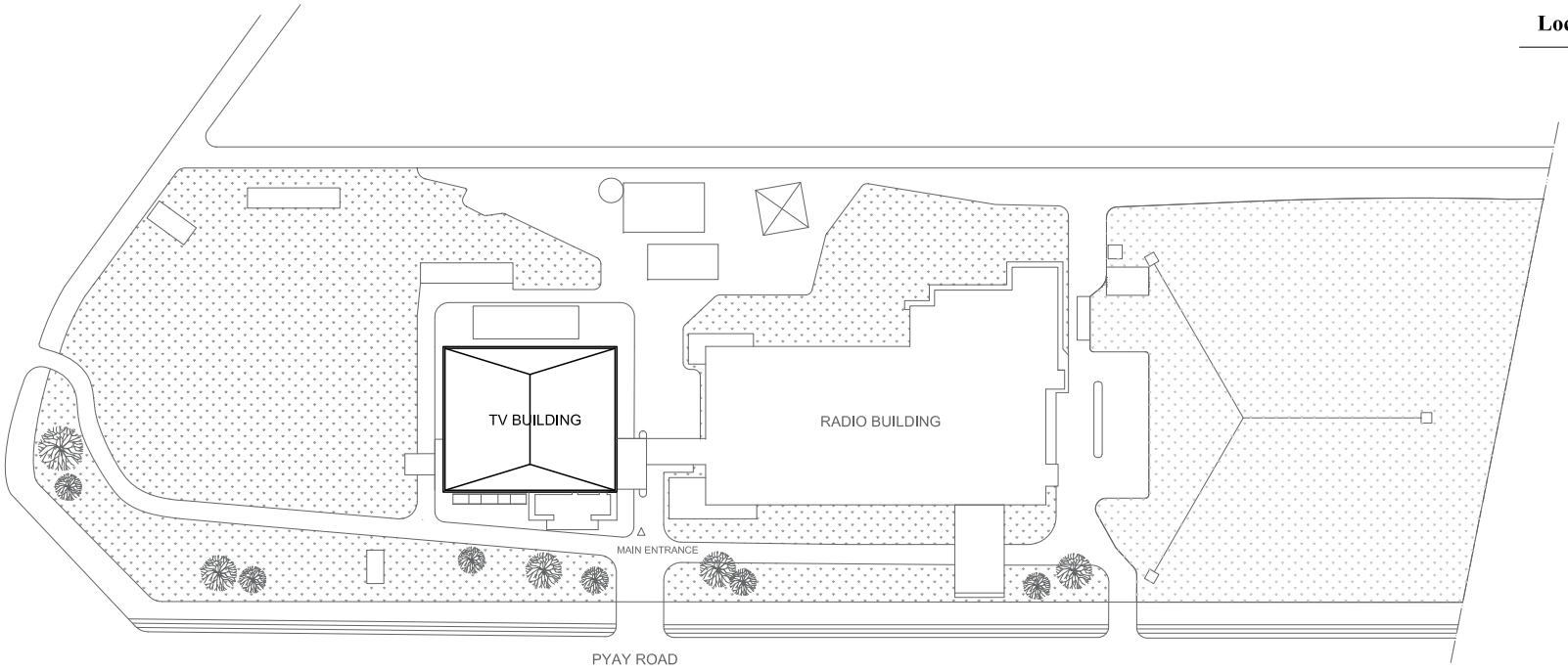
Drawing-28: <NBC> Format Conversion System



Drawing-29 <YBC/NBC> Block Diagram of DSNG-VAN

Myanma Radio and Television, YBC
(Source: wikimapia)

Location Map



Site Layout Plan

Drawing-30: <YBC> Building Renovation Drawing-1 (Site Map & Site Layout Plan)

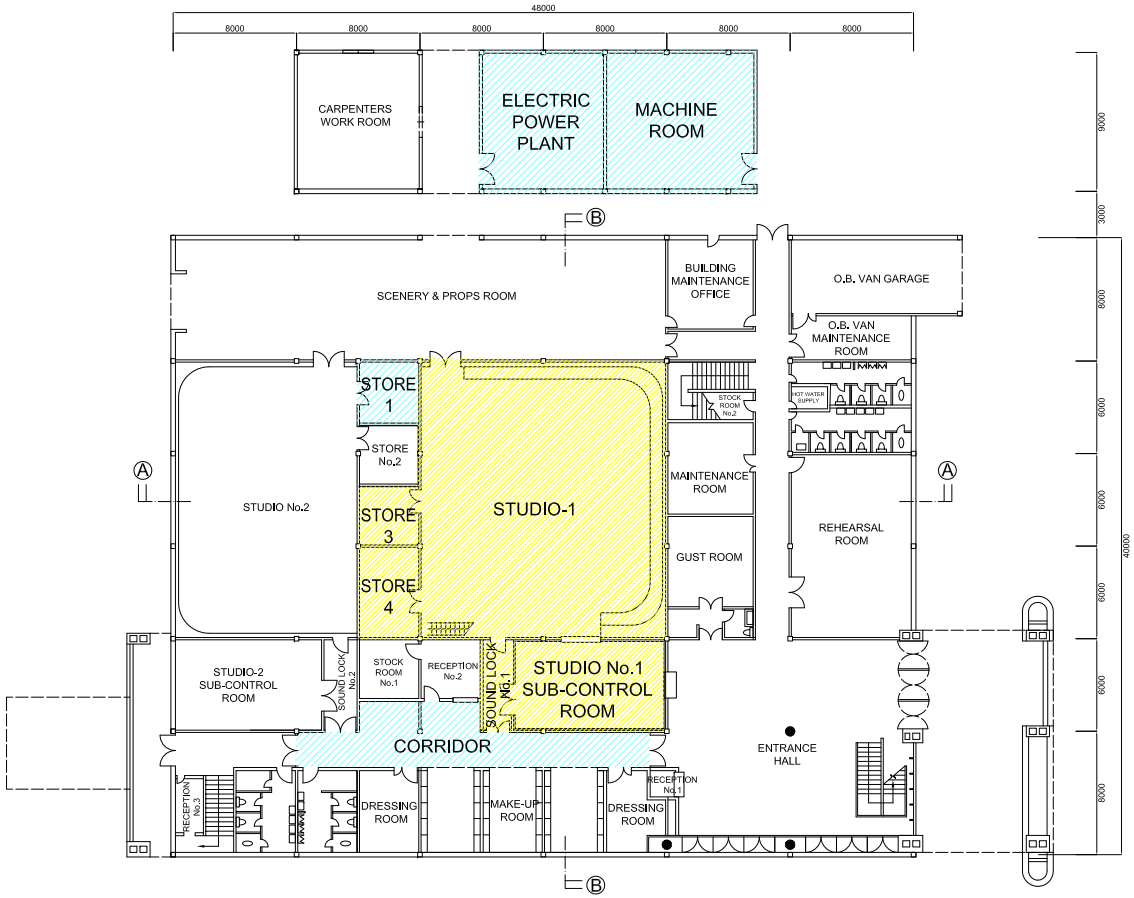
Studio No.1	[Outline] Floor Area: 288m^2, Ceiling Height: 8m
Contents of Renovation	
Floor	300x300mm PVC floor tiles after removal of the existing vinyl tile and repairing of the underlying mortar
Skirting	Repainting with oil paint (OP) after underlying adjustment
Wall	Cyclorama: Repainted after cleaning the surfaces Below the ceiling: Soundproof materials comprising glass wool, polyethylene film, grass cloth, wired mesh, etc. completely renewed Above ceiling: Repainting with synthetic resin emulsion paint (EP) after underlying adjustment
Ceiling	Safety net on the grid ceiling renewed (powder coating)
Others	Catwalk renewed and reinforcement of opening for operation panel of motorized batten rigging system
Eqpt. Related Work	Provision of wiring duct and cable tray for studio lighting system, ceiling lights changed to LED lighting fixtures

Sub-Control Room No.1	[Outline] Floor Area: 57m^2, Ceiling Height: 2.7m
Contents of Renovation	
Floor	500x500mm tile carpet flooring on free access floor (150mm in height) after removal of the existing vinyl tile, 300x300mm PVC floor tile flooring only for the portion of the entrance door opening
Skirting	Repainting (OP) after underlying adjustment
Wall	Wooden rib finish (clear lacquer applied) on glass cloth finished glass wool base layer for wainscot and glass wool board finish on upper side of the walls
Ceiling	Rockwool board ceiling, grass wool laying in the false ceiling
Others	Equipment rack enclosed be light gauge steel partitions with a access door
Eqpt. Related Work	Ceiling lights changed to LED lighting fixtures and relocation of air-intake and exhaust grilles for air-conditioning system

Sound Lock No.1	[Outline] Floor Area: 15m^2, Ceiling Height: 2.4m
Contents of Renovation	
Floor	300x300mm PVC floor tiles after removal of the existing vinyl tile and repairing of the underlying mortar
Skirting	Repainting (OP) after underlying adjustment
Wall	Repainting (OP) after underlying adjustment
Ceiling	Repainting (EP) after underlying adjustment

Store No.3, No.4	[Outline] Store No.3 Floor Area: 16m^2, Ceiling Height: 3m Store No.4 Floor Area: 24m^2, Ceiling Height: 3m
Contents of Renovation	
Floor	300x300mm PVC floor tiles after removal of the existing vinyl tile and repairing of the underlying mortar
Skirting	Repainting (EP) after mortar base adjustment
Wall	Repainting (EP) after mortar base adjustment
Ceiling	Repainting (EP) after mortar base adjustment

Renovation of Building Equipment	
Store No. 1 & Corridor	Renewal of indoor hydrant box and piping
Machine Room in Annex.	Renewal of fire pump and piping for indoor hydrant system
Power Plant in Annex.	Expansion of transformer for studio lighting system including electrical wiring to Studio No. 1



Common Renovation for all the Rooms to be Renovated	
Exposed Steel Surface	Repainting with synthetic resin oil painting (SOP) after material surface adjustment, applied for steel stair, steel doors, handrails, etc.
Exposed Wooden Surface	Repainting (OP) after material surface adjustment, wooden door frame etc.
Common for all the Existing Room	
Building Equipment	Renewal of automatic fire alarm system

: Rooms for renovation of interior finishes
: Rooms for renovation of building equipment

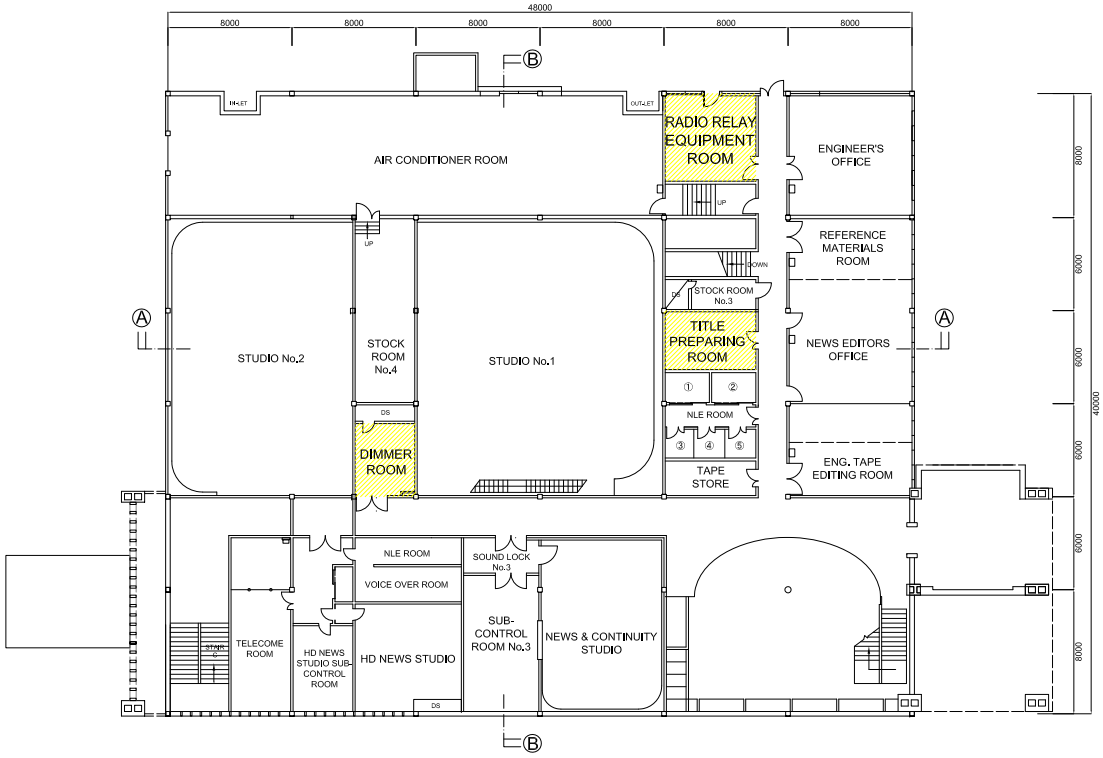
Drawing-31: <YBC> Building Renovation Drawing-2 (Ground Floor Plan)

Rectifier Room (Dimmer Room)	[Outline] Floor Area: 24m^2, Ceiling Height: 3m
Contents of Renovation	
Floor	300x300mm PVC floor tiles after removal of the existing vinyl tile and repairing of the underlying mortar
Skirting	Repainting (EP) after mortar base adjustment
Wall	Repainting (EP) after mortar base adjustment
Ceiling	Repainting (EP) after mortar base adjustment
Eqpt. Related Work	Relocation of air-intake/exhaust grilles and thermostat for air-conditioning system

Radio Relay Equipment Room (to be utilized as “Archive Room”)	[Outline] Floor Area: 34m^2, Ceiling Height: 3m
Contents of Renovation	
Floor	500x500mm tile carpet flooring on free access floor (100mm in height) after removal of the existing vinyl tile, 300x300mm PVC floor tile flooring only for the portion of the entrance door opening
Skirting	Repainting (EP) after mortar base adjustment
Wall	Repainting (EP) after mortar base adjustment
Ceiling	Repainting (EP) after ceiling board surface adjustment
Eqpt. Related Work	Relocation of air-intake/exhaust grilles and thermostat for air-conditioning system

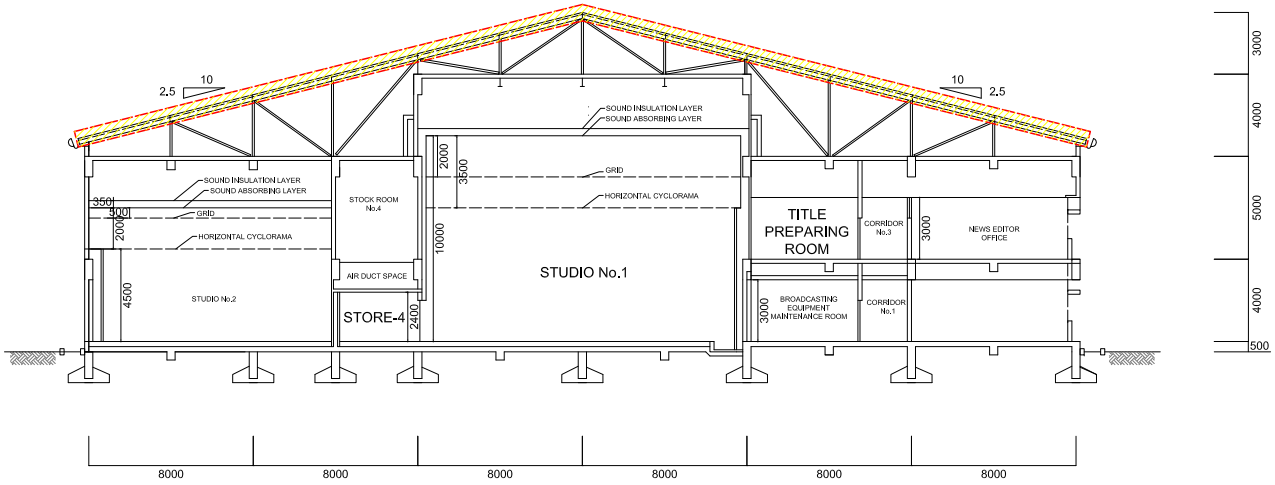
Title Preparation Room (to be utilized as “Computer Graphics Room”)	[Outline] Floor Area: 22m^2, Ceiling Height: 3m
Contents of Renovation	
Floor	500x500mm tile carpet flooring on free access floor (100mm in height) after removal of the existing vinyl tile, 300x300mm PVC floor tile flooring only for the portion of the entrance door opening
Skirting	Repainting (EP) after mortar base adjustment
Wall	Repainting (EP) after mortar base adjustment
Ceiling	Repainting (EP) after ceiling board surface adjustment
Eqpt. Related Work	Relocation of air-intake/exhaust grilles and thermostat for air-conditioning system

Common Renovation for all the Rooms to be Renovated	
Exposed Steel Surface	Repainting with synthetic resin oil painting (SOP) after material surface adjustment, applied for steel stair, steel doors, handrails, etc.
Exposed Wooden Surface	Repainting (OP) after material surface adjustment, wooden door frame etc.
Common for all the Existing Room	
Building Equipment	Renewal of automatic fire alarm system

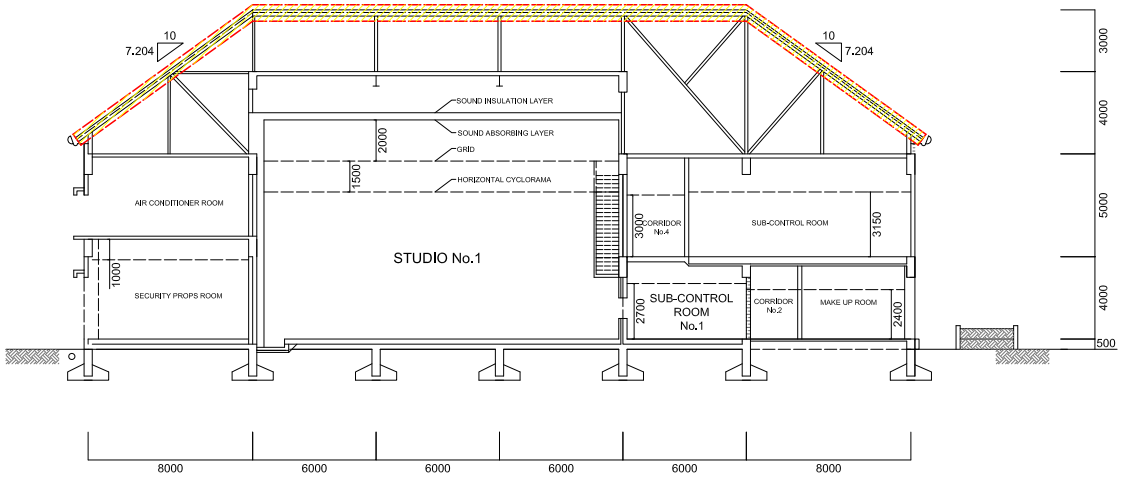


: Rooms for renovation of interior finishes

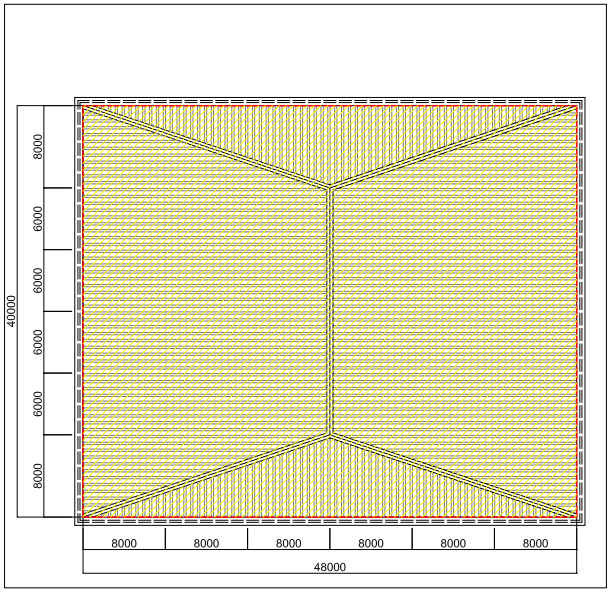
Drawing-32: <YBC> Building Renovation Drawing-3 (First Floor Plan)



A-A Section



B-B Section



Roof Plan

: Portion to be renovated

[Renovation]
All the aged existing steel roofing sheet are to be removed and provided with new galvalume ribbed steel sheet. As for the base of the roofing, existing steel truss are to be re-used.

Drawing-33: <YBC> Building Renovation Drawng-4 (Section & Roof Plan)

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Project Implementation System

1) Implementation Procedure

The Project will be implemented according to the framework of the grant aid scheme of the Government of Japan (GOJ). Once the Project is approved by the cabinet of Japan, an Exchange of Notes (E/N) will be signed between the GOJ and the Government of Myanmar (GOM). Following the E/N, a Grant Agreement (G/A) will be concluded between the GOM and the Japan International Cooperation Agency (JICA) to define the necessary provisions for implementing the Project, such as payment conditions, responsibilities of GOM and procurement conditions. Following the G/A, the project implementing agency, MRTV shall conclude an agreement with the Japanese consultant recommended by JICA (hereinafter referred to as "the Consultant"), which shall then enter into the detailed design for the project components and draw up tender documents.

After approval for the tender documents prepared by the Consultant has been obtained from MRTV and JICA, a tender calling for Japanese trading companies or manufacturers will be announced. The tender documents will then be distributed to prospective tenderers via public tender notice and the tender will be conducted for the equipment procurement. The tender works for the Project up to the signing of the contract shall be implemented in Japan. Meanwhile, the consultant agreement is normally concluded in the recipient country, i.e. in Myanmar.

The contractor selected by the tender (hereinafter referred to as "the Supplier") shall manufacture, ship and install the equipment under supervision of the consultant. Sequentially from the equipment, namely its installation, running test and adjustment, the Consultant shall join the inspectors of the MRTV in performing an acceptance test and inspection. Upon completion of the acceptance test and inspection, the Supplier shall implement initial operation guidance and operational training for the selected MRTV engineers and on completion of this guidance and training, once all the work necessary for the Project has been completed and following a move to handover formalities.

2) Role of Each Organization Concerning the Project

① JICA

JICA is the agency responsible for promoting the implementation of grant aid projects in general by the GOJ and the funds for the Project will be provided through JICA. The Project will be implemented after conclusion of G/A, following the conclusion of E/N. The agreement concluded between MRTV and the Consultant (hereinafter referred to as "the Agreement") and the contract concluded between MRTV and the Supplier (hereinafter referred to as "the Contract") for the Project must be verified by

JICA and both the Agreement and Contract shall take effect after verification by JICA. During each payment for the Consultant and Supplier, JICA's approval is also required, even when the Agreement/Contract has been verified.

② Project Execution Agency (MRTV)

The competent authority of the Project is the Ministry of Information (MOI) and the project execution agency is MRTV. To implement the Project, MRTV is requested to fully understand the grant aid mechanism of the Japanese Government. In addition, to facilitate the Project, MRTV is also requested to maintain close contact with higher authorities in Myanmar such as the Ministry of Planning and Finance, etc. as well as related organizations on the Japan side, such as JICA and the Embassy of Japan in Myanmar. Close communications such as this with project-related organizations allow MRTV to oversee the appropriate business adjustment throughout the Project. The competent authority of MRTV, the Ministry of Information, is also requested to maximize cooperation for MRTV in terms of ensuring a budget to enable the works and expenses on the Myanmar side during the implementation of the Project and proper operation and maintenance on its completion. The main items to be implemented by MRTV and MOI are as follows:

- Ensuring budget application and securing the required budget for the Myanmar side in compliance with the entire Project implementation schedule
- Confirmation of the agent band in Myanmar for Banking Arrangement (B/A), selection of the agent bank in Japan and management to accelerate the conclusion of B/A[6], immediately after concluding a G/A with JICA
- Issuance of Authorization to Pay (A/P) to each counterparty of the Consultant Agreement and the Contract for equipment procurement and installation, immediately after verification of the Agreement and Contract, respectively
- Completion of works to be performed by the Myanmar side within the deadlines conforming to the implementation time schedule
- An appropriate response to the procedures to be carried out on the Myanmar side, such as payment of customs clearance charges, etc.
- Determining and liquidating the approval or licensing required in Myanmar to implement the Project and provide information and adjusting to the Japanese Consultant/Supplier if such formalities relate to them

③ Consultant

Following the conclusion of an Agreement with MRTV and verification of the same by JICA, the Consultant shall implement survey and discussions concerning the contents

6 There is a possibility that the Myanmar Foreign Trade Bank (MFTB), normally nominated as the agent bank in Myanmar, will conclude a B/A with a Japanese bank without any confirmation with MRTV. Since a Japanese banker's commission for issuing A/P may become a major burden for the project execution agency, both MRTV and MOI should take the initiative to select the Japanese agent bank irrespective of MFTB discretion.

of the detailed design with MRTV and then commence the detailed design according to this preparatory survey report. The Consultant shall compile the findings of the detailed design into the design drawings and specifications and also prepare tender documents, including instructions to tenderers, a draft contract, general conditions of contract and other tender-related documents and obtain approval thereof from MRTV and JICA.

During the tender stage, the consultant shall act on behalf of MRTV in carrying out all tender affairs up to the signing of the Contract between MRTV and the Supplier, including the announcement of tender, distribution of tender documents, response to inquiries, opening of tender, contract negotiations and so on. Moreover, during the supervision stage of the Project, the consultant shall implement all supervisory services, from equipment procurement through to installation, equipment adjustment and handover.

In light of specific constraints on the Project, whereby building renovation work and installation of equipment have to be carried out in parallel with broadcast operations in both YBC and NBC and given that wide-ranging pieces of equipment – more than 1,000 sets - are to be introduced, controlling and adjusting the overall implementation time schedule, including the preparatory work to be carried out by MRTV, is one of the key services of the Consultant.

④ Supplier

As for the Supplier who undertakes the equipment procurement and its installation work, it is common to select from Japanese general trading companies or Japanese manufacturers with ample experiences in the field. The eligibility conditions for equipment suppliers are specified in the tender notice and the successful bidder suitable for the supplier is to be determined via public tender procedures. The Supplier shall complete such works within the contract period as procurement of the equipment according to the specifications prepared by the Consultant, transportation of the equipment to the Project sites, installation and adjustment of all the equipment and provision of oration guidance for the equipment, etc. When handing over the equipment, the Supplier shall submit as-built drawings and operation and maintenance manuals to MRTV and even on completion of the Project, such after-care services as supply for spare parts (five years) and as required when the equipment fails.

Summing up the above, the relationship among responsible organizations for the Project as well as Japanese firms providing consultant services and procuring and installing of the planned equipment can be graphically represented as shown in Fig. 2-12 below.

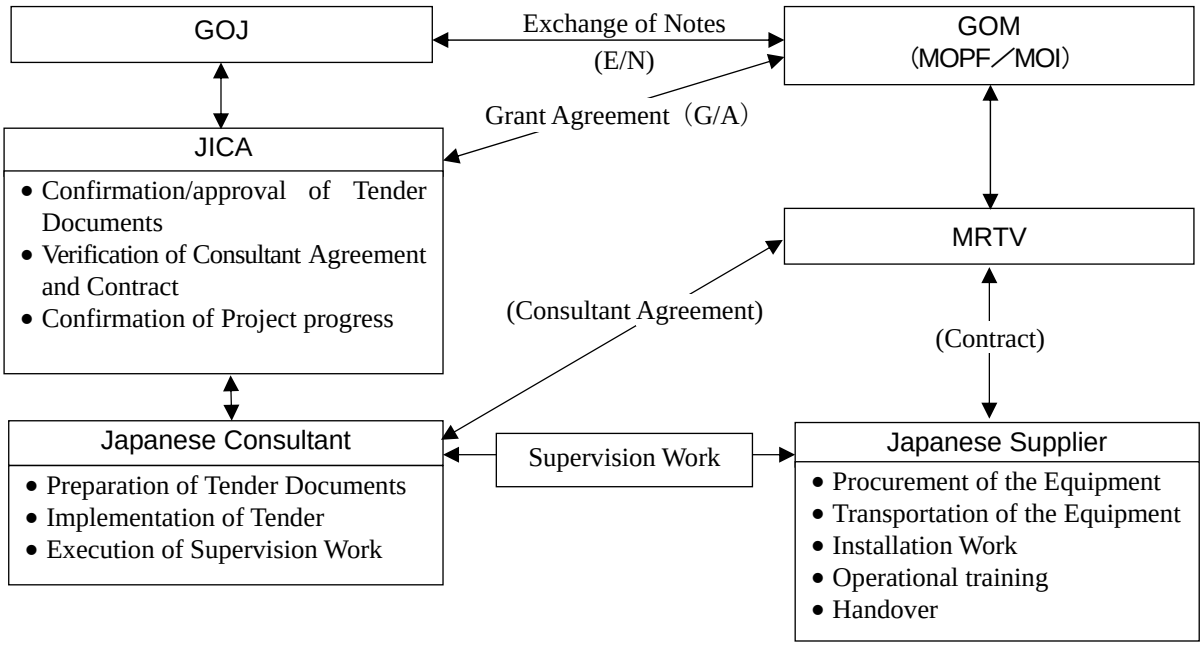


Fig.2-12 Roles and Relations of Each Party for the Project

(2) Procurement Management

1) Procurement Management Personnel Plan

The equipment installation for the Project will start from the studio lighting system of YBC and once this installation is complete, all other equipment will be installed in YBC and NBC simultaneously. Therefore, the Supplier must assign Japanese managers in each site to manage and control the YBC and NBC installation work. Managers for each site should preferably have experience of similar broadcasting equipment installation work as engineers or ample experience of Japanese grant aid projects as project managers.

Renovation of the YBC TV building, which is set to commence prior to equipment installation work, requires a high building quality to maintain the environmental conditions in which to operate the state-of-the-art broadcasting equipment. Accordingly, other than equipment installation managers, persons qualified as construction managers and with ample work experience in the construction field should be selected. Since renovation of the building includes building equipment renovation works, electrical engineers are also periodically dispatched to manage such work. The dispatch periods for these managerial staff are estimated as follows:

- Manager of equipment installation for YBC[7] 5.5 months
- Manager of equipment installation for NBC 4.0 months
- General manager of building renovation 5.0 months

7 Installation of the studio lighting system in YBC is to be performed during the last six weeks of the building renovation period, so that installation of equipment in YBC takes longer than that for NBC.

- Manager of building equipment renovation Twice, 1.0 month in total

2) Necessity of Engineer's Dispatch

All the system equipment introduced for the Project is to be assembled in Japan after procuring the components in Japan or in third countries and, once assembled, the equipment must once again be subdivided into parts as required and transported to the Project sites. On delivery, the equipment must then be reassembled and adjusted. This reassembly and installation must be carried out using the equipment manufacturer's specific expertise. Moreover, after installation, a high technical level is required to adjust and test/inspect the equipment, as well as guidance in handling each piece of equipment and operational training, in which the manufacturer's own specification are very much reflected and required for handing over the equipment. With these circumstances in mind, the dispatch of manufacturer's engineers is inevitable and those engineers shall carry out their specific works targeting a technical transfer to MRTV engineers. It should be noted that MRTV's engineers have already obtained operation and maintenance technology of the equipment of a certain grade and there seem to be no technical problems related to maintenance. However, MRTV's engineers are considered unaccustomed to the latest equipment to be introduced for the Project, so that approximately five weeks of operational training in YBC is planned, mainly for video-related equipment and approximately three weeks of operational training in NBC, mainly for ICT network system equipment.

(3) Use of the Local Consultants/Contractors or Suppliers

As the work to install the equipment requires high technology, it is carried out by Japanese engineers to be dispatched from each equipment manufacturer. Accordingly, skilled engineers from the local supplier are limited to workers that assist the Japanese engineers. However, for building renovation work, local construction companies will be mobilized under the supervision of a Japanese Supplier, since almost all the building and equipment materials can be procured in Myanmar, including imported materials and reflecting the relatively small-scale contents of the building renovation compared to the scale of the procured equipment. As specified previously, the purpose of the building renovation is to ensure state-of-the-art equipment is introduced for the operational environment, hence the Supplier is requested to prepare elaborate renovation shop drawings that match the equipment layout. In general in Myanmar, local construction contractors are not accustomed to preparing such shop drawings and entrust a local consultant to do so. When preparing the shop drawings, since the details must be adjusted in line with equipment placement requests, there are plans to employ architectural and electrical equipment design engineers from a local consulting firm to create the drawings as the main purpose. Other than these local engineers, office assistants will also be employed for work in YBC and NBC, respectively. The employment periods for these staff are estimated as follows:

- Architectural design engineer for YBC 5.0 months
- Electrical design engineer for YBC Twice, 3.0 months in total

- Office clerk for YBC 9.0 months
- Office clerk for NBC 4.0 months

2-2-4-2 Implementation Conditions

(1) Construction Planning Considering Healthy Operation of Broadcasting Center

The key aspect during the construction stage of the Project is that the work in both YBC and NBC shall proceed in the same buildings where broadcasting is underway. As for YBC, since noise and vibration are inevitably generated while renovating the building, delicate adjustment of time zones and work approaches are required through careful discussions between the manager of the Supplier and the MRTV project execution manager every week. For Studio No. 1 in particular, in which the largest renovation is required, adjacent Studio No. 2 is used by MRTV-4, while Myanmar International (MI) is producing programs in the News Studio on the first floor and coordination of the work time zone may not necessarily be with MRTV itself.

In NBC, it is expected that significant electrical adjustment, such as cutting, changing and connecting the wiring, etc. will be required to integrate the existing Content Network System already introduced in the building. If any accident were to occur and disrupt a broadcasting program, it could become a major problem and impact on the commitment of the MRTV staff. As well as YBC, sufficient study and confirmation of the status quo before starting work is also quite important in NBC.

(2) Securing of Safety Measures for the Work in High Places

Studio No. 1 in YBC has a large space and a ceiling 10 meters high. During interior renovation and when installing a studio lighting system, some works are carried out at elevation, such as changing the safety net on the grid ceiling, renewing the catwalk, working on a motorized studio lighting system with an electrical lifting device and associated wiring. Accordingly, full care should be taken to ensure safety measures for workers and avoid the risk of accidents involving slipping or falling. As for workers on the floor, wearing of helmets is mandatory as parts of the materials and tools are also likely to fall.

As for the renovation of the roof covering, it is crucial to provide sufficient scaffolding and safety treatment for workers, since work is also carried out at elevation. If an accident were to occur and roofing works were suspended, this would not only have a key impact on the subsequent installation work, but also cause water ingress into the building due to rainfall. Accordingly, the work schedule for renovating the roof covering should take full account of weather conditions.

(3) Notes for the procurement, transport and loading of the equipment

Equipment to be procured under the Project is the product of manufacturing in Japan and developed Western countries of the manufacturer, so that in light of quality assurance and strict observance of delivery times, the procurement schedule offered by the Supplier is reliable. As many of the manufacturers establish a supporting system to users keeping sales agents in YBC city, there is no hindrance in correspondence when equipment failure is observed, even during

installation work. However, close attention should be paid to packing and shipping equipment, since the latest sophisticated broadcasting equipment has to be shielded against shock and high temperature and humidity. For the Project, over 400km of inland transportation is required from the port of YBC to Tatkon, where NBC is located and loading and unloading several times throughout the transportation process, accordingly, most robust case packing (wooden framed moisture-proof packaging) is to be applied for the procured equipment.

It is fully expected that, with the implementation schedule in mind, delivery will be made during the rainy season of August or September. Accordingly, at the time of inland transportation of DSNG-VAN, instead of self-propelled transportation, transport to the final destination should be via 40-feet containers together with other equipment, to prevent any slip accident and excessive soiling affecting the vehicle.

NBC is located in a remote rural area and since its premises are wide enough, there seems to be no problem with carrying-in to the site, however, at YBC, with roads frequently congested with cars coming and going in the center of the YBC city, carrying-in to the site may be difficult. Since it seems feasible to unload the equipment on the adjacent road, MRTV is requested to study, as applicable, permission to occupy the roads for a certain period.

(4) Consideration of Security during Execution of the Work

The Japanese Supplier and Consultant shall obtain the latest security information around the Project sites and strive to ensure safety, while executing the work. In case that there is concern over security, they shall consult with MRTV and Japanese Government agencies (Embassy of Japan and JICA office in Myanmar).

2-2-4-3 Scope of Works

The work sharing of the Japanese and Myanmar sides in implementing the Project under the grant aid of the Japanese Government is shown in Table 2-3.

Table 2-3 Classification Table for the Works to be carried out by Both the Governments

Item of the Work	Japan Side	Myanmar Side
(Works for YBC)		
Removal of the existing studio lighting system and its related equipment and electrical wiring in Studio No. 1		●
Removal of the existing equipment and unused cable etc. from eight rooms to be renovated		●
Removal of the existing equipment and unused cable etc. from the Earth station		●
Removal of the slave clock device		●
Interior renovation and introduction of LED lighting fixtures in eight rooms to be renovated	●	
Renovation of the roof covering	●	
Restoration of the automatic fire alarm and indoor hydrant systems	●	
Expansion of transformer for the studio lighting system and laying cable trays and a cable ladder in Studio No. 1	●	

Item of the Work	Japan Side	Myanmar Side
Introduction of content transmission system equipment and electrical wiring to rooms of Studio No, 2, News Studio and MNR in YBC	●	
Installation of content transmission system in the rooms of Studio No. 2, News Studio and MNR and its wiring connection in YBC		●
Diversion of two sets of existing video recording and playback equipment for the new equipment for Studio No. 1		●
Diversion of two sets of HD video cameras to DSNG-VAN		●
(Works for NBC)		
Renovation of the existing Archive Room		●
Securing of space for Content Network System equipment and wiring route		●
Diversion of the existing video recording and playback equipment (one set in total) for the format conversion system		●
Diversion of four sets of HD video cameras to DSNG-VAN		●
(Common Works for YBC and NBC)		
Procurement of planned equipment, transportation and carrying-in on the Project sites	●	
Installation of the planned equipment	●	
Initial operation guidance and operation and maintenance training on completion of the installation work	●	
Securing of the primary-side power supply suitable to operate procured equipment		●
Securing of grounding terminals suitable to operate the newly introduced equipment		●
Securing of storing spaces for the planned equipment from carrying-in the sites to the completion of installation work		●
(Other General Items)		
Tax exemption on the import of the planned equipment		●
Payment of customs clearance charges when importing the equipment		●
Acquisition of legal approvals required by the Government of Myanmar		●
Payment of charges necessary to issue A/P and bank's commission required for each payment		●
Appropriate and efficient maintenance and operation of the donated equipment		●
Execution of responsible items other than the above as the recipient country side as specified in the Exchange of Notes		●

2-2-4-4 Consultant Supervision

(1) Basic Policy of Supervision

The Consultant shall, under full understanding of the basic concept and policies of the outline design, organize a project team to perform consistent services for detailed design and supervision of the Supplier's work, targeting smooth implementation of the Project.

1) Carry out fine-tuned adjustments to ensure no discrepancies arise on the equipment installation work and strive to ensure completion of the works on schedule.

2) Appropriately report on work progress to related organizations in both countries to ensure no discrepancies in their understanding of the work status. Moreover, respond promptly and give advice following inquiries from the Supplier.

3) Be prepared to offer technical transfer to officials on the Myanmar side to realize greater effects of Japan's grant aid. Moreover, always be ready to offer adequate and appropriate explanations concerning not only the equipment design concept but also installation methods and technology, etc.

(2) Contents of Supervision

The contents of the supervision to be performed by the Consultant are as follows:

1) Work Related to the Tender and Conclusion of the Contract

The Consultant shall implement tender works, including preparing tender documents and responding to tenderers' inquiries, from the announcement to the opening of the tender. The Consultant shall also evaluate the tender, recommend an appropriate contractor and attend contract negotiations and conclusion of contract, etc. The details and results of these proceedings shall be appropriately reported to MRTV.

2) Examination of Submissions from the Supplier

Submissions from the Supplier such as manufacturer's drawings, implementation program, execution time schedule, shop drawings for renovation, technical data, samples, etc. are examined for approval by confirming the tender documents and the proposal offered by the Suppliers.

3) Inspection Witness

To ensure quality control and confirm the completion ratio of the work, witnesses to inspections such as factory and equipment verification prior to shipment, several kinds of test during the equipment installation, etc. are to be performed. When the inspection result matches the tender documents, the equipment of the work is to be approved and if not, an amendment, alternative or replacement of the equipment/work is requested to the Supplier.

4) Supervision of the Work

In addition to the resident supervisors, appropriate supervisors are to be dispatched according to the work. Supervisors shall always inspect whether or not the work is going properly in accordance with specifications and drawings and specify corrections to the Supplier if necessary. All the Consultant activities and the progress of the work are to be reported monthly to MRTV and JICA; aiming to share an understanding of the present situation of work with the relevant parties.

5) Assistance of Handing-Over the Formalities

On completion of the final test and inspection of the work, the report of the acceptance test/inspection shall be submitted to MRTV for the final approval required to hand over the work. In addition, all necessary submissions from the Supplier such as the spare parts, instruction and operation manuals for each piece of equipment etc. shall be examined and approved alongside appropriate advice on operation and maintenance to MRTV.

(3) Supervisors Dispatch Plan

The planned equipment for the Project comprises various kinds of broadcasting system equipment and the latest ICT network equipment, such as video equipment comprising HD cameras, a virtual video system, multi-viewer, video wall system, etc. and audio equipment comprising an intercom system, digital audio mixer, network system device, etc. plus a file-based ICT network system using computers as graphics systems, archive systems, file conversion systems, etc. and DSNG-VANs mounting satellite communication antenna, etc.

In addition, equipment related to the building facilities such as a slave clock system and uninterruptible power supply units are to be introduced. All this equipment to be provided for YBC and NBC is to be categorized with 80 systems in total and a total of around 1,100 pieces of equipment.

To operate such wide-ranging equipment in a suitable environment, complete interior renovation of Studio No. 1 and related rooms surrounding the studio as well as renovation of the electrical installation, restoration of firefighting equipment and renovation of the roof covering are required for the aged YBC TV building. These renovation works in YBC also constitute part of the Project.

Thus, the Project comprises a wide range of highly specialized equipment with building renovation work. Moreover, the two project sites of YBC and NBC are more than 400km apart and works on both sites are to be carried out in parallel. This means a certain number of supervisors with specialties in line with the equipment are to be allocated for both sites as well as general managers in equipment installation and building renovation fields. The supervisors and their roles (duration of stay in Myanmar) are as follows:

- General Project Manager

  The General Project Manager shall oversee entire consulting services as the most responsible person for the Project and visit to the project sites three times, i.e. at the time of commencement of building renovation work, commencement of equipment installation work and handover of the Project after completion of equipment installation work (approximately 1.1 month in total).

- Whole Equipment Planner

  The Whole Equipment Planner shall be the chief supervisor offering various kinds of supervision for equipment installation and mainly stay in YBC, since approximately two-thirds of the equipment is to be provided there. He shall also visit the project sites before commencing the building renovation work to confirm completion of the preparatory work to be carried out by MRTV (approximately 4.8 months in total).

- Video Equipment Engineer

  The Video Equipment Engineer, who has designed video-related equipment, shall stay in YBC and mainly supervise the equipment for Studio No. 1 and the video equipment mounted on the DSNG-VAN (approximately 3.0 months in total).

- Audio Equipment Engineer

  The Audio Equipment Engineer who has designed audio equipment shall visit the project sites at the time of testing and inspecting the audio-related equipment included in the equipment for Studio No. 1, content transmission system and Content Network System, etc. (approximately 1.0 month).

- Studio Lighting System Engineer

  The Studio Lighting System Engineer who has designed the system shall stay in YBC and supervise the installation work for the system there. He shall also visit YBC before commencing building renovation work to confirm the removal of the existing lighting system to be carried out by MRTV (approximately 2.2 months in total).

- ICT Network System Engineer

  The ICT Network System Engineer shall stay in Nay Pyi Taw and supervise file-based ICT systems like archive systems, content network systems and format conversion systems (approximately 4.0 months).

- Building Renovation Planner

  The Building Renovation Planner shall visit when commencing the building renovation work and arrange and instruct work execution programs to the supplier by consulting with responsible MRTV persons regarding the work to be conducted in parallel with broadcasting. He shall also visit at the time of completing the renovation work, carry out intermediate testing and inspection of the work and confirm whether sufficient environment conditions in which to install the equipment have been achieved or not (approximately 0.5 month in total).

- Interior Renovation Planner

  The Interior Renovation Planner shall stay in YBC and supervise the all the renovation work in YBC as the resident engineer for the work (approximately 5.0 months in total).

- Building Equipment Renovation Planner

  The Building Equipment Renovation Planner shall provide periodical supervision of the building equipment renovation work in YBC. He/she shall visit YBC twice at the time of commencement and completion of the building equipment renovation work (approximately 1.0 month in total).

2-2-4-5 Quality Control Plan

The Consultant shall carry out quality control during the project execution stage based on the purport of the basic design. The JIS definition of quality control, i.e. ‘the structure of means for economically producing goods or services of quality that comply with customer requirements’, shall be adopted as the basic guideline when executing the project. The Consultant will provide the Contractor with appropriate guidance to entirely assure the quality of the equipment procured in the Project, by surveying all the stages of the Project in detail, from the tender, installation, adjustment and inspection

and completion and handover. Among all the processes, the following are five important points in terms of quality control:

- Tendering
- Manufacturing of Equipment
- Shipping and Transportation
- Installation Work in Myanmar
- Adjustment, Acceptance Inspection and Handover of the Equipment

The key issues for each of the above five points are summarized below:

1) Tendering

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

2) Manufacturing of Equipment

   At the manufacturing stage, the Consultant will review the technical information on materials, manufacturing drawings, samples, etc. submitted by the Supplier and confirm conformity with the tender document specifications in detail. The Consultant will also inspect the functions and electrical characteristics of the system and confirm whether the performance characteristics meet the specifications at the time of factory inspection.

3) Shipping and Transportation

   The Consultant entrust the following verifications to a reliable, third-party inspection organization, prior to shipment of the equipment.

   - Comparison of the contract equipment list with the shipping documents
   - Comparison of the shipping documents with the equipment

   Furthermore, in terms of transportation, the consultant will confirm whether the packaging is appropriate for the transportation method, whether the transportation route is appropriate and whether the necessary measures are in place to minimize the risk of an accident during transportation. In the process, the Consultant may provide a strong recommendation to the Supplier for rerouting, etc. as necessary.

4) Installation work in Myanmar

   During the installation work stage, it is no exaggeration to say that executing safe and accident-free work is the ultimate key to successful installation work of the equipment. The Consultant will provide guidance from this standpoint after confirming the details of the work plan proposed by the Supplier, such as planning a feasible schedule, allocating appropriate staff and work procedures, etc., to ensure the works are performed smoothly and without any accident.

5) Adjustment, acceptance inspection and handover of the equipment

   Following the installation, adjustment and inspection of the equipment, the Consultant will confirm whether the original functions and electric characteristics of the equipment are

reproduced, by comparing test data taken at the sites and factory before shipment. Further, the Consultant will also provide the Supplier with sufficient guidance on handing over the equipment, suggesting, for example, that the Supplier confirm the numbers on the contract equipment list and prepare a detailed spare parts list, to transfer adequate technical information to the Myanmar side.

2-2-4-6 Procurement Plan

(1) Equipment Procurement plan

Although the eligible source countries for Japanese grant aid generally include Japan or a recipient country (Myanmar), the equipment introduced into the Project has not been produced by the Government of Myanmar and most major equipment for the Project originates from Japanese manufacturers. However, Japanese companies have recently suffered hollowing out of their domestic production bases and many such products are now produced in countries such as ASEAN, China and Taiwan. A lot of excellent broadcast equipment that would meet the broadcasting station specifications is being produced in OECD countries such as the United States and European countries. In this context, it is difficult to classify major equipment and the above-mentioned countries can be cited as third countries, as shown in Table 2-4

Table 2- 4 List of the Countries for Procurement of Major Equipment

Major Equipment	Eligible Source Countries			Remark (Third Countries)
	Myanmar	Japan	Third Country	
1. Equipment for Studio No. 1 ・HD Camera and Peripherals ・Studio Camera Pedestal ・Camera Crane Equipment ・Slow-motion Picture Controller ・Virtual Video System ・Video Production Switcher ・Multi-viewer ・Computer Graphics System ・Video Server Device ・Character Generator Device ・Video Wall System ・Intercom System ・Digital Audio Mixer ・Microphone and Microphone Stand ・Studio Lighting System ・Motorized Batten Rigging System		○	○	OECD Countries, ASEAN Countries, China and Taiwan

Major Equipment	Eligible Source Countries			Remark (Third Countries)
	Myanmar	Japan	Third Country	
2. Computer Graphics System ・Graphic Computer Equipment ・Graphic Software ・Graphic Database Server ・Data Storage Device ・Network System Device ・Scanner ・Printer ・Ingest System ・Uninterruptible Power Supply (UPS)		○	○	OECD Countries, ASEAN Countries, China and Taiwan
3. Archive System in YBC ・MAM Server Device ・Network System Device ・Baseband Ingest System ・File base Ingest System ・QC Terminal System ・Browsing Terminal System ・UPS		○	○	OECD Countries, ASEAN Countries, China and Taiwan
4. Archive System in NBC ・Archive Storage Device ・Archive Server Device ・Network System Device ・Ingest System ・Browsing Terminal System ・Video Converter ・Video Router ・RS-422 Signal Router ・Format Conversion System ・Sync Signal Generator ・UPS		○	○	OECD Countries, ASEAN Countries, China and Taiwan
5. Content transmission System ・Video Router ・Audio/Video Monitors ・Audio/Video Peripherals ・Network System Device ・UPS for Content Network System ・Room-to-room Communication System ・Network System for Room-to-room Communication ・Master Clock System ・Slave Clock Device ・UPS for Master Clock System		○	○	OECD Countries, ASEAN Countries, China and Taiwan

Major Equipment	Eligible Source Countries			Remark (Third Countries)
	Myanmar	Japan	Third Country	
6. Content Network System ・MAM Server Device ・Format Conversion Server ・Network System Device ・File base Ingest System ・Baseband Ingest System ・QC Terminal System ・Browsing Terminal System ・Room-to-room Communication System ・Network System for Room-to-room Communication ・UPS		○	○	OECD Countries, ASEAN Countries, China and Taiwan
7. Format Conversion System ・Format Conversion Terminal Device ・Network System Device ・UPS		○	○	OECD Countries, ASEAN Countries, China and Taiwan
8. DSNG-VAN ・Body of DSNG-VAN ・C-Band Transmitter ・C-Band Motorized Antenna ・C-Band Antenna Control Unit ・Satellite Communication Modem ・L-Band Splitter ・Encoder/Decoder ・Network System Device ・HD Video Wireless Transmission Equipment ・Audio/Video Switcher ・Audio/Video Monitoring Equipment ・Spectrum Analyzer ・Inverter Generator ・UPS		○	○	OECD Countries, ASEAN Countries, China and Taiwan

＊Note: Equipment produced in Asian countries such as ASEAN member countries, China and Taiwan is limited to Japanese manufacturer's products only.

(2) Equipment Transport Plan

1) Transport Route and Time Span Required for Transport

Transport for the procured equipment is at the expense of the Japan side and is to be made by the Supplier concluded with MRTV. All the equipment, even that procured from third countries, is gathered in Japan for a sampling test of system integration in the factory and a

quantitative equipment inspection before shipment. After passing the pre-shipment inspection, all the equipment, including DSNG-VANs, is to be placed in containers and forwarded to Myanmar by ship. The containers unloaded at the YBC port will then be directly delivered by truck to the YBC and NBC Project sites. Nay Pyi Taw is located on the highway connecting YBC and the second city of Myanmar, Mandalay and the road from Nay Pyi Taw to Tatkon is paved, meaning unhindered inland transport to NBC in only 5-6 hours. A proper estimation of the total time span for transport from Japan to the Project sites would be approximately two months, since marine transport from Japan to Myanmar requires approximately 40 days and unloading the equipment and customs clearance procedures at YBC port require approximately two weeks.

(The figure quoted from Google Map)

Fig.2-13 Transport Route to the Project Sites

2) Equipment Import and Exemption Procedures

When importing goods to Myanmar, an import license or permit must be obtained before shipment. The former (import license) is for cases when tax is imposed on imported goods and the latter (import permit) is for cases when the imported good is tax-free. For equipment to be imported to Myanmar under Japan's grant aid project, an import permit has to be obtained because they are classified as tax-exempt. This must always be done before

shipping the equipment and at the time of import customs clearance, the date of acquiring the import permit and preparing the shipping documents are confirmed. If the import permit was acquired after shipping, note that a fine may be imposed.

Where a tax-exemption procedure is conducted in Myanmar, a consignee MRTV is required to obtain a tax-exemption certificate as well as the import permit, before the equipment arrives at Yangon Port (or Yangon Airport).

The documents required for obtaining an import permit and tax-exemption certificate are listed in Table 2-5 below. It takes at least one month after submitting the required documents to the Ministry of Transport, meaning it is important to carry out the procedures as soon as possible after each shipment leaves Japan.

Table 2-5 Outline of Formalities for Import Permit and Tax Exemption

Formality	Application Destination	Required Time Span	Necessary Documents	Applicant
Import Permit	Ministry of Transport	One Month	Shipping Documents － Shipping Invoice: One original － Copies of E/N and G/A	MRTV
Tax-Exemption Certificate	Ministry of Transport	One Month	Shipping Documents － Shipping Invoice: One original － Bill of Lading: One original － Packing List: One original － Certificate of Origin: One original － Copies of E/N and G/A	MRTV

2-2-4-7 Operating Guidance Plan

MRTV's engineers will have learned the operation and maintenance technology of the broadcasting equipment, including HD equipment, by using the equipment procured for the SEA Games or under general cultural grant aid from the Japanese Government, so there seems to be no technical problem in terms of operation and maintenance. However, few engineers are familiar with operating and maintaining such planned equipment; introduced with the latest digital and ICT network technology. Initial operational guidance and training for MRTV's engineers, accordingly, will be made in YBC and NBC on completion of the acceptance test and inspection of all the equipment. As for the studio lighting system and its electrical lifting devices for Studio No. 1, works for installation, adjustment and testing operation were completed before the other equipment. However, the initial operational guidance and training for the system is to be carried out on completion of the acceptance test and inspection of all the equipment, since the operational guidance of the system incorporated with other equipment is effective.

(1) Plan for Initial Operation Guidance

Initial operation guidance will be via on-the-job training to acquire basic items of the operating method, such as each device starting and stopping, the basic setting, the operating environment and measuring of various characteristics.

(2) Plan for Operational Training

Operational training will be made on completion of the adjustment, testing operation and testing and inspection of each piece of equipment by the manufacturer's engineers dispatched from the Supplier. Operational training will be implemented, while using each piece of equipment; focusing on practical guidance for routine maintenance such as system operation, troubleshooting and daily maintenance, etc. The trainer's explanations are to be conveyed via an English/Burmese interpreter using the instruction manual (written in English) supplied with each piece of equipment. To confirm the trainees' understanding, tests will be conducted on the first and last days of the operational training.

Table 2-6 shows the concrete items of initial operation guidance and operational training required for the Project.

Table 2-6 Items for Initial Operation Guidance and Operational Training

No.	System Name	Items of Guidance/Training	Days
1	Equipment for Studio No. 1	1) Outline of the whole program production system 2) Method of adjusting the HD camera 3) Function and operation method of the video production switcher 4) Function and operation method of the digital audio mixer 5) Troubleshooting for the video system and audio equipment system 6) Function, operation method, setting for operation environment and troubleshooting of the virtual video system 7) Function, operation method, setting for the operation environment and method of daily maintenance of the video wall system 8) Function, operation method, setting for operation environment and method of daily maintenance of the video server device and computer graphics system 9) Function, operation method, setting for operation environment of the slow-motion picture controller 10) Function and operation method of the intercom system 11) Function, operation method and method of daily maintenance of the studio lighting system 12) Function, operation method and method of daily maintenance of the motorized batten rigging system	18 days
2	Computer Graphics System	1) Outline of network composition 2) Function, operation method, setting for operation environment and method of daily maintenance of graphic computers 3) Operation and adjustment method of scanner and color evaluation light booth	3 days
3	Archive System for YBC	1) Outline of network composition 2) Function, setting for operation environment and method of daily maintenance of MAM server device 3) Function, operation method and setting for the operational environment of the ingest system 4) Function, operation method and setting for the operational environment of the QC terminal and browsing terminal systems	4 days

No.	System Name	Items of Guidance/Training	Days
4	Archive System for NBC	1) Outline of network composition 2) Composition of archive system, work flow and method of daily maintenance 3) Function, operation method and setting for the operational environment of the ingest system 4) Function, operation method and setting for the operational environment of browsing terminal system	4 days
5	Content transmission System	1) Outline of network composition 2) Function and operation method of the video router and network device for room-to-room communication 3) Function and operation method of master clock system	2 days
6	Contents Network Systemontent Network System	1) Outline of network composition 2) Conditions of the interfaces with the existing network system 3) Function, setting for operational environment and method of daily maintenance of MAM server device 4) Function, operation method and setting for the operational environment of the ingest system 5) Function, operation method and setting for the operational environment of the QC terminal and browsing terminal systems	7 days
7	Format Conversion System	1) Outline of network composition 2) Composition of archive system, work flow of the format conversion system 3) Function, operation method, setting for operational environment and method of daily maintenance of the format conversion terminal device	5 days
8	DSNG-VAN, YBC	1) Vehicle structure and method of daily maintenance of VAN 2) Outline of network composition 3) Function, operation method, setting for operational environment on satellite transmission 4) Function and operation method of HD video wireless transmission equipment	1 day
	DSNG-VAN, NBC	(Ditto)	2 days
9	Maintenance and Measuring Equipment for YBC	1) Function and operation method of multi-signal analyzing monitor, portable signal generator, spectrum analyzer and audio signal analyzer 2) Function and operation method of spectrometer	1 day
10	Maintenance and Measuring Equipment for NBC	1) Function and operation method of multi-signal analyzing monitor, portable signal generator and spectrum analyzer	1 day

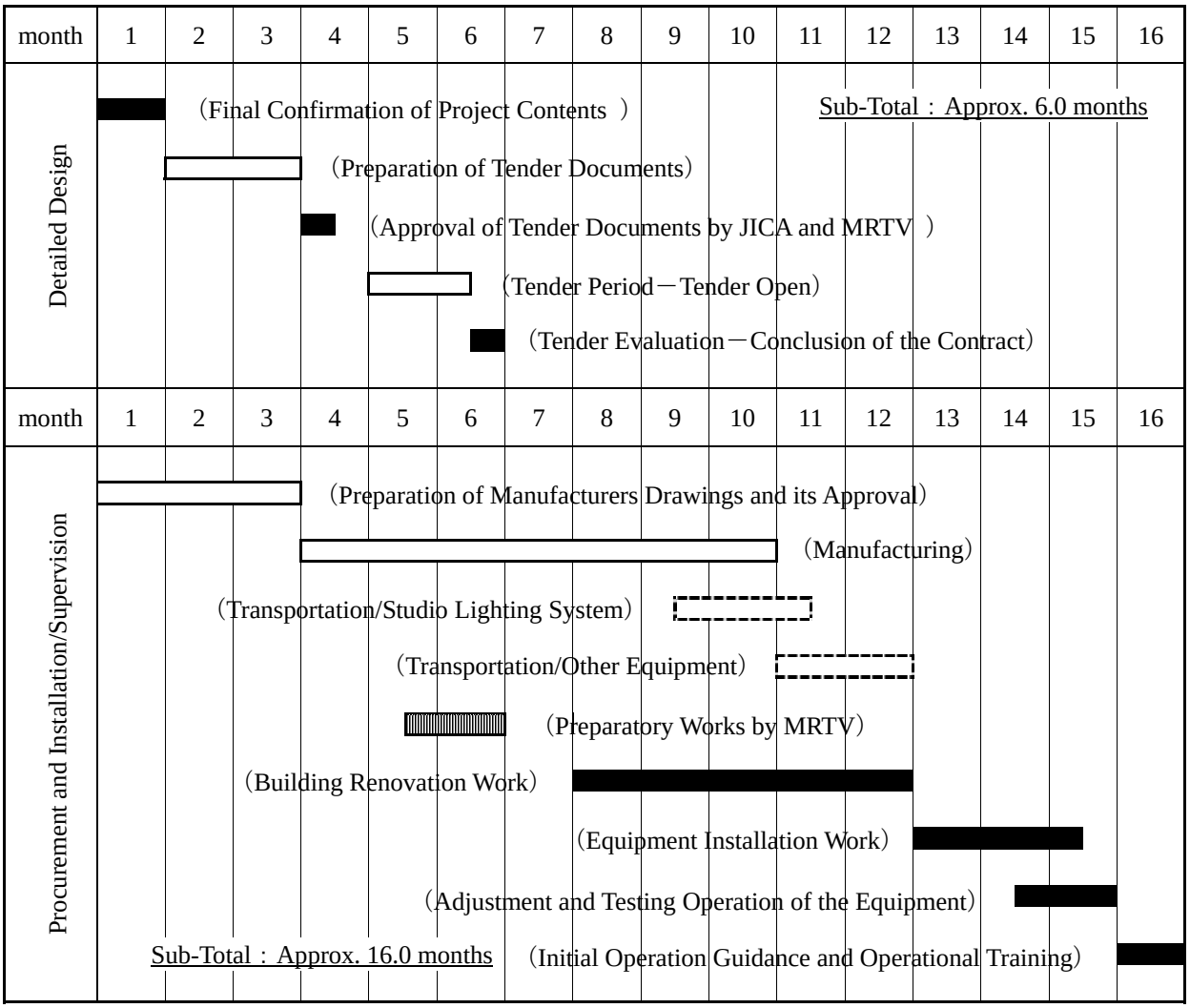
2-2-4-8 Soft Component (Technical Assistance Plan)

With regard to operating the equipment to be procured under the Project, as specified previously, there are plans for initial operation guidance and operational training for about one month in YBC and about three weeks in NBC. In light of the technical capabilities of MRTV's engineers, it is sufficient to perform such guidance and training, even without a soft component program.

2-2-4-9 Implementation Schedule

As for implementing the Project, as shown in Table 2-7, assuming six months for the detailed design and 16 months for the equipment procurement and installation work, a total of 22 months is envisaged. However, in Table 2-7 below, the execution of the detailed design includes all the processes from conclusion of the Consultant Agreement to the conclusion of a Contract between MRTV and the Supplier and the equipment procurement and installation work includes formalities to verify the Contract and all the processes up to handover of the equipment, such as initial operation guidance and operational training.

Table 2-7 Implementation Schedule



2-3 Obligations of Recipient Country

Obligations of the Myanmar side in the event that the Project is implemented under Japan's grant aid are as follows:

(1) Preparatory Works for Building Renovation

The following preparatory works shall be completed before commencing the building renovation work for the Yangon TV building.

- Removal of the existing studio lighting system equipment in Studio No. 1, including all lighting fixtures, manual lifting devices and all electrical wiring for the system
- Removal of existing equipment and all the unused electrical wires and cables from the following rooms:
  - Studio No. 1, Sub-Control Room No. 1, Sound Lock No. 1, Store Nos. 3 and 4, Rectifier Room (Dimmer Room), Radio Relay Equipment Room (to be renewed as the Archive Room), Title Preparing Room (Computer Graphics Room) and Earth Station
- Removal of the master and slave clocks and all electrical wiring

(2) Preparatory Works for Equipment Installation Works

The following preparatory works shall be completed before commencing the equipment installation works for YBC and NBC:

＜YBC＞

- Securing the primary power supply equipment and grounding terminals necessary for appropriate operation of the newly introduced equipment to be installed in Studio No. 1, Sub-Control Room No. 1, Rectifier Room, Radio Relay Equipment Room, Title Preparing Room and Earth Station

＜NBC＞

- Renovation of the existing Archive Room comprising light gage steel partitions with door, flooring by tile carpets, installing of a cable rack, wiring ducts and trays
- Securing the primary power supply equipment and grounding terminals necessary for appropriate operation of the newly introduced equipment for the archive system and Content Network System
- Securing space for the newly introduced equipment for a Content Network System and its electrical wiring route

(3) Installation of the Equipment

The following work shall be completed for YBC during equipment installation conducted by Japan side.

- Installation and electrical wiring connection of the equipment for contents transmission system supplied in the rooms of Studio No. 2, News Studio and MNR by Japan side.

(4) Diversion of the Existing Equipment for the New System

- Diversion of the existing HD digital video recording and playback equipment (two sets of XDCAM HD422, PMW-1000) to the Equipment for Studio No. 1
- Diversion of the existing video recording and players (four sets of Betacam SP/two sets of U-Matic/five sets of DVC pro) to a format conversion system
- Diversion of the existing HD video camera (six sets of XDCAM, PMW-500) to DSNG-VAN

(5) Securing Storage Rooms or Space for the Equipment

Storage rooms or spaces shall be secured for the equipment from delivery to completion of the installation work. Storage spaces or rooms shall be locked and all ingress of rainwater completely prevented. The expected time for delivery of the equipment and its volume are as follows:

＜YBC＞

【First Shipment】

Delivery:	11 months after contract with the Supplier (maybe August 2018)
Equipment:	Studio lighting equipment and its motorized batten rigging system equipment
Estimated volume:	Approx. 370 F/T (9 x 40’ container and 1 x 20’ container)

【Second Shipment】

Delivery:	12 months after contract with the Supplier (maybe September 2018)
Equipment:	Remaining equipment for YBC with one DSNG-VAN
Volume Estimated:	Approx. 220 F/T (6x40’ container)

＜NBC＞

【Second Shipment】

Delivery:	12 months after contract with the Supplier (maybe September 2018)
Equipment:	All the equipment for NBC with two DSNG-VAN s
Estimated volume:	Approx. 220 F/T (6x40’ container)

(6) Conclusion of Banking Arrangement (B/A)

It is specified in G/A, that according to the practice of Japan grant aid, the recipient government, i.e. GOM shall open an account in the name of the government with a bank in Japan and conclude an agreement[8] to authorize the payment procedure to the bank in Japan. Payment for the Consultant and Supplier will be made through an Authorization to Pay (A/P) specified in the Banking Arrangement (B/A).

(7) Issuance of Authorization to Pay (A/P) and Payment of Banker’s Commission

The Authorization to Pay (A/P) is a kind of certificate issued to the Japanese bank, notifying a payment made to an executive for the Consultant or Supplier, on behalf of the recipient

8 In general, recipient countries also entrust the formality to a bank of the recipient country, so that such agreement is referred to as the “Banking Arrangement”

government. In A/P, the same payment conditions are to be specified as the Consultant Agreement and the Supplier's Contract and issued for each contract agreement. GOM shall be responsible for payment of the A/P issuance fee and banker's commission payable in accordance with B/A. These fees and commissions will be considerable based on the total amount of the Project, hence sufficient care shall be taken when selecting the Japanese agent bank. An example of fee and commission of a Japanese bank with considerable experience of offering such services are as follows:

(In the case of the Bank of Tokyo-Mitsubishi UFJ)

Issuance Fee for A/P	:	6,000 JPY per issuance of A/P
Banker's Commission	:	Approximately 0.1% of the E/N amount (Approx. 2.3 million JPY)

(8) Payment of Customs Clearance Charge

Although the marine transportation cost to the Yangon Port and inland transportation cost to the YBC and NBC project sites will be borne by GOJ, the customs clearance charge at the Yangon Port shall bear the cost to be covered by GOM as the equipment consignee. Based on an estimation of a Japanese forwarder, it has been reported that the customs clearance charge required in the port of Yangon will be fixed per container as follows, however, it seems cheaper when the Myanmar side gets in touch with the relevant authorities.

(Estimates of Custom Clearance Charge Based on the Report from a Japanese Forwarder)

For a 40ft container:		US$ 300.- per container
For a 20ft container:		US$ 250.- per container
Total numbers of containers (referencing the above (3)	:	21 numbers of 40ft + one 20ft container
Total cost estimate	:	US$ 300×21 + US$ 250×1 = US$ 6,550.-

(9) Reimbursement of Commercial Tax to Local Subcontractors

Approx. 5% of the contract price of local subcontractors engaged by a Japanese Supplier.

Rough cost estimate : Approx. 500 million JPY = 55,500,000 MMK

(10) Implementation of Responsibilities of GOM as specified in E/N and G/A

Other than the above, the Myanmar side shall grasp all the responsibilities to be performed by GOM as specified in E/N and G/A shall be implemented timely and surely.

2-4 Project Operation Plan

2-4-1 Operation and Maintenance System

In case the Project is approved, implementation of the Project shall be controlled mainly by the Technical Department staff assigned to NBC or YBC. The Technical Department, the largest department among MRTV, has 1,028 staff members（98 management staff members and 930 general staff members）which is equal to 43.5% of the personnel of MRTV. Among them, there are 358 engineers (approx. one third of the total staff) those who are operating and maintaining all the MRTV's existing equipment in NBC, YBC and all the local bureaus and repeater/transmission stations. Table 2-8 shows the number of engineers classified by speciality in NBC and YBC, respectively. The operation, maintenance and management of the equipment procured under the Project will be handled by television engineers with the current sufficient team of 144 staff members.

Table 2-8 Classification of MRTV's Engineers

Affiliation / Specialty	NBC	YBC	(Total)
TV Engineers	103	41	144
Radio Engineers	71	28	99
Transmission Engineers	85	30	115
(Sub-Total)	259	99	358
(Total)	358		—

Most of the technical staff graduated from a university of science or technology and they receive one month of training by MRTV in the first year of employment. The Training covers a broad range of broadcasting engineering topics such as broadcasting systems, program production, terrestrial transmitting engineering, satellite transmitting engineering and news gathering. In addition, international manufacturers periodically hold a technical workshop, mainly at NBC, and in total 485 engineers have participated dozens of times in workshops from 2008, the year of NBC's establishment, to 2015.

Moreover, 19 members have participated in JICA training programs, including the programs in the third country, and 196 members have participated in other training programs which are organized by other ODA donor countries. These return trainees have become the instructors of the broadcasting engineering technical workshop in MRTV in order to share their techniques and experiences with other engineering staff.

The aforementioned training courses and technical workshops are set as a part of the MRTV training program. Therefore, the technical level of the current engineering staff in MRTV is deemed high enough for the implementation of the project. As explained in Section 2-1: Design Policy, it is necessary to cultivate some human resources capable of ICT network engineering for the completion of the project. However, MRTV does not need to invite any specialists or trainers from a third party since they can operate and maintain the broadcasting equipment by themselves in accordance with the current training program.

2-4-2 Equipment Maintenance Plan

Recent technical innovations have enhanced the reliability of broadcasting equipment and allowed them to minimize the number of component parts. Accordingly, mechanical troubles affecting such broadcasting equipment have been drastically diminished. However, to utilize the equipment effectively, daily checks and periodical maintenance are still important as well as troubleshooting and replacing consumable parts. The lifetime of the broadcasting equipment must be extended by proper operation, daily checks and preventive maintenance such as cleaning, adjustment, repair and lubrication. Defragmenting the hard disk mounted on the computer and server is also effective to extend the lifetime of the Broadcasting Equipment. Moreover, in-depth knowledge of the characteristics of each piece of equipment help prevent mechanical troubles and accidents before they happen and enhance the stability of utilization of the equipment. In addition, some of the equipment needs periodical replacement of parts according to the maintenance manual.

The durable life of the computer and server for this project is set as six years and that for other equipment, ten years. In general, the failure rate gradually increases over its lifetime, as shown in Fig. 2-14. As for digitalized equipment, such as computers and servers, the failure rate tends to increase more precipitously than for other equipment.

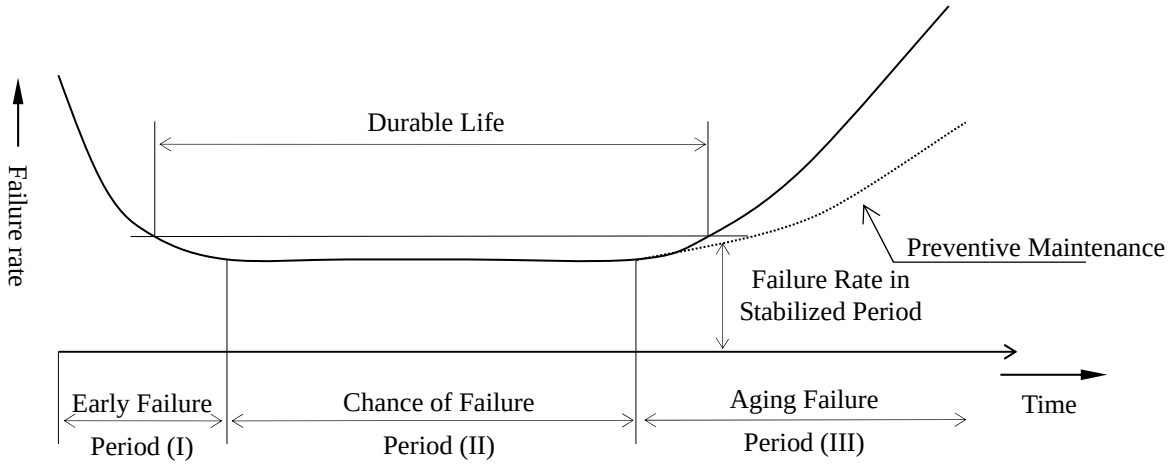


Fig.2-14 Failure Rate of the Equipment before, during and after Durable Lifetime

Periods I, II and III in Fig. 2-14 are detailed as follows:

I Early Failure Period

Failure in this period is early failure which arises from lot failures in the factory. Accordingly, it is important to determine the cause of failure and take measures immediately.

II Chance of Failure Period

After the early failure period has been covered, the failure rate is kept low. The period for which failure rate can be kept below a certain rate is known as the “Durable Life”.

III Aging Failure Period

Once the chance failure period of the parts, units or the system has elapsed, the failure rate

increases again. Failure during this period is mostly due to aging of the parts which compose the mechanism or system. Accordingly, it is important to reduce such troubles and prolong the lifetime of the mechanism and system by conducting proper preventive maintenance of parts.

Recent digital equipment to be used for this project, mounts the moving parts so seldom that mechanical troubles caused by abrasion of mechanical parts have decreased and accordingly, failure rate during the service life have also decreased drastically. Moreover, most of the digital equipment includes a self-diagnostic function, which automatically indicates the failure part if failure occurs.

As for analog equipment, most of the repairs and maintenance were conducted by the staff of MRTV (or a manufacturer). However, as for digital equipment, the repairing or maintenance of specific equipment shall be treated only by a licensed company by the manufacturer, or some shall be covered by a prior maintenance contract with the manufacturer.

Table 2-9 lists the prospective equipment for this project, which shall be treated only by a company licensed by the manufacturer, or which may require a prior maintenance contract with the manufacturer. In case this project is approved, MRTV must list the actual equipment requiring licensed maintenance and continuously make a maintenance contract with a licensed company for such equipment as required.

Table 2-9 List of the Equipment Having a Possibility of Maintenance Contract

Item No.	NAME	Maintenance by Licensed Company	Maintenance Contract
1-1	HD Camera and Peripherals	●	
1-5	Studio Camera Pedestal	●	
1-8	Slow-motion Picture Controller	●	
1-9	Virtual Video System		●
1-10	Video Production Switcher	●	
1-14	Computer Graphics System		●
1-15	Video Server Device		●
1-16	Character Generator Device		●
1-17	Video Wall System		●
1-19	Digital Audio Mixer	●	
1-26	Lighting System	●	
1-27	Motorized Batten Rigging System	●	
2-1	Graphic Computer Equipment		●
2-3	Graphic Database Server		●
2-4	Data Storage Device		●
2-9	Ingest System		●
3-1	MAM Server Device		●
3-3	Baseband Ingest System		●
3-4	File base Ingest System		●

Item No.	NAME	Maintenance by Licensed Company	Maintenance Contract
3-5	QC Terminal System		●
3-6	Browsing Terminal System		●
4-1	Archive Storage Device		●
4-2	Archive Server Device		●
4-4	Ingest System		●
4-5	Browsing Terminal System		●
6-1	MAM Server Device		●
6-2	Format Conversion Server		●
6-4	File base Ingest System		●
6-5	Baseband Ingest System		●
6-6	QC Terminal System		●
6-7	Browsing Terminal System		●
7-1	Format Conversion Terminal Device		●

To utilize the equipment effectively for an extended period, daily checks must be conducted and each system periodically maintained using the measuring instrument procured under this project. The check and maintenance points for periodical maintenance are listed in Table 2-10.

Table 2-10 Check and Maintenance Points

Maintenance Period	Check and Maintenance Points
Daily Check	● Cleaning ● Visual check of each meter and failure indicator ● Visual check of the connectors
Characteristics Measurement (Semiannual Check)	● Measurement of Level Diagram ● Frequency character ● S/N ratio ● Moderation Distortion ● Power Supply Voltage ● Specific Functions ● Quality of Transmitted Source between Systems (HD-SDI signals)

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

In case the Project is implemented under Japan's grant aid, the total project cost to be borne by the Myanmar side is approx. 309,750,000 MMK. The following is a breakdown of the project cost to be borne by the Myanmar side and the estimation conditions:

(1) Breakdown of the Cost to be Borne by the Myanmar Side

Preparatory Works for YBC and NBC	:	219,750,000 MMK	(≈19.8 million JPY)
Customs Clearance Charge for Procured Equipment	:	9,000,000 MMK	(≈0.8 million JPY)
Reimbursement of Commercial Tax to Local Subcontractors	:	55,500,000 MMK	(≈5.0 million JPY)
Advising commission of A/P and Bank Commission	:	25,500,000 MMK	(≈2.3 million JPY)
Total		309,750,000 MMK	(≈27.9 million JPY)

(2) Estimation Conditions

1) Date of Cost Estimation: January 2016
2) Exchange Rate: 1US$＝121.95JPY, 1MMK＝0.09JPY
3) Implementation Period: As shown in Table 2-7 Implementation Time Schedule
4) Others: The project cost is to be estimated in accordance with Japan's grant aid

2-5-2 Operation and Maintenance Plan

The Operation and Maintenance cost for the next ten years are estimated as follows:

(1) Employment Cost

It is considered that no special employment other than yearly regular employment of MRTV's staff will be necessary to operate and maintain the procured equipment for the Project, accordingly, employment cost is not considered in the estimation.

(2) Equipment Maintenance Cost

Failure will occur at times during normal operation, which means a budget for equipment maintenance is required. To estimate the maintenance cost for the project, reference is made to typical broadcasting stations in Japan. As stated above, digital equipment shall be maintained only by the licensed company or manufacturer, hence a budget for such maintenance is required. A typical Japanese broadcasting station equipped with digital equipment usually budgets 0.5% of the equipment cost for equipment maintenance every year. Accordingly, the annual maintenance cost required for the equipment under this project is estimated as 100 million MMK (9 million JPY). However, the budget is required only from the second year after completion of the Project since the equipment will be covered by a warranty for one year.

(3) Electric Power Cost

The annual cost of power consumption of each system under the Project is estimated as 198 million MMK (18 million JPY) as shown in Table 2-11. The unit rate for the power consumption of 150.0 MMK/kVA tallies with the official rate announced by the Ministry of Electric Power. The estimated cost includes neither the basic charge nor fluctuation for ten years.

Table 2-11 Estimated Power Consumption and Charges for Each System

System		Power Consumption	Working hour/day	Working days/year	Total working hour/year	Total Power consumption /year	Unit rate (MMK/kVA・hour)	Power charges (MMK)
Equipment for Studio 1	Lighting System	230.0kVA	8	365	2,920	671,600kVAhr	150.0	100,740,000
	Others	30.8kVA	8	240	1,920	59,136kVAhr	150.0	8,870,400
Computer graphics system		7.9kVA	8	240	1,920	15,168kVAhr	150.0	2,275,200
Archive System for YBC		18.8kVA	24	365	8,760	164,688kVAhr	150.0	24,703,200
Archive System for NBC		11.7kVA	24	365	8,760	102,492kVAhr	150.0	15,373,800
Content transmission System		3.0kVA	5	240	1,200	3,600kVAhr	150.0	540,000
Content Network System		32.6kVA	24	365	8,760	285,576kVAhr	150.0	42,836,400
Format Conversion System		9.6kVA	8	240	1,920	18,432kVAhr	150.0	2,764,800
Total		344.4kVA	―	―	―	1,320,692kVAhr	―	198,000,000

(4) Advanced Funding for Future Renewal of the Equipment

The lifetime of the prospective equipment under this project is set as six years for the computer & server and ten years for other equipment. Accordingly, the equipment shall be replaced after six years or ten years and the budget prepared by advanced funding. It means that 1/6 of the cost of the computer & server: 881 million MMK (79.3 million JPY) and 1/10 of the cost of other equipment: 952 million MMK (85.7 million JPY) shall be accumulated annually as advanced funding. However, the studio lighting system and its rigging system do not require the advanced funding because their lifetime is set beyond 15 years.

In addition, some of the computers and servers require new maintenance contracts at the time of renewal. Although the maintenance cost depends significantly on the manufacturer, model and maintenance service, it shall be minimized to 5% of the equipment cost for keeping the basic maintenance services just to operate the equipment. Accordingly, 1/6 of the cost for the maintenance contract: 48 million MMK (4.3 million JPY) shall be accumulated every year in addition to advanced funding for future renewal.

(5) Operation Cost for DSNG-VAN

MRTV has concluded a year-round contract with Thaicom Satellite for a set of transponders as the satellite link to transmit the signal from NBC to local stations. This satellite link can also be used for a satellite relay for DANG-VAN. This satellite link has such a wide range of frequencies that other signal transmission from DSNG-VAN to NBC or YBC is free of charge, except for the petroleum required to operate DSNG-VAN. Given that DSNG-VAN makes round trips to remote area 100km far from the station three times a week for three hours of news gathering, the total distance become 28,800km per year, requiring 6000 liters of petroleum. Since the market rate for

the petroleum as of September 2016 is 540 MMK/litter, the annual cost for 3 DSNG-VANs is estimated at 9.72 million MMK (0.875 million JPY).

In addition, the cost for petroleum for generators equipped on DSNG-VANs is required. Given that a generator consumes 5 liters per news gathering episode, three DSNG-VAVs require 2,160 liters of petroleum per year, which cost 1.17 million MMK (0.105 million JPY) excluding the fluctuation of the petroleum.

Based on the above calculation, the Operation and Maintenance Cot for ten years are estimated as shown in Table 2-12.

Table 2-12 Estimated Cost for Operation and Maintenance for 10 years

(Figures in 1,000 MMK)

Fiscal Year	1st	2nd	3rd	4th	5th
1. Electric Power Cost	198,000	198,000	198,000	198,000	198,000
2. Equipment maintenance Cost	—	100,000	100,000	100,000	100,000
3. Advanced Funding	1,881,000	1,881,000	1,881,000	1,881,000	1,881,000
1) Computers & Servers	929,000	929,000	929,000	929,000	929,000
2) Others	952,000	952,000	952,000	952,000	952,000
4. Operation Cost of DSNG-VAN	10,890	10,890	10,890	10,890	10,890
1) Petroleum for DSNG	9,720	9,720	9,720	9,720	9,720
2) Petroleum for Generator	1,170	1,170	1,170	1,170	1,170
Total	2,089,890	2,189,890	2,189,890	2,189,890	2,189,890
Rate to current budget of MRTV in 2014/2015 (56.4 billion MMK)	3.71%	3.88%	3.88%	3.88%	3.88%
Rate to current expenditure of MRTV in 2014/2015 (35.6 billion MMK)	5.87%	6.15%	6.15%	6.15%	6.15%

Fiscal Year	6th	7th	8th	9th	10th
1. Electric Power Cost	198,000	198,000	198,000	198,000	198,000
2. Equipment maintenance Cost	100,000	100,000	100,000	100,000	100,000
3. Advanced Funding	1,881,000	1,881,000	1,881,000	1,881,000	1,881,000
1) Computers & Servers	929,000	929,000	929,000	929,000	929,000
2) Others	952,000	952,000	952,000	952,000	952,000
4. Operation Cost of DSNG-VAN	10,890	10,890	10,890	10,890	10,890
1) Petroleum for DSNG	9,720	9,720	9,720	9,720	9,720
2) Petroleum for Generator	1,170	1,170	1,170	1,170	1,170
Total	2,189,890	2,189,890	2,189,890	2,189,890	2,189,890
Rate to current budget of MRTV in 2014/2015 (56.4 billion MMK)	3.88%	3.88%	3.88%	3.88%	3.88%
Rate to current expenditure of MRTV in 2014/2015 (35.6 billion MMK)	6.15%	6.15%	6.15%	6.15%	6.15%

The total electric power charge to MRTV was 829 million MMK (75 million JPY) in the fiscal year 2012/2013, which increased by 23% to 1020 million MMK (92 million JPY) in the fiscal year 2013/2014 because of the busy operation for the SEA Games. Subsequently, the power charge increased by 272.9% to 2780 million MMK (250 million JPY) in the fiscal year 2014/2015 because MRTV started preparation for terrestrial digital broadcasting. The Project will require an additional power charge of 198 million MMK (17.8 million JPY) every year. However, it will be just 0.35% of the current budget for MRTV in fiscal year 2014/2015 (56.4 billion MMK) and MRTV will be able to bear the cost. Moreover, it is noted that MRTV is planning to switch off analog broadcasting by 2020 so that power consumption is expected to decline from 2021.

Since prospective equipment under this project will run on a file basis, the current production cost using recording materials such as VTRs and DVDs will decline. Also, since visual contents will be produced by in-house staff of MRTV with prospective virtual video systems and computer graphics systems, production outsourcing costs can be eliminated. Meanwhile, since the lifetime of the computer and server is as short as six years, the cost of renewal will exceed that of existing equipment operated with VTRs or DVDs. Consequently, the advanced funding required is estimated as 1.88 billion MMK (170 million JPY) per year. However, it will be just 3.3% of the current budget of MRTV for fiscal year 2014/2015 (56.4 billion MMK) and MRTV is expected to be able to bear the cost.

Consequently, the total operation and maintenance cost is estimated as 2.09－2.19 billion MMK. However it will be just 3.71－3.88% of the current budget of MRTV in fiscal year 2014/2015 and just 5.87－6.15% of current expenditure of MRTV in fiscal year 2014/2015. Therefore, MRTV is expected to be able to bear the cost as previously judging from the financial records in these years.

Chapter 3 Project Evaluation

Chapter 3 Project Evaluation

3-1 Preconditions

This Project aims to improve the environment allowing MRTV to produce a range of expressive and high-quality programs by upgrading the broadcasting equipment at both YBC and NBC. The Project also ultimately aims to help Capacity building and development of systems to sustain economy and society including assistance for promotion of democratization in Myanmar. To realize the above aims, the actions listed in Article 2.3 of Chapter 2 should be taken by the Myanmar side on a timely basis as minimum preconditions. The following are the most critical of such actions:

(1) Quick Issuance of A/P based on B/A

When the Project starts, the implementing agency, MRTV, must conclude a consultant agreement with the Japanese Consultant. Subsequently, based on the detailed design and bidding document prepared by the Japanese Consultant, MRTV shall conclude a contract with the Japanese Supplier through bidding procedures under the grant aid Project. Since payment under such contracts shall be guaranteed only by A/P, any delay in issuing the A/P will directly delay the Project itself. Verification of the agreement and contract by JICA is the final precondition for issuing the A/P, so MRTV should discuss the quick issuance of A/P beforehand, as well as approval of the budget, with superagencies, MOPF, MOI and MFTB, while applying for JICA's verification.

(2) Preparation for renovation works and installation of the broadcasting equipment

Since the installation of the broadcasting equipment can only commence after the renovation works of the YBC are completed, the renovation work of YBC is scheduled for the period of procurement of the broadcasting equipment. The installation works at YBC and NBC are also scheduled in parallel with efficiency in mind.

Although both the renovation and installation works are the responsibility of the Japanese Supplier, one crucial precondition for commencing the works is to ensure the preparatory works at YBC by MRTV, as stipulated in Article 2.3 of Chapter 2, are completed in advance. Also critical for the preparatory works at NBC by MRTV is ensuring the equipment is installed on time. Therefore, regardless of perspective, the timely completion of the preparatory works by MRTV is the minimum prerequisite to conduct the whole of the Project smoothly. The following is a list of deadlines for each preparatory work stipulated in the M/D concluded on November 4, 2016.

＜Preparatory works prior to the building renovation of YBC: refer to (1) of Article 2.3 of Chapter 2 ⇒ To be completed by the End of March 2018＞

- Removal of existing studio lighting system and related equipment and electrical wiring
- Removal of existing equipment and electrical wiring from the rooms to be renovated, in which the procured equipment is to be installed
- Removal of the master and slave clocks and electrical wiring

＜Preparatory works before installing the equipment: refer to (2) of Article 2.3 of Chapter 2
⇒ To be completed by the End of September 2018＞

- Renovation of the existing Archive Room and securing space for the newly introduced equipment for the contents network system and its electrical wiring route at NBC
- Providing the earth terminals necessary to operate all the equipment to be procured for both YBC and NBC

(3) Smooth implementation of tax exemption and custom clearance procedures

As stated in clause 2) (2) 2-2-4-6 of Chapter 2 “Equipment Import and Exemption Procedures”, an application for tax exemption for the procured equipment must be submitted in parallel with the import application. Both applications require approvals from the Ministry of Transport (MOT) by submitting a copy of shipping documents as well as E/N and G/A. Since obtaining such approval from the MOT will take at least one month, the applications shall be submitted immediately after receiving the shipping document from the Supplier to obtain the import license and tax exemption while shipping the equipment.

In case the E/N is signed in March 2017, the first shipment (Studio Lighting System Equipment for YBC) is expected to depart in mid-June 2017 and the second (all other broadcasting equipment, including DSNG-Van) is expected to depart in early August 2017. Accordingly, the application for tax exemption for the first shipment must be submitted by the end of June 2017 and completed by the end of July 2017. The application for the second shipment must be submitted by mid-August 2017 and completed by mid-September 2017. Advance consultation with MOT is recommended to expedite the application for the second shipment based on the experience of the application for the first shipment.

For the customs clearance, the implementing agency, which must be the consigner of the equipment, is the key party who can complete the application promptly. Accordingly, MRTV must give the necessary information to the related authority of MOT and consult with them regarding payment of customs clearance, which is the responsibility of MRTV.

3-2 Necessary Inputs by Recipient Country

The inputs by the Myanmar side to utilize and maintain the effectiveness of the Project are stated below.

(1) Securing program production personnel

MRTV aims to expand the current on-air time from 17 hours/day to 24 hours/day by 2022, three years after completion of the Project. It is a realistic target to expand the on-air time to 24 hours/day by increasing the in-house programs, provided the TV Studio No. 1 in YBC is equipped with advanced broadcasting facilities and file-base editing system utilizing the computers

MRTV aims to produce new in-house programs, in sectors including entertainment, education,

culture and information, to be produced at TV Studio No. 1 in YBC. However, details such as content, on-air time and frequency have yet to be determined. Immediately after the Project is approved, MRTV must make a concrete plan for the broadcasting timetable and take the necessary steps to secure and develop human resources for future program production on completion of the Project.

TV programs for the 6 MRTV TV channels are currently managed by a total of 636 personnel, but the actual number of personnel for program production remains unclear. At any rate, it is important that MRTV should reinforce personnel for program production at YBC according to the future expansion plan for program production and educate them to fully utilize the new equipment. Accordingly, it is also integral for MRTV to set training programs for production staff into the domestic seminar or overseas training, which is currently organized by manufacturers. Technical Assistance for the Project for Capacity Development of MRTV, which is currently executed as a JICA program in parallel with this Project, is also expected to be an effective means of human resource development.

(2) Securing operation and maintenance personnel for program production equipment

As stated in clause (6) 2-2-1 of Chapter 2 “Policy of Operation and Maintenance Management”, the current number of engineering personnel in YBC is insufficient to operate the ICT network system, since the current personnel are used only to operate the existing analog TV production equipment. In the case of this Project, five engineers, comprising two engineers for computer graphics and three for operating the network system, namely the archive system and contents transmission system, must be newly assigned. MRTV must exploit the opportunity provided by the aforesaid technical assistance program by JICA to develop human resources capable of operating the ICT network system before completing this Project.

3-3 Important Assumptions

As important assumptions other than those already mentioned, MRTV shall fulfill the following obligations to utilize and maintain the effectiveness of the Project:

- Securing storage space for the equipment until the completion of the installation;
- Securing rooms in which to accommodate the procured equipment and sufficient power to operate all the broadcasting equipment according to the requirements specified in the design documents and
- Reliably meet the responsibilities of the Myanmar side as stipulated in the E/N and G/A.

3-4 Project Evaluation

3-4-1 Relevance

Following the transition to civilian rule in 2011, various changes have occurred in Myanmar. As for the broadcasting field, which was previously government-controlled, a number of commercial TV channels started broadcasting and the broadcast of various programs commenced, including foreign. Under such democratic movement, a Broadcasting Law, aiming to ensure the broadcasting business in Myanmar would meet international standards, was enacted in August 2015 and discussion to improve this law has continued in Congress. A PSM Bill, which aims to liberalize governmental control over the broadcasting business, is also discussed in Congress. According to these laws, MRTV has taken steps to ensure the independency and fairness of the broadcasting business, although legal development of the laws for broadcasting business are still criticized by various sectors.

Economic assistance from the Japanese Government started from the "Project for TV broadcasting equipment" (JPY 350 million) in 1980. Subsequently, the Japanese Government constructed a TV Studio Center in Yangon (current YBC) and granted program production equipment, including playout system, OB van and radio relay system, through the "Project for Expansion of TV Facilities" (JPY 2,960 million in total through the 1st and 2nd phases) in 1982~1983, whereupon full-fledged TV broadcasting got underway. Since the TV Studio Center in Yangon functioned as an MRTV hub station until the main office of MRTV was relocated to the new capital Nay Pyi Taw in March 2008, it is understood that a Japanese grant aid Project rightly built the foundation of MRTV as a national broadcasting station.

During the SEA Games in December 2013, various sporting events hosted in principal cities in Myanmar were broadcast worldwide from the International Broadcasting Center set up by MRTV. It shows how the technical skills of MRTV have improved to such an extent over these 30 years that MRTV successfully broadcast the SEA Games worldwide, even though it was supported by other countries, including Asia. In view of the MRTV's current full-fledged movement towards public broadcasting and a long history of the Japanese Government assisting Myanmar, it seems quite natural that Myanmar requested the Japanese Government to assist in expanding the broadcasting equipment and mainly to rehabilitate the program production facilities in YBC.

In April 2012, the Japanese Government announced a basic economic cooperation policy of Japan's Assistance to Myanmar; focusing on: ❶ Improving people's livelihoods (including assistance for ethnic minorities and poverty groups as well as agricultural and rural development), ❷ Capacity building and developing systems to sustain the economy and society (including assistance to promote democratization) and ❸ Development of infrastructure and related systems necessary for sustainable economic development. The Project remains consistent with these basic economic cooperation policies to Myanmar. Also, efforts to improve the broadcasting equipment have also been reasonably supported by assistance policies under the Japan-Myanmar Cooperation Program announced by Japanese Government in November 2016, which listed "telecommunications, broadcasting and postal services as tools to connect the people" as one of the pillars of cooperation, which means the relevance of the

Project is extremely high.

As stated above, the Project is consistent with both the development policy of Myanmar and the cooperation policy of Japan, which targets capacity building and development of systems to sustain the economy and society by improving the broadcasting business. Accordingly, it can be considered crucial to support the implementation of this program as a form of Japanese grant aid.

3-4-2 Effectiveness

(1) Quantitative Effect

Comparison table between the current figure and the final target of program production (number of programs and total hours on air) is shown in Table 3-1 based on the practical discussion of the quantitative effect of the Project with MRTV. The current data for December 2015 and the expected result in 2022 are compared, three years after completion of the Project in 2019.

Table 3-1 Expected Quantitative Effect for Each Channel

Index	Current data (2015)		Target (2022)	
Number of the Programs	Channel	Number/week	Channel	Number/week
	MRTV-N	320	MRTV-N	350
	MRTV-E	260	MRTV-E	280
	NRC	175	NRC	200
	Hluattaw	60	Hluattaw	70
	Farmer	224	Farmer	250
	MI	504	MI	504
	Total:	1,543	Total:	1,654
On-air Time	Channel	Hours/week	Channel	Hours/week
	MRTV-N	112h	MRTV-N	168h
	MRTV-E	168h	MRTV-E	168h
	NRC	119h	NRC	133h
	Hluattaw	112h	Hluattaw	133h
	Farmer	112h	Farmer	133h
	MI	168h	MI	168h
	Total:	791h	Total:	903h

Implementing the Project is expected to streamline program production by the new Contents Network System in NBC. Moreover, using the new archive and format conversion systems will allow existing MRTV program content to be reused. Although no new TV studio will be constructed in NBC under this Project, MRTV aims to increase the number and on-air time of programs by optimally exploiting existing equipment.

Meanwhile in YBC, program production capability in TV Studio No. 1 is expected to be drastically improved. As well as NBC, program production is expected to be streamlined and the

new computer graphic and archive systems will allow existing MRTV program content to be reused.

According to the future plan of MRTV, the on-air time of the MRTV-N channel is to be expanded to 24 hours/day by creating 30 new programs. MRTV also aims to expand the on-air time for in-house programs to 19 hours/day via channels such as NRC, Huluttaw and Farmer produced in NBC. As new programs to be produced in Studio No. 1 in YBC, MRTV expressed the wish to produce various programs like music shows, folk song/dance programs, talk shows, education programs, information programs and quiz shows, etc.

Based on the above, the quantitative effects of this Project can be summarized as follows:

- Three years after the completion of the Project, it is expected that there are an increase of 111 programs as new production program totaling six channels. As for the broadcasting time, the total of six channels is expected to increase by 112 hours.

(2) Qualitative Effect

Expressive programs with high quality (talk shows with telops inserted, entertainment programs utilizing virtual video systems, etc.) will be increased and efforts to build the capacity of human resources supporting the economic society will be promoted.