Currency Budgets by AC
Foreign aid or loan funds

In the 4th Four Year Plan, currency budget allocations for the CADTC Project is already arranged as follows.

Personnel Payment	2,084,000 Kyats
Fuel & Light Expenses	120,000 Kyats
Teaching Materials & Equipment	1,400,000 Kyats

Based on the survey and collected data, the rough estimation of the operation and maintenance costs for the first year is tentatively calculated as follows.

Personnel Expenditures	515,220 Kyats
Maintenance Expenses for facilities	260,000 Kyats
Equipment, consumables and supplies	300,000 Kyats
Operating Expenses for mechanical & Lighting facilities (60% of max. operation)	250,600 Kyats
Maintenance Expenses for vehicles	43,200 Kyats
Miscellaneous Expenditures	180,000 Kyats
Total	1,549,000 Kyats

The operation costs necessary for the operation of equipment of the CADTC are shown below. The calculation is conducted on the assumption of 100% operation of all the equipment at the same time. Nevertheless, it will be of very rare occurrence that all the facilities including training rooms and training hall are operating every day throughout the month. Considering preparation terms of the rooms and equipment, the running costs of the equipment may be less than the 100% calculation.
The aforesaid calculation is estimated by the rate of average monthly usage as 60% of maximum operation.

Calculation of Electrical Charges

(1) Conditions of Calculation

a. One month usage of electricity by maximum loading

b. Operating hours of equipment: 8 hours a day and 25days per month

(2) Rough loading capacity

	Power:KW	Lighting:KW
a. Main Bldg.	26	105
b. Training Hall	-	10
c. Workshop	10	6
d. Storage	-	1
e. Utilities Bldg.	12	1
f. Corridor	-	1
Japanese Portion: Total		172 KW
g. Canteen	-	14
h. Guest house	-	8
i. Staff house (1)	-	6
j. Staff house (2)	-	60
k. Dormitory	-	80
l. Gymnasium	-	25
Burma Portion: Total		193 KW

(3) Usage of Total Electric Power

Total Capacity = 172 KW + 193 KW = 365 KW

365 KW x 8 hrs. x 25 days = 79,000 KWH per month

(4) Electrical Charges

Electrical charges per month = 500 KWH x 54 pyass + 78,500 KWH x 44 pyass

= 27,000 pyass + 3,454,000 pyass

= 3,481,000 pyass

= 34,810 Kyats

CHAPTER 8. EVALUATION OF THE PROJECT

The social and economic evaluation of the implementation for the establishment project of the Central Agriculture Development Centre in the Socialist Republic of the Union of Burma are as follows:

1) Socio-Economic Evaluation

It is pointed out that in the case of agricultural production required storongly to be suited for natural conditions and improvement in the institutional and organizational systems of conventional and customary practice has the same meaning as increased investment of the capital, in that it will contribute closely toward developing of productivity and technical levels.
It is said to be effective to plan the project of a software system making effective use of physical conditions which will serve to contribute toward improvement of the technical level and productivity.

From this point of view, the CADTC project can be evaluated conclusively as the effective project well balanced as to be able to contribute toward increasing agricultural production in Burma, in that Project is planned to display its systematic function of overall control with the target to level up the conventional spreading system of agriculture, to propagate agricultural technology through such improved agricultural technology through such improved spreading system for agricultural population over a wide area and to provide the publication services concerning new technology and related informations of whole agriculture.

The success of the Government of Burma in the project of the Whole Township Paddy Production Development Programme (WTPPDP) whose main factures are including the more intensive use of exotic and locally bread HYVS, the introduction of improved cultivation practices (by intensive guidance of extension managers), and the application of recommended rates of fertifizer and agro-medicine.
WTPPDP shows that the intensive care to farmers for the improved cultivation practices by extension managers will closely contribute

toward the develpping of productivity to the wider area where the improved cultivation practices are not infiltrated.
From this point of view the CADTC project can be evaluated to contribute toward improvement of productivity.

Since the proposed construction site of the CADTC is situated in the Burma's typical rain-fed paddy field area achieving annual yield above the nationwide average, forming a part of paddy fields in Hlegu Township, the educational effect to be exerted upon local peasants around the demonstration farm of the CADTC and agricultural population in whole Burma will be evaluated to be of tremendous value. Besides that, in view of the fact that surrounding area of the Project site is planned to be future educational area in Rangoon city, the construction project can be evaluated as being very contributory to development of urban planning as well.

As stated above, both technical and grant aid cooperations by the Government of Japan for the establishment of the CADTC to provide sufficient services for farmers of wide dispertion can be assessed as the project with potential advantage of large contribution in the direct phase of technological transfer and propagation and in the indirect phase of improved agricultural productivity, in that the level of Knowledge and technical skills of the agricultural population would encourage their positive attitude toward full comprehension of new agricultural technology.

2) Contribution to Extension Power

The present problems involved in the existing extension system of agriculture throughout the country of Burma may be attributed to absence of technical staff in the field assignment, multiplexed structure of the extension system, low technical level of extension staff and feeble leadership of extension staff.

The training programme for those extension staff is provided for annual total of about 5,889 trainees at different levels of state, division and township by on-the-job training and in-service training, making use of educational facilities such as Agricultural Research

Institute in Yezin and Agricultural Research Division in Gyogon, and experimental facilities including Central Farm and Production Camp.

By the establishment of the CADTC, the pyramid training system constituting of Central Training, Regional Training and Local Training will be formed up so as to ensure, high quality and high density of training. And also, the annual total of trainees will be increased by 835 for all the medium class of extension staff at states, divisions and township levels, furthermore regional training and local training will be leveled up by extension personnels and subject matter specialists as a lecturer trained in the CADTC.

In addition to the above, the CADTC will be able to provide Pre-service training for 500 new recruits per each year at graduates levels of University, Agricultural Institutes and Agricultural High Schools.
The target of agricultural development policy in Burma aims at easing the present over-load of 3,256 acres assigned to each extension managers (1980/1981) to 1,000 acres per each managers. Establishment of the CADTC has its significant meaning with its greater contributions for the agricultural development.

2) Financial Evaluation

The financial evaluations for the establishment project of the CADTC are as follows.

Capital Costs

The scope of work to be carried out by the GSRUB is as outlined in the Demarcation of Construction of 6-3 of Chapter 6, and the estimated construction cost evaluated by the Team is at 14,459,000 Kyats. The capital budgets for the CADTC project in the FFYP is amounting to 13,700,000 Kyats.
Therefore, should the scope of estimated construction satisfy the function of the CADTC, the capital budgets would be enough to cover the construction costs for the Burmese contribution.

Operational Costs

As for the facility planning of the CADTC, full consideration to the natural climatic conditions is taken into architectural and mechanical planning to save energy and reduce expense of utilities by the adequate operation and maintenance. The annual operation and maintenance costs for the CADTC is estimated at 1,550,000 Kyats. The breakdown costs are as specified in 7-3 Operation & Maintenance Costs; 515,220 Kyats for personnel expenditures, 256,200 Kyats for fairlity maintenance expenses, 223,200 Kyats for maintenance expenses for vehicles and miscellaneous.

Out of such costs, the costs of spare parts and consumables will be expected to be followed up by Japanese Technical Cooperation.

In reality, however, it is estimated that the annual total sum of 926,000 Kyats for operation and maintenance of the CADTC would run short after opening of the CADTC. Annual currency budget within AC amounts to some 1,668,000,000 Kyats (1982/1983). Therefore, it is strongly desired that first priority should be given to the CADTC's budgetary deficit to cover the stortage.

3) Operational and Institutional Evaluation

The operation and maintenance organization for the CADTC constitutes five (5) sectors of office administration, training, audio-video, publicity and farm control under the leadership of Project Manager. This organizational system would not affect the purpose and function of the CADTC in the least. Since the CADTC will be responsible for drafting, on behalf of AC, the overall training programme to be implemented by the Corporation, having an advisory board of the Training Implementation Committee which is organized by each division managers of AC.

This is indeed worthy of evaluation and appraisal in respect of the training for extension of agricultural technology with strong linkage to other divisions.

The recruit plan of training staff to be engaged in the CADTC is as shown in Annexed Data.

It is planned that most of the staff will be transferred from the present personnel employed by AC and employment of all the staff will terminate in two years. As for the required qualification for staff, the supervisory or senior staff should be the graduate, with wealth of job experience, from Agricultural Institute or Institutes of Agriculture and the technical staff should be the graduate from Agricultural High School or Institutes of Agriculture, having field experiences.

Especially, the training staff will be the lecturer with educational background as the graduate from Agriculture Institute and job experiences over 10 years. According to the staffing policy of the GSRUB, the staff qualified to be a lecturer will have to receive any foreign training course abroad or lecturer's training course before he will be assigned to the training service. Japan is expected to dispatch experts to Burma in this field.

Total number of staff to be assigned to the CADTC will be 101 persons, for which annual payroll cost is estimated at 515,220 Kyats. It is hoped that this cost will be incorporated into the running budget so as to secure necessary number of staff.

The Centre needs earliest implementation of Japan's project-type technical cooperation. In the future by the time of scheduled opening the plan to accept into Japan administrative and training staff from Burma or to dispatch from Japan training experts to Burma to provide guidance on the lecturers' course will certainly contribute much toward the management of the CADTC.

CHAPTER 9. CONCLUSION AND RECOMMENDATIONS

The Project is concluded with sufficient effect by the previous social, institutional, operational and financial evaluations of the Project requested by the Government of Burma. The grant aid and technical cooperation by the Government of Japan for the establishment project of the Central Agriculture Development Training Centre aiming at achieving the national target of agricultural development by way of training or extension has a great significance to contribute the Projects and economic growth in Burma.

In the recognition that agricultural development is in dispensable to ecomic growth of Burma, much can be expected from future establishment of the CADTC with the object to establish the agricultural extension system under the grant aid cooperation by the Japanese Government. At the same time, however, the achievement of agricultural development by effective operation and activity of the CADTC will largely depend on the self-supporting effort to achieve the target on the GSRUB.

1) The staff recruitment plan of the Centre is to recruit necessary number of administrative and training staff for a period of two years from AC and other related organs. However, full preparation must be made with considerable lead time by selecting the staff at the earliest stage and decision of the detailed training programme, so that they can be fully familiarized with details of fairlity design and can take over smooth operation of the Centre immediately after its completion.

2) In order to ensure maximum effect from the training in the Centre in a short time, the trainees' dormitory must be designed neatly in a better condition and incorporated into the training programme.
Besides, same consideration must be given to any other living quarters and environment for accommodation of administrative/training staff and visiting lecturers.
These facilities should be completed before the operation start of the CADTC considering the fuction of the CADTC.

3) The adequate execution system of the Project is requested to be established by GSRUB authorities concerned to secure adequate connection of infrastructure, prompt procedure for customs clearance of imported materials and equipment according to the construction schedule.

4) Engineers qualified to handle various experimental equipment as well as skilled in the building and utilities maintenance should be appointed during the construction period, so that they may get fully familiarized with the method of maintenance and control of equipment to be installed in the Centre, thus encauraging establishment of the periodic inspection system of equipment and the regular supply system of consumables.

It is therefore strongly recommended that technical cooperation should be extended by the Japanese Government to train same Burmese counterparts in this field.

Necessary expenses for building maintenance and equipment running are estimated at on monthly average of 42,000 Kyats - 43,000 Kyats (subject to variations by seasons).

Necessary expenses for supplies of spare parts and consumables of the equipment are estimated at on monthly average of 300,000 Kyats.

5) With regard to the Capital and Currency Budget to be shared by the GSRUB, it is obvious that the project fund would run short if the fund is financed by such sum as budgeted for construction and operation of the CADTC under the FFYP of the GSRUB. Unless any extra fund is available from other project funds budgeted under the organization of AC, the CADTC would fail to perform its fullest operational function.

6) The project type technical cooperation is under study by the Japanese Government in an attempt to ensure smooth activities of the CADTC. The earliest implementation of the project is desired, in the expectation that the CADTC could display its performance of high efficiency by assignment of training experts from Japan to Burma who would provide assistance in the formulation of the training curriculum and guidance over local training staff after establishment of the Centre.

APPENDIX

1. Dispatch of the Survey Team
2. Minutes of Discussions
3. Location and Conditions of the Site
4. Related Informations for the CADTC
5. Estimated Cost for Burmese Contribution of the CADTC Proposed by Agriculture Corporation
6. Design Criteria for Demonstration Farm

APPENDIX 1. Dispatch of the Survey Team

For the planning and design of the Centre concerned, survey teams have been dispatched for the Basic Survey of the Final Survey.

1) Members of the Survey Team

Basic Design Survey Team (March 7, 1982 - March 28, 1982)

Team Leader	Mr. Kazuhisa Matsuoka	Japan International Cooperation Agency
Project Architect (Acting Leader)	Mr. Kiyoshi Sakurai	Kume Architects-Engineers
Architect	Mr. Shigeru Wakayama	Kume Architects-Engineers
Mechanical Engineer	Mr. Nobuo Horie	Kume Architects-Engineers
Irrigation Engineer	Mr. Kiyoshi Suzuki	Kume Architects-Engineers
Financing & Operation Planning Specialist	Mr. Shunji Nagata	Kume Architects-Engineers

Final Survey Team (June 9, 1982 - June 16, 1982)

Team Leader	Mr. Kazuhisa Matsuoka	Japan International Cooperation Agency
Project Architect (Acting Leader)	Mr. Kiyoshi Sakurai	Kume Architects-Engineers
Irrigation Engineer	Mr. Kiyoshi Suzuki	Kume Architects-Engineers

2) Cooperative Officials in the Survey

EMBASSY OF JAPAN IN BURMA

Mr. Masataka Tachibana	Ambassador Extraordinary and plenipotentiary
Mr. Teruo Hayakawa	Minister
Mr. Akio Motosugi	First Secretary

JAPAN INTERNATIONAL COOPERATION AGENCY

Mr. Takeda	Director

MINISTRY OF AGRICULTURE & FORESTS

U Kyaw Htain	Deputy Minister for Agriculture & Forests
U Hla Moe	Director, Planning & Statistics

AGRICULTURE CORPORATION

U Khin Win	Managing Director
U Hla Myint	General Manager, Planning Div.
U Chit Saing	Dy. General Manager
U C.M. Oak	Dy. General Manager
Dr. Kyi Win	〃
U Tin Htu Co	Dy. Asst. General Manager
Dr. U Myint Thein	Agriculture Research Institute
U Hha Shwe	General Manager, Administration Div.
U Mai Aung	〃 , Accounts Div.
U Twin Hlaing	〃 , Extension Div.
U Tha Tun Oo	Dy. General Manager, Land Use Div.
Dr. Tin Hla	Asst. General Manager, Extension Div.
U Hla Shwe	Dy. General Manager
U Ba Toke	Asst. General Manager

U Thein Pe	Dy. Asst. Genenral Manager (CADTC Project Manager)
U Aung Myint	Field Asst. of Project Site

AGRICULTURE MECHANIZATION DEPARTMENT

U Wan Maung	Asst. Director, Rural Water Supply Div.
U Di Aung Ba	Dy. Director

IRRIGATION DEPARTMENT

U Myin J U	Exclusive Engineer

CONSTRUCTION CORPORATION

U Win Kyu	S.O.I A/S Research
U Shwe Win	S.O.II Design
U Tin Aung	S.O.II Architect
Mr. Desouza	S.O.II Quantity Surveyor
U Hla Myint	S.O.III Electrical
U Shwe Tun Maung	S.O.II Testing
Mr. A.K.Mazumder	S.O.III Testing

POSTS & TELECOMMUNICATION CORPORATION

U Soe Tha	Division Engineer
U Maung Thaung	Dy. General Manager

ELECTRIC POWER CORPORATION

U Hlaing Myint	A.E.E
U Tin Htoo Aye	A.E
U Ba Thet	Superintendenting Engineer

CIVIL ENGINEER'S CONSTRUCTION CO-OPERATIVE

U Mya Than	Advisor
U Tin Maung	Lecturer, Rit
U Tin Ohn	Vice Chairman

AGRICULTURE RESEARCH INSTITUTE (YEZIN)

U Tun Saing	Head, Maize & Cereals Division

DEPT. OF METEOROLOGY & HYDROLOGY

U Hlaing Myint	A.E.C

HOUSING DEPARTMENT

Sang Tun Aung	Director, Urban Planning

APPENDIX 2. Minutes of Discussions

The Basic Design Survey Team and the Government of the Socialist Republic of the Union of Burma have held a series of discussions and exchanged views. The both parties summarized their agreements on Minutes as the result, and exchanged their signatures by Mr. Matsuoka, Team Leader and Mr. Khin Whin, Managing Director of the AC, Ministry of Agriculture and Forests.

MINUTES OF DISCUSSION
ON
THE CENTRAL AGRICULTURE DEVELOPMENT TRAINING CENTRE (CADTC) PROJECT
IN
THE SOCIALIST REPUBLIC OF THE UNION OF BURMA

BETWEEN

AGRICULTURE CORPORATION-BASIC DESIGN STUDY TEAM

19 MARCH 1982

JAPAN INTERNATIONAL COOPERATION AGENCY

MINUTES OF DISCUSSION

ON

THE CENTRAL AGRICULTURE DEVELOPMENT TRAINING CENTER (CADTC) PROJECT

IN

THE SOCIALIST REPUBLIC OF THE UNION OF BURMA

At a request of the Government of the Socialist Republic of the Union of Burma (GOB) for the grant capital aid in establishing the CADTC, the Government of Japan(GOJ) has sent a Mission to carry out the Basic Design Study (the Study) on the CADTC Project (the Project) from 8th to 27th March in 1982.

The Mission visited the project site and held a series of discussions with the Agriculture Corporation(AC) under the Ministry of Agriculture and Forests and authorities concerned of the GOB.

Both parties have agreed to recommend their respective Governments and authorities concerned to examine the major points of understanding reached between them, which is included as Annex 1, toward the realization of the Project.

19th March 1982
Rangoon

(KHIN AIN)
Managing Director
Agriculture Corporation

(KAZUHISA MATSUOKA)
Leader
JICA Mission

ANNEX - 1.

MAJOR POINTS OF UNDERSTANDING

I. Outline of the Project

(1) The objective of the Project is to promote and develop the knowledge and capability of the AC's extension personnels for the purpose of transfering correct and advanced technology to farmers.

(2) To achieve the objective, the CADTC will mainly function as a central training center to design and monitor all training programs for extension personnels as well as to train the managing staff and subject matter specialist. The training program is accordingly designed for states and divisions managers, township managers and new recruits. To give general extension personnels opportunities to become the managing staff, however, the CADTC has a few training courses for village tract managers snd village managers.

(3) The training program in the CADTC will consists of:

1. In-service Training to aquire the special knowledge and technology necessary for the extension services;
2. On the Job Training to re-orient managing staff for extension services; and
3. Pre-service Training to orient new recruits for extension services.

The proposed training schedule is shown in Annex 2.

(4) The CADTC will be established under the direct control of the Managing Director of the AC and staffed by about seventy professional personnel and thirty supporting personnels mainly recruited from the AC itself. The organization chart of the CADTC is attached as Annex 3.

II. Project Site.

The proposed site of the CADTC is in the AC's Rubber Estate located at Zayat Kwin in Hlegu township of Rangoon Division, and has about 18 hecters of land area.

III. Project Facilities

Facilities necessary for the Project consists of:

1. Administrative Building including offices, exhibition room, library, publication room etc.,
2. Training Building including main training hall, training rooms, laboratories etc.,
3. Workshop, Warehouse and Glass Houses.
4. Canteen
5. Hostel
6. Guesthouse
7. Staff and Labourer quarters
8. Fencing and Roads
9. Tube wells, pump House and Reservoir
10. Demonstration Farm (10 hecters)

IV. Basic Design Study

The JICA carries out the basic design study in line with the activities described in the Inception Report. The Study includes the preliminary engineering for all facilities mentioned above.

V. Executing Agency

The AC will be the executing agency for the Project responsible for the implementation of the preparatory works and construction works of the Project.

The AC will establish a Project Management Office in the AC Headquarter and a Liaison Office at the Project site and appoint a well qualified project manager and adequate staff for the proper implementation of the Project, before the completion of the construction works of CADTC.

VI. GOB's Contribution

The GOB will take the following necessary measures, on condition that the capital grant aid by the GOJ is extended to the Project:

1. Provision of respective data and information to a Japanese consultant and a contractor necessary for the detailed engineering services and construction;
2. Land aquisition necessary for the construction of facilities;
3. Execution of groundwater survey including water lifting test and core boring including penetration test.
4. Land consolidation and Improvement of soil in the demonstration plot;
5. Construction and provision of;
   (a) Canteen Building,
   (b) Guest House, Staff and Labourer quarters,
   (c) Demonstration Plot,
   (d) Fencing, land-scaping and roads,
   Tube wells, Pump house and a storm reservoir
   (e) External drainage from the CADTC building,
   (f) Electrical power main line to the CADTC building,
   (g) Telephone lines and equipment,
   (h) Space necessary for such construction on temporary office, working area, stock yard and others, and
   (i) Furniture, carpet, curtains and other furnishings.
6. Budgetary arrangement and expenditure of maintainance and operating cost and expenses.
7. To ensure prompt unloading and custom clearance in Burma of imported materials and equipment for the construction and facilitate the internal transportation for them.

8. To exempt Japanese nationals concerned from customs duties, internal tax and other fiscal levies which may be imposed in Burma on the occasion of the supply of materials and services for construction.
9. To provide and accord necessary permissions, licences and other authorization required for the execution of the Project.

VII. GOJ's Contribution Requested

The items requested by the GOB, where cost will be borne by the GOJ, are as follows:

1. Buildings and Facilities
   (a) Main Training Hall and Training rooms
   (b) Laboratories
   (c) Exhibition room
   (d) Library
   (e) Publication room
   (f) Audio-Visual Equipment room
   (g) Administrative rooms
   (h) Workshop, Ware house, and Glass house

2. Equipment

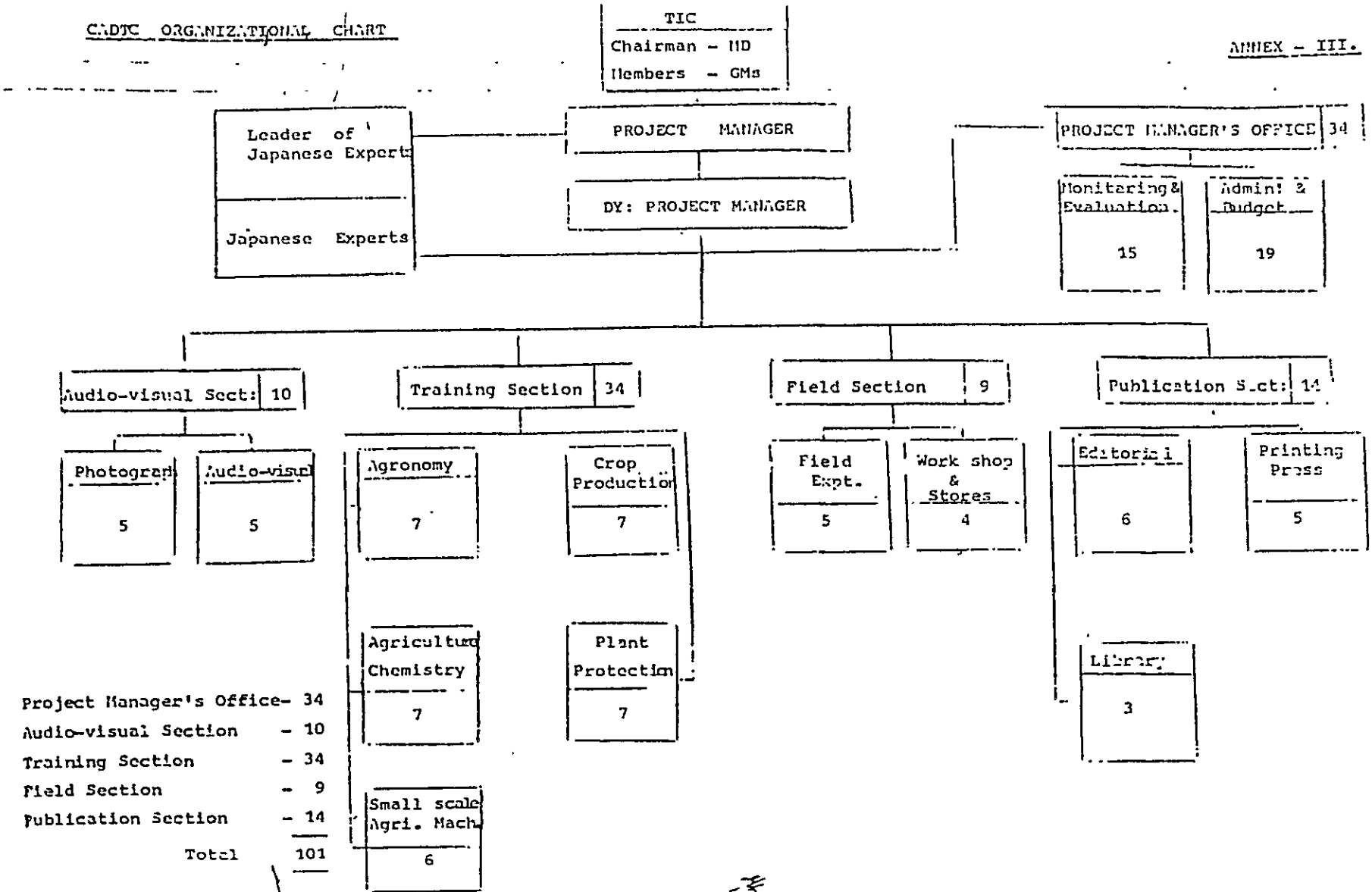
   Equipment items necessary for the CADTC activities are listed with priority order in Annex 4. Numbers and rough specification of those equipment will be recommended in the Basis Design Study Report by JICA.

TRAINING SCHEDULE FOR S. DIS

Gr. No.	Type of Training	Total No of Trainees	No. of Trainees per course	Duration (m) X Frequency	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
I	PRE-SERVICE TRAINING	500	500												200	200
(1)	B. Ag.		250	2x1			200	200								
(2)	Dip. Ag.		150	2x1												
(3)	R.S.		100	2x1	100	100										
II	ON THE JOB TRAINING	595	115													
(1)	Division Level	45	15	½- 1½x3						15		15				15
(2)	Township Level	250	50	½- 1x5	50	50			50	50				50		
(3)	Village Level	300	50	1-1½x6	50	50			50	50	50	50	50	50		
III	IN-SERVICE TRAINING	240	110						20	20	20	20	20	20		
(1)	S.M.T.	80	20	3- 6x4								20	20	20		
											20	20	20			
(2)	Specialist Comprehensive								20	20	20	20	20	20		
	(a) Central/Div.	20	10	3x2					10	10	10	10	10	10		
	(b) Township	60	30	6x2	30	30	30	30	30	30	30	30	30	30	30	30
(3)	Extension + General Agri. (Township)	60	30	3x2					30	30	30	30	30	30		
(4)	Planning/Project (Analysis) (Township + above)	20	20	3x1						20	20	20				
		1335	725	-	230	230	230	230	210	245	200	235	200	230	230	245

CADTC ORGANIZATIONAL CHART

ANNEX - III.



Project Manager's Office- 34
Audio-visual Section - 10
Training Section - 34
Field Section - 9
Publication Section - 14

Total 101

ANNEX - IV

EQUIPMENT LIST REQUIRED FOR CADTC

REQUESTED BY A.C.

1. AGRO. BIOLOGY LAB.
   - (a) Botany
   - (b) Agronomy
   - (c) Seed Technology
   - (d) Entomology
   - (e) Pathology
   - (f) Micro-biology
   - (g) Horticulture
   - (h) Meteorology
2. AGRO.CHEMISTRY
   - (a) Soil
   - (b) Fertilizer
   - (c) Biofertilizer
   - (d) Food technology
3. FARM MECHINERY
4. VEHICLES
5. IRRIGATION EQUIPMENTS
6. OFFICE EQUIPMENTS
7. AUDIO-VISUAL EQUIPMENTS

ANNEX-IV :(1)

EQUIPMENTS FOR AGRO-BIOLOGY LABORATORY

No.	PARTICULARS	QUANTITY	PRIORITY
1.	Stereoscopic microscroscope	5	A
2.	Student microscope	50	A
3.	Glass slides	20	A
4.	Dissecting sets.	50	A
5.	Electric Oven	4	A
6.	Germination dishes	100	B
7.	Petri-dishes	100	A
8.	Camera with close-up lens	2	B
9.	Dark-room with photo enlarger, developing instruments.	1	A
10.	Glass house	3	B
11.	Over head transparacies :		A
	- Cereal grains.	2	
	- Mono & dicot root cross section	4	
	- Mono & dicot root development	4	
	- Stem tip anatomy	2	
	- Dicot stem	2	
	- Monocot stem	2	
	- Leaf anatomy	2	
	- Stomate structure	2	
	- Leaf variation	2	
	- Type of specialized stem	2	
	- Angiosperm flower	2	
	- Angio sperm life history	2	
12.	Remote control slide projector	2	B
13.	Autoclave (10 litre capacity)	2	A
14.	Top pan digital balance (capacity 1 kg. max-0.1 gm. min.)	2	A
15.	Seed moiture tester	3	A
16.	Bench type moiture tester	2	B
17.	Dust fan	3	A
18.	Germination pads (Packets)	100	B

No.	PARTICULARS	QUANTITY	PRIORITY
19.	Vaccum cleaner	3	B
20.	Theodolite and plane table leveling equipments.	1	B
21.	Seed cabinet	1	A
22.	Hydrometers sp.gravity 2 to 0.05	20	A
23.	P^H meter (portable)	5	A
24.	Dessicator	10	A
25.	Dissectting tray	50	B
26.	Stereoscopic dissectting miroscope	4	A
27.	Forceps	100	A
28.	Chemical dust sperator	1	B
29.	Insect collection boxes	50	B
30.	Cabinet for insect boxes	5	B
31.	Insect nets	100	B
32.	Hand lens x 10	50	A
33.	Nose cap	1	A
34.	Epidioscope	1	A
35.	Pesticides handling kits	1	A
36.	Rubber glove	50	B
37.	Refrigerator	5	B
38.	Measuring cylinders (2 litres)	5	A
	" (1 litres)	5	
	" (500 ml.)	10	
	" (200 ml.)	10	
	" (100 ml.)	10	
	" (10 ml.)	5	
39.	Funnels of different sizes	20	A
40.	Dehumidifier	1	A
41.	Seed straining equipment	1	B
42.	Shaker for test tube & flasks	2	B
43.	Flasks 250 ml.	150	A
	" 100 ml.	50	
	" 10 ml.	50	
44.	Beakers 500 ml.	20	A

No.	PARTICULARS	QUANTITY	PRIORITY
44.	Beakers 250 ml.	50	A
	" 100 ml.	25	
45.	Test tubes	500	A
46.	Pipetts 50 ml.	10	A
	" 25 ml.	20	
	" 20 ml.	20	
	" 10 ml.	20	
	" 5 ml.	10	
47.	Isolation transfer booth	1	A
48.	Water demineralizer	2	A
49.	Distilled water plant	1	A
50.	Microscope slide cabinet	2	B
51.	Budding knife	100	A
52.	Budding tape	100	A
53.	Prunning saw	50	A
54.	Grafting knife	50	A
55.	Secateur	50	A
56.	Rain guage	3	A
57.	Wind Anemometer	3	A
58.	Dry & wet bulb	20	A
59.	Max: & Min: Thermometer	20	A
60.	Barometer	20	A
61.	Atmometer	2	A
62.	Sunshine recorder	2	A
63.	Evaporation pan	2	A
64.	Agro-chemicals	1 lot	A

EQUIPMENTS FOR AGRO-CHEMISTRY LABORATORY.

Soil chemistry laboratory.		Quantity	Priority
1. Pipette (bulb)	100 ml.	5	A
	50 ml.	10	
	25 ml.	40	
	10 ml.	20	
	5 ml.	10	
(graduated)	10 ml.	20	
	5 ml.	20	
2. Burettes	200 ml.	50	A
	100 ml.	20	
(micro)	10 ml.	5	
(Auto filling)	20 ml.	5	
3. Beakers	500 ml.(pyrex)	20	A
	250 ml. "	50	
	100 ml.	25	
	10 ml.	20	
4. Valumatric flask with stoppers.	1 litre	5	A
	500 ml.	10	
	250 ml.	50	
	100 ml.	50	
5. Conicial flasks	500 ml.	20	A
	250 ml.	50	
	100 ml.	50	
	10 ml.	20	
6. Pimarels		100	A
7. Hot plates 220 V.		3	A
8. Oven		3	A
9. Aluminum moisture cup		100	B
10. Tongs		20	A

No.	Particulars	Quantity	Priority
11.	Sieves of standard match	2 sets	A
12.	Sieve shaker	1 "	A
13.	Soil anger of different sizes	2 "	B
14.	Burettes and Pipette stands	50	A
15.	Soil Thermometer	5	B
16.	Soil Penetrometer	1	B
17.	Test tubes	500	A
18.	Shaking machine	1	A
19.	Sucking machine with thick walling rubber tubings.	1	A
20.	Vacuum cleaner	1	A
21.	Diffent size of filter 100/box	200 boxes	A
22.	Cabinet	5	A
23.	Degital P^H meter with electrodes	2	A
24.	Direct reading conductivity bridge.	2	A
25.	Coloric meter	1	A
26.	Analytical balance 220 V.	2	A
27.	Top pan balance 500 gm.	2	A
28.	Desk type calculator	2	B
29.	Refrigeritor	2	A
30.	Deionizer	2	A
31.	Distillation plant	1	A

AGRO - CHEMISTRY.

No.	PARTICULARS	QUANTITY	PRIORITY
1.	Pipette 100 ml. (bulb)	10	A
	50 ml.	30	
	25 ml.	50	
	10 ml.	50	
	5 ml.	20	
	10 ml.(graduated)	20	
2.	Burette 100 ml.	50	A
	50 ml	50	
	20 ml. (Micro burette)	5	
	10 ml. "	5	
3.	Conicial flask 250 ml.	200	A
	500 ml.	50	
4.	Beaker pyrex 1 liter	5	A
	500 ml.	10	
	250 ml.	50	
	100 ml.	25	
	50 ml.	25	
	10 ml.	25	
	5 ml	25	
5.	Shaking bottles 250 ml.	50	A
6.	Funnels (glass)	100	A
7.	Funnels and burette stands	50 sets	A
8.	Centrifuge	1	A
9.	Oven	4	A
10.	Soil and plant material grinder.	1	A
11.	Shaking machines.	1	B
12.	Digital P^H meter	2	A
13.	Direct reading conductivity bridge	3	A
14.	Colouri - photo meter	1	A
15.	Soil thermometer. 5 cm.	2	A
	10 cm.	2	
	20 cm.	2	
	25 cm.	2	

ANNEX - IV...(vii)

No.	PARTICULARS	QUANTITY	PRIORITY
16.	Analytical Balance (eletric)	2	A
17.	Top pan balance (eletric)	2	A
18.	Distallation plant " with 2 sets of heating elements.	1	A
19.	Steel cabinet	5	B
20.	Calculator (Decientifie)	4	A
21.	Filter paper No.40, whatman.	100 boxes	A
22.	Refrigator	2	A
23.	Hot plates	3	B
24.	Incubator	3	A
25.	Soil augers	5	A
26.	Microscope Research type-	2	A
	Binocular dissecting microscope	2	A
	Mitrophotograpic equipment	1	A

Farm Machinery.

No.	PARTICULARS	QUANTITY	PRIORITY
1.	Tractor (diesel 4 wheel drive) with 10% spare parts. 50 HP.	2	A
2.	Disc harrow , for the above tractors.	2	A
3.	Disc plough	2	A
4.	Bulldozer with complete accessories	1	C
5.	Power tiller with rotary harrow and plough attachment and 10% spare parts.	5	A
6.	Seeders	3	B
7,	Thresher with winnower	3	B
8.	Dryer (capacity 2 ton)	2	B
9.	Rice huller	2	A
10.	Corn sheller	3	A
11.	Rollers for levelling	5	C
12.	Oxyacetylene welder	1	A
13.	Electric welder	1	A
14.	Soldering Heating Torch	1	A
15.	Air Jacies	3	A
16.	Air compressor for spraying	1	A
17.	Motor cradle Jack	1	A
18.	Pivot stand for tire work	1	A
19.	Lathe machine	1	A
20.	House jack	1	A
21.	Engine Analyser	1	A
22.	Hock saw (Electric)	1	A
23.	Cutting Tools	1 set	A

No.	PARTICULARS	QUANTITY	PRIORITY
24.	Repairing Tools Hammer Wrench Vise Anvil Electrical Tools	2 sets	A
25.	Diesel Auseilliary (indoor type) 60 KB out put with other accessories.	1	A
26.	Test meter	1	A
27.	ULV power Sprayers	15	A

VEHICLES.

No.	PARTICULARS	QUANTITY	PRIORITY
1.	Truck 6 Ton (heavy duty)	2	A
2.	Pickup truck 3/4 ton	2	A
3.	Micro-bus (4 wheel drive)	5	A
	or light Heno bus.	3	A
4.	B-600 pick-up	3	A
5.	D-2000 light truck	5	A
6.	Water Bowser	2	A
7.	Mazda Jeep (for experts)	5	A
8.	Bycycles	200	B

IRRIGATION EQUIPMENTS.

No.	PARTICULARS	QUANTITY	PRIORITY
1.	Tube well	3	A
2.	Electrical pumps	3	A
3.	Electric motors	3	A
4.	Compressor	3	A
5.	Pipes for tube wells	300 meters	A
6.	Sprinkler nozzles & pipes for	1 ha.	B
7.	Drip irrigation nozzles & pipes for	1 ha.	A
8.	Irrigation pipes for experimental field.	1000 meters.	A

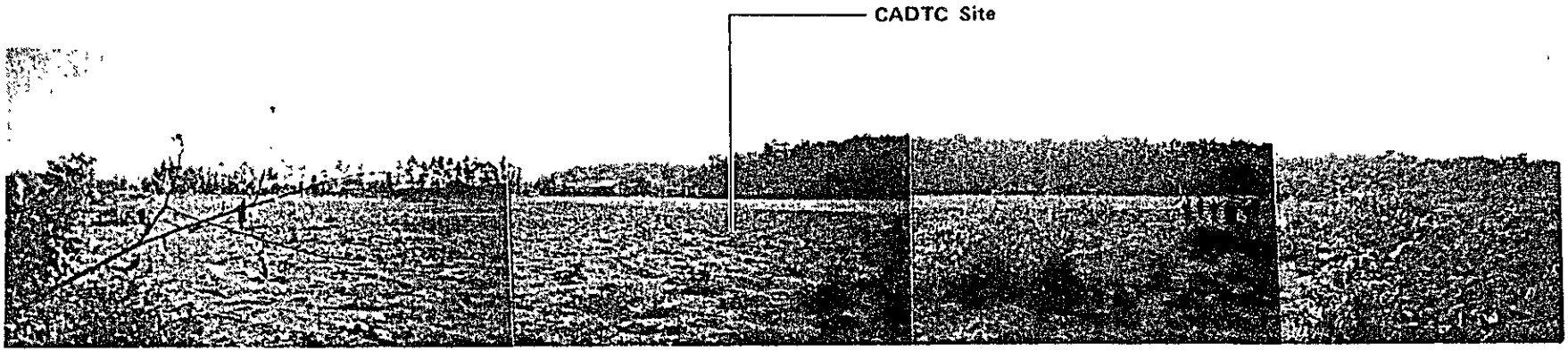
OFFICE EQUIPMENTS

No.	PARTICULARS	QUANTITY	PRIORITY
1.	Plain paper copier	3	A
2.	Offset printing press	1 set	A
3.	Tag printer	1	A
4.	Type-writer English 24"	3	A
5.	Type-writer Burmese 24"	3	A
6.	Electric type writer	3	A
7.	Gastener (large)	2	A
8.	Collators	2	B
9.	Punch and binding combo with plastic	2	A
10.	Panasonic electric staplier	3	A
11.	Slid processing equipments	1 set	A
12.	Paper cutting machine	1	A
13.	Book binding machine	1	A
14.	Photo block processing equipment	1 set	A
15.	English letter composits	5 sizes	B
16.	Burmese letter composits	5 sizes	B
17.	Stencil cutter	3	
18.	35 mm. negative film	100 cartoon	A
19.	35 mm. positive film	100 cartoon	A
20.	Colour developing tank (complete sets)	1 no.	A
21.	Photographic chemicals	1 lot	A
22.	Photopaper (Black & white)	1 lot	A
23.	Photocolour paper	1 lot	A
24.	Colour Reversel film 35 mm.	500 rolls	A
25.	Inlarger	1 set	A

No.	PARTICULARS	QUANTITY	PRIORITY
26.	Plastic frame for slides 35 mm.	5000	B
27.	Timer clock	1	B
28.	Camara with complete accessories	1	A
29.	Calculator (Desis type), Electrical.	5	A
30.	Calculator (portable)	5	B
31.	Gestener stencil copier(large).	1	A
32.	" " " (small).	1	A

AUDIO VISUAL EQUIPMENTS AND TEACHING AID.

No.	PARTICULARS	QUANTITY	PRIORITY
1.	Television sets	1	A
2.	Audio visual set	1	A
3.	Overhead projector	3	A
4.	Slide projector	3	A
5.	Projector stand & Screen	3	A
6.	Portable tape recorder	3	A
7.	Cassette tapes	250	A
8.	Movie camera	2 sets	A
9.	Camera with complete accessories	2	A
10.	Slide cabinet	1	A
11.	Movice projector 35 mm. complete with sound equipment	2	A
12.	Public address system	3	A

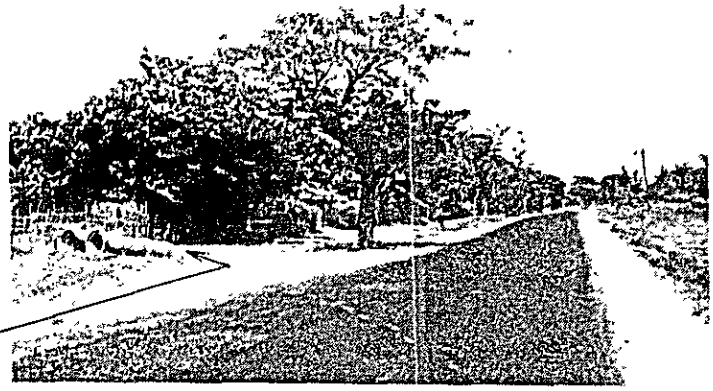


Construction Site for Main Bldg., Training Hall

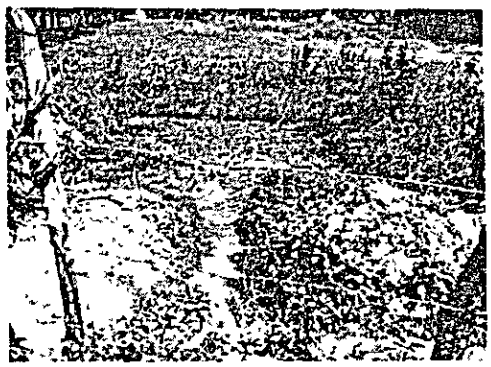
Construction Site for Workshop, Canteen, Guesthouses, etc.

APPENDIX 3. Location and Conditions of the Site

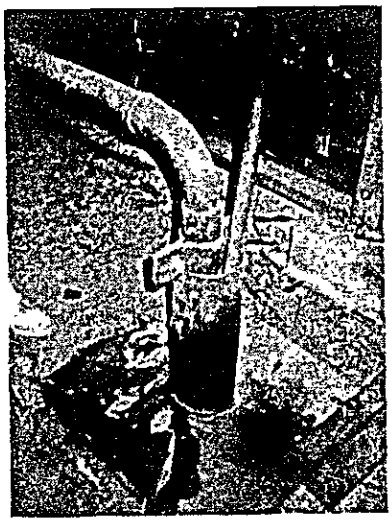
1) Location photograph
(dated March 20, 1982)



Rangoo-Mandalay Road

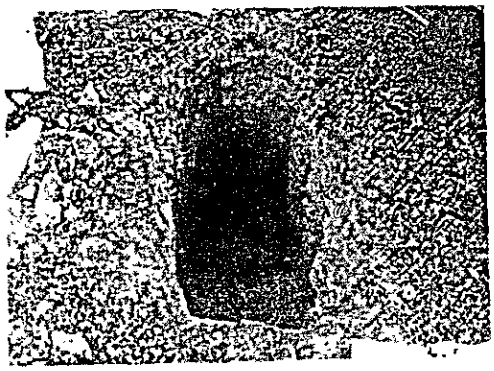


Reserved Pond in the Site

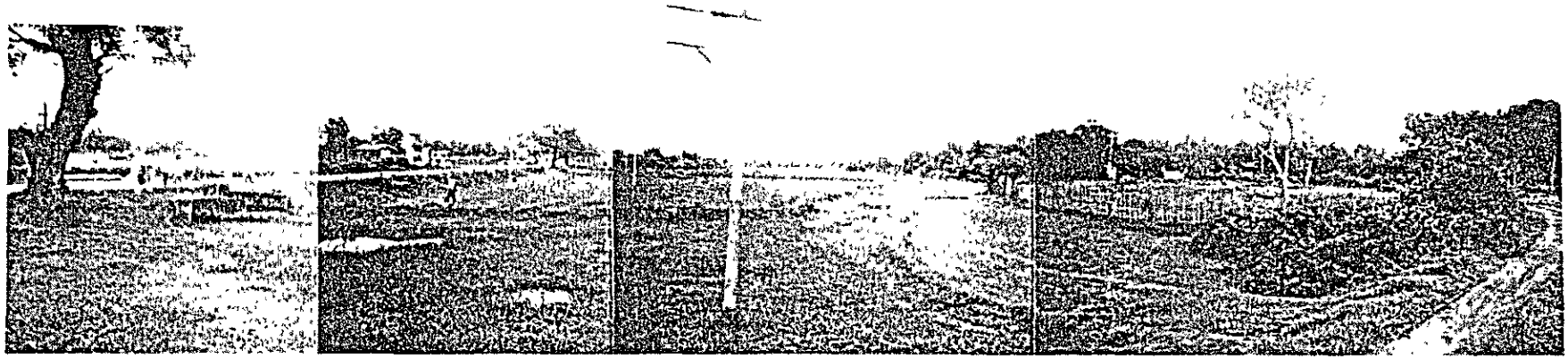


Existing Well
150ϕ x 130'
800gal/hour

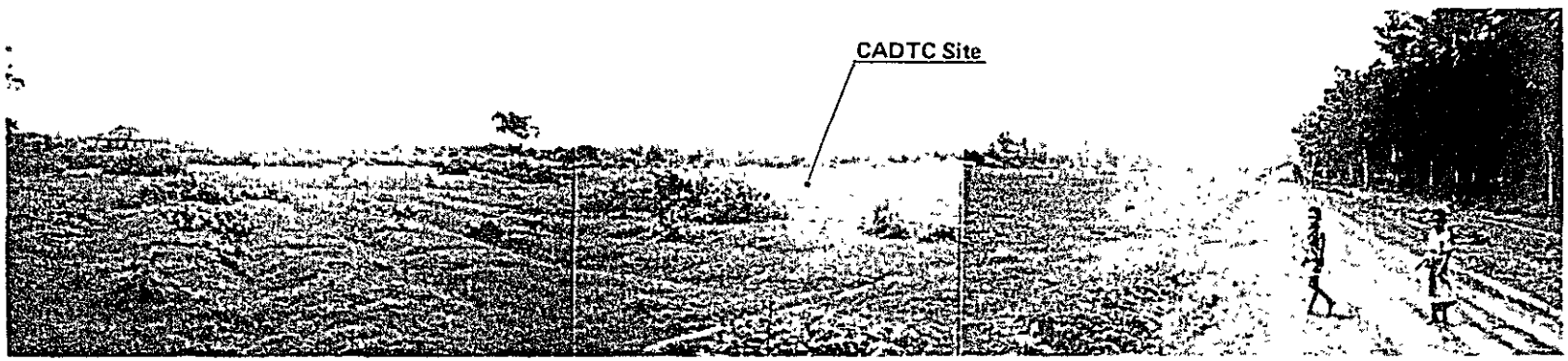
Land Surveying at the Site



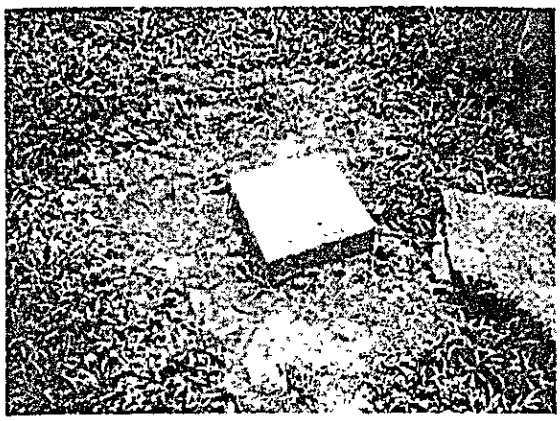
Test Pit H=2.0M



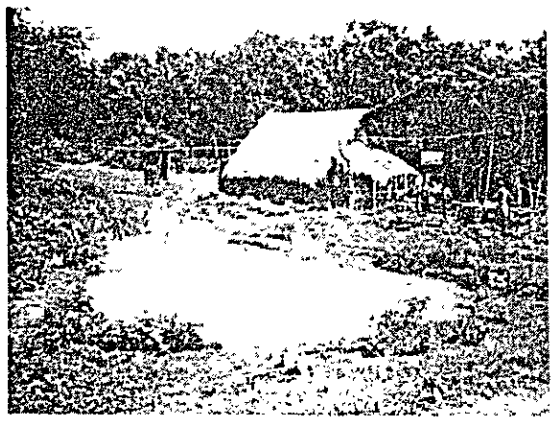
Proposed Demonstration Farm (Paddy Field)



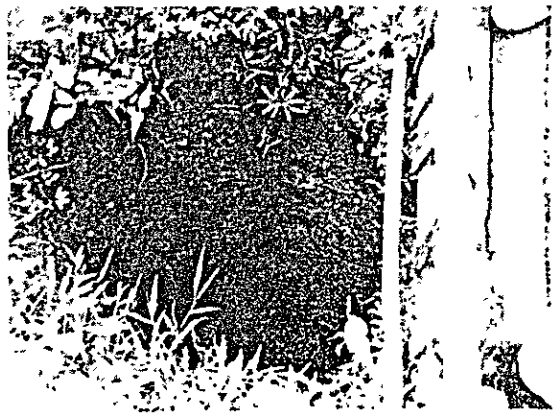
Location Photograph (dated June 13, 1982)



(Bench Mark at the Site)



(Existing Pond at the Site)
This is to be used as the Storm Reservoir.



Existing well near the Site
(Water level: GL-3M)

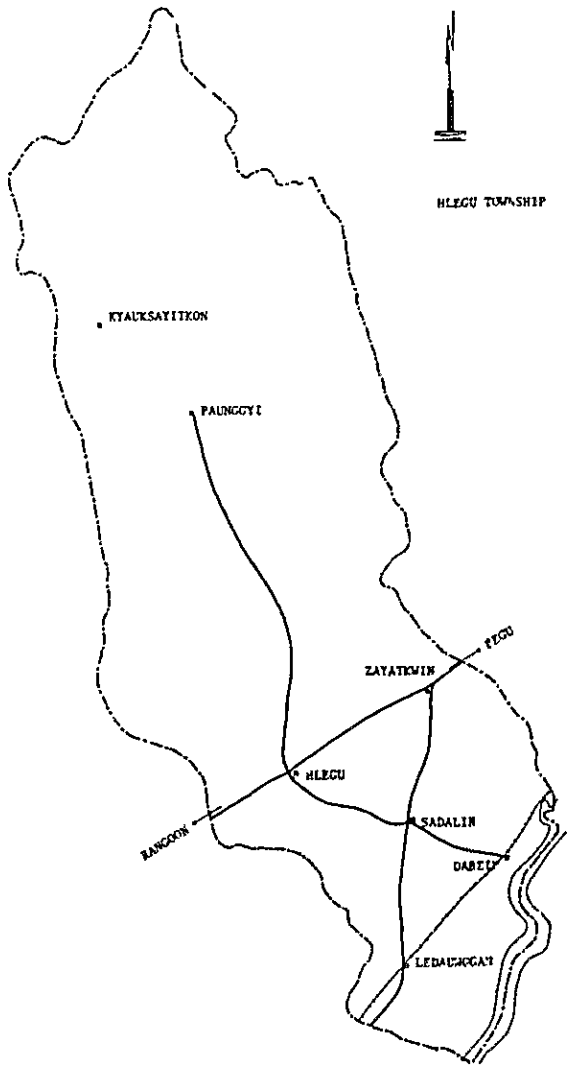
(Cleak 1.8 Km apart from the Site)

2) Climate Conditions

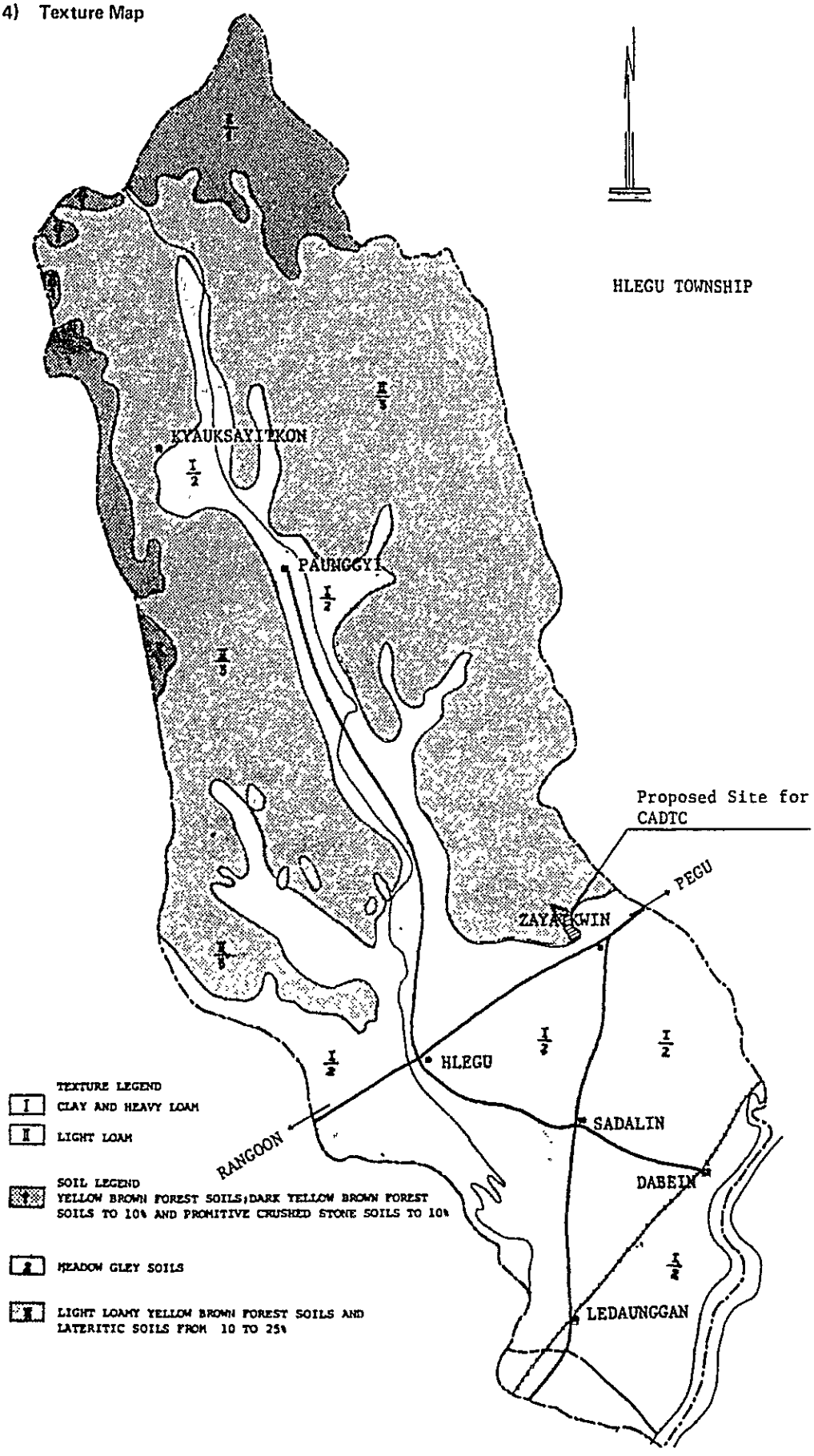
Station: PEGU
LAT.: 17° 20'
Long. 96° 30'
Above M.S.L.: 49 feet

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN DAILY MAXIMU TEMPERATURE (°F)	90.0	93.6	97.3	99.1	84.3	86.6	85.3	85.8	87.7	91.0	91.1	88.9
HIGEST MAXIMUM RECORD IN 24 HOURS	107°F on 25th April 1958											
MEAN DAILY MINIMUM TEMPERATURE (F°)	61.0	62.9	67.4	74.0	76.2	75.7	75.2	75.1	75.4	74.8	70.8	63.6
LOWEST MINIMUM RECORD IN 24 HOURS	50°F on 13th January 1955											
MEAN DAILY RELATIVE HUMIDITY AT 0930 B.S.T. %	69.0	65.0	59.0	63.0	70.0	82.0	84.0	86.0	83.0	79.0	77.0	72.0
MEAN DAILY RELATIVE HUMIDITY % AT 1830 B.S.T. %	61.0	45.0	44.0	54.0	70.0	89.0	89.0	90.0	85.0	81.0	75.0	71.0
MONTHLY RAINFALL NORMAL IN INCHES (1891 - 1940)	0.3 / 0.20	0.3 / 0.28	0.4 / 0.30	2.0 / 1.53	13.7 / 12.58	24.6 / 24.87	27.5 / 30.38	27.0 / 29.79	21.3 / 19.61	10.3 / 7.70	2.9 / 2.07	0.5 / 0.37
MEAN MONTHLY RAINFALL IN INCHES	0.27	0.20	0.08	1.06	12.05	26.46	28.51	32.13	20.00	8.62	0.94	0.39
HAVIEST RAINFALL RECORD IN 24 HOURS	8.40 inches on 31st August 1958											

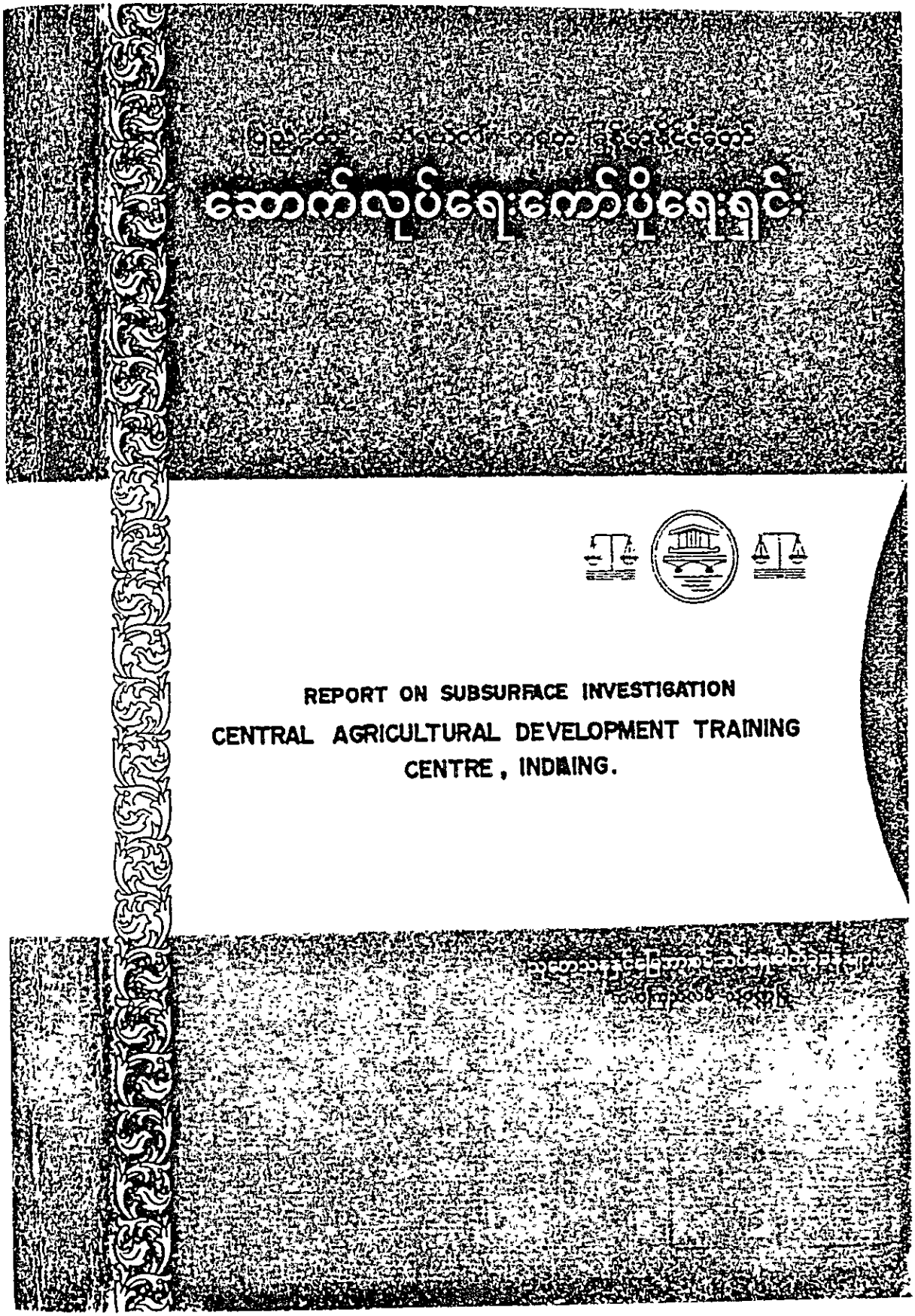
3) Site Location



4) Texture Map



5) Report on Subsurface Investigation for the CADTC site



REPORT ON SUBSURFACE INVESTIGATION
CENTRAL AGRICULTURAL DEVELOPMENT TRAINING
CENTRE, INDAING.

THE SOCIALIST REPUBLIC OF THE UNION OF BURMA
MINISTRY OF CONSTRUCTION
CONSTRUCTION CORPORATION

REPORT ON SUBSURFACE INVESTIGATION CENTRAL AGRICULTURAL DEVELOPMENT TRAINING CENTRE, INDAING.

Research & Soil Testing Laboratories
Kamakyi Road, Thuwunna, Rangoon.

1982

C O N T E N T S

CONSTRUCTION CORPORATION
RESEARCH & SOIL TESTING LABORATORIES
KAMAYUT ROAD, THUWUNNA.

REPORT ON SUBSURFACE INVESTIGATION, CENTRAL AGRICULTURAL DEVELOPMENT TRAINING CENTRE, INDAING.

1.0 INTRODUCTION

1.1 AUTHORITY

In response to a request by the Managing Director of the Agricultural Corporation, vide his letter No.10504 - Planning -82/41 dated 16.3.82 and channelised through the Managing Director of the Construction Corporation, the Staff Officer II, Research and Soil Testing Laboratories Construction Corporation sent out a drilling machine with a complement of crew to carry out necessary subsurface investigation at site dilineated for the proposed structures.

1.2 SCOPE

This report pertains to the field and laboratory studies comprising the general subsurface soil condition prevailing at the site.

2.0 SUBSURFACE INVESTIGATION

2.1 DRILLING PROCEDURE

The drilling, sampling and the locations Fig.No.1.1 of the borings were programmed by the Japanese Experts of the Project. Type of sampler used, depth of drilling and position of water table are shown in the following table.

Bore Hole No.	No.of Samples		Depth of Drilling (Ft.)	Reduced Level (Ft)	Water Table (Ft.)	Remarks
	Shelby Tube	Split Spoon				
1	11	8	62.0	111.85	16.5	
2	11	16	101.5	113.71	17.0	
3	11	8	62.0	110.70	16.0	
4	11	8	62.0	114.03	19.0	

NOTE:

- Depth of Drilling from the existing ground-level
- Reduced Level at the surface of the bore-hole location
- Water-Table recorded during the month of May 1982.

2.2 DRILLING & SAMPLING PROCEDURE

The wash boring method was used for the advancement of the bore-hole.

In this procedure the sampling tube (Shelby-Tube or Split-Spoon) was attached to the drill-rod using an adaptor and counter-sunk screws, lifted by the cat-head winch and derrick of the drilling machine and finally positioned at the location of the boring. Then the winch was used to pull tight on the attached rope threaded through a sheave at the top of the derrick, wound 3 to 4 times on the revolving cat-head winch thus lifting the hammer weighing 140 lbs. Next, the tightened rope was suddenly loosened resulting in the hammer to drop onto the drive head attached to the sampler through the drill rods, thus driving the sampler into the subsurface soil formations.

The sampler was thus driven into the soil and the number of blows for every 6 inches penetration recorded. Such 6 inches penetration was repeated 4 times thus totalling the length of the sample to 24". The summation of the number of blows for the second and third 6 inches penetration is considered as "N", the number of blows required per foot penetration of the sampler.

The sampling was performed continuously upto a depth of 20 feet and thereafter at 5 feet intervals.

The collected samples were sealed against loss of moisture, identified and sent to the Central Laboratory for analyses.

2.3 PRESENTATION OF FIELD DATA

The pertinent informations on the subsurface condition are furnished in the two Soil-Profiles (Fig.Nos.2.1 and 2.2).

The rectangular symbols indicate the depth of samples and the number of blows required per foot penetration of the sampler.

3.0 LABORATORY ANALYSIS

A total of 44 Shelby-Tube samples and 40 Split-Spoon samples were received and tested in this laboratory in accordance with the requirements specified by the Japanese experts. The analyses consisted of:-

- Visual Classification on all the samples
- Natural Moisture Content on all the samples
- Densities and Unconfined Compression Tests on all amenable samples
- Grain-size Distribution, Atterberg Limit and Consolidation Tests on selected samples.

The test procedures were in accordance with recognised soil-mechanics practices.

The test-results in Figures as well as in Tables are appended to this report.

4.0 CONCLUSION

The subsurface materials prevailing at the proposed site, in accordance with the Geological Map of Burma, issued by Earth Sciences Research Division of the Burma Research Society is composed of older Irrawaddian Formation and is termed as MIOCENE-PLIOCENE group.

The materials from the existing surface to a depth of 30 feet (± 5 feet) generally is cohesive in nature. Below this depth Sand becomes predominant and the materials are more or less cohesionless.

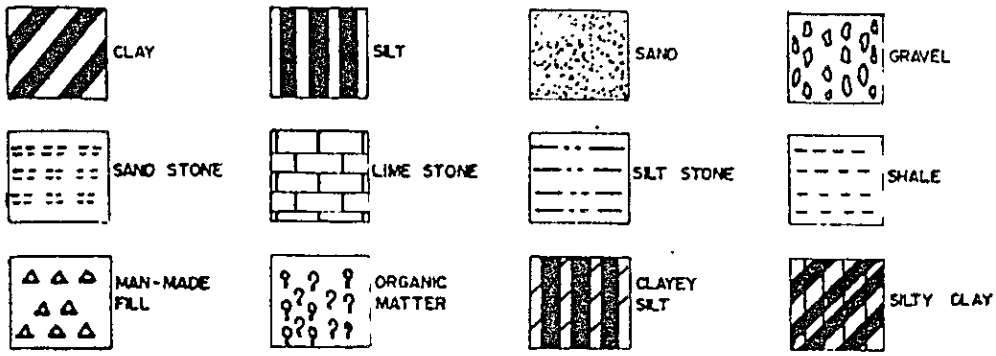
The ground water-table encountered during the period of drilling (MAY 1982) was at a depth varying from 16 to 19 feet from the existing surface.

May is the month when the monsoon just starts. Therefore it is likely that the water-table may rise further during the months of July - August when the monsoon is at its peak.

(SHE TUN MAUNG)
STAFF OFFICER II
RESEARCH & SOIL TESTING LABS:
CONSTRUCTION CORPORATION.

STM/30682.

LEGEND OF SYMBOLS USED TO INDICATE MATERIAL IN BORE HOLE

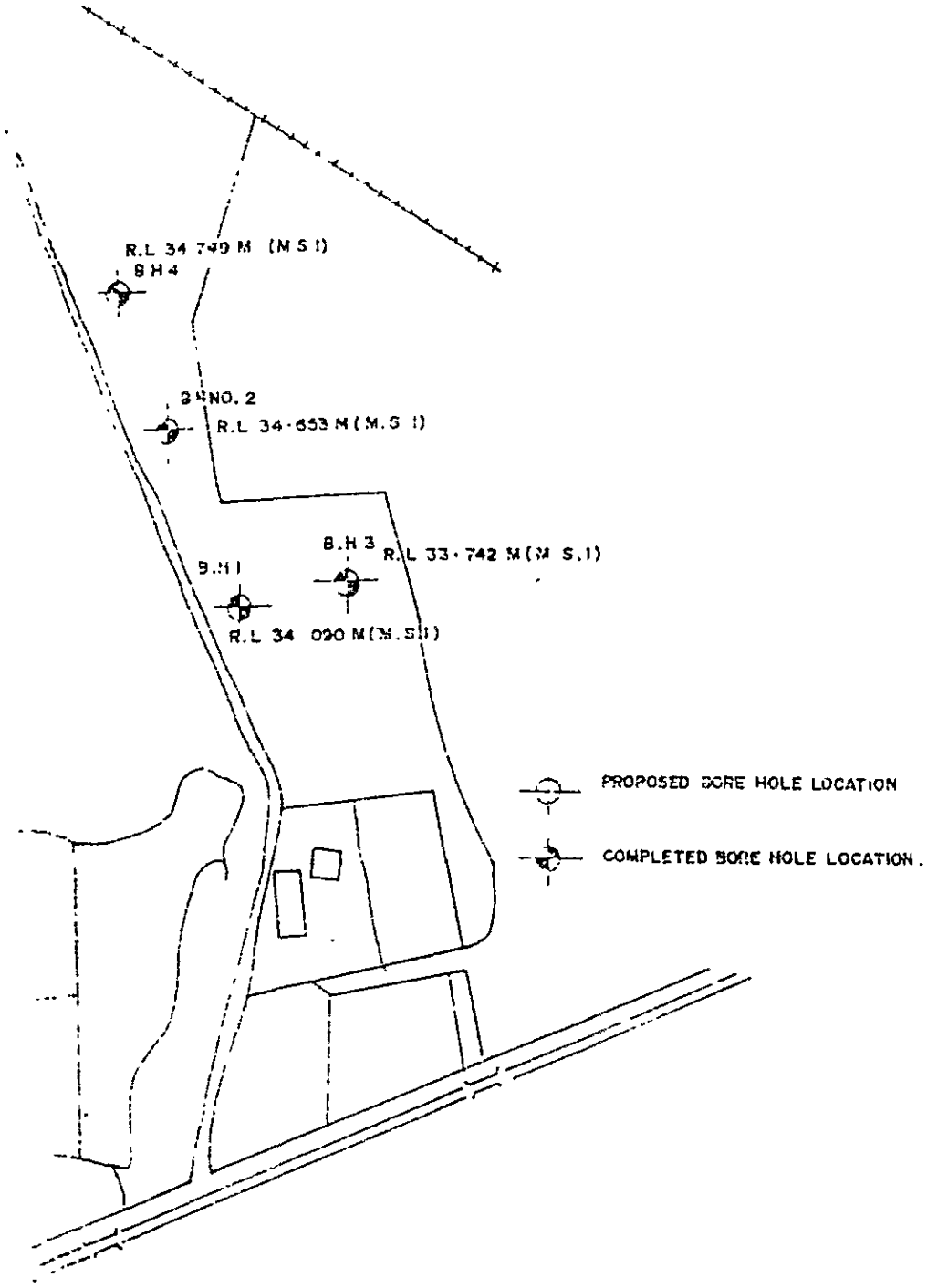


TERMINOLOGY USED TO DENOTE THE PERCENTAGE BY WEIGHT OF EACH COMPONENT

DESCRIPTIVE TERM	RANGE OF PROPORTION
TRACE	1 - 9 %
SOME	10 - 19 %
ADJECTIVE (eg Sandy, Silty)	20 - 34 %
AND (Major soil)	⩾35 %

TERMINOLOGY USED TO INDICATE THE CONSISTENCY OF THE UNDISTURBED MATERIAL

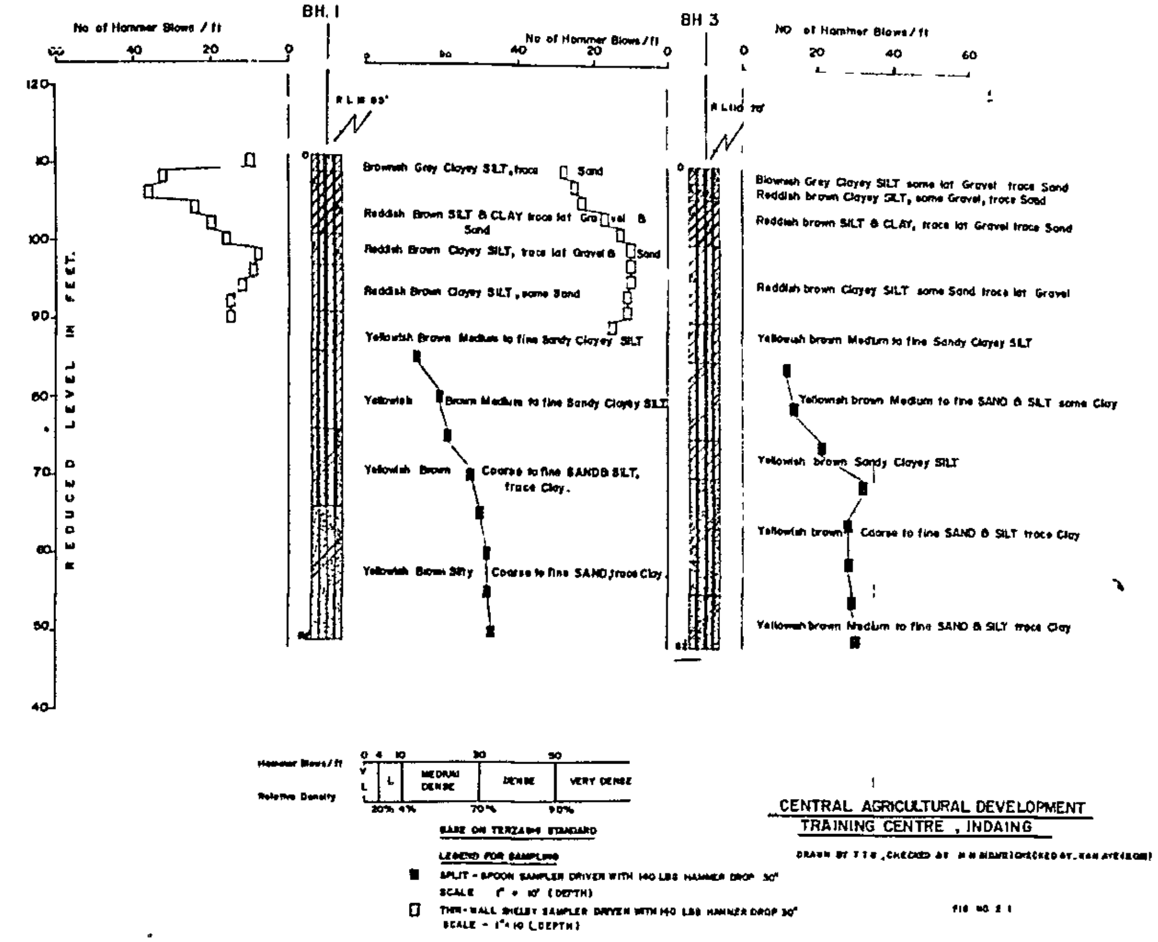
DESCRIPTIVE TERM	RANGE OF UNCONFINED COMPRESSIVE STRENGTH	
	TON PER SQUARE FOOT	KILO NEWTON PER SQUARE METER
VERY SOFT	<0 20	<20
SOFT	0·20 - 0 40	20 - 40
FIRM OR MEDIUM STIFF	0 40 - 0 75	40 - 75
STIFF	0·75 - 1·50	75 - 150
VERY STIFF	1·50 - 3·00	150 - 300
HARD	>3·00	>300

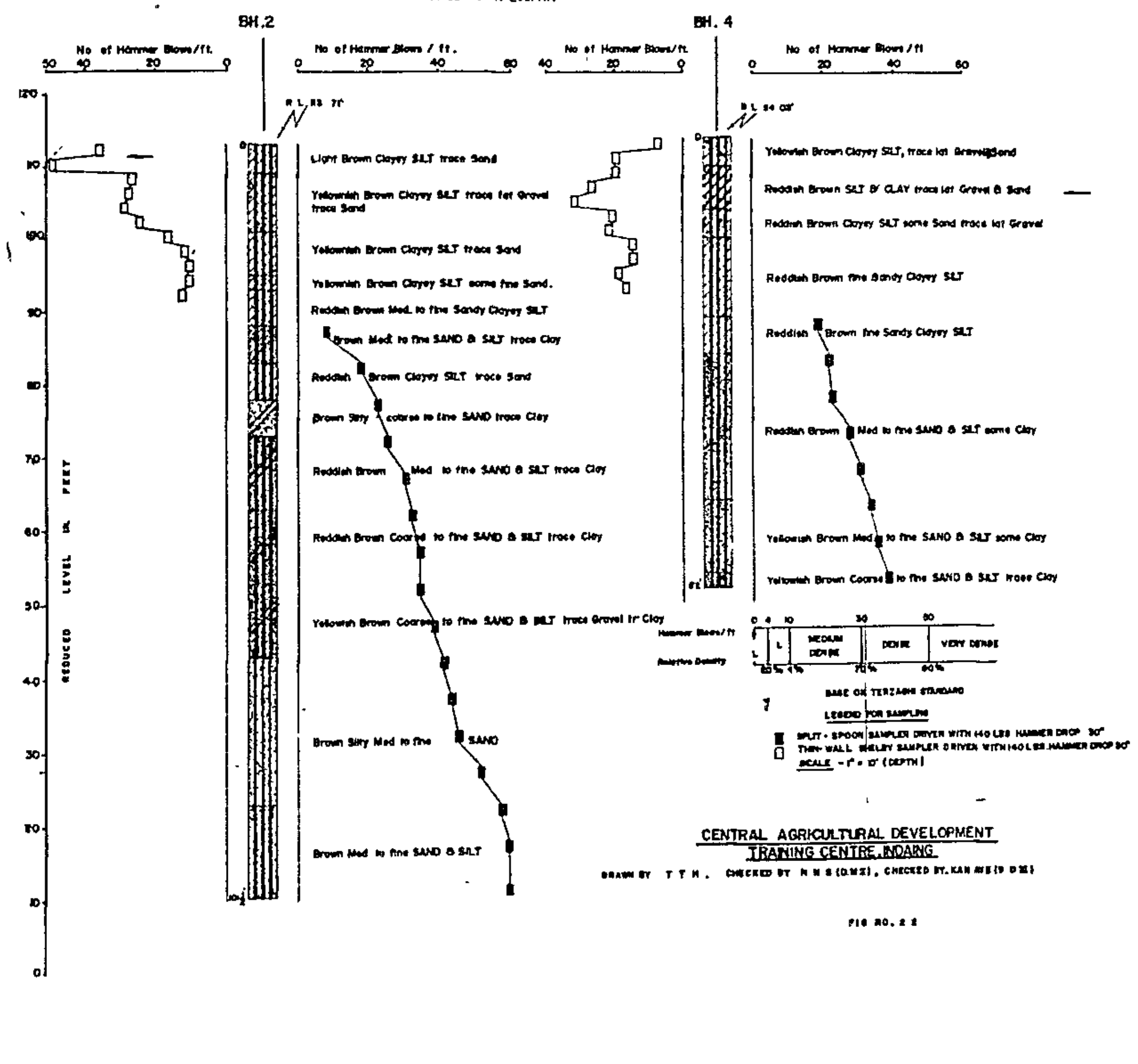


CENTRAL AGRICULTURAL DEVELOPMENT TRAINING CENTRE,

INDAING.

FIG : NO. 1 - 1


BH. I
BH 3
No of Hammer Blows / ft
REDUCED LEVEL IN FEET.
Brownish Grey Clayey SILT, trace Sand
Reddish Brown SILT & CLAY trace lat Gravel & Sand
Reddish Brown Clayey SILT, trace lat Gravel & Sand
Reddish Brown Clayey SILT, some Sand
Yellowish Brown Medium to fine Sandy Clayey SILT
Yellowish Brown Medium to fine Sandy Clayey SILT
Yellowish Brown Coarse to fine SAND & SILT, trace Clay.
Yellowish Brown Silty Coarse to fine SAND, trace Clay
Blowish Grey Clayey SILT some lat Gravel trace Sand
Reddish brown Clayey SILT, some Gravel, trace Sand
Reddish brown SILT & CLAY, trace lat Gravel trace Sand
Reddish brown Clayey SILT some Sand trace lat Gravel
Yellowish brown Medium to fine Sandy Clayey SILT
Yellowish brown Medium to fine SAND & SILT some Clay
Yellowish brown Sandy Clayey SILT
Yellowish brown Coarse to fine SAND & SILT trace Clay
Yellowish brown Medium to fine SAND & SILT trace Clay
Hammer Blows / ft
Relative Density
MEDIUM DENSE
DENSE
VERY DENSE
BASE ON TERZAGHI STANDARD
LEGEND FOR SAMPLING
SPLIT - SPOON SAMPLER DRIVEN WITH 140 LBS HAMMER DROP 30"
SCALE 1" = 10' (DEPTH)
THIN-WALL SHELBY SAMPLER DRIVEN WITH 140 LBS HAMMER DROP 30"
SCALE - 1" = 10 (DEPTH)
CENTRAL AGRICULTURAL DEVELOPMENT
TRAINING CENTRE , INDAING


BH.2
BH. 4
No of Hammer Blows / ft.
REDUCED LEVEL IN FEET
Light Brown Clayey SILT trace Sand
Yellowish Brown Clayey SILT trace lat Gravel trace Sand
Yellowish Brown Clayey SILT trace Sand
Yellowish Brown Clayey SILT some fine Sand.
Reddish Brown Med. to fine Sandy Clayey SILT
Brown Med. to fine SAND & SILT trace Clay
Reddish Brown Clayey SILT trace Sand
Brown Silty coarse to fine SAND trace Clay
Reddish Brown Med to fine SAND & SILT trace Clay
Reddish Brown Coarse to fine SAND & SILT trace Clay
Yellowish Brown Coarse to fine SAND & SILT trace Gravel & Clay
Brown Silty Med to fine SAND
Brown Med to fine SAND & SILT
Yellowish Brown Clayey SILT, trace lat Gravel & Sand
Reddish Brown SILT & CLAY trace lat Gravel & Sand
Reddish Brown Clayey SILT some Sand trace lat Gravel
Reddish Brown fine Sandy Clayey SILT
Reddish Brown fine Sandy Clayey SILT
Reddish Brown Med to fine SAND & SILT some Clay
Yellowish Brown Med to fine SAND & SILT some Clay
Yellowish Brown Coarse to fine SAND & SILT trace Clay
Hammer Blows / ft
Relative Density
MEDIUM DENSE
DENSE
VERY DENSE
BASE ON TERZAGHI STANDARD
LEGEND FOR SAMPLING
SPLIT - SPOON SAMPLER DRIVEN WITH 140 LBS HAMMER DROP 30"
THIN-WALL SHELBY SAMPLER DRIVEN WITH 140 LBS HAMMER DROP 30"
SCALE - 1" = 10' (DEPTH)
CENTRAL AGRICULTURAL DEVELOPMENT
TRAINING CENTRE, INDAING

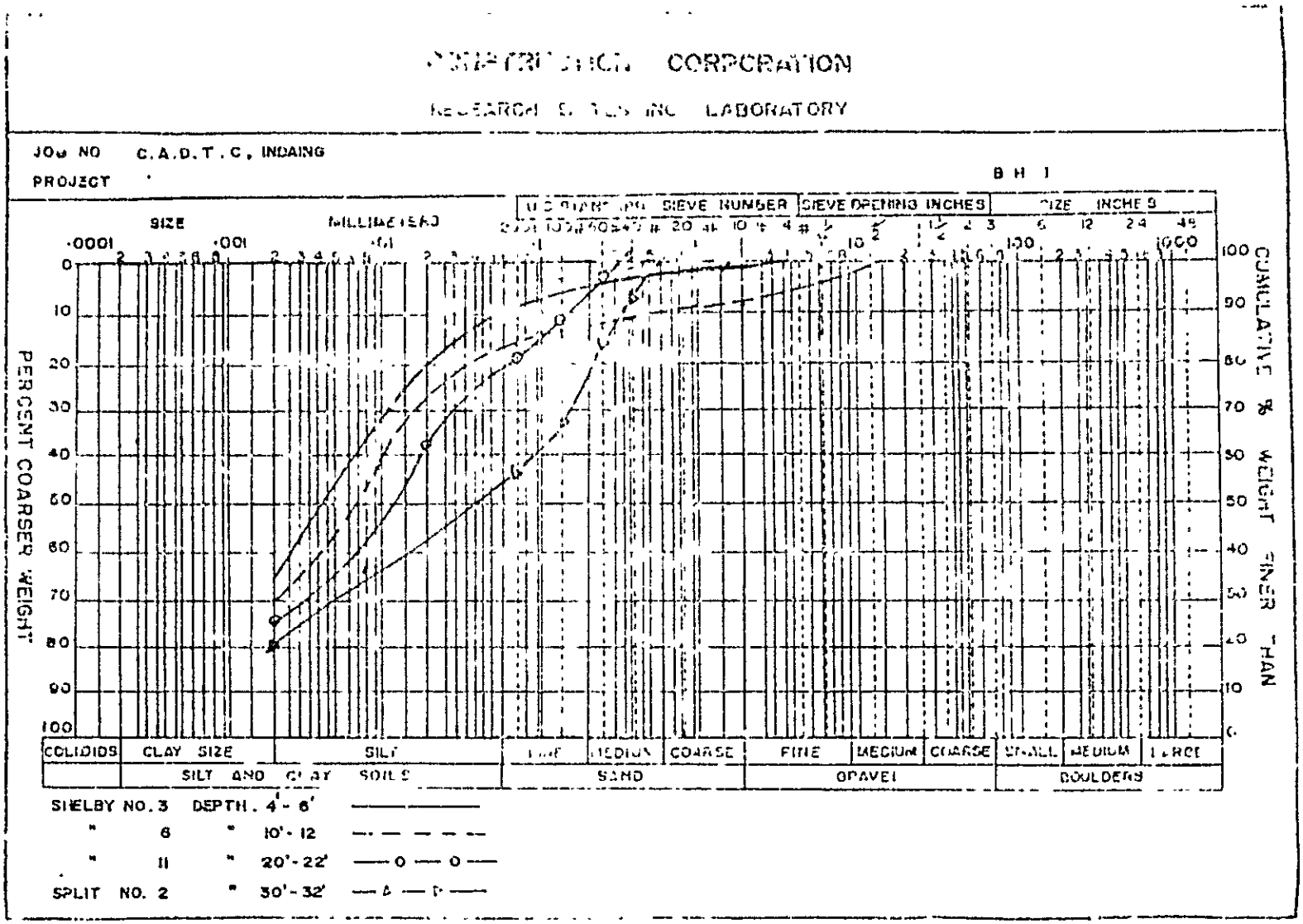


Fig 5-1 GRAIN SIZE DISTRIBUTION

CONSTRUCTION CORPORATION

RESEARCH & TESTING LABORATORY

JOB NO C.A D.T.C, INDAING

PROJECT

B.H. 2

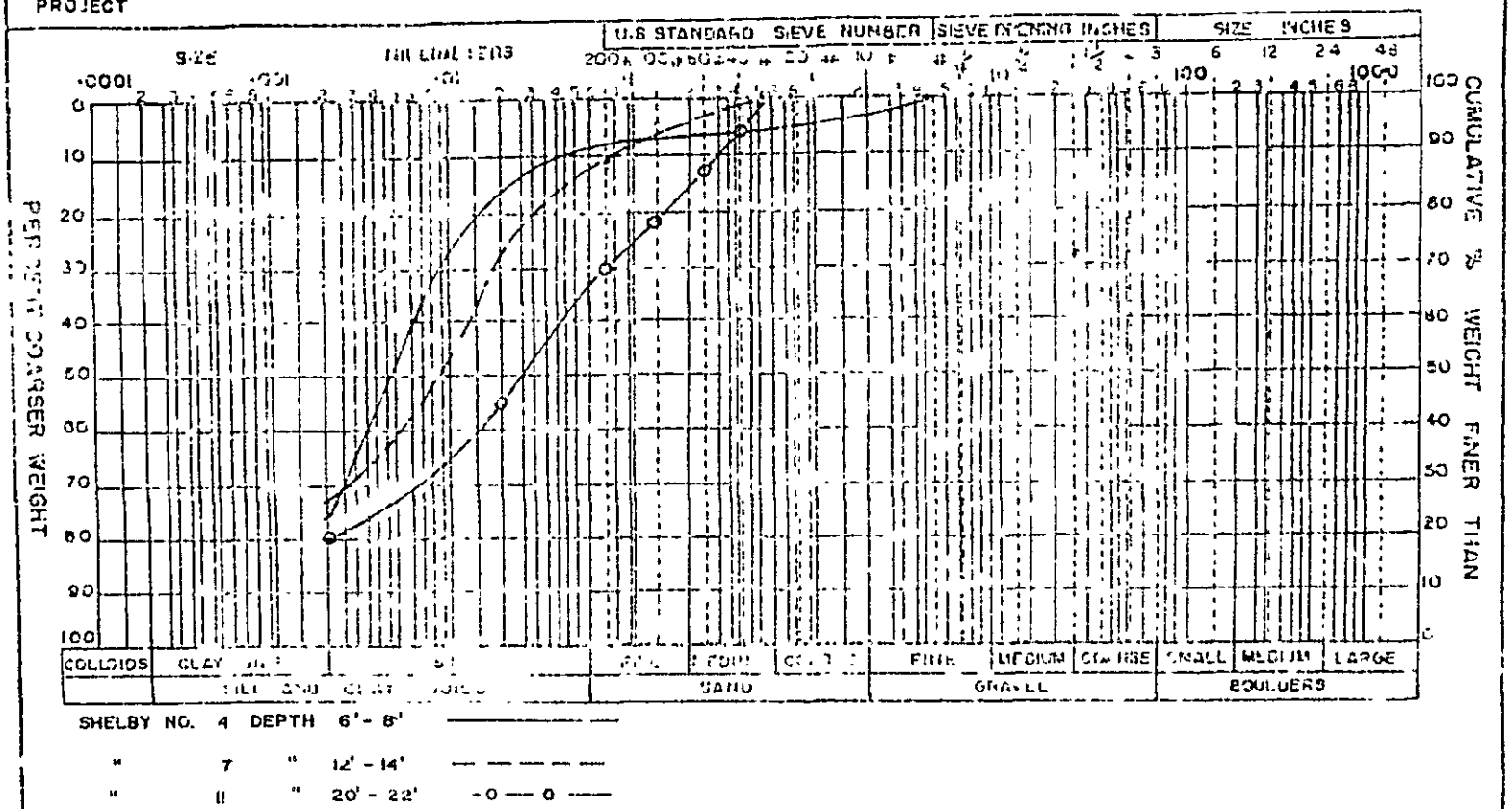


Fig 3-2 GRAIN SIZE DISTRIBUTION

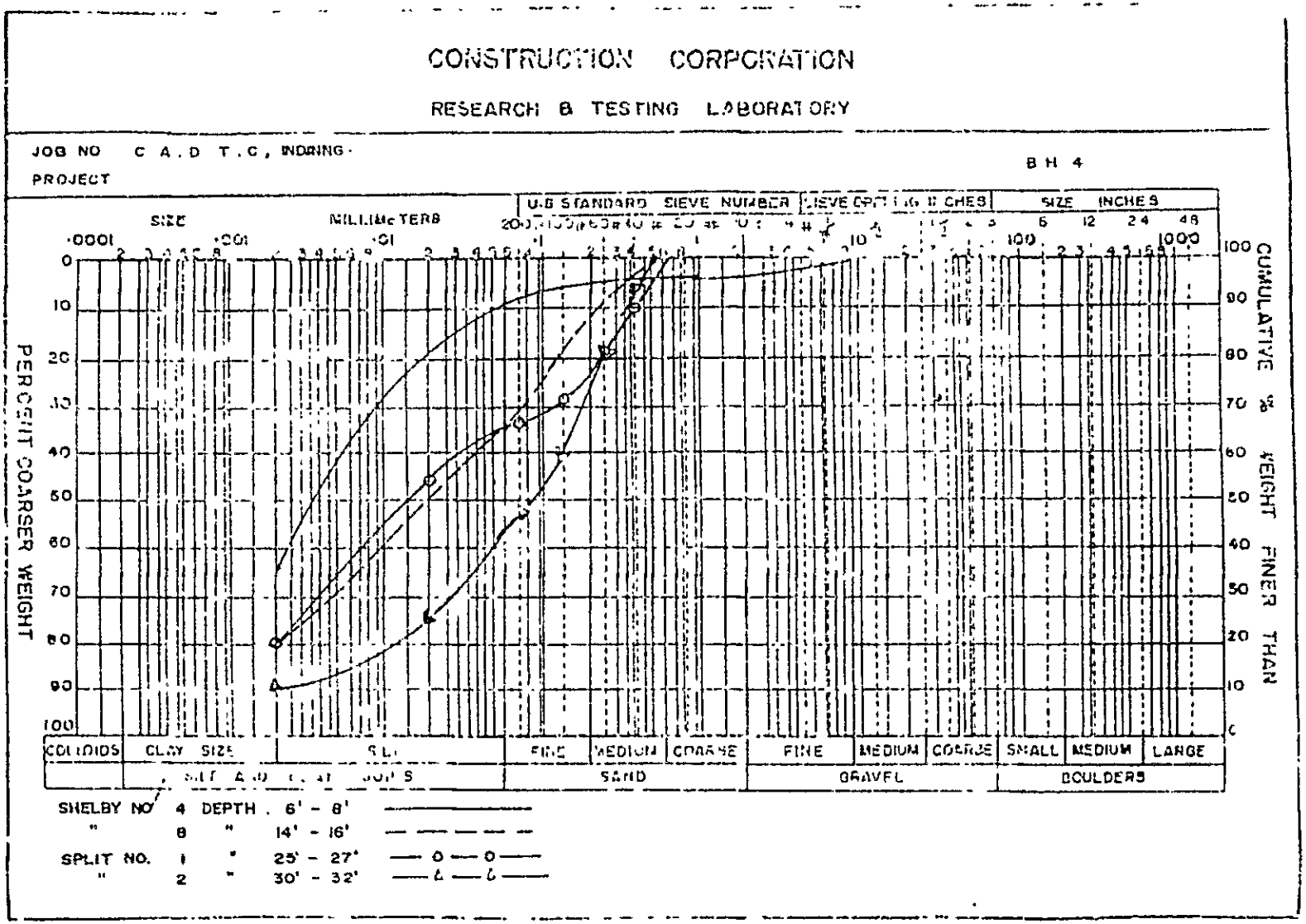


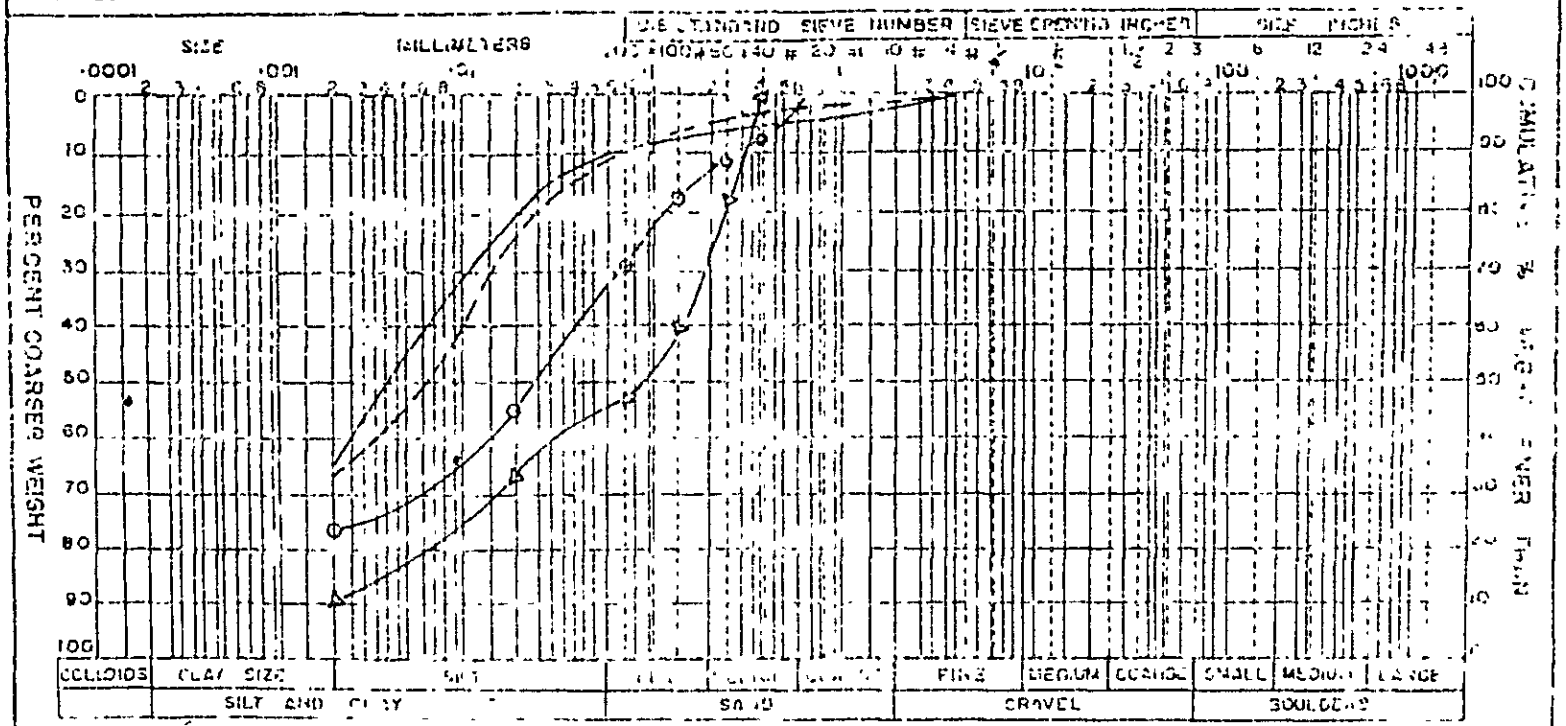
FIG 3-5 GRAIN SIZE DISTRIBUTION

CONSTRUCTION CORPORATION

[illegible] TESTING LABORATORY

JOB NO C.A.D.T.C, INDAING.

PROJECT B.H. 3



SHELBY NO. 3 DEPTH 4' - 6'

" 6 " 10' - 12'

" 11 " 20' - 22'

SPLIT NO. 2 " 30' - 32'

Fig 5-4 GRAIN SIZE DISTRIBUTION

CONSTRUCTION CORPORATION

RESEARCH & TESTING LABORATORY

JOB NO C A D T.C, INDIANA

PROJECT

B H 4

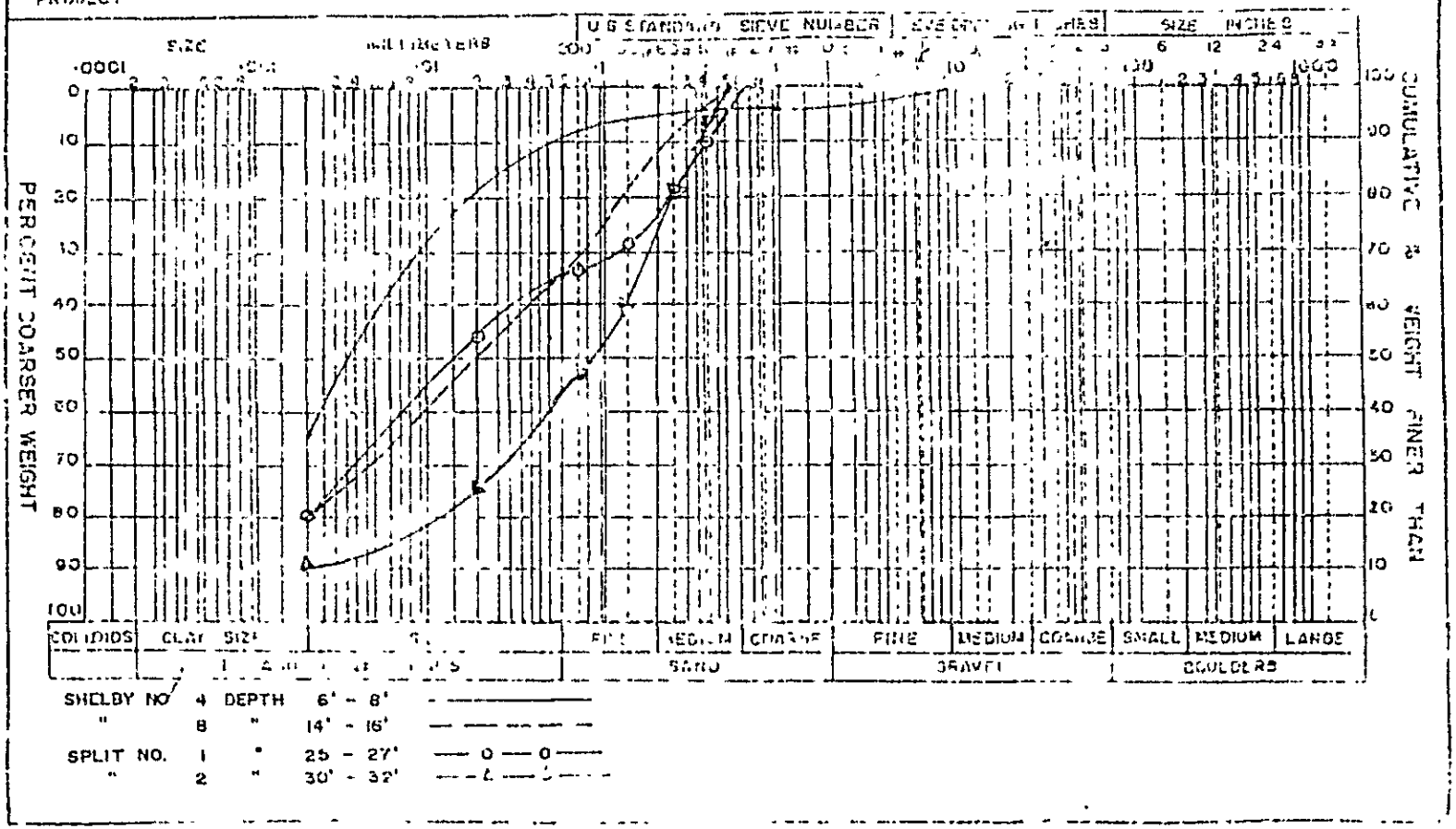
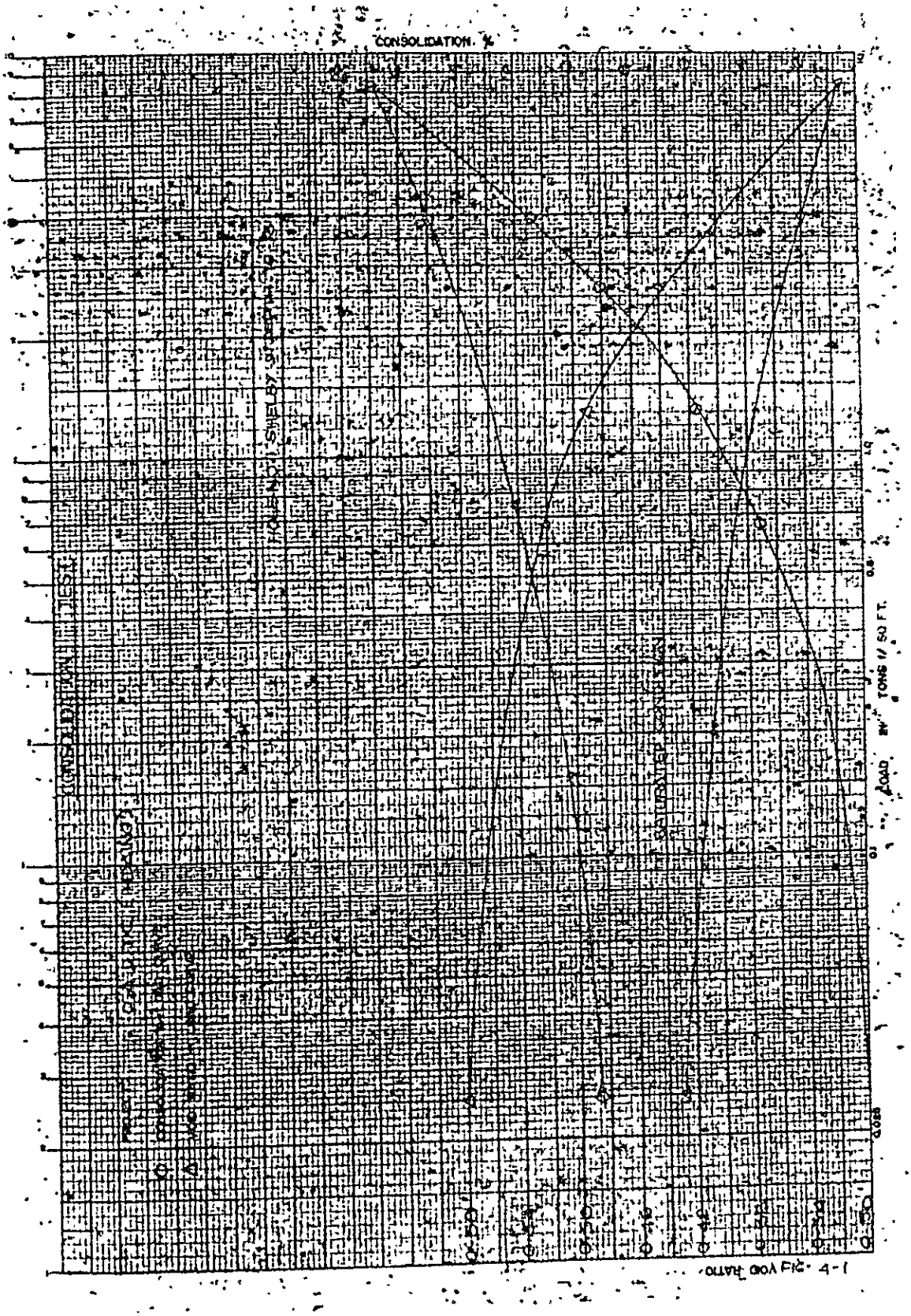
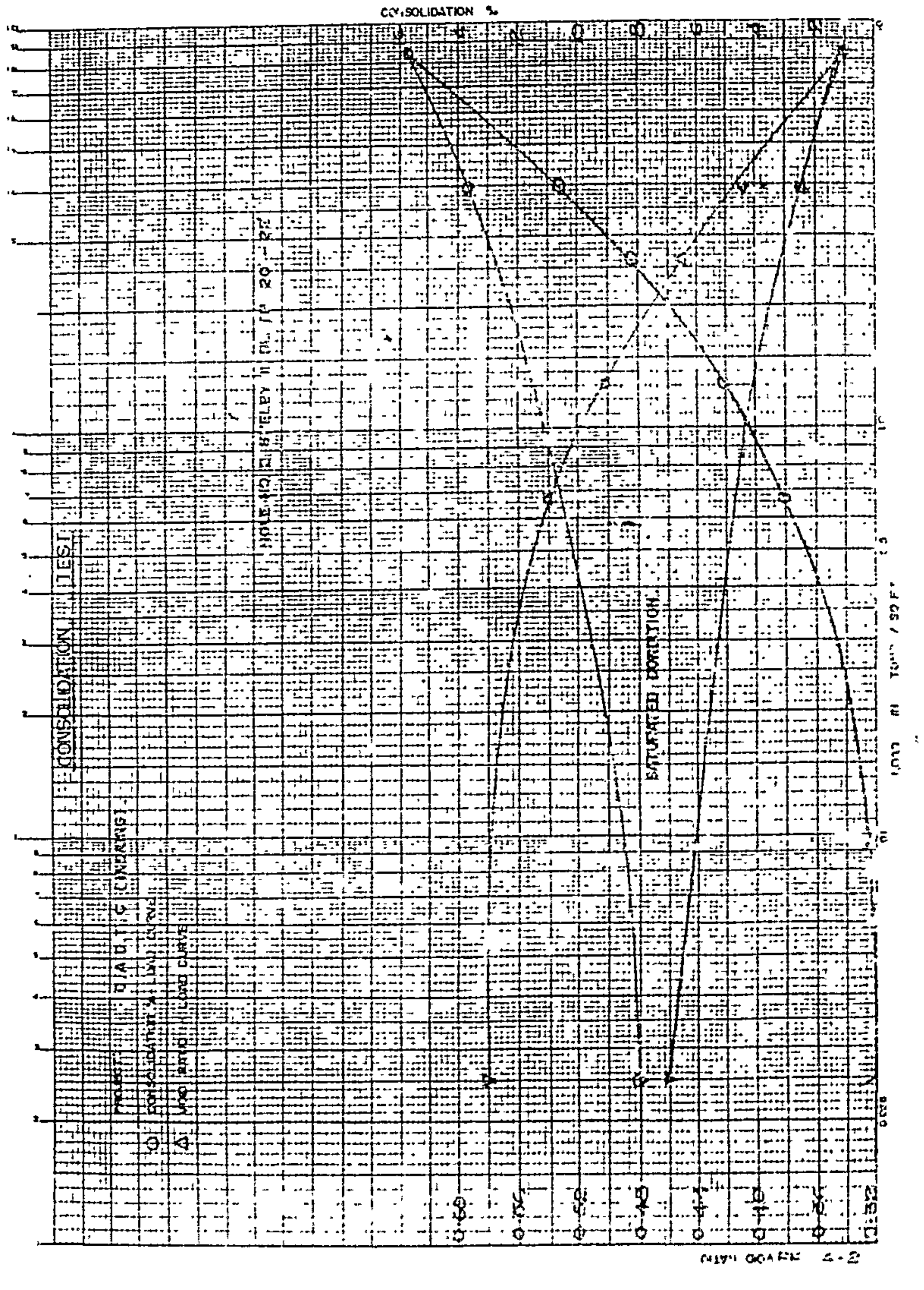


FIG 3-6 GRAIN SIZE DISTRIBUTION


CONSOLIDATION, %
TONS / SQ FT.


CONSOLIDATION %
CONSOLIDATION TEST
SATURATED CONDITION

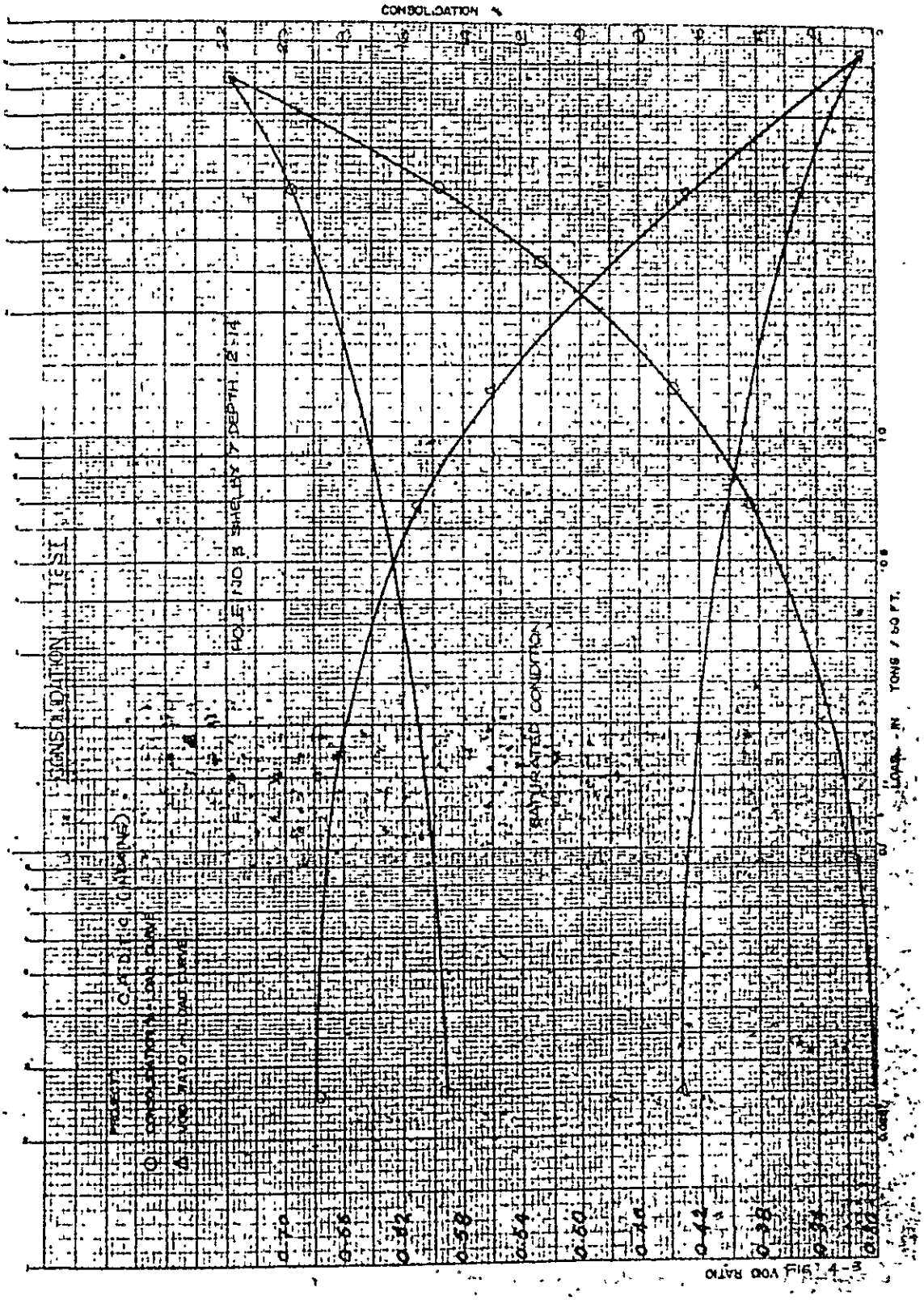

CONSOLIDATION
CONSOLIDATION TEST
HOLE NO B SHELBY @ DEPTH 2'-11"
NATURALATED CONDITION
LOAD - IN TONS / SQ FT.
VOID RATIO

FIG. 4-3

TABLE 1.1 NATURAL MOISTURE CONTENT,WET&DRY DENSITIES&UNCONFINED COMPRESSION TEST.

JOB: C.A.D.T.C.(INDAING). BORE HOLE NO.(1).

SHE'SPL' LBY'IT.' NO.'NO.'	DEPTH F T.	VISUAL CLASSIFICATION	MOISTURE 'CONTENT' %	DENSITIES Lb/Cu.Ft. WET	DENSITIES Lb/Cu.Ft. DRY	UCS.TEST RESULTS 'STRENGTH' 'Lb/Sq.Ft'	UCS.TEST RESULTS STRAIN %	NO.OF BLOW PER Ft(N).
1 -	0 - 2	Brownish grey Clayey SILT, trace Sand.	11.75	117.90	105.50	-	-	10
2 -	2 - 4	Reddish brown SILT&CLAY, trace lateritic Gravel, trace Sand.	14.26	129.59	113.42	-	-	32
			14.10	130.70	114.55	-	-	36
3 -	4 - 6	- do -	20.71	128.91	106.79	-	-	24
4 -	6 - 8	- do -	21.76	127.07	104.36	5136	11.75	20
5 -	8 -10	- do -						
6 -	10 -12	Reddish brown Clayey SILT, trace Gravel and Sand.	22.18	125.08	102.37	4207	11.75	16
			23.19	123.08	99.91	2029	13.50	8
7 -	12 -14	- do -	22.82	123.84	100.83	2035	8.50	9
8 -	14 -16	Reddish brown Clayey SILT, some Sand.	22.71	126.00	102.68	-	-	12
9 -	16 -18	- do -	22.33	126.64	103.53	-	-	15
10 -	18 -20	- do -						
11 -	20 -22	Yellowish brown medium to fine Sandy Clayey S I L T.	22.20	127.81	104.59	-	-	15
1	25 -27	- do -	21.97	-	-	-	-	14
2	30 -32	- do -	20.83	-	-	-	-	20
3	[illegible]	Yellowish brown coarse to fine SAND&SILT, trace Clay.	19.73	-	-	-	-	22
4	40 -42	- do -	19.04	-	-	-	-	28
5	45 -47	Yellowish brown Silty coarse to fine SAND, trace Clay.	18.97	-	-	-	-	30
6	50 -52	- do -	18.63	-	-	-	-	32
7	55 -57	- do -	18.35	-	-	-	-	32
8	60 -62	- do -	17.76	-	-	-	-	33

TABLE 1.2.NATURAL MOISTURE CONTENT,WET&DRY DENSITIES&UNCONFINED COMPRESSION TEST.

JOB: C...D.T.C.(INDAING). BORE HOLE NO. (2).

SHE'SPL' LBY'IT.' NO.'NO.'	DEPTH F T.	VISUAL CLASSIFICATION	MOISTURE 'CONTENT' %	DENSITIES Lb/Cu.Ft. WET	DENSITIES Lb/Cu.Ft. DRY	UCS.TEST RESULTS 'STRENGTH 'Lb/Sq.Ft.'	UCS.TEST RESULTS 'STRAIN %	NO.OF BLOW PER 'FT.(N)
1 -	0 - 2	Light brown Clayey SILT, trace Sand.	10.59	124.12	112.23	-	-	35
2 -	2 - 4	- do -	9.17	124.89	114.40	-	-	48
3 -	4 - 6	Yellowish brown Clayey SILT, trace lateritic Gravel & Sand.	11.09	122.33	110.12	6200	12.00	26
			11.29	122.84	110.38	5980	11.75	27
4 -	6 - 8	- do -	11.89	123.94	110.77	-	-	28
5 -	8 -10	- do -	12.[illegible]	121.71	108.45	6000	12.80	24
6 -	10 -12	- do -	20.44	125.98	104.60	-	-	16
7 -	12 -14	Yellowish brown Clayey SILT, trace Sand.	22.50	123.11	100.50	-	-	11
8 -	14 -16	- do -	22.69	121.19	98.78	2100	15.5	10
9 -	16 -18	- do -	21.45	121.09	99.70	-	-	10
10 -	18 -[illegible]	Yellowish brown Clayey SILT, some fine Sand.	20.40	123.18	102.31	-	-	12
11 -	20 -[illegible]	Reddish brown medium to fine Sandy Clayey SILT.	19.37	-	-	-	-	8
1	25 -27	Brown medium to fine SAND&SILT,trace Clay.	21.12	-	-	-	-	18
2	30 -32	Reddish brown Clayey SILT, trace Sand.	18.65	-	-	-	-	23
3	[illegible] -37	Brown Silty coarse to fine SAND,trace Clay.	17.96	-	-	-	-	[illegible]
4	[illegible] -42	Reddish brown medium to fine SAND&SILT, trace Clay.	16.64	-	-	-	-	31
5	[illegible] -47	- do -	16.45	-	-	-	-	33
6	[illegible] -52	Reddish brown coarse to fine SAND&SILT, trace Clay.	16.32	-	-	-	-	35
7	[illegible] -57	- do -	16.26	-	-	-	-	35
8	60 -62	Yellowish brown coarse to fine SAND&SILT, trace Gravel, trace Clay.	16.08	-	-	-	-	39
9	65 -67	- do -	15.80	-	-	-	-	42
10	70 -72	Brown Silty medium to fine S A N D.	15.60	-	-	-	-	44
11	75 -77	Brown Silty medium to fine S A N D.	15.45	-	-	-	-	46
12	80 -82	- do -	15.05	-	-	-	-	52
13	85 -86½	- do -	14.80	-	-	-	-	58
14	90 -91½	Brown medium to fine SAND & SILT.	14.55	-	-	-	-	60
15	95 -96½	- do -	14.45	-	-	-	-	60
16	100-101½	- do -						

TABLE 1.3.NATURAL MOISTURE CONTENT,WET&DRY DENSITIES&UNCONFINED COMPRESSION TEST.

JOB: C.A.D.T.C.(INDAING). BORE HOLE NO. 3.

SHELBY NO.	SPLIT NO.	DEPTH Ft.	VISUAL CLASSIFICATION	MOISTURE CONTENT %	DENSITIES Lb/Cu.Ft. WET	DENSITIES Lb/Cu.Ft. DRY	U.C.S.TEST RSLT STRENGTH Lb/sq.ft.	U.C.S.TEST RSLT STRAIN %	NO.OF BLOWS PER Ft."N"
1		0-2	BrownishGreyClayeySILT,someLat:Grl;tr:Sand.	10.45	126.67	114.70	-	-	28
2		2-4	ReddishBrownClayeySILT,someLat:Grl;tr:Sand.	14.41	128.69	112.48	-	-	25
3		4-6	ReddishBrownSILT&CLAY,tr:Lat:Grl:&Sand.	22.62	129.49	105.60	6271	10.50	23
4		6-8	- do -	23.04	125.87	102.30	4233	11.75	17
5		8-10	- do -	25.39	126.02	100.50	3075	13.00	13
6		10-12	ReddishBrownClayeySILT,someSand,trLat:Grl.	27.72	124.27	97.30	2062	11.75	10
7		12-14	- do -	28.00	123.58	96.55	-	-	10
8		14-16	- do -	28.10	124.19	96.95	1950	16.75	10
9		16-18	- do -	27.39	124.59	97.80	-	-	11
10		18-20	- do -	26.50	125.34	99.08	-	-	11
11		20-22	YellowishBrownMed:to fineSandy&ClayeySILT.	25.58	128.39	102.24	-	-	15
	1	25-27	YellowishBrownMed:to fineSAND&SILT,someClay.	24.42	-	-	-	-	12
	2	30-32	- do -	23.47	-	-	-	-	14
	3	35-37	YellowishBrownSandy&Clayey SILT.	22.76	-	-	-	-	21
	4	40-42	YellowishBrownCoarse to fineSAND&SILT,trClay.	20.21	-	-	-	-	22
	5	45-47	- do -	18.75	-	-	-	-	28
		[illegible]	- do -	18.64	-	-	-	-	28
	7	[illegible]-57	YellowishBrownMed:to fineSAND&SILT,tr:Clay.	18.46	-	-	-	-	29
	8	60-62	- do -	18.26	-	-	-	-	30

TABLE 1.4.NATURAL MOISTURE CONTENT,WET&DRY DENSITIES&UNCONFINED COMPRESSION TEST.

JOB: C.A.D.T.C.(INDAING). BORE HOLE NO. 4.

SHELBY NO.	SPLIT NO.	DEPTH Ft.	VISUAL CLASSIFICATION	MOISTURE CONTENT %	DENSITIES Lb/Cu.Ft. WET	DENSITIES Lb/Cu.Ft. DRY	U.C.S.TEST RSLT STRENGTH Lb/sq.ft.	U.C.S.TEST RSLT STRAIN %	NO. OF Blows Per Ft."N"
1		0-2	YellowishBrownClayeySILT,tr:Lat:Grl:&Sand.	16.60	114.36	98.08	-	-	7
2		2-4	- do -	14.87	123.83	107.80	-	-	19
3		4-6	ReddishBrownSILT&CLAY,tr:Lat:Gravel&Sand.	16.40	126.20	108.42	5100	10.80	19
4		6-8	- do -	15.63	128.29	110.95	6320	11.80	26
5		8-10	- do -	15.00	129.36	112.50	-	-	31
6		10-12	ReddishBrownClayeySILT,someSand,tr:Lat:Grl.	19.20	126.64	106.26	-	-	20
7		12-14	- do -	19.96	128.29	106.94	-	-	21
8		14-16	ReddishBrown fine Sandy&Clayey SILT.	21.19	126.72	104.56	-	-	14
9		16-18	- do -	20.94	126.70	104.78	1950	13.35	14
10		18-20	- do -	20.35	128.00	106.36	-	-	18
11		20-22	- do -	20.73	127.27	105.42	-	-	16
	1	25 27	Reddish brown fine Sandy&Clayey SILT.	19.20	-	-	-	-	19
	2	30-32	ReddishBrownMed:to fine SAND&SILT,someClay.	18.80	-	-	-	-	22
	3	35-37	- do -	18.56	-	-	-	-	23
	4	40-42	- do -	17.63	-	-	-	-	28
	5	45-47	- do -	17.35	-	-	-	-	31
	6	50-52	YellowishBrownMed:to fineSAND&SILT,someClay.	17.24	-	-	-	-	34
	7	55-57	- do -	17.05	-	-	-	-	36
	8	60-62	Yellowish brown Coarse to fine SAND&SILT, trace Clay.	15.88	-	-	-	-	39

ML/14682*

TABLE 2.1.GRAIN SIZE DISTRIBUTION & ATTERBERG LIMITS TEST.

JOB: C.A.D.T.C., INDAING. BORE HOLE NOS: 1, 2 & 4.

SHELBY NO.	SPLIT NO.	DEPTH Ft.	DESCRIPTION	MECHANICAL ANALYSIS: GRAVEL MEDIUM 25.4mm to 9mm	GRAVEL FINE 9mm to 2mm	SAND COARSE 2mm to 0.6mm	SAND MEDIUM 0.6mm to 0.2mm	SAND FINE 0.2mm to 0.06mm	TEST RESULTS: SILT 0.06mm to 0.002 mm	CLAY Less than 0.002 mm	FINE Minus No.200 Sieve, %	ATTERBERG LIMITS: Liquid Limit %	Plastic Limit %	Plasticity Index %
			BORE HOLE NO. 1.											
3		4-6	Reddish BrownSILT&CLAY,tr:Grl&Sand.	-	1	2	2	5	55	35	91	47.0.	22.5	24.5.
6		10-12	Reddish BrownClayeySILT,tr:Grl&Sand.	-	4	2	2	4	54	30	85	41.0	20.0	21.0
11		20-22	YellowishBrownMed to fineSandy&Clayey SILT.	-	-	-	6	14	54	26	81	35.0	17.0	18.0
	2	30-32	YellowishBrownClayyMod to fine SAND & SILT.	-	-	-	21	24	35	20	56	28.0	14.0	14.0
			BORE HOLE NO. 2.											
4		6-8	YellowishBrownClayeySILT, traceGrl&Sand.	-	3	2	1	3	67	24	92	35.0	17.0	18.0
7		12-14	YellowishBrownClayeySILT, some [illegible]	-	-	-	3	9	61	27	89	37.0	17.5	19.5
11		20-22	ReddishBrown Medium to fine Sandy&Clayey SILT.	-	-	-	16	16	48	20	70	30.0	15.0	15.0
	2	30-32	ReddishBrownClayeySILT, trace Sand.	-	-	-	-	4	67	29	97	41.0	20.0	21.0
	3	35-37	BrownSiltyCoarse to fine SAND, trace Clay.	-	-	9	22	46	20	3	29	-Non Plastic-		

TABLE 2.2.GRAIN SIZE DISTRIBUTION & ATTERBERG LIMITS TEST.

JOB: C.A.D.T.C., INDAING. BORE HOLE NOS: 3 & 4.

SHELBY NO.	SPLIT NO.	DEPTH Ft.	DESCRIPTION	MECHANICAL ANALYSIS: GRAVEL MEDIUM 25.4mm to 9 mm	GRAVEL FINE 9 mm to 2 mm	SAND COARSE 2 mm to 0.2mm	SAND MEDIUM 0.2mm to 0.06mm	SAND FINE 0.06mm to 0.2mm	TEST RESULTS: SILT 0.06mm to 0.002 mm	CLAY Less than 0.002 mm	FINE Minus No.200 Sieve, %	ATTERBERG LIMITS: Liquid Limit %	Plastic Limit %	Plasticity Index %
			BORE HOLE NO. 3.											
3		4-6	ReddishBrownSILT&CLAY, traceGravel&Sand.	-	2	2	3	3	54	36	90	48.0	23.0	25.0
6		10-12	ReddishBrownClayeySILT, someSand,tr:Gravel.	-	1	1	3	6	55	34	90	44.0	22.0	22.0
11		20-.	YellowishBrown medium to fineSandy&ClayeySILT.	-	-	2	11	19	44	24	70	34.0	17.0	17.0
	2	30-32	YellowishBrown medium to fineSAND&SILT,someClay.	-	-	-	27	27	36	10	47	-Non Plastic-		
			BORE HOLE NO. 4.											
4		6-8	ReddishBrownSILTY, traceGravel&Sand.	1	2	1	1	4	55	36	92	49.0	24.0	25.0
8		14-16	ReddishBrownSandyClayey SILT.	-	-	-	11	21	48	20	69	30.0	15.0	15.0
	1	25-27	- do -	-	-	1	20	13	46	20	67	30.0	15.0	15.0
	2	30-32	ReddishBrown medium to fine SAND&SILT,someClay.	-	-	-	26	29	35	10	48	-Non Plastic-		

TABLE 3.1. CONSOLIDATION TEST RESULTS.

JOB: C.A.D.T.C., INDAING. BORE HOLE NOS. 1, 2 & 3.

DRILL HOLE NO.	SHELBY NO.	DEPTH Ft.	VISUAL CLASSIFICATION	MOISTURE CONTENT %	DRY DENSITY Lbs/cu.ft.	CONSOLIDATION PERCENT Tons per square foot 0.2	1.0	2.0	4.0	8.0
1.	9	16-18	Clayey SILT, some Sand.	22.71	102.68	2.8	4.8	7.6	11.5	16.5
2.	11	20-22	Sandy & Clayey SILT.	20.40	102.31	2.4	4.2	6.9	10.7	15.4
3.	7	12-14	ClayeySILT,someSand,traceGravel.	28.00	96.55	3.4	5.7	9.4	14.9	21.4

APPENDIX 4. Related Informations for the CADTC

1) Estimated Payment Schedule for Staff

Sr. No.	Description	Pay Scale	Quantity	Kyats/ month	Kyats/ year	Remarks
1	2	3	4	5	6	7
	Project Manager's Office					
1	Project Manager	1300	1	1300	15600	
2	Dy. Project Manager	1000-50-1200	1	1200	14400	
3	Training Instructor	450-25- 700	1	700	8400	
4	Superintendent	400-20- 520	1	520	6240	
5	Asst. Tr. Instructor	320-15- 440	1	440	5280	
6	Demonstrator	320-15- 440	1	440	5280	
7	B.C	300-15- 420	1	420	5040	
8	Store Keeper	300-15- 420	1	420	5040	
9	Accountant	300-15- 420	1	420	5040	
10	Training Asst.	210-15- 330	1	330	3960	
11	Sr. Typist	210-15- 330	2	660	7920	
12	U.D.C	185-15- 305	4	305	3660	
13	Record Keeper	185-15- 305	1	305	3660	
14	L.D.C	150-10- 220	8	1760	21120	
15	Tr. Typist	150-10- 220	2	440	5280	
16	Driver	130-10- 200	3	600	7200	
17	Watchman	100- 2- 110	4	440	5280	
			34	10700	128400	
	Training Section					
1	Lecturer	800-40-1000	4	4000	48000	
2	Asst. Lecturer	500-30- 800	5	4000	48000	
3	Tr. Instructor	450-25- 700	5	3500	42000	
4	Asst. Tr. Instructor	320-15- 440	5	2200	26400	
5	Demonstrator	320-15- 440	5	2200	26400	
6	Tr. Asst.	210-15- 330	10	3300	39600	
			34	19200	230400	
	Field Section					
1	Farm Manager	500-30- 800	1	800	9600	
2	Field Instructor	450-25- 700	1	700	8400	
3	Agri. Engy.	450-25- 700	1	700	8400	
4	Asst. Field Instructor	320-15- 440	1	440	5280	
5	Foreman	320-15- 440	1	440	5280	
6	Demonstrator	320-15- 440	1	440	5280	
7	Field Asst.	210-15- 330	1	330	3960	
8	Mechanic I	210-15- 330	1	330	3960	
9	Mechanic II	150-10- 220	1	220	2640	
			9	4400	5280	
	Audio-Visual Section					
1	Sr. Photographer	320-15- 440	1	440	5280	
2	Tr. Photographer	185-15- 305	2	610	7320	
3	Projectionist	185-15- 305	1	305	660	
4	Processor/Designer	185-15- 305	4	1220	14640	
5	Electrician	185-15- 305	1	305	3660	
6	Asst. Electrician	150-10- 220	1	220	2640	
			10	3100	37200	
	Publication Section					
1	Sr. Publicity Officer	500-30- 800	1	800	9600	
2	Tr. Publicity Officer	450-25- 700	1	700	8400	
3	Librarian	450-25- 700	1	700	8400	
4	Asst. Publicity Officer	320-15- 440	1	440	5280	
5	Mechanist	320-15- 440	1	440	5280	
6	Foreman	320-15- 440	1	440	5280	
7	U.D.C	185-15- 305	2	610	7320	
8	Record Keeper	185-15- 305	1	305	3660	
9	Compositor	150-10- 220	2	440	5280	
10	L.D.C	150-10- 220	3	660	7920	
			14	5535	66420	
	Total Estimated Payment					
1	Project Manager's Office		34	10700	128400	
2	Training Section		34	19200	230400	
3	Field Section		9	4400	52800	
4	Audio-Visual Section		10	3100	37200	
5	Publication Section		14	5535	66420	
			101	42935	515220	

Source: Agriculture Corporation (March, 1982)

2) Staff Requirement (1)

	Office/Section	Description	Minimum Qualification	Total No.	Year I	Year II	Year III	Source
1	2	3	4	5	6	7	8	9
	Project Manager's Office							
	(Monitoring & Evaluation)	1. Project Manager	B.Age PG Training & (10) Yrs exper.	1	1			AC
		2. Dy. Proj. Manager	B.Age PG Training & (10) Yrs exper.	1	1			AC
		3. Training Instructor	B.Age (6) Yrs exper.	1		1		AC
		4. Asst. Tr. Instructor	B.Ag (4) Yrs. exp/ Dip (8) Yrs	1	1			AC
		5. Demonstrator	B.Ag (2) Yrs. exp/ Dip. (5) Yrs.	1		1		AC
		6. Training Asst.	B.Ag/Dip	1	1			AC
		7. U.D.C	BEHS + exper.	2	1	1		AC
		8. L.D.C	BEHS	4	2	2		NR
		9. Sr. Typist	BEHS + exper.	1		1		AC
		10. Tr. Typist	BEHS	1	1			NR
		11. Record Keeper	BEHS	1		1		AC
	(Administration & Budget)	1. Superintendent	BEHS + exper.	1	1			AC
		2. B.C	BEHS + exper.	1		1		AC
		3. U.D.C	BEHS + exper.	2	1	1		AC
		4. L.D.C	BEHS	4	2	2		NR
		5. Store Keeper	BEHS + exper.	1	1			AC
		6. Accountant	Account grade I & II passed	1	1			AC
		7. Sr. Typist	BEHS + exper	1	1			AC
		8. Tr. Typist	BEHS	1		1		NR
		9. Driver	-	3	3			NR
		10. Watchman	-	4	4			NR
				34	22	12	-	

Source: Agriculture Corporation (March, 1982)

Staff Requirement (2)

	Office/Section	Description	Minimum Qualification	Total No.	Year I	Year II	Year III	Source
1	2	3	4	5	6	7	8	9
	Training Section							
	(Agronomy)	1. Lecturer	B.Age PG Training & (10) Yrs exper.	1	1			AC/NR
		2. Asst. Lecturer	B.Age PG Training & (5) Yrs exper.	1	1			AC
		3. Tr. Instructor	B.Age (6) Yrs exper.	1		1		AC
		4. Asst. Tr. Instr.	B.Ag (4) Yrs. exp/ Dip (8) Yrs.	1	1			AC
		5. Demonstrator	B.Ag (2) Yrs. exp/ Dip. (5) Yrs.	1	1			AC
		6. Tr. Asst.	B.Ag/Dip	2	1	1		AC
	(Crop Production)	1. Lecturer	B.Age PG Training & (10) Yrs. exper.	1	1			AC/NR
		2. Asst. Lecturer	B.Age PG Training & (5) Yrs. exper.	1	1			AC
		3. Tr. Instructor	B.Age (6) Yrs. exper.	1		1		AC
		4. Asst. Tr. Instr.	B.Ag (4) Yrs. exp/ Dip (8) Yrs.	1	1			AC
		5. Demonstrator	B.Ag (2) Yrs. exp/ Dip (5) Yrs.	1	1			AC
		6. Tr. Asst.	B.Ag/Dip.	2	1	1		AC
	(Agri. Chemistry)	1. Lecturer	B.Age PG Training & (10) Yrs. exper.	1		1		AC/NR
		2. Asst. Lecturer	B.Age PG Training & (5) Yrs. exper.	1		1		AC
		3. Tr. Instructor	B.Age (6) Yrs. exper.	1		1		AC
		4. Asst. Tr. Instr.	B.Ag (4) Yrs. exp/ Dip (8) Yrs.	1		1		AC
		5. Demonstrator	B.Ag (2) Yrs. exp/ Dip (5) Yrs.	1		1		AC
		6. Tr. Asst.	B.Ag/Dip	2	1	1		AC
	(Plant Protection)	1. Lecturer	B.Age PG Training & (10) Yrs. exper.	1		1		AC/NR
		2. Asst. Lecturer	B.Age PG Training & (5) Yrs. exper.	1		1		AC
		3. Tr. Instructor	B.Age (6) Yrs. exper.	1		1		AC

Source: Agriculture Corporation (March, 1982)

Staff Requirement (3)

	Office/Section	Description	Minimum Qualification	Total No.	Year I	Year II	Year III	Source
1	2	3	4	5	6	7	8	9
		4. Asst. Tr. Instr.	B.Ag (4) Yrs. exp/ Dip (8) Yrs.	1		1		AC
		5. Demonstrator	B.Ag (2) Yrs. exp/ Dip (5) Yrs.	1		1		AC
		6. Tr. Asst.	B.Ag/Dip	2	1	1		AC
	(Small Scale Agri. Machinery)	1. Asst. Lecturer	B.E. (Agri.) (8) Yrs. exper.	1		1		NR
		2. Tr. Instructor	B.E. (Agri.)/ A.G.T.I.	1		1		NR
		3. Asst. Tr. Instr.	B.E. (Agri.)/ A.G.T.I.	1		1		NR
		4. Demonstrator	B.E. (Agri.)/ A.G.T.I.	1		1		NR
		5. Tr. Asst.	A.G.T.I.	2	1	1		NR
				34	13	21	-	
	Field Section							
	(Field Expt.)	1. Farm Manager	B.Age PG Training & (5) Yrs. exper.	1	1			AC
		2. Field Instructor	B.Age (6) Yrs. exper.	1		1		AC
		3. Asst. F. Instructor	B.Age (4) Yrs. exp/ Dip. e (8) Yrs.	1	1			AC
		4. Demonstrator	B.Ag (2) Yrs. exp/ Dip (5) Yrs.	1		1		AC
		5. Field Asst.	B.Ag/Dip	1	1			AC
	(Workshop & Stores)	1. Agri. Engg.	B.E. (Agri.)	1	1			NR
		2. Foreman	A.G.T.I.	1		1		NR
		3. Mechanic I	A.G.T.I.	1	1			NR
		4. Mechanic II	T.H.S	1		1		NR
				9	5	4	-	
	Audio Visual Section							
	(Photography)	1. Sr. Photographer	BEHS/T.H.S with exper.	1	1			AC/NR
		2. Tr. Photographer	BEHS/T.H.S with exper.	2		2		AC/NR
		3. Processor/Designer	BEHS/T.H.S with exper.	2	1	1		NR

Source: Agriculture Corporation (March, 1982)

Staff Requirement (4)

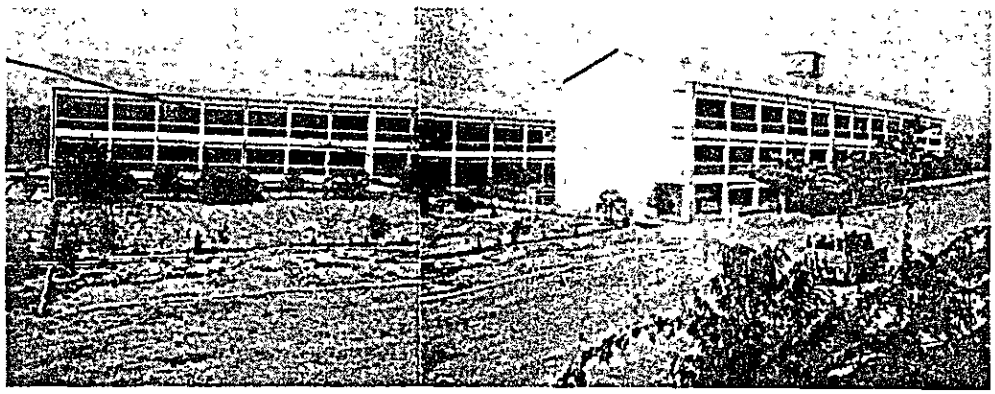
	Office/Section	Description	Minimum Qualification	Total No.	Year I	Year II	Year III	Source
1	2	3	4	5	6	7	8	9
	(Audio-Visual)	1. Projectionist	BEHS/T.H.S with exper.	1	1			NR
		2. Processor/Designer	BEHS/T.H.S with exper.	2	1	1		NR
		3. Electrician	BEHS/T.H.S with exper.	1	1			NR
		4. Asst. Electrician	BEHS/T.H.S with exper.	1		1		NR
				10	5	5	-	
	Publication Section							
	(Editorial)	1. Sr. Publicity Officer	B.Ag/B.A (Eng.)	1	1			AC/NR
		2. Tr. Publicity Officer	B.Ag	1		1		AC
		3. Asst. Publicity Officer	B.Ag	1	1			AC
		4. U.D.C	BEHS + exper.	1	1			AC
		5. L.D.C	BEHS	2	1	1		NR
		6. Record Keeper	BEHS	1	1			AC
	(Printing Press)	1. Mechanist	A.G.T.I	1	1			NR
		2. Compositor	BEHS	2		2		NR
		3. Foreman	A.G.T.I	1	1			NR
	(Library)	1. Librarian	B.Ag/Dip. (Lib)	1	1			AC
		2. U.D.C	BEHS + exper.	1		1		AC
		3. L.D.C	BEHS	1		1		NR
				14	8	6	-	

Source: Agriculture Corporation (March, 1982)

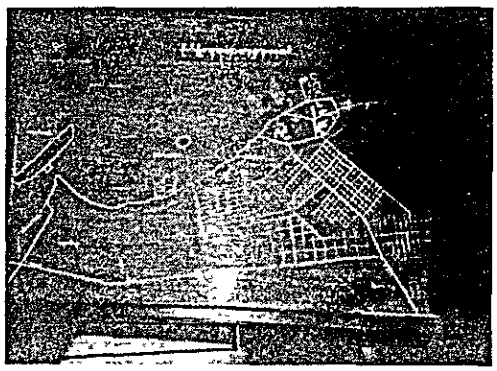
3) Assignment Plan of Training Sector's Staff

Sr. No.	Description	Total No. of Training Staff for each Subject	No. of Permanent Staff	No. of Visiting Lecturers	ARI	ARD	EXTN: DIV:	Source Other AC	Outside AC	Japanese Trainers
1	2	3	4	5	6	7	8	9	10	11
1	Induct. T	31	10	22	4	4	4	7	3	
2.	On Job. T	54	20	34	4	4	6	7	6	
3.	Inservice	62	20	42	6	6	8	9	6	
4.	Total	76	34	42	6	6	8	9	6	

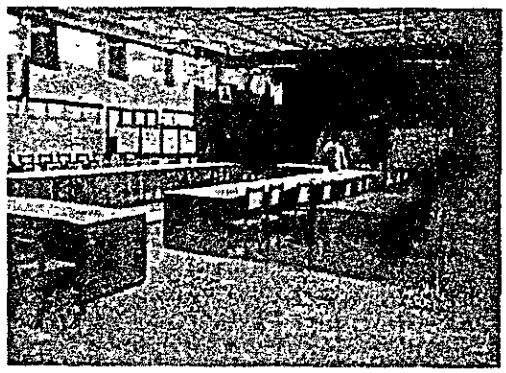
Remarks: Some of the CADTC teaching staff as well as visiting lecturers may involve in more than one type of training. (Therefore number of teaching staff in each type of training does not add for the total.)



ARI YEZIN



ARI Master Plan



ARI Training Hall

ARI Laboratory

4) Yearly Plan of Lecturers Brieding in CADTC

*: (ex. Dispatching abroad, Dispatching domestic University)

Sr. No.	Description	Minimum Qualification	Number	Year 1 year	2 year	3 year	Source (ARI, APD, EX-DIV.)	Breeding Way of Lecturers*
1.	Lecturer (Agronomy)	B.Ag with past graduate training and (10) years experience.	1	1			Within AC (or) out-side source	Already experienced person and training abroad
2.	Lecturer (Crop Production)	"	1	1			"	"
3.	Lecturer (Agri: Chem:)	"	1		1		"	Preselection and attached to various divisions and training abroad
4.	Lecturer (Plant Protection)	"	1		1		"	"
5.	Asst: Lecturer (Agronomy)	B.Ag with past graduate training and (5) year experience.	1	1			Within AC	
6.	" (Crop Production)	"	1	1			"	"
7.	" (Agri: Chem)	"	1		1		"	"
8.	" (Plant Protection)	"	1		1		"	"
9.	" (Small Scale Agri: Machin:)	B.Sc (Agri: Engy:) with (8) years experience.	1		1		Out-side source	"
10.	Training Instructor (Agronomy)	B.Ag with (6) years experience	1		1		Within AC	Preselection and attached to various divisions and training abroad
11.	Training Instructor (Crop Production)	B.Ag with (6) years experience.	1		1		Within AC	Preselection and attached to various divisions and training abroad
12.	Training Instructor (Agri: Chem:)	"	1		1		"	"
13.	Training Instructor (Plant Protection)	"	1		1		"	"
14.	Training Instructor (Small Scale Agri: Mach:)	"	1		1		Out-side source	"
15.	Asst: Training Instructor (Agronomy)	B.Ag with (4) years experience and Diploma with (8) years experience.	1	1			Within AC	Preselection and attached to various divisions
16.	Asst: Training Instructor (Crop Production)	"	1	1			"	"
17.	Asst: Training Instructor (Agri: Chemistry)	"	1		1		"	"
18	Asst: Training Instructor (Plant Protection)	B.Ag with (4) years experience and Dip. with (8) years experience.	1		1		Within AC	Preselection and attached to various division
19.	Asst: Training Instructor (Small Scale Agri: Mach:)	"	1		1		Out-side source	"
20.	Demonstrator (Agronomy)	B.Ag with (2) years experience and Dip. with (5) years experience.	1	1			Within AC	"
21.	Demonstrator (Crop Production)	"	1	1			"	"
22.	Demonstrator (Agri: Chem:)	B.Ag with (2) years experience and Dip. with (5) years experience	1		1		Within AC	Preselection and attached to various division
23.	Demonstrator (Plant Protection)	"	1		1		"	"
24.	Demonstrator (Small Scall Agri: Mach:)	"	1		1		Out-sider AC	"
25.	Training Asst: (Agro)	B.Ag/Dip.	2	1	1		Within AC	Direct selection and interval traiing
27.	Training Asst: (Crop Pred:)	"	2	1	1		"	"
29.	Training Asst: (Agri: Chem:)	"	2	1	1		"	"
31.	Training Asst: (Plant Protection)	"	2	1	1		"	"
33. & 34.	Training Asst: (Small scall Agri: Mach:)	"	2	1	1		Out-side AC	"

Source: Agriculture Corporation (March, 1982)

List of Training Courses — (1) implemented by AC (1981/82)

SR NO	NAME OF TRAINING COURSE	TRAINEES NO	TRAINEES LEVEL	TRAINING PERIOD	PLACE OF TRAINING (DIVISION)	ESTIMATED NO OF LECTURERS INVOLVED	REMARKS
1	Paddy Production	55	VH/VTH	1 m	Yezin (ARI)	6	O.J T
2	Maize Production	45	VH/VTH	1 m	Yezin (ARI)	5	"
3	Wheat Production	35	VH/VTH	1 m	Yezin (ARI)	5	"
4	Oil Seed Production (Ground nut/ Sesamum/Sunflower)	50	VH/VTH	1 m	Yezin (ARI)	9	"
5	Peas and Beans Production	50	VH/VTH	1 m	Yezin (ARI)	5	"
6	Fibre Crop Production (Cotton/Jute)	28	VH/VTH	1 m	Yezin (ARI)	5	"
7	Sugarcane Production	27	VH/VTH	1 m	Yezin (ARI)	5	"
8	Bio-Fertilizer Production	55	VH/VTH	1 m	Yezin (ARI)	4	"
9	Cropping Systems	40	VH/VTH	1 m	Yezin (ARI)	6	"
10	Field Research Technique						
11	Agro-Technique for the Whole Township High Yield Program	50	DTH	2 weeks	Yezin (ARI)	4	Inservice
12	Organic/Inorganic Fertilizer Application Method and Soil Fertility	50	DTH	2 weeks	Yezin (ARI)	4	"
13	Plant Protection Technique	50	DTH	2 weeks	Yezin (ARI)	3	"
14	Field Research Technique	50	DTH	2 weeks	Yezin (ARI)	3	"
15	Workshop on Production of Major Crops	70	TH and above	1 week	Yezin (ARI)	8	"
16	Workshop on advanced Crop Production Technique	70	TH and above	1 week	Yezin (ARI)	6	"
17	Transplanting Equipment Training	100	VH to TH	10 days	Hmawbi (Central Farm)	4	two mechanics from AMD (OJT)
18	Transplanting Equipment Training	100	VH to TH	10 days	Mandalay (Central Farm)	4	"
19	Transplanting Equipment Training	100	VH to TH	10 days	Prome Township Production Camp	4	"
20	SMS Training (Paddy)	20	Dip Agri Graduate Diploma	6 months Agric	Yezin (ARI)	6	Inservice
21	SMS Training (Maize)	12	Dip Agri	6 months	Yezin (ARI)	5	"
22	SMS Training (Wheat)	8	Dip Agri	5 months	Yezin (ARI)	5	"
23	SMS Training (Ground Nut)	16	Dip Agri	5 months	Yezin (ARI)	3	"
24	SMS Training (Sesamum)	16	Dip Agri	3 months	Yezin (ARI)	3	"
25	SMS Training (Sunflower)	16	Dip Agri	5 months	Yezin (ARI)	3	"
26.	SMS Training (Cotton)	6	Dip Agri	6 months	Yezin (ARI)	3	"
27	SMS Training (Jute)	4	Dip Agri	8 months	Yezin (ARI)	5	"
28	SMS Training (Peas and Beans)	14	Dip Agri	5 months	Yezin (ARI)	5	"
29.	SMS Training (Pest Control)	19	Dip Agri	5 months	Yezin (ARI)	4	"
31	Rubber Estate Management	30	DEM/EM	10 days	Mudon Rubber Estate	5	O J T
32	Rubber Grafting Technique	40	Professional Workers	5 days	Tavoy Rubber Estate	4	"
33	Rubber Grafting Technique	40	Professional Workers	5 days	Mergui Rubber Estate	4	"
34	Rubber Grafting Technique	40	Professional Workers	5 days	Palaw Rubber Estate	4	"
35	Rubber Nursery Technique	30	VH/VTH	10 days	Mudon Rubber Estate	3	"
36	Rubber Plantation Management	30	VH/VTH	10 days	Mudon Rubber Estate	4	"
37	Rubber Tapping Technique	30	VH/VTH	10 days	Mudon Rubber Estate	3	"
38	Rubber Grading and Packing	60	VH/VTH	10 days	Mudon Rubber Estate	4	"
39	Rubber Estate Budget and Accounts	30	VH to TH	10 days	Mudon Rubber Estate	6	"
40	Marketing and Ditribution of Agricultural Inputs	60	VH to TH	2 months	Hmawbi Central Farm	12	"
41	Mushroom Culture Training	20	VH to DTH	5 days	Gyogon (APO)	3	O.J.T.
42	Reaper Binder Training	50	VH/VTH	4 days	Prome Township	4	"
43	Reaper Binder Training	21	VH/VTH	4 days	Gyogon (ARD)	4	"
44	Reaper Binder Training	20	VH/VTH	4 days	Mandalay Central Farm	4	"
45.	Plant Protection Training	445	VTH & above	1 week	7 States and 7 Division	42	"

Source: Agriculture Corporation (March, 1982)

List of Training Courses – (2) implemented by AC (1981/82)

SR. NO	NAME OF TRAINING COURSE	NO	TRAINEE LEVEL	TRAINING PERIOD	PLACE OF TRAINING (DIVISION)	ESTIMATED NO OF LECTURERS INVOLVED	REMARKS
46.	Village and Village Tract Manager Inservice Training	1280	VH/VTH	2 weeks	1 Hmawbi 2 Mandalay 3 Tatkon 4. Magwe 5. Mudon 6 Myaunmya 7 Bilway 8 Yangalaung 9 Ma-Ho 10 Mahlaing	36	Inservice
47	Village and Village Tract Manager Short Course	740	VH/VTH	1 week	1 Hmawbi 2 Mandalay 3 Tatkon 4 Magwe 5 Mudon 6 Myaunmya 7 Bilway 8 Yangalaung 9 Ma-Ho 10 Mahlaing	36	"
48.	Seed Development Project Short Courses	1200	VH/VTH	1 week	1 Hmawbi 2 Mandalay 3 Magwe 4 Mahlaing 5 Lungyaw 6 Letdadan	36	"
49.	Cotton Development Project Short Courses	180	VH/VTH	1 week	1 Hlaing-Yet	12	"
50.	Other Short Courses Tissue Culture Statistics Budgetting & Accounting	400	Tsp Manager Dy Tsp. " VTH VH	1 week	Gyogon	10	Inservice
	TOTAL	5889					

APPENDIX 5. Estimated Cost for Burmese Contribution of the CADTC Proposed by Agriculture Corporation

Telex : Agrico BM 2033
Cable : AGRICORP
Telephones :—
Managing Director 83480
G.M. (Admin) 70289
Office 72621
72655

The Socialist Republic Of The Union Of Burma
MINISTRY OF AGRICULTURE AND FORESTS
AGRICULTURE CORPORATION
No. 74, SHWEDAGON PAGODA ROAD
RANGOON, BURMA.

No...540(Ka)(4)(Oo)/82/ ۹۰۷

Dated the 13 June 1982 .

Dear Mr. Iwata,

Sub: Estimated Cost for Burmese Contribution of CADTC Project and Report on Subsurface Investigation

Please find enclosed a copy each of Estimated Cost for Burmese Contribution of the CADTC Project and Report on Subsurface Investigation by the Construction Corporation.

It would be much appreciated if you could kindly forward the above to the Basic Design Study Team of JICA for CADTC Project.

Thank you very much for your assistance.

With best regards,

for Managing Director
(Chit Saing, Deputy General Manager)

Mr. Tooichi Iwata,
Project Management Division
Grant Aid Department, JICA
c/o Embassy of Japan,
Rangoon.

cc: General Manager (Extension)

Sr. No.	Particulars	Investment Cost K (000)
1	BUILDING WORK	
	(1) Labourer's Quarter - - -	
	(2) Guardman's House - - -	
	(3) Canteen / Dining Hall - - -	
	(4) Trainees Dormitory - - -	
	(5) Staff House - - -	
	(6) Guest House - - -	
	(7) Godowns - - -	
	(8) Covered Way (Road) - - -	
	Sub Total	9113
2	OUTDOOR WORKS	
	(1) Fencing, Landscaping and Roadpavement - - -	
	(2) Storm Reservor - - -	
	(3) Sports field - - -	
	(4) Outdoor lightning - - -	
	(5) Exterior drainage - - -	
	(6) Site Preparation - - -	
	*(7) Demonstration Farm - - -	
	Sub Total	2091
	* A part of these cost are expected to be covered by the Grant of Technical Cooperation. (Japanese)	
3	INFRASTRUCTURE WORK	
	(1) Water Supply (well drilling) - - -	
	(2) Drainage (Side ditch excavation)- - -	
	(3) Electric Supply (at 11KV rating)- - -	
	(4) Telephone Connecting (from PEGU for 16.14 miles) - - -	
	(5) Septic Tank and Sewer - - -	
	Sub Total	2275
4	Furniture and Fixture - - -	121
5	Training Equipment - - -	100
	Total (-	13700

Note:- (1) The above estimated cost, are only for capital expenditure of the Project. The operating cost such as wages & salaries, custom duties & taxes, electricity & fuel etc, are not included; and will be formulated in annual budget.

(2) Subject to the approval by the Central Construction Committee.

Kyi Kyi

APPENDIX 6. Design Criteria for Demonstration Farm

1) Planning Criteria for Soil Improvement

A. Demonstration Farm

(1) Crops

The plan shall aim at cultivating various crops in the demonstration farm. Main crops shall be paddy rice and peanut.

(2) Soil

Gley soil (heavy clay soil).

(3) Purpose

Borrow sand shall be laid on heavy clay soil to enhance cultivability. As running of equipment under wet state above pF 2.0 worsens the soil by kneading it, dry state below pF 2.0 is desirable. Heavy clay soil is susceptible to lose air and become solid-liquid double phase structure due to compression of tractors, etc. Borrow sand shall eliminate such tendency, increase the air-void ratio, decrease the water holding capacity, raise the soil temperature, enhance the nitrification and lower the plasticity and the cohesion.

(4) Method and Effect

2,250 m^3 borrow sand shall be mixed up with the soil in the planned farm. The grain size distribution in heavy clay soil after mixing of borrow sand shall be made as follows.

a) Grain Size Distribution (%)

b) Coarse Sand b') Fine Sand

b")	Silt	c)	Clay
d)	Humus (%)	e)	Specific Gravity
f)	Actual	g)	Planned

(5) Prior to land consolidation for paddy field, 15 cm thick surface soil shall be taken off, into which borrow sand shall be mixed (input of chaff is also effective) after arrangement of subsoil.
Then, thus treated surface soil shall be returned back to the ground.

E. Infrastructure Consolidation for Exhibition Upland Farm

Peeling-off of surface soil will make the land sterile. For amendment, organic matter, phosphate, base and other materials shall be put in. When large equipments are used for infrastructure consolidation, a compact and fine layer will be formed due to kneading and running pressure of civil work equipments. Sometimes, compact and fine subsoil layer will be exposed because of peeling off of surface soil. While the root zone becomes smaller due to formation of such compact layer, harmful effects becomes liable to occur because of overmixing due to bad drainage and of overdrying due to cut-off of upward movement of moisture. Formation of compact layer due to running pressure of large civil work equipments is accelerated especially under humid condition (above pF 2.0). When the soil is kneaded and compressed under such state, it is apt to form a compact layer.

Method: Layer mixing plowing by combo shall be executed down to 110 cm below the ground level. After levelling and ridging, straw (20,000 bundles/ha) and cattle dung (1,000 bags/ha) shall be laid on.

2) Design Criteria for Irrigation

Irrigation

A. Rice Crop Water Requirement

The following items shall be taken into consideration for calculation of irrigation water requirement.

(1) Consumption Use of Water

Consumption use water requirement shall be calculated for each cultivation style of various crops in accordance with the Blaney-Criddle formula.

(2) Land Soaking and Preparation

For preparation of transplanting paddy field, it will take 6 days to plow up and prepare the land. Irrigation water requirement during this period shall be determined.

(3) Weighted Field Water Requirement

Required volume of water for 10 days shall be uniformly supplied to each farm in accordance with water requirement divided on the basis of the cultivation schedule in the specific farm.

(4) Farm Turn-Out Requirement

The maximum required volume of water at farm turn-out shall be 120% of water requirement for farm so as to cope with required volume in the final booting stage of crops.

(5) Water Losses

Water losses during transfer shall be estimated as follows.

Losses in branch waterway: 7.5 - 15.0%
Losses in main waterway: 7.5%

B. Upland Crop Water Requirement

(1) Upland crop water requirement shall be calculated on the basis of two-time irrigation for ordinary crops: first around the sprouting period and second 35 - 45 days later. Therefore, calculated turn-out water requirement is 90 mm and 110 mm respectively.

C. Water Requirement in the Irrigation System

(1) Irrigation Water Requirement

The maximum water requirements at the branch turn-out and the main waterway intake shall be calculated in accordance with the above water consumptions.

Calculated irrigation water requirement

Daily average water requirement	:	6.36 (mm/day)
Land soaking and preparation	:	245.0 (mm)
Field water requirement	:	9.0 (mm)
Farm turn-out water requirement	:	11.25 (mm)
		1.30 (liter/sec/ha)
Maximum loss (branch waterway)	:	15.0 (%)
(main waterway)	:	7.5 (%)
Maximum water requirement at turn-out	:	1.52 (liter/sec/ha)
Maximum water requirement at main waterway intake	:	1.68 (liter/sec/ha)

D. Design Criteria for Terminal Facilities

Terminal facilities required for farm construction shall be designed in accordance with the following criteria.

(1) Farm Turn-Out

(i) The farm supplied with water by the turn-out shall be each plot. The turn-out shall keep a necessary water level for enough feeding all over the plot and shall permit measurement of turn-out water volume at any time. Its capacity shall be 1.3 liter/sec/ha for a 5 ha irrigated paddy field.

(ii) The size of the turn-out orifice shall be one of the following three according to the flow rate.

1) Design flow rate (m^3/sec)
2) Size of orifice gate (mm)
3) below 0.05

(2) Farm Ditch

(i) The farm ditch shall be excavated along the slope and the farm boundary and shall not exceed 200 m·in length. The terminal end of ditch shall be able to eliminate excess water.

(ii) Spacing and density of farm ditches shall be as follows.

Spacing : 200 m
Density : 70 m/ha

Farm Drainage

(i) Farm drainage ditches shall be located in a depressed ground or a boundary of irrigated land. Bridge across the

drainage ditch shall be installed at intervals of 200 m to facilitate agricultural work.

(ii) Drainage ditch shall have a capacity of 5 liter/sec/ha and keep a water level lower than 20 cm below the ground level.

(iii) Density of drainage ditches shall be 22 m/ha.

(3) Upland Irrigation Facilities

Gravity irrigation system is not suitable to brown soil poor in water holding capacity. As sprinkling irrigation system leads to too big water consumption for this soil, dripping irrigation is the most desirable system. Since water transfer due to capillarity at terminals is made constant, adequate location of emitters can reduce the wetting range. In this case, we have only to adopt emitters of small discharge water, but it is necessary to install small sprinklers in a sandy soil or in a place which lacks capillary water.

(1) Design Procedure

A. Determination of the maximum water requirement for mature crops.

B. Determination if the above daily water requirement can be fed to unit area.

C. Determination of the number of emitters required for mixing 50% of earth volume in the root zone.

D. Determination of the irrigation time during the peak water consumption period.

E. Determination to what extent the water pressure change is allowable within one irrigation block to obtain the required EU value.

F. Determination of the spacing and the length of piping for ridge crops.

G. Determination of the allowable length of emitter line and of the head loss of manifold within the range which satisfies the value calculated in the item E.

H. Determination of the location and the size of main and secondary main.

I. Determination of a pressure regulating equipment which may satisfy the item E.

J. Determination of filter specifications.

K. Determination of pump specifications.

(2) Design Criteria

A. Maximum water requirement for grown-up tree

(1) Daily irrigation water requirement

Potential vaporization : 8 mm/day (April)

$$\frac{10{,}000 \text{ liter/mm ha}}{1{,}040 \text{ minutes/24 hours}} = 6/94 \text{ liter/min/ha}$$

Therefore, water requirement per ha under 8 mm/day vaporization and 85% irrigation efficiency is as follows:

$$\frac{1 \times 8 \times 6.94}{0.85} = 65.32 \text{ liter/min} = 1.09 \text{ liter/sec}$$

(2) Daily water requirement for crop (Pan Evaporation/day x Crop Coefficient)

Crop coefficient		Vegetable and upland crop	
1) Barley	1.05	10) Pulse	1.00
2) Carrot	1.00	11) Maize	0.95
3) Cotton	1.05	12) Cucumber	0.90
4) Cauliflower	0.95	13) Eggplant	0.95
5) Melon	0.95	14) Cayenne	0.95
6) Peanut	0.95	15) Potato	1.05
7) Radish	0.80	16) Spinach	0.95
8) Sugar cane	1.05	17) Tomato	1.05
9) Tobacco	1.05	18) Soy bean	1.00

liter/day/100 m ridge/

$/m^3$/day/100 m ridge =

(1.0/0.001 x 100 x ridge spacing (m) x Crop coefficient x Daily water requirement mm/day) ÷ Irrigation efficiency

Irrigation for cayenne (ridge spacing : 70 cm)
(efficiency : 85%)

$$\frac{0.001 \times 70 \times 0.75 \times 7.6}{0.85} = 0.595 \text{ m}^3/\text{day}/100\text{m}$$

$$= 6.3 \text{ mm/day}$$

B. Daily water requirement per 100 m drip hose

Drip hose shall be laid on the down slope along the branch and the ridge, because the slope is gentle. (N-S)

Daily water requirement per 100 m drip hose:

$$\frac{1 \times (100 \times 0.7) \times 0.95 \times 63}{0.85} = 493 \text{ liter/day/100 m}$$

(1) Irrigation time during the peak water consumption period

For drip hose with 12 inch x 6 inch discharge outlet spacing, irrigation time under 8 psi water pressure is as follows:

493 liter/day/100 m = 72.18 min/day = 1.2 hours

C. _____

D. _____

E. Water Pressure Change

The allowable flow rate change shall be within ± 10% of design rate.

F. Spacing and Length of Drip Hose

The spacing of drip hose depends on the spacing of ridge; in this case, it shall be 70 cm. The hose length shall be maximum 100 m so that the flow rate change at discharge outlet can be within ± 10%.

G. Allowable Head Loss of Manifold

When total area is considered as one lot, each secondary main is for two lots. As 142 ridges exist in 100 m, there are 71 ridges for each manifold. 100 m long double-structure hose has a discharge rate of 683 liter. The flow rate through manifold is 988.56 liter/min because there are 72 hoses. The head loss of 3 inch bore 100 m long manifold is almost equal to the altitude difference.

H. If secondary main adopts also a bore of 4 inches, the pressure loss will become nearly zero in consideration of pressure increase due to the altitude difference. The main between secondary

mains shall adopt 4 inch bore PVC to be connected with the pump.

I. Pressure regulating equipment shall be installed at each inlet of secondary main, because pressure losses of secondary main and manifold are offset by the altitude difference.

J. Filter Specifications

The hose for ridge crop shall be equipped with media filter combined with 200-mesh screen.
The flow rate is 988.56 liter/min.

K. Pump Specifications

	Psi
a. Hose working pressure	: 8.00
b. Head loss of branch	: 1.44
c. Pressure loss of branch	: 0.50
d. Head loss of manifold	: 0
e. Loss of pressure regulating valve (3 inch)	: 11.0
f. Loss of secondary main	: 0
g. Loss of main	: 3.85
h. Loss of filter equipment	: 6.0
i. Suction height	: 6.06
j. Miscellaneous loss 10%	: 4.33

$$\text{Required pump horse power} = \frac{\text{liter/sec (flow rate) x m (head)}}{7.61 \times \text{pump efficiency}}$$

$$= \frac{\text{x 2 m}}{76.1 \times 0.7}$$

$$= 5.42 \text{ HP}$$

$$= 3.8 \text{ KW}$$