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## Abbreviations

ASEAN	Association of South East Asian Nations
B/D	Basic Design
CCI	Cambodia Communication Institute
CDC	Council for the Development of Cambodia
CENAT	National Tuberculosis Center
CJCC	Cambodia-Japan Cooperation Center
D/D	Detail Design
E/N	Exchange of Notes
EDC	Electricite du Cambodge
ESSP	Education Sector Support Program
GDP	Gross Domestic Product
GOJ	Government of Japan
HRD	Human Resources Development
IFL	Institute of Foreign Languages
I-PRSP	Interim Poverty Reduction Strategy Paper
JICA	Japan International Cooperation Agency
M/D	Minutes of Discussions
M/M	Minutes of Meetings
MJC	Myanmar-Japan Center for Human Resources Development
MoC	Ministry of Commerce
MoCFA	Ministry of Culture and Fine Arts
MoEF	Ministry of Economy and Finance
MoEYS	Ministry of Education, Youth and Sport
MoPT	Ministry of Posts & Telecommunication
MoT	Ministry of Tourism
NIM	National Institute of Management
ODA	Official Development Assistance
PPWA	Phnom Penh Water Authority
R/D	Record of Discussion
RULE	Royal University of Law and Economics
RUPP	Royal University of Phnom Penh
SC	Steering Committee
TCP	Technical Cooperation Project
UNTAC	United Nations Transitional Authority in Cambodia
VJCC	Vietnam-Japan Human Resources Cooperation Center

## **SUMMARY**

## SUMMARY

The Kingdom of Cambodia (hereinafter referred to as "Cambodia") wasted and lost many talented people including engineers and intellectuals by a long civil war in the 1970s. In the 1980s, the Cambodia's economy had been growing steadily by assistance from eastern countries. In the 90s, Cambodia had shifted to the market economy system. Cambodia is now reestablishing the economy with democratization assistance by UNTAC, and assistance from international organizations. However, there are few internationally talented people who have the knowledge and technology in the economic and social field to adapt to progress economic globalization, and also, those who are needed that can contribute after joining ASEAN in Cambodia which aims at a more progressive market economy. Cambodia's human resources development is now a very important issue.

Our country, Japan retains assistance to Cambodia based on the official policy that continuous stability in Cambodia is indispensable for peace and development of Asia together with the Pacific Ocean region. Moreover, it is moving forward to establish the so called "Japan Center" project that aims to promote market economy through human resources development with Japan's knowledge, and also, to promote mutual understanding between Japan and other countries that are changing over to market economy.

Under prevailing circumstances, Japan International Cooperation Agency (hereinafter referred to as "JICA") conducted the Project Formation Study in March, 2000 to discuss realization of the Center for Human Resources Development that the main activities of the Center would be to hold "Human Resources Development (hereinafter referred to as "HRD") Courses", "Japanese Language Courses" and "Exchange Programs". Thereafter, in light of the results of the above study, the Royal Government of Cambodia requested assistance from Japan's Grant Aid for the realization of the facility and equipment required to establish the Cambodia - Japan Cooperation Center (hereinafter referred to as "CJCC"). Moreover, the Royal Government of Cambodia requested that Technical Cooperation Project be initiated relative to the "HRD Courses", "Japanese Language Courses" and "Exchange Programs" that would be implemented by the CJCC. In response thereto, the 1<sup>st</sup> Preliminary Study Team by Technical Cooperation Project was dispatched from February to March, 2003. Thereafter, the 2<sup>nd</sup> and 3<sup>rd</sup> Preliminary Study Team were dispatched in June and November, 2003 respectively. As a result of the studies, R/D was signed between Cambodia and Japan in March, 2004.

This Project was planned to construct required facility adequate to implement above "HRD Courses", "Japanese Language Courses" and "Exchange Programs" by CJCC in close

collaboration with Technical Cooperation Project activities. In the event competent and capable personnel who can cope with market economy through activities of the CJCC are brought up in the future, not only Cambodia's shift to market economy will be more promoted, but, it is anticipated that closer relationship between Cambodia and Japan will be realized.

In response to this Japan's Grant Aid requests, JICA dispatched the Basic Design Study Team to Cambodia between November 17 and December 14, 2003 and through discussions, field survey, and technical examination of the results in Japan, JICA prepared the draft report of the study. In order to explain and to consult with related officials concerned from the Royal Government of Cambodia in regard to the components of the draft report, JICA dispatched the Basic Design Explanation Team to Cambodia between February 22 and March 7, 2004. Thereafter, the Royal Government of Cambodia agreed and accepted in principle the contents of the draft report.

In the basic design of this Project, the natural and social conditions of Cambodia, construction and material procurement conditions, implementing organization's maintenance and management capability as well as collaboration and coordination, etc., with the Technical Cooperation Project had to be considered and design policy determined. The outline of the final plan is as follows:

	<b>Room Name</b>	<b>Total Area (m<sup>2</sup>)</b>	<b>Remarks</b>	
<b>1</b>	<b>Lobby/Exchange</b>	1.1 Lobby/ Exhibition Space, Foyer	603.00	Large-sized display system
		1.2 Library	162.00	Including PC booths, Guidance booths, Stacks, etc.
		<b>Sub-Total</b>	<b>765.00</b>	
<b>2</b>	<b>Seminar</b>	2.1 Seminar Room for 20 persons	108.00	3 rooms
		2.2 Seminar Room for 25 persons	54.00	
		2.3 Seminar Room for 30 persons	54.00	
		2.4 Computer Room	72.00	
		2.5 Room for Exchange Program	54.00	
		2.6 Japanese-style Room	32.00	
		<b>Sub-Total</b>	<b>374.00</b>	
<b>3</b>	<b>Administration</b>	3.1 Director Room	72.00	2 rooms
		3.2 Reception Room	36.00	
		3.3 Administration Office	72.00	
		3.4 Instructors Room	108.00	HRD/Japanese Language Course
		3.5 Meeting Room	72.00	2 rooms
		<b>Sub-Total</b>	<b>360.00</b>	
<b>4</b>	<b>Others</b>	4.1 Multi-purpose Hall Interpretation Room Projection Room etc.	432.00	AV system
		4.2 Electrical Room	54.00	
		4.3 Staff Room	22.00	
		4.4 Pantry	18.00	
		4.5 Storage	72.00	3 rooms
		4.6 Kitchenette	4.00	
		4.7 Toilets	104.00	On first & Second floor Including Toilet for the disabled
		4.8 Circulation	397.00	
		<b>Sub-Total</b>	<b>1,175.00</b>	
		<b>Total</b>		<b>2,674.00</b>

\*Procurement of Furniture (tables, chairs, book shelves, etc.) which are contained in this Project.

In the case this plan is implemented by Japan's Grant Aid, the term of work for completion of the entire project is assumed to be about 17 months including time required for detailed design. The cost estimated for this Project is expected to be approximately 499 million Japanese yen (some 490 million Japanese yen from Japan and Cambodia to shoulder some 9 million Japanese yen). This cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant.

The implementing organization of this Project is CJCC established in the Royal University of Phnom Penh (hereinafter referred to as "RUPP"). According to a preliminary calculation performed by the Cambodian side, annual running cost (includes fees and charges for electricity, telephone, fuel, internet connection, water supply and drainage services, etc.) of the CJCC is estimated to be approximately US\$ 67,000, and personnel expenses are estimated at US\$ 76,440 according to a preliminary calculation performed by those involved in the

Technical Cooperation Project. RUPP is applying to the Ministry of Education, Youth and Sport (hereinafter referred to as "MoEYS") for a special budget corresponding to running cost, personnel expenses, etc. In addition to expenses, it must support and newly establish the Center and cope with the budget required to implement the Project and to maintain and operate the new facilities which will be secured. The revenue and expenditure plan in connection with the management and operation budget of the CJCC is envisaged to be covered not only by MoEYS's special budget but also from admission fees, fees to be collected from the various courses and charge for multi-purpose hall. If MoEYS's budget and fees collected for the courses, etc., can be secured on a steady basis, it is believed that management of the CJCC would not encounter hardship.

The circumstances that may prevail by implementing this Project are described hereinafter.

**(1) Direct Effects**

- 1) By preparing and establishing seminar and computer rooms necessary to hold HRD Courses and Japanese Language Courses, it will become possible to implement the required curriculum for Japanese language education and to introduce competent and capable personnel who will, eventually, contribute to the positive realization of a market economy.
- 2) By preparing and establishing a room for exchange program and Japanese-style room, it will become possible to carry out programs and activities which will contribute to promote cultural exchange between Cambodia and Japan.
- 3) By preparing and establishing a multi-purpose hall, it will become possible to hold Japanese speech contests, show Japanese movies, hold various lecture meetings and all sorts of exhibitions, workshops, etc., based at the CJCC which are now held at the Japanese Embassy or other rental facilities.
- 4) By preparing and establishing a library which can accommodate approximately 5,000 to 6,000 books related to Japan, economy, etc., as well as providing reading space, it will become possible to make public and to gather information at the CJCC which will provide required information to visitors as well as exchange information based thereat.



## **(2) Indirect Effects**

- 1) By planning facilities established and maintained under the Project activities related to Japanese language education, market economy and exchange between Cambodia and Japan, it is expected that CJCC will play the main role in academic and culture exchange between the two nations.
- 2) By planning facilities established and maintained under the Project activities related to Japanese language education, market economy and exchange between Cambodia and Japan, it is expected that intensification of human resources engaged in various sectors of the Cambodian society such as more people learning about Japan and their language, improved capability of Japanese language teachers becoming available, development of competent and capable persons who contribute towards promoting market economy, etc., can be realized.
- 3) Again, by planning facilities established and maintained under the Project activities related to Japanese language education, market economy and exchange between Cambodia and Japan, all sorts of interchanges at various levels such as state level, academic exchange, private sector exchange, etc., will materialize facilitating mutual understanding between the two countries.
- 4) Through planning facilities established and maintained under the Project and by the CJCC, strengthening cooperation between other Japan Centers in Asian nations and through various activities, information exchange between Japan and other nations all over Asia, will most likely, promote and strengthen mutual understanding between each country as well as intensifying promotion of human resources of each nation concerned.

In conclusion, recommendations relative to executing this Project are described below.

### **(1) Establishment of Management Organizations in the CJCC by the Cambodian Side**

Although management and operation of the presently planned CJCC will take the form of joint management between Japan's Technical Cooperation Project and Cambodia, it is expected to be largely dependent on those involved in the Technical Cooperation Project. The Cambodian side is now in the course of selecting staff to operate and manage the Center and it is considered that establishing the Cambodia management system will, in the real sense, lead to educational, economic and culture exchange

between both nations and substantial joint activity by staff of both nations. Therefore, establishing the Cambodia management system both in respect to human resources and financial aspects through the Technical Cooperation Project will be required.

## **(2) Establishment of CJCC Functions**

The CJCC will aim at establishing the function as the central organ within Cambodia for exchange between Cambodia and Japan. In regard to the future with the Center at the core, there is ample room to scrutinize plans, to expand activities through cooperation and exchange with other universities and research institutes such as implementing scientific activity cooperation with each faculty, etc., of RUPP where the CJCC is situated. Therefore, whilst constantly paying close attention to the Cambodian national educational plans and to the direction in which the market economy is heading, by scrutinizing the role at the Center amidst such circumstance, it is felt that expanding the functions of the central player and making it function more effectively will indeed be possible.

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## **CHAPTER 1**

# **BACKGROUND OF THE PROJECT**

# CHAPTER 1 BACKGROUND OF THE PROJECT

## 1-1 Background and Outline of Grant Aid Request

### (1) Background of the Request

The Kingdom of Cambodia (hereinafter referred to as "Cambodia") adopted the market economy policy from results of the Paris Peace Accords of 1991. However, their organizational and basic strategies regarding market economy are still incomplete. It is a matter of urgency to develop their human resources in this field.

Our country, Japan retains assistance to Cambodia based on the official policy that continuous stability in Cambodia is indispensable for peace and development of Asia together with the Pacific Ocean region. Moreover, it is moving forward to establish the so called "Japan Center" project that aims to promote market economy through human resources development with Japan's knowledge, and also, to promote mutual understanding between Japan and other countries that are changing over to market economy.

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collaboration with Technical Cooperation Project activities. In the event competent and capable personnel who can cope with market economy through activities of the CJCC are brought up in the future, not only Cambodia's shift to market economy will be more promoted, but, it is anticipated that closer relationship between Cambodia and Japan will be realized.

## **(2) Outline of the Request and Main Components**

The outline and main components of the request from the Royal Government of Cambodia about this Project are shown below.

[Outline of the Project]	
1) Overall Goal:	To promote and develop the market economy in Cambodia and mutual understanding between Cambodia and Japan.
2) Project Purpose:	To construct the facility of the CJCC and develop human resources for the market economy in Cambodia.
3) Expected Outputs:	To construct facility and install proper equipment necessary for CJCC
4) Activities and Inputs:	
A. Contents of request to the Japanese side:	
Facilities construction:	Cambodia - Japan Cooperation Center
Equipment supply:	Equipment for educational training, administration and library, and furniture etc.
B. Execution plan by the Cambodian side:	
Conduct the courses using the planned facility, deploying necessary teachers, and developing operation and maintenance system.	
5) Target area (site):	Royal University of Phnom Penh, in the Institute of Foreign Languages Campus, Phnom Penh, Cambodia
6) Direct/Indirect Beneficiaries:	
A. Direct beneficiary:	Students in and around Phnom Penh, government officials, private enterprises and citizens.
B. Indirect beneficiary:	All the citizens in both countries and private enterprises to which CJCC bring positive results.

## **CHAPTER 2**

### **CONTENTS OF THE PROJECT**



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

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

#### **(1)    Overall Goal and Project Purpose**

The Overall Goal of this Project is to promote and develop the market economy in Cambodia and mutual understanding between Cambodia and Japan. The Project should be implemented in close collaboration between facility construction by the Grant Aid and Technical Cooperation Project which provides assistance to the activities of CJCC. To realize the overall goal, the main objective of this Project is to provide the facility for CJCC to implement "HRD Courses", "Japanese Language Courses" and "Exchange Programs" based on the request from the Cambodian side and results of the Basic Design Study.

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

This Project is to construct the facility of the CJCC in close collaboration with Technical Cooperation Project, and implements three activities which include "HRD Courses", "Japanese Language Courses" and "Exchange Programs" to realize the above mentioned Overall Goal and Project Purpose. It is expected that the human resources who respond to market economy in Cambodia are developed and the mutual understanding and friendly relations between Cambodia and Japan will also be immensely promoted by this implementation. This Project is to construct the facility of the CJCC for implementation of Technical Cooperation Project activities in CJCC.

### **2-2    Basic Design of the Requested Japanese Assistance**

#### **2-2-1    Design Policy**

The basic design of the facilities in this Project is based on the following design policies considered from the results of the field survey, the natural and social conditions of Cambodia, the construction and procurement conditions, the maintenance and management capability of the Implementation Agency and adjustments made in cooperation with Technical Cooperation Project.

- (1) The contents of the facilities and their assumed scale should be based on the activities of the Technical Cooperation Project. A rational number and scale of facilities should be designed in accordance with the programs of the Technical Cooperation Project.
- (2) Having examined the functions and the activity plan required for CJCC, the overall plan for the contents and function levels of the new facility will be designed to satisfy its purpose.
- (3) Having compared/examined relevant similar facilities in Cambodia and by Japan's Grant Aid, the advantages for the Project will be considered. On the other hand, the current problems that are expected will be improved as much as possible in the Project.
- (4) The environmental condition, local climate (rain, sunshine and wind) and social customs should be taken into consideration in the design of the facilities.
  - 1) The level of the first floor will be raised the same as the existing buildings on campus of RUPP in order to prevent water infiltration and provide radiant heat protection from the ground.
  - 2) The roof should be sloped in order to provide protection from direct radiation of sunlight and to have positive protection from rain water.
  - 3) Deep eave overhangs and louvers can help to provide shade in the rooms from direct sunlight and intense rainfall and to facilitate natural ventilation.
- (5) The design of the facility and equipment plan should allow low cost and easy maintenance based on the technical support and maintenance/management system from the Cambodian side.
- (6) Rationalization of the construction by lowering the cost are promoted and easy maintenance should be considered through the maximum use of local or third county construction methods and materials.
- (7) Functional technology, durability and practicality should be considered within the appropriated budget. Also, the design should be in harmony with the surrounding environment and emphasize the character of CJCC.
- (8) Cooperation and adjustment of the equipment which are not contained in the Project should be fully considered with Technical Cooperation Project.

## 2-2-2 Basic Plan (Construction Plan/Equipment Plan)

### 2-2-2-1 Results from Examining the Contents of Request

#### (1) Facility Planning

##### 1) Contents of Request

The contents of request for the facility, which the Basic Design Study analyzed, were agreed to by the Cambodian side after discussion and examination, and described in the Minutes of Discussions signed on December 3, 2003. Table 2-1 shows the confirmed contents of request for the facility.

**Table 2-1 Required Rooms from the Cambodian Side**

(Facilities)

Room		Contents	Remarks
<b>I. Lobby-Exchange</b>			
A.	Lobby	Entrance Lobby, Video Display, CCTV System	
B.	Library	5,000-6,000 books capacity	
	Reading Desk	Seat for 30 people	
	Internet Booth	3 PC booths for internet access	
	AV Booth	2 video viewing booths	
	Study Carrel	3 study booths with tape recorders	
	Control Desk	Control desk, Equipment rack	
	Storage	Storage Space for keeping books, spare table and CD	
C.	Guidance Booths	2 booths with table & chairs	
<b>II. Seminar</b>			
A.	Multi-Purpose Hall	250-300 seats room	
		Interpretation booth	Japanese, Khmer, English
		Large-size screen	
B.	Seminar Room	3 rooms with 20 seats (Japanese/HRD)	
	Seminar Room	1 room with 25 seats (Japanese/HRD)	
	Seminar Room (JICA-NET)	1 room with 30 seats (HRD)	Further information will be available later
C.	Computer Room	20 computer units with server & printer	1 computer for lecturer
D.	Japanese Style Room	1 room with 8 pieces of tatami room	
E.	Room for Exchange Program	1 room for 15 – 20 persons with mini kitchen	
F.	Kitchenette		
<b>III. Administration</b>			
A.	Director Room	2 Director room	
B.	Reception Room	Small reception room for 10 persons	
C.	Administration Office	1 room with 10 seats for expert and staff (inc. part-time)	Administration + Exchange Program
D.	Instructor Room	1 room with 10 seats for expert and staff (inc. part-time)	HRD Course
		1 room with 10 seats for expert and staff (inc. part-time)	Japanese Course
E.	Meeting Room	1 meeting room with 20 seats (for all staff)	Weekly meeting
F.	Other	1 room for 5 persons	Driver, Security, Cleaner
<b>IV. Others</b>			
A.	Pantry	Beverage (coffee, tea etc. for function)	
B.	Corridor, etc.	Corridors, Staircases	
C.	Toilets	1 Toilet each floor	
D.	Machinery Space	Power room, Pump room Generator room, Air conditioning for required rooms	
E.	Storage space	Storage space for seminar equipment, and storage for office supplies	

(Equipment)

Equipment		Description
A.	Lobby Display System	Large Screen Display with Satellite transmission system
B.	AV Equipment for Multi-Purpose Hall	LCD Projector, Screen (Wide), CD Player, Video Deck, Audio Amplifiers, Speaker
C.	Furniture	

## 2) Examination of the Contents of Request

For each requested facility shown in Table 2-1, discussions were held with the Cambodian side and Technical Cooperation Project Study Team in terms of the necessary number and scale of each room, as they have been examined in the Basic Design Study. Concerning the contents of the Minutes of Meetings between the Cambodian side and Technical Cooperation Project Study Team, further discussions were held in Japan after the Basic Design Study. The results are presented as follows:

### A. Library

Rack room for 5,000 - 6,000 books, reading desks for 30 persons, 3 internet booths and 2 AV booths etc., were requested by the Cambodian side. Their necessity is acknowledged, and the contents, the form, and the size of the facility have been planned through comprehensive discussions with the Cambodian side and Technical Cooperation Project Study Team.

### B. Seminar Room

3 seminar rooms for 20 persons (for HRD Course and Japanese Language Course), 1 seminar room for 25 persons (for HRD Course and Japanese Language Course) and 1 seminar room for 30 persons (for HRD Course and JICA-NET) were requested by the Cambodian side. It was confirmed by Technical Cooperation Project Study Team that these seminar rooms will not only be utilized for HRD course and Japanese Language Course, and also, RUPP will newly establish the Department of Japanese under IFL, and it was acknowledged as necessary.

The Cambodian side and Technical Cooperation Project Study Team agreed that the Department of Japanese would utilize the CJCC facilities to be provided by the Japan's Grant Aid under following conditions:

- The Department will pay some rent (RUPP will decide the amount) to the CJCC account.
- The Department will never occupy any part of the Center facilities, and
- The CJCC Director will take full responsibility of operation and maintenance of the facilities.

### C. Computer Room

Computer room for 20 persons was requested by the Cambodian side. Through comprehensive discussions with the Cambodian side, it was confirmed that they would use computers for every class in the HRD Course and Japanese Language Course. One computer room for 20 persons was acknowledged as necessary. Also, it was confirmed that existing computer rooms in RUPP and other relevant facilities were used efficiently, so necessity of computer room in CJCC was acknowledged as required by the Basic Design Study.

### D. Multi-purpose Hall

Multi-purpose hall for about 400 persons was requested by the Cambodian side. However, the Technical Cooperation Project Study Team and Basic Design Study Team explained that a multi-purpose hall to be prepared in the CJCC should have appropriate capacity, size and specification to satisfy the Project activities. The Cambodian side accepted this comment and asserted that, they expected approximately 250-300 persons would be a reasonable capacity. Although many discussions have been undertaken with the Cambodian side and Japanese side, and it was agreed that the planned capacity of multi-purpose hall should consider 250-300 people.

The details of activities at a multi-purpose hall was planned by the Cambodian side and Technical Cooperation Project Study Team based on the past holding records by Embassy of Japan, JICA Cambodia office and the Cambodian side. The major activities are seminar, workshop, movie, Japanese speech contest, etc. The multi-purpose hall is planned as an appropriate space with a stage, projection room, simultaneous interpretation room, etc., to realize and accommodate above activities.

### E. Administration Office

Each of the room requested for administration is considered necessary for the operation of CJCC. The space should be planned on the second floor for security.

- a) 2-Director's Rooms (for use by CJCC Director of the Cambodian side and Chief Advisor of Japanese side)

- b) Reception Room for 10 persons (for use by both the Cambodian side and the Japanese side)
- c) Administration Office for 10 staff (for use by both the Cambodian side and the Japanese side)
- d) Instructor Room for 20 staff of HRD Course and Japanese Language Course (for use by both the Cambodian side and the Japanese side)
- e) Meeting Room for 18 persons

F. Room for Exchange Program and Japanese-style Room

Room for exchange program was requested by the Cambodian side. The contents of activities, such as Khmer language course, cooking course, etc., for 20 persons should be planned by the Cambodian side, and its necessity was acknowledged. Also Japanese-style room was acknowledged as necessary and should be planned with 8 tatami mats and utilized for the introduction of Japanese culture.

G. Others

We plan to utilize the exterior space in the Project site usefully. The courtyard is planned to integrate the exchange zone, by utilizing the existing large tree and pond at the Westside of CJCC. The courtyard exchange space can be used to facilitate and encourage integration of people to the exchange space, provide various activities and also utilized as rest space for relaxation.

Barrier free concept, which is not common in Cambodia, is going to be considered in the facility planning, mainly for the first floor, in order to facilitate a people-friendly space for CJCC.

## **(2) Equipment**

1) Activity and equipment needed in CJCC

The Technical Cooperation Project Study Team which parallels the Project presented an Equipment List showing necessary items shown in Table 2-2. Based on this list and discussions with the Cambodian side and Technical Cooperation Project Study Team, examination and survey regarding the scope of equipment have been considered consistent with CJCC's activity and the facility planning.

2) Examination of contents of request

Based on site survey and several discussions with the Cambodian side and Technical Cooperation Project Study Team, we concluded that the equipment list requested by the Cambodian side was adequate for CJCC's activities such as HRD Courses, Japanese Language Courses and Exchange Programs.

Both sides agreed that the Project should consider some arranged lobby display and AV (Audio Visual) system built into the facility and furniture closely related to room layout. The final list of equipment is shown in Table 2-2.

The above mentioned lobby display, AV system and furniture will be included in the facility construction scheme.

**Table 2-2 The List of Necessary Equipment for Technical Cooperation Project**

Equipment Name	Quantity	Short Specification	Scope of Work (for facility construction)
<b>1. Lobby/ Exchange Zone</b>			
A. Lobby Display	1 unit	Large Screen Display with Satellite transmission System	○
B. Audio-visual System	1 unit	Video Monitor Booths (Video-recorder, CD-recorder, etc.)	
C. Computer Terminals	1 unit	For Book Administration, Printers	
D. Equipment	1 unit	Furniture (Tables, Chairs, Equipment Racks)	○
		Copy Machine	
E. Library Control Desk	1 unit	Furniture (Tables & Chairs)	○
		Detector	
F. Guidance Booth	1 unit	PC & Printer for Reference System of Books	
G. Others	1 unit	CCTV System	○
<b>2. Seminar Zone</b>			
A. AV Equipment for Multi-purpose Hall	1 unit	LDC Projector, Screen (Wide), CD Player, Video Deck, Audio Amplifiers, Speaker	○
B. Seminar Room Furniture	1 unit	OHP Projector, LDC Projector,	
		Desks & Chairs, Equipment Wagon, White board, Screen	○
C. Computer System	1 unit	PC, PC Server, Printer, Internet Connection	
D. Equipment	1 unit	TV, VIDEO	
<b>3. Administration Zone</b>			
A. Office Equipment	1 unit	Copy Machine, Fax Machine, PC & Printer	
		Telephone & Internet Connection	○
B. Office Furniture	1 unit	Desks, Chairs, Bookshelves, Lockers, etc.	○
C. Lesson Editing Equipment	1 unit	Editing Equipment, etc.	
<b>4. Others</b>			
A. Satellite Transmission Receiving System	1 unit	Amplifier, Distributor, Connection to Required Equipment	○
B. Storage Racks	1 unit	Seminar Equipment, Furniture	○
		Administrative Supplies, School Records & Documents,	
C. Extension Telephone System	1 unit		○
D. Radio System in the Center	1 unit		○
E. Pantry	1 unit	Tables & Chairs, Cooking Facilities (Sink)	○
		Cooking materials	
F. JICA-NET	1 unit		

Source: From Technical Cooperation Project

### 2-2-2-2 Site Layout Plan

The Royal University of Phnom Penh (RUPP) campus master plan was planned and designed by a renowned Cambodian architect Vann Molyvann in the 1960s. This campus made a good impression visually and functionally taking advantage of historic architectural characteristic of ancient Angkor. In particular, emphasis was placed on pedestrian bridges, pathways and water ponds which are presently maintained by world heritage who have



maintained the historic "Angkor Wat" style of architecture and also some facilities with pilotis are expressed at the first floor pathway with open columns expressed continuous to the second floor. This design language is used in the 1960s and practiced globally. Historic Angkor tradition has been expressed on this campus as visually pleasing and functional. Mr. Vann Molyvann studied under Le Corbusier who is the master of modern architecture, and his level of design is highly respected worldwide.

The project site is located in the RUPP campus which is adjacent the IFL building, French library, and boundary fence of Engineering Institution of Cambodia. It was requested by the Cambodian side that the design should consider harmony with the design of facilities in the RUPP campus by utilizing the pedestrian bridge which extend from main street (Blvd Russian Federation) to IFL and the open corridor pathways which connects from the French library to the project site to accent and harmonize with the campus environment. Moreover, it was also confirmed by Mr. Vann Molyvann that the campus plan around IFL is based on the historical design concept of "Angkor Wat", and it has been planned to connect with the corridors from French library to this project site.

The site layout plan for the Project was based on the existing overall composition of the facility, giving full consideration to above mentioned site conditions, such as the natural conditions, the actual site ground contours and the condition of the surrounding area. The following considerations are given as the basic policies for the physical zoning and flow line plan of the facilities.

- (1) This concept shall be considered to harmonize with RUPP campus, to assimilate ("Marriage") culture and tradition between Cambodia and Japan and to promote mutual understanding and to be symbolic tie between the two countries. Based on this concept, it is considered a rational plan in regard to the pedestrian flow and functional aspects to harmonize with the campus activities.
- (2) It is necessary to examine integration of the location of the new facility on the site and consideration of the existing large tree located in the central north portion of the site. Layout of the facilities should also be integrated by the architectural, structural and utility design concepts.
- (3) It is important to consider the layout of the facility in order to incorporate good ventilation and natural lighting and reducing use of mechanical devices throughout the

year with consideration of the climate in Cambodia, and it was concluded that the main facility should face the south direction.

- (4) Safety, accessibility to the facilities from the main gate and security check points should be considered in order to provide an effective security system within the site.
- (5) A good environment suitable for educational activities and Japanese sensitivity and atmosphere would be achieved with effective use of open space (the courtyard).

### **2-2-2-3 Facility Planning**

#### **(1) Floor Plan**

##### 1) Basic Concept for Determination of Contents and Scale of Facilities

The selection of the contents and scale of the facilities is based on the study of the number of rooms and the scale of each room. The design concept and determination of the facilities' scale may have an important impact, not only in regard to the functional aspects of the facilities, but it will have an important effect on the construction and project cost. The determination of the facility scale is based on the following considerations:

- A. The contents of the facilities and their assumed scale should be based on the contents of the Minutes of Discussions and the discussion with Technical Cooperation Project Study Team after the Basic Design Study. A rational number and scale of facilities should be designed in accordance with the contents of these discussions.
- B. The appropriate floor areas of room per person varies for each purpose. Therefore, the size of major rooms should be confirmed through discussions with the Cambodian side in regard to the layout plan utilizing minimum space required for equipment and use of the rooms shown on the drawings. An optimum facility design is to be formulated through studies of existing similar facilities in other countries as a reference for the Project.
- C. The computation of scale for each room should be planned giving consideration to the basic unit of each room based on their educational needs and the practice activities for the Human Resources Development Courses, Japanese Language

Courses and Exchange Programs. Space design for utilities and equipment should be taken into consideration in regard to the safety and functional aspects of the facility.

- D. The flow line plan, zoning plan and facilities plan should be prepared taking into consideration the internal circulation of staff and services, external flow pattern of guests, etc.
- E. The scale of facilities should be calculated based on the activity plan (curriculum and number of students) of the HRD Courses, Japanese Language Courses and exchange programs confirmed during the Basic Design Study and by Technical Cooperation Project.
- F. The facilities scale, in terms of operation and maintenance, should be examined rationally based on the number of staff and the organizations of CJCC prepared by the Cambodian side and the usage of the facilities.

## 2) Study for the number and the scale of rooms

The scale and number of each room have been determined in accordance with a series of discussions and examinations with the Cambodian side. The computation for scale of each room is planned through discussions with the Cambodian side and studies of other similar projects undertaken with Japan's Grant Aid as a reference.

While the Basic Design Study Team carried out their survey, the Cambodian side proposed the number, size and function for each room and they were confirmed through discussions with Technical Cooperation Project Study Team. Based on these discussions, each room area has been formulated with consideration of planned activities such as the type of lectures and number of students.

### A. Library

The Library is planned to provide reference books and offer information in regard to Japan and market economy to broaden their own knowledge and for their personal advantage. It is planned on the assumptions indicated below.

- a) Numbers of books: from 5,000 to 6,000 books
- b) Number of seats: 30 seats, as requested from the Cambodian side.

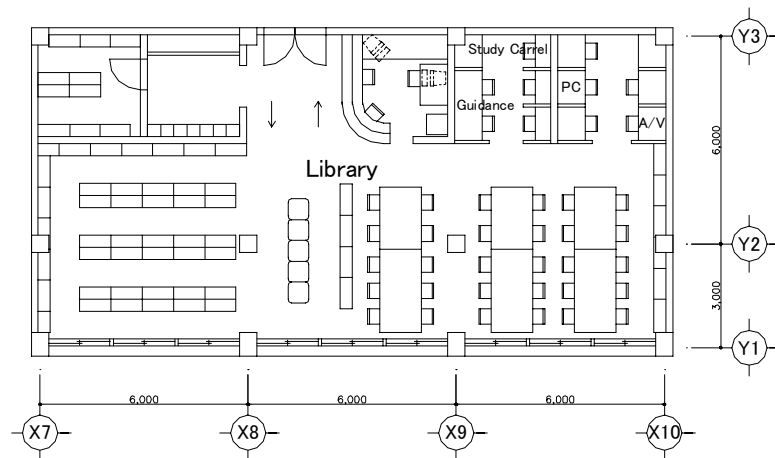
To analyze the architectural planning, the approximate floor area (A) for a reading room is calculated according to (a) number of books, (b) number of seats, (n) capacity of books per square meter and (m) area allowed for each person per square meter.

**Table 2-3 Approximate Floor Area for a Reading Room**

$A=(a/n + b/m) \alpha$	$a=5,500$ (average of 5,000 to 6,000 books)
$\alpha$ (margin)=2.1 (a standard using high shelves)	$b=30$
	$n=220$ per $m^2$ (a standard using high shelves)
	$m=0.6$ per $m^2$ (a standard for six-person desks)
	$\rightarrow A=157.5 \text{ m}^2$

Source: Construction design data collection (edited by Architectural Institute of Japan)

The assumed area not only include shelves and reading desks, but also, study carrel, guidance booths, AV booths and PC booths in the library. The function and scale are narrowed down to the minimum necessity and the scale of the library should be appropriate and adequate for their intended use.



**Figure 2-1 Library**

**B. Seminar Room**

The seminar room is planned to accommodate total of five rooms which include 3 rooms for 20 persons (for HRD Courses and Japanese Language Courses), 1 room for 25 persons (for HRD Courses and Japanese Language Courses) and 1 room for 30 persons (for HRD Courses and JICA-NET). As a result of discussions with the Cambodian side, the desk and chair were planned combined to facilitate arrangement for discussion style or facing style which might be necessary and in order to have flexibility for any layout.

The programs of each course are shown in the following table 2-4.

**Table 2-4 Tentative Schedule of Courses**

	Courses	Students (persons)	Term (months)	Frequency (times/year)
HRD Courses	Mini Business & Management Course I	25	3	4
	Mini Business & Management Course II	20	3	4
	Entrepreneur Incubating Course I	20	6	2
	Entrepreneur Incubating Course II	20	6	2
	Seminar Type or Incentive Short-term Course	300	2-3 days	4
Japanese Language Courses	Beginner Level Course	25	6	2
	Intermediate Level I Course	20	12	1
	Intermediate Level II Course	20	12	1
	Teachers Training Course	15	12	2
Department of Japanese	The detail of course program is planning by Technical Cooperation Project and Japan Foundation.			

Source: From Technical Cooperation Project

a) Seminar Room for 20 persons

The Seminar Room is planned for 20 persons for HRD Course and Japanese Language Course. It has been planned as 36m<sup>2</sup> in consideration of the activity and the layout plan of furniture. Also, it was planned with consideration that RUPP will newly establish Department of Japanese to accommodate 3 classes.

b) Seminar Room for 25 persons

The Seminar Room is planned for 25 persons for HRD Course and Japanese Language Course. The area planned is 54m<sup>2</sup> which was formulated by comparing the room size between this Project and similar projects by Japan's Grant Aid which utilized the standard data analyzed is as follows. Area per persons, is 1.8m<sup>2</sup> to 2.16m<sup>2</sup>, which is similar to others. Also, it is considered from an architectural planning viewpoint that it is an appropriate area for lectures.

c) Seminar Room for 30 persons

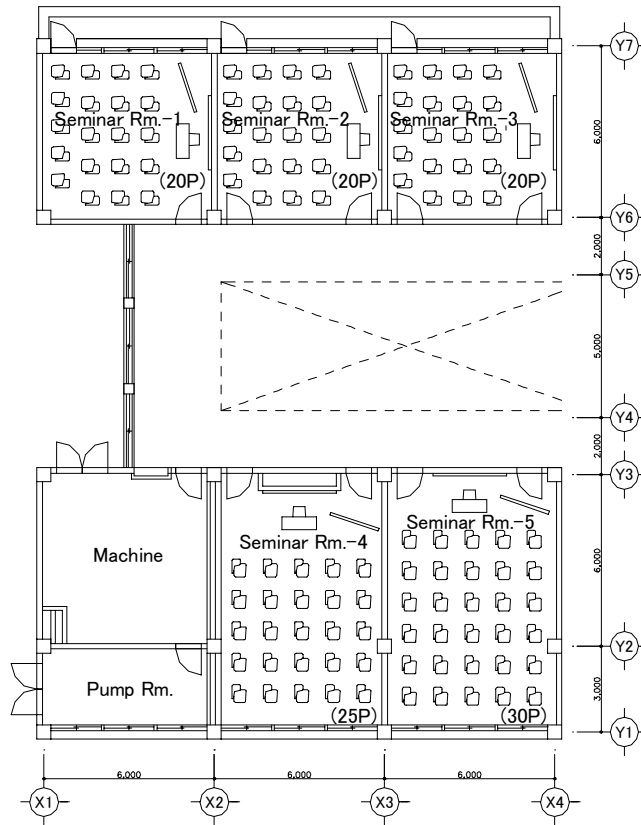
The Seminar Room is considered for 30 persons for HRD Course and JICA-NET which is in planning stage by the Technical Cooperation Project.

**Table 2-5 Comparison of the Room Size (Seminar Room)**

Seminar Room		Area (m <sup>2</sup> )	Capacity (person)	Area (m <sup>2</sup> ) per person
The Project	CJCC	36.0	20	1.8
		54.0	25	2.16
		54.0	30	1.8
Similar Projects	MJC*	63.0	30	2.1
	VJCC-HNC**	82.5	40	2.06
	VJCC-HCMC***	58.8	36	1.6
	LJCC****	67.5	30	2.25
	MJCC*****	54.0	30	1.8

Source: From Basic Design Study Report

- \* MJC: Myanmar-Japan Center for Human Resources Development
- \*\* VJCC-HNC: Vietnam-Japan Human Resources Cooperation Center in Hanoi
- \*\*\* VJCC-HCMC: Vietnam-Japan Human Resources Cooperation Center in Ho Chi Minh City
- \*\*\*\* LJCC: Lao-Japan Human Resource Cooperation Center
- \*\*\*\*\* MJCC: Mongolia-Japan Human Resource Cooperation Center



**Figure 2-2 Seminar Room**

**C. Computer Room**

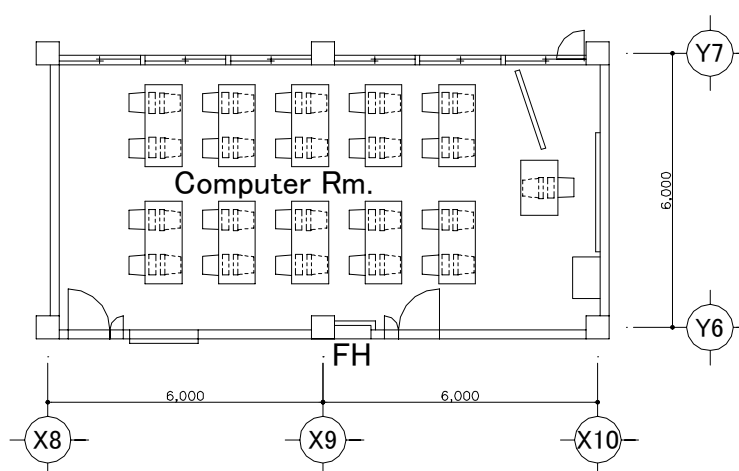
It has been confirmed that computers will be used for both HRD course and Japanese language course. Therefore, a Computer Room must be planned to accommodate 20 persons. Comparison of the room size between the Project and

similar projects by Japan's Grant Aid assistance is as follows. Area per person, is 3.6m<sup>2</sup>, which is similar to others

**Table 2-6 Comparison of the Room Size (Computer Room)**

Computer Room		Area (m <sup>2</sup> )	Capacity (person)	Area (m <sup>2</sup> ) per person
<b>The Project</b>	<b>CJCC</b>	<b>72.0</b>	<b>20</b>	<b>3.6</b>
Similar Projects	MJC	63.0	30	2.1
	VJCC-HNC	64.0	20	3.2
	VJCC-HCMC	59.0	20	2.95
	LJCC	60.0	20	3.0
	MJCC	54.0	15	3.6

Source: From Basic Design Study Report



**Figure 2-3 Computer Room**

**D. Room for Exchange Program and Japanese-style Room**

As exchange programs have various kinds of activities, number of participants and frequency for the exchange program must be able to respond to the demand and have flexibly. Therefore, area of the room should be 54m<sup>2</sup>, which is almost the same as the seminar room in order to have flexibility to seminars as well as exchange programs. Also, Japanese-style room is planned to introduce Japanese culture with space having 8 tatami mats.

Because various activities are included in the exchange programs, it is desirable not to provide a fixed space for exchange program but also have flexible space for lobby, multi-purpose hall, and external space if needed for lectures, exhibitions and meetings. Therefore, the room for exchange program, Japanese-style room, courtyard and multi-purpose hall have been arranged adjacent to each other to take advantage of flexibility between these spaces.

#### E. Multi-purpose Hall

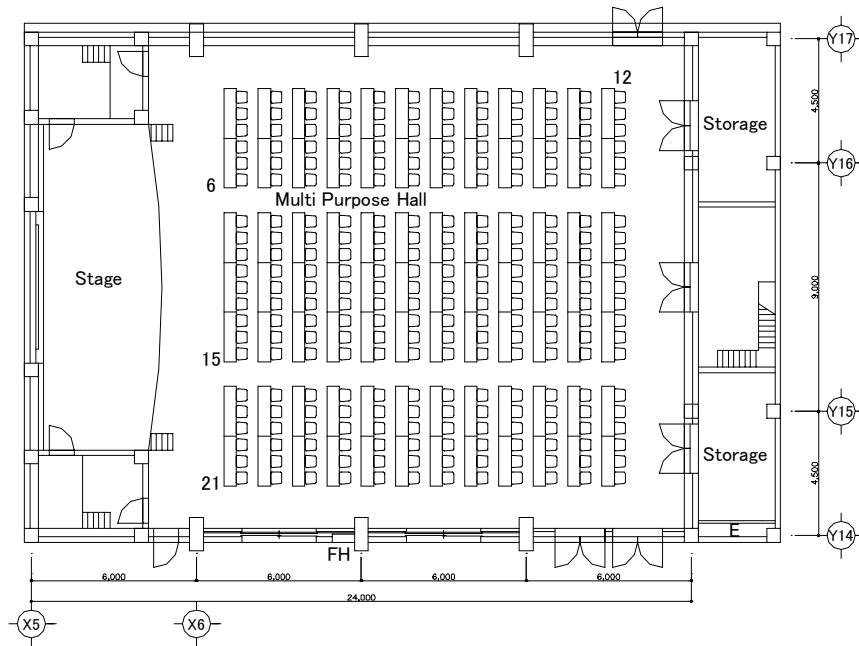
It has been clarified and confirmed that there is a plan to implement various programs carried out as exchange programs in the Japanese embassy, JICA, the Cambodian side and other related organizations which have been carried out in Cambodia to date in CJCC. Therefore, the necessity for a multi-purpose hall has been confirmed. The multi-purpose hall is planned as an appropriate space with a stage, projection room, simultaneous interpretation room, storage, etc., to accommodate various activities.



**Table 2-7 Utilization Plan at Multi-purpose Hall in CJCC (Draft)**

	Activities/ Contents	Sponsor	User	Period (time/year)	Frequency (day/time)	Occupancy Day (day/year)	No. of Person (no/time)	Occupancy Time (hour)
1	Business Seminar	CJCC	General	4	2	16	300	-
2	Exchange Activities Japanese Language Learners in Cambodia	CJCC	Japanese Language Lerner	2	1	6	100	-
3	Japanese Traditional Play Game (origami etc.)	CJCC	Pupil	2	1	6	150	-
4	Theatrical Performance (Puppet Show, Shadow Show etc.)	CJCC	General	2	1	6	200	-
5	Cambodian Traditional Culture Performance	CJCC	General	2	2	8	200	-
6	Martial Arts Club (BUDO) (Judo, Aikido etc.)	CJCC	General	2/week	2/week	96	50	-
7	Film Festival	CJCC	General	3	1	9	200	-
8	Exhibition/ Photo Exhibition	CJCC	General	1	7	9	500	-
9	Exhibition/ ODA,NGO Exhibition	CJCC	General	1	7	8	500	-
10	Internet Live Activities	CJCC	Pupil	2	1	4	200	-
11	Request Survey Explanatory Session	JICA	Persons Concerned	1	1	2	200	3
12	Seminar, Workshop by JICA Projects	JICA	Persons Concerned	6	1-2	12	100	8
13	Seminar by Ex-0participants of Training in Japan	JICA	Persons Concerned	2	1-2	4	200	4
14	Orientation for Youth Invitation Program	JICA	Persons Concerned	2	1	4	150	4
15	Alumni Association of Ex-participants of Training in Japan	JICA	Persons Concerned	2	1	4	300	8
16	Japan Grant-aid for Human Resources Development Scholarship/ Explanatory Sessions	JICA	General	2	1	4	300	4
17	Japan Grant-aid for Human Resources Development Scholarship/ Examination	JICA	General	2	1	4	200	4
18	Japanese Language Speech Contest	EOJ	Japanese Language Lerner	1	1	2	300	8
19	Japanese Traditional Culture Performance (KABUKI, NOU etc.)	EOJ	General	2	2	9	150	4
20	Music Contest (Traditional Music, Modern Music etc.)	EOJ	General	2	2	9	200	4
21	Examination for National Expenditure Scholarship of MoEYS	EOJ	Persons Concerned	1	1	2	120	4
22	Intellectual Seminar	EOJ	General	4	1	8	100	4
23	Scholarship Program for High School Students/ Explanatory Session	EOJ	Persons Concerned	1	1	2	200	4
24	Scholarship Program for High School Students/ Examination	EOJ	Persons Concerned	1	1	2	100	4
25	Japanese Abilities License Examination for Scholarship Students	EOJ	Persons Concerned	1	2	3	50	4
26	Security Information Meeting	EOJ	Persons Concerned	1	1	2	150	4
27	Entrance Ceremony	RUPP	Persons Concerned	1	1	2	400	4
28	Graduation Ceremony	RUPP	Persons Concerned	1	1	2	400	4
29	International Conference	RUPP	Persons Concerned	1	5	7	250	8
30	Workshop/ Seminars	RUPP	Persons Concerned	4	3	16	100	8
31	Conference with universities in Cambodia	RUPP	Persons Concerned	1	2	3	100	4
32	Annual Meeting of MoEYS	MoEYS	Persons Concerned	1	2	3	50	8
33	General Assembly	Others	Japanese Association	1	1	2	150	4
34	Year End/ New Year Party for Japanese	Others	Japanese Association	2	1	4	150	4
35	Seasonal Events (Bon-odori, Mochitsuki)	Others	Japanese Association	2	1	4	200	4
36	Japanese Abilities License Examination	Others	General	1	1	2	100	4
37	Private Exhibition	Others	General	(Irregular)				
38	Rental for Organization	Others	General	(Irregular)				

Source: From Technical Cooperation Project



**Figure 2-4 Multi-purpose Hall**

F. Administration Zone

The planned area was designed as 360m<sup>2</sup> in consideration of narrowing down to a minimum required rooms and have the flexibly. Administration zone includes rooms as follows:

a) Director Room

Comparison of the room size between the Project and similar projects by Japan's Grant Aid is as follows. Area per person is 36m<sup>2</sup>, which is similar to others. As a result of analyzes and studies of other countries Japan Center, it is confirmed that the scale of the room is satisfactory and considered an appropriate area.

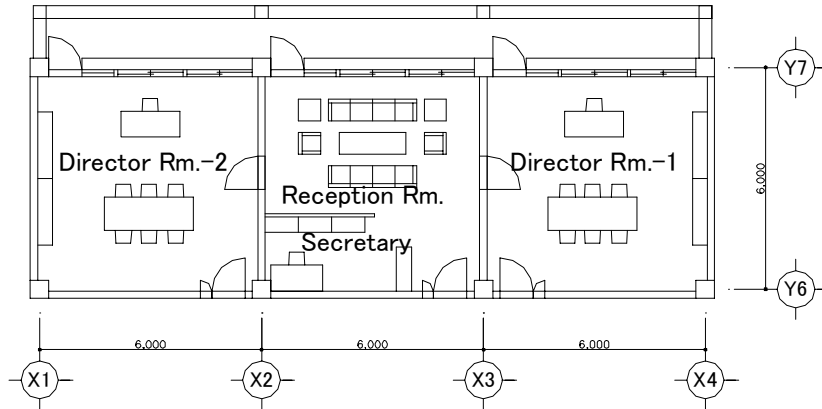
**Table 2-8 Comparison of the Room Size (Director Room)**

Director Room		Area (m <sup>2</sup> )	Capacity (person)	Area (m <sup>2</sup> ) per person
The Project	CJCC	36.0	1	36.0
Similar Projects	MJC	36.0	1	36.0
	VJCC-HNC	34.0	1	34.0
	VJCC-HCMC	35.0	1	35.0
	LJCC	27.0	1	27.0
	MJCC	26.0	1	26.0

Source: From Basic Design Study Report

b) Reception Room

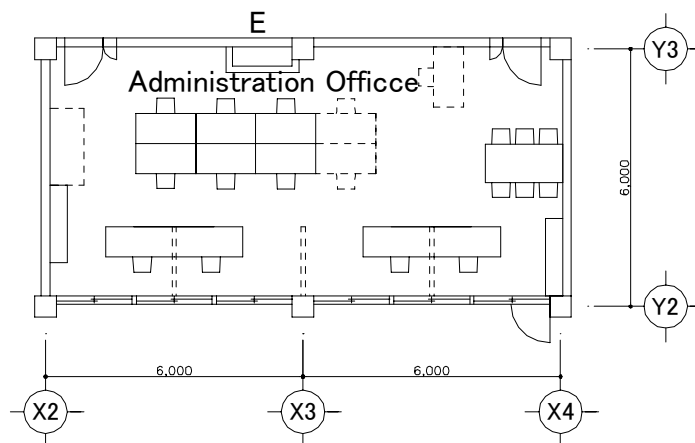
Reception Room is considered to accommodate 10 persons, and it is planned to respond to various visitors. It has been planned as 36m<sup>2</sup>.



**Figure 2-5 Director Room and Reception Room**

c) Administration Office

The space is planned for the general office workers, Japanese coordinator and exchange program staff to do their work in the Administration Office. Layout of furniture have been arranged with consideration of the layout plan being flexible. Space has been planned as 72m<sup>2</sup> including a meeting space.



**Figure 2-6 Administration Office**

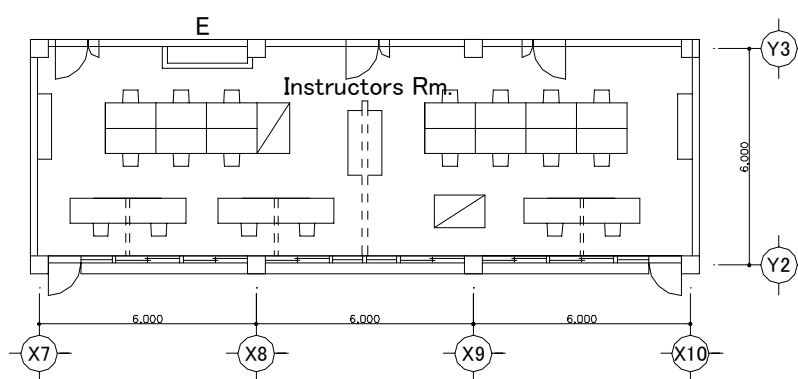
d) Instructors Room

Comparison of the room size in relation to similar projects by Japan's Grant Aid is as follows. In this center, a total of 1 instructor room for instructors of HRD course and Japanese language course is planned. Area per person, which is 5.4m<sup>2</sup>, is a bit smaller than the others, however, it is considered, from an architectural planning viewpoint, that it is an adequate area for the office work. In each of the HRD course and Japanese language course, plan to dispatch Japanese Experts, in the long and short term, has been planned. Together with Cambodian Instructors of each course, 20 persons are expected to use this room throughout the year. Based on this, the plan has been arranged considering the layout of furniture, and the area fixed as 108m<sup>2</sup>.

**Table 2-9 Comparison of the Room Size (Instructors Room)**

Instructors Room		Area (m <sup>2</sup> )	Capacity (person)	Area (m <sup>2</sup> ) per person
<b>The Project</b>	<b>CJCC</b>	<b>108.0</b>	<b>20</b>	<b>5.4</b>
Similar Projects	MJC	63.0	8	7.9
	VJCC-HNC (* Including the storage space)	120.0	8	15.0
	VJCC-HCMC	118.0	15	7.9
	LJCC	61.85	7	8.8
	MJCC	52.0	8	6.5

Source: From Basic Design Study Report



**Figure 2-7 Instructors Room**

e) Meeting Room

Meeting Room for 18 persons have been planned with an area of 36m<sup>2</sup>. The room is planned close to the administration office and instructor room for convenience utilized by staff of CJCC.

### 3) Required Rooms and Floor Areas

As a result of the field survey and information gathered during the discussion with the Cambodian side, minimum area requirements for required rooms have been established. The area of rooms based on the above mentioned examination is shown in Table 2-10.

**Table 2-10 Required Rooms and Their Floor Areas**

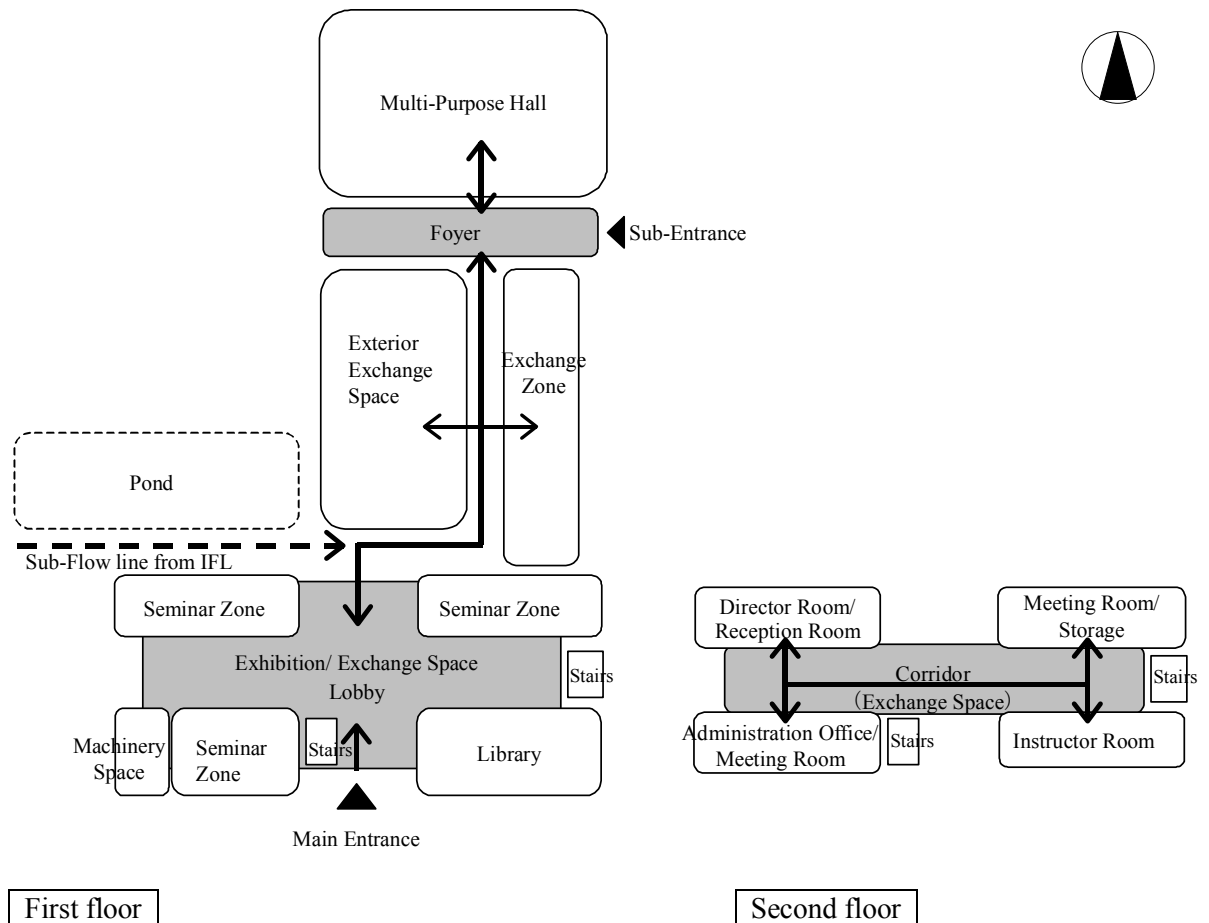
	Room Name	Total Area (m <sup>2</sup> )	Remarks		
1	Lobby/Exchange	1.1 Lobby/ Exhibition Space, Foyer	603.00	Large-sized display system Including PC booths, Guidance booths, Stacks, etc.	
		1.2 Library	162.00		
		<b>Sub-Total</b>	<b>765.00</b>		
2	Seminar	2.1 Seminar Room for 20 persons	108.00	3 rooms	
		2.2 Seminar Room for 25 persons	54.00		
		2.3 Seminar Room for 30 persons	54.00		
		2.4 Computer Room	72.00		
		2.5 Room for Exchange Program	54.00		
		2.6 Japanese-style Room	32.00		
		<b>Sub-Total</b>	<b>374.00</b>		
3	Administration	3.1 Director Room	72.00	2 rooms	
		3.2 Reception Room	36.00		
		3.3 Administration Office	72.00		
		3.4 Instructors Room	108.00		HRD/Japanese Language Course
		3.5 Meeting Room	72.00		2 rooms
		<b>Sub-Total</b>	<b>360.00</b>		
4	Others	4.1 Multi-purpose Hall	432.00	AV system	
		Interpretation Room Projection Room etc.	72.00		
		4.2 Electrical Room	54.00		
		4.3 Staff Room	22.00		
		4.4 Pantry	18.00		
		4.5 Storage	72.00		3 rooms
		4.6 Kitchenette	4.00		
		4.7 Toilets	104.00		On first & Second floor Including Toilet for the disabled
		4.8 Circulation	397.00		
		<b>Sub-Total</b>	<b>1,175.00</b>		
<b>Total</b>		<b>2,674.00</b>			

\*Procurement of Furniture (tables, chairs, book shelves, etc.) which are contained in this Project.

In terms of floor planning, the calculated areas and the layout plan as mentioned above are used, and each facility is planned on the basis of the following criteria:

- A. The floor plan should be coordinated considering the relationship between each room. Contents and function of each room shall be considered in the floor plan so that the facility can be integrated effectively.

- B. The zoning is facilitated by preparing a void space in the center of the building. The void space can be used effectively for various kinds of exhibitions.
- C. The plan should be symmetrical, and the flow planning should be functional and clear.
- D. Library, seminar rooms, multi-purpose hall and room for exchange program should be on the first floor, because it is considered that there are many users expected from the outside. Since the administration section is for limited use, they are planned on the second floor in consideration of security.
- E. It is important to integrate required rooms and equipment effectively so as to create flexibility in planning. Structure grid layout should be a standard module. Building should be planned with most economical and common module considering layout plans of computers, equipment, furniture, etc., for economical construction. The basic structural frame spans shall be examined and considered to create usable space within its structural module.
- F. The size and layout of equipment and furniture in each room should be considered in the design.
- G. Considering local climatic conditions at the construction site, the facility should be planned in order to provide protection from rainfall and strong sunlight. However, minimum air conditioning should be considered and a comfortable indoor environment should be maintained by both air conditioning and natural ventilation.



**Figure 2-8 Zoning Plan**

**(2) Elevation and Cross-Section Plan**

Cambodia is located in the tropical monsoon zone which is hot and has high humidity, therefore, the building must consider how natural ventilation is utilized and how heat load can be controlled. The severe heat-gain from sunlight must be considered and controlled. When planning the elevation and cross-section of the building, the local climate should be considered on the basis of the following policies:

- 1) The analysis of the site ground level and floor heights of the existing buildings shall be considered in order to determine the floor level and cross section of the new facility. In particular, the ground elevation height difference within the site should be examined.
- 2) The level of the first floor will be raised the same as the existing buildings on campus of RUPP in order to prevent water infiltration and to allow control of radiant heat from the ground.

- 3) The roof should be sloped in order to provide protection from sun radiation and direct sunlight and to have positive protection from rain water.
- 4) Deep eave overhangs and louvers can help to provide shade in the rooms from direct sunlight and intense rainfall to facilitate natural ventilation.
- 5) Wall surfaces should have adequate openings to facilitate room ventilation and provide balanced natural lighting, and also to reduce the running cost of electrical lighting and equipment.
- 6) The building elevation design should consider to be in harmony with the surrounding environment and the existing buildings within campus of RUPP.

### **(3) Cost Reducing Measures**

Various cost reduction factors have to be considered in the course of design works for the new facilities. The following cost control and the maintenance costs must be taken into account for building design:

- 1) The overall size of the facility is rationalized so as to enhance the utilization rate of the rooms and to promote the effective use of rooms, utilities and equipment.
- 2) The standardization of space is necessary to give flexibility in the design of the buildings. The basic module should be determined by considering how it will be combined to form the overall buildings. Through extensive investigations, the economical span and standard module has been successfully determined for incorporation into the Basic Design.
- 3) In principal, natural ventilation and lighting is to be applied as much as possible and mechanical ventilation and artificial lighting is to be minimized to reduce maintenance costs. However, some of the rooms in the building will need mechanical systems. In this case, independent systems will be used in place of a central system.
- 4) Local construction materials should be effectively used so as to reduce the costs for construction and maintenance. Also, in the long term view of the Project, together with the consideration of the maintenance costs of the facilities, the finishing materials will be selected considering the building life span and maintenance characteristics of the materials.



- 5) Positive consideration shall be given to the installation of high energy efficient equipment and insulation material in order to reduce operational costs.
- 6) As mentioned above, cost reduction measures shall be considered in the course of the design work. The reduction of the initial cost shall be considered carefully so as not to cause any cost increase in operations and maintenance and deterioration in quality.

#### **2-2-2-4 Structural Plan**

##### **(1) Basic Policy**

The structural plan for the Project should be formulated after a full review of the existing site conditions and considering the results of the soil investigation. The structure shall be designed to prevent serious defects such as cracks caused by structural member deflection and ground settlement, etc. Additionally, the building shall have sufficient factor of safety and to have durability against earthquakes, strong winds, etc. Consideration should also be given to local construction methods, materials and to facilitate maintenance.

##### **(2) Standard for Structural Design**

The building code of Cambodia is improving its local original standards. Generally, the construction standards follow the Building Standards Law of Japan, and the analysis method and design of structure shall refer to the structure design standard of the Architectural Institute of Japan (AIJ) as required. In addition, the material standards shall follow the Japanese Industrial Standards (JIS), the American Society For Testing and Materials (ASTM) and British Standards (BS).

##### **(3) Construction Methods and Materials**

###### **1) Method of Construction**

The superstructure is to be reinforced concrete and the walls are of brick which are economical and widely used materials in Cambodia. Although the walls are based on brick structure, the horizontal rigidity of a building is increased by reinforced concrete walls which are superficially arranged to provide sufficient lateral stability. In Cambodia, in order to raise sound insulation and air tightness, the outer walls are double brick masonry.

## 2) Concrete Reinforcement

There are three ready-mixed concrete plants in Phnom Penh city. Lately, appearing on the market in Phnom Penh are reinforcement bar products that are made in Thailand, Vietnam and China.

## 3) Structural Steel

The steel products are manufactured in Thailand, Malaysia, Singapore, Vietnam, etc., and transported and assembled in Cambodia.

## **(4) Soil Conditions and Foundation Design**

The results of the soil investigations indicate that sub-strata from ground level to a depth of 1.50 meters are topsoil, the layers from 1.50m to 5.50m are sandy clay (N value is 11-25), the layers from 5.50m to 13.00m are mixtures of sand and clay (N value is 15-34), the layers from 13.00m to 16.00m are sand and the layers more or over 16.00m are solid sand (N value is 50 over). Evaluating from the soil condition of the National Tuberculosis Center and Maternal and Child Health Center by Japan's Grants aid project, the location along the Tonle Sap River in Phnom Penh city has soft ground.

This project site is located 4km to Tonle Sap River, and it is analyzed that good soil conditions are distributed over the comparatively shallow depth where the river separates. In order to design a two-story building, the plan of foundation will use spread footing for foundation which support facilitates over sandy clay (N value is 11-25) at the depth below 1.50m from ground level. From result of hearing with the Cambodian side, the facilities of RUPP generally use spread footing for foundation. The foundation of this Project adopts the continuous footing in consideration of differential settlement. From the result of soil investigation, allowable design bearing value of soil is 80kN/m<sup>2</sup>.

## **(5) Design Load**

- 1) Wind load : The wind load is calculated based on Japanese Standards. Basic wind speed is assumed as 30 m/sec.
- 2) Seismic Force : Considering similar Japan's Grant Aid project is of neighboring countries as for reference, a base shear coefficient adopted is half (Co=0.1) of the value set in the Building Standards Law of Japan.

- 3) Dead load : Load conditions are to be determined considering the equipment layout  
 Live load and use. Location should be considered for rooms such as Machinery space where dead/live loads are relatively higher, they should be at first floor level for a more economical slab design.

## (6) Materials

Consideration materials are given as follows:

Concrete	From footing to first floor	Concrete strength 21N/mm <sup>2</sup> *
	From first floor Column and Wall to Roof	Concrete strength 24N/mm <sup>2</sup> *
Reinforcement	Round steel bar	φ 6- φ 9
	Deformed bar SD295A	D10-D16
	Deformed bar SD345	D19-D25
Steel	Shape steel, Steel plate	SS400, SSC400

\*Note: Minimum compressive strength by cylinder test @ 28days

### 2-2-2-5 Utility and Building Facility Plan

#### (1) Plumbing Work

##### 1) Water supply system

###### A. Source of potable water

It is planned to provide the CJCC with two water supply systems. One is potable water supply system that comes from PPWA (Phnom Penh Water Authority) city water main. Another one is flushing water supply system that is fed from the existing deep well located in the project site. Potable water system will be composed of a water receiver tank made from FRP panels, lift pumps and an elevated water tank. Potable water will be distributed to lavatories and kitchen sinks by gravity. Flushing water system will be also composed of a water receiver tank that is constructed at ground level, lifts pumps and an elevated water tank. Flushing water will be distributed to sanitary fixtures and irrigation for landscape. Capacity of water receiver tanks will be equal to one day's water consumption.

B. Estimated water demand per day

Occupants;	Staff (include lecturers)	35 persons
	Students	90 persons
	Visitors	250 persons
	<hr/> Total	<hr/> 375 persons
Unit water consumption;	Staff;	100 liters/person/day
	Student and Visitor;	30 liters/person/day

Water demand is calculated based on the occupancy and the above unit water consumption rate as follows:

Staff	35 persons ×	100 liters/person/day =	3,500 liters/day
Students and Visitor	340 persons ×	30 liters/person/day =	10,200 liters/day
<hr/> Total			<hr/> 13,700 liters/day

Assuming the proportion of potable water to flushing water as 40% to 60%:

$$\begin{aligned} \text{Potable water demand;} & \quad 13,700 \text{ liters/day} \times 40\% = 5,480 \text{ liters/day} \\ & \rightarrow 6 \text{ cum/day} \end{aligned}$$

$$\text{Flushing water demand;} \quad 13,700 \text{ liters/day} \times 60\% = 8,220 \text{ liters/day}$$

Irrigation water for the site is added to the above figure:

$$5 \text{ mm/day} \times 1,500 \text{ m}^2 = 7,500 \text{ liters/day}$$

$$\begin{aligned} \text{Total flushing water demand;} & \quad 8,220 \text{ liters/day} + 7,500 \text{ liters/day} = 15,720 \text{ liters/day} \\ & \rightarrow 16 \text{ m}^3/\text{day} \end{aligned}$$

2) Sewerage System

It is planned to equip the CJCC with a sewerage water treatment plant (STP). The wastewater generated from the CJCC will be treated by the STP, and then be discharged to the existing sewerage network at the campus of RUPP. It was found that there are no requirements for effluent water quality from STP in Phnom Penh city. However, the design quality of effluent water from the STP is set to be less than Biological Oxygen Demand (BOD) 60ppm so as to prevent the adjacent environment from pollution. The design flow rate of the STP is calculated based on the return rate of 100% for consumed potable water.

Capacity of the STP: Quality of treated water; Less than BOD 60ppm  
Design Flow Rate; 14m<sup>3</sup>/day

Rainwater from the facility and pavement will be collected and be soaked into the soil as much as possible and then be discharged to the existing RUPP sewerage network.

### 3) Plumbing Fixtures

Most of the water closets equipped in the existing RUPP are Asian type. Since the RUPP side said that western type water closets became popular very recently, we plan to provide the CJCC with both western type water closets with low tank and Asian types.

### 4) Fire Fighting Facilities

It is planned to provide fire extinguishers and indoor hydrant system to secure the CJCC against fire. Installation of hydrant system should comply with Japanese fire code because the Cambodian fire code has not been established yet.

## **(2) Air Conditioning and Ventilation Work**

### 1) Air conditioning system

Phnom Penh city is located near the equator at latitude of 11° north and altitude of approximately 11 meters. The climate is hot and humid throughout the year. According to the air conditioning design standard of ASHRAE (American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc.), the outdoor design condition should be as follows,

Outdoor: Dry Bulb 36°C, Wet Bulb 28°C, Daily Range 11°C  
(ASHRAE Fundamentals 1997: at Phnom Penh)

In the light of the usage of the existing Vietnam- Japan Human Resources Cooperation Center in Hanoi and the above mentioned outdoor conditions, we are planning to install air conditioning system (A/C system) in every seminar room, library, multi-purpose hall, room for exchange program, Instructors room and Administration office that will be occupied by a large number of people in order to maintain appropriate indoor conditions. Since the spacious entrance hall at the first floor is

two-story high and will be able to obtain natural ventilation and effective sunshade, it won't be provided with an A/C system. Split type air conditioners will be used for individual type air conditioning system.

2) Ventilation system

We are planning to provide pantry, toilets, electrical rooms and mechanical rooms with mechanical ventilation systems so as to eliminate odor, heat and humidity outside. According to the Japanese standard of the Ministry of Land, Infrastructure and Transport and the ASHRAE standard, the recommended standard of mechanical ventilation is shown in Table 2-11.

**Table 2-11 Design Standard of Mechanical Ventilation**

Room	Method of Ventilation	Unit Air Flow Rate	Remarks
Toilet	Exhaust only	10 Round/hour	To eliminate odor
Storage	Exhaust only	5 Round/hour	
Pantry	Exhaust only	10 Round/hour	
Pump room	Exhaust only	5 Round/hour	
Electrical room	Exhaust only	10 Round/hour	To eliminate heat

**(3) Electrical Works**

1) Power Supply System

In the existing RUPP, two medium voltage power supply lines (3φ 3W, 22KV) are led-in by the Electricite du Cambodge (EDC). The medium voltage power is stepped down to low voltage power (3φ 4W, 380/220V) by the existing 630KVA transformer equipped in the substation and then is distributed to all facilities. Based on the site survey and discussions with EDC through the Basic Design Study, EDC accepted to newly distribute low voltage power to CJCC from the existing substation and to install a demand meter for CJCC. Furthermore, It was confirmed that Cambodian side should be responsible for the installation work of this low voltage power cable from the EDC's substation to the electrical room of CJCC.

**Table 2-12 The Estimated Power Load**

Description	Load Density (VA/m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Total Load (KVA)	Remarks
Lighting and Small Appliance	50	1,800	90	
Air conditioning Equipment	150	1,200	180	
Plumbing Equipment			10	
Total			280	

Thus, the estimated power load is approximately 280 KVA. Assuming that demand factor is 60%, the estimated power demand is calculated as follow,

$$280\text{KVA} \times 0.6 = 168\text{KVA} \rightarrow 170\text{KW}$$

Based on the result of discussions with the engineers in the EDC and the RUPP, the condition of power supply in Phnom Penh by EDC is still not stable. Therefore, we conclude that a stand-by generator should be provided for the CJCC. Some non-robust equipment such as computers should be provided individually with Uninterrupted Power Supply units (UPS) by equipment work.

## 2) Stand-by Generator

Based on the result of discussions with the engineers in the EDC and the RUPP, the condition of power supply in Phnom Penh by EDC will be improved. Frequency of power outage is fewer than before. However, power supply by EDC is still not stable and we will provide a stand-by generator in order to facilitate the CJCC activity. The generator will also provide back-up emergency power supply to the hydrant pump in accordance with the Fire Code. We will prepare change over circuits, from duty to emergency drive of the generator to effectively utilize stand-by power. The capacity of the generator is estimated to be equivalent to 25% of peak demand load (280KVA).

- A. Type: Indoor packaged diesel driven generator  
Low noise and radiator cooling type
- B. Capacity: 3 Phase 3 Wire 380V 50Hz 80KVA
- C. Fuel: Diesel oil (10 hours running)
- D. Quantity: 1 (one) number

## 3) Main Feeder Wiring System

- A. Wiring Method: Cable ladder. Conduit piping
- B. Power Distribution Main Feeder: 3 $\phi$  4W 380V/220V
  - For lighting and small appliance 1 $\phi$  2W 220V
  - For power 3 $\phi$  3W 380V

## 4) Lighting System

Every room, entrance hall and corridor will be equipped with fluorescent lamps since it will reduce energy consumption and fluorescent lamps are easy to maintain. The

lighting intensity level to be adopted is based on international standards and JIS (Japanese Industrial Standards) as follows:

**Table 2-13 Standard of Lighting Intensity Level**

Room	Lighting Intensity (lux)	Remarks
Entrance hall	200	
Seminar room	400	
Multi-purpose hall	400	
Library, Computer room	400	
Administration office, Instructors room	300	
Corridor	100	
Toilet, Storage	100	

Exit lights with batteries should be installed at every staircase and exit.

5) Telephone System

It is planned to provide the CJCC with a telephone system including a Private Automatic Branch Exchanger (PABX), 25 extension telephones and necessary cabling work. Through the discussion with the Cambodian side, it was confirmed that the Cambodian side should be responsible for the following items;

- a) Application and subscription fee for 5 new telephone trunk lines by MoPT
- b) Expense for the installation of in-coming line from outside to the Main Distribution Panel to be provided by the Project

6) Public Address System

We are planning to provide a public address system so as to make announcements to students and staff in common areas and seminar rooms. An amplifier will be equipped in the administration office.

7) Master Antenna Television System

There are two Cable Television (CATV) Companies in Phnom Penh city. One of the CATV Company, Phnom Penh Municipal Cable TV distributes 66 channels by cabling and 22 channels by antenna including BBC, CNN and NHK BS. Now, we have an option to get NHK BS satellite broadcasting by installing a parabolic antenna and receiving TV signal from CATV Company. Since it is more advantageous to receive TV signal from CATV, from financial point of view, we decided to adopt CATV.



#### 8) LAN (Local Area Network) System

Technical Cooperation Project is planning to supply personal computers for the computer room, library and administration office. We will equip pre-wired LAN system and install LAN outlets and interconnected cabling so as to easily link these personal computers within the CJCC. The planned LAN system will be of fast ether-net (100Base-T) and consist of sub-networks such as library loop, computer room loop and administrative loop. The LAN system may be able to access the Internet through routers. However, installation of network equipment such as switching hubs and routers is out of the scope since concept of network architecture is not finalized at the present time.

#### 9) Fire Alarm System

A manual fire alarm system will be provided. We are planning to install combination panels that consist of an alarm bell, an indicator lamp and a push button in each alarm area. The fire control panel is to be installed in the staff room on the first floor.

#### 10) Closed Circuit Television (CCTV) System

The Cambodian side requested CCTV system to improve ability of security in CJCC. During the basic design study, we found that the existing French library of RUPP is equipped with CCTV system and couple of other universities in Phnom Penh are also using the same system. Furthermore, it is planned to provide expensive equipment such as large display system in the entrance lobby. We admitted necessity of installation of CCTV system. Surveillance cameras will monitor the main entrance and sub entrance and a monitor television will be equipped in the staff room.

#### 11) Lightning Protection System

Lightning protection system will be provided to prevent serious damage to the building structure and electrical facilities.

### **(4) Garbage and Waste Disposal**

The staff belonging to the Department of Administration and Finance periodically collects all garbage and waste generated in the existing RUPP. The amount of garbage and waste is very few and collected waste is brought to a dump station or burnt away. The small amount of waste generated by the CJCC will be collected by RUPP as usual.

## **2-2-2-6 Building Material Plan**

### **(1) Basic Policy**

The building material plan shall be formulated based on the climatic conditions, the location of the site, the local construction situation, construction period, construction cost, and maintenance and operation costs. The following shall be matters of Basic Policy:

- 1) The local procurement of construction materials shall be considered to reduce construction costs and facilitate the construction period. However, it has to be confirmed that local materials are acceptable in quality and supply in Cambodia.
- 2) The maintenance and operational costs shall be reduced by considering the adaptation to the local climate, resistance against climate and the selection of materials that are easy to maintain and also, materials that are easily obtained locally.
- 3) It is important to note that the selection of material should be made to satisfy the essential functions of CJCC and must be considered along with the utility and equipment plans.
- 4) Selection and determination of the building materials shall be based on the studies on local procurement or application of local construction methods.

### **(2) Building Material Plan**

The local construction situation and construction schedule as well as method for minimizing operation and maintenance costs should be taken into consideration for the prominent building material plan, referring to the analysis of materials for other similar projects. Materials for structural works and some finishing works can be procured in Cambodia, but majority of the materials for finishing work come from neighboring countries such as Thailand. The materials of the existing buildings which are made by local materials and local construction method in RUPP are as follows:

The roof materials are tile roofing and reinforced concrete flat roof, Exterior wall materials are trowelled mortar with paint on brick masonry or reinforced concrete, Interior wall materials are trowelled mortar with paint on brick masonry, Ceiling materials are mortar with paint, Floor materials are cement tile, windows are aluminum sash. The policy to select materials for the Project is to adopt local materials which are acceptable in quality

and supply in Cambodia, considering harmony with the existing buildings. The selection of materials for the Project will aim at maximizing the adoption of local construction methods and selection of local materials, mainly under the supervision of a Japanese contractor. This policy is intended to reduce the construction cost. In reference to the surveys and studies of materials of existing buildings and similar projects, it is considered that this policy will enable proper selection and procurement of building materials under the scheme of Japan's Grant Aid. The results of these considerations are as follows:

#### 1) Structural Materials

In principle, the typical local construction method and materials, which are reinforced concrete for main frames with bricks walls, will be adopted for this Project. Also for the pitched roof structure, reinforced concrete roof slab will be adopted considering water leaks from the roof, construction schedule and cost reducing factors.

#### 2) Exterior Finishing

##### A. Exterior Wall

Exterior wall finishing will be planned mainly using washed terrazzo. It is necessary to consider the adoption of quality material and local construction methods. Moreover, it is necessary to assure good quality by paying attention to the condition of mortar, curing methods and time, etc.

##### B. Roofs

Tile roofing will be adopted for the new building taking into consideration the durability from heavy rain and heat absorption from strong sunlight and also maintenance. Also the appearance of the roof tile will match the surrounding landscape and be designed in association with CJCC campus building materials used.

##### C. Windows and Doors

For provision of better durability and air tightness for external openings, such as windows and doors, in order to plan the air conditioning in most of the rooms, local available aluminum sash will be adopted for the new building. Also, steel sash will be used for the some openings facing outside. These materials have

been used for openings of external walls of the existing buildings and similar projects. The security grill on the front or back face of the windows will be adopted to provide protection against theft and intruders.

#### D. Exterior Floor

Natural stone and interlocking block, which are popular and generally used in Cambodia, will be adopted for the floor finish materials for the outside terrace and courtyard. The surface of the floor shall carefully finished to prevent slippage when wet.

#### E. GRC Louvers

Louvers, which protect the rooms from direct sunlight and intense rainfall and incorporate good ventilation and natural lighting throughout the year are planned to be made of GRC (Glass fiber Reinforced Cement), which resulted when analyzing durability and functionality of the material. However, it is important to examine the attachment details, etc., and during supervision of construction because it has not been used thereafter for buildings in Cambodia.

### 3) Interior Finishing

#### A. Floors

Ceramic tile, which are generally used in Cambodia, will be adopted in the new buildings considering its quality and durability. Natural stone will be adopted for the part of entrance hall. PVC tile will be adopted for the rooms equipped with free-access floors in order to facilitate maintenance of computer and electrical wiring. Trowelled mortar with dust proof coating will be adopted for electrical room.

#### B. Walls

Paint on mortar base will be used as the finishing materials for interior walls. This is generally used in Cambodia and it is used for the existing facilities. Sound absorption and reflection should be considered to select the interior finishing materials for the multi-purpose hall. As such, quality of plaster works and paint works shall be controlled together, the same as for the exterior walls.

### C. Ceilings

Suspended ceilings using rock-wool insulated boards and cement board with paint will be used in the new buildings. Sound absorption and reflection should be considered by proposal to select the most suitable finishing material for the multi-purpose hall.

### (3) Proposed Main Materials

The criteria for building materials have been analyzed and studied. Based on the analysis, main materials proposed are as follows:

**Table 2-14 Main Materials Proposed**

Structure		Reinforced concrete						
Floor Height		4,500mm for first floor and 4,000mm for second floor						
External Finish	Roof	Pitched roof: Roofing tile, Flat roof: Mortar setting bed urethane resin waterproofing						
	Eaves	Cement board						
	External Wall	Washed terrazzo, Louvers: GRC w/ EP						
	Doors & Windows	Aluminum sush						
	1) Windows	Aluminum (Anodized) and steel door						
	2) Doors	Aluminum (Anodized) and steel door						
External Floor	Mortar setting bed non-slip ceramic tile, Interlocking block, Natural stone							
Internal Finish		Entrance Hall	Rooms for Administration	Seminar Room	Computer Room	Multi-purpose hall	Corridors	Staircase
	Floor	Mortar setting bed ceramic tile Natural stone (a part)	Mortar setting bed ceramic tile Free access floor & PVC tile	Mortar setting bed ceramic tile	Free access floor & PVC tile	Strip flooring hard wood parquet floor	Mortar setting bed ceramic tile	Mortar setting bed ceramic tile
	Baseboard	Mortar setting bed ceramic tile Natural stone (a part)	Mortar setting bed ceramic tile Hard wood w/ OSCL	Mortar setting bed ceramic tile	Hard wood w/ OSCL	Hard wood w/ OSCL	Mortar setting bed w/VP	Mortar setting bed ceramic tile
	Wall	Washed terrazzo Natural stone (a part)	Mortar trowel w/EP Hard wood w/ OSCL	Mortar trowel w/EP	Mortar trowel w/EP	Acoustic perforated board w/ OSCL	Washed terrazzo	Washed terrazzo
	Ceiling	Rockwool acoustic board	Rockwool acoustic board (System ceiling)	Rockwool acoustic board (System ceiling)	Rockwool acoustic board (System ceiling)	Rockwool acoustic board Hard wood w/ OSCL	Cement board w/VP	Repair mortar w/VP
	Toilet	Floor	Mortar setting bed ceramic tile					
	Wall	Mortar setting bed ceramic tile						
	Ceiling	Cement board w/VP						

Legend: EP: Enamel Paint, VP: Vinyl Paint, PVC: Polyvinyl Chloride, OSCL: Oil Stain Clear Lacquer, GRC: Glass fiber Reinforced Cement

## **2-2-2-7 Equipment Planning**

### **(1) The Contents of the Planned Equipment**

The Project will provide an AV system in the multi-purpose hall, Lobby Display system and furniture as shown in Table 2-2.

### **(2) Necessity of Requested Equipment**

#### 1) AV system in Multi-purpose Hall

AV system is indispensable for effective activity in the multi-purpose hall that accommodates from 250 to 300 people. The AV system will consist of a LCD projector, screen, amplifier and speakers. Installation work of the equipment relates closely to building construction because it needs power supply, cabling work and conduit piping work to function properly. Therefore, it would be appropriate to provide the AV system under the scope of equipment work by the Project.

#### 2) Lobby Display System

This type of Lobby Display System was equipped on the similar projects, namely, the Myanmar-Japan Center for Human Resources Development, the Vietnam-Japan Human Resources Cooperation Center in Hanoi and the Mongolia-Japan Human Resource Cooperation Center by Japan's Grant Aid. Since the display system is useful to disseminate information regarding Japan by broadcasting Japanese TV programs, it would be reasonable to incorporate it by the Project.

#### 3) Furniture

The layout and quantity of furniture is examined according to the accommodation number and the use in each room. It is planned to use the same type of movable furniture in each room, to allow flexibility in function of the rooms when the layout and quantity of furniture are changed for various activities.

The main planned equipment is as follows:

**Table 2-15 Specifications of the Main Planned Equipment**

No.	Description	Q'ty	Location	Remarks
1.	Lobby Display System			To be installed in lobby
1-1	Wide plasma display	1	Lobby	50" diagonal, Multi system, Wall mount type
1-2	Stereo speaker	1	Lobby	Rated input; 8W
1-3	AV Switcher	1	Library	
1-4	TV Tuner	1	Library	VHF,UHF、 Multi system
1-5	BS Tuner	1	Library	
1-6	Video tape recorder	1	Library	VHS tape、 NTSC
1-7	DVD Player	1	Library	DVD-A, DVD-R, CD, CD-R/RW
1-8	Remote Controller	1	Library	To select input signal, Video, RGV and AUX.
1-9	Color monitor TV	1	Library	14" Diagonal, Multi system
1-10	Personal computer	1	Library	Desk top type, with 15" CRT
1-11	Equipment Rack	1	Library	To install above mentioned equipment
1-12	Cable and Connector	1 lot		Necessary cable and connector for the "Lobby Display System"
2.	AV System			To be installed in Auditorium
2-1	Audio Mixer	1	Projection room	
2-2	Monitor Speaker	1 set	Projection room	
2-3	Cassette Tape Recorder	1	Projection room	
2-4	AV Switcher	1	Projection room	
2-5	Monitor TV	1	Projection room	9" Diagonal, multi system
2-6	Video Tape Recorder	1	Projection room	VHS Tape, NTSC
2-7	DVD/CD Player	1	Projection room	Multi system, DVD-A,V, DVD-R, CD, CD-R/RW
2-8	Power Control Unit	1	Projection room	
2-9	Overhead Camera	1	Multi-purpose hall	Multi system,
2-10	Screen Control Switch	1	Projection room	
2-11	Wireless Tuner	1	Projection room	
2-12	Digital Equalizer	1	Projection room	
2-13	Power Amplifier	1	Projection room	Rated power output 160W+160W
2-14	Main Speaker	1 set	Multi-purpose hall	Power handling capacity; 160W
2-15	Sub Speaker	1 set	Multi-purpose hall	Power handling capacity; 160W
2-16	LCD Projector	1	Multi-purpose hall	Brightness 3,200 ANSI
2-17	Motorized Screen	1	Multi-purpose hall	
2-18	Wireless Antenna	1 set	Multi-purpose hall	
2-19	Wireless Microphone	4 set	Multi-purpose hall	Hand type, Tie-pin type
2-20	Dynamic Microphone	2 set	Multi-purpose hall	With Table-top type stand and Floor type stand
2-21	Cable & Connector	1 lot		Necessary cable and connector for the "AV System"