

Basic Design Study on the Project for
Strengthening Regional Education and Training Institutions for Nurses and Primary Health Care Workers
in the Lao People's Democratic Republic

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ABBREVIATION

ADB	Asian Development Bank
AIJ	Architectural Institute of Japan
ASTM	American Society for Testing and Materials
BS	British Standards
CHT	College of Health Technology
DOP	Department of Organization and Personnel
DPB	Department of Planning and Budgeting
EDL	Electricite des Laos (Electric Power Authority)
E/N	Exchange of Notes
GDP	Gross Domestic Product
GOL	The Government of Lao PDR
IMR	Infant Mortality Rate
JASS	Japanese Architectural Standard Specification
JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standards
LCD	Liquid Crystal Display
MCH	Mother and Child Health
M/D	Minutes of Discussion
MES	Medical Equipment Service
MMR	Maternal Mortality Rate
MOH	Ministry of Health
MPSC	Medical Product Supply Center
NAMPAPA	Water Supply Authority
NGO	Non-Governmental Organization
OHP	Overhead Projector
PHC	Primary Health Care
PHO	Public Health Office
PHS	Public Health School
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
U-5MR	Under Five Mortality Rate
WB	World Bank
WHO	World Health Organization

SUMMARY

SUMMARY

The Lao People's Democratic Republic (hereinafter referred to as "Lao PDR") is located in the middle of Indo-China peninsula, and its total land area is 240 thousand km² (almost equal to the area of mainland of Japan). The population was estimated to be 5.52 million in 2002, and about 80% of the total population lives in the rural area. The target schools of this project are strategically distributed throughout the country (located in the Oudomxay Province, Luangprabang Province, Vientiane City, Khammuane Province, Savannakhet Province and Champasak Province). The distance from Oudomxay to Champasak is approximately 740km, therefore their climates differs from each other.

After abolishing the monarchy in 1975, Lao PDR strived to establish a socialist country. "New Economic Mechanism" has been introduced since 1986, which resulted in average of 7% annual economic growth rate between 1988 and 1997. However, the Asian Economic Crisis in 1997 stalled the pace of economic growth, and the GDP per capita was still US\$329 in 2001. In addition, the disparities between rural and urban areas in terms of quality of life are considerably large, because of the differences in geographical condition and the insufficient development of infrastructure. The government of Lao PDR (hereinafter called "the GOL") has been making effort for the sustainable development of the country with the national development plan "Socio-economic Development Strategy for 2020, 2010 and Five Year Socio-economic Plan (2001-2005)", and a national goal of the Lao PDR is to get out of the category of Least Developed Country to eradicate poverty by the year 2020.

GOL regards the health sector as one of the most important sectors for sustainable development of the country, and "Health Development Plan Toward Year 2020 and 2010 and Health Development Plan 2001-2005" was introduced in 2001. The plan clearly identifies that the health sector goal toward 2020 is "to enable all population to have access to the equal and quality health service which meet their needs". In the plan, Human Resource Development is one of the most important and prioritized strategies.

Health status of Lao PDR is significantly lagging behind the other Asian countries. The fact that infectious diseases such as Malaria, Acute Respiratory Infections and Diarrhoea are major causes of death, indicates that it is of utmost importance to strengthen Primary Health Care (PHC) service in the country, in particular, to improve service quality of health workers serving in rural areas where coverage and level of health care service are significantly low.

The number of health facilities which are currently in operation in provinces, is 18 provincial hospitals, 131 district hospitals, and 702 health centres at village level. Among various health workers working for these facilities, the ratio of nurses is significantly high. The job of nurses ranges widely, which sometimes goes beyond their expected practice especially in facilities of lower administrative levels. Thus, it is obvious that nurses play essential role to improve community health in the country. Since their professional levels vary

greatly, the shortage of competent nurses having appropriate knowledge and skills is serious problem in the remote area.

In order to improve the health status of people all over the country, it is of urgent necessity to strengthen disease prevention and basic medical care through primary health care. In particular, it is essential to educate and improve quality of nurses and PHC workers who will work at the field. At present, there are 5 Public Health Schools (PHSs) located in Oudomxay, Luangprabang, Khammuane, Savannakhet, and Champasak, and the College of Health Technology (CHT) for the education of nurses in Lao PDR¹. However, physical conditions of the facilities and equipment in these schools are deteriorating and having difficulty to meet the demand for quality nurse education and in-service training. Therefore, there is great urgency to improve their health educational environment.

Based on the request from the GOL, the Japanese government conducted a Lao Health Master Planning Study (JICA Project) based on their national plans, implemented in 2001 to 2002, and formulated the “Lao Health Master Plan”. One of the overall concepts in this master plan, which is now the authorized master plan of health sector, is “To improve the quality of health worker training, especially nurse training, and to allocate and to motivate well-trained health workers in districts hospitals and health centres”.

In August 2002, the Ministry of Health of the GOL, made a request for Grant Aid for the Project to Strengthen Regional Education and Training Institutions for Nurses and Primary Health Workers in Lao PDR (hereinafter called “the Project”) to the Government of Japan.

In response to the said request, the Government of Japan decided to conduct a Basic Design Study (hereinafter called “the Study”), and JICA dispatched a Basic Design Study Team from the 28th of August to 8th of October 2003 for discussions with the Lao PDR side, field survey, and data collection. Through the technical analysis and examination in Japan, JICA prepared a draft report of the Study including the basic design plan. JICA dispatched the Draft Report Explanation Team from the 11th to 31st of January 2004, in order to explain and to consult with GOL officials in regard to the components of the draft report, and thereafter, basic agreement was obtained. The outline of the final plan is shown in Table-S1 and Table-S2.

When this plan is decided to be implemented by Japan’s Grant Aid, the time frame for the entire project was scheduled to be approximately 18 months (6 months for detailed design and 12 months for construction). The estimated cost for this project is approximately 578 million Japanese yen (some 576 million Japanese yen from Japan and Lao PDR will shoulder the remaining 2 million Japanese yen). This cost estimation is provisional and would require further examination by the Government of Japan for the approval of the Grant.

¹ Oudomxay Public Health School will start nursing course in Oct. 2005.

Table-S1 Facility Plan: The Floor Area of New Construction and Renovations

New Construction				Renovation			
Rooms	Area /Unit (m ²)	No. of Rm	Area (m ²)	Rooms	Area /Unit(m ²)	No. of Rm	Area (m ²)
Oudomxay Public Health School							
A1. Classroom	84	3	252.0				
A2. Demonstration room	140	1	140.0				
A3. Library	49	1	49.0				
A4. Toilets	32	1	32.0				
A5. Others			271.0				
Sub-total			744.0				
Luangprabang Public Health School							
A1. Demonstration room	133	1	133.0	B1. Classroom	94.8	4	410.8
A2. Toilets	32	1	32.0	B2. English room		2	126.4
A3. Others			51.0	B3. Others			360.4
Sub-total			216.0	Sub-total			897.6
Khammuane Public Health School							
A1. Classroom	84	2	168.0	B1. Classroom	84	2	168.0
A2. Demonstration room	140	1	140.0	B2. Others			48.0
A3. Library	63	1	63.0				
A4. Toilet	32	1	32.0				
A5. Others			233.0				
Sub-total			636.0	Sub-total			216.0
Savannakhet Public Health School							
A1. Classroom	84	3	252.0	B1. Classroom (L)	54.6	1	54.6
A2. Demonstration room	140	1	140.0	B2. Classroom (S)	65	1	65.0
A3. Toilet	32	1	32.0	B3. Others			46.0
A4. Others			248.0				
Sub-total			672.0	Sub-total			165.6
Champasak Public Health School							
				B1. Classrooms (L)	72	6	432.0
				B2. Classroom (S)	48	1	48.0
				B3. Demonstration room	96	1	96.0
				B4. Dormitory Rm.	48	5	240.0
				B5. Storage	48	1	48.0
				B6. Toilet		2	86.4
				B7. Others			384.0
				Sub-total			1,334.4
Total			2,268.0	Total			2,613.6

Table-S2 Equipment Plan

Classification (No. of Items)	Major Item	Allocation						
		OX	LP	KA	SK	CS	CHT	TTL
Equipment to learn basics of nursing through in-school practice (39items)	Anatomical Human Body	1	1	1	1	1	0	5
	Human Skelton	1	1	0	1	0	0	3
	Pregnant Uterus Model	0	0	0	1	0	1	2
	Phantom for Delivery	1	1	2	0	1	1	6
	Injection Simulator	6	6	6	6	6	0	30
	Resuscitation Simulator	1	0	1	1	1	0	4
	Binocular Microscope	3	3	3	3	3	1	16
Equipment used in the classroom (14items)	Overhead Projector	2	1	2	1	0	0	6
	Overhead Projector (Reflection)	0	0	0	0	0	1	1
	Tape Recorder	2	0	2	2	1	0	7
	LCD Projector System	1	0	1	1	1	0	4
	LCD Projector System (3D)	1	1	1	1	1	1	6
Equipment to produce teaching materials (5items)	Copying Machine	1	1	1	1	1	1	6
	Small Printing Machine	1	1	1	1	1	0	5
	Computer with Printer	4	2	3	1	2	1	13
	Image Acquisition Equipment	1	1	1	1	1	1	6

Notes) OX: Oudomxay Public Health School, LP: Luangprabang Public Health School, KA: Khammuane Public Health School, SK: Savannakhet Public Health School, CS: Champasak Public Health School CHT: College of Health Technology

Budget of the Project for the target schools depend on two sources: Ministry of Health for Luangprabang, Savannakhet and Champasak PHSs and the CHT, and respective provincial health office for Oudomxay and Khammuane PHSs. Budget of Ministry of Health and provincial health offices is expected to increase from now on and budget allocation to each target school will become larger as well. In particular, the budget for the target schools are expected to increase in accordance with the GOL's budgetary policy to reduce new investment and to spend fair amounts of money to improve working conditions of government staff and operation and management of facilities.

Operation and maintenance of the school facility and equipment are basically under responsibility of each school, and daily maintenance, such as cleaning by students or simple repair by teachers, have been in operation. The operation and maintenance system is planned to be further strengthened in each school by securing the necessary budget for new facilities and equipment.

The main effects assumed by implementing this project are as described below.

(1) Direct Effects

- a) The teaching and learning environment in each PHS would be improved through new construction/renovation of classrooms. Floor area for each student would become more appropriate, and indoor environment will be improved by re-arrangement of facilities including doors and windows.
- b) New demonstration room and equipment would make it possible for all students to have nursing practices in one class. Therefore, time period of hands-on practice in school would be increased from 30-60 hours/course (2-year Nurse Course) to 300 hours/course (2.5-year Nurse Course). This would help facilitate students' acquisition in regard to knowledge and skills for nursing.
- c) Procurement of equipment for the CHT will help by strengthen the course in Bachelor of Nursing. It will, consequently, help increase the number of nursing teachers with Bachelors Degree, and it is expected that the quality of education in the PHSs would be improved.
- d) New demonstration room and new equipment for demonstration, practice, and production of teaching materials, will motivate the teachers to improve and develop their teaching method. Thus, it will improve the quality of education.

(2) Indirect Effects

- a) Through the implementation of this project, the number of nurses and PHC workers working in the provincial hospitals, district hospitals, and health centres will increase, and the quality of health workers working in these health facilities would be improved. As a result of this project, health service in rural areas, especially primary health care service, will be improved and strengthened.

- b) By improving the libraries, health workers in the area of each PHS will have more opportunities to educate themselves by having useful information in regard to medical/health services.

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

(1) Establishment of Integrated Nurse Education System:

Principal measures to be undertaken by the Lao side are summarized as follows, in order to establish and enhance nursing education system.

- a) To ensure the quality of students: At present, number of existing students largely exceeds planned number. This factor has caused deterioration in education quality in schools. In order to enhance educational quality by effective use of facilities and equipment provided by the Project, each school should limit intake of students enrolled every year. In addition, entrance examination should be conducted in appropriate and fair manner, to keep the qualified students level.
- b) To ensure quality of education: In order to implement 2.5-year nurse education curriculum in proper and sustainable manner, MOH should deploy competent teachers and provide necessary teaching and learning materials for each school. In addition, it is suggested to clearly define and assess the qualification standards to be a teacher.
- c) To ensure the level of education result: In order to certify the level of nurse education, standardized examination should be implemented uniformly in all PHSs in order to graduate. The students should pass this standardized graduation examination; in order to practice in any health facility in Laos. It is also advisable to introduce a qualifying examination by the government for the nurse licensing in the future.

(2) Strengthening Coordination among PHSs:

At present, each school practices various efforts for school management to allocate limited resources. In order to strengthen capacity of school operation and management, enhancement of coordination among all PHSs should be emphasized while increasing school staff and budget as well as upgrading teaching staff. For example, information sharing and exchange of school management and personal exchange program among PHSs should be considered. In order to materialize such coordination MOH support and CHT initiative are indispensable.

(3) Implementing Regular Follow-up Survey of Graduates:

Currently, neither PHSs nor CHT conducts follow-up survey of the graduates. There are no data to know which health facilities graduates are working for, employment status (e.g. full-time, part-time, volunteer), and what kind of job they are engaged in if they are not in the health sector. In order to improve the quality of health service in Lao PDR, it is very essential that the graduates work for health

sectors and use their professional skill and knowledge. Therefore, it is strongly suggested that MOH will establish the system and instruct all schools to enable them to conduct regular follow-up surveys of their graduate.

(4) Establishing Incentive System to Encourage Health Workers to Work in Remote Areas:

In general, health workers are reluctant to work in health facilities located in rural areas, especially in health centres in remote areas. As a result, shortage of health workers are prevalent in district hospitals and health centres. In order to obtain sufficient health workers, MOH should establish an incentive system to encourage health workers to work in rural areas. For instance, provision of remote area allowance, improvement of housing conditions, and favourable consideration in future promotions for those who go to work in remote areas, should be taken into consideration.

(5) Increasing Opportunities of In-Service Training for Health Workers Serving in the Provinces:

Most health workers in provinces, especially in district hospitals and health centres, are nurses. Due to frequent changes of nurse education system, their professional education period ranges from a few months to 3 years. Consequently, their quality of service significantly varies, although in-service training programmes have been implemented occasionally by MOH, and with assistance of donor agencies and international NGOs. It is strongly recommended that MOH will prepare a routine budget to implement such in-service training regularly to improve quality of health workers in provinces. The Project plans to improve the facilities, so that each PHS can also utilize the school as a training centre to conduct such in-service training.

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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

Health status of Lao People's Democratic Republic (hereinafter referred to as "Lao PDR") has gradually improved since the mid-80s. However, major health indicators such as Infant Mortality Rate (IMR: 82 per 1,000 live births), Under Five Mortality Rate (U-5MR: 107 per 1,000 live births) and Maternal Mortality Rate (MMR: 530 per 100,000 live births) shows that Lao PDR has the worst condition compared with other Asian countries (on average in Asian countries, IMR=33, U-5MR=43, and MMR=140). The fact that infectious diseases such as Malaria, Acute Respiratory Infections, and Diarrhoea are major causes of death indicates that it is of utmost importance to strengthen primary health care service in the country.

In Lao PDR, about 80% of the entire population (Estimated to be 5.52 millions in 2002) are living in rural areas. Since the mountainous terrain feature of the country hinders access from rural areas to urban areas, health care service quality in rural areas is significantly poor. In order to improve health status of the entire population, it is most urgent issue to improve the quality of health workers who are supposed to play a key role to promote primary health care in rural areas. Especially, since the nurses are engaged in various kinds of health care service at lower administrative levels, such as districts and villages, strengthening their education and training is most essential. In addition, health workers are usually reluctant to work at remote areas, therefore, lack of health workers hinders primary health care promotion in remote areas. In order to tackle this problem, the Ministry of Health (MOH) undertakes to train Primary Health Care Workers (PHC Workers) and post them at health centres throughout the country.

Health workers in Lao PDR are categorized into 4 levels: primary (junior or senior high school + vocational education for 2 or less than 2 years), middle (senior high school + 3 years technical education), high (university graduate) and higher (postgraduate) level. At provincial and district levels, the proportion of primary level health workers to all staff is large. It amounts to 66% and 42% at provincial and district levels, respectively, whereas only 12% at central level. It attributes to low quality health care service in rural and remote areas. For instance, in district hospitals, many primary level workers (more than 90% are nurses) work as substitutes for other medical staff after having only several weeks of in-service training due to chronic shortage of paramedical staff as well as doctors. At health centre level, staff (mostly primary level) have to play various roles because of difficulty in access to the hospital from villages. They provide villagers with basic medical treatment, prescription of essential drug, pre- and post-natal care, and health and hygiene

education. Furthermore, health workers are usually reluctant to work at health centres in remote areas, therefore, shortage of health centre staff is ordinary practice in remote areas.

Currently, pre-service education of nurses and PHC workers is carried out in College of Health Technology (CHT) in Vientiane City and 5 Public Health Schools (PHS) located in major provincial towns of Oudomxay, Luangprabang, Khammuane, Savannakhet and Champasak. In-service training for existing nurses is also executed irregularly in these PHSs. However, due to aging and shortage of facilities and equipment, these schools face difficulty to maintain quality education at present.

Under this circumstance, the Ministry of Health of GOL made a request to receive Grant Aid for the Project to strengthen education of health workers (especially focusing on nurses and PHC workers) who are needed to serve at provincial and district hospitals and health centres to provide quality health care service. Upon this request, the Project aims at improving quality of health worker education in provinces through improvement of teaching and learning environment of CHT and 5 PHSs.

(2) Outline of the Request and Main Components

The outline and main components of the request from the government of Laos regarding this Project are shown below;

[Outline of the Project]	
(1) Overall Goal	: Quality of health workers serving in provinces is improved.
(2) Project Goal	: Quality of health worker education in provinces is improved.
(3) Expected Outputs	: Teaching and learning environment of 5 Public Health Schools and the College of Health Technology is improved.
(4) Activities and Inputs	
1) Contents of the request to Japanese side	: a) Facilities: classroom, demonstration room, library b) Equipment: equipment used in classroom, equipment used for in-school practice, and equipment to produce teaching materials
2) Execution plan by Lao PDR side	: - Allocation of necessary teaching staff - Establishment of sustainable operation and maintenance system - Execution of education and training by using planned facilities and equipment system
(5) Target Area (Schools)	: Oudomxay, Luangprabang, Khammuane, Savannakhet, and Champasak Public Health Schools, and College of Health Technology (Vientiane City)
(6) Direct/Indirect Beneficiaries	: a) Direct beneficiaries: Students and Teachers in above schools b) Indirect beneficiaries: Population in Lao PDR, especially those who live in provinces

CHAPTER 2
CONTENTS OF THE PROJECT

CHAPTER 2 CONTENTS OF THE PROJECT

2-1 Basic Concept of the Project

2-1-1 Overall Goal and Project Purpose

Getting out of the Least Developed Country is the national goal of Lao PDR toward the year 2020. The Socio-economic Development Strategy for 2020, 2010 and Five Year Socio-economic Plan (2001-2005) mentions that health service delivery throughout the country is a task of the Health Sector. Based on this plan, the MOH formulated “Health Development Plan Toward Year 2020, 2010 and Health Development Plan 2001-2005”. The plan clearly identifies that the health sector goal toward 2020 is “to enable all population to access equally and promptly to the quality health service which meet their needs”.

To strengthen health service delivery in backward areas is the most effective way to achieve this objective. Therefore, it is essential to improve quality of health workers serving in the provinces.

Based on these background situations, the Project designates its overall goal as improving the quality of health workers serving in the provinces by improving and upgrading the facilities and equipment of 5 PHSs and CHT.

2-1-2 Outline of the Project

In order to achieve the Project purpose, the Project will target on 5 PHSs and the CHT. For 5 PHSs, located in Oudomxay, Luangprabang, Khammuane, Savannakhet, and Champasak, renovation and construction of their facilities and equipment procurement will be carried out. For the CHT, located in Vientiane City which is in charge of providing higher education for existing and prospective teachers of health worker education institutions, necessary equipment will be procured. Through these activities, it is expected that teaching and learning environment of 5 PHSs and CHT in the provinces would be greatly improved.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Validity of the Project Criteria

(1) Field of Cooperation

The target of this Project is to upgrade the health worker education in institutions that currently train nurses and PHC workers. The health service facilities which are currently in operation in the provinces, number 18 provincial hospitals, 131 district hospitals, and 702 health centres at village level. Among various health workers working for these facilities, the percentage of nurses is significantly high (Appendix- 12).

Thus it is obvious that nurses are playing essential role to improve community health in the country. However, their professional level varies. Notably, under the present system, there are 2 types of nurses: low-level nurses completing 2-year education at PHSs in provinces and middle-level nurses completing 3-year education at the CHT. Both levels of nursing courses require graduates from senior high school. Additionally, there are “under-qualified” nurses who studied nurse subjects for much shorter period ranging from several months to less than 2 years in the past. Some of them graduated from nurse school operated by each province in the past and the others have learned in the field at the period of revolutionary war. Their general educational background also varies from primary school to senior high school. According to the present classification of MOH, they are also classified as low-level nurse. Currently, at province and below provincial level, about 90% of nurses are low-level nurses¹.

In order to improve and equalize the quality of nurse in the country, MOH has decided to integrate present 2-year education course in PHSs and 3-year course in the CHT into uniform 2.5-year middle-level nurse education course. From October 2003, this 2.5-year course starts at PHS of Luangprabang, Khammuane, Savannakhet, and Champasak and the CHT whereas Oudomxay PHS will begin the same course from 2005.

On the other hand, health service situation at village level cannot be solved solely by strengthening nurse education. Health workers are reluctant to work at remote area unless they have originated from the area. In such remote areas, people who have completed senior high school are very low

¹ The level such as “low” or “middle” represents level of government official by education background. Since such level is not appropriate to distinguish qualification of nurse, MOH now intends to establish the level of nursing as follows: low-level nurse as “Assistant Nurse”, middle-level nurse as “Technical Nurse”, bachelor nurse as “Professional Nurse”, and nurse with post-graduate education as “Nurse Specialist”.

in number, therefore, only a few can go to study at health worker education institution. As a result, an absolute lack of health workers hinders primary health care promotion in remote areas.

In order to tackle this problem, MOH undertakes to train PHC workers and post them at health centres throughout the country. The training course of this PHC worker has already started at Oudomxay and Luangprabang PHSs and other PHSs will follow as soon as they are prepared. Students enrolled in the PHC worker course must have completed junior high school and be willing to work for the health centre at their own community. They are selected through their community and provincial authority. During 3-year training period, they receive allowance and necessities such as uniform, furniture, and bedding from their province. In exchange, they have to contract to work at the health centre at their community after training.

Taking these situations into consideration, request from the GOL for this Project is quite rational and appropriate. This Project will facilitate fundamental improvement of nurse education system and contribute to development of human resources for primary health care promotion. In this regard, supporting health worker education institutions is concluded to be very reasonable and in demand.

(2) Selection of Schools

At present, there are 5 PHSs located in Oudomxay, Luangprabang, Khammuane, Savannakhet, and Champasak and the CHT educating nurses in Lao PDR². This Project will target all these schools.

The CHT is the only institution educating middle-level paramedical professionals in Lao PDR. With reference to nurse education, there are 2 courses: 3-year middle-level nurse course (pre-service education) and 2-year and 4-month bachelor nurse course (continued education). The CHT plans to close middle-level nurse course and to concentrate on bachelor nurse course program. Right now, the bachelor course accepts nurse teachers of the PHSs and the CHT, and promising middle-level nurses working at provincial hospitals. After completing the course, they are expected to be a leader or in a management position at their own workplaces. It is, therefore, apparent that the CHT greatly contributes to improvement of nurse education in provinces and consequently to improvement of health service quality in provinces.

On the other hand, 5 PHSs, situated in major regional cities, accept students from surrounding provinces. When ill-developed transport network and large economic gap between the capital and the provinces are taken into account, these 5 schools seem to be distributed strategically based on geographical and demographic condition of the country. Without such schools in provinces, it is

² Oudomxay PHS will start nursing course from Oct. 2005.

impossible to educate health workers and the workers to rural areas. Moreover, it is primarily essential to enable all these schools to provide high quality education in order to supply high quality health workers to health facilities in backward areas. As a result, regional disparity of health service delivery will be resolved.

Thus, to select all these 5 PHSs and the CHT as Project targets is essential and certainly rational.

(3) Scale of Cooperation for Each School

Although student enrollment at PHSs are fixed as 40 per year for each school, all four schools (Luangprabang, Khammuane, Savannakhet and Champasak) accept much more number of students. There are 2 main reasons behind this situation: first, national policy of human resource development expects higher and vocational education schools to give educational opportunities as many as possible for high school graduates whose number is growing year by year; second, demand for nurse is increasing in the health sector. However, since unlimited increase of student will deteriorate quality of education, MOH reconsiders the student intake in each school. New prescribed number of students in each school, as shown in Table 2-2-1, is going to be applied from Year 2006 when the next 5-year plan starts. This number is decided based on the population of provinces where each school is supposed to cover, capacity of each school and its training hospital (provincial hospital), and future demand for nurse forecasted.

Table 2-2-1 Yearly Student Intake in Each PHS

PHS	Oudomxay	Luangprabang	Khammuane	Savannakhet	Champasak	Total
Prescribed number of student in 2002	-	40	40	40	40	160
Actual number of students enrolled in 2002	-	92	90	126	164	472
Annual prescribed number of students from 2006	60	60	60	100	100	380

As a result of analysis based on the data collected through the study, this prescribed number of student is proved appropriate because of following reasons

- 1) According to MOH plan, 1 or 2 nurses will be posted per health centre in the future. At present, significant number of health centres, among 702 in total, only have under-qualified staff who only receive health worker education for a few months or less than 2 years. In addition, a number of health centres are being newly established every year. Therefore, demand for qualified nurses will surely increase in the future. (Appendix 13)
- 2) MOH has a regulation regarding standard number of nurses per bed for central, provincial, and district hospitals. However, present situation in each hospital does not meet this standard,

That is, demand for nurse is still not satisfied. If these hospitals are better equipped and number of bed increase in future, more number of nurses is required. (Appendix 13)

- 3) At district and health centre level, many medical assistants substitute for medical doctor and even partly go into nursing. Since medical assistant has not been produced any longer, positions of medical assistants will be partly replaced by nurses when existing medical assistants reach their retirement. (Appendix 13)
- 4) In fact, not all graduate nurses of PHSs and the CHT can become permanent staff working for government health facilities/institutions and offices. However, significant number of nurses are hired as contract staff for health facilities. Cost for such contract nurses comes from the budget of provincial or district government or hospital itself. There are also many nurses who work as volunteer in hospital while being engaged in part-time job at private clinic or pharmacy to earn money (Appendix 14). In short, all nurses, who completed nurse education courses, are making use of their professional skills for their work in some way. According to employment plan of MOH, employment of nurse will increase more than present. Therefore, employment opportunities for nurse will increase in future in due course (Appendix 15).
- 5) At present, Khammuane, Savannakhet and Champasak PHSs accept students from 10 provinces located to the south of Vientiane province. Among all 18 provinces, Savannakhet is the largest province and Champasak is the 3rd in the country in terms of population. As such demographic characteristics are taken into account, it is reasonable that Savannakhet and Champasak PHSs are allowed to enroll more number of students than other 3 schools. (Appendix 16)

Lastly, it should be emphasized that prescribed number of students set by MOH is less than present student intake in each school (see Table 2-2-1). However, it is essential for both MOH and schools to assure the sufficient budget for sustainable school management because students in one grade will stay in school longer than now due to the change of study period from 2 into 2.5 years.

To sum up, it is appropriate that the scale of cooperation is determined based on the prescribed number of students set by MOH.

(4) Basic Concept for Determination of Contents and Scale of Facilities

The design concept for determining the facilities' scale will have an important impact, not only on the function for the facilities, but more importantly will have effect the construction and Project cost. Facility contents and scale have been studied with the policies based on the facilities listed in M/D Annex-1 (Appendix-5). The basic concepts for studying the Project scale are:

- 1) Renovation/construction of facilities and procurement of equipment for 5 PHSs to be covered by this Project. Contents and level of the facility for each school will be studied to achieve a common standard. For the purpose of supporting teachers training procurement of equipment for the CHT also to be covered.
- 2) Most of the PHSs in Lao consists of academic facilities, administrative facilities and dormitories. However, it is agreed that this Project will focus on strengthening the academic portion of facilities.
- 3) PHS will be designed in combination with “Classrooms”, “Demonstration Room” and “Library” mainly, which are necessary for the “2.5-year Nurse Training Course” and “PHC Worker Course”.
- 4) Using the existing facility is one of the prioritized concept, and facilities to be renovated will be selected according to study on possibility and necessity of renovation based on the result of inspection and structural examinations.
- 5) Capacity of classroom is designed according to the MOH’s policy which is the planned number of students for 2.5-year nurse training course will be 60pers./class (50pers./class and 2 classes/year for Savannakhet PHS and Champasak PHS). In order to secure good quality education, it is confirmed by MOH and each school that the number of students per class should not exceed 110% of each quota. (See to Appendix 4 Minutes of Discussion “7-3”).

The contents and number of rooms required for each PHS have been confirmed through the discussions during the field survey. Based on the future plan of courses and number of students summarized as shown in Table 2-2-3, the number of rooms required to be constructed or renovated have been decided as noted in Table 2-2-2.

Table 2-2-2 The contents and number of rooms required for each school

	No. of Students	No. of Necessary Rooms (total)	Future Plan		
	a) Nurse Course b) PHC Worker Course	a) Classroom b) Demonstration Rm c) Library	Use Existing Building	Renovation	New Construction
Oudomxay PHS	a) 60 pers./year b) 40 pers./year	a) 3 Rooms b) 1 Room c) 1 Room	a) - b) - c) -	a) - b) - c) -	a) 3 Rooms b) 1 Room c) 1 Room
Luangprabang PHS	a) 60 pers./year b) 50 pers./year	a) 4 Rooms b) 1 Room c) 1 Room	a) - b) - c) 1 Room	a) 4 Rooms b) - c) -	a) - b) 1 Room c) -
Khammuane PHS	a) 60 pers./year b) 60 pers./year	a) 4 Rooms b) 1 Room c) 1 Room	a) - b) - c) -	a) 2 Rooms b) - c) -	a) 2 Rooms b) 1 Room c) 1 Room
Savannakhet PHS	a) 100 pers./year b) 45 pers./year	a) 9 Rooms b) 1 Room c) 1 Room	a) 4 Rooms b) - c) 1 Room	a) 2 Rooms b) - c) -	a) 3 Rooms b) 1 Room c) -
Champasak PHS	a) 100 pers./year b) 30 pers./year	a) 7 Rooms b) 1 Room c) 1 Room	a) - b) - c) 1 Room	a) 7 Rooms b) 1 Room c) -	a) - b) - c) -

Table 2-2-3 Implementation plan of Nurse Training Course and PHC Worker Course

	No. of Students	No. of Cls.	2003	2004	2005	2006	2007	2008
Oudomxay PHS								
Nurse Course 2.5year	60	1						
	60	1						
	60	1						
PHC Worker Course	40	1						
	40	1						
	40	1						
Required Classrooms			1	2	3	3	3	3
Luangphabang PHS								
Nurse Course 2.0year	75	1						
	94	1						
Nurse Course 2.5year	65	1						
	40	1						
	40	1						
	60	1						
	60	1						
PHC Worker Course	50	1						
	50	1						
	50	1						
Required Classrooms			3	4	4	4	4	4
Khammouane PHS								
Nurse Course 2.0year	81	1						
	90	1						
Nurse Course 2.5year	120	2						
	40	1						
	40	1						
	60	1						
	60	1						
PHC Worker Course	30-60	1						
Required Classrooms			2	3	4	4	4	4
Savannakhet PHS								
Nurse Course 2.0year	72	1						
	125	2						
Nurse Course 2.5year	133	2						
	*2100	2						
	*2100	2						
	100	2						
	100	2						
PHC Worker Course	30	1						
	45	1						
	45	1						
	45	1						
	46	1						
Required Classrooms			3	5	6	9	9	9
Champasak PHS								
Nurse Course 2.0year	94	2						
	150	3						
Nurse Course 2.5year	105	3						
	*2100	2						
	*2100	2						
	100	2						
	100	2						
PHC Worker Course	30-40	1						
Required Classrooms			5	6	5	7	7	7

*1 Classrooms required for each school in order to implement Nurse Course and PHC Worker Course.

*2 Although the planned number is 40, this numbers are decided based on the actual student number.

: 1st grade : 2nd grade : 3rd grade

2-2-1-2 Basic Design Policy for Facility Planning

The basic design of the facilities in the Project is based on the following design policies giving due consideration to the results of the field survey, the environmental and social conditions of Lao PDR, the construction and procurement conditions, the maintenance and management capability of the Implementation Agency and construction schedule under Japan's Grant Aid assistance.

- 1) In particular, it is very important to pay attention to the functional technology, in regard to endurance and practicality within the sphere of reasonable costs together with the activity plan and functions required for PHSs. Building should be generally planned with a standard module, and the basic plan is commonly used for all schools in order to have a rational and economical construction, layout plans of equipment and furniture for economical construction.
- 2) One prioritized basic concept is to use existing facilities as much as possible, and the possibility and necessity of renovating the existing facilities were studied based on the results of inspection and structural examination of the existing buildings. In the case the facility lacks functional qualities, the necessity of new facility shall be studied. Coordination with existing facilities is to be considered for the new building.
- 3) Luangprabang PHS is located in the area of World Heritage, and the building which we are planning to renovate is registered as a most important building. Therefore, renovation work of this Project should follow the instructions and regulation prepared by UNESCO.
- 4) The local climate (rain, sunshine and wind) and social customs should be taken into consideration. Shape of the roof shall be sloped to deal with the heavy rain, and louvers for sun shade and intercepting the rain and water drainage system shall also be installed.
- 5) In order to minimize the running cost for operation as well as to improve the educational environment, large windows and doors shall be adopted. The necessary ventilation and light shall be controlled by the louvers and ventilation blocks.
- 6) Durable and rational structural plan shall be designed using reinforced concrete frame. For renovation, from the view points of economical effectiveness and endurance, optimum method shall be determined.
- 7) Rationalizing the construction and lowering the cost are promoted and easy maintenance should be considered through maximum use of local or third-county construction methods and materials. The design for the facilities and equipment plan should allow low-cost and easy maintenance based on the technical level and maintenance/management system of the Lao side.

- 8) The schedule for the future implementation of the Grant Aid scheme, such as detail design, tender, groundbreaking, completion and hand-over, should be decided paying careful attention to the school activity schedules, availability and use of tentative facility, time required for renovation/new construction of each building etc.

2-2-1-3 Basic Policy for Equipment Planning

(1) Nursing Education in Lao PDR

Health workers including nurses and PHC workers share their knowledge, as described, they have learned in basic sciences such as physics, chemistry, mathematics and medical knowledge such as anatomy and physiology. Based on the knowledge, they provide additional medical services utilizing their added specialty in the field of health and medical care, notably, nursing. Therefore, curriculum of those subjects are indispensable to be a competent nurse.

Generally, medical doctors and nurses provide medical care and nursing care within their specialty, respectively, and they work together as a team. However, job description of nurses in Lao is not clearly documented. Nurses assigned to the health centres or district hospitals, where medical doctors or assistant medical doctors may not be available, have to do diagnostic as well as curative works as much as possible, partly due to poor accessibility into the upper level medical facilities.

Moreover, nurses are expected to work as midwives for normal childbirth delivery since there are no differentiation between nurses and midwives. Equipment that does not come into wide use in the medical facilities needs careful consideration since nurses have to take appropriate nursing and/or treatment measures even if there are no suitable equipment available.

Even though nursing education is difficult to achieve verbally and requires a lot of human models, pictures, figures and images, there are few textbook written in the Lao language. The equipment to produce those teaching materials and visual aids to show those produced materials to the students are limited. Therefore, most importantly, appropriate measures have to be taken to solve those problems.

When formulating the basic design of facilities and equipment for the nursing education, the number of students to be trained has to be planned and defined. In studies such as “Supply and Demand of Nurses in Lao PDR”, “Survey on the Job for New Graduates in Lao PDR”, “Justification of Planned Number of Students in view of the Distribution of Population in Lao PDR” shown in this report, and “Guidelines for Management of Nurse Training Facilities in Japan” are referred in order to formulate the basic design.

(2) Equipment needed for Nursing Education and Basic Policy

Equipment needed for the nursing education are classified into the following three groups and studied based on the policy to focus on the aspects which are directly related to the nursing education.

1) Equipment used in the classroom

In order to teach human body structures and physiological functions thereof and to have students understand the mechanism of diseases, various kinds of models of human body and organs are indispensable. Furthermore, in addition to models, various audiovisual equipment is useful to effectively train nurses and PHC workers.

2) Equipment to produce teaching materials

The equipment is indispensable to help teachers produce the summary of each lecture and other teaching materials or for students to make reports of their group works. Since it is economically difficult for students to buy textbooks in Lao, the summary of lectures made by the teachers is very important.

3) Equipment to learn basics of nursing through in-school practice

In the nursing field, it is important to teach the basics of daily life-support techniques (nursing techniques) through the hands-on practice at school. Therefore, fundamental equipment that is necessary for nursing practice at school before actual clinical practice at hospitals and community practice at villages is to be provided.

When the equipment of the above three groups is studied, criteria for equipment selection and quantity determination are made considering the newly-started curriculum for 2.5-year nurse training course and the role of nurses and PHC workers in the clinical practice at medical facilities.

When the selection of the equipment for the CHT is studied, the following future plan and characteristics of the CHT are also considered.

1) Nursing course for Bachelor's Degree has started since 2003 and enrollment includes graduates of middle level nursing course at the CHT and rural PHSs.

2) There are six courses altogether to train nurses, pharmacists, clinical lab technicians and so on at the CHT and the facilities such as library, practice/demonstration room and laboratory and accompanying equipment are shared by all students.

3) Due to the equipment for nursing practice and computers for hands-on practice provided by Thailand, Korea, and other donors, the equipment for practice is reasonably well furnished.

A number of instructors for lectures and practices are invited, particularly from Thailand in order to keep the level of the Bachelor course.

- 4) In the five PHSs in rural areas, instructors to teach midwifery are not sufficient in number and 2.5-year training is not long enough. Thus, the CHT plans to strengthen the lecture and in-school practice for midwifery.
- 5) Expansion of the building and donation of some equipment for the CHT were made recently through Thai support. Thus, the construction or renovation of the CHT facilities is not planned in this Project.

(3) Criteria for Equipment and Planned Quantity

- 1) Criteria and Quantity for five PHSs

Quantity is calculated based on the criteria for sixty students per class as shown below. The actual quantity for each school varies depending on the existing equipment that can still be used and future plans for equipment provided by other donors.

Criteria for Quantity	Types of Equipment
Equipment to be allocated on school basis	Equipment for lecture and production of teaching material
	Equipment for hands-on practice
Equipment to be allocated on 10-student basis	Equipment for hands-on practice
Equipment to be allocated on group basis for community practice	Equipment for community practice

- 2) Equipment plan for the CHT

Regarding the equipment for the CHT, the following equipment is also taken into consideration.

- a) Equipment for Practice: Since equipment for the midwifery practice is short in number, equipment for technique in midwifery is planned.
- b) Equipment for Laboratory: Students of nursing course share the same laboratory of clinical lab. course, where microscopes are equipped. Since the conventional microscopes are sufficient in number in teaching, a face-to-face or teaching type microscope is planned. This type of microscope will increase the training efficiency of students from other courses as well.

- c) Equipment for Production and Lecture of Teaching materials: Equipment such as computer system, copying machine, scanner, digital video camera, 3D LCD projector system and so on are planned for the production and presentation of teaching materials. Those equipment are planned to be set up in the library so that any instructors or students can access and use the equipment.

2-2-1-4 Results from Examining the Contents of Request

(1) Facility Planning

The contents of the request for the facility, which the Basic Design Study have covered, were agreed between the Lao side and Japanese side after the discussion and examination, and described in the Minutes of Discussions (M/D) signed on 29th January 2004. Table 2-2-4 shows the requested facilities by the Lao side regarding PHSs shown in the M/D Annex-1 (Appendix-5). Major study points on the contents are shown below, and further discussions were held in Japan after the Basic Design Study.

Table 2-2-4 Requested Facilities for the Project (M/D Annex-1, January 29, 2004)

Name of School	Items
Oudomxay PHS	A. New Construction: 1 Building A-1. Classroom: 3 rooms A-2. Demonstration room: 1 room A-3. Library: 1 room
Luangprabang PHS	A. New Construction: 1 Building A-1. Demonstration room: 1 room B. Renovation: 1 Building B-1. Classroom: 4 rooms
Khammuane PHS	A. New Construction: 1 Building A-1. Classroom: 2 rooms A-2. Demonstration room: 1 room A-3. Library: 1 room B. Renovation: 1 Building B-1. Classroom: 2 rooms
Savannakhet PHS	A. New Construction: 1 Building A-1. Classroom: 3 rooms A-2. Demonstration room: 1 room B. Renovation: 1 Building B-1. Classroom: 2 rooms
Champasak PHS	B. Renovation: 2 Buildings B-1. Classroom: 7 rooms B-2. Demonstration room: 1 room B-3. Toilet

1) Study on the PHSs to be covered by the Project

Regarding the facilities, improvement was requested for 5 PHSs except the CHT. As described in Section 2-2-1-1(2), it was agreed to give priority to upgrade all 5 PHSs equally in

accordance with a kind of standard, in consideration of the Project objectives; to improve and strengthen the education/training of Nurses and PHC workers who will work in the remote areas of the province.

Additional request for the CHT was raised by the Lao side at the beginning of the Basic Design Study. However, it was agreed by the Lao side that the improvement of CHT's facility would not be covered by this Project due to lack of the request in the Application Form.

2) Study on the facility contents for each school

In the Application Form submitted by the Lao side, academic facilities such as classrooms and demonstration rooms, and facilities for the school administration and dormitories were requested for each school as shown in Table 2-2-5.

Since a lot of students from other provinces and remote areas are studying in each school, dormitory for the students is essential for each school. It has been strongly requested by each school, as well as MOH, to improve/expand their dormitories. However, in consideration of project scale and project concept, the priority will be given to upgrade five schools equally using the same standards. Decision was made that only academic facilities will be covered by the Project.

3) Study on the necessary facilities and number of rooms

Necessary facilities and number of classrooms were studied based on the future plan for each school as well as the condition of the existing facilities. The result of this study, agreed by the Lao side, is shown in Table 2-2-3.

Table 2-2-3 shows the planned courses, planned number of classes and students for each school, which were confirmed through discussions with MOH and schools during the Basic Design Study. As academic facilities, three kinds of facilities, such as a) Classroom, b) Demonstration Room, and c) Library, are required for PHSs. In regard to three facilities, necessities were examined for school by school.

4) Study on the necessity and possibility of renovating the existing facilities based on the existing buildings.

In parallel with the study on the required facilities, necessity and possibility of renovation of the existing buildings were studied based on the inspections.

Additionally, there are some cases where classrooms and dormitories were mixed in the same area. Facilities required to be constructed or renovated for each school were studied, with consideration given to re-arrangement of the functional layout plan as well as the maximum use of the existing buildings.

Table 2-2-5 Contents of Request for Each PHS

	Oudomxay PHS	Luangphabang PHS	Khammuane PHS	Savannakhet PHS	Champasak PHS
Major Existing Rooms	Classrooms: 1 (using dining building) Demonstration Room: 1 Dormitory	Classrooms: 3 Demonstration room: 1 Laboratory room: 1 Library: 1 Dormitory	Classrooms: 2 Demonstration room: 1 Library: 1 Large meeting room: 1 Dormitory	Classrooms: 3 Demonstration room: 1 Library: 1 Large lecture room: 1 Dormitory	Classrooms: 5 Demonstration room: 1 Laboratory: 1 Library: 1 Large lecture room: 1 Dormitory
Requested Buildings (Application Form for Grant Aid, Aug.2002)	Construction of -Training Rms. (220m ²) -Dormitory for trainers and trainees.(for 20pers., 360m ²)	Renovation of - Classrooms, Hall, and Demonstration Rm. Construction of - Classroom Bldg. (200m ²)	Rearrangement of existing technical buildings. Construction of - Dormitory for students (for 120pers., 1,080m ²) - Training Rm. , Hall and Library (220m ²) - Dormitory for trainers and trainees (for 20pers., 360m ²)	Re-construction of - Administration Bldg. (280m ²) - Dormitory for students.(for 50pers., 430m ²) Construction of - Training Rms. (380m ²) - Dormitory for trainers and trainees.(for 20pers., 360m ²)	Re-construction of -Classroom and Technical Bldg. (430m ²) - Dormitory for students.(for 120pers., 1,080m ²) Construction of -Training Rms.(220m ²) - Dormitory for trainers and trainees.(for 20pers.,360m ²)
Request from each school (from site survey)	1)Classrooms 2)Demonstration room 3)Dormitory (40 students) 4)Teachers' Dormitory	1) Classrooms 2) Dormitory 3) Demonstration room 4) Library 5) Kitchen & Dining 6) Toilet	1)Classrooms 2)Library 3)Demonstration room & Anatomy room 4)Laboratory 5)Computer room	1)Classrooms :10 rooms 2)Demonstration room 3)English classroom 4)Computer room 5)Laboratory 6)Dormitory	1)Classrooms : 8 rooms 2)Demonstration Room a. English classroom b. Computer room c. Laboratory
Required Classroom/ Demonstration Room/Library	3 rooms / 1room / 1room	4 rooms / 1room / 1room	4 rooms / 1room / 1room	9 rooms / 1room / 1room	7 rooms / 1room / 1room
Requested Facility (M/D Annex-1, Oct.2003)	<u>New Construction</u> ➤ Classroom : 3 rooms ➤ Demonstration room ➤ Library	<u>New Construction</u> ➤ Demonstration room <u>Renovation</u> ➤ Classroom : 4 rooms (Existing 2 classrooms and demonstration room will be changed to 4 classrooms) *Existing Library will be used continuously.	<u>New Construction</u> ➤ Classroom : 2 rooms ➤ Demonstration room ➤ Library <u>Renovation</u> ➤ Classroom: 2 rooms	<u>New Construction</u> ➤ Classroom: 3 rooms ➤ Demonstration room <u>Renovation</u> ➤ Classroom: 2 rooms *Existing 4 classrooms and library will be used continuously.	<u>New Construction</u> ➤ Classroom: 7 rooms (+5 rooms for dormitory) ➤ Demonstration room ➤ Toilet Buildings

(2) Equipment

Health workers including nurses and PHC workers work by sharing their knowledge of basic general subjects as well as basic medical subjects. And more importantly, they are expected to provide health and medical care services with the added specialized knowledge.

Therefore, curriculum aimed at mastering these subjects is indispensable in order to train nurses and PHC workers. To effectively train nurses and PHC workers, various educational and training equipment is extremely important and thus it is necessary not only to construct buildings with infrastructure but also procure equipment to work with.

The list of requested equipment attached to the Application Form from the Lao side is the same for all schools. The following list shows the major requested equipment for educational and training purposes.

Purposes	Requested Equipment (example)
Practice equipment for nursing	Patient bed, Neonatal cot, Stretcher, Suction unit, Microscope, Boiling sterilizer, Baby care dummy, Adult care dummy etc.
Anatomical models of human body and organs	Anatomical human model, Circulatory system model, Respiratory system model etc.
Practice equipment for basic physiological data	Sphygmomanometer, Thermometer, Weight/Height scale for infant, Stethoscope etc.
AV equipment for lecture	Slide projector, Overhead projector, TV system etc.
Equipment for production of teaching materials	Computer system, Copying machine, Small printing machine etc.

For medical knowledge particularly in human body structure and its functions, it is most effective to use models, figures, pictures and images. Also, it is very important for them to receive hands-on practice and exercise. However, in reality, in many schools the number of practice equipment and models is limited and/or outdated. Also as there are few textbooks written in the Lao language, lectures are often given utilizing conventional audio-visual equipment. But equipment for producing teaching materials and for presentation at lectures is extremely short in number. In order to solve those problems, the list of requested equipment is considered basically appropriate.

For formulating the plan, the differences in each school are also considered in some existing equipment that can still be used and in the plans for equipment provided by other donors. Also, the equipment plan was made coordinating the Facility Plan in this Project.

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

2-2-2-1 Site Layout Plan

The site layout plan for the Project was based on the analysis of the entire composition of the facility, giving full consideration to site conditions, such as the natural conditions, the condition of the existing facilities and the surrounding area. Results of the physical inspection of the existing facilities are also considered for the new site layout plan. It was confirmed that all of the Project sites have the authority to use their existing school buildings and their land, continuously.

The following matters are the basic concept for the zoning and flow plan of the facilities.

- 1) In some schools, dormitories mingle with academic facilities, such as classrooms and demonstration rooms within the school sites. In order to improve the educational environment, rearrangement of the functional layout (review of zoning) has been considered to separate academic zone and dormitory zone.
- 2) Functional layout and flow patterns, shall be considered for the rational site layout plan, in order to ensure their functions incorporated with the existing buildings, especially for relationship with the administrative buildings and existing classrooms or library which will be kept as they are.
- 3) The site layout of the facilities are designed with consideration of the climate in Lao PDR, in order to incorporate good ventilation and natural lighting without using mechanical devices, and control strong sunlight throughout the year by use of louvers.

Proposed site layout plan for each PHS is shown in the following table.

Table 2-2-6 Study on Site Layout Plan for Each School

	Site plan	Requested facilities
Oudomxay PHS	<p>Training center in the school site, used for the in-service training for health staff, belongs to Provincial Health Office and it is not available to use for school permanently. In addition, it was requested to keep the large open space at northern part for a provincial football grounds by the Provincial Governor.</p> <p>At the east side of the existing buildings, one dormitory building (for PHC workers training course) and a toilet& shower building are under construction with ADB support. Therefore, it is planned to built a new classroom building at the north-eastern part of the site.</p> <p>Administration building will be prepared by Lao side.</p>	<p><u>New Construction:</u> 2 stories</p> <ul style="list-style-type: none"> ➤ 3 Classrooms ➤ Demonstration room ➤ Library <p>◇ No. of required classrooms : 4</p>
Luangprabang PHS	<p>No. of classroom is not enough for starting 2.5-year nursing course. Therefore, it is planned to renovate the existing classroom building for 4 classrooms and to construct a new demonstration room.</p> <p>The existing library will be continuously used. And the existing small laboratory room will be converted to the reading/study space of library after the new demonstration room with laboratory counter are completed.</p>	<p><u>New Construction:</u> 1 story</p> <ul style="list-style-type: none"> ➤ Demonstration room <p><u>Renovation:</u> 1 story</p> <ul style="list-style-type: none"> ➤ 4 Classrooms <p>◇ No. of required classrooms : 4</p>
Khammuane PHS	<p>There are only 2 classrooms. The size of the existing library and demonstration room are not enough for the activities.</p> <p>It is proposed to construct a new classroom building (for 2 classrooms, demonstration room, and library) and renovate the existing classroom building, so that the academic zone and dormitory zone will be clearly separated.</p>	<p><u>New Construction:</u> 2 stories</p> <ul style="list-style-type: none"> ➤ 2 Classrooms ➤ Demonstration room ➤ Library <p><u>Renovation:</u> 1 story</p> <ul style="list-style-type: none"> ➤ 2 Classrooms <p>◇ No. of required classrooms : 4</p>
Savannakhet PHS	<p>The school site is separated into two parts by Khanthabuli Rd. Most of the buildings in the western part were built in 1950's and are seriously decrepit.</p> <p>In order to meet the students' increase, any buildings, with space available, are used for dormitory, so that dormitories are spread around the school site.</p> <p>Therefore, it is proposed to rearrange the site layout plan to clearly separate academic zone from dormitory zone. Zone along the Mekong river in the western site and eastern site are planned to be academic zones.</p> <p>Demonstration and dormitory building in the eastern site are going to be renovated as a classroom building.</p> <p>New building for classrooms and demonstration room will be built at the space near the administration building. Demonstration of old hall and removing arm tank will be managed by Lao side.</p>	<p><u>New Construction:</u> 2 stories</p> <ul style="list-style-type: none"> ➤ 3 Classrooms ➤ Demonstration room <p><u>Renovation:</u> 1 story</p> <ul style="list-style-type: none"> ➤ 2 Classrooms <p>◇ No. of required classrooms :9</p> <p>◇ 4 classrooms and Library: existing facility</p>
Champasak PHS	<p>To meet the demand, the number of classrooms were increased and their location are mixed with dormitory.</p> <p>It is planned to convert the western building to a dormitory building, the southern building to a classroom and demonstration building, and the eastern building to a classroom and dormitory building.</p> <p>These three buildings were build in early 1980's. Although some roof leakages are seen, their structural condition seems adequate. Therefore, it is planned to renovate two of them, the southern building and eastern building which contain classrooms.</p>	<p><u>Renovation:</u> 2 stories</p> <ul style="list-style-type: none"> ➤ 7 Classrooms (+5 dormitory rooms) ➤ Demonstration room ➤ Toilets (for male and female) <p>◇ No. of required classrooms : 7</p>

2-2-2-2 Architectural Design

(1) Floor Plan

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

1) Basic Policy

- a) The floor plan should be coordinated considering the relationship between each room. Taking into account the frequency of utilization, most of classrooms are planned to locate on the ground floor. Two classrooms are adjoining each other, and a movable wall is going to be used as a partition between two classrooms, so that these rooms may be converted to a large room in the case of a school event or a big lecture.
- b) An open corridor system is adopted so as to maintain a comfortable environment with natural light and ventilation. Benches along the corridor will be used by students during the class break.
- c) Buildings have been planned on a module concept to increase flexibility, reduce operating and managing cost, and rationalize construction. Modular structural grid layout should be most economical and common in Lao PDR considering layout plans of equipment and furniture for economical construction.
- d) The standardization of floor plans of “Classroom”, “Demonstration Room” and “Library” is considered, and new buildings for each school are designed with a combination of these standard plans.
- e) The size and layout of equipment and furniture in each room should be considered in the design.
- f) 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.

2) Study on the scale of rooms

The scale of each room has been determined in accordance with a series of discussions and examinations with each school and MOH, and studies of similar existing facilities in Lao PDR and similar Projects undertaken with Japan’s Grant Aid used as points of reference. Based on

the discussions during Basic Design Survey between each school and study team, each room area has been calculated with consideration of planned activities such as the type of lectures and number of students.

a) Classroom Planning

As mentioned before, the number of student per class was planned as 60 per class (50 per class : Savannakhet and Champasak PHS). For the new construction, a standard module of classroom is designed as $12\text{m} \times 7\text{m} = 84\text{sqm}$ for 60 students, which is 1.4sqm per person, with consideration to the existing buildings in some schools. According to the field survey, more than 80 students were studying in the same scale classrooms. It is a prerequisite condition to keep proper number of students per class in order to secure good quality education.

In case that more than two classrooms are planned to be constructed or renovated, two of them are planned to be placed adjacent to each other. The wall between them is going to be movable wall, so that they may be used to function as a one large lecture hall. In the case of conversion, it can be used for lectures for approximately 120 persons with desk, or more than 200 students with chair.

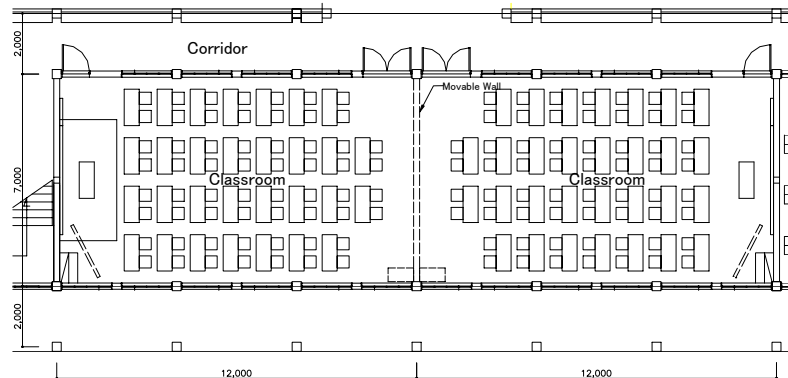


Figure 2-2-1 Classroom

b) Demonstration Room

The rooms will be used for demonstration by teachers and also for nursing practice using beds or some devices. The floor area of this room is planned as $16\text{m} \times 7\text{m} = 112\text{sqm}$ for 60 students, which is 1.89sqm per person, with the ratio of one bed for 10 students.

In the room, sinks will be used to practice hand-washing or washing devices, and counters will be placed for laboratory training, and some equipment such as 6 hospital beds will be utilized for bedside training, together with some cabinets and trolleys to facilitate training.

For the purpose of training, many devices and models will be used in this room. In order to keep enough space for practice, most of them can be stored in the preparation room, which is 4m x 7m = 28sqm, next to the demonstration room.

In addition, a movable partition wall will be installed in the middle of the room. In the case of small group practice, it is possible to divide the larger space to two small rooms.

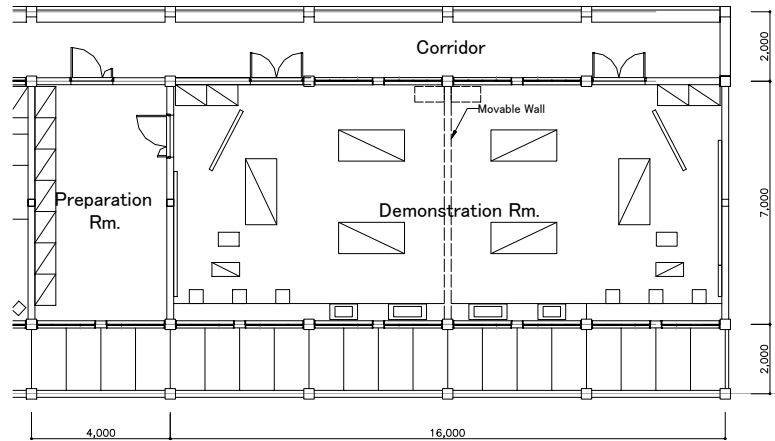


Figure 2-2-2 Demonstration Room

c) Library

According to the field survey, the existing libraries have a space for some books but have no space for reading and studying in most of the schools. However, it is necessary for the library to have a space for study to facilitate the situation of dormitories, where there is no space for study.

Therefore, the library is planned with book storage area as well as reading/self-study area. In the reading area, a counter for future computer corner will be reserved in addition to the large desk for reference study.

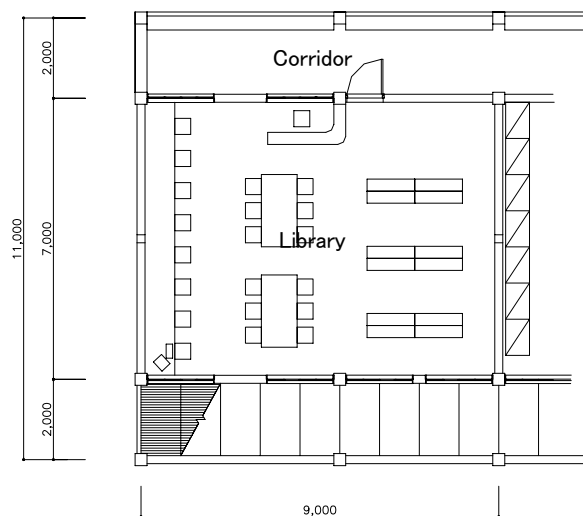


Figure 2-2-3 Library

(2) Elevation and Cross-Section Plan

Lao PDR is located in the temperate monsoon zone, on the south side of the Tropic of Cancer, therefore it is hot and humid. However, to secure the natural ventilation and mitigate severe sunlight is the essential issue for the building design. For planning of elevation and cross-section of the building, the following basic policies are considered:

- 1) The site ground level and floor height of the existing buildings shall be taken into consideration in order to determine the floor level and cross section.
- 2) The level of the ground floor will be raised to the same as the existing buildings in each site in order to prevent water infiltration and radiant heat from the ground. Especially for Champasak PHS, where flooding has occurred several times, the site level is lower than the level of public road, and the floor level is lower than that of the inner court, therefore, the level of ground floor shall be raised by additional concrete.
- 3) The roof should be sloped in order to provide protection from sun radiation and direct sunlight and to have positive protection from heavy rain water.
- 4) Deep eaves and louvers can help to provide protection for rooms from direct sunlight and intense rainfall.
- 5) Adequate openings to facilitate room ventilation and provide balanced natural lighting, and also to reduce the running cost of electrical lighting and equipment shall be secured. In order to secure the natural ventilation during the heavy rains, ventilation blocks and louvers are also used.
- 6) The elevation design should consider harmony with the surrounding environment and the existing buildings by use of local design and materials of construction.

(3) Renovation Plan

Field investigation was performed to study the condition of the existing facilities in order to analyze the necessity of renovation for each school. The future plan of each school has been taken into consideration, the following buildings are prioritized to be renovated from the results of the examination.

Table 2-2-7 Renovation Plan

School	Current Condition	Renovation Plan
<p>Luangprabang PHS</p> <p><Classroom Building></p>	<p>This building was built in 1920's, and now decrepit. It has been renovated twice, however, superstructure seems usable.</p> <ul style="list-style-type: none"> - Roof: Truss members seems to be completely damaged by termite. - Steel plates used for reinforcing truss looks strong enough although covered with rust. Verge board looks comparably new. - Wall: Mortar separation from sub-structure is not visible. However there are some cracks, because of only one application of mortar 10 mm thick, and the paint finishing has peeled already. - Doors & Windows: Condition of wooden frames are not in bad condition, but some members of wooden frames were damaged by termite. Panel for door and windows are deteriorated. - Ceiling: The ceiling boards re-installed at the time of renovation are warped and damaged due to moisture. - Floor: Clay tile have been worn down, and the surface of floor is uneven. Tiles are not separated but the floor tile grout joint are cracked and loose. 	<ul style="list-style-type: none"> ➤ In order to secure 4 classrooms, replacement of walls and installation of new sliding wall will be planned. ➤ Construction and renovation should follow the regulation instructed by "World Heritage Site Office".*1 ➤ English classrooms were renovated with WHO's support last year. The renovated Parts are not going to be renovated. - Roof: Re-structuring the new truss with the same members as existing truss. At least one member should be kept to exemplify original shape.. - Wall: Re-mortaring and re-painting. - Doors and Windows: Re-installation of new doors and windows. - Ceiling: Replace all ceiling boards. - Floor: Total re-setting of clay tile.
<p>Khammuane PHS</p> <p><Classroom Building></p>	<p>The building was built 16 years ago, and its structural condition is stable. Structural cracks and warps, foundation settlement is not visible. There used to be three classrooms, however it was renovated to two classrooms.</p> <ul style="list-style-type: none"> - Superstructure: Concrete columns seems strong enough. - Roof: Condition of truss members seems secure with proper rigidity and without rot and warp. Tin roofing sheet is completely rusted. Ridge board also should be changed. - Wall: Mortar separation from sub-structure is not visible. However there are some cracks due to one application of mortar 10 mm thick, and the paint finishing has peeled off already. Wall between two rooms is wooden panel, and will be removed. - Doors & Windows: Most of their panels are 	<ul style="list-style-type: none"> - Roof: Roofing sheet will be changed to new cement roof tile, with consideration to the heat insulation and protection from noise during rain etc. Truss should be reinforced as required to install new roof tile. - Wall: Re-mortaring and re-painting. Wooden partition between the two rooms will be changed to brick wall. - Doors and Windows: Re-installation of new doors and windows. - Ceiling: Replace all ceiling boards. - Floor : Re-mortaring is required.

School	Current Condition	Renovation Plan
	<p>obsolete.</p> <ul style="list-style-type: none"> - Ceiling: Ceiling panels are warped and damaged due to moisture. - Floors: Cement surface are worn from usage and not even. - Ant trails are visible, and their nests are found on the ceiling. 	
<p>Savannakhet PHS <Demonstration / Dormitory Building></p>	<p>This building was built in 1995. Painting and finishing are obsolete.</p> <ul style="list-style-type: none"> - Roof : No problem for truss. But roofing slate are deteriorated and leaking occurs. - Wall: Mortar separation from sub-structure is not visible. However there are some cracks, because of only one application of mortar 10 mm thick, and the paint finishing has peeled off already. - Doors & Windows: Most of their panels are obsolete. - Ceiling: Ceiling panels are warped and damaged due to moisture. - Floors: Cement surface was worn from usage and not even. 	<ul style="list-style-type: none"> ➤ To secure two rooms, the corridor in the middle will be included as part of a large classroom by rearrangement of walls. - Roof : Roofing sheet will be changed to new cement roof tile, with consideration to the heat insulation and protection from rainy noise etc. Truss should be reinforced where required to install the new roof tile. - Wall: Re-mortaring and re-painting. - Doors and Windows: Re-installation of new doors and windows. - Ceiling: Replace all ceiling boards. - Floor: Re-mortar of 30mm thick.
<p>Champasak PHS <Classroom / Dormitory Building 1> <Demonstration / Dormitory Building></p>	<p>Buildings were built almost 15 years ago, however, their structure is strong enough. Structural cracks and warp, foundation settlement were not visible. There used to be three classrooms, however it was renovated to two classrooms.</p> <ul style="list-style-type: none"> - Roof : No problem for truss. But roofing sheets are deteriorated and leaking. - Wall: Mortar separation from sub-structure is not visible. However there are some cracks, because only one application of mortar 10 mm thick, and the paint finishing has peeled off already. - Doors & Windows: Most of their panels are obsolete. - Ceiling: Ceiling panels are warped and damaged due to moisture. - Floors: Cement surface was worn from usage and not even. - There are a lot of ants, and ants trail are visible on the wall. Wooden frames of windows and doors, on the ceiling plenum space are used for nest. 	<ul style="list-style-type: none"> ➤ In order to secure the necessary classrooms, location of walls shall be rearranged. - Roof: Roofing sheet will be changed to new cement roof tile, with consideration to the heat insulation and protection from rain noise etc. Accompany the new roof tiles, truss should be reinforced. - Wall: Re-mortaring and re-painting. - Doors and Windows: Re-installation of new doors and windows. - Ceiling: Replace all ceiling boards. - Floor: Level of ground floor will be made 150 mm higher in order to protect from the water flood, placing additional concrete and re-mortaring will be arranged to raise the slab floor. - Drainage system for rain water will be installed. - Corridor: Water protection panel will be installed, in order to protect flood. - Classroom/Dormitory Building 2: In order to protect flood, water protection panel will be installed.

*1) This building is classified as an important building for the World Heritage Site. Approval is required from the World Heritage Site Office before implementation of renovation work.

- a) The existing truss members should be used as much as possible. If it is not usable due to damage, at least one part should remain to show the original structural condition.
- b) Design and colors of building outside, it should be kept the original style. Approval by the World Heritage site office is required even though the change is small.
- c) Roof tile: Adoption of local and traditional tile and local manufacture is recommended.

(4) Cost Reducing Measures

Various cost reduction factors have to be considered in the course of design works for the new facilities and renovation works. The following cost performance ratio 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 room layout, utilities and equipment.
- 2) The standardization of space is necessary to give flexibility in the design of the buildings. The basic module with economical span has been determined, and also, standard floor plans of “Classroom”, “Demonstration Room” and “Library” were formulated so that plan of each school may be designed with combination of these standard plans.
- 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 as well as initial cost.
- 4) Local construction materials and local construction method, 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) Required Rooms and Floor Areas

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

Table 2-2-8 The floor area of new construction and renovations

New Construction				Renovation			
Rooms	Area /Unit	No. of Rm	Area (m ²)	Rooms	Area /Unit	No. of Rm	Area (m ²)
Oudomxay PHS							
A1. Classroom	84	3	252.0				
A2. Demonstration room incl. preparation room	140	1	140.0				
A3. Library	49	1	49.0				
A4. Toilets	32	1	32.0				
A5. Others			271.0				
Sub-total			744.0				
Luangprabang PHS							
A1. Demonstration room	133	1	133.0	B1. Classroom	94.8	4	410.8
A2. Toilets	32	1	32.0	B2. English room		2	126.4
A3. Others			51.0	B3. Others			360.4
Sub-total			216.0	Sub-total			897.6
Khammuane PHS							
A1. Classroom	84	2	168.0	B1. Classroom	84	2	168.0
A2. Demonstration room	140	1	140.0	B2. Others			48.0
A3. Library	63	1	63.0				
A4. Toilet	32	1	32.0				
A5. Others			233.0				
Sub-total			636.0	Sub-total			216.0
Savannakhet PHS							
A1. Classroom	84	3	252.0	B1. Classroom (L)	54.6	1	54.6
A2. Demonstration room	140	1	140.0	B2. Classroom (S)	65	1	65.0
A3. Toilet	32	1	32.0	B3. Others			46.0
A4. Others			248.0				
Sub-total			672.0	Sub-total			165.6
Champasak PHS							
				B1. Classrooms (L)	72	6	432.0
				B2. Classroom (S)	48	1	48.0
				B3. Demonstration room	96	1	96.0
				B4. Dormitory Rm.	48	5	240.0
				B5. Storage	48	1	48.0
				B6. Toilet		2	86.4
				B7. Others			384.0
				Sub-total			1,334.4
Total			2,268.0	Total			2,613.6

2-2-2-3 Structural Plan

(1) Basic Policy

The structural plan for the Project will be formulated after a full review of the existing site conditions together with the results of the soil investigation. The structure shall be designed to withstand serious defects from deflection and settlement, etc. In addition, the building shall have sufficient safety and durability against short term horizontal loading such as from strong winds and seismic loads. Consideration should also be given to local construction methods and structural system which is easy to construct and durable.

(2) Standard for Structural Design

Structural design shall basically conform to the relevant codes, regulations and standards of Lao PDR. In terms of regulation or standards for buildings, “The Rule of Construction” has been enacted by Urban Planning Division, Ministry of Communication, Transportation, Post and Construction in 1990. This rule was generally prepared for all provinces, however, detailed descriptions are not included. Therefore, in addition to the Lao’s rule, other relevant codes and or AIJ (Architectural Institute of Japan) should be referred in order to secure safety and rational in structural design and also for cost reduction.

(3) Method and Material

According to the past record, Lao PDR did not have a measurable earthquake. Other loads and imposed loading will be set according to the meteorological condition and site soil conditions.

For the new construction, the superstructure shall be made of reinforced concrete frame and the walls are to be made of brick which are economical and widely used materials in Lao PDR. Because of the simple plan and equal spans, a simple rigid frame structure with brick wall which is common in Lao is adopted.

In terms of the renovation work, only the buildings which are judged as structurally sound are selected. Therefore, basic structure will not be changed and reinforcement will be considered if required. For the Luangprabang, the existing shape of roofing truss will be restored because it is registered as part of the World Heritage site.

(4) Soil Condition and Foundation

New construction of classroom buildings are planned for the 4 PHSs. Among them, a boring test and a plate load test have been done for the three schools where two story buildings are planned to be constructed, and test excavation has been made at another school (Luangprabang PHS) with a plan of a single story building.

The result of soil investigations for each school is as follows.

- a) Oudomxay PHS: The layers from ground level to a depth of 2.50m are Silty Clay (N-value is 7-8), the layers from 2.50 to 6.00m are Silty Clay (N-value is 14-22), and the layers from 6.00m and more are Solid Clay (N-value is more than 35). As a result of unconfined compression test with the neighborhood soil of 2.00m depth is 0.63kg/cm^2 (62kN/m^2).
- b) Luangprabang PHS: As a result of a test excavation up to 1.20m depth, has been confirmed that layers from ground level to 0.45 m is surface soil, and the layers from 0.45m to 1.20m is quality clay.
- c) Khammuane PHS: The layers from ground level to a depth of 3.00 meters is Silty Clay (N-value: 10 – 14), and the layers from 3.00m to 5.70 m is silty (N-value is 6 – 10), the layers from 3.00m to 5.70 m is silty (N-value is 6 – 10), the layers from 5.70m – 11.00m are Silty Sand (N-value is 18-25), and more than 11.0m is Sand (N-value is more than 37). As a result of unconfined compression test with the neighborhood soil of 2.20m depth is 0.91kg/cm^2 (89kN/m^2).
- d) Savannakhet PHS: The layers from ground level to a depth of 9.15 meters is Silty Clay (N-value is 20 – 35), and the layers from 9.50m or more is Sand (N-value is more than 65). As a result of unconfined compression test with the neighborhood soil of 5.20m depth is 2.00kg/cm^2 (178kN/m^2).

Because of the one or two story buildings, Continuous footing will be adopted to protect from the differential settlement.

(5) Design Load

- 1) Wind load : The wind load is calculated as 30m/sec of basic wind speed in accordance with the Japanese Standard.
- 2) Seismic Force : In Lao PDR, sensible earthquake has not been recorded. With careful consideration to the safety building and the characteristics and referring to the facilities from the similar project, base shear coefficient can be reduced to 50% of the appropriate value (Co=0.1) in the Building Standard Law of Japan.
- 3) Dead load : With consideration to secure the enough strength, the columns, beams, and slabs will be safety and economical design.

(6) Material Plan

It is planned to use the following structural materials.

Concrete	Foundation, Superstructure	Strength by cylinder test 21N/mm ²
Steel Bar	Round Steel Bar	φ6 – φ9
	Deformed Bar SD295A	D10 – D16
	Deformed Bar SD345	More than D19
Steel	Steel Plate,	SS400, SSC400

2-2-2-4 Utility and Building Facility Plan

It should be remembered that this facility is for the PHS. Facility planning and equipment planning should be coordinated so that each facility, such as laboratory, workshop and so on, can be operated effectively. Consideration should be given to the condition of existing infrastructure (electric power, water supply and drainage, etc.). Most importantly, operational and maintenance system costs need to be considered in regard to economic compatibility .

(1) Basic Concept

- 1) The following items need to be considered for the utility plan.
 - a) Building planning should consider the number of persons using the facility based on the educational curriculum. It is important that the demonstration room reviews the demonstration & practice educational experiments which are likely to be conducted. These can then be coordinated with facility and equipment planning for effective use of facilities.
 - b) As there will be many demonstrations & practice with educational experiment and equipment, consideration should be given to the consistency and/or interface with facility and equipment plans and reduce problems with proper piping and electricity distribution.
- 2) In order to clarify the scope of the work to be borne by the Japanese and Lao project participants, the facility plan should be prepared so that existing facilities at the Project site are not affected. New facilities for the Project should be independent of the existing facilities. In addition, the function of existing facilities and new facilities to be built by the Project should be clarified. Most importantly, new facilities should function together with existing facilities.
- 3) From the view point of easy procurement of spare parts, easy facility maintenance and repair, and easy facility operation and management, equipment and materials for the Project should be locally available products.
- 4) The codes and standards used for materials, design, etc., should basically be relevant codes and standards in Lao PDR, “Laos Government Gazette Extraordinary”. If there are no applicable codes and standards in Laos, other internationally recognized codes and standards should be applied.

- 5) As low utility costs are very important for facility maintenance and operation, the facility plan should take into consideration energy saving measures.

(2) Water Supply and Sewerage System

1) Water Supply Systems

As for the scope of works for water supply systems, it was explained and confirmed that connections from the main pipe to a water supply meter at the site boundary should be the undertaking of the Water Authority (NAMPAPA). Piping from the water meter to the new water reservoir, and further piping and connections should be carried out by the Japanese project participant.

After discussions with NAMPAPA, it was determined that the quality of the water supply is satisfactory, therefore, it will not be necessary to provide filtration equipment. Also, it was confirmed that the water pressure is enough for direct supply for single or double story buildings. However, as a countermeasure for suspension of the water supply, which happens quite often in daytime, in the Oudomxay Province, elevated water tank is planned for Oudomxay PHS.

Piping materials should be polyvinyl chloride pipe, PVC, which is strong, low cost, and easy to install.

Based on the number of persons and each room's operational rate, the daily water consumption for each school is estimated as follows:

Table 2-2-9 Estimated Daily Water Consumption for Each School

Site	The number of persons	Class	Total of persons	Unit water consumption l /person · day	Water consumption l /person · day	Total m ³ /day
1. Oudomxay PHS	Students: 60 people/class Staff: 1 people/class	3	183	40	7,320	8
2. Luangprabang PHS	Students: 60 people/class Staff: 1 people/class	4	244	40	9,760	10
3. Khammuane PHS	Students: 60 people/class Staff: 1 people/class	4	244	40	9,760	10
4. Savannakhet PHS	Students: 60 people/class Staff: 1 people/class	5	305	40	12,200	13
5. Champasak PHS	Students: 60 people/class Staff: 1 people/class Shower:	7	357	40	14,280	22
		-	357	20	7,140	

2) Sewerage System

Lao PDR has neither sewerage nor standards for wastewater treatment and effluent. Wastewater from the existing PHS penetrates into the ground directly from the soak pit (seepage pit) tank through the septic tank. According to the soil survey at the site, the groundwater level is high, depending on the tide conditions.

Waste water from the sink of the demonstration & practice room, toilet sewerage will be collected and be drained to a soak pit.

3) Sanitary Equipment

Western type water closets are mainly used in the existing facilities. According to the request by PHSs, water closets should be Asian types considering Laos lifestyle and hygienic view points.

Since sanitary equipment is locally available, maintenance including procurement of spare parts would be easy.

4) Fire Extinguishers Facility (Scope of Architecture)

The fire extinguisher will be designed according to the Japanese regulations. The fire hydrant and fire extinguisher should be provided for immediate fire danger, so that people can be quickly evacuated from the buildings and fire fighting action can be promptly taken.

5) Ventilation System

As for the ventilation, the basic policy should be natural ventilation. However, a mechanical ventilation system is considered for lavatory.

(3) Electrical Works

1) Power Supply System

As for the power source for the new facility, low voltage line (1 phase, 2 wires, 220v, 50Hz) located in the existing PHSs has been extended to the campus. This will provide the power source for the new facility.

According to the series of discussions with the PHSs and the Electricite Des Laos (EDL) in Laos, the existing electric pole and electric supply line can be relocated within the site. It has been confirmed that relocation of the existing electric pole and electric supply line and

distribution/extension works (as stated in the Minutes of Discussion) should be carried out by the Lao side.

The power supply condition has not yet improved. Both power failures and voltage fluctuation sometimes occur in the rainy season.

The estimated power demand is as shown in the following calculation:

Table 2-2-10 Estimated Power Demand for School

Site	Contents	Load density w/m ²	Building area m ²	Total load kw	Demand factor %	Demand kw
1. Oudomxay PHS	Lighting, Electrical Outlets, Ceiling Fan	25	750	19	90	17
2. Luangprabang PHS	Lighting, Electrical Outlets, Ceiling Fan	25	900	23	90	21
3. Khammuane PHS	Lighting, Electrical Outlets, Ceiling Fan	25	800	20	90	18
4. Savannakhet PHS	Lighting, Electrical Outlets, Ceiling Fan	25	800	20	90	18
5. Champasak PHS	Lighting, Electrical Outlets, Ceiling Fan	25	1,100	28	90	25
Total				347		190

Power failures were not experienced during the Basic Design Survey period but according to the PHSs, power failures occur occasionally during the rainy season. However, a class was not interrupted by power failures. An emergency generator will not be provided for the new facility and consideration should be given to maintain minimum loading for operation of building utilities and for security.

Main feed wiring capacity should be adequate for the equipment to be connected. Wiring method should be basically a cable track system in shafts and for other location wiring should be a conduit piping system.

2) Lighting Fixtures and Outlets

Existing facilities have large openings, so during the daytime almost no lighting is used in the class room. However, the lighting level was found to be relatively low, which is not an ideal condition. Furthermore, during the rainy season, each room is even darker due to cloudy conditions. A minimum lighting level should be maintained in order not to affect training.

The lighting level for each room is established as follows, based on the mean “JIS” standard lighting level and taking the PHS’s requirements into consideration. For each room in

particular, an efficient lighting layout is required, using local switch circuits, in order that the electrical running cost can be reduced.

Table 2-2-11 Lighting Level Plan for Each Room

Room \ Lighting Level	JIS Standard Lighting Level	Design Lighting Level Lx	remarks
Class Room	750 – 200	200	
Demonstration Room	750 – 200	200	
Library	750 – 300	300	
WC	300 – 75	75	
Corridor	300 – 75	55	
Storage	75 – 30	30	

Security lighting has been considered since expensive equipment will be installed in the new facility. It is proposed that mercury vapour lighting fixtures are to be provided at the exterior entrance and around the buildings.

3) Ceiling fan

In each of the existing PHS, air conditioners are not necessary in the classroom. However, a minimum numbers of ceiling fans should be provided in each classroom. Rooms should, wherever possible, have sufficient openings to provide natural ventilation so that air conditioners can be shut down when appropriate and the building running costs can be minimized.

2-2-2-5 Construction Plan / Building Material Plan

(1) Basic Policy

The building material plan shall be formulated based on the following basic policy in consideration of the climatic conditions, local culture, local construction method and materials, construction period and construction cost, etc.

- 1) The local procurement of construction materials shall be considered to reduce construction costs and shorten the construction period. However, the quality and supply capacity in Lao PDR should be confirmed.
- 2) The maintenance and operational costs shall be reduced by the building design considering the adaptation to the local climate, resistance against climate and the selection of materials that are easy to maintain.
- 3) Function of PHS and activity plan in each room should be taken into consideration when the materials have been selected.
- 4) Selection and determination of building materials shall be based on the detailed studies of local construction method and procurements.

(2) Building Material Plan

Building material plan is formulated according to the above mentioned policy, referring to the analysis of materials used for the similar facilities. Materials for structural works and some finishing works can be procured in Lao PDR, however, most of the finishing materials come from neighboring countries such as Thailand.

The policy for selection of materials in regard to the Project is to adopt local materials which are acceptable in quality and supply in Lao PDR, 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. 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:

1) Structural Materials

The typical local construction method and materials, which are reinforced concrete for main frames with brick walls, will be adopted for this Project.

2) Exterior Finishing

a) Exterior Walls

Exterior wall finishing will be mainly long-lasting weatherproof paint such as acrylic urethane resin paint. It is necessary to consider the adoption of quality material for easy maintenance and endurance.

In order to avoid the degeneration of paint coating and cracks, the quality of plastering work should be maintained by the careful work. Quality of plaster works and paint works shall be controlled by quality assurance inspections.

b) Roofs

Asbestos-free fiber reinforced cement roofing tile will be adopted for the new building and renovation work which is supported by ridged light weight steel frame roof structure taking into consideration the durability and to avoid sound transmission from heavy rain and heat absorption from strong sunlight and also maintenance. Also the appearance of the roof tile will match the existing buildings and surrounding landscape. For the renovation work, reinforcing and restructuring the roof frame is considered to adopt the above mentioned roof.

Especially for the Luangprabang PHS, under the registration of the World Heritage Office, the renovation and construction work should be implemented according to the regulations prepared by the UNESCO's World Heritage Site Office in Luangprabang. It is confirmed by MOH and the Study Team, the roofing tiles indicated by UNESCO should be adopted, and the necessary roofing tiles for renovation works would be prepared by the Lao side through the support of UNESCO's World Heritage Site Office.

c) Windows and Doors

Windows and doors for renovation and construction works, wooden doors, wooden windows, or jalousies are adopted in consideration to the existing ones.

Ventilation system for these schools is planned with ceiling mounted fan units and natural ventilation. Therefore, doors and windows with louvers and ventilation blocks are adopted.

The security grill will be installed on the windows of demonstration and preparation rooms and also in the libraries.

d) Wood Louvers

Wood louvers are planned to be placed along the corridors to protect the rooms from direct sunlight and intense rainfall and to incorporate good ventilation and natural lighting throughout the year. Although wood is commonly used in Lao PDR, the wood quality and durability should be considered by careful selection.

3) Interior Finishing

a) Floors

Porcelain tile, generally used and available in Lao PDR, will be adopted for floor finishing for classrooms and demonstration Rooms.

b) Walls

Painting on mortar base will be adopted as the finishing materials for interior walls. This is generally used in Lao PDR and used for the existing facilities. As such, quality of plaster works and paint works shall be controlled during installation as well as for the exterior walls.

c) Ceiling

Suspended ceiling using rock wool acoustic boards will be mainly used. Fiber reinforced cement board is also used for some areas, such as toilet and corridors.

(3) Proposed Major Materials

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

Table 2-2-12 Major Finish Materials

New Construction		Oudomxay PHS Khammuane PHS Savannakhet PHS						
Structure		Reinforced Concrete Wall: Brick						
Floor Height		4,000 mm						
Exterior Finish	Roof	Roof tile (Asbestos-free Fiber Reinforced Cement Roofing)						
	Plancier	Wood Louver (with Insect Screen)						
	Wall	Exterior Wall: Mortar Trowel, Acrylic Urethane Resin Paint				Louvers: Wood Louver + OSCL		
	Windows Doors	Wooden Windows (with Wooden Louver OSCL, Float Glass) Wooden Door (Wooden Double Swinging – Half Louvered Panel Door, with Paint)						
Interior Finish	Room	Classroom	Demonstration Room	Library	Prep. Room	Corridor	Toilet	Stairs
	Floor	Mortar-bed Porcelain Tile 300x300 (Non-slip type)	Mortar-bed Porcelain Tile 300x300 (Non-slip type)	Mortar-bed Porcelain Tile 300x300 (Non-slip type)	Mortar-bed Porcelain Tile 300x300 (Non-slip type)	Mortar-bed Terracotta Tile 300x300	Mortar-bed Porcelain Tile 100x100 (Non-slip type)	Mortar-bed Porcelain Tile 300x300 (Non-slip type)
	Wall	Mortar-bed Emulsion Paint	Mortar-bed Emulsion Paint	Mortar-bed Emulsion Paint	Mortar-bed Emulsion Paint	Mortar-bed Acrylic Urethane Resin Paint	Mortar-bed Ceramic Tile 100x100	Mortar-bed Acrylic Urethane Resin Paint
	Ceiling	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	1F: Fiber Reinforced Cement Board (t=12) VP 2F: Wood Louver (w/OSCL) with Insect Screen Wood Furring	Fiber Reinforced Cement Board (t=12) VP Wood Furring
Ceiling Height		3400	3400	3400	3400	3400	2600	

New Construction		Luangprabang PHS			
Structure		Reinforced Concrete Wall: Brick			
Floor Height		4,000 mm			
Exterior Finish	Roof	Roofing Tile (Clay Tile)			
	Plancier	Wood Louver (w/OSCL) with Insects Screen			
	Wall	Exterior Wall: Trowelled mortar with Acrylic Urethane Resin Paint		Louver: Wooden Louver with Paint	
	Windows Doors	Wooden Windows (with Wooden Louver, OSCL, Float Glass) Wooden Door (Wooden Double Swinging – Half Louvered Panel door, with Paint)			
Interior Finish	Room	Demonstration Room	Preparation Room	Corridor	Toilet
	Floor	Mortar-bed Porcelain Tile 300x300 (Non-slip Type)	Mortar-bed Porcelain Tile 300x300 (Non-slip Type)	Mortar-bed Terracotta Tile 300x300 (Non-slip Type)	Mortar-bed Porcelain Tile 100x100 (Non-slip Type)
	Wall	Mortar bed Emulsion paint (EP)	Mortar-bed Emulsion Paint (EP)	Mortar-bed Emulsion Paint (Acrylic)	Mortar-bed Porcelain Tile 100 x 100
	Ceiling	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	Wood Louver (w/OSCL) with Insect Screen Wood Furring	Fiber Reinforced Cement Board (t=12) Vinyl PSaint Wood Furring
Ceiling Height		3400	3400		2600

Renovation		Khammuane PHS		Savannakhet PHS	
Exterior Finish	Roof	Roof tile (Asbestos-free Fiber Reinforced Cement Roofing)			
	Plancier	Wood Louver (w/OSCL) with Insects Screen			
	Wall	Exterior Wall: Trowelled Mortar with Acrylic Urethane Resin Paint			
	Windows Doors	Wooden Windows (with Wooden Louver, OSCL, Float Glass) Wooden Door (Wooden Double Swinging – Half Louvered Panel Door, with Paint)			
Interior Finish	Room	Classroom		Corridor	
	Floor	Mortar-bed Ceramic Tile 300x300 Non-slip Type		Mortar-bed Terracotta Tile 300x300	
	Wall	Mortar-bed, Emulsion Paint		Mortar bed, Acrylic-urethane Resin Paint	
	Wall	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)		Fiber Reinforced Cement Board (t=12) Vinyl Paint Wood Furring	

Renovation		Champasak PHS					
Exterior Finish	Roof	Roof tile (Asbestos-free Fiber Reinforced Cement Roofing)					
	Plancier	Wood Louver (w/OSCL) with Insect Screen					
	Wall	Exterior Wall: Trowelled Mortar with Acrylic Urethane Resin Paint					
	Windows Doors	1F: Aluminum (Jalousie) 2F: Wooden Windows (with Wooden Louver, OSCL, Float Glass) Wooden Door (Wooden Double Swinging – Half Louvered Panel Door, with Paint)					
Interior Finish	Room	Classroom	Demonstration & Prep. Room	Dormitory	Corridor	Stairs	Toilet
	Floor	1F: Mortar-bed Porcelain Tile 300x300 (Non-slip Type) 2F: Wood Strip OSCL	Mortar-bed Porcelain Tile 300x300 (Non-slip Type)	Wooden Strip OSCL	1F: Mortar-bed Terracotta Tile 300x300 2F: Wood Strip OSCL	Lower: Mortar-bed Porcelain Tile 300x300 (Non-slip Type) Upper: Wood Strip OSCL	Mortar-bed Porcelain Tile 100x100 (Non-slip Type)
	Wall	1F: Mortar-bed Emulsion Paint 2F: Wood Strip OSCL	Mortar-bed Emulsion Paint	Wood Strip OSCL	1F: Mortar-bed Acrylic-urethane Resin Paint 2F: Wood Strip OSCL	1F: Mortar-bed Acrylic Urethane Resin Paint 2F: Wood Strip OSCL	Mortar-bed Ceramic Tile 100x100
	Ceiling	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	1F: Wood Louver (w/OSCL) with Insects Screen Wood Furring 2F: Fiber Reinforced Cement Board (t=12) Vinyl Paint Wood Furring	Fiber Reinforced Cement Board (t=12) Vinyl Paint Wood Furring	Fiber Reinforced Cement Board (t=12) Vinyl Paint Wood Furring

Renovation		Luangprabang PHS	
Exterior Finish	Roof	Roofing Tile (Clay Tile) (to be Provided by UNESCO)	
	Wall	Exterior Wall: Trowelled Mortar with Acrylic Urethane Resin Paint	
	Windows Doors	Wooden Windows (+OP, Float Glass) Wooden Door (Wooden Double Swinging – Half Louvered Panel Door, with Paint)	
Interior Finish	Room	Classroom	Corridor
	Floor	Roofing Tile (Clay Tile) (Indicated by UNESCO)	Roofing Tile (Clay Tile) (Indicated by UNESCO)
	Wall	Mortar-bed, Emulsion Paint	Mortar-bed, Acrylic Urethane Resin Paint
	Ceiling	Rock-wool Acoustic Board (t=12) Suspension System (T-runner)	Wood Louver (w/OSCL) with Insect Screen Wood Furring

2-2-2-6 Equipment Plan

(1) Planned Equipment

In order to have effective nursing education, various educational materials are essential. It goes without saying that not only buildings with full infrastructure, but also providing human body/organ models, educational practice equipment and equipment for producing teaching materials are indispensable.

The plans for equipment and its quantity are made based on the policy described in “Chapter 2, 2-1 Designing Policy”. Major Planned Equipment for the 5 PHSs and the CHT are shown in the table below. The codes a. b. c. and d. show the criteria for categorization and quantity. The numbers in parentheses in the column of the examples of planned equipment show quantity based on the criteria for quantity calculation. A list of equipment obtained by applying criteria for quantity is attached as Appendix 14, Criteria and Quantity of Equipment.

Table 2-2-13 Major Planned Equipment

Code	Criteria for Quantity	Usage of Equipment	Planned Equipment (example)
a	Equipment to be allocated on school basis	Equipment for lecture and teaching material production	Human body/organ models, OHP(3), Slide projector, LCD projector, Copying machine, Small printing machine, White board(2), Computer(4) and peripherals
b		Equipment for practice	
c	Equipment to be allocated on 10-student basis	Equipment for practice	Injection simulator, Sphygmomanometer, Stethoscope, Thermometer, Irrigator stand
d	Equipment to be allocated on group basis	Equipment for community practice	Sphygmomanometer, Stethoscope, Thermometer

Table 2-2-14 Major Planned Equipment for the CHT

Usage of Equipment	Planned Equipment (example)
Equipment related to diagnosis/technique in midwifery	Phantom for delivery, Measuring rod for infant, Weighing scale for infant
Equipment for laboratory	Face-to-face binocular microscope
Equipment for production and lecture of teaching material	Computer system and peripherals, Copying machine, 3D LCD projector system

Since the quantity of usable existing equipment and the quantity of equipment expected to be provided by other donors vary from school to school, actual quantity to each PHS is planned subtracting these quantities. Planned equipment and its quantity for each PHS and the CHT are shown in attachment, Appendix 15, Planned Equipment.

As for the Injection Simulator for injection training, upper arm type had been planned in the beginning, but due to the request that the intra-muscular injection is also commonly performed at the hip portion in medical facilities, the simulators for upper arm as well as hip are planned respectively for each PHS.

(2) Planned Equipment for Each PHS and Room to Setup

Planned equipment can be categorized as those used in classrooms, those used in practice rooms, those used in instructors’ rooms and those used in libraries. The list of equipment for the CHT and each PHS and their locations is attached as Appendix 16, Allocation of Planned Equipment.

(3) Existing Equipment and Equipment Planned to be Donated

The existing equipment in each PHS varies from many kinds of human body/organ models and practice equipment provided by UNICEF twenty years ago to those provided by other donors recently.

But the newly procured equipment are very limited to such equipment as LCD Projector System provided by ADB and equipment for language laboratory from WHO. Many body/organ models are damaged in some parts. The equipment for nursing practice and for producing and presenting teaching materials are lacking in many schools. Computer systems have been provided by donors to some PHSs; however, they are so outdated in terms of their function that in many cases upgrading such as increasing memory capacity can hardly be implemented.

Under this situation WHO has decided, recently, to assist PHSs by providing equipment. A number of equipment has already been ordered by WHO to medical equipment sales agent of French company in Lao PDR. The equipment is scheduled to arrive in Vientiane by early 2004 and MOH plans to deliver to PHSs. Therefore, this plan was made subtracting those numbers of the equipment that is duplicated in the WHO list.

Table 2-2-15 List of Duplicated Equipment to be procured by WHO

Equipment	Quantity	PHSs to Set Up
Pelvis Model	2	Oudomxay PHS, Savannakhet PHS
Pregnant Model	2	Oudomxay PHS, Khammuane PHS
Dummy for Baby Care	5	Oudomxay PHS, Luangprabang PHS, Khammuane PHS, Savannakhet PHS, Champasak PHS
Patient Bed	5	Oudomxay PHS, Luangprabang PHS, Khammuane PHS, Savannakhet PHS, Champasak PHS

The above table shows, among the equipment planned by WHO, the equipment which are duplicated with the planned equipment of this Project and the name of PHSs where its placements

to set up are planned (refer to “APPENDIX-9 Allocation of Medical Equipment Supported by WHO”).

(4) Study of Preliminary Specifications

Preliminary specifications of major equipment are shown below.

Major Planned Equipment	Preliminary Specifications
Human body model	Height: approx. 100 cm, Component: approx. 30, Synthetic materials
Bed for practice	Manual gatch bed w/mattress
Injection Simulator	Intra-muscular injection training devices applied to upper arm and hip
Suction unit	Suction capacity: approx. 20 L/min, 220 VAC
Electronic balance	200 to 300 g max, Digital display
Binocular microscope	Magnification: 40 to 1000, Halogen lamp, 220 VAC
Video CD player	DVD/VCD player, Replay media: video CD/DVD, 220VAC
Copying machine	Max paper size: A3, w/sorter
Small printing machine	Electronic stencil, Max paper size: A4
Computer system	Desk-top computer, Pentium IV, 2 GHz or faster, 80 GB or larger HDD, 15” or larger display, w/LAN, MODEM, printer, USB2.0, UPS
Image acquisition equipment	Scanner: CCD camera, A4, 1600dpi or higher, Digital video camera: CCD, Digital camera: CCD

Regarding equipment for teaching material production and audio/visual equipment in particular, it is necessary that the total process from the production of teaching material to the data transfer to display must be utilized as a system. In other words, it must be clearly designated in the technical specifications so that data can be smoothly transferred, processed, displayed and projected among related or intended equipment. Furthermore, methods to use the equipment must be thoroughly explained by installation engineers when the installation of equipment is completed.

(5) Vehicle

The major purpose of the vehicles in the original list of requested equipment is to transport students, teachers, medical equipment and goods for daily life. This is needed when students and teachers visit health centers in villages to educate villagers on health issues and conduct medical activities known as community practice.

Taking last year’s practice as an example, they traveled to far villages some 100 km away, and as the road conditions were bad the community practice was conducted in dry season just before the graduation. The period of stay for community practice was 1 to 2 months and sometimes the students and teachers made the rounds in villages by rotation.

Also, during this period, principal, vice-principal and other teachers visit these villages once a week to monitor and at the same time to give on-the-spot training; the vehicles were used for this purpose as well.

At present, the schools borrow vehicles from the Provincial Health Office and/or nearby Malaria Stations, PHC Center, and when this cannot be done, schools rent vehicles from other sources, which costs more than 1.5 Mkip (approximately US\$150) for a round trip.

Frequency of vehicle use is quite high during community practice period. However, during the remaining 10 months of the year vehicles are used in such cases where schools transport instructors who attend seminars and workshops, for purchasing foods, firewood for students who stay in the dorm, running errands for stationary, banking, etc.

The policy of this Project is to focus on academic aspects of nursing education, but vehicles only relate indirectly to the policy.

Also, regarding vehicles, in some cases schools are given subsidy for gasoline in-kind, and usually the subsidy is not enough, therefore schools must come up with funds for gasoline and the cost of driver. Since schools virtually have no means for revenue at present, it is questionable for the school to become economically independent. As it is quite difficult to justify vehicles for the school, they have been excluded from the plan.

(6) Textbooks and Reference Materials

The list of requested equipment includes textbooks and reference materials, which were studied in Japan. And an agreement was reached that it would be better to be handled by the JICA Technical Cooperation in nursing education in Lao PDR.

Since textbooks and reference books are urgently needed, it is most important not to wait until this Project is completed but that they should be expedited and delivered to schools as soon as possible. From this viewpoint it is very significant to have the JICA Technical Cooperation be involved to handle this matter.