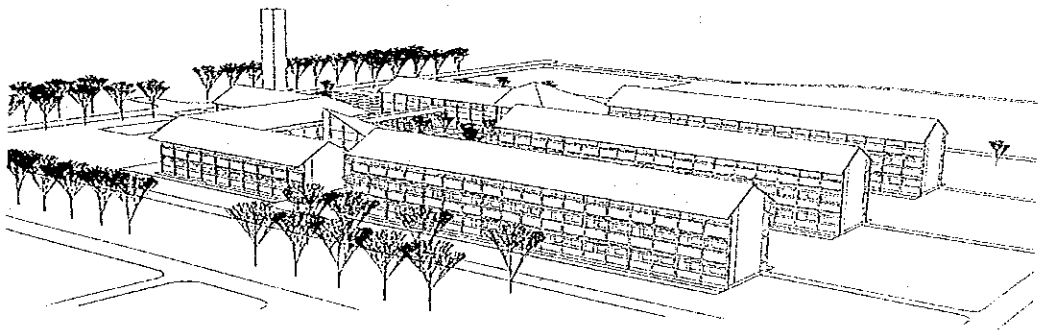
Can Tho university. Upgrading of the quality and quantity of the teaching staff is the most important matter of this school.

The major research themes of this course are practical food processing methodology, processing machinery research and the extraction of active principles. However, judging from the scale of the facilities, experimental equipment and number of instructors, it will be very difficult for the school to produce satisfactory results.

The three departments offered by the Faculty of Agricultural Sciences are forced to continue operating with facilities inappropriate to a university environment and somehow get by using minimal outdated laboratory equipment. If Viet Nam hopes to continue its move towards a market economy, however, it will need properly educated college graduates working in the Mekong Delta's agricultural sector. It can be concluded that the improvement of experimental and training facilities, supply of basic education and research equipment, restructuring of curriculum, and technical cooperation related to instruction of experimental methods are all necessary.



CHAPTER 4 OUTLINE OF THE PROJECT

CHAPTER 4. OUTLINE OF THE PROJECT

4-1. Overall Objective

In 1986, the Government of the Socialist Republic of Viet Nam introduced a market economy through its *doi moi* policy and has since made steady reform efforts in all other areas as well. In order to achieve sustainable economic development, it is necessary to make improvements in the productivity of the agricultural sector by taking effect more concrete practical education and technical training which supports industrial development, therefore improvement of educational materials and curriculum, expand laboratories and other facilities and reeducate the teaching staff who provide the actual leadership in this area is most essential.

The Mekong Delta has a 2,000-year history as a grain producing region and the farmers of the Mekong have protected the area's position as Bread Basket (rice basket) until the present. Today the region provides 50% of the national food supply, filling the food shortages common in the north and also exporting a part of the produce to acquire valuable foreign currency. The Can Tho University Division of Agriculture is located in the center of the Mekong Delta and plays an important role in the regions agricultural development.

Can Tho University's facilities, however, have severely deteriorated, especially the facilities related to the Division of Agriculture which have been housed in temporary buildings since plans for relocation sponsored by the Government of Japan were stopped in 1975. The present situation fails to provide adequate educational facilities. As far as experimental equipment is concerned, some of the equipment provided during the technical cooperation period remains, but most of this is damaged and of no use in the classroom. Expansion of these is anticipated.

The goal of this plan is to turn toward the market economy promoted by the Government of Viet Nam, raise better skilled personnel in the agricultural field and expand the facilities and equipment of Can Tho University Division of Agriculture.

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4-2. Examination of the Request

4-2-1. Suitability and Necessity of the Plan

(1) Suitability

As stated previously, the fertile land and sufficient population of the Mekong Delta make for high development potential. This region is blessed with all of the resources of the agricultural sector as well as farms, livestock, forestries and fisheries. With a view to the industrial development of Viet Nam, many favorable preconditions are fulfilled.

The agricultural sector of Viet Nam is undergoing great change as it moves towards a market economy. It is experiencing a shift from agriculture based on self-sufficiency to a commodity agriculture for the development of industry. In other words, there is a movement in the agricultural sector to produce primary agricultural products for use as raw materials in the food processing industry, resulting in a diversification of the agricultural village economy. Diversification of the agricultural sector is necessary if concrete efforts to realize industrial and export-oriented agricultural are to succeed. At the same time, agricultural instructors who have received practical technical training are needed.

Since its founding Can Tho University has produced 4,725 graduates (as of 1992). There have also been 6,316 graduates from its In-Service-Training program. Although no follow-up survey has been conducted, it is believed that most of the graduates are now active in the regional agricultural sector, based on the fact that almost all are originally from the region. Furthermore, through this improvement plan, the modernization of the facilities and equipment of the three departments of the Faculty of Agricultural Sciences and the development of practically trained instructors and researchers will not only serve to modernize agriculture in the Mekong Delta, but also play an important role in supporting the economic development of the country as a whole.

(2) Examination of Necessity

Economic growth in developing countries must be rapid and continuous. Rapid population growth in Viet Nam has caused food shortages and unemployment. The disparity in living standards between the north and south and other factors contributing to the dissatisfaction of the people can be easily trigger political instability. This tension can only be relaxed by agriculture which sustains growth by maximizing the investment and reserves relative to population increase. Until industry has grown to the point where it can absorb some of the excessive labor force, agriculture will have to absorb the local work force. Maximum activity in agriculture directed towards increasing production is of urgent importance in maintaining a stable society and economy.

Development aimed at this kind of sustained growth requires efforts by the people for the people. In Viet Nam, a country where 80% of the population is involved in the agricultural sector, it will be impossible to improve conditions from the outside without the cooperative spirit of the farmers. In the Mekong Delta, if the development potential of the region lies in its soil, it is expected that the construction and widespread education of new farming villages by farmers with cooperative spirit can bring striking results.

As stated previously, graduates of Can Tho University are involved in activities for widespread education in farming villages throughout the region and have greatly contributed to the improvement of productivity. If the country is going to achieve its goal of doubling national income, it will be necessary to diversify and modernize the agricultural sector, with consideration to harmonization with nature, and spread this to every corner of the agricultural community.

Based on the current conditions that exist in Viet Nam, the implementation of these plans through the grant assistance cooperation of the Government of Japan and the practical training of human resources to participate in the education, research and extension in the agricultural sector is judged to be both a valid and urgent matter.

4-2-2. Implementation and Administration Plans

(1) Personnel Placement Plans

1) Fluctuations in the number of students

As stated previously, Viet Nam has no fixed enrollment system for students, so there are large fluctuations each year as shown in table 4-2-2-2. This is because the Ministry of Education and Training, based on predictions of social and economic trends, annually designates how many students will be recruited in each university. The majority of students at any given time want to enroll in a faculty which helps them find a job in the future and the university recognizes this according to examination scores.

The physical limits created by the facilities, equipment and number of instructors, causes the quality of education to drop when the number of students passes a certain point. In another sense, if an insufficient number of students enter a certain field, the return on social investment in the education program is low and therefore inefficient.

Table 4-2-2-1. Proposed Enrollment Projections by Can Tho University

(Unit : Students)

	1993	1994	1995	1996	1997
University	1,500 (100)	1,870 (125)	2,300 (153)	2,900 (193)	3,600 (240)
In-Service Course	500 (100)	620 (124)	780 (156)	980 (196)	1,200 (240)
Post-Graduate School	50 (100)	60 (120)	60 (120)	80 (160)	80 (160)
Total	2,050 (100)	2,550 (124)	3,140 (153)	3,960 (193)	4,880 (238)

( ) shows rate of increase index

Source : CU data

At present, there is no fixed number of students in each faculty. As shown in Table 4-2-2-2, the average number of students enrolled in the Faculty of Agricultural Sciences over the last ten years is 48:49:50, with

Table 4-2-2-2. Number of Freshmen, Faculty of Agricultural Sciences (1983-92)

(Unit : Students)

Group	Department	83	84	85	86	87	88	89	90	91	92	Ave	93**
1	Agronomy	104	48	109	44	53	35	26	29	19	12	48	
	Animal Hus. & Vet. Medicine	54	39	75	53	70	32	50	44	27	50	49	
	Food Sciences & Technology	0	39	50	46	64	49	30	53	60	112	50	210
	Fisheries	59	24	66	84	95	93	70	65	25	54	64	
	Sub-Total	(217)	(150)	(300)	(227)	(282)	(209)	(176)	(191)	(131)	(228)	(211)	
2	Agricultural Engineering	0	35	0	33	77	49	33	43	39	51	36	
	Agri. Civil Engineering	44	36	56	40	33	37	45	78	31	25	43	180
	Sub-Total	(44)	(71)	(56)	(73)	(110)	(86)	(78)	(121)	(70)	(76)	(79)	
3	Agri. Economics	40	25	54	41	97	74	125	116	94	372	104	240
Total		301	246	410	341	489	369	379	428	295	676	393	630
(University Total)		704	757	1,208	1,038	1,270	982	881	878	900	1,540	1,016	1,500

* Group : 1 Agri. Sciences 2 Agri. Engineering 3 Economics

Source : CU data

** number of student enrollment notified by MOET

48 at present. This number was established because it is expected to provide good results with respect to the available experimental facilities.

Table 4-2-2-3. Enrollment Projections in Vietnam (1990~2005)

(Unit 1,000 students)

	Begin	1990/91	1995/96	2000/01	2005/06	End
Primary (G1~G5)	71.2%	8,862	9,909	10,736	11,492	62.1%
Lower Sec. (G6~G9)	21.8%	2,708	3,326	4,273	5,386	29.1%
Upper Sec. (G10~G12)	4.2%	528	636	829	941	5.1%
Voc. Training (G6 graduates)	0.8%	105	188	280	367	2.0%
Scc. Training (G12 graduates)	0.9%	118	85	1,038	134	0.7%
Higher Educ. (inc. In-Service)	1.0%	122	112	142	181	1.0%
Total	100.0%	12,443	14,257	16,365	18,501	100.0%
Index	-	100	115	132	149	-

Source : MOET/UNDP/UNESCO Joint Report, 1992

The expected future increase in the number of students is calculated for the year 2000, five years after the completion of facilities. The increase index is based on a joint research report compiled by MOET/UNDP/UNESCO, and set at 1.50, with the fixed number of 72 students.

However, this student increase index is based on a simulation from elementary level education. As suggested in this study, the actual increase in the number of students and the number of demand from society will be greatly influenced by Viet Nam's economic development. For this reason, the details must be adjusted on an annual basis.

Table 4-2-2-4. Enrollment Projection of Higher Education (1990~2005)

(Unit 1,000 students)

	Begin	1990/91	1993/94	1988/99	2003/04	2005/06	End
Universities (4~6 years)	62.3%	76	70	85	113	123	68.0%
Local Colleges (4 years)	15.6%	19	11	16	21	22	12.1%
In-Service Training*	22.1%	27	29	32	35	36	19.9%
Total	100.0%	122	109	132	169	181	100.0%
Index	-	100	89	108	139	152	-
		112	100	121	155	166	

* Including of In-Service-Tr. (Full Time and Part Time) and Open System Education

Source : MOET/UNDP/UNESCO Joint Report, 1992

2) Tendency in the number of instructors

This same report sets the international standard teacher-student ratio at 1:4.9. The number of teachers necessary can thus be inversely calculated as the increase in the number of students. Considering with the general situation in developing countries, this ratio seems over-estimated. We accept 1:9.8 as a double of the above ratio.

On table 4-2-2-4, the present ratios vary depending on the department, with 1:1.5 in the Dept. of Agronomy and 1:13.5 in the Dept. of Food Science. With the present number of instructors remaining unchanged, when the set number of 48 students is admitted it will bring the number of students in each department to 240. At this time the teacher student ratio will be 1:4.2 in the Dept. of Agronomy, 1:6.0 in the Dept. of Animal Husbandry and Veterinary Medicine, and 1:11.4 in the Dept. of Food Science. On number of teachers, it is fulfilled except in the Dept. of Food Science.

However, the majority of instructors hold bachelors degrees, with 13 graduate degree holders in the Dept. of Agronomy, 7 in the Dept. of Animal Husbandry and Veterinary Medicine and 4 (including students

now studying abroad) in the Dept. of Food Technology, and totally 24 instructors only. Expecting all instructors holding master degree or higher, 72 instructors have to promote to higher degree.

In the year 2000, the fixed number of students admitted will be raised to 72. When the number of students reaches 360, 37 instructors of master degree holders will be necessary to bring the teacher-student ratio in line. There is, therefore, a necessity to add 24 instructors in the Dept. of Agronomy, 30 in the Dept. of Animal Husbandry and Veterinary Medicine and 33 in the Dept. of Food Technology.

Therefore, it is hardly expected to raise the standard of the teaching staff and increase their numbers in the seven years before the year 2000.

Table 4-2-2-5. Net Floor Area and Projections of Lecturers / Students

Dept.	Area (m^2)		Nos of Lecturers			Nos of Students*			Ratio of Lec. / Stu.			Nos. of Labs
	Existing	Requests	Existing	Average	Projection	Existing	Average	Projection	Existing	Average	Projection	
Agronomy	746	1,760	57 (13)	24	37	86	240	360	1.5	4.2	9.8	11
Animal H. Vet	416	1,248	40 (7)	24	37	196	240	360	4.9	6.0	9.8	12
Food Sc. Tech.	214	1,280	21 (4)	24	37	284	240	360	13.5	11.4	9.8	10
Total	1,376	4,288	118 (24)	72	111	566	720	1,080	6.6	7.2	9.8	33

* Average numbers of student was calculated 48 from past ten years tendency. Projection index was provided 1.5 times in 2000 from MOET/UNDP/UNESCO Joint Report, 1992.
( ) shows numbers of Lecturers holding master or doctor.

(2) Budget Plan

1) The budget of the Ministry of Education and Training

As mentioned before, the normal expenditures related to the education budget of the central government cover personnel fees and scholarships, as well as expenses needed to operate and maintain existing facilities. In

1992, the former accounted for 22% of the budget and the latter 78%, for a total of 1,961,000 million dong (about $177 million). The construction budget for new facilities is allocated for projects approved by the Ministry of Finance and is listed separately in the budget. This amounted to 118,000 million dong (10.7 million dollars) in 1992. According to the Ministry of Education and Training, the total budget for FY 1992 was 2,079,000 million dong (about $188 million). That is equivalent to 6.71 percent of the GDP for that year. This marked a large increase over the previous year's GDP ratio of only 3.86 percent.

The education budget of the Ministry of Education and Training has been increasing annually, reaching 380 in 1992 according to the increase coefficient for 1989. With the dollar exchange rate, the increase coefficient was 145, the budget is predicted to continue increasing in the future.

Table 4-2-2-6. Budget for Education in Vietnam (1988-93)

	1988	1989	1990	1991	1992	1993
State Budget for Education	198,123	547,151	877,805	1,104,000	2,079,000	n.a.
(100 mill VND)	-	100	160	202	380	n.a.
Budget for Can Tho Univ.	445	2,054	3,584	5,040	7,930	11,066
(mill VND)	-	100	175	246	387	539

Lower Shows index

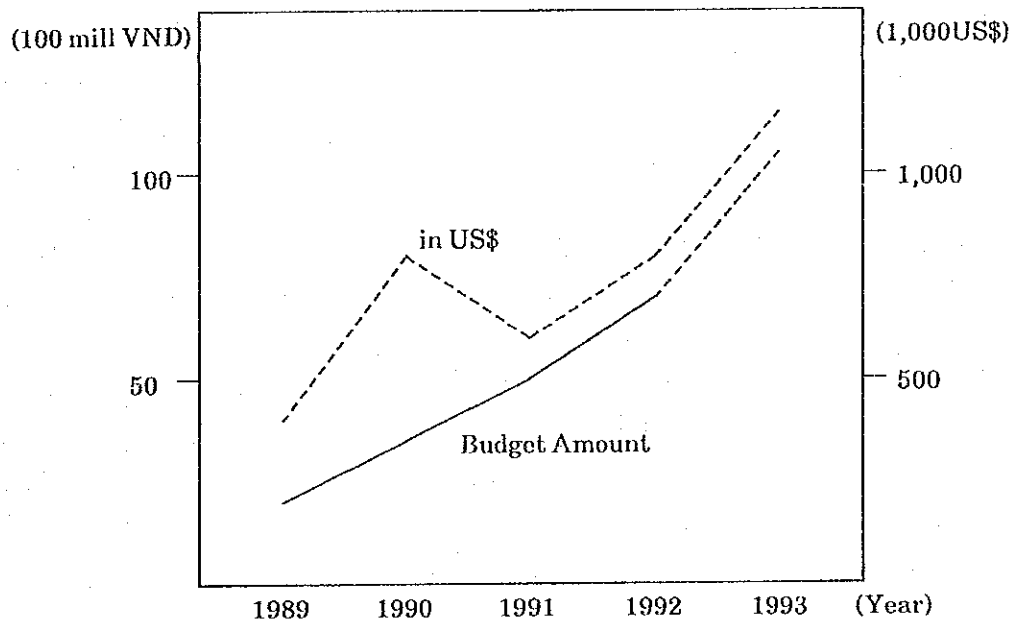
Source : MOET data

2) Can Tho University Operating Budget

As stated in section 3-3-2, the operating budget for Can Tho University in 1992 totalled 16.2 billion dong (about 162 million yen). The Ministry of Education and Training provided 6.9 billion dong (about 69 million yen) from the normal budget for operating expenses, while one billion dong (about 10 million yen) was provided for facility construction expenses. The expenses provided by the central government totalled about 49% of the total operation budget for Can Tho University.

The remaining 51% was covered by income independently produced by the university and assistance provided through joint research projects with various foreign institutions. This assistance was composed of equipment and cash to cover local costs. Due to the extremely limited nature of central government budget allotment, the independent income of the university and foreign assistance supplements are important elements that influence university administration.

Budget from MOET to Can Tho University (1989-93)



Source : Charted from CU data

The budget appropriations of the Ministry of Education and Training have increased annually. The increase index in relation to 1989 was 387 for the 1992 performance base and 539 for the 1993 budget base, showing large-scale growth. The funds allocated to Can Tho University are expected to increase as the scale of the central government budget grows.

4-2-3. Relations with Other Assistance Projects

Since its establishment, Can Tho University has received financial support from many countries. As was previously mentioned, in the five-year period of technical cooperation from 1970, the Japanese government supplied 160 million yen in equipment to the Division of Agriculture. Since then, assistance in the form of joint research and scholarships has been received from various institutions. Development of the Mekong Delta region has been the theme of many of these joint research projects, and assistance from most organizations has been related to the delta region.

Table 4-2-3. International Cooperation Project of Faculty of Agricultural Sciences (Recent Years)

Project Title	Organization	Personnel	Estimated Budget
Biotechnology Research and Development Centre	Wageningen Agri. Univ. (Holland) I. N. R. A. (France)	Prof. Tran P. Duong (11 in total)	380,000ECU
Vietnam Farming Systems	IDRC (Canada)	Prof. Vo-T. Xuan (14 in total)	200,000USD
Soil Problems of Mekong Delta	SARC (Sweden)	Prof. Vo-T. Xuan (13 in total)	220,000USD (in 3 years)
Dev. Improved Rice Technology for MD	IRRI (Philippines)	Prof. Vo-T. Xuan (19 in total)	8,000USD (every years)
Soybeans Processing (Small Scale)	n. a.	Mr. Bui H. Thuan (4 in total)	37,000USD
Livestock Development Program (Ph-II)	n. a.	Dr. Chau Ba Loc (n.a.)	12,400USD (1992) 13,980USD (1993) 16,980USD (1994)

Source : CU data

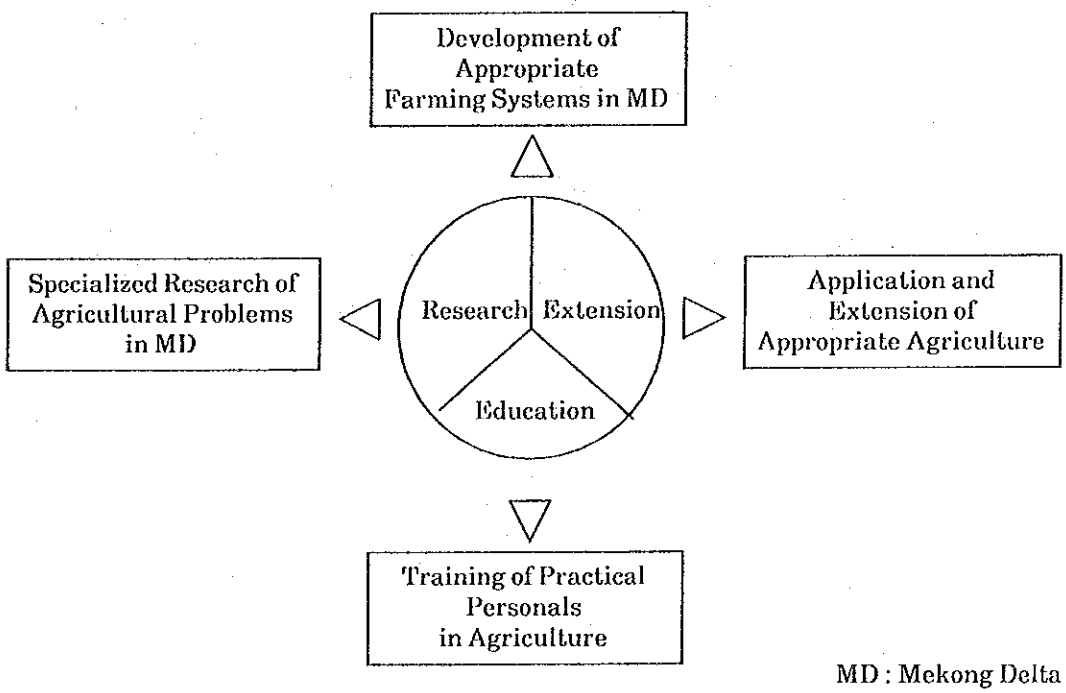
As there are currently no assistance plans from the West, because of economic sanctions in place, this project will not be overlapping. Table 4-2-3 shows recent assistance programs which have definite costs. Joint research is expected to remain the primary source of financial assistance in the future.

4-2-4. Examination of the Organizational Elements Plan

Can Tho University Division of Agriculture was established in response to the demands of the residents of the Mekong Delta, and is specially designed to deal with the agricultural development of the region. According to its establishment charter, the functions of the school are to be implemented through activities in three areas: education, research and diffusion. In other words, the aim is to develop specialized agricultural methods based on specific research of the agriculture in the Mekong Delta and to provide practical education to engineers in that field. A further goal is to spread these improved techniques throughout the Delta region by way of graduates of this division and the in-service-training programs. These techniques will be made more diverse and more practical based on feed-back from the field regarding their effectiveness. The university will also support these efforts with all sorts of experimentation, field surveys and information gathering and analysis.

Focussing on the concrete functions, the promotion of related activities as project cycles is considered extremely valuable in heightening the planning efficiency of each activity.

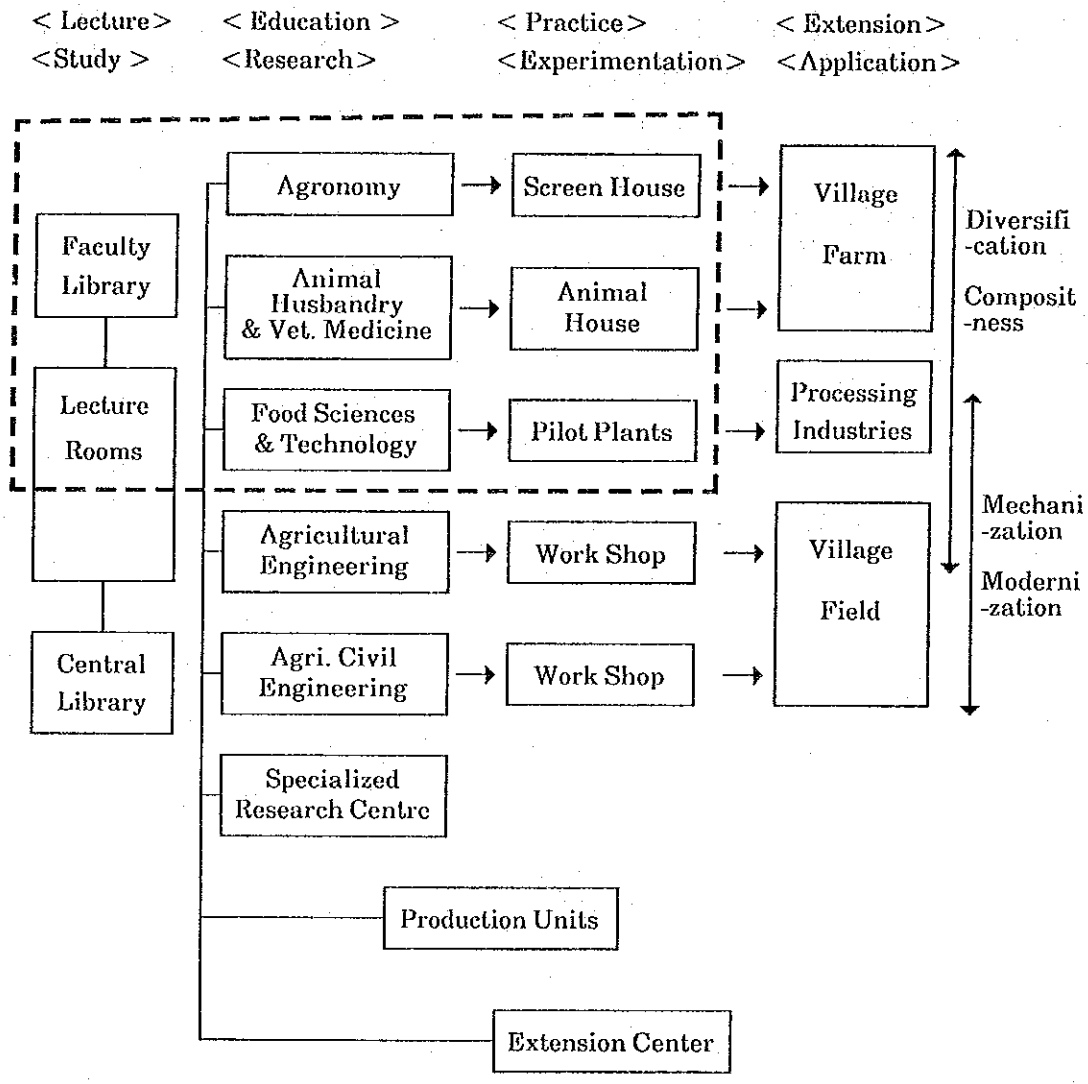
Chart 4-2-4-1. Activities of Faculty of Agricultural Sciences - Project Cycle



MD : Mekong Delta

The plan at Can Tho University is to unify the existing faculties of the Division of Agriculture, making it a five departments school. The Dept. of Aquaculture, which is currently a part of the Dept. of Fisheries, will be merged with the Dept. of Agronomy, eliminating the former. In this department, agronomy and fresh water fish breeding will be combined in an effort to diversify agricultural village management. Also, with an eye to the developing market economy, agricultural economics will join the mainstay courses of trade, finance and accounting in the Faculty of Economics.

Chart 4-2-4-2. Components of Faculty of Agricultural Sciences



In the future, the organizational elements of the Faculty of Agricultural Sciences will be as shown in chart 4-2-4-2. The five departments will join efforts in grappling with the Agricultural development of the Mekong Delta. This project will focus on the high priority departments of Agronomy, Animal Husbandry and Veterinary Medicine and Food Technology because of their role as the driving force in the diversification of Mekong agriculture. The Dept. of Agricultural Machinery and the Dept. of Agricultural Engineering are not included in this plan. However, in consideration of the mechanization and modernization of Mekong agriculture, they are also important. Therefore, as part of the plans for relocating and expanding facilities, the university has requested that extra space be set aside for additional construction in the future.

4-2-5. Requested Facilities and Equipment

(1) Examination of Facility Scale

According to the report of the pleriminary study team, the facilities requested by Can Tho University remain unchanged from the report of the basic design study made in 1975 and are not appropriate for present activities. The study team has, therefore, estimated the scale and contents of the facilities and held discussions with the university based on data previously acquired. At the same time, a survey of the activities and usage of present facilities was conducted. The scale of the requests by the three departments was attached as a memorandum when the minutes were signed.

During further detailed discussions took place, there was no significant changes in the requests of the Dept. of Agronomy and Dept. of Animal Husbandry and Veterinary Medicine. The Dept. of Food Technology, however, asked for an additional 488 square meters of space. Upon his return from study abroad, the dean made requests to increase the area and number of laboratories available to the 284 students presently enrolled and to add a pilot plant (256 square m) that demonstrates educational training materials. The requested areas (net) for facilities are as follows.

Requested Net Floor Area

Agronomy	1,760m^2
Animal Husbandry and Vet. Medicine	1,248m^2
Food Sciences and Technology	1,280m^2
Sub-Total	4,288m^2
Common Lecture	880m^2
Faculty Library	352m^2
Administration	416m^2
Sub-Total	1,648m^2
Total	5,936m^2

In setting the scale of the facilities, consideration was given to the cost benefit and function with respect to the following matters.

1) The current number of students is not fixed, causing large fluctuations in the number of students enrolled each year. The scale will be set at 48 students per class in consideration of economic efficiency and based on the average figures from past years.

2) The Dept. of Agronomy has a 25-year history and well established research activities. The Dept. of Food Technology has a short history and is dealing with first-stage research. In order to raise academic standards, research must be emphasized and research space must be considered. Regarding high-level research, future expectations call for research facilities to be set up in separate buildings.

3) There are few teachers and an overwhelming shortage of those holding masters degrees or Phds. A teachers room should be built for superior educators.

4) The increase of students in the Faculty of Education and other divisions has left a tremendous shortage of classrooms. The departmental lecture halls should, therefore, be considered common facilities.

5) A faculty library should be set up as a place for data and information gathering as well as a study area for students of the relevant faculty.

6) For the maintenance and management of equipment and materials provided, a maintenance unit shall be set up, allowing effective use of this equipment.

7) A space for the production of distilled water will be set up to provide water used in experiments by related departments.

(2) Examination of Requested Equipment

As stated in the preliminary survey report, the equipment list attached to the request contained 248 items, with a total of 1,165 units. The revised equipment list that was given to the preliminary survey group at the site had then grown to 897 items, with a total of 6,492 pieces. The list covers the entire Division of Agriculture, and includes many analysis instruments used in research. For this reason, the pleriminary study team has concluded it necessary to reexamine the content of the equipment list in its entirety.

In response to this, the survey group has requested that the university submit another equipment list organized by priority. Furthermore, the group explained that the examination and selection process based on the following selection standards. These standards were accepted by the university.

1) Supplied equipment are restricted to items used by the three designated departments. Highly necessary general equipment for common use will be added.

2) Considering the operating budget and availability of distributors, it is predicted that the maintenance cost of advanced analysis instruments and precision equipment will be exorbitant and overwhelm other aspects of the research budget. Therefore, educational equipment and basic research instruments will be the mainstay of this project.

3) Priority will be given to high-efficiency of equipment that conform to the educational process and research content and have various uses.

4) To provide equipment that can be used jointly by the related departments without any overlapping.

5) The effective use of the present equipment will be the governing principle, but in the case of shortages or equipment particularly susceptible to wear and tear, replacements will be provided.

No further requests have been made by the university, but in order to provide an effective maintenance and management system, the establishment of a maintenance unit has been proposed and agreement has been reached on the provision of one of these units.

As a result of the examinations, the following 90 items (101 units) have been judged to be outside the scope of provisions and agreement has been reached with the university to avoid the overlapping of the three equipment items through shared use between faculties.

1) Equipment outside the scope of provisions
Automatic seed analyzer, gravity concentrator, pressurized soil disinfecting device, high performance soil moisture gauge, high performance thermometer, automatic water quality analyzer, soil and plant compound analyzer, high performance liquid color level analyzer, high speed amino acid analyzer, passenger vehicles and others.

2) Equipment with quantity adjusted
Large capacity glass wares : Amount reduced.
Water purification and distillation devices :
One water supply room to be jointly used for experiments.
Computers : Establishment and joint use of a computer room for each department.

4-2-6. Examination of the Necessity of Technical Cooperation

The Government of Viet Nam has requested grant aid with project-type technical cooperation for these improvement plans. Based on these requests, in April 1993 at the time of the preliminary study related to grant aid, a study on the possibility of project formula technical cooperation was also implemented. As a result of this study, it was judged that because of the financial and personnel shortages resulting from the 18-year period in which no cooperation took place, the activity of the Division of Agriculture has dropped significantly and is not yet in a position to receive project-type technical cooperation. Therefore, the dispatch of individual experts and JOCV members is still under investigation.

The purpose of this project is to develop individuals with the practical skills needed to support the agricultural development in the Mekong Delta that accompanies the introduction of a market economy. With this goal in mind, Can Tho University and the Ministry of Education and Training are involved with various reform efforts. However, as stated previously, numerous factors make the present situation extremely difficult. The necessity for technical cooperation is judged to be very high in the following areas.

1) Advice to develop practical teaching methods for teachers and their counterparts

2) Advice to improve the syllabus and curriculum and to cooperate toward the production of various types of educational materials.

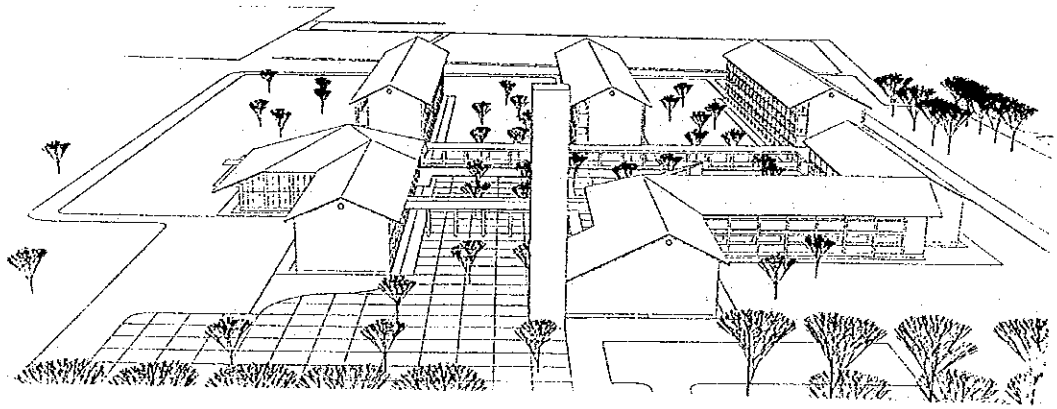
3) Guidance in the usage of equipment related to education and research activity.

4) Advice counterparts for training in Japan by technical cooperation.

5) Advice related to the school activities including education, research and development.

4-2-7. Basic Policy for the Implementation of Cooperation

In regards to the implementation of this plan, the above examination concerning the results, likelihood of completion, and implementation capacity of Viet Nam have all been confirmed. Furthermore, the results of the plan are in accordance with the conditions of the grant aid system. As a result, the implementation of grant aid by Japan has been judged to be valid. Therefore, based on the grant aid of Japan, the following outline of the plan will be considered and a basic plan will be implemented. In regard to the content of the plan, however, it was deemed appropriate to change part of the request, as noted in the section on the examination of the content of the requested facilities and equipment.

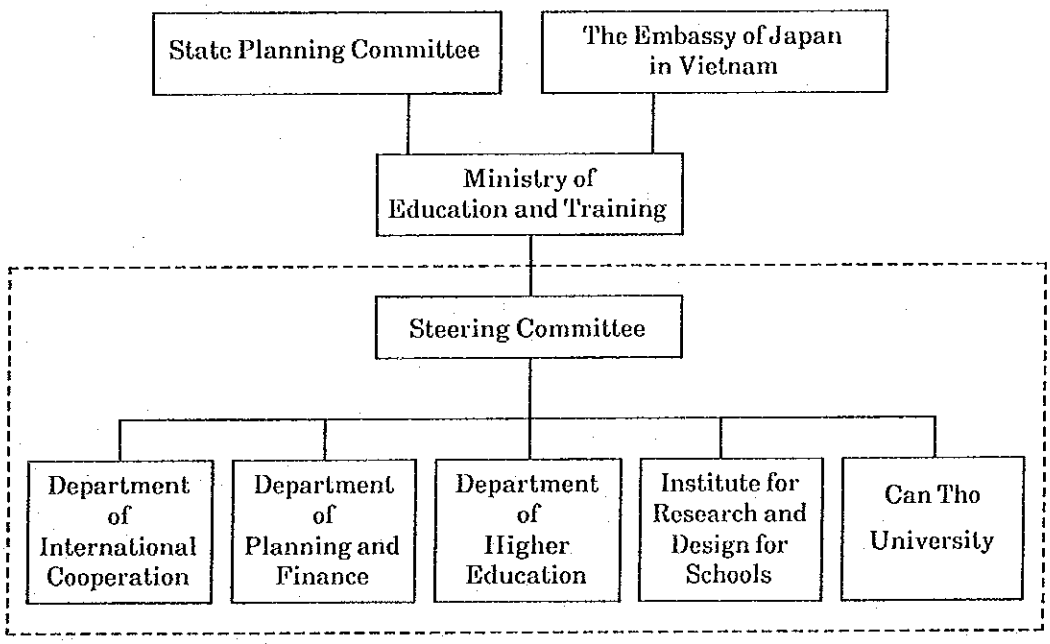


4-3. Project Description

4-3-1. Executing Agency and Operational Structure

The executing organization for this project is the Ministry of Education and Training (MOET) of the Government of Viet Nam, with the Department of International Cooperation acting as the representative body. As the contact for all matters concerning overseas assistance for the Government of Viet Nam, the State Planning Committee (SPC) is in control of the entire process, with its steering committee, as illustrated in fig. 4-3-1-1, organized for the implementation of this project.

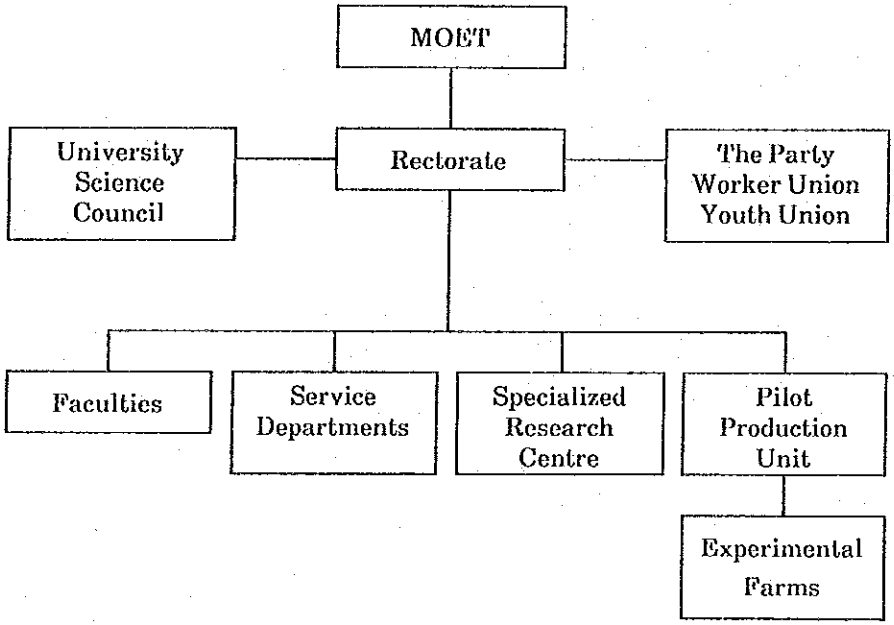
Fig. 4-3-1-1. Organization of Steering Committee



The structure of Can Tho University is as shown in Fig. 4-3-1-2. The University Science Committee, an equivalent to the Japanese university council, has been organized. Twenty-three members of the university faculty are designated as committee members and important matters are discussed by all members of the committee, while urgent matters are only discussed by upper level and related committee members. The function of the committee, however, is to conduct discussions only, with all final decisions made by the rector (university president) based on the contents of the committee's consultation.

Three university vice-rectors are appointed with the authorization of the rector and serve as respective heads of the section of Education, section of Administration and the section of International Affairs. All educational divisions, affiliated research facilities, administration departments and enterprise units are organized under the authorization of the vice-rector of each department, but no supervisory division heads have been appointed. In the current hierarchy, therefore, the faculty deans and research facility heads are located directly under the vice-rector, resulting in a very inefficient organization.

Fig. 4-3-1-2. Existing Structure of Can Tho University



As per described, Fig. 3-3-2-2 represents the administrative organization being planned by Can Tho University. There is a proposal to establish a Governing Board between the University and the Ministry of Education and Training, to increase contact between the two organizations and to organize colleges with appointed deans to supervise the various faculties. In the same way, there is a plan to appoint a person responsible for the supervision of all research facilities and production units.

4-3-2. Activities Plans

(1) Content of Relative Department

The content of relative three departments is shown as follows.

• Dept. of Agronomy	(4.5 years)	48 Students/year (total 240)
- Chair of Plant Physiology - Chair of Genetics and Breeding - Chair of Soil Science - Chair of Plant Protection - Chair of Crop Science		
• Dept. of Animal Husbandry and Veterinary Medicine	(5 years)	48 Students/year (total 240)
- Chair of Animal Pathology - Chair of Infections and Parasitic Disease - Chair of General Zootechnology - Chair of Special Zootechnology - Chair of Anatomy and Physiology		
• Dept. of Food Science and Technology	(4.5 years)	48 Students/year (total 240)
- Chair of Food Science - Chair of Food Technology - Chair of Food Processing (in future)		

(2) Syllabus and Curriculum

The Ministry of Education and Training and Can Tho University have been working to change the educational curriculum since the implementation of *doi moi* in 1986. In 1990, the first two years of basic study were designated as Cycle I and the following two years of major study as Cycle II. The separation of the two is relatively loose and it is possible for introductory courses from the major course fields to be taught to students during the general education stage, if the university judges it appropriate.

As far as the courses are concerned, an increase in the ratio of practical technical courses over theory based courses and an increase in the percentage of experiments and practical training are desired. The tremendous lack of laboratories and experimental equipment, however, make it impossible to follow the educational curriculum as it is set. As there are no elective courses

in the curriculum, there are many required courses and the number of lecture hours is long, averaging 830 hours per academic year. The curriculum remains flexible and can be further improved.

4-3-3. Location and Conditions of the Project Site

(1) Location of the University

Can Tho University is located in the city of Can Tho, approximately 176 km southwest of Ho Chi Minh City, a journey of about four hours by car. Can Tho is located in the central Mekong Delta, the agricultural center of Viet Nam and has three campuses within the city limits. The building site referred to in this plan is on campus II (Cai-khe Campus), the largest of the three.

(2) Campus II (Cai-khe Campus)

Campus II is located 2.5 km west of central Can Tho and the has an area of 87 ha. The one-story faculty buildings of the Faculty of Agriculture and the Faculty of Education were built before 1975 in the South Vietnam era and have deteriorated significantly. The central facilities, including the auditorium, central, library, and classroom buildings, are located in the center of the campus and are relatively new, having been built after 1980 in accordance with the plans of the Ministry of Education and Training.

The building site in this plan is on the main road that runs northwest from the campus main gate in an advantageous location accessible to the nearby auditorium, central library, and classrooms which make up the central facilities. (refer to 5-3-4 drawing No.-01 Existing Plan of Campus Ⅱ)

(3) Condition of the Building Site

The building site is 250m wide along the section that faces the main road and has a depth of 300m for a total area of 75,000 square meters and is of sufficient size for the facility in this plan. The site is presently used to grow eucalyptus trees and as a livestock grazing pasture. It will be necessary to fell the eucalyptus trees and level the land at the time of construction. In order to allow the bonsai nursery, located in the southeast corner of the site,

and the Meko Poultry Enterprise, located on the western side of the site to continue operations, the university has requested these areas be excluded from the plan.

On the site allocated for the Japanese-side plan, a request was made for consideration to be given to future plans to shift an agricultural machinery department and an irrigation and soil improvement department.

The Japanese-side planned facility will be built in the front area of the site, along the main road and approximately 36,800 square meters will be used. Measurements of the site and a geological survey were carried out by the study mission, the results or which appear in the supplementary data.

(4) Conditions of Infrastructure

1) Water Supply

A 400mmϕ city water main is installed along the road that runs past the front of Can Tho University. A 90mmϕ pvc pipe branching off his has been buried along the main road that passes in front of the proposed construction site. The water supply for the proposed facility will branch off this pipe.

Presently, campus II receives 23,000ton of water per month from the city water main. The water has a coloration factor of 20 and cloudiness factor of 9 and there would be no obstacles in using the water in applications other than drinking water. In the water distillation and purification device, use of a pre-filter will reduce blockage in the main filter.

The water supply pressure is designated at 3.3 kg/cubic cm while the actual water pressure is only 1 to 1.2 kg/cubic cm. The pressure pump at the city water supply station often suffers breakdowns and water stoppages are common. Therefore, existing water system is supplied by a 56 cubic meters water tank located outside the lecture building and a 28 cubic meters elevated water tank located on its roof. There is also a reserve well, and the university has plans to dig a well for the use of this facility in the event of water stoppage from the city supply.

2) Drainage

① Main drainage

Drainage water, including sewage, miscellaneous waste water and rain water, will all be released into the river by way of open ditches. Located in the southeast part of the building site is an open ditch with a width of 6m, which is the main drainage of the planned facility. The drainage water from the planned facility will ultimately be released in the Rach Ngong River.

② Septic tanks

The septic tanks will only be used for sewage water, with all other drainage water being released untreated into the main drainage. The size of the septic tank will be determined by the number of closets, with approximately 1.83 cubic m per 1 closet. Regulations PH5-8, BOD80, COD160 and others all applicable restrictions to drainage water.

3) Electricity Supply

There are two transformer substations in Can Tho, transforming voltage from 66 KV to 15 KV. In the future, a change in the voltage to 20 KV is planned and should be completed in 5 years.

The power supply is delivered by a 15 KV (50 Hz) aerial power line running parallel to the road that runs past the front of campus II. The power capacity is 180 kVA in the students dormitory and 680 kVA in the facility. Transformers are set up in 6 locations on the campus, with the closest transformer to the planned construction site rated at 320 kVA. This transformer supplies electricity transformed into 3-phase 4-line 220/380 V (50 Hz).

During the dry season, Can Tho's electric supply is cut off two days a week between the hours of 7:00 and 18:00, but as a public institution, the university is not subject to these blackouts. The range of voltage fractuation is large, estimated at ±20 %, so voltage stabilizers are commonly used.

The present transformer (320 kVA) is insufficient for the planned facility and it will be necessary to install a new transformer and power line for up-grade. According to an estimate made by the university, the transformer will cost 40 million dong and the power line 30 million dong.

The amount of electric power currently used on campus II is 62,405 kWH per month for the facilities and 16,000 kWH per month in the dormitory. All charges for electric power are calculated by the amount consumed and there is no basic charge system. The rate charged to Can Tho university is the same as that charged to other offices, 480 dong per 1 kWH.

4) Telephone Line

The telephone line runs along the electric power lines along the city road that passes in front of campus II. All of existing lines are directly connected from the main, as there is presently no switchboard. Can Tho is in the process of laying a new underground branch line with completion expected within one year. It will be possible to branch into this line.

Regarding telephone charges, local calls (per 3 minutes) are 1,400 dong (5:00 to 22:00) and 1,200 dong (22:00-5:00), with every additional minute costing 470 dong and 376 dong, respectively. Long distance calls and international calls are calculated depending on distance.

5) Gas

There is no city gas supply in Can Tho and LPG is not for general household use and cooking. At present, the only way of acquiring the LPG used in experiments is by purchasing it in Ho Chi Minh City. As gas use is not common, gas pipes do not exist in the present laboratory facilities and LPG cylinders deliver gas through rubber tubes to the instruments that require gas. The current price of LPG is 8,500 dong per one Kg.

4-3-4. Outline of Facilities and Equipment

Facilities and equipment have been chosen by taking into consideration the personnel plan and the activity plan as well as the request from Vietnamese side. Facilities and equipment necessary for the activities of education, research and extension in related three departments are outlined below.

(1) Facilities

1) Laboratory Section

This section consists from such as laboratories and offices for related three departments.

• Dept. of Agronomy
- Plant Physiology Lab, Genetics and Breeding Lab, Soil Science Lab, Plant Protection Lab, Crop Science Lab., etc. Chairman's Office, Graduate's Room, Dept. Head Office, Computer Room, etc.
• Dept. of Animal Husbandry and Veterinary Medicine
- Animal Pathology Lab, Infections and Parasitic Disease Lab, General Zootechnology Lab, Special Zootechnology Lab, Anatomy and Physiology Lab, etc. Chairman's Office, Graduate's Room, Dept. Head Office, Computer Room, etc.
• Dept. of Food Sciences and Technology
- Food Science Lab, Food Technology Lab, Food Processing Lab, Pilot Plant, etc. Chairman's Office, Graduate's Room, Dept. Head Office, Computer Room, etc.

2) Common Use Section

This section consists from such as lecture rooms, faculty library and administrative offices for common use of related three departments.

• Common Lecture Rooms
- Small Lecture Room, Medium Lecture Room, Large Lecture Room, etc.
• Faculty Library
- Reading Space, Book Storage, Material Processing Room, Library Administration Office, etc.
• Administration Offices
- Dean's office, Deduty Dean's Office, Board Room, Faculty Administration Office, etc.

(2) Equipment

Categories and outlines of equipment necessary for activities of education, research and extension in the related three departments are mentioned below.

1) Common Use Equipment

a. Audio Visual Equipment - the equipment required for education and extension activities in order to make video softs and show to students in campus or farmers in villages.
b. Printing Equipment - the equipment required for printing of texts, reeflets and other teaching materials in order to use widly for all kind of relative activities.
c. Water Treatment Equipment - the equipment required for distilling water in order to supply for all related experimentation.
d. Other Equipment - the tool sets required of maintenance of scientific equipment and vehichles required for student field studies or extension activities.

2) Equipment for Department of Agronomy

a. Education and Research - the equipment required for training, observation and basic research relating to plant physiology, genetics, soil science, plant protection and crop science, etc., and for some applied research or extension activities.
b. Common Use - such as personal computer and copy machine, etc.

3) Equipment for Department of Animal Husbandry and Veterinary Medicine

a. Education and Research - the equipment required for training, observation and basic research relating to animal pathology, parasitology, zootechnology, anatomy and physiology, etc., and practical training on artificial insemination technologies.
b. Common Use - such as personal computer, copy machine and slide projector, etc.

4) Equipment for Department of Food Sciences and Technology

a. Education and Research - the equipment required to training and basic research relating to food preservation, food chemistry, fermentation, food technology and practical training on food processing technologies.
b. Common Use - such as personal computer, slide projector and overhead projector, etc.

4-4. Operation and Maintenance Plan

At the time this facility is handed over to the Government of Viet Nam, the three related departments will move from their present facilities and operations will begin. In addition to sufficient advanced preparation of the facility, a detailed plan for the administration, maintenance and supervision of the facility is necessary.
Although the activities of this university play an important role in the agricultural development of the Mekong Delta, it is first and foremost one of the universities under the budget control of the Ministry of Education and Training.

In regards to the operating budget, as noted in section 4-2-2, personnel wages and scholarships make up the majority of the budget allocated by the central government, and research and operation maintenance funds are extremely limited. The actual operation of the university is supplemented by independent income raised by the university which is just barely sufficient. The budget from the Ministry of Education and Training is increasing annually at a rate of 150 compared to the previous year and it is hoped that this budget will continue to increase.

Presently at Can Tho University, there is a serious shortage of teachers at or beyond the master degree level. In order to improve this situation, there is an urgent need to increase the amount provided for personnel wages by the Ministry of Education and Training.

After the facility has been turned over to the Government of Viet Nam, a budget equivalent to the amount estimated in section 4-2-2 will be necessary for the operation, maintenance and supervision of the facility and equipment. A corresponding budget is a prerequisite if this facility is to be used to effectively provide active education and research programs. Along with the implementation of this project, it is strongly hoped that great self-help efforts will be made by the Government of Viet Nam in terms of making budgetary provisions for the management, maintenance and supervision of the facility.

4-4-1. Operation Plan

(1) Teaching Staff

Judging from the scale of the chairs (courses) that make up each department, the following personnel have been deemed necessary based on the standard 1:2:4 ratio of doctoral/master/undergraduate degree holders.

Table 4-4-1-1. Teaching Stuff Allocation Plan

(Unit : Persons)

Department	Doctor		Master		Others		Sub-Total	
Agronomy (5 chs)	6	5	7	10	44	20	57	35
Animal H. & Vet. Medicine (5 chs)	2+(3)	5	2	10	3	20	7+(3)	35
Food Science & Technology (3 chs)	0	3	1+(3)	6	18	12	19+(3)	21
Total	8+(3)	13	10+(3)	26	65	52	83+(6)	81

1) Left : Exisitng, Right : Projection
2) ( ) shows in abroad or Candidate

The Dept. of Agronomy has a long history and is active in research and the spreading of agricultural techniques throughout the region. Its teaching staff is nearly sufficient. The Dept. of Animal Husbandry and Veterinary Medicine is lacking in all areas and is in need of supplementation, while the Dept. of Food Sciences and Technology needs a doctoral degree holder in a supervising capacity as well as masters degree holders as lecturers.

(2) Administration Related Staff

The current staff of the university totals 826. The operation of this facility requires appointments to the following staff positions from current staff.

Dean	1 person
Deputy Dean	2 persons
Administration and Finance	20 persons
Library Section :	
Reference	2 persons
Printing	3 persons
Assistant	1 person
Maintenance Section :	
Electricians	1 person
Mechanical Engineer	1 person
Assistant	2 persons
Total	33 persons

4-4-2 Management and Maintenance Plan

(1) Facility Maintenance Plan

1) Building

The main points in regard to building maintenance are daily cleaning, the repair of worn or damaged parts and security in order to ensure building safety and security.

Daily cleaning will have a favorable effect on the attitude of those using the building and is also important to maintain the necessary level of cleanliness for the research facilities. It also leads to the early discovery of damage and equipment breakdowns and subsequent early repair, thus prolonging the life of building mechanical equipment and research equipment.

Repair work mainly consists of the repair or renewal of exterior and interior finishing materials which protect the structure of building. Based on Japan's experience, it is believed that remodeling or partial rebuilding will be required every ten years due to changes in activities and/or staff increases. The regular inspections and repairs required to

prolong the building life will be described in detail in the maintenance manual to be presented to the Vietnamese side at the time of handing over the building and are outlined below.

Outline of Regular Building Inspections

(Exterior)	
- Repair and repainting of exterior finishings	every five years
- Inspection, repair and repainting of roofing sheets	inspection: annually, others: every five years
- Inspection and repair of roof waterproofing	inspection: annually, others: as required
- Cleaning of gutters and drains	monthly
- Inspection and repair of sealing material around doors and window frames	annually
- Painting of exterior doors and window frames	every five years
- Inspection and cleaning of drainage ditches and manholes	monthly
- Gardening	as required
(Interior)	
- Alteration of interior finishings	as required
- Repair and repainting of interior walls	as required
- Replacement of ceiling materials	as required
- Adjustment of doors and windows	annually
- Replacement of hardware	as required

With regard to security work, access to the building must be checked and security measures must be taken to prevent the theft of any equipment.

2) Building Mechanical System and Equipment

Not only regular operation control and inspection but also the repair and exchange of parts will be required for the proper maintenance of building mechanical system and equipment. The life of building mechanical system and equipment can definately be extended by proper operation and regular inspections, adjustment, cleaning and repair. Their safety must be secured by measures to prevent breakdowns and accidents without causing damage to the building. Overhauls and the replacement

of worn parts must be conducted pursuant to the maintenance manual at the time of regular inspections.

Maintenance staff members must have an exact understanding of the system design and capacity, etc.. so that they can prevent accidents. Full-time engineers should, therefore, be provided for each of the electricity, air-conditioning, plumbing, and special equipment fields. Moreover, these engineers should undergo on-site training from the system and equipment installation and test operation stages to obtain a thorough knowledge of the system and equipment for which they will be responsible. Maintenance manuals will be provided at the time of project completion. The service lives of the main building system and equipment are as follows :

Service Lives of Main Building System and Equipment

Electricity	
- Generator	15 - 20 years
- Panel Boards	20 - 30 years
- Fluorescent Lamps	5,000 - 10,000 hours
- Incandescent Lamps	1,000 - 1,500 hours
- Telephone Exchangers	40 years
- Public Address Equipment	10 - 20 years
Plumbing	
- Pump, Pipes and Valves	10 - 15 years
- Tanks	15 - 20 years
- Sanitary Fixtures	25 years
- Fire-Fighting Equipment	20 years
- Gas Apparatus	6 years
- Sewage Treatment Equipment	7 years
Air-Conditioning	
- Pipes	10 - 15 years
- Fans	10 - 15 years
- Air-Conditioner	5 - 10 years

(2) Management and Maintenance Plan of Equipment and Materials

1) Equipment

Correct management and maintenance of equipment and instruments is one of the most important factors to ensure smooth operation of the Project. For instance, analytical instruments are composed of precision parts, and some are easily damaged or affected by ambient conditions such as temperature and humidity while others are subject to influences of vibration and shock. They require well planned management and maintenance.

Generally speaking, management and maintenance procedures include

① routine inspections to be conducted by persons who daily operate the equipment and instruments

② emergency inspections in case of the occurrence of troubles

③ regular inspections, usually once or twice a year, to be conducted by engineers with proper expertise and techniques.

Routine inspections are to be carried out in accordance with the inspection items and frequencies stipulated in relevant manuals by a person responsible for a specific instrument and designated from among the operators of that instrument.

Outlines of management and maintenance of principal instruments are listed in the following table.

Equipment	Main Equipment	Internal Maintenance	Local Agents Maintenance
General Purpose Instruments	Oven, Blender	Cleaning once/month Inspection twice/year	as required
Analytical Instruments	Atomic Absorption Spectrophotometer	Cleaning routine Inspection four times/year	as required once/year
Optical Instruments	Optical Microscope	Cleaning routine Inspection once/year	as required once/year
Audio Visual Equipment	VTR, Camera, Video,	Cleaning routine Inspection once/month	as required twice/year
Printing Equipments	Photo Copy Machine Offset Machine	Cleaning routine Inspection once/week	as required once/year

2) Expendables and Chemicals

Inventory control of expendables and chemicals should be effected in close coordination between research and training facilities and management ones. The staff-in-charge of department should confirm inventories of these items to check whether or not they are being appropriately used. The management facility should secure a smooth supply of these items to the research and training facilities and procure them from suppliers in a planned way.

(3) Trial Calculation of Management and Maintenance Expenses

Trial calculation of management and maintenance expenses, which the Vietnamese side should bear after the completion and turnover of the buildings to it, has been effected in accordance with the results of the basic design study. This project is an improvement of existing facilities so that existing condition will shift to and continue in this new buildings. Therefore, this trial calculation is included additional only on personnel, facility operation, facility and equipment maintenance and expendable expenses.

1) Personnel Expenses

Personnel expenses to be borne at the time of opening the buildings (1995) are calculated based on the personnel plan. Average annual income is based on data available from the Vietnamese side and an average increase till the opening is included as 150% in this trial calculation.

Salaries (additional personnels only)

- Doctors	590,000VND×12months×5×1.5=	53,100,000VND
- Masters	402,000VND×12months×15×1.5=	115,776,000VND
- Maintenance Engineers	230,000VND×12months×2×1.5=	8,280,000VND
1) Total		177,156,000VND

2) Facility Operation Expenses

Annual operation expenses are calculated by assuming routine loads of water supply, power, LPG and telephone.

① Water charges

Daily water consumption

- Students	568psn×80ℓ/psn·day=	12,160ℓ/day
- Staff	80psn×100ℓ/psn·day=	8,000ℓ/day
- Lecturers	80psn×250ℓ/psn·day=	20,000ℓ day
	Sub-total	40,160ℓ/day≈40m³/day

Annual water consumption

=40m³/day×25days/month×9months/year

=9,000m³/year

Annual water charge

=9,000m³/year×1,500VND/m³

=13,500,000VND/year

② Power charges

Dairy power consumption

=3,300kVAh×0.8=2,640kWh/day

Annual power consumption

=2,640kWh/day×25days/month×9months/year

=594,000kWh/year

Annual power charge

=594,000kWh×480VND/kWh

=285,120,000VND/year

③ LPG charges

The volume of LPG to be consumed is calculated based on that staff members will use bunsen burner for two hours per day. In principle, students will not use often to avoid accidental cases. LPG is butane gas and 10kg per one cylinder.

Dairy gas consumption

=2hrs×300kcal/hr×80staff=48,000kcal/day

48,000kcal/day÷15,500kcal/kg≈3kg/day

Annual gas consumption

=3kg/day×25days/month×9months/year

=675kg/year

Annual gas charge

=675kg/year×140,000VND/10kg

=9,450,000VND/year

④ Telephone charges

This calculation assumes following conditions within 3 minutes but students will use pay-phone.

- Staff	Local call	10 calls/day
	Distance call	2 calls/day to T.P.
- Lecturer	Local call	15 calls/day
	Distance call	3 calls/day to T.P.
		3 calls/day to Hanoi

Daily telephone charge

- Staff =10 calls×1,400VND/call+2 calls×3,300VND/call
  =20,600VND/day
- Lecturer =15 calls×1,400VND/call+3 calls×3,300VND/call
  +3 calls×11,700VND/call
  =66,000VND/day

Annual telephone charge

=(20,600VND+66,000VND)/day×25days/month
×9months/year
=4,635,000VND/year

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2) Total ①+②+③+④ 312,705,000VND/year

3) Facility and Equipment Maintenance Expenses

① Maintenance expenses of facilities

Building maintenance expenses vary substantially as time elapses. By assuming that annual average maintenance expenses per floor area amount to 4,000VND/m^2 when viewed over a span of 30 years, the facility maintenance expenses are calculated (including the facility cleaning and guarding expenses).

4,000VND/m^2·year×9,800m^2= 39,200,000VND/year

② Maintenance expenses of mechanical system

Mechanical system maintenance expenses will not amount to much during the first five years after the completion of the building, but parts and instruments will have to be replaced with new ones thereafter. The expenses are calculated by assuming that annual average maintenance expenses are about 1.5% of the mechanical system expenses when viewed over a span of ten years.

28,000,000VND/year

③ Maintenance expenses of research and training equipment

Equipment maintenance expenses will not amount to much during the first few years after the completion of the building, but they will gradually increase as time passes. Based on ordinary examples seen in Japan, annual maintenance expenses are expected to be 1.5% of equipment prices for the initial five years and 4% for the next five years. Hence, they amount to ¥ 2.5 million.

· During the initial five years

¥ 250,000,000×*0.2×0.015= ¥ 750,000/year

≒75,000,000

· During the next five years (200,000,000VND/year)

* Ratio of equipment requires maintenance among all equipment

3) total 142,200,000VND

4) Expendable Expenses

Volumes of expendable and chemicals to be consumed in the Project will vary substantially depending on the degree of its activities. In this trial calculation, the ratio of utilization of the equipment and materials is assumed to be 50% of the ordinary ratio in Japan.

11,300,000VND/year

5) Total of the Trial Calculation

Total maintenance expenses (ordinary budget)

1)	Personal expenses	177,156,000VND
2)	Facility operation expenses	312,705,000VND
3)	Facility and equipment maintenance expenses	142,200,000VND
4)	Expendable expenses	11,300,000VND
	1)~4) Total	643,361,000VND

Hence, the trial calculation assumes 644 million VND as annual maintenance expenses, or ¥ 6.44 million in Japanese currency.

4-5. Technical Cooperation

The Government of Viet Nam has an urgent duty to promote practical market-oriented education related in response to the introduction of a market economy. The Ministry of Education and Training, under the *doi moi* policy, is dealing with all manners of reform related to the efficient integration of current universities, the reevaluation of educational subjects and the reeducation of teachers and instructors among other issues.

In light of these educational reforms, the purpose of these improvement plans is to strengthen the functions of the Faculty of Agricultural Sciences of Can Tho University, the core education and research facility in the Mekong Delta. Almost all of the students that enter the university are from the Mekong Delta area and after graduation remain there working for the development of the agricultural sector. In this improvement plan, the physical groundwork for an educational environment is created through the improvement of facilities and equipment, making practical technical education possible.

In addition, a reform of teaching methods is also important in the promotion of modern technical education. There is a need to modernize all forms of educational techniques ranging from the reevaluation of syllabus, curriculum, texts, and other teaching materials to guidance in experimental and training methods and graduate research. Individual efforts by those in all positions of responsibility will be indispensable to this reform and technical transfer from outside will greatly increase the efficiency of this reform.

The following methods are considered efficient applications of technical cooperation in an effort to make effective use of the facilities for this plan and maximize the results of assistance.

(1) Technical Transfer from JICA Specialists and JOCV

- Technical guidance and advice to counterparts
- Preparation of syllabus and curriculum and cooperation in the production of all types of teaching materials
- Advice concerning education, research, the spreading of technical information and academic activities

(2) Cooperation in the Training of Can Tho University Teachers

- Ministry of Education overseas study scholarships
- Third country training and overseas study
- Overseas study in Viet Nam
- JICA training
- Other (training programs in private enterprises, etc.)

(3) Technology Transfers from Related Educational Organizations and Private Sector Enterprises

- Joint surveys and research with international organizations
- Joint research with sister universities and other institutions
- Research and development commissioned by private sector enterprises

These methods of technology transfer are possible, but as Can Tho University has already received assistance from foreign governments and cooperation from non-governmental organizations, a wide range of developments is anticipated.

Support activity in the form of the dispatch of JICA specialists and cooperation volunteers (JOCV) is now under investigation and in the future, there is a high possibility of recommencing project-type technical cooperation.

In terms of technical cooperation, it is thought that the development of local assistance or sector assistance will have a higher influencing effect than country assistance. In the region, the Asian Pacific Economic Sphere is taking shape, and investment from neighboring countries is rising extremely fast.

The Government of Japan has implemented economic cooperation in the neighboring Asian countries and effects from previous technology transfers are beginning to be seen. The transferred technology merges with the traditional local technology, raising it to an appropriate level. The current technology in use in Japan is too advanced to be transferred to all countries and appropriate technologies that have been tried in a country under roughly equivalent conditions take root more quickly. The formation of a structure for continuing the transfer of technology as a form of collaboration assistance, primarily based on overseas studies and third country training, is considered vitally important.

CHAPTER 5 BASIC DESIGN

CHAPTER 5. BASIC DESIGN

5-1. Design Policies

The Can Tho University Faculty of Agricultural Sciences is set up as the core education and research facility in the agricultural development of the Mekong Delta. It is also expected to fulfill the role of a receiving organization for a large range of international cooperation, particularly concerning the South-to-South, where development has been forecast. The basic design of this planned facility will be made with emphasis to the functional efficiency, durability and economic efficiency in fulfilling the activities forecasted in this plan. Plans concerning design are as follows.

(1) Plans Related to Natural Conditions

- Temperature and Humidity

  Can Tho is located at a latitude of 10° 02' north and a longitude of 105° 47' east and is situated in the tropical monsoon region with high temperatures and high humidity. The average maximum temperatures are between 29.2°C and 34.9°C and the average maximum humidity is from 93% to 97%, making it hot and humid throughout the year. For these reasons, an open design is desirable to take advantage of natural ventilation.

- Rainfall

  In the rainy season (May to September), monthly rainfall reaches 300mm caused by the southwest monsoon. The maximum single day rainfall is 198 mm and falls in violent downpours for short periods. This period is accompanied by strong winds, so it is necessary to take into account the rain that will be blown into the buildings in designing the facility.

- Exposure to sunlight

  The average number of hours of sunlight reaches a peak in March and April at about 9 hours. The rays of the sun are very strong because of the regions low latitude, making it necessary to give consideration to the penetrating

rays in the east in the morning and the west in the evening. The position of the sun at midday is very high so special consideration must be given to the roof section.

- Wind direction and strength

The direction of the wind in Can Tho is south-southwest during rainy season and east-southeast during dry season, with changes caused by the monsoon. Average wind speed is 0.8 m/s-1.8 m/s and maximum wind speeds are moderate at 18 m/s.

Typhoons originate above the Philippine Sea and usually strike north and central Viet Nam. In 50 years, there have only been four incidents of typhoons coming aground below a latitude of 10 degrees south. Accordingly, consideration must be given to the entrance of rain caused by the wind direction during the rainy season and to natural ventilation during the dry season.

- Earthquakes and lightning

The regional earthquake zone is situated in the Sunda mountain system which forms the Philippine islands and stretches from the Himalaya mountains across Myanmer extending to the islands of Sumatra and Java. The region surrounded by this zone makes up an area of the crust of the earth stabilized by the Asiatic shield. Southern Viet Nam is located in the center of this and does not require that special consideration be given to earthquakes. The area is not particularly susceptible to lightning, but as lightning rods are normally installed in the area some consideration must be given to this matter.

(2) Plans Related to the Conditions of the Building Site

- Weak soil condition

Can Tho is located in the center of the Mekong Delta, on an alluvial fan almost 40m in depth created by the silt carried by the Mekong River. The water level is about 1.5m, creating extremely poor conditions for construction foundation. It is necessary to drive concrete piles as deep as

the support level in order to prevent the settlement of the structure. In the planning, use of expansion joints in anticipation of uneven settlement should be considered.

- Establishment of floor level

The planned building site is about 0.5m lower than the asphalt road that runs through the campus. In consideration of the drainage after violent rain showers, the first floor level of the building should be raised 0.5m bringing it to the same level as the road that runs in front of the building site.

(3) Plans Related to the Local Construction Conditions

- Laws and regulations related to construction

The application for construction approval related to this project is submitted to the Ministry of Construction, Can Tho office by Can Tho University. There is no equivalent of the Construction Standards Law of Japan, but plans for regulations exist in the Ministry of Construction and various provincial branch offices. Therefore, planning will be carried out in accordance with the related regulations of Japan.

- Technical capacity of local construction companies

As there are no private sector construction companies in Can Tho with experience in construction projects of the scale of this facility, a construction company from Ho Chi Minh City will carry out the construction as a sub-contractor under Japanese Main Contractor. Until recently, the number of new construction projects in this city was extremely limited and the construction industry was not well developed. Therefore, complicated construction methods and details will be avoided, with an emphasis on a design that will improve local construction methods as much as possible within the limits of local technical capacity.

(4) Corresponding Plans Related to Maintenance and Supervision Capacity

- Maintenance and supervision capacity

Although it is increasing annually, the budget allocated by the central government for the administration of the university is not sufficient and income raised independently by the university must supplement this budget. Simple methods that do not require maintenance or supervision expenses must, therefore, be adopted for the facility and equipment, taking full advantage of natural lighting and ventilation.

- Technical level of maintenance and supervision

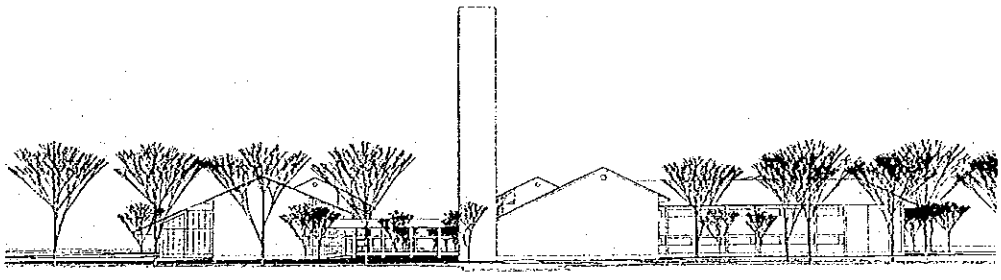
After observing the conditions concerning maintenance and supervision of the facilities currently in operation, it must be said that level of maintenance and supervision is generally low in Viet Nam. The major reason for this is the insufficient budget and resulting lack of morale. With regards to instruments and equipment, local manufacturer representatives are almost non-existent, making it impossible to receive after sales protection or service. Consequently, it is vital that all of the facilities, including electrical instruments and other installations can be easily maintained and are of sufficient durability.

(5) Plans Related to the Level of the Facility and Equipment

The location of the facility makes it apparent that it is expected to fulfill the function and character of the core educational facility in the Mekong Delta. In summary of the previously listed investigation results, it is vital that emphasis be placed on responding to the relatively harsh natural and building site conditions in adopting simple facility planning and equipment selection which does not require large maintenance and supervision expenses. Durability should be emphasized, making the facility resistant to damage caused by students and others. The guiding precondition of this basic plan is a facility with low long-term maintenance expenses and, for this reason, initial costs will be slightly high.

(6) Plans Related to the Construction Period

The commencement of construction is scheduled from 5 months later than the exchange of notes (E/N) takes place. Under the single year budget system of the Government of Japan, even if the exchange of notes is permitted to extend one more fiscal year but it will be until the last day of March 1995. It will be impossible to complete the entire facility within this fiscal year of ten months. The basic plan, accordingly, has the precondition that the construction process be divided into two phases.



5-2. Study and Examination on Design Criteria

5-2-1. Composition of Facilities

This facility is composed according to the factors noted in 4-3-4. In constructing the rooms necessary for meeting these demands, there is a need to consider the conditions of the site, organize the entire facility into separate structures of suitable size and arrange them according to function. As a result of the investigations, consideration was given to the composition of facilities, the following five buildings will be planned.

(1) Common Facilities (Phase- Ⅰ)

1) Administration Building :
be composed of offices for administration and adjacent faculty library including material print room.
2) Common Lecture Building :
be composed of various sized lecture rooms and seminar rooms for common use and water pump/electricity rooms through student hall.

(2) Laboratories (Phase- Ⅱ)

1) Laboratory Building-1 : be composed of 4 chairs of Dept. of Agronomy
2) Laboratory Building-2 : be composed of 4 chairs of Dept. of Food Science and chair of crop science
3) Laboratory Building-3 : be composed of 4 chairs of Dept. of Animal Husbandry also maintenance unit.

5-2-2. Facility Scale

The scale of the facility was set according to the area of the rooms requested from Vietnamese side and in consideration of the time in which classrooms are used according to the currently established curriculum, the numbers and arrangement of instructors and staff, placement of the supplied equipment and transferred equipment and other matters. The basis for calculating the area of the necessary rooms is as follows.

- Lecture room

The number of lecture hours, including all courses for the three faculties, is about 12,000 per year according to the current curriculum. This calculation takes into account the 70% operating rate, 7.5 hours of class time a day (including two lectures in the morning and three in the evening), and 190 school days in the year.

13 rooms × 7.5 hours/day × 190 school days × 0.7
= 12,970 hours/year
= about 12,000 hours/year.

The lecture rooms are arranged with the number of students in a unit being set at 24. The 13 rooms are listed below:

- small lecture rooms (25 students), 1 unit (24 students). 8 rooms
- medium lecture rooms (50 students), 2 units (50 students. 4 rooms
- large lecture room (100 students), 4 units (90 students). 1 room

The area of the lecture rooms are set at 1.9 m^2/student.

- Laboratories

One laboratory unit has 24 students and the scale of the laboratories is set according to the type of laboratory table and the placement of equipment. The Dept. of Food Technology has a large number of students and few instructors, making it desirable to have laboratories that provide for 30 students per unit. Laboratory tables will therefore be arranged to accommodate 32 students per unit.

The Dept. of Agronomy has requested that laboratories be divided between those used for research and those used for student use. General experiments would be conducted in student laboratories and while research laboratories with equipment for analysis would be used for graduate research and masters degree research.

● Drawing room

There has been a request for drawing and machine drafting equipment for the departments in the Dept. of Food Technology. A2-size drafting boards are to be set up with 2.2 square meters of space per person.

● Department Head's Office and Chairman's Office

A Department Head's Office will be established for the organization of activities within a department. Including a space for discussion, this room will have an area of 32 square meters. A department office and computer room will be set up next to this. The former is to be used as a space for the general affairs of the department and the latter as a room for housing current and new computers in a single area.

A Chairman's Office will be established for organizing affairs within each chair (course). A laboratory will also be set up, making the area of this room 16 square meters. As there are plans to organize the Department of Food Technology into three different chairs, rooms for three chairmen will be set up.

● Lecturer's Room and Graduate Students Room

The following structure was decided under the assumption that the lecturer's room would be for holders of masters degrees or higher and in anticipation of the future increase of personnel needed.

Department	Head	Chairman	Office
Agronomy	1	5	9 (18p)
A. H & Vet Med	1	5	5 (10p)
Food Science	1	3	3 (6p)

The lecturer's room will be 16 square meters and used jointly by two persons. A graduate students room will be attached to the lecturer's room and three graduate students or assistants will be placed there. Note that there are no standards for lecturer's rooms (laboratories) in Japan, but materials on the calculation of area according to basic plans from Tsukuba University indicate

the measurements of 27.9 square meters for professors, 18.6 square meters for associate professors and 13.9 square meters for assistants.

- Faculty library

A faculty library will be established to combine the rooms for information storage and practical study. The reading room will seat 80 students and the open-shelf stacks will house 8,000 volumes, primarily consisting of books in specialized areas of study.

Browsing room	for 80 persons
Reading room	2.5 square meters/person
Stacks and magazine racks ...	1.8 square meters/1,000 volumes

A materials compilation room will be established for the simple printing of texts, educational materials, research materials and others within the faculty. The administrative office will handle matters related to the library and materials compilation divisions. The management of the library will be the responsibility of the dean of the faculty, but will be operated in cooperation with the central library.

Calculation of Planned Rooms

I . Common Facility

I -1. Administration Building

Rm. No.	Room Name	Area Calculation Basis	Units (8×8m)	Area (m^2)
A 001	Faculty Admin. Office	3p×12m^2/p+6p×6m^2/p+3m^2/p=105m^2 Including meeting and telephone exchange space	2.0	128
A 004	Faculty Library	Reading 80p×2.5m^2/p=200m^2 Book stg. 6,000books×10.75m^2/1,000books =65m^2 Including reception, reference, space, etc.	6.0	384
A 005	Library Admin. Office	1p×12m^2/p+4p×3m^2/p=24m^2 Including book order, receive, repairing space	0.5	32
A 006	Material Print Rm.	Depends on printing machines and storage	0.5	32
A 101	Board Rm.	30seats×3m^2/p=90m^2 Including presentation space	1.5	96
A 102	Reception Rm.	Depends on furniture layout	0.25	16
A 103	Reception & Waiting	Depends on receiption counter and waiting bench, etc.	0.375	24
A 104	Secretary Rm.	3p×6m^2/p=18m^2	0.375	24
A 107	Dean's Office	Including office work and meeting space	0.5	32
A 108	Dupty Dean's Office	Office work(×2)·Reception(×1)space	0.5	32
		Sub-Total	12.5	800
	Common Space		-	426
		Total - (A)		1,226

p : person

I -2. Common Lecture Building

Rm. No.	Room Name	Area Calculation Basis	Units (8×8m)	Area (m^2)
B 001	Student Hall		1.75	112
B 002	Pump Rm.	Depends on pumps layout	0.25	16
B 004	Elec. Panel Rm.	Depends on panels and transformer layout	1.0	64
B 005	Generator Rm.	Depends on generator and attachments	0.25	16
B 007	L. Lecture Rm.	$100p \times 1.5p/m^2 = 150m^2$ 1room	2.5	160
B 008 ~ 012	S. Lecture Rm.1~4	$25p \times 1.9p/m^2 = 48m^2$ 4rooms	3.0	192
B 014 ~ 015	M. Lecture Rm.1~2	$50p \times 1.9p/m^2 = 95m^2$ 2rooms	3.0	192
B 101 ~ 103	Seminar Rm.1~3	$12p \times 2.5p/m^2 = 30m^2$ 3rooms	1.5	96
B 108 ~ 111	S. Lecture Rm.5~8	above described 4rooms	3.0	192
B 113 ~ 114	M. Lecture Rm.3~4	above described 2rooms	3.0	192
		Sub-Total	19.25	1,232
	Common Space		-	947
		Total - (B)		2,179
		Common Facility Total - (A)+(B)		3,405

II. Laboratories

II-1. Laboratory Building-1 (Dept. of Agronomy)

Rm. No.	Room Name	Area Calculation Basis	Units (8×8m)	Area (m^2)
C 001	Head of Dept. Office	Including receiption and meeting space	0.5	32
C 002	Dept. Admin. Office	5p×3m^2/p+meeting space(15m^2)=30m^2	0.5	32
C 003	Computer Rm.	Centralizing various computers	0.5	32
	1) Chair of Soil Science		(6.0)	(384)
C 004	Soil and Plant Specimens Rm.	Depends on specimen's shelves Work table (1×2p=2p)	0.5	32
C 005	Soil Survey and Mapping Rm.	Work table(2×6p=12p)and equipment space	1.0	64
C 006	Graduate's Rm.	3p of post-graduate student or assistant	0.25	16
C 007	Lecturer's Rm.	2p of lecturer	0.25	16
C 008	Graduate's Rm.	as described	0.25	16
C 009	Lecturer's Rm.	as described	0.25	16
C 010	Soil and Plant Analysis Lab.	Student practice lab. and research space Lab. table (4×6p=24p), Research table (×2)	2.0	128
C 011	Soil Science Reh. Lab.	Research lab. Lab. table(2×6p=12p)	1.0	64
C 012	Chairman's Office	Including meeting space	0.25	16
C 013	Reagent Stg.	Depends on reagent shelves	0.25	16
	2) Chair of Plant Protection		(5.75)	(368)
C 105	Equipment Stg.	Storage for plants collecting tools	0.25	16
C 106	Graduate's Rm.	as described	0.25	16
C 107	Lecturer's Office	as described	0.25	16
C 108	Plant Pathology and Nematology Reh. Lab.	Research lab. Lab. table (2×2p=4p)	0.5	32
C 109	Microorgarism Inoculation Lab.	Inoculation testing on plant protection	0.25	16
C 110	Specimens Processing and Washing Rm.	Processing of plant and insect specimens and washing include glassware	0.25	16
C 111	Plant Pathology and Nematology Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64

Rm. No.	Room Name	Area Calculation Basis	Units (8×8m)	Area (m^2)
C 112	Microscopes Store Rm.	Centralized store for various microscopes	0.25	16
C 113	Pesticide Store Rm.	Storage and control various pesticide	0.25	16
C 114	Entomology and Pesticide Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
C 115	Entomology and Pesticide Reh. Lab.	Research lab. Lab. table (2×2p=4p)	0.5	32
C 116	Chairman's Office	as described	0.25	16
C 117	Entomology Specimen Rm.	Storage and maintaine entomology specimens	0.25	16
C 118	Graduate's Rm.	as described	0.25	16
C 119	Lecturer's Office	as described	0.25	16
	3) Chair of Plant Physiology		(4.0)	(256)
C 101	Horticulture Reh. Lab.	Studen practice lab. Lab. table (1×2p=2p)	0.5	32
C 102	Graduate's Rm.	as described (for 5 persons)	0.5	32
C 103	Staff Rm.	as described (for 5 persons)	0.5	32
C 104	Chairman's Office	as described	0.25	16
C 201	Tissue Culture Reh. Lab.	Research lab. Lab. table (2×2p=4p)and equipment space	1.0	64
C 202	Plant Physiology Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
C 204	Precision Instruments Rm.	Centralizing precision instruments Lab. table (1×2p=2p)	0.25	16
	4) Chair of Genetics and Breeding		(5.25)	(336)
C 203	Chairman's Office	as described	0.25	16
C 205	Graduate's Rm.	as described	0.25	16
C 206	Lecturer's Office	as described	0.25	16
C 207	Graduate's Rm.	as described	0.25	16
C 208	Lecturer's Office	as described	0.25	16

Rm. No.	Room Name	Area Calculation Basis	Units (8×8m)	Area (m^2)
C 209	Plant Breeding Reh. Lab.	Research lab. Lab. table (2×6p=12p)	1.0	64
C 210	Electrophoresis Lab.	Various electrophoresis testing Conc. table (1×2p=2p)	0.5	32
C 211	Plant Genetics Lab.	Student practice lab. and research space Lab. table (4×6p=24p), Research table (×2)	1.0	64
C 212	Specimens Store Rm.	Store specimens on genetics	1.5	96
C 213	Genetics for Cells Reh. Lab.	Research lab. Lab. table (1×2p=2p)	0.25	16
C 214	Seed Storage Rm.	Depends on prefabric fridge and work space	0.5	32
		Sub-Total	22.5	1,440
	Common Space		-	720
		Total - (C)		2,160

II -2. Laboratory Building -2 (Dept. of Food Science and Technology, Dept. of Agronomy)

Rm. No.	Room Name	Area Calculation Basis	Units (8×8m)	Area (m^2)
D 001	Head of Dept. Office	as described	0.5	32
D 002	Dept. Admin. Office	as described	0.5	32
D 003	Computer Rm.	as described	0.5	32
	1) Chair of Food Science		(13.5)	(864)
D 004	Graduate's Rm.	as described	0.25	16
D 005	Lecturer's Office	as described	0.25	16
D 006	Food Preservation and Storage Lab.	Student practice lab. Lab. table (4×8p=32p)and equipment space	1.5	96
D 007	Chairman's Office	as described	0.25	16
D 008	Material Stg.	Depends on storage shelves	0.25	16
D 009	Pilot Plant-1	Depends on layout of light equipment for food processing	1.5	96
D 010	Pilot Plant-2	Depends on layout of heavy equipment for food processing	2.0	128
D 101	Chairman's Office	as described	0.25	16
D 102	Inoculation and Culture Lab.	Inoculation and culture testing on food fermentation, Lab. table (1×2p=2p)	0.25	16
D 103	Food Fermentation Lab.	Student practice lab. Lab. table (4×8p=32p)and equipment space	1.5	96
D 104	Graduate's Rm.	as described	0.25	16
D 105	Lecturer's Office	as described	0.25	16
D 106	Food Chemistry Lab.	Student practice lab. Lab. table (4×8p=32p)and equipment space	1.5	96
D 107	Measuring Instrument Rm.	Various testing and measuring Lab. table (2×2p=4p)	1.0	64
D 108	Food Analysis Lab.	Analytical testing on food processing	0.5	32
D 109	Chairman's Office	as described	0.25	16
D 110	Instruments Stg.	Store Instruments for pilot plant	0.25	16
D 111	Food Processing Lab.	Student practice lab. Lab. table (4×8p=32p)and machine space	1.5	96
	2) Chair of Food Engineering		(3.25)	(208)
D 201	Food Engineering Lab.	Student practice lab. Lab. table (4×8p=32p)and equipment space	1.5	96

Rm. No.	Room Name	Area Calculation Basis	Units (8×8m)	Ares (m^2)
D 202	Graduate's Rm.	as described	0.25	16
D 203	Lecturer's Office	as described	0.25	16
D 204	Engineering Drawing Rm.	Practice on mechanical drawing (A-2 size) $32p \times 2.0m^2/p = 64m^2$	1.0	64
D 206	Drawing Equipment Stg.	Store of drawings and equipment	0.25	16
	3) Dept. of Crop. Science		(4.25)	(272)
D 205	Chairman's Office	as described	0.25	16
D 207	Graduate's Rm.	as described	0.25	16
D 208	Lecturer's Office	as described	0.25	16
D 209	Instruments Storage	Store of collecting tools for plants specimens Work table ($1 \times 2p = 2p$)	0.5	32
D 210	Specimens Analysis Lab.	Sellection and analyzing of plant specimens Work table ($2 \times 2p = 4p$)	0.5	32
D 211	Specimens Store Rm.	Store of plant specimens Work table ($1 \times 2p = 2p$)	0.5	32
D 212	Crop Science Lab.	Student practice lab. Lab. table ($4 \times 6p = 24p$)	1.0	64
D 213	Graduate's Rm.	as described	0.25	16
D 214	Lecturer's Office	as described	0.25	16
D 215	Crop Science Reh. Lab.	Research lab. Lab. table ($2 \times 2p = 4p$)	0.5	32
		Sub-Total	22.5	1,440
	Common Space		-	720
		Total - (D)		2,160

II -3. Laboratory Building -3 (Dept. of Animal Husbandry and Veterinary Medicine)

Rm. No.	Room Name	Area Calculation Basis	Units (8×8m)	Area (m^2)
E 001	Head of Dept. Office	as described	0.5	32
E 002	Dept. Admin. Office	as described	0.5	32
E 003	Computer Rm.	as described	0.5	32
E 012	Maintenance Unit	Maintein and repairing of scientific equipment Work table (2×2p=4p)	1.0	64
	1) Chair of Animal Pathology		(5.0)	(320)
E 004	Chairman's Office	as described	0.25	16
E 005	Instruments Washing Rm.	Washing instruments for obstetrics and artificial insemination	0.25	16
E 006	Obstetrics and Artificial Insemination Lab.	Student Practice lab. Work table (4×6p=24p)	1.0	64
E 007	Graduate's Rm.	as described	0.25	16
E 008	Lecturer's Office	as described	0.25	16
E 009	Diagnosis and Animal Clinic	Student practice lab. Lab. table (4×6p=24p)	1.0	64
E 010	Pharmacology Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
E 011	Animal Pathology Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
	2) Chair of General Zootechnology		(4.0)	(256)
E 101	Chairman's Office	as described	0.25	16
E 102	Instruments Stg.	Store instruments	0.25	16
E 103	Animal Nutrition Lab.	Student practice lab. Lab. table (4×6p=24p)and equipment space	1.5	96
E 104	Animal Feeds Lab.	Testing of nutriments of various animal feeds Lab. table (1×2p=2p)	0.5	32
E 105	Graduate's Rm.	as described	0.25	16
E 106	Lecturer's Office	as described	0.25	16
E 107	Genetics and Animal Breeding Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
	3) Chair of Special Zootechnology		(3.5)	(224)
E 108	Apiculture Lab.	Research lab. Lab. table (2×2p=4p)	0.5	32
E 109	Chairman's Office	as described	0.25	16

Rm. No.	Room Name	Area Calculation Basis	Units (8×8m)	Area (m^2)
E 110	Quality Analysis Lab.	Analyzing of animal products	0.25	16
E 111	Animal Products Q/C Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
E 112	Graduate's Rm.	as described	0.25	16
E 113	Lecturer's Office	as described	0.25	16
E 114	Special Zootechnology Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
	4) Chair of Anatomy and Physiology		(3.5)	(224)
E 201	Chairman's Office	as described	0.25	16
E 202	Instrument Washing Rm	Washing of instruments for anatomy	0.25	16
E 203	Anatomy Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
E 204	Graduate's Rm.	as described	0.25	16
E 205	Lecturer's Office	as described	0.25	16
E 206	Physiology Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
E 207	Histology Reh. Lab.	Research lab. Lab. table (2×2p=4p)	0.5	32
	5) Chair of Infectious and Parasitic Disease		(4.0)	(256)
E 208	Chairman's Office	as described	0.25	16
E 209	Feed Hygiene Analysis Lab.	Analyzing on Hygiene of various feed	0.25	16
E 210	Feed Hygiene Lab.	Research lab. Lab. table (2×2p=4p)	0.5	32
E 211	Microbiology and Immunology Lab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
E 212	Graduate's Rm.	as described	0.25	16
E 213	Lecturer's Office	as described	0.25	16
E 214	Infectious DiseaseLab.	Student practice lab. Lab. table (4×6p=24p)	1.0	64
E 215	Parasitic Disease Reh. Lab.	Research on Parasitic Disease Lab. table (2×2p=4p)	0.5	32
		Sub-Total	22.5	1,440
	Common Space		-	720
		Total - (E)		2,160
		Laboratory Bldg. Total (C)+(D)+(E)		6,480

5-3. Basic Plans

5-3-1. Site and Layout Plan

(1) Plans for the Use of the Site

This site is located along the left side of the road which directly approaches the front gate of the campus and will include an orchard, experimental farm, hog raising farm, fish farm and other facilities behind of this site. An area will also be allotted for the placement of an agricultural research and development center. Accordingly, if these facilities are completed and the three departments are transferred, virtually all of the facilities for agricultural education, research and extension will be located at a single area.

The size of the site is wide enough to set up an area (J-area) necessary for the construction activities for this facility. Furthermore, space will be secured for future construction to enable the transfer of two more departments. The site contains an old classroom building and a temporary hut for agricultural cultivation that will be torn down by the university. In addition, there is a eucalyptus orchard and pasture, but others are not expected to interfere with construction.

The site is almost completely flat and lies about 0.5m from the front of the road, making it necessary to elevate the land around the building. In terms of infrastructure conditions, there have been water supply pipes, electricity aerial lines, and telephone lines established. However, the current transformer capacity is insufficient, making it necessary to install an independent transformer and in-coming line. There are currently no exchange equipment for the telephones and only a few direct lines, creating a need for additional line connections. Construction with extending distance about 200m is possible for the university.

This site for construction therefore meets the necessary conditions for the planning of these facilities. The concentration of almost all agriculture facilities in a single area is also seen as making the current site a good choice.

(2) Plans for Arrangement of Facilities

A university campus should have facilities which are systematically laid out, a tranquil environment for motivating young students to study, and a unified spirit among everyone including the instructors. Universities provide the final place for students to spend their impressionable student years before going out into the real world, making it necessary to create a campus plan that will encourage communication between students.

The site for this project is located next to the central library, classroom building and auditorium which form the core facilities of the university, making it part of the university center. This gives these facilities symbolic meaning and the plans for the placement of these facilities will therefore put emphasis on mutual relations and order with the other facilities. A symbol tower will be built in the area surrounded by the above said buildings and site for this project. This tower will become the symbol of the entire university as a center plaza area. Furthermore, the road lined with flame trees which comes up from the main approach will also be made into a symbol for the entire campus. While becoming the main systematic link between facilities, it will also promote communication between instructors and students.

The facilities for the Faculty of Agricultural Sciences provided by these plans will be arranged according to three functions. The facilities to match these functions will include an administrative building, common lecture building and laboratory building. Consideration will be given to harmonization with the environment by actively using the natural environment around the site. These facilities will be connected by covered walkways, shaded by trees, and accented by the proximity to water, providing a space for the promotion of communication between instructors and students.

Plans for the outside of the facilities will take into account the drainage of water during rainy season. This will be achieved through measures to prevent the sinking of the foundation, provide rainwater drainage through open ditches and establish a pond for the adjustment of the level of water.

5-3-2. Architectural Designs

(1) Plan

The site for construction is hot and humid year round, making it necessary to give consideration to natural ventilation and damage caused by humidity. In order to avoid blowing rains and exposure to the sun, balconies with long overhangs will be planned.

1) Administrative Building

This building is for administration of the single faculty and will therefore be planned with the minimal necessities. The first floor will be reserved for quiet activities and include rooms for the dean, deputy deans (two people), secretary and conferences (30 people) while the ground floor will house the faculty administration office. The faculty library will be set up between the administrative building and the laboratory building, making it accessible to administrators, students and instructors.

2) Common Lecture Building

As noted in 5-2-2, this building is composed of eight small lecture rooms, four middle lecture rooms, one large lecture room and three seminar rooms. An open student hall will be set up on the ground floor for study breaks.

3) Laboratory Building -1

This building will house the head of department office, department administration office and computer room in a single location as well as provide for the four chairs of the department of Agronomy. The laboratories, research rooms, analysis rooms and other rooms will be arranged according to function for the department units.

4) Laboratory Building-2

This building will house two chairs of the department of Food Technology as well as room for a third one in the future. The Crop Science will be located on the second floor.

5) Laboratory Building-3

This building will house the five chairs of the department of Animal Husbandry and Veterinary Medicine. Units for the maintenance of equipment and the production of water for experiments by all of the faculties of the division will be located on the ground floor.

(2) Elevation and Section

- Elevation

These facilities will have an outside appearance which conforms to the existing large auditorium. In order to avoid exposure to the strong sun and rain, the overhangs will be extended. Furthermore, balconies will be set on the outside walls with no through hallways in order to block the low sunlight in the mornings and afternoon. The outside walls will be typical of the region, having a wash finish that shows little dirt.

- Section

As the ground soil is in poor condition, the laboratory buildings will be planned 3-stories high, reducing the numbers of concrete piles required. The common lecture building and administrative building face to front and will therefore be built only 2-stories high in order to avoid an intimidating appearance. The floor level will be established 0.5m above the level of the road in front of the building in order to prevent blowing flood from entering and to avoid exposing moisture from the ground. The level of the existing ground at the site is about 0.5m below this, resulting in a gap of about one meter in comparison to the level of the current site.

(3) Structural Design

1) Basic Policy for Structural Design

To pursue the structural design of the buildings theses items will be set up as follows.

a. The building should be extremely durable in view of its public character.
b. As the site is virtually never hit by earthquakes or typhoons, the horizontal force acting against the building will be very small. Consequently, the structural frame mainly supports such vertical loads as the dead load and live load.
c. As simple a structure as possible should be adopted in consideration of the local construction level.
d. The construction materials should be corresponded to the local supply capability and local quality and workability standards.
e. An economical building should be planned.

① Structural Form

Southern part of Viet Nam is located off the circum-pan-pacific earthquake belt and almost free from earthquakes. It is seldom struck by typhoons, has so far the maximum instantaneous wind velocity recorded has been 30.9 meters per second, and consequently the intensity of lateral forces action upon buildings is markedly low when compared with that in Japan. This gives a considerable freedom in the design of building frames and in the case of a building having four stories or more, the provision of a special frame capable of resisting horizontal forces is not required, and a frame consisting of columns and beams is sufficient to withstand vertical and horizontal forces.

Reinforced concrete frame, which is currently very popular and economical in Viet Nam, will be use for structure form.

Building Name	No. of Stories	Structural Form
Laboratory Bldg.	3 Stories above ground	RC rigid Rahmen frame
Common Lecture Bldg.	2 Stories above ground	RC rigid Rahmen frame
Administration Bldg.	2 Stories above ground	RC rigid Rahmen frame

② Ground Conditions at the Site, and Foundation Design Principle

On the project site, weak ground continues down to a level about 30 meters below ground level and no apparent bearing stratum is observed at levels lower than that. If the building is to be constructed on such ground, uneven settlement will occur. Therefore, it is necessary to provide the expansion joints between the buildings, and the building must be constructed consistently with the same type of foundations and piling method. With regard to its plan, a building nearly rectangular or square and free from many vertical projections its recommended and, with regard to elevation, a building consisting of a 2-stories part on one side and a 3-stories part on the other thus varying in height should be avoided as far as it is practicable. The use of finishing materials having least possible weight is also one of the conditions essential to the building.

Geological Conditions

Depth	Layer	N value
GL - 30m	Clay	<5
- 30m ~ 37m	Clay with sand	12~16
- 37m ~	Clay with sand	20~25

Taking into consideration the two facts that the horizontal force acting on the building is small and the ground is extremely weak, the arrangement of columns in a 4-meter grid is considered best with respect to frame strength and economy.

2) Structural Design Criteria

Viet Nam has no codes that govern structural calculations, and all calculating methods are left to qualified engineers. In the structural calculation of the Project, the following points should preferably be taken into consideration :

i) Values of external forces and assumed loads should be determined from local weather, geography, subsoil conditions and the use of the building.
ii) Allowable stress intensities of Japanese structural materials should be in conformity to the values set forth in the Architectural Institute of Japan codes and those of local structural materials should be determined with consideration given to variations in quality.
iii) Calculation of frame stresses and cross-sections should be made in accordance with the methods defined in the Architectural Institute of Japan codes.

3) Design Conditions on Loads and External Forces

Design conditions on loads and external forces are as summarized below for the buildings.

a. Dead Load
Structural materials, finishing and other things which is fixed to the buildings are properly estimated.
b. Live Load
In any case, the values defined in Japanese Standard should be employed for all live loads, except that values that meet the actual conditions of the rooms for special usages such as laboratory, workshop, etc, should be determined.

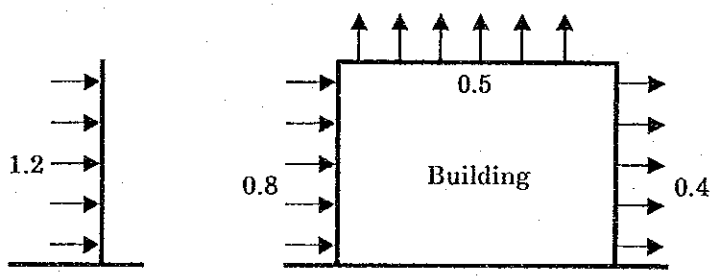
Room	kg/m2
Lecture Room	300
Laboratory, Library	400
Office, Meeting Rm.	300
Machine Room	500
Roof	50

The load of heavy equipment is considered separately.

c. Wind Pressure

According to the records of the Meteorological Observatory at Can Tho area, the maximum wind velocities of 60 knots (30.9m/s) were registered. And typhoon or tropical depression struck the Can-Tho area in 1948, 1950 and 1956. Taking into consideration of designing the building against the values recorded in the past, it is considered reasonable that allowance be made for the maximum wind velocity of 40m/s.

The wind pressure is calculated by multiplying the wind factor by the velocity pressure. The wind factor is taken from the Japanese Building Codes as mentioned below.



Building Height (h)	Minimum Wind Velocity Pressure (kg/m2)
16m or less	$q=60\sqrt{h}$
More than 16m	$q=120^{4}\sqrt{h}$
According to the above formula	
In case of 10m	190kg / cm2
In case of 20m	254kg / cm2

d. Seismic Force

Southern part of Viet Nam does not belong to the circom-pan-Pacific earthquake belt and no record has been taken on earthquake which affect to the building, so that it is not necessary to consider the earthquake as the structural design factor.

4) Structural Materials and Construction Methods

Selection of structural materials depends on the scale, construction and usage of the building, qualities of local materials, local supply capacity, construction methods, shipping terms of materials from Japan and prices. In general, however, procurement of local quality materials in large quantities is considered difficult.

For the building, the structural materials described in the following paragraphs are considered as local procurement.

i) Concrete

A batching plant should be provided on site by which weighing, proportioning and mixing of concrete materials are performed with the design compressive strength of concrete aimed at $F = 210 kg/cm^2$.

Since the site is located in the high-temperature zone, concrete should be of stiff consistency so as to prevent the cracking of concrete in its initial hardening period, the slump being restricted to 10 - 15cm. Addition of retarder to concrete is recommended.

Cement made in Viet Nam and Indonesia are procured in Vietnamese market.

ii) Reinforcing steel bars

Reinforing steel bars made in Viet Nam, Russia and Korea are procured in Vietnamese market, however, procurement of these steel bars in large quantities is considered difficult. It is considered appropriate that main reinforcement be of SD30 and secondary reinforcement SD30 or SR24.

iii) Piles

From the viewpoints of strength and economy, the piles should be of reinforced concrete made at site. Piles must be driven to a depth below ground level of about 36 meters. Assuming that three

sectional piles each 12 meters long and 40cm×40cm in section are used.

For structures of small scale and minor structures, local melaleca piles (wooden poles) of 8cm in diameter and 8-10 meters in length will be sufficient.

(4) Building Utilities Planning

1) Air-Conditioning and Ventilation Planning

The basic policy for the air-conditioning and ventilation planning is the selection of a system with a low maintenance cost which is very easy to operate and which provides useful support for the maximum utilization of the building functions.

① Indoor and Outdoor Design Conditions

- Indoor Design Conditions

  The standard DB and RH will be 25°C ±2°C and 55% ±10% respectively except for those rooms requiring special conditions (while a DB of 26°C is adopted as the air-conditioning design condition in Japan, 25°C is adopted here in view of Vietnamese outdoor conditions).

- Outdoor Design Conditions

  The lowest realistic levels of DB and RH at 36.1°C and 65% respectively will be adopted to avoid an excessive provision of equipment.

② Air-Conditioning System

A separate air-conditioning system as low operation cost system is planned for each room using air-cooling separate type air-conditioners.

The air-conditioning system will be installed in the computer rooms and a part of laboratories.

③ Ventilation System

In principle, natural ventilation will be used. Mechanical ventilation will be introduced in those places where it is deemed necessary in view of the room function. The exhaust from draft chambers (Fume Hood) will be exhausted to the roof by exhaust fan at the roof.

Ceiling fan will be introduced in whole rooms for driving natural ventilation.

2) Plumbing Work Planning

① Water Supply

- Water Source

Water will be supplied to the building from city water pipe and deep well which will be constructed by the University. The well water will be used when the city water supply is shortage. The result of the water test shows the quality to be reasonably good vis-a-vis WHO and Japanese water quality standards and, therefore, the water can be used for the building with the provision of a sterilizing unit.

- Water Supply System

A water reserved tank (40 ton) will be installed under the building and water will be pumped from this water reserved tank to an elevated water tank (8 ton), and water will be supplied to each part of building using the gravity method.

Jointless polyethylene tubes will be used for outdoor piping in view of land subsidence and corrosion while galvanized steel pipes will be used for indoor pumping pipes. Vinyl pipes will be used for other indoor piping.

② Drainage and Vent System

- Drainage System

Three drainage systems are planned for rainwater, sewage and waste water and laboratory waste water.

- Rain water :

  Natural drainage to the ditch at the site. (Some rain water will be discharged to the ditch through the artificial pond.)

- Sewage and Wastewater :

  Separate drainage pipes indoors and a combined drainage pipe outdoors. Drainage to the ditch after treatment at the septic tank.

- Laboratory waste water :

  Heavy metals contained in laboratory waste water to be treated at the place of generation. Acids and alkalis to be treated at the neutralization tank. Drainage to the ditch.

● Vent System

In principle, a circuitous vent system will be employed.

● Waste Water Treatment Systems

- Septic tank :

  Treatment of sewage will be introduced the putrefaction tank method. Maintenance of the putrefaction tank method is easier than the long aeration method which be used in Japan.

- Neutralization Tank :

  Only for pH control by neutralizing acids and alkalis. No aeration, coagulation, or settling processes are involved.

③ Sanitary Fixtures

Such items as water closets, urinals, lavatories, slop sinks, etc., will be provided in the lavatories, laboratories and other places depending on the requirements.

④ Gas Supply

Butane gas cylinders will be provided to the laboratories. At the operation of laboratories, the butane gas cylinders will be carried in laboratories and used as heat energy.

⑤ Special Gas Supply

Oxygen, hydrogen, nitrogen, helium, acetylene, compressed air, etc., will be used at the laboratories. In principle, each type of gas

cylinders will be carried in laboratories and connected with equipment directrly. Each type of gas and gas cylinders should be prepared by the University.

⑥ Emergency Showers

Emergency showers will be provided where necessary in view of possible laboratory accidents so that chemicals and toxic substances can be immediately washed off.

3) Electrical Planning

In general, the electrical planning will be designed in accordance with Japanese electrical standard with taking into consideration of situation of Viet Nam. Good quality electrical equipment in local market will be planned as building equipment for easy maintenance, and the other electrical equipment will be selected from JIS product.

① Power Supply System

a) Power Receiving and Transforming Equipment

The power supply to the building will be made from the existing over head line via incoming pole located at central road of the campus of the University.

The AVR will be installed to prevent damage to electrical equipment caused by voltage fluctuations, and lightning rod will be installed to prevent damage caused by frequent blackouts due to lightning.

Power Receiving Voltage : 3-phase, 3-wire 15KV
Transformer Capacity : 500KVA×1 No.

b) Generator

A generator will be installed to provide an emergency power supply source for security lighting. The rough specifications of the generator are as follows.

Capacity : 3-phase, 4-wire, 150KVA
System : Diesel engine generator

c) Main Feeder and Power Lines

Power will be supplied to each panel boards from the Electrical Room through cable line.

Voltage : 3-phase, 4-wire, 380/220V

d) Lighting Wiring

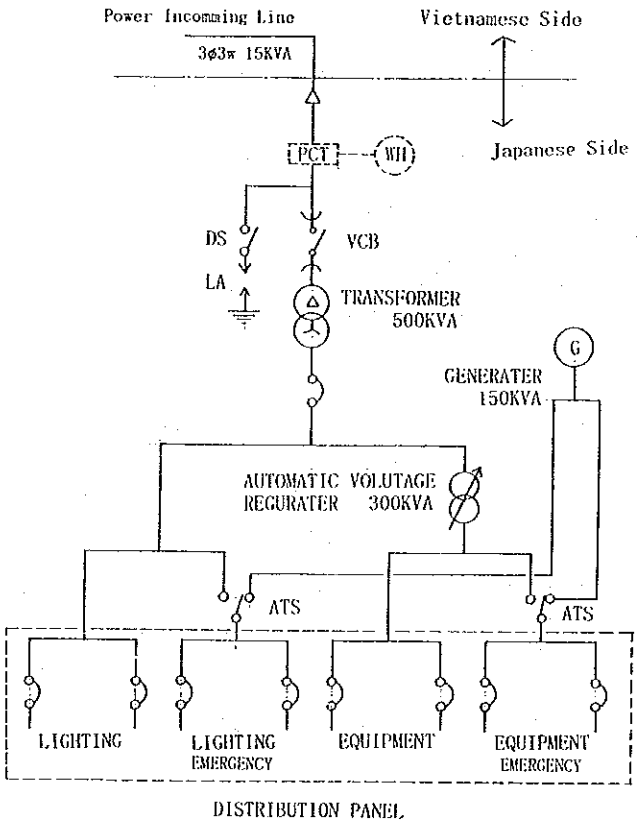
Central control switch panel for lighting fixture will be installed at office of Administration Bldg. for save energy. In general, receptacles will be followed local standard specification, and 100V circuits will be prepared for equipment at some of laboratories which be required 100V circuits.

e) Lighting Fixture

The Luminous intensities for the main rooms are as follows :

Laboratory, lecture room and office :	fluorescent lamp	40W×2	300lx
Large lecture room :	fluorescent lamp	40W×2	300lx
	and incandescent lamp	60W	
Computer room :	fluorescent lamp	40W×3	500lx

Elec. Power Supply System



② Telecommunication System

a) Telephone System

An overhead cable will be extended to the building from the existing telephone lines in the campus via incoming pole and telephone exchanger for the campus will be installed in the building.

b) Public Address System

A main amplifier for paging will be installed at the office in the administration bldg.

③ Information System

a) Television Reception System

A antenna for common use will be installed and piping and wiring conducted up to the terminal outlets.

b) Audio Visual System

Audio visual system will be installed at the following rooms.

Audio visual system: Large lecture room

④ Disaster Protection System

a) Fire Alarm System

A push-button type fire alarm system with alarm bells will be introduced throughout the building and a alarm panel will be installed at office in administration bldg..

b) Lightning Rod

Lightning rods (protection angle 60°) will be installed in each building.

Room size and Utilities

I. Common Facility

1. Administration Building

Rm. No.	Room Name	Units (8×8m)	Area (m^2)	AC	CF	VT	FH / CB
A 001	Faculty Admin. Office	2.0	128		CF		
A 004	Faculty Library	6.0	384		CF		
A 005	Library Admin. Office	0.5	32		CF		
A 006	Material Print Rm.	0.5	32		CF		
A 101	Board Rm.	1.5	96		CF		
A 102	Reception Rm.	0.25	16	AC			
A 103	Reception & Waiting	0.375	24		CF		
A 104	Secretary Rm.	0.375	24		CF		
A 107	Dean's Office	0.5	32	AC			
A 108	Dupty Dean's Office	0.5	32	AC			

AC : Air Conditioning CF : Ceiling Fan VT : Ventilation FH/CB : Fume Hood / Clean Bench
AAS: Atomic Absorption Spectrophotometer

2. Common Lecture Building

Rm. No.	Room Name	Units (8×8m)	Area (m^2)	AC	CF	VT	FH / CB
B 001	Student Hall	1.75	112				
B 002	Pump Rm.	0.25	16			VT	
B 004	Elec. Panel Rm.	1.0	64			VT	
B 005	Generator Rm.	0.25	16			VT	
B 007	L. Lecture Rm.	2.5	160		CF		
B 008 ~ 012	S. Lecture Rm.1~4	3.0	192		CF		
B 014 ~ 015	M. Lecture Rm.1~2	3.0	192		CF		
B 101 ~ 103	Seminar Rm.1~3	1.5	96		CF		
B 108 ~ 111	S. Lecture Rm.5~8	3.0	192		CF		
B 113 ~ 114	M. Lecture Rm.3~4	3.0	192		CF		

AC : Air Conditioning CF : Ceiling Fan VT : Ventilation FH/CB : Fume Hood / Clean Bench
AAS: Atomic Absorption Spectrophotometer

II. Laboratories

1. Laboratory Building -1 (Dept. of Agronomy)

Rm. No.	Room Name	Units (8×8m)	Area (m^2)	AC	CF	VT	FH / CB
C 001	Head of Dept. Office	0.5	32		CF		
C 002	Dept. Admin. Office	0.5	32		CF		
C 003	Computer Rm.	0.5	32	AC			
	1) Chair of Soil Science	(6.0)	(384)				
C 004	Soil and Plant Specimens Rm.	0.5	32		CF		
C 005	Soil Survey and Mapping Rm.	1.0	64		CF		
C 006	Graduate's Rm.	0.25	16		CF		
C 007	Lecturer's Rm.	0.25	16		CF		
C 008	Graduate's Rm.	0.25	16		CF		
C 009	Lecturer's Rm.	0.25	16		CF		
C 010	Soil and Plant Analysis Lab.	2.0	128		CF		FH (2) AAS (2)
C 011	Soil Science Lab.	1.0	64	AC			
C 012	Chairman's Office	0.25	16		CF		
C 013	Reagent Stg.	0.25	16			VT	
	2) Chair of Plant Protection	(5.75)	(368)				
C 105	Equipment Stg.	0.25	16		CF		
C 106	Graduate's Rm.	0.25	16		CF		
C 107	Lecturer's Office	0.25	16		CF		
C 108	Plant Pathology and Nematology Reh. Lab.	0.5	32		CF		
C 109	Microorgarism Inoculation Lab.	0.25	16	AC			CB
C 110	Specimens Processing and Washing Rm.	0.25	16		CF		
C 111	Plant Pathology and Nematology Lab.	1.0	64		CF		

Rm. No.	Room Name	Units (8×8m)	Area (m^2)	AC	CF	VT	FH / CB
C 112	Microscopes Store Rm.	0.25	16	AC			
C 113	Pesticide Store Rm.	0.25	16			VT	
C 114	Entomology and Pesticide Lab.	1.0	64		CF		FH
C 115	Entomology and Pesticide Reh. Lab.	0.5	32		CF		
C 116	Chairman's Office	0.25	16		CF		
C 117	Entomology Specimens Rm.	0.25	16	AC			
C 118	Graduate's Rm.	0.25	16		CF		
C 119	Lecturer's Office	0.25	16		CF		
	3) Chair of Plant Physiology	(4.0)	(256)				
C 101	Horticulture Lab.	0.5	32		CF		
C 102	Graduate's Rm.	0.5	32		CF		
C 103	Staff Rm.	0.5	32		CF		
C 104	Chairman's Office	0.25	16		CF		
C 201	Tissue Culture Reh. Lab.	1.0	64	AC			CB
C 202	Plant Physiology Lab.	1.0	64		CF		
C 204	Precision Instruments Rm.	0.25	16		CF		
	4) Chair of Genetics and Breeding	(5.25)	(336)				
C 203	Chairman's Office	0.25	16		CF		
C 205	Graduate's Rm.	0.25	16		CF		
C 206	Lecturer's Office	0.25	16		CF		
C 207	Graduate's Rm.	0.25	16		CF		
C 208	Lecturer's Office	0.25	16		CF		
C 209	Plant Breeding Reh. Lab.	1.0	64		CF		

Rm. No.	Room Name	Units (8×8m)	Area (m^2)	AC	CF	VT	FH / CB
C 210	Electrophoresis Lab.	0.5	32	AC			
C 211	Plant Genetics Lab.	1.5	96		CF		
C 212	Specimens Store Rm.	0.25	16	AC			
C 213	Genetics for Cells Reh. Lab.	0.25	16	AC			
C 214	Seed Storage Rm.	0.5	32		CF		

AC : Air Conditioning CF : Ceiling Fan VT : Ventilation FH/CB : Fume Hood / Clean Bench
AAS: Atomic Absorption Spectrophotometer

2. Laboratory Building -2 (Dept. of Food Science and Technology, Dept. of Agronomy)

Rm. No.	Room Name	Units (8×8m)	Area (m^2)	AC	CF	VT	FH / CB
D 001	Head of Dept. Office	0.5	32		CF		
D 002	Dept. Admin. Office	0.5	32		CF		
D 003	Computer Rm.	0.5	32	AC			
	1) Chair of Food Science	(13.5)	(864)				
D 004	Graduate's Rm.	0.25	16		CF		
D 005	Lecturer's Office	0.25	16		CF		
D 006	Food Preservation and Storage Lab.	1.5	96		CF		
D 007	Chairman's Office	0.25	16		CF		
D 008	Material Stg.	0.25	16			VT	
D 009	Pilot Plant-1	1.5	96		CF		
D 010	Pilot Plant-2	2.0	128		CF		
D 101	Chairman's Office	0.25	16		CF		
D 102	*Inoculation and* Culture Lab.	0.25	16	AC			CB (Safety type)
D 103	Food Fermentation Lab.	1.5	96		CF		
D 104	Graduate's Rm.	0.25	16		CF		
D 105	Lecturer's Office	0.25	16		CF		
D 106	Food Chemistry Lab.	1.5	96		CF		FH
D 107	Measuring Instrument Rm.	1.0	64	AC			
D 108	Food Analysis Lab.	0.5	32		CF		FH
D 109	Chairman's Office	0.25	16		CF		
D 110	Material Stg.	0.25	16			VT	
D 111	Food Processing Lab.	1.5	96		CF		
	2) Chair of Food Engineering	(3.25)	(208)				

Rm. No.	Room Name	Units (8×8m)	Area (m^2)	AC	CF	VT	FH / CB
D 201	Food Engineering Lab.	1.5	96		CF		
D 202	Graduate's Rm.	0.25	16		CF		
D 203	Lecturer's Office	0.25	16		CF		
D 204	Engineering Drawing Rm.	1.0	64		CF		
D 206	Drawing Equipment Stg.	0.25	16			VT	
	3) Dept. of Crop. Science	(4.25)	(272)				
D 205	Chairman's Office	0.25	16		CF		
D 207	Graduate's Rm.	0.25	16		CF		
D 208	Lecturer's Office	0.25	16		CF		
D 209	Instruments Storage	0.5	32		CF		
D 210	Specimens Analysis Lab.	0.5	32		CF		
D 211	Specimens Store Rm.	0.5	32	AC			
D 212	Crop Science Lab.	1.0	64		CF		
D 213	Graduate's Rm.	0.25	16		CF		
D 214	Lecturer's Office	0.25	16		CF		
D 215	Crop Science Reh. Lab.	0.5	32		CF		

AC : Air Conditioning CF : Ceiling Fan VT : Ventilation FH/CB : Fume Hood / Clean Bench
AAS: Atomic Absorption Spectrophotometer

3. Laboratory Building -3 (Dept. of Animal Husbandry and Veterinary Medicine)

Rm. No.	Room Name	Units (8×8m)	Area (m^2)	AC	CF	VT	FH / CB
E 001	Head of Dept. Office	0.5	32		CF		
E 002	Dept. Admin. Office	0.5	32		CF		
E 003	Computer Rm.	0.5	32	AC			
E 012	Maintenance Unit	1.0	64		CF		
	1) Chair of Animal Pathology	(5.0)	(320)				
E 004	Chairman's Office	0.25	16		CF		
E 005	Instruments Washing Rm.	0.25	16		CF		
E 006	Obstetrics and Artificial Insemination Lab.	1.0	16		CF		
E 007	Graduate's Rm.	0.25	16		CF		
E 008	Lecturer's Office	0.25	16		CF		
E 009	Diagnosis and Animal Clinic	1.0	64		CF		
E 010	Pharmacology Lab.	1.0	64		CF		FH
E 011	Animal Pathology Lab.	1.0	64		CF		
	2) Chair of General Zootechnology	(4.0)	(256)				
E 101	Chairman's Office	0.25	16		CF		
E 102	Instruments Stg.	0.25	16			VT	
E 103	Animal Nutrition Lab.	1.5	96		CF		
E 104	Animal Feeds Lab.	0.5	32		CF		FH
E 105	Graduate's Rm.	0.25	16		CF		
E 106	Lecturer's Office	0.25	16		CF		
E 107	Genetics and Animal Breeding Lab.	1.0	64		CF		
	3) Chair of Special Zootechnology	(3.5)	(224)				
E 108	Apiculture Lab.	0.5	32		CF		

Rm. No.	Room Name	Units (8×8m)	Area (m^2)	AC	CF	VT	FH / CB
E 109	Chairman's Office	0.25	16		CF		
E 110	Quality Analysis Lab.	0.25	16		CF		FH
E 111	Animal Products Q/C Lab.	1.0	64		CF		
E 112	Graduate's Rm.	0.25	16		CF		
E 113	Lecturer's Office	0.25	16		CF		
E 114	Special Zootechnology Lab.	1.0	64		CF		
	4) Chair of Anatomy and Physiology	(3.5)	(224)				
E 201	Chairman's Office	0.25	16		CF		
E 202	Instrument Washing Rm	0.25	16		CF		
E 203	Anatomy Lab.	1.0	64		CF		
E 204	Graduate's Rm.	0.25	16		CF		
E 205	Lecturer's Office	0.25	16		CF		
E 206	Physiology Lab.	1.0	64		CF		
E 207	Histology Reh. Lab.	0.5	32	AC			
	5) Chair of Infectious and Parasitic Disease	(2.5)	(224)				
E 208	Chairman's Office	0.25	16		CF		
E 209	Feed Hygiene Analysis Lab.	0.25	16	AC			CB
E 210	Feed Hygiene Lab.	0.5	32		CF		
E 211	Microbiology and Immunology Lab.	1.0	64	AC			CB
E 212	Graduate's Rm.	0.25	16		CF		
E 213	Lecturer's Office	0.25	16		CF		
E 214	Infectious DiseaseLab.	1.0	64		CF		
E 215	Parasitic Disease Reh. Lab.	0.5	32		CF		

AC : Air Conditioning CF : Ceiling Fan VT : Ventilation FH/CB : Fume Hood / Clean Bench
AAS: Atomic Absorption Spectrophotometer

(5) Construction Materials Planning

Particular attention should be paid in the selection of construction materials to their suitability vis-a-vis the local climate, and the use of locally familiar materials and construction methods should be promoted where possible. The following materials are planned for each part of the building taking economy, durability, and ease of maintenance into consideration.

1) Exterior Finishing Materials

Washed terrazzo which are matched with local climate and which are appeared calm atmosphere as educational building exterior finish.

The sloped roof covered by local made roof tiles will be planned for roof finishing in consideration of heat insulation and appearance of buildings.

Aluminum window frames producted in Japan will be used in view of easy maintenance and high air tight capacity.

2) Interior Finishing Materials

The rooms have been classified based on their individual requirements for the selection of the most suitable interior finishing materials. Finishing materials for major rooms are as follows :

Room Name	Floor	Wall	Ceiling	Reason of Selection
Lecture Room	Cement tile	Paint finish on mortar	Acoustic board	Durability, easy maintenance
Laboratory	Polished terrazzo	Paint finish on mortar	Acoustic board	Durability, cleanliness, easy maintenance
Computer Room	Vinyl tile	Paint finish on mortar	Acoustic board	Special use, easy maintenance
Head of Dept. Office Meeting Room	Tile carpet	Wooden panel and vinyl wall covering	Rockwool acoustic board	Executive officer, reception, easy maintenance
Entrance Hall	Local made stone	Washed terrazzo	Wooden panel ceiling	Good atmosphere, easy maintenance
Lavatory	Ceramic mosaic tile	Ceramic tile	Paint finish on Plywood	Easy maintenance
Corridor	Cement tiles, Mortar base board	Washed terrazzo	Paint finish on mortar	Weatherability, easy maintenance
Stair	Washed terrazzo	Paint finish on mortar	Paint finish on mortar	Weatherability, easy maintenance

5-3-3 Equipment Plan

(1) Basic Policy

The following will be noted in the planning of the equipment required for the educational activities which are suggested by the Activities Plan described in Chapter 4-3-2.

1) The equipment to be provided should correspond to the level and contents of the intended educational activities of the departments/chairs.

2) The existing equipment and the conditions of their usage and maintenance should be thoroughly examined for the effective continued use of the equipment. The existing equipment and the new equipment should be coordinated taking the contents of all activities into consideration.

3) The new equipment should serve the each department's activities for a long time. The spare parts supply and equipment maintenance situation in Vietnam should be taken into consideration in the selection of equipment so that the current maintenance system is not seriously affected.

(2) Equipment List

The types of equipment required for the university's educational activities are as follows (refer to Equipment List):

1) Equipment for Common use
2) Equipment for the Department of Agronomy
3) Equipment for the Department of Animal Husbandry and Veterinary Medicine
4) Equipment for the Department of Food Science and Technology

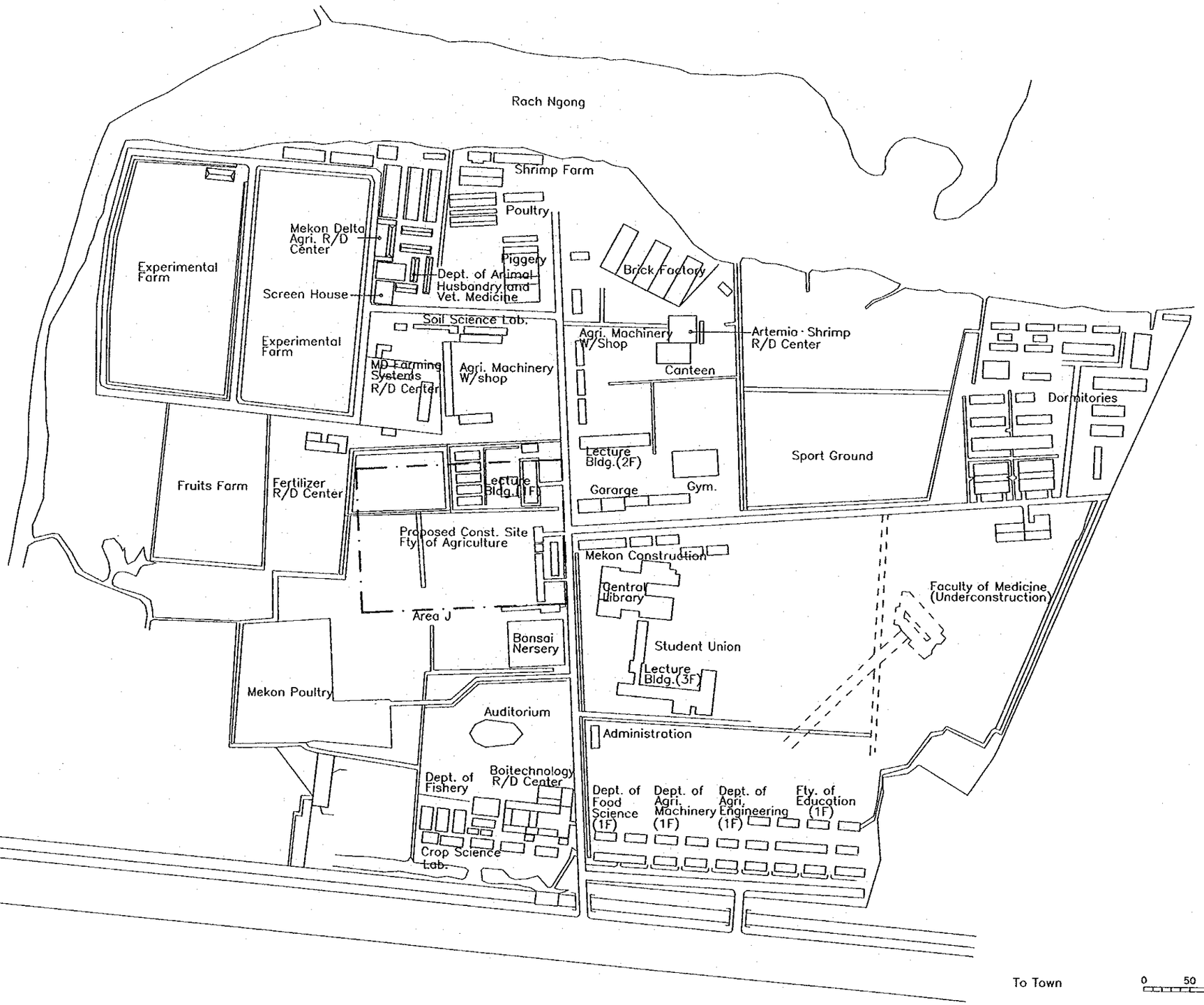
5-3-4. Basic Design Drawings

(1) Drawing List

01 Existing Plan of Campus II
02 Site Plan
03 Ground Floor Plan
04 1st Floor Plan
05 2nd Floor Plan
06 Elevations
07 Sections
08 A - Ground Floor Plan Detail
09 A - First Floor Plan Detail
10 B - Ground Floor Plan Detail
11 B - First Floor Plan Detail
12 C - Ground Floor Plan Detail
13 C - First Floor Plan Detail
14 C - Second Floor Plan Detail
15 D - Ground Floor Plan Detail
16 D - First Floor Plan Detail
17 D - Second Floor Plan Detail
18 E - Ground Floor Plan Detail
19 E - First Floor Plan Detail
20 E - Second Floor Plan Detail
21 Elec. Water and Drainage Route Diagram

(2) Floor Area Tabulation

Buildings	Phase-1		Phase-2		S-Total
	Rooms	Common space	Rooms	Common space	
Administration	944m^2	282m^2	-	-	1,226m^2
Common Lecture	1,470m^2	709m^2	-	-	2,179m^2
Laboratory-1	-	-	1,728m^2	432m^2	2,160m^2
Laboratory-2	-	-	1,728m^2	432m^2	2,160m^2
Laboratory-3	-	-	1,728m^2	432m^2	2,160m^2
S-Total	3,405m^2		6,480m^2		9,885m^2
Walkway, etc.	56m^2		400m^2		456m^2
G-Total	3,461m^2		6,880m^2		10,341m^2



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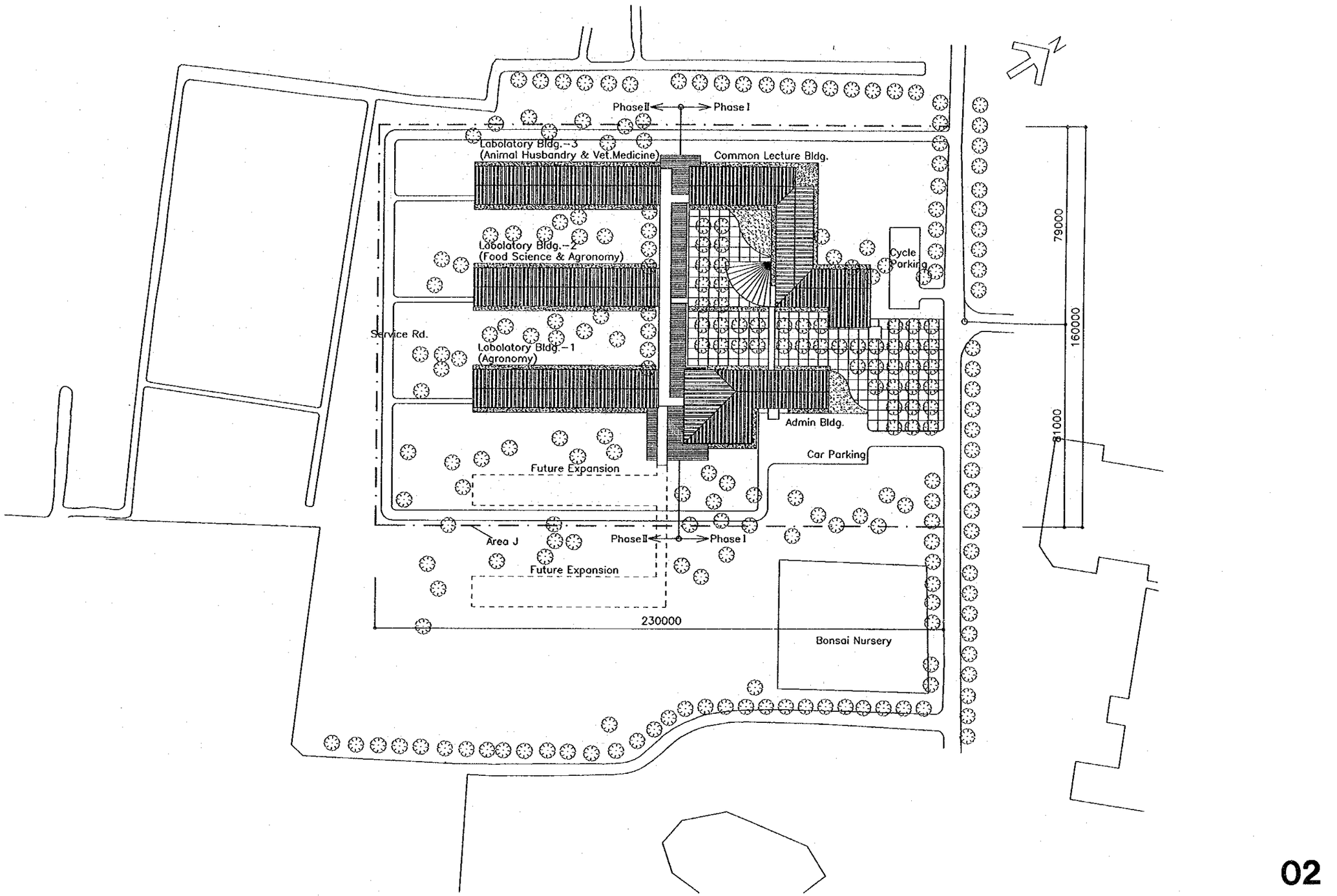
EXISTING PLAN OF CAMPUS II 1:4500



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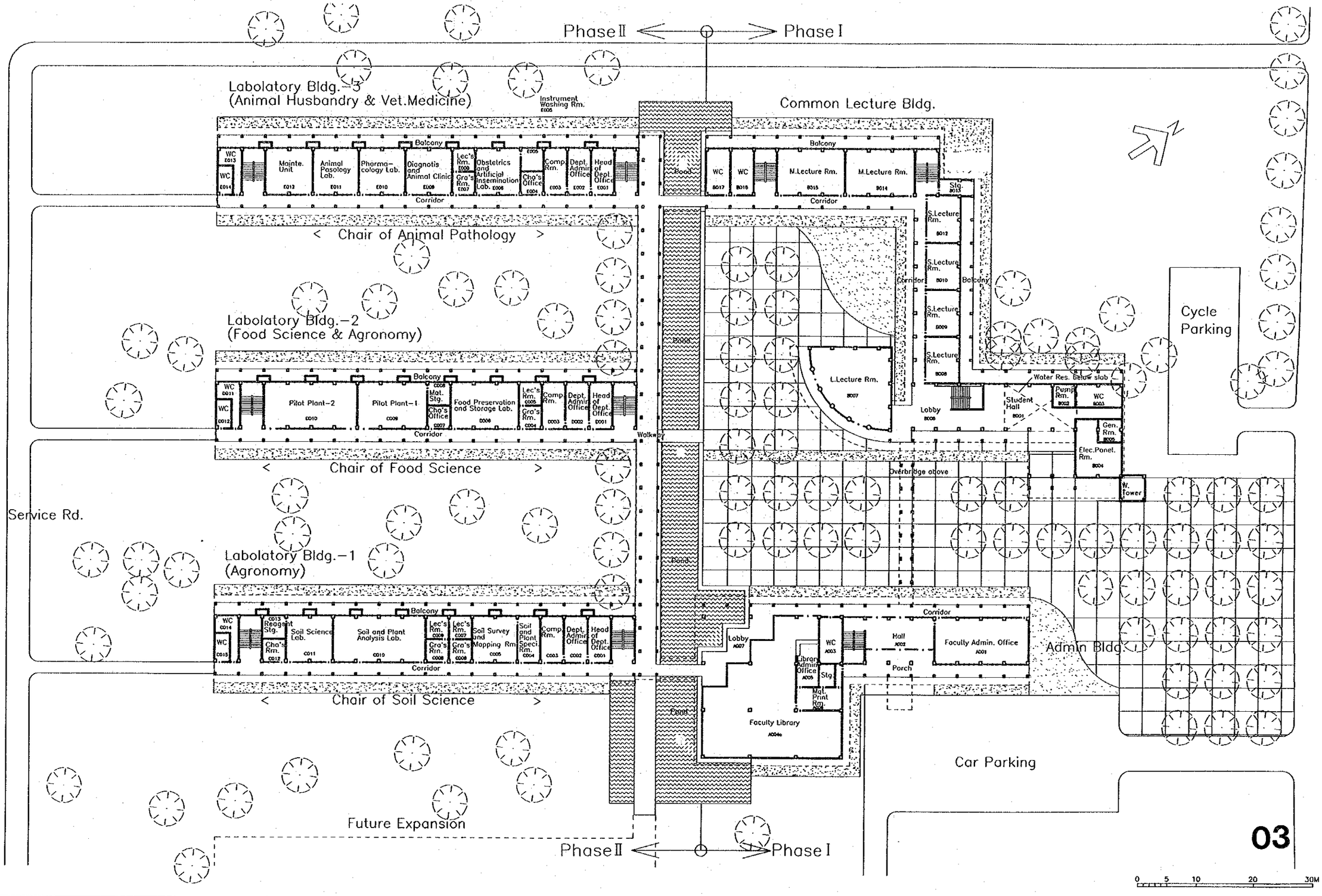
SITE PLAN 1:1500



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GROUND FLOOR PLAN 1:600