

The function of PMU would be as follows;

- To prepare annual work plans and cost estimate, which would be discussed and ratified by the Project Steering Committee and financing agency, and
- To implement the project works with a collaboration with line-Departments concerned.

6.6.2. Implementation Schedule

The implementation period of the Master Plan Project is 15 years and is divided into three phases, that is, short-term (1990-1995), middle-term (1995-2000), and long-term (2000-2005) periods. The implementation schedule for the Master Plan Project is shown in Figure 6-3.

Financial and technical assistance by the foreign governments and/or international development organizations will be required because of the large amount of the development cost for the project.

As regards the foreign aid projects shown in Table 4-1, the implementation period of these projects correspond to the short term scheduled in the Master plan, and project costs are not counted in those of the Mastern Plan.

When the foreign aid project contents are revised in future, the physical and financial matters should be treated through Project Steering Committee and District Project Coordination Committee shown in Figure 6-2.

6.6.3. Operation and Maintenance Plan

1) Operation and Maintenance Organization

Operation and Maintenance (O & M) works for the constructed facilities in the project will be carried out by the following two organizations, that is, related line-Departments of the government in

NWFP and the Village Community to be newly established on the basis of village (Mauza) level.

The former will have the responsibility for such major facilities as the agricultural infrastructure, agricultural supporting services, road and communication, rural electrification, village water supply and rural infrastructure. On the other hand, the latter will be for small scale facilities such as roads, bridges, irrigation, village water supply, which have been provided by the Minor Works Programmes in the Union Council under the jurisdiction of LG & RD Department.

2) Operation and Maintenance Cost

The operation and maintenance cost consists of salary and wages of staff, administration and general expenditure cost, equipment operation cost, and maintenance cost of facilities. Physical contingency and price escalation should be considered and are estimated at 20 percent of the total operation maintenance cost and 7.1 percent per annum, respectively. The operation and maintenance cost for the Master Plan Project is shown as follows;

Operation and Maintenance Cost for the Project

(unit: million Rs.)

<u>Description</u>	<u>Total</u> <u>(1990-2005)</u>	<u>Short-Term</u> <u>(1990-1995)</u>	<u>Middle-Term</u> <u>(1995-2000)</u>	<u>Long-Term</u> <u>(2000-2005)</u>
1. Agri. Infrastructure	144	16	47	81
2. Agri. Supporting Service	446	81	164	201
3. Road and Communication	542	93	198	251
4. Rural Electrification	144	12	41	91
5. Village Water Supply	176	20	58	98
6. Rural Infrastructure	1,584	133	432	1,019
7. Village Community Development	0	0	0	0
Sub-total	<u>3,036</u>	<u>355</u>	<u>940</u>	<u>1,741</u>
Contingency	607	71	188	348
Sub-total	<u>3,644</u>	<u>427</u>	<u>1,128</u>	<u>2,089</u>
Price Escalation	3,674	80	759	2,835
Total	<u>7,318</u>	<u>507</u>	<u>1,887</u>	<u>4,924</u>
Average per Annum	563 (280)	169 (142)	377 (226)	985 (418)
	13 years	3 years	5 years	5 years

Note: Figure in parenthesis shows the O & M cost without price escalation cost.

FIGURE 6-3 IMPLEMENTATION SCHEDULE OF MASTER PLAN PROJECT

Year	Project Development Works																	Remarks	
	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05		
	Master Plan Study																		
	1. Agricultural Infrastructure Development																		
																			Preparation, Construction and Establishment
																			Service and O & M
	2. Agricultural Supporting Service Development																		
																			Preparation, Construction and Establishment
																			Service and O & M
	3. Road and Communication Development																		
																			Preparation, Construction and Establishment
																			Service and O & M
	4. Rural Electrification Development																		
																			Preparation, Construction and Establishment
																			Service and O & M
	5. Village Water Supply Development																		
																			Preparation, Construction and Establishment
																			Service and O & M
	6. Rural Infrastructure Development																		
																			Preparation, Construction and Establishment
																			Service and O & M
	7. Village Community Development																		
																			Preparation, Construction and Establishment
																			Service and O & M

6.7. Socio-Economic Justification

The proposed development project aims to i) strengthen the base for the agricultural production and income generation, ii) expand the scope of job opportunity and iii) improve the living standard of the rural people in Swat District.

The Master Plan, consisting of various development plans such as agricultural development scheme, agricultural infrastructure scheme and rural infrastructure scheme, was formulated on the basis of the procedures of integrated rural development approach.

The socio-economic benefits generated from each scheme are tangibly quantitative and intangibly qualitative. Majority of these schemes would generate intangible benefits rather than tangible benefits.

1) Agricultural Infrastructure Development

Agricultural infrastructure development comprises of i) new irrigation schemes with 12 schemes, and ii) improvement/extension of irrigation schemes with six schemes, iii) Barani field consolidation with two schemes and iv) flood control and land protection.

Economic justification on schemes mentioned above were studied quantitatively based on such economic factors as conversion factor, economic (border) prices of input and output, cropping pattern, crop yield and crop budget "with" and "without" the project. The standard conversion factor and commodity economic prices are shown in Annex H.

Project costs on three stages of 1990-1995, 1995-2000 and 2000-2005 were estimated. Commodity prices are forecasted by World Bank upto 2000. Hence, this quantitative study shall be conducted on schemes scheduled in 1990 to 2000.

Implementation of new irrigation schemes, extension irrigation scheme excluding flood protection and Barani field consolidation would contribute to expansion of crop acreage of vegetable and fruits.

Economic justification on 15 irrigation schemes excluding flood protection schemes were studied. Crop production with the project is based on cropping pattern proposed in Paragraph 7.2.2 "Agriculture

Plan". Beneficial acreage of 15 irrigation schemes are about 19,770 ha which occupies about ten percent of the cultivated acreage of Swat District.

Proposed cropping pattern is positively schemed to expand commercial crops, such as vegetables and fruits. In full development year of 15 schemes, incremental crop production volume is projected to be about 650 tons of paddy, 5,830 tons of maize, 8,470 tons of wheat, 15,800 tons of vegetable (represented by tomato) and 16,700 tons of fruits (represented by apple). Growth rates of these incremental products in Swat District are expected to be 10 percent of paddy, 4.5 percent of maize, 8.7 percent of wheat, 51 percent of vegetable and 26 percent of fruits as compared with production in 1986/87 (refer to paragraph 3.3.3).

Economic internal rate of return (EIRR) for the 15 schemes with the financial direct cost of 706 million Rupees (1990 to 2000) is estimated at 23.3 percent.

Financial direct costs for overall agricultural infrastructure development were calculated at 1,178 million Rupees. Assuming that cost ratio for unskilled labor employed by this development schemes would occupy about five to ten percent of 1,178 million Rupees, employment opportunity is expected to create about 112,000 to 224,000 persons ($1,178 \text{ million Rupees} \times (0.05 \text{ or } 0.1) / 15 \text{ years} / 35 \text{ Rupees per day}$).

Generation of employment opportunity was forecasted to increase to 286,000 persons (refer to paragraph 4.2.3) in 2005. Thus, implementation of agricultural infrastructure development schemes will contribute to the improvement of employment problems in future.

2) Agricultural Supporting Service Development

Seed Multiplication Scheme

Seed farm with size of eight hectare (20 acre) will be established at four places. Seed quantities supplied by these seed farms will meet the required seed volume for wheat and maize in Swat District, assuming that seeds of maize and wheat will be replaced at one time per three seasons and four seasons, respectively, and the present cropped acreage of both crops will sustain in future.

One fruit nursery center with 0.8 ha (2acre) will be established. According to the land use plan, orchard acreage will expand from 5,370 ha in 1986/87 to 8,000 ha in 2005. This new nursery center will supply about 75 percent of seedlings necessary for new plantation (represented by apple) and replacement of fruit trees conducted at one time per 20 years.

Livestock Development Scheme

Productivity of livestock and reduction of production loss will be improved through establishment of veterinary hospital, artificial insemination centres and distribution system of high breeding animal.

In 1988, livestock farmers of 237,400 raised cattle-cows of 226,000 heads and buffalo-cows of 162,000 heads. If the future daily milk production rises by around 20 to 30 percent of the present production through implementation of the schemes, one livestock farmer would get an annual average incremental income of 7,000 to 16,500 Rupees.

Farm Mechanization Service

Tractor station will be established at three places to raise the crop yield and cropping intensity. Tractors, hand-tractors and sprayers owned by these stations are lent to farmers. These machineries will be used in the fields of 1,500 ha per year.

Small Industry

Establishment of the processing factory of apple will be necessary in order to process/use low quality apples. The proposed factory will be able to process raw apples of 300 tons per season. However, if the 300 tons of apples are not bought by the factory, there will be a damage of about 1.8 million Rupees based on the perishable rate of 50 percent.

Handicraft centre for women consisting of 500 members will be established. They will be trained for six months, and later process cloths at their respective houses using the machines and raw materials lent by the centre. Monthly income per member will range from 300 to 500 Rupees.

Marketing Facilities

Management body of marketing centers will obtain direct revenue such as the market facility charge, viz., 3,000 Rupees per month per dealer, and a commission of six percent of market prices of agricultural products.

Creation of Employment Opportunity

Agricultural supporting service development will give active impact to the farmers to raise the cropping intensity and introduce profitable crops. This activity will increase labor requirement for crops.

Operation and management of buildings and facilities established by the schemes will create employment opportunity of 460 staffs. If about five percent of direct costs of 292 million Rupees are paid to unskilled labor, about 28,000 persons will be employed.

3) Road and Communication

In 1988, Swat District has a total length of road of 1,021 km, pavement 594 km and non-pavement 427 km. The annual growth rate of road length from 1978 to 1985 was estimated at 4.3 percent in NWFP and 2.1 percent in Swat District. It is forecasted that the length of road of Swat District in 2005 will be about 1,500 km based on the above annual growth rate of 2.1 percent.

Based on the Master Plan, the length of road is planned at 322 km as new construction and 533.7 km as pavement. Pavement ratio will be improved from 50 percent in 1988 to 75 percent in 2005 through implementation of schemes.

The correlation efficiency between the length of road for 1970/71 to 1985/86 and the number of registered cars in NWFP show a high rate of 98 percent. Extension of road per kilometer will generate increase of 47 cars in NWFP and 39 cars in Swat District. The number of cars registered in Swat District is forecasted to increase from 10,000 in 1985 to 32,000 in 2005. Road schemes under this Master Plan would contribute to the increase of cars.

The quantitative benefit from road construction consists of traffic volume cost saving, passengers time saving and improvement quality of marketable agricultural products. The former two items will be studied through the improvement scheme of trunk road in SIRDP as described in paragraph 7.6.

4) Rural Electrification Scheme

Establishment of two mini-hydel power station, viz., 200 KW in Martung and 400 KW in Kalam were planned. Economic justification on 200 KW scheme was studied and shown in paragraph 7.6. The study shows low economy; hence, the extension plan of existing WAPDA transmission system would occupy 94 percent of implementation cost of 1,114 million Rupees for 15 years.

5) Village Water Supply Scheme

Village water supply scheme will give the following socio-economic impacts:

- Prevention of contagious disease, and thus improvement of health and hygiene,
- Saving of water-fetching labor, then conversion of fetching labor to education of children and part-time job,
- Equipping of fire fighting facilities,
- Cleaning of public road, sidewalk and public square through water sprinkling,
- Promotion of treatment of dust,
- Elimination of social anxiety and improvement of willingness to pay water charge and tax, and
- Increase of level of dietary.

CHAPTER VII. FORMULATION OF PRIORITY DEVELOPMENT PLAN

CHAPTER VII. FORMULATION OF PRIORITY DEVELOPMENT PLAN

7.1. Selection of Priority Sub-Project and Related Schemes

The Project Area corresponding to Swat District was divided into 20 Sub-Project Areas (see Location Map) based on the Tehsil boundary from view point of area-wise project planning. Out of the 20 Sub-Project Areas, the eight Sub-Project Areas was preliminarily selected at first as the priority development areas applying the following criteria;

- i) Local peoples requirement,
- ii) Concentration of main project facilities, and
- iii) Social and economical backwardness.

And, as the second step, furthermore selection of the priority development areas was made in order to materialize the project implementation. For this second selection, the following criteria are applied to the eight priority Sub-Project Areas.

- i) Physical Aspects
 - Present diffusion index of rural infrastructure, and
 - Present agricultural index.
- ii) Planning Aspect
 - Coordination with on-going projects,
 - Implementation stage of the proposed schemes,
 - Attainability for implementing schemes,
 - Scale of irrigation areas, and
 - Possibility of micro-hydel power generation.

As the result, Chakesar, Puran and Martung Sub-Project Areas involving six Union Councils in Shangla Par Sub-Division are selected as the priority development areas, which are called as Shangla Par Integrated Rural Development Project (SIRDP).

The subsequent paragraph will describe the result of Pre-Feasibility Study focusing on those selected areas of SIRDP.

7.2 Shangla Par Integrated Rural Development Project

7.2.1. Present Situation of SIRDP Area

1) Location and Geography

The selected Shangla Par Integrated Rural Development Project Area is located in the southern part of Shangla Par Sub-Division as shown in the Project Map. The area, having the total areas of about 67,700 ha with population of about 138,600 in 1988, administratively consists of three Sub-Tehsils with six Union Councils, that is , Kuz Pow Chakesar and Bar Pow Chakesar in Chakesar Sub-Tehsil, Puran and Makhozai in Puran Sub-Tehsil and Martung and Behlol Khel in Martung Sub-Tehsil. Most of these areas face the Indus river, and major tributaries such as Chakesar and Itai Khwars are pouring into the Indus river.

To approach the areas from Mingora, capital of Swat District, only two roads are available; one is Khawazakhela-Alpuri-Derai-Aloch-Martung road and the other is Karora-Chakesar-Derai road. The roads in the areas are very rough with no pavement. The area is very hilly and surrounded by high mountains.

2) Soils and Present Land Use

The Area has high and steep mountains, and narrow valleys in ranging in elevation from about 600 to 3,100 m, where cultivated fields extend nearly to the tops of mountains. The papers written for the International Center for Integrated Mountain Development (ICIMOD)says that the specific physical and social natures in the Himalaya-Karakorum-Hindu Kush mountain ranges areas, where the Project Area is included, require an integrated approach between engineering and socio-economic sectors for the natural resources-conservation oriented development.

Comparing with other areas in the Shangla Par Sub-Division, deep and fertile pockets in the large area exist in the SIRDP. The soil is mostly shallow in the sloping lands, whereas these of the small relief and valley bottom are considerably deep and somewhat fertile.

The land capability classification of the SIRDP Area is shown in

Figure 7-1. It is clear that the land in the SIRDP Area has severe development limitations.

The present land use in the area is summarized as follows;

<u>Present Land Use</u>				
(unit : ha)				
Land Categories	Chakesar	Puran	Martung	Total
<u>Cultivated Land</u>	<u>6,860</u>	<u>8,400</u>	<u>4,510</u>	<u>19,770</u>
- Irrigated	410	1,210	320	1,940
- Unirrigated (Barani)	6,450	7,190	4,190	17,830
<u>Uncultivated Land</u>	<u>17,930</u>	<u>17,830</u>	<u>12,170</u>	<u>47,930</u>
- Cultivable Waste	1,290	1,040	480	2,810
- Pasture Land	5,270	5,020	7,660	17,950
- Grazing Land	2,980	4,130	840	7,590
- Forest Land	6,170	5,360	1,260	12,790
- Not Available for Cultivation	2,220	2,280	1,930	6,430
Total	24,790	26,230	16,680	67,700

Source : Land Revenue Office, Swat District

About 29 percent of total land or 19, 770 ha are cultivated, while there are 2,810 ha of cultivable waste land. Only 18 percent of total land or 12,790 ha are classified into forest land.

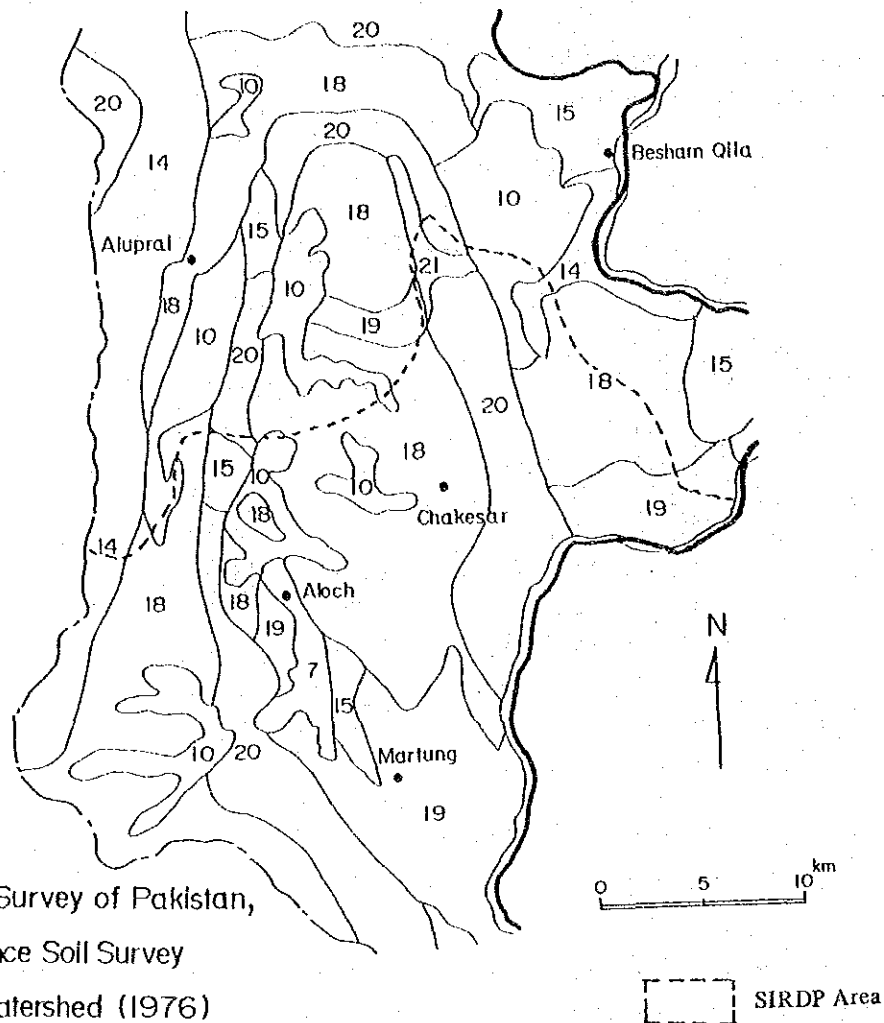
3) Climate and Water Resources

a) Climate

The climate varies from sub-tropical type to sub-humid type and alpine zone type in the SIRDP Area. The precipitation is received in the form of snow in the winter season in most places and frost is common in the whole area.

The general condition is as mentioned in paragraph, 3.1.4 and the following is the mean values of respective climatic elements in the SIRDP Area.

FIGURE 7-1 LAND CAPABILITY MAP OF SIRDP AREA



Source: Soil Survey of Pakistan,
Reconnaissance Soil Survey
Tarbela Watershed (1976)

LEGEND OF LAND CAPABILITY MAP OF SIRDP AREA

Symbol	Land Capability	Characteristics
7	d III	Moderate dry-farmed land
10	d III - e IV	Some moderate dry-farmed land with little agriculturally unproductive land and little fair woodland
14	e VII - VIII	Poor Woodland, agriculturally unproductive land
15	VIII - d IV - d III	Agriculturally unproductive with some poor and little moderate dry-farmed land
17	VIII - g VI	Agriculturally unproductive land with little fair range land
18	VIII - e VI - e VII	Agriculturally unproductive land, fair and poor wood land
19	VIII - g VI - g VII	Agriculturally unproductive land, fair and poor range land
20	VIII - e VII - e VI	Agriculturally unproductive land with some poor and little fair wood land
21	VIII - g VII - g VI	Agriculturally unproductive land with some poor and little fair range land

Source: Soil Survey of Pakistan, Reconnaissance Soil Survey-Tarbela Watershed (1976)

Climatic Element in the SIRDP Area

<u>Climatic Element</u>	<u>Maximum</u>	<u>Minimum</u>
Mean Temperature	Jun. 29°C	Dec. 5°C
Monthly Rainfall	Mar. 164mm	Nov. 30mm
Mean Humidity	Aug. 65%	May 42%
Monthly Evaporation	Jun. 350mm	Dec. 50mm

b) Hydrology

The SIRDP Area is covered with the two watersheds of Itai Khwar and Chakesar Khwar. Both the Khwars flow into the Indus river.

The discharge peaks appear twice a year, March and September, following the winter and summer rains. The run-off percentage can be estimated at about 13 to 17 percent in winter season, 23 to 45 percent in summer and about 22 percent a year. The remarkable delay (time lag) of discharge caused by the snowfall and the thaw does not appear in this area except for small highland valleys.

The catchment areas and the design discharges at the project sites are as follows.

Catchment Area and Design Discharges

<u>River</u> (Khwar)	<u>Intake Point</u> (Place)	<u>Catchment Area</u> (sq.km)	<u>Design Discharge</u> (MCM/Year)
Itai Khwar	Sandai	45	8.5
Choga Khwar	Upper Choga	56	10.4
Itai Khwar	Jambal Derai	227	42.2
Chakesar	Surbanai Banda	37	6.9
Itai Khwar	Kuz Kabulgram	337	62.7

The run-off depth, specific discharge and monthly discharge etc. are as described in paragraph 5.2.

c) Present Utilization of Water Resources

River Flow

The river water is used for small scale irrigation, the power of many water mills and a few numbers of private micro-hydel power plant by means of traditional intake and conveyance method complying with the life mode and land use in the mountain villages. However, it seems to

be quite difficult to introduce the large scale irrigation systems or modern water facilities taking into account the mountainous lay of land and the present situation of the local people's livings. On the other hand, the potentiality of the flow still exists for the water resources of small scale irrigation and micro-hydel power generation.

Springs

There are many perennial springs in SIRDP Area and they are traditionally used for private small irrigation water, drinking water and other domestic uses in the mountainous area. Especially, the spring water is more used for drinking by village people rather than river water. However, every spring has a small quantity of outflow and it is almost fully used by the owner or the water right holders.

Groundwater

The aquifer does not widely develop in SIRDP Area where rock layer exists under shallow surface soil. The dug well can not be found for groundwater use because it is difficult to obtain the groundwater from the narrow aquifer, fault and fracture zones locally existing there.

4) Socio - Economic Situation

a) Population

The population in SIRDP Area is estimated at 138,600 in 1988. The annual growth rate from 1981 to 1988 is shown in the following table. The high rate is recorded in Chakesar.

Trend of Population in SIRDP Area

(unit: thousand)

<u>Sub-Tehsil</u>	<u>1981</u>	<u>1988</u>	<u>Annual Rate</u>
Chakesar	38.8	51.5	4.1
Puran	45.4	51.2	1.8
Martung	33.5	35.9	1.0
<u>SIRDP Total</u>	117.7	138.6	
Alpuri	102.7	121.5	2.5
Besham	31.0	46.9	6.2
<u>Total</u>	251.4	307.0	2.8

source: 1981 : Population Census

1988 : Village Profile Survey, LG & RD Dept. Swat

The population in the year of 2005 will be projected at about 222,000 in SIRDP Area, 91,000 in Chakesar, 58,000 in Puran and 46,000 in Martung respectively.

b) Household and Family Population per House

The number of households in 1988 are estimated at about 21,330 in SIRDP Area, 7,920 in Chakesar, 5,530 in Puran and 7,880 in Martung. Average family population per house is 6.5 persons.

Increase in population, household and family members per house in SIRDP Area should be inevitably accompanied by the solution of socio-economic problems such as improvement of food self-sufficiency, provision of social infrastructure and expansion of employment opportunities.

c) Farm Economy

The results of the farm management survey with 30 samples in SIRDP Area conducted by the Study Team are shown in the following table. These samples were selected among large size class farmers.

Average Farm Management Situation

<u>Land Use</u>	<u>Land</u>	<u>Average Field per Farm (acre)</u>	<u>Percent (%)</u>
	Rainfed	6.75	41
	Irrigated	2.73	17
	Upland	6.86	31
	Sub-total	16.34	100
	Grass land	19.10	
	Agri. land	35.44	
<u>Livestocks</u>	<u>Kind</u>	<u>Number</u>	
	Cattle	Adult	2.1
		Calf	0.5
	Buffalo	Adult	0.7
		Calf	0.1
<u>Crop Gross Income</u>	<u>Crop</u>	<u>Area (acre)</u>	<u>Gross Income (Rs)</u>
	Paddy	2.49	7,203
	Maize	7.29	4,708
	Wheat	7.65	5,446
	Total	17.43	17,357
			996 (per acre)

5) Agricultural Production

The major crops planted in both seasons, Kharif and Rabi are as follows;

Major Crops and Production in SIRDP Area (1987/1988)

Crop	Irrigated				Unirrigated				
	Area	Yield	Product	Area	Yield	Product	Area	Yield	Product
	(ha)	(%)	(ton/ha)	(ton)	(ha)	(%)	(ton/ha)	(ton)	(ton)
1. Cultivated Area	1,940	(100)			17,830	(100)			
2. Cropped Area	2,736	(141)			29,869	(167)			
<u>Kharif Crops</u>	1,901	(98)			16,368	(92)			
-Maize	503	(26)	1.8	905	16,305	(91)	1.1	17,935	
-Rice	1,392	(72)	1.6	2,227	21	(0)	-	-	
-Beans&Pulses <u>1/</u>	-	(-)			34	(0)	0.6	20	
-Vegetables <u>2/</u>	4	(0)	11.7	47	1	(0)	6.1	6	
-Others <u>3/</u>	2	(0)	18.6	37	7	(-)	11.2	78	
<u>Rabi Crop</u>	817	(42)			13,472	(76)			
-Wheat/Barley	744	(39)	1.6	1,190	13,215	(73)	0.8	10,572	
-Rape&Mustard	-	(-)	0.6		24	(1)	0.4	10	
-Fodders <u>4/</u>	4	(0)	18.9	76	134	(0)	11.3	1,514	
-Others <u>5/</u>	69	(3)	1.0	69	199	(1)	0.7	139	
Sugarcane	17	(0)	38.0	646	29	(0)	21.8	632	
Fruits <u>6/</u>	1	(0)	12.7	13	-	(-)	-	-	

Note : 1/, 2/, 3/, 4/, 5/, and 6/ are the representative crops of black gram, tomato, maize (fodder), shaftal lentil and apple.

Source : Land Revenue Office and Agricultural Statistic Office, Swat

Most of the existing irrigation systems are traditional ones, which irrigate seasonally rice fields by gravity during Kharif season. Rice and wheat are mainly grown in each season of Kharif and Rabi with the overall cropping intensity at 141 percent. This cropping intensity is considerably lower than that in the Swat Sub-Division irrigated areas. Following two factors appear to affect this low cropping intensity, namely;

- The limited water sources in Rabi season, and
- The ill drainage due to lack of drainage facilities.

The limited water sources may be also one of the major reasons for the very limited area under vegetables and fruits even in the irrigated areas. Maize and wheat are exclusively cropped in the unirrigated areas. The unirrigated areas are located on mountain sides upto nearly the tops of mountains, where about 70 percent of the lands have the slope of more than 50 percent. The following five constraints for the development of crop production are identified;

- Small area coverage of irrigated areas,
- Poor drainage systems,
- Poor road systems,
- Inadequate extension services, and
- No governmental services on the control of river bank and soil erosions, and on the introduction of small agricultural machinery.

Regarding animal husbandry, the wide infection of the cattle and buffaloes with liverfluke and the severe shortage in feed supply are the most critical problems in the area.

6) Agricultural Infrastructure

The agricultural productivity hovers around the low level in SIRDP Area comparing with that in Swat Sub-Division, because the disadvantaged topographical and water resources conditions impede the elevation of irrigation and farming activities there.

a) Irrigation

The total cultivated area is 19,770 ha in SIRDP Area, and about 10 percent of the area of 1,940 ha is irrigated at present by means of traditional irrigation systems.

The situation of irrigation in three areas are as follows;

Cultivated Area and Irrigated Area

Item	Chakesar		Puran		Martung		Total	
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Cultivated Area	6,860	100	8,400	100	4,510	100	19,770	100
Irrigated	410	6	1,210	14	320	7	1,940	10
Unirrigated	6,450	94	7,190	86	4,190	93	17,830	90
Cropped Area	10,967	100	13,982	100	7,675	100	32,624	100
Irrigated	667	6	1,554	11	513	7	2,734	8
Unirrigated	10,300	94	12,428	89	7,162	93	29,890	92
Crop Intensity		160		166		170		165
Irrigated		163		128		160		141
Unirrigated		160		173		171		168

The farmland is irrigated by gravity by means of traditional off-takes and unlined channels but tube-well or lift irrigation has not been employed yet. No national irrigation scheme has been carried out by the governmental organization, and nothing is planned for future at present.

This area is left out of the priority area of the on-going national development plan. The regional difference from the other better area seems to be getting more, if the SIRDP Area is left as it is.

The existing traditional irrigation facilities face the following problems at present;

- Conventional type of off-takes can not take in the regular quantity of water against the seasonal fluctuation of river flow, since it is always damaged by the flood.
- Large conveyance losses occur with leakage and collapse of unlined canals, and
- Crossings of canals on the streams and gullies are damaged by the sharp water flow.

b) Farmland Improvement

There are many rainfed dry farming (Barani) terraced fields developed upto the top of hills in SIRDP Area. The irrigated farmlands exist in very small areas along the Itai and Chakesar Khwars. Most of the cultivated areas are Barani fields as tabulated in a) Irrigation.

These cultivated lands do not receive irrigation water in the farming season because of the higher locations than water sources. The productivity in such lands is very low. While, the fields are exposed to the severe rains, eroded and collapsed in the rainy seasons. There are no farm roads provided except for the small access roads from main road to villages passing through the cultivated areas. The levees and field boundaries are used for footpaths. This condition causes the farmers inconvenience and inefficient farming activities.

c) Flood Protection

Since the natural reservability (water holding capacity) is low in the watersheds, the rivers suddenly increase in the discharge immediately after heavy rains in the rainy seasons. The river discharge changes into a mud flow or sometimes a debris flow, and it makes severe damage to farmlands, residential areas and public utilities such as irrigation facilities, buildings and roads etc. However, very little countermeasure has been carried out now. It is the most important subject from now on to take the necessary measures to cope with the protection of damaged places, erosion control and stabilization of sharp flow sources.

7) Rural Infrastructure

The prevailing condition of rural infrastructure in the SIRDP Area is generally poor comparing with other areas in Swat District and is far behind from the national and/or provincial targets on rural development. The sectoral situation, problems and constraints in the area are summarized as follows;

Roads

All main and branch roads in the SIRDP Area are not paved and density of branch roads is very low. Therefore, the transportation in the area and/or among neighboring areas is very restricted. Improvement and construction of roads are strongly requested by the local people and are essential for the agricultural development in the future. However, improvement and/or construction works of roads are very costly due to the steep mountainous topography in Shangla Par Sub-Division.

Telecommunication

Facilities of telegram, telephone and post in the area are very poor and are located in only main villages. Telephone lines are often interrupted by breakdown of equipment, snowfall and others. Majority of the local people is not benefited from existing facilities. It is required to establish a telecommunication system in the remote area for disaster relief and first aid of health care and others.

Rural Electrification

Electricity supply through WAPDA transmission line is not available in Shangla Par Sub-Division at present. There are only some private micro-hydel generator (5 to 10 kw) in the SIRDP Area. Those private facilities cannot fulfill the local people's demand. The lack of electricity supply is restricting the improvement of social services such as health care, education, etc. and development of small industry and others.

Village Water Supply

Present population coverage of water supply systems in the SIRDP Area is estimated at less than 30 percent which is the lowest among three Sub-Divisions in Swat District. The constraints on village water supply development in the area are due to scattering of local villages in mountainous area, lack of electricity which cannot allow the introduction of lift pumps, and others.

Education Facilities

Participation rates at primary education in the SIRDP Area are estimated at 28 and 2 percent for boys and girls, respectively. They are the lowest figures in Swat District. The reasons for that are low incentive to join education due to local backwardness, a scatter of houses in mountainous area, difficulty to post teachers in unattractive remote area and others.

Health Facilities

It is difficult to keep residential doctors in the SIRDP Area due to the low living condition in the remote area. The existing facilities are generally very poor, and therefore the local people have to go to Mingora and/or Saidu Sharif to receive proper medical care.

Sanitation Facilities

Hygiene education is not carried out properly in the area, therefore they are not interested in construction of village sewage system and latrines. PHE Department is in charge of those works, however, they are giving priority to development of water supply. Sanitation facilities are being very poorly introduced in the SIRDP Area.

7.2.2. Rural Development Plans

1) Agricultural Infrastructure Plan

a) Small Scale Irrigation Scheme (SSIS)

The scheme is delineated to utilize the river discharge which flows down quite much in the short period after rain in the intermittent rivers and/or streams in the mountainous area. The flow is caught and stored in the farm pond, and effectively supplied for small-scale supplementary irrigation, cattle and domestic uses.

The farm pond with 5,000 to 10,000 cu.m in capacity is to be constructed with excavation and embankment at a suitable natural hollow, small valley or flat space near the stream. The flooded water will be introduced by off-take (regulator) installed in the stream to the farm pond through feeder canal. The stored water is supplied to the existing farmlands and other required places through the lined canals under adequate water management. The scheme is shown in DWG No. 1.

This scheme can not realize the perennial and stable irrigation, however, the flooded water can be used as the new water resources without any trouble with existing rights customs of water uses.

b) Spring Water-Tank Programme

The main purpose of the scheme is to carry out the effective irrigation for the valuable cash crops such as fruits and vegetables using perennial spring water in the mountainous places, even though it is small scale irrigation scheme.

The concrete or brick made water storage tank (capacity be equivalent to one or two days outflow of the spring) is installed equipped with the suitable receiving inlet at the spring site. The required number of water taps and valves are properly fit in order to distribute the water rotationally to the every lot of orchards and fields among the beneficiaries. The scheme is shown in DWG No.2.

It becomes possible to use water most effectively applying drip and /or basin irrigation method by extension of vinyl pipe and nozzles by the user from distribution tap of main pipe. However, it is important and first matter that the new water allocation method and agreement must be

made among and by the users, because the traditional water right and ownership have been already established for drinking water supply and others in most of the springs.

c) Irrigation and Hydel Power Scheme

For planning the irrigation schemes with stable river run-off discharges, field survey was conducted in the areas, and it was found out that following three schemes located in Itai and Chakesar Khwar basins have a possibility to formulate an integrated irrigation plan in combination with micro-hydel power generation.

- Sandai-Aloch Irrigation and Hydel Power Scheme,
- Choga Irrigation and Hydel Power Schemes, and
- Chakesar Irrigation and Hydel Power Scheme

As the first step of the planning, the possibility of effective water use by means of dam construction was studied from economical and technical points of view based on the following conditions;

- The river run-off discharges at the proposed sites in the respective Khwars were calculated adopting the run-off hydro-pattern of the Barandu river, since no thaw influences upon the river discharge in the area. In the analyses, the probability of 1/5 year drought is decided as design year.
- Irrigation water requirements were estimated based on the proposed cropping pattern (see Figure 5-2) and land use in case of design year mentioned above.
- Micro-hydel power would be generated using the released irrigation water from the dam.
- Reservoir storage capacities at the respective proposed dam sites were obtained by topographic survey result.

Based upon these conditions, reservoir's behavior trials on a few cases of alternative plans were made in order to find the most optimal scale of irrigation and hydel power plans. As the conclusion, it was found out that the dam construction plan is not feasible due to steep gradient of the river profile (eight to three percent) and a large quantity of sediment

(400-700 cu.m/sq. km/year), which are the characteristic of the Khwars running down the bald watersheds. Further investigation is, however, awaited to make conclusion whether dam plan is feasible or not on the Chakesar Irrigation and Hydel Power Scheme.

The detailed study results are compiled in Annex D.

As the conclusion, the irrigation and hydel power schemes in those areas are decided to be the head regulator methods, because of above mentioned reasons. The outline of the irrigation and micro-hydel power schemes is as follows;

- The irrigation and micro-hydel power schemes are planned at three places in Sandai-Aloch scheme and every one place in Choga and Chakesar schemes.
- The head regulator and feeder canal (about 500 m long) are to be constructed to obtain the water head required for the micro-hydel power generation.
- The existing irrigation canals and the off-takes are to be improved for better use.
- The river banks are to be protected with gabions (stones and G.I.wire basket) and spurs in the required spots to protect farmlands from flood.
- New roads and village ponds are to be constructed for improvement of village life.

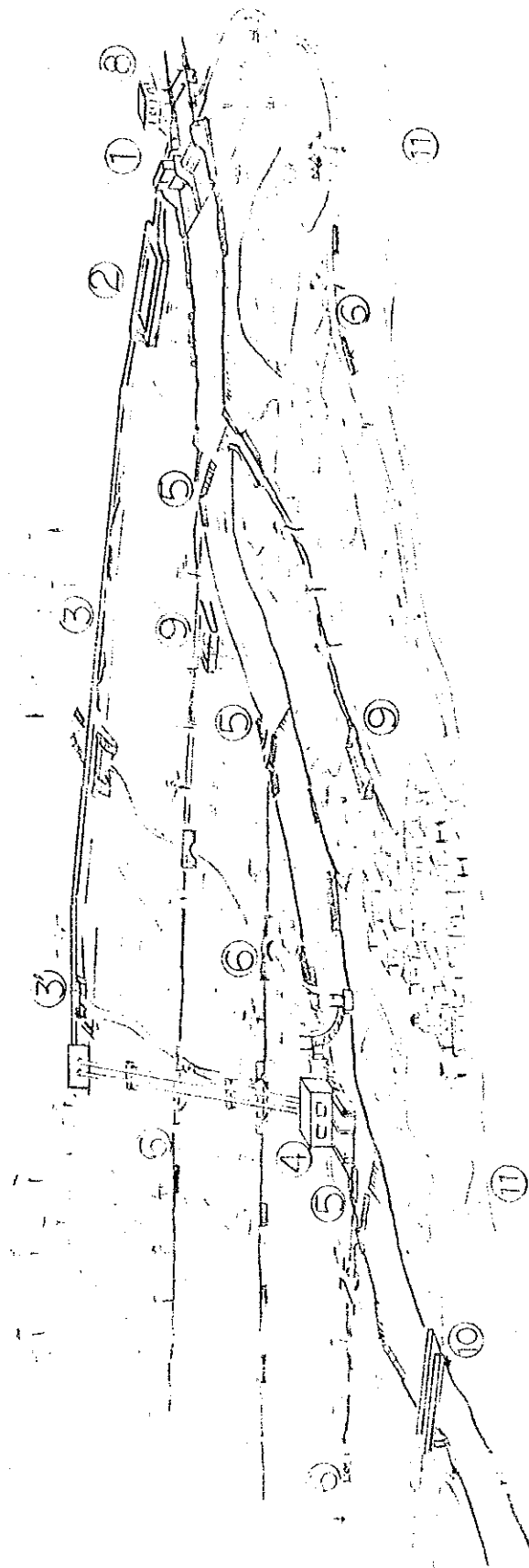
Figure 7-2 shows illustrated view of irrigation and hydel power schemes.

2) Agriculture Development Supporting Plan

a) Agricultural Development Plan

As for the existing irrigation systems, it is required to improve the irrigation water supply. Moreover, the improvement of on-farm water management with providing the on-farm facilities and also drainage systems will be needed to increase cropping intensity. The result of this study reveals that it is difficult to convert these seasonal irrigation

FIGURE 7-2 ILLUSTRATED VIEW OF IRRIGATION AND HYDEL POWER SCHEME



- | | |
|------------------------|--------------------------------------|
| (1) Head Regulator | (5) Improvement of Existing Off-take |
| (2) Sedimentation Pond | (6) Improvement of Existing Canal |
| (3) Feeder Canal | (7) Riverbank & Land Protection |
| (4) Hydel Plant | (8) O & M Quarter |
| (9) Village Pond | (9) Spillway |
| | (10) Bridge |
| | (11) Road |

systems to the perennial ones in the SIRDP Area. Considering the availability of irrigation water, it is proposed to apply the cropping pattern B shown in Figure 5-2 in the improved traditional irrigation areas. Also in the proposed Small Scale Irrigation Scheme (SSIS), this cropping pattern will be applied.

On the other hand the proposed Tank Irrigation will be able to supply irrigation water throughout year although the scale of irrigation service area is limited. In the irrigation service areas, the cropping pattern A in Figure 5-2 could be applied, aiming at introducing cash crops like fruits and vegetables, onion etc. In case of the perennial irrigation areas in the high altitude (more than about 1,500 m from the sea level), it is possible to introduce the temperature-zone fruits (apple, grape, apricot, etc.) and vegetable (Kharif tomato, turnip, radish, etc.) and Kharif potato. The cropping pattern in the unirrigated areas would not be mostly improved from the existing ones.

The animal husbandry should be developed to raise the productivity because the Project Area has a large potential of livestock and poultry production. To raise the production efficiency of crop production and animal husbandry, it is proposed to implement the following agricultural development supporting scheme under the Project.

b) Agricultural Development Supporting Scheme

Agricultural Extension Strengthening and Seed Multiplication Scheme

It is proposed to establish the Agricultural Technology Transfer and Demonstration (ATTD) Farm in Mingora (main farm) and SIRDP Area (branch farms) for the transfer of efficient and effective farming technology applied in the different agroecological zones. The ATTD Farm will have the major activities of adaptive research and training in the following items of interdisciplinary technology:

- Crop selection and cultivation technology in different agroecological zone,
- Stabilization of rice production and promotion of crop diversification,
- Appropriate technology on Barani crop cultivation,

- Improvement of on-farm irrigation practices,
- Improvement of quality in fruits and vegetables production with applying proper pest control technique,
- Various aspects of technology in post-harvest and marketing of products, and
- Farm mechanization with small farm machinery especially in the mountainous areas.

For strengthening the extension activities, it is proposed to install the buildings for extension and training activity with adequate space and equipment (vehicles, audio-visual aids) etc., materials. The scheme is shown in DWG No.5, and No.6.

Certainly enough number of extension staff (a Field Assistant per Union Council and a Agriculture Officer per three to five Field Assistants) should be posted according to the national standard. The establishment of a seed farm and a fruit nursery station will be required for the multiplication and distribution of quality seeds and fruit trees.

Furthermore, it is also proposed to establish the Field Assistant office of the Fruits and Vegetables Development Board and a Bee-keeping Center, respectively for the development of these purposes. The scheme is shown in DWG No.4, and No.5.

Animal Husbandry Development Scheme

It is proposed to strengthen the veterinary services through upgrading of four Veterinary Dispensaries to Veterinary Hospitals in accordance with the local people's demand. Four Natural Breeding Centers, one Artificial Insemination Center and one main Nutrition Improvement Unit are required to be established in SIRDPA Area. The stud animals of rams, he-goat and sets of Fayumi chicken (five pullets and one cockerel) should be distributed for the improvement of genetic characteristics of local animals and poultry. The scheme is shown in DWG No.7.

Farm Mechanization Promotion Scheme

For the introduction of small farm machinery under rental system, three tractor stations should be built in the Project Area.

Soil Conservation

Considering the condition of soil erosion in the area, it is proposed to expand soil conservation activities in Swat District, specially in the SIRDP Area. The existing Swat Conservation Office has to increase the staff with provision of a main office, a workshop, a branch office, several units of supervisors' offices and the related equipment, durable goods like bulldozers, tractors and vehicles.

Cooperative and Input Supply Scheme

Two Inspector Offices of Cooperative Department and the branch offices of Provincial Agricultural Cooperative Bank should be established to serve farmers about farm credit and input supply.

Since there is no regular input supply point in the Project Area, it is proposed to establish an Agriculture Development Authority (ADA) sale point with a warehouse at the capacity of about 1,000 ton in Alpuri for the supply of farm inputs. Regarding the improvement of the farm product market, it is proposed to develop four marketing facilities including storages in Chakesar, Aloch and Martung. One of the section in ATTD Farm will serve for the development of local marketing in the area through utilizing the proposed marketing facilities. The scheme is shown in DWG No.9.

3) Road and Communication Plan

Road development is indispensable for various other sectional development in SIRDP Area and then should be given priority for implementation in SIRDP. Therefore, improvement and pavement of main roads in the Project Area should be carried out in the initial stage of SIRDP. The total length of the main roads which should be improved and paved is estimated at 103.5km, as shown below;

Yakhtangi-Derai-Aloch	:	15.0 km
Derai-Chakesar-Karora	:	50.5
Alochi-Martung	:	20.0
Aloch-Choga	:	6.0
Choga-Inawar	:	6.0
Choga-Kuzpan	:	6.0
<u>Total</u>		<u>103.5</u>

Following the improvement works of main roads, in order to increase road density in the area construction of branch roads should be implemented in the middle and long-term development. Hence a road density in the Project Area will be gradually raised. The scheme is shown in DWG No.12.

b) Communication Development Plan

Telephone system in the Project Area is in poor condition. Improvement of the existing communication system will take much budget and long period until completion.

One of the felt needs for mountainous village people in the Project Area is timely and prompt communication system. In case of urgent sickness or accident, village people can not take a speedy rescue by the medical system. They have to carry their patients with beds instead of stretcher. In order to reply the felt needs mentioned above, an establishment of wireless telephone system is proposed in the short-term development.

4) Rural Electrification Plan

As stated in paragraph 6.2.4, WAPDA proposed the rural electrification plan for Swat District including Shangla Par Sub-Division. However, the capacity of the electric supply in the plan is lower than the demand for the Project Areas as shown below. In order to supplement for lack of the electric power supply in the areas, development of micro-hydel power should be carried out;

Electric Power Supply and Demand in the Project Areas
(As of 1989)

Name of project Area	Demand of Public Facilities (KW)	Demand of Agri. Facilities (KW)	Demand of Household (KW)	Total Demand in Each Area (KW)	Supply on Proposed Plan (KW)
Chakesar	26	18	5,011	5,055	-
Puran	60	64	3,496	3,620	-
Martung	32	8	2,397	2,437	-
Total	118	90	10,904	11,112	6,300

In the study period, some hydraulic potential sites for micro-hydel power development have been found in the Project Area. The micro-hydel power generation analysis was made upon rainfall record of Karora in Shangla Par Sub-Division and hydro-pattern of the Barandu river in Buner Sub-Division due to the lack of the rainfall and discharge record in the Project Area. The Study Team carried out more precise field survey including topographic survey and analysis on the following potential sites;

- Surbanai Banda (Chakesar Khwar) in Chakesar,
- Sandai (Sandai Khwar) in Puran,
- Choga (Choga Khwar) in Puran, and
- Jambal Derai (Itai Khwar) in Puran.

According to the result of the study, it was found out that the discharges of the streams at Surbanai Banda, Sandai and Choga show remarkable seasonal fluctuation. The planning of hydel power development at the three schemes, however, are technically feasible to plan a hydel- power stations with the improvement of existing irrigation systems.

On the other hand, in case of Jambal Derai, There is little compensation to present agricultural assets although the river has a certain amount of stable river discharges and suitable topographical condition for a hydel-power development.

Furthermore, in this study, it was identified that Kabulgram, Itai Khwar in Martung has some potentials for micro-hydel power according to the topographical and hydrological data. The power plant will be combined with a new dam which will be constructed for the purpose of a new irrigation system for Kabulgram village.

Micro-hydel power potential in the Project Areas are described as follows;

<u>Potential of Micro-Hydel Power in the Area</u>				
Schemes	Power (Max)	Power (Firm)	Annual Possible Power Generation	Annual Available Generation
	(Kw)	(Kw)	(Mwh)	(Day/Year)
Chakesar	3.5	0.6	9.0	130
Sandai	45.0	27.5	143.0	214
Choga	3.5	2.0	11.3	224
Jambal Derai	200.0	84.6	721.0	355

Note: Details are given in Annex F. The scheme is shown in DWG No.10 and No.11.

5) Village Water Supply Development Plan

Population coverage of existing water supply systems in SIRDP Area is estimated at 17 to 28 percent and is comparatively lower than the national target of the Seventh Five-Year Development Plan by 1993, as 70 percent. Construction of water supply systems is essential to improve living condition of rural area and should be planned as a long-term development plan through direct participation of local people. It is targeted that population coverage will be increased upto 75 percent by the end of SIRDP. Water supply system by gravity is suitable technically and economically in the SIRDP Area because of its steep mountainous topography. However, most of existing springs which are located near by villages are already developed. In company with progress of rural electrification, introduction of lift pumps will be required to expand water supply systems, while development of gravity water supply systems will be physically limited in the future. The scheme is shown in DWG No.13.

6) Rural Infrastructure Development Plan

a) Education Facilities Development Plan

In order to improve very low participation rate at primary education in the Project Area, 28 and 2 percent for boys and girls respectively, it is required to increase the number of new schools. This contribute to mitigate the present hard accessibility to schools. Participation rate will be raised upto 90 and 70 percent for boys and girls by 2005, and a school density 1,000 and 2,000 population per school. In the short and middle-term development, all existing schools should be improved and/or upgraded to serve good condition in a long-term and to give incentive to local people to join education.

In order to increase the number of teacher and raise up participation rate for village students scattered, residence and dormitory should be established. The scheme is shown in DWG No.14.

b) Health Care Facilities Development Plan

At first, present poor health care conditions should be improved through posting of doctors, upgrading of dispensaries to BHU's level and

facilities improvement for existing BHU's, RHCs and hospitals. Number of BHUs and RHCs should be increased gradually to cover population growth in future. By the end of 2005, it is targeted that 10,000 population per BHU and 5,000 population per doctor, which can be a base of the proper health care system planned by the national government . In the short-term development of SIRDP, ambulances should be stationed at existing hospitals in the Project Area in company with road improvement. It can be helpful for the rescue medical system and the link system with the District Headquarter Hospital in Saidu Sharif. The scheme is shown in DWG No.15.

c) Sanitation Facilities Development Plan

Self-construction of latrines should be encouraged by the government with hygiene education through the long-term development of SIRDP. It is proposed that population coverage of 20 percent would be achieved by the year of 2005. Schools and other public facilities will be improved in the short and middle-term development. Therefore, these improvement works should involve construction of latrines with participation of local people. The scheme is shown in DWG No.16.

7.3 Agricultural Technology Transfer and Demonstration (ATTD) Farm Scheme

7.3.1 Objective and Function of ATTD Farm

Agricultural Technology Transfer and Demonstration Farm aiming at the farmers' training in Swat District, especially in SIRDP Area was planned to be established at Mingora as a priority scheme. The functions of the ATTD Farm are as follows;

- Upgrading farmers' systematization of farming technology for increasing yield and improving quality of the respective crops including fruits and vegetables through adaptive research,
- Strengthening agricultural extension services by developing extension workers' capability, and
- Technology transfer through on-farm demonstration of irrigated farming with sprinkler/trickle irrigation system etc. and Barani farming to the farmers.

7.3.2 Organization of Proposed ATTD Farm

The proposed ATTD Farm has the following seven sections as indicated in Figure 7-3;

- Adaptive research to introduce suitable crop
- Paddy crop cultivation and extension
- Upland crop and Barani cultivation trial farming
- Model irrigation and on-farm water management section
- Quality improvement/pest control for vegetable and fruit
- Marketing and farmer's organization
- Agricultural machinery and workshop

In this organization, the transfer of agricultural research technology will be basically made by the adaptive research trial under the jurisdiction of Director Research for the Transformation and Integration of Provincial Agricultural Network (TIPAN) Project in NWFP and his staff at Agricultural Research Station in Mingora, and on the other hand,

the transfer of technology through demonstration plots will be under the jurisdiction of Director General of Agriculture and his extension staff in Mingora.

7.3.3 Proposed Facilities

The ATTD Farm comprises a main farm in Mingora and two branch farms at Malamjabba and Nipk Khel and other four places in SIRDP Area. The required facilities are listed below;

a) Main Farm (Mingora, 8 ha)

- Land acquisition and development including vegetable production farms with plastic film houses and tunnels.
- Buildings and offices
- Agricultural machinery
- Laboratory equipment
- Transportation vehicles

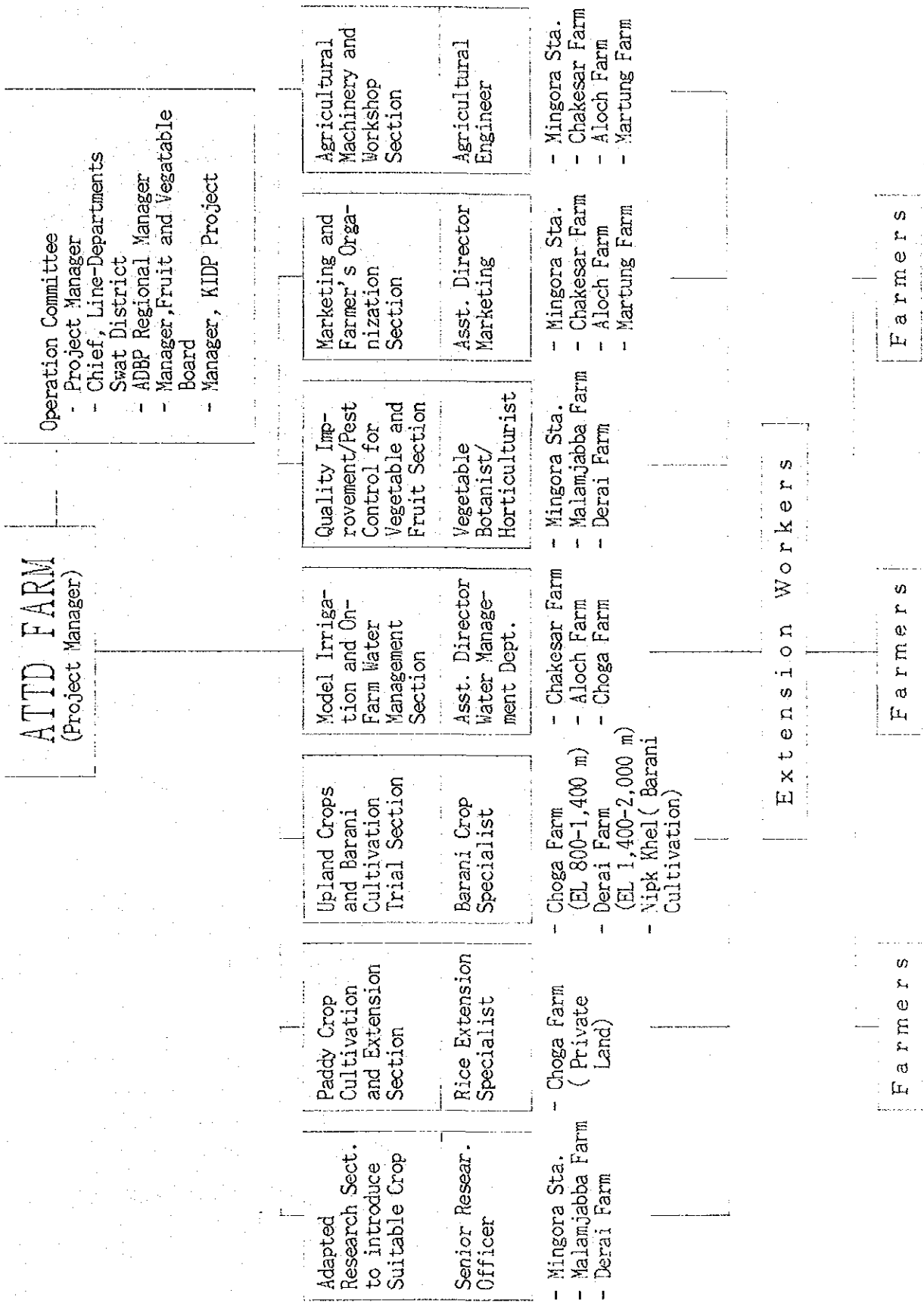
b) Branch Farms (6 places, 20 ha in total)

- Land acquisition (private land)
- Adapted crop research farm
- Demonstration farm (private land)
- Barani model demonstration farm and on-farm water management
- Transportation vehicles

c) Agricultural Machinery Workshop (4 places in total)

- Mingora main farm
- Branch farms of Malamjabba, Chakesar and Aloch.

FIGURE 7-3 PROPOSED ORGANIZATION FOR AGRICULTURAL TECHNOLOGY TRANSFER AND DEMONSTRATION (ATTD) FARM



7.4. Project Facilities and Cost Estimate

7.4.1. Project Facilities

The project facilities in the project were planned on the basis of the same considerations mentioned in the Master Plan Project (see paragraph 6.4). The Table 7-1 indicates the proposed facilities in each development works in terms of the three development stages.

7.4.2. Project Cost

The project cost of SIRDP is estimated according to the estimation conditions mentioned in the Master Plan Project (see paragraph 6.5.1).

The development project cost is estimated at about 1,455 million Rupee (without price escalation) as shown in Table 7-2.

7.5. Project Implementation Plan

7.5.1. Implementation Organization

Implementation of the project would be made by newly established implementation organization as described in the Master Plan (see paragraph 6.6.1). Namely following working organization should be established for the project;

Project Steering Committee	: Policy making organization at provincial level with the presence of relevant Secretaries of Departments,
Project Coordination Committee	: Overall project coordination organization at District level with participation of Project Managers of line-Departments, District Councils and Union Councils,
District Management Unit	: Actual implementation body supported by line-Departments concerned.

TABLE 7-1 PROPOSED DEVELOPMENT WORKS FOR SIRDP AREAS

Development Works	Schemes	Qty	Term
1. Agri. Infrastructure Development - Irrigation	· Small Scale Irrigation Scheme	18 pla.	1990-2005
	· Spring Water Tank Irrigation	30 pla.	1990-2000
	· Kabalgram Irri. Scheme	320 ha.	2000-2005
	· Sandai-Aloch Irri. & Hydel Power Scheme	352 ha.	1990-1995
	· Choga Irri. & Hydel Scheme	170 ha.	1995-2000
	· Chakesar Irri. & Hydel Scheme	110 ha.	- do -
	2. Agri. Supporting Service Development - Research - Extension & Seed Multiplication - Livestock & Poultry - Agri Engineering & Soil Conservation - Cooperative & Input Supply - Small Industry - Marketing Facilities	· Soil Survey & Equipment	50,700 ha
· ATTD Farm (Mingora)		1 pla.	- do -
· Agricultural Training Centres		3 pla.	1990-1995
· Improv./Const. of Extension Facilities		6pla.	- do -
· Seed Farm		1pla.	- do -
· Fruit Nursery Station		1pla.	- do -
· F & V. Training Office		1pla.	- do -
· Transportation		LS	- do -
· Bee Keeping Center		1 pla.	- do -
· Veterinary Hospital		4 pla.	- do -
· Natural Breeding Center		4 pla.	- do -
· Artificial Insemination Sub-Center		1pla.	- do -
· Animal Nutrition Improvement		1pla.	- do -
· Poultry Hatchery			
· Animal Distribution		1pla.	- do -
· Soil Conservation Project		LS	1990-2005
· Tractor Station		LS	1990-1995
· Inspector Office		3 pla.	- do -
· Cooperative Bank		1 pla.	- do -
· Agr. Inputs Warehouse		1 pla.	- do -
· Women Handicraft Center		1 pla.	1990-1995
· Main Market. Center (Mingora)		1 pla.	1990-1995
· Marketing Sub-Center		1 pla.	- do -
	3 pla.	- do -	

Development Works	Schemes	Qty	Term	
3. Road & Communication Development - Road Development	· Road Improvement	103.5 km	1990-1995	
	· Road Construction	176.0 km	1990-2005	
	· Wireless Telephone System	LS	1990-1995	
4. Rural Electrification Development - Rural Electrification	· Extension of WAPDA Transmission Line	26,700 houses	1995-2005	
	· Micro-Hydel Power Station	200kw	1990-1995	
5. Village Water Supply Development - Water Supply System	· Construction of New Water Supply System	22,300 houses	1990-2005	
6. Rural Infrastructure Development - Education	· Improv. and Upgrading of Existing Schools	102 pla.	1990-2000	
	· Construction of New Schools	241 pla.	1990-2005	
	- Health Care Facilities	· Improv. / Upgrading Existing Facilities	10 pla.	1990-2000
		· Construction of BHUs	11pla.	1990-2005
	· Upgrading BHU to RHC	3pla.	2000-2005	
	· Residence for Doctor	41 pla.	1990-2005	
	· Ambulances	3 unit	- do -	
	- Sanitation Facilities	· Self-Construction of Latrines	7,100 houses	- do -
		· Minor Works Programme	LS	1990-2005
	7. Village Community Development			

TABLE 7-2. SUMMARY OF DEVELOPMENT COST FOR SIRDP

(unit: million Rs.)

<u>Description</u>	<u>F/C</u>	<u>L/C</u>	<u>Total</u>
1. Project Works			
- Agricultural Infrastructure			
Irrigation Schemes	70.3	46.9	117.2
- Agricultural Supporting Service			
ATTD Farm	39.1	16.7	55.8
Extension and Others	48.5	20.8	69.3
- Road and Communication	162.9	65.7	228.6
- Rural Electrification			
Micro-Hydel Power	20.2	5.1	25.3
Extension of WAPDA Line	91.6	39.2	130.8
- Village Water Supply	64.0	27.4	91.4
- Rural Infrastructure			
Education Facilities	67.6	67.5	135.1
Health Care Facilities	17.5	7.5	25.0
Sanitation Facilities	23.7	15.8	39.5
- Village Community	0	14.4	14.4
Sub-total (Direct Cost)	<u>605.3</u>	<u>327.1</u>	<u>932.4</u>
2. Land Acquisition and Compensation (5%)	0	46.6	46.6
3. Project Administration (10%)	37.3	55.9	93.2
4. Engineering Service (15%)	97.9	42.0	139.9
Sub-total (Direct & Indirect Cost)	<u>740.5</u>	<u>471.6</u>	<u>1,212.1</u>
5. Contingency (20%)	148.1	94.3	242.4
Sub-total	<u>888.6</u>	<u>565.9</u>	<u>1,454.6</u>
6. Price Escalation (1990-2005)	248.0	385.2	633.1
Grand Total	1,136.6	951.1	2,087.7

In planning the implementation organization of the project, the most important matter would be local people's participation to the project at village level, where through their representative bodies such as villages and Union Councils, all villagers have to arrive at an agreement on the project consensus to carry out project implementation. So as to cope with these requirements, the Village Community should be newly organized at village (Mauza) level.

7.5.2. Implementation Schedule

It will take 15 years for implementation of SIRDP, viz. from the year of 1990 to 2005. The tentative implementation schedule for SIRDP is shown in Figure 7-4. The seasonal weather conditions, particularly snowfall and heavy rain, which will affect on construction works have been considered in the schedule.

7.5.3 Operation and Maintenance Cost

The preliminary estimation of operation and maintenance (O & M) cost for SIRDP was made in the way for the Master Plan Project (see paragraph 6.6.3).

The annual operation and maintenance cost is estimated at about 60 million Rupee (without price escalation) as shown below;

Annual Operation and Maintenance Cost
(Average of 13 years)

		(unit : million Rs)	
Short-Term Plan	:	52.8	(44.5) ^{1/}
Middle-Term Plan	:	91.2	(54.5)
Long-Term Plan	:	176.6	(74.9)
Total		115.2	(60.0)

^{1/} Figures in parenthesis show O & M costs without price escalation.

FIGURE 7-4 IMPLEMENTATION SCHEDULE OF SIRDP

Project Development Works	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		1990	1995					2000					2005			
1. Agricultural Infrastructure Develop.																
-Small Scale Irrigation Schemes																
-Spring Water Tank Irrigation																
-Sandai-Aloch Irri. & llydel Scheme																
-Choga Irri. & Hydel Scheme																
-Kabalgram Irrigation Schemes																
2. Agricultural Supporting Service Development																
-Soil Survey																
-ATTD Farm (Mingora)																
-Extension and Seed Multiplication																
-Livestock and Poultry																
-Soil Conservation																
-Tractor Station																
-Cooperative and Input Supply																
-Women Handicraft Center																
-Main Marketing Center (Mingora)																
-Sub-Marketing Center																
3. Road and Communication Development																
-Main Road Improvement (103.5km)																
-Branch Road Construction (176km)																
-Wireless Telephone Systems																
4. Rural Electrification Development																
-Extension WAPDA Transmission Line																
-Micro-Hydel Power Scheme																
5. Village Water Supply Development																
-New Water Supply Schemes																
6. Rural Infrastructure Development																
-Impr. & Upgrad. of Existing Schools																
-Establishment of New Schools																
-Impr. of Existing Health Facilities																
-Establishment of New BHUs																
-Establishment of New RHCs																
-Self-Construction of Latrines																
7. Village Community Development																
-Minor Works Programme																

Remarks:

————— : Preparation, Construction and Establishment

- - - - - : Services and O & M

7.6. Project Evaluation

7.6.1. Basic Concept and Method of Analysis

The Shangla Par Integrated Rural Development Project (SIRDP) covers a total area of 67,700 ha.

In Chapter III, the prevailing problems, conditions, and the restrictions for the project development, such as land and other resources, employment condition and farm economy, agricultural technology, crop growing conditions and social infrastructure facilities were studied. These problems and conditions are concentrated on the SIRDP Area.

The conditions of the project evaluation is summarized as follows:

- Limited land to support whole population due to steep slope cultivation,
- Various crop growing conditions in the area,
- Lack of agricultural infrastructure and low productivities with inadequate supporting activities,
- Inadequate marketing facilities due to limited surplus farm products,
- Lack of rural infrastructures, such as road, village water supply and rural electricity,
- Seasonal work in big cities and towns in village to supplement low-income of the farmers; and,
- Lack of employment opportunities.

The above conditions are related to each other; thus, the general investment to solve these problems will be needed. The total investment cost including price escalation of the project amounted to about 2,090 million Rupees, which investment will be divided into seven plans for a period of 15-year financial program or until 2005.

The basic concepts of project evaluation are the following:

- The benefits expected by the implementation of the project are composed of direct and indirect benefits. However, this project focuses the tangible benefits on the basis of the above six plans. Furthermore, the effects of the general investment will also be considered in this study.

- Estimation of agricultural benefit is based on the benefit which will be produced by investment project in 1990-1995 and 1995-2000 since the international price of rice, wheat, and fertilizer can be estimated until Year 2000.
- The investment cost for the agricultural infrastructures, which was planned on the basis of limited land and water resources at the hilly topographic areas shows rather high as compared with benefits to be created by the project. Under this situation, the economic evaluation of the project should be made based not only on quantitative benefit-cost method but also quantitative benefit method.
- By applying the quantitative benefit-cost method, the benefit-cost ratio or internal rate of return was calculated. In this analysis, the conversion factor of 0.85 was used to convert cost and benefit streams to economic prices (see Annex H). The exchange rate used was U.S.\$1.00 equivalent to Rs. 21.00.

Analysis method of project evaluation for each plan are as follows:

1) Agricultural Infrastructure Plan

The increased benefit in crop production is generated by irrigation benefit. The project benefit is computed based on the production material for the crop and economic wages, cropping pattern and unit production yield by year of "with project" and "without project".

Project cost is divided into foreign currency and local currency portions. The conversion factor will be applied in local currency at the current border prices. The cropping pattern and unit target yield are based on the agricultural development plan, as shown in paragraph 7.2.2.

2) Agricultural Development Plan

Evaluation of project cost for this plan is classified into seven groups; namely, (i) research (ii) technology transfer and seed multiplication, (iii) livestock, (iv) soil conservation and farm

mechanization, (v) cooperatives and supply of production materials, (vi) rural industries, and (vii) marketing of the products, etc. Through the study of the objective, function and utilization of the proposed facilities, direct and indirect benefits for the project would be evaluated.

3) Road and Communication Plan

Tangible benefit of the road and communication plan will be generated by the reduction of transportation expenses, and passenger's time loss, preservation to the transportation damage of agricultural products. This benefit will be computed by each route on which the traffic volume can be observed at present and in future. The benefit in the project is calculated for the length of 76.5 km with asphalt of main road linking with Chakesar, Aloch, Murtung, Derai and Choga.

The road plan in SIRDP includes six routes of pavement and 16 routes of new roads, which were selected at the request of six Union Councils through inquiry survey and based on the development plan of the Government. As a result of the study of the benefited population, household and cultivated area, future traffic volume and public utility of the medical facilities, etc. of each route, priority of the main routes under this plan was confirmed (see Annex H).

Telecommunication scheme was planned for the establishment of first-aid medical system in the remote area and some places in the mountains. The benefit for this plan could not be fully estimated, however, great effect can be expected in the Project Area.

4) Rural Electrification Plan

A large amount of the cost will be distributed for the expansion of the existing power transmission line of WAPDA, and micro-hydel power is planned at Jambal Derai in Murtung. Economic evaluation for the micro-hydel power is based on the thermal power generation unit price used in "Reshun Hydel Project, Region Upper Chitra, 1988".

5) Rural Water Supply Plan

In general, the rate of expenditure for consumption of water is assumed to be four to five percent of the average household income at the maximum. For this study, four percent was used in estimating the expenditure, and evaluation has been made on the assumption that water charge is regarded as the benefit of the project.

On the other hand, labor saving cost for water by this project can be estimated as the benefit. Thus, field survey was conducted by obtaining 30 sample farms for drinking water in Shangla Par area (see Annex H). From the 22 samples responded, the average water work per day was 3.2 man/day, 4.5 times/day (0.51 hour/time), 7.3 hours/day and 16.2 hours/day in Chakesar, 5.2 hours/day in Puran, and 4.0 hours/day in Murtung. Although the benefit can be computed, the average wage cannot be applied to the under-age worker. Since all 1,720 farms do not need the hours mentioned above, this benefit has not been computed.

6) Rural Infrastructure Plan

This plan consists of such infrastructures as education, health care and sanitation facilities. Evaluation of this plan should be made on social evaluation method in order to make it quantitative.

7) Village Community Development Plan

This plan would promote small-scale rural community and socio-economic infrastructures in the village by volunteer-work among the villagers. Project evaluation has been made by quantitative analysis.

7.6.2. Estimation of Project Benefits

1) Agricultural Infrastructure Plan

The incremental crop benefits are estimated below based on the following irrigation projects:

Proposed Irrigation Scheme

<u>Irrigation Scheme</u>	<u>Beneficial Area</u>	<u>Construction Period</u>
Sandai-Aloch	352 ha	short-term
Choga	170 ha	middle-term
Chakesar	110 ha	middle-term
Small Scale Irrig. Scheme	12 sites	short 6, middle 6
<u>Spring Water Tank Program</u>	<u>30 sites</u>	<u>short 15, middle 15</u>

Note: Beneficial areas per one scheme site on small-scale irrigation scheme and spring water tank programme are assumed at 50 ha and 1 ha, respectively.

The construction component in the three irrigation schemes of Sandai-Aloch, Choga and Chakesar is improvement of existing off-take and canal. Hence, an irrigation efficiency will be improved, and irrigation water supply will be conducted on schedule, and crop yield is expected to be increased. Existing cultivated land of three schemes is paddy field under irrigation.

Small-scale irrigation scheme can not realize the perennial and stable irrigation, due to the limited water resources. However, the mountainous river discharge, which flows down quite much in the short period after rain, will be effectively supplied for commercial crops such as tomato and will bring about increase in yields of Kharif crops. Irrigation period is not perennial and incremental agricultural benefits are not much expected in comparison with project costs.

The scheme of spring water-tank program is to construct one water storage tank with capacity equivalent to one or two days outflow of spring. After construction of water storage tank, the surrounding orchards will be irrigated and the commercial crops such as fruits and vegetable will be cultivated in the beneficial Barani fields. However, as

the water capacity supplied by spring is limited, the beneficial acreage will be in small scale.

Annual incremental crop benefits generated by the above-mentioned five schemes are estimated as follows:

Annual Crop Benefits

<u>Items</u>	<u>Paddy</u> (ton)	<u>Maize</u> (ton)	<u>Vegetable</u> (ton)	<u>Fruits</u> (ton)	<u>Incremental NPV</u> (Million Rupee)
Without Project at Present	728	607	74	-	
With Project in Future	910	638	634	126	
Incremental Benefit	182	31	560	126	3.7

2) Agricultural Plan

Agricultural development plan will give much impact to farmers, viz., upgrading of standard level of farmer's cropping technology, introduction of cash crops, increase in crop yield, promotion of agricultural extension service, etc. As a result, farm income will increase and employment opportunity in the rural area will be expanded, especially ATTD Farm scheme which occupies 44 percent of direct costs or 115 million Rupees in the agricultural plan will play an important role.

Seed farm and fruits nursery centers will be established at each site in SIRDP. Supply of seeds and seedling by these facilities will meet the demand in Shangla Par Sub-Division and Swat District.

Socio-economic benefits on livestock development scheme, farm mechanization service, women's handicraft center and marketing facilities were studied as shown in paragraph 6.7.

3) Road and Communication Plan

Vehicle operating cost saving value and passenger time saving value generated by the construction of trunk road of 76.5 km were estimated. Forecasting of normal traffic excluding that generated by the road projects was studied in order to avoid double counting of benefits. Growth rate of daily normal traffic without the project and daily bus passengers are estimated on two cases of six percent and eight percent as shown in the Annex H.

Annual Incremental Benefits
(2005 in Year)

(unit: million Rs)

<u>Case</u>	<u>Vehicle Operating Cost Saving Value</u>	<u>Bus Passenger Time Saving Value</u>	<u>Total</u>
Case 1	10.97	6.41	17.38
Case 2	14.78	8.32	23.10

The general effects generated by road development projects include the expansion of commerce and rural industry activities through the stable and sustainable traffic, saving of transport time, costs and losses of goods, expansion of employment opportunity, upgrading of school participation rate, improvement of accessibility to medical or social services, promotion of investment to other social infrastructure, etc.

4) Rural Electrification Plan

The economic justification on Jambal Derai micro-hydel power development scheme was made in several case studies taking into consideration the degree of study results on key factors in the pre-feasibility study stage.

- Direct costs of 17 to 25 million Rupees.
- Percentage of indirect cost and contingency of 30 to 50 percent (percentage used in the Hydel Plan of SHYDO is less than 30 percent).
- Unit cost per kilowatt of the equivalent thermal plant is 14,665 Rupees based on Resume Hydel Project, Region Upper Chitral, PC-1 Proforma, 1988. This value is converted in 1989 price.
- Installed capacity of 200 kw is estimated by using load factor at range of 0.423 to 0.5 and operating period of 355 to 365 days.
- Economic life is 35 years for the hydel power plant and 15 years for the diesel plant.

Unit fuel cost per kilowatt hour of the equivalent thermal plant is 1.75 Rupees (1989 price) based on Resume Hydel Project.

Annual electric benefits are estimated at 1.549 to 1.847 million Rupees by using the key factors mentioned above (see Annex H).

The general effects generated by rural electrification project would include promotion of medical services and education and upgrading of living standard in the rural area.

5) Village Water Supply Plan

The affordable water charge are estimated at four percent of farm income per farm household on an average based on the 30 sample-farms conducted by farm management survey of SIRDP. The affordable water charge with the project in future is assumed at 4.7 Rupees per cubic meter considering expansion of farm income in future.

The beneficiaries in 1990 to 1995 are planned to be 8,600 houses, or an annual beneficiary of 1,720 houses (see Annex H).

The general effects generated by village water supply project are represented by release of rural women from the heavy water fetching labor, upgrading of standard of health / sanitation.

6) Rural Infrastructure Plan

Education facilities development scheme is to promote education for the capable person in the rural development and to extend the number of successful farmers who are capable in introducing the developed agricultural technique.

Literacy represented as index of project effects will be improved through an integrated manner by development of road, electricity, water supply, health / sanitation and education.

The participation ratio of primary school expected by the education facilities development schemes will be improved by 90 percent for boys and 70 percent for girls in 2005.

Health and facilities development schemes would upgrade the standard level of number of BHU and doctors by one set per 10,000 population and one person per 5,000 population, equivalent to the national level in 2005.

The integrated effects on ambulances to be stationed at existing hospitals and road development scheme would contribute to the saving of lives and stability of the welfare.

Sanitation facilities development schemes would disseminate latrines at coverage of 20 percent of population by 2005 in SIRD. P.

This scheme should be encouraged by the Government as a part of the village community development plan for the promotion of the rural volunteer movement.

7) Village Community Development Plan

The most important social functions required for village community plan as described in paragraph 6.2.7 are engagement of small-scale development activities such as project finding and construction of public facilities and execution of operation and maintenance of the constructed small or medium-scale projects facilities. This should be conducted through individual efforts.

Direct costs of 14.4 million Rupees will be allocated for the village community activities by the year of 2005.

7.6.3. Financial and Economic Evaluation

1) Financial Evaluation

Financial evaluation was made on the irrigation beneficiaries and village water supply scheme.

a) Crop Budget of Irrigated Farmer

Item	Sandai-Aloch Irrigation Scheme	Small Scale Irrigation Scheme	Spring Water Tank Scheme
1. Average Area 1/	1.52ha	1.52	1.52
Paddy	0.88	-	-
Barani	0.64	1.52	1.52
2. Cropped Area			
(At Present):			
Paddy	1.09ha(72%)	-	-
Maize	0.40(26%)	1.40(92%)	1.40(92%)
Wheat	0.64(42%)	1.16(76%)	1.16(76%)
Vegetable	0.02(1%)	-	-
(With Project-Year 2005):			
Paddy	1.09(72%)	-	-
Maize	0.40(26%)	1.40(92%)	0.6(40%)
Wheat	0.64(42%)	1.16(76%)	0.6(40%)
Vegetable	0.02(1%)	0.08(5%)	0.3(20%)
Fruits	-	-	0.3(20%)
Pulses	-	-	0.3(20%)
3. Yield per Hectare (ton)			
(At Present):			
Paddy	1.6	-	-
Maize	1.1	1.1	1.1
Wheat	0.8	0.8	0.8
Vegetable (Tomato)	11.7	-	-
(With Project-Year 2005):			
Paddy	2.0	-	-
Maize	1.16	1.16	1.1
Wheat	0.84	0.84	0.8
Vegetable (Tomato)	14.00	14.00	14.00
Fruits(Apple)	-	-	14.00
Pulses (Lentil)	-	-	1.20
4. Crop Budget (Rupee)			
(At Present):			
Crops Gross Income (including straw)	10,082	9,868	9,868
Production Cost (excluding family labor)	2,444	1,677	1,677
Crop Net Income	7,638	8,191	8,191
(With Project-Year 2005)			
Crop Gross Income (including straw)	11,023	15,420	79,826
Production Cost (excluding family labor)	2,550	2,523	16,201
Crop Net Income	8,473	12,897	63,625

Note: 1/ Average area is based on average farm size of landowner in 1980
Agriculture Census (See Paragraph 3.3.1)

b) Financial Evaluation on Water Supply Scheme

The financial internal rate of return (FIRR) was calculated at 10 percent, as shown in the Annex H.

2) Economic Evaluation

a) Agricultural Infrastructure Plan	<u>Case</u>	<u>EIRR</u>
Sandai-Aloch Scheme	Case 1	14.5%
Choga Scheme	Case 1	13.3%
Chacesar Scheme	Case 1	10.3%
Above three schemes and Spring Water-Tank Scheme		9.2%

b) Road Plan		
Trunk Road Improvement Scheme	Case 1	8.5%
	Case 2	10.5%

c) Rural Electrification Plan

<u>Direct Cost</u> (million Rs.)	<u>Percentage</u> <u>Direct Cost &</u> <u>Contingency</u> (%)	<u>Load Factor</u> <u>for Annual</u> <u>Energy</u>	<u>Case</u>	<u>EIRR</u>
25	50	0.423	Case 1	2.8%
25	50	0.500	Case 2	4.0%
25	30	0.423	Case 3	4.2%
25	30	0.500	Case 4	5.5%
17	50	0.423	Case 5	6.5%
17	50	0.500	Case 6	8.0%
17	30	0.423	Case 7	7.9%
17	30	0.500	Case 8	9.6%

CHAPTER VIII. RECOMMENDATIONS AND CONCLUSION

CHAPTER VIII. RECOMMENDATIONS AND CONCLUSION

8.1 Recommendations

1) Promotion of Staged Development for Master Plan Project

The development plan for Master Plan Project is worked out by three staged development in short, middle and long-terms. The short-term development is formulated in taking into account the implementation priority, quick yielding, etc. In this study, Pre-Feasibility study has been made on the priority plans in the short-term plan. It is necessary, however, to make further works of survey, investigation and design on the other short-term plans proposed in the Master Plan for materializing the project implementation. And also, necessary surveys and studies for the middle and long-term plans should be started as early as possible to expect the project implementation.

2) Promotion of Priority Development Project

The study on Master Plan Project has revealed that the development priority of the projects in the District is given to Shangla Par Sub-Division, Buner Sub-Division and Swat Sub-Division in order. As the first step, the Shangla Par Integrated Rural Development Project (SIRD P) involving three Sub-Tehsils of Chakesar, Puran and Martung should be implemented in priority.

3) Development Plan of SIRD P and Its Effects

It is anticipated that the following seven major development plans involved in the SIRD P will not only give an appropriate guideline for rural development in Swat District, but also serve as a model of the development for the neighboring Districts adjacent to Swat District;

- Agricultural Infrastructure Plan,
- Agricultural Supporting Facility Plan,
- Road and Communication Plan,
- Rural Electrification Plan,
- Village Water Supply Plan,
- Rural Infrastructure Plan, and
- Village Community Development Plan

4) Arrangement for SIRDP Implementation Programme

It is surely anticipated that the implementation of SIRDP will bring benefits directly to the local people in Chakesar, Puran and Martung Sub-Divisions, and also give socio-economic impact to the country as well as surrounding areas. Consequently, the Pakistan Government should take necessary measures for preparation for early implementation of SIRDP. Furthermore, following subjects should be arranged prior to the project implementation;

- Establishment of a suitable project implementation organization to execute project construction and to conduct effective management among relevant Government agencies,
- Arrangement of necessary local budget for implementation and of land acquisition according to the proposed plan,
- Explanation of Project Plan to the local people to participate to the project; and,
- Strengthening and establishment of agricultural institutions and operation & maintenance organizations with the participation of local people.

5) Implementation Organization for SIRDP

The main implementation agency for SIRDP is the Local Government and Rural Development (LG & RD) Department, but the development plans involved in Project consist of many components mentioned above, so that the related Government Agencies concerned should cooperate actively each other for successful project implementation.

6) First Priority Development Schemes in SIRDP Area

The first priority development schemes are proposed to be implemented in the early stage out of the priority development schemes above-mentioned. Table 8-1 indicates the proposed first priority development schemes. For selecting the first priority development schemes, the following criteria are taking into consideration that is, (a) the schemes should be categorized into short-term development in the SIRDP, (b) the schemes should be of local peoples' strong demand and of

expectation of quick effects by the implementation of the schemes, and (c) financial acceptability for the implementation, etc.

7) Swat River Basin Irrigated Agricultural Development Project

The SIRDP was proposed as priority development project in the short-term development, through the study of Master Plan. On the other hand, as the middle and long-term plans, Swat River Basin Irrigated Agricultural Development Project was proposed in the Master Plan. According to the preliminary hydrological analysis of discharges in the Swat river, about 3,300 MCM of the river discharge is annually wasted without an effective utilization at the lower reaches of Swat District. This fact shows a large potential of water resources to be developed by constructing a large scale storage dam in the upstream in the Swat river.

Major components for the project are summarized as follows:

- Water resources development by dam construction,
- Improvement of existing irrigation systems located on the both banks of the Swat river,
- Expansion of irrigation areas and improvement of irrigation facilities in the Upper and Lower Irrigation Canals located in Malakand Agency,
- Establishment of irrigated agricultural farming systems and strengthening/establishment of agricultural institutions, and
- Introduction of an adequate water distribution and management systems to materialize an effective utilization of available water resources.

It is strongly recommended that the fundamental investigation and study for the project should be commenced in the early stage in considering the following facts, that is, the local people and Government Agencies concerned desire abundant water resources development in the Swat river and furthermore long period will be needed to carry out the investigations such as land and water resources and geological surveys.

8.2. Conclusion

1) Implementation of Master Plan and Priority Development Projects

Since the development plans proposed in the Master Plan will directly contribute to raise income level of the local people and improvement of their living standards, it is important for Government Agencies concerned to give a necessary administrative guidance to the local people for their participation in the project implementation in order to organize the farmers' groups and village community groups, which will play a role as an effective body for project works at the village level with self-help and self-contribution.

2) Effects of Priority Development Schemes

Shangla Par Sub-Division selected as the priority development project area has been suffering from low agricultural production due to the reasons of (a) insufficient consolidation of agricultural infrastructure, (b) traditional farming method, and (c) ineffective agricultural institutional activity organization. It is considered, however, that the implementation of SIRDP will solve the problems to restrict development of the areas to increase agricultural production and to improve social welfare of the local people in the areas. And also, it is hoped that the development plan will serve as model for rural development through Pakistan, and contribute to providing a firm foundation for a sound and prosperous nation.

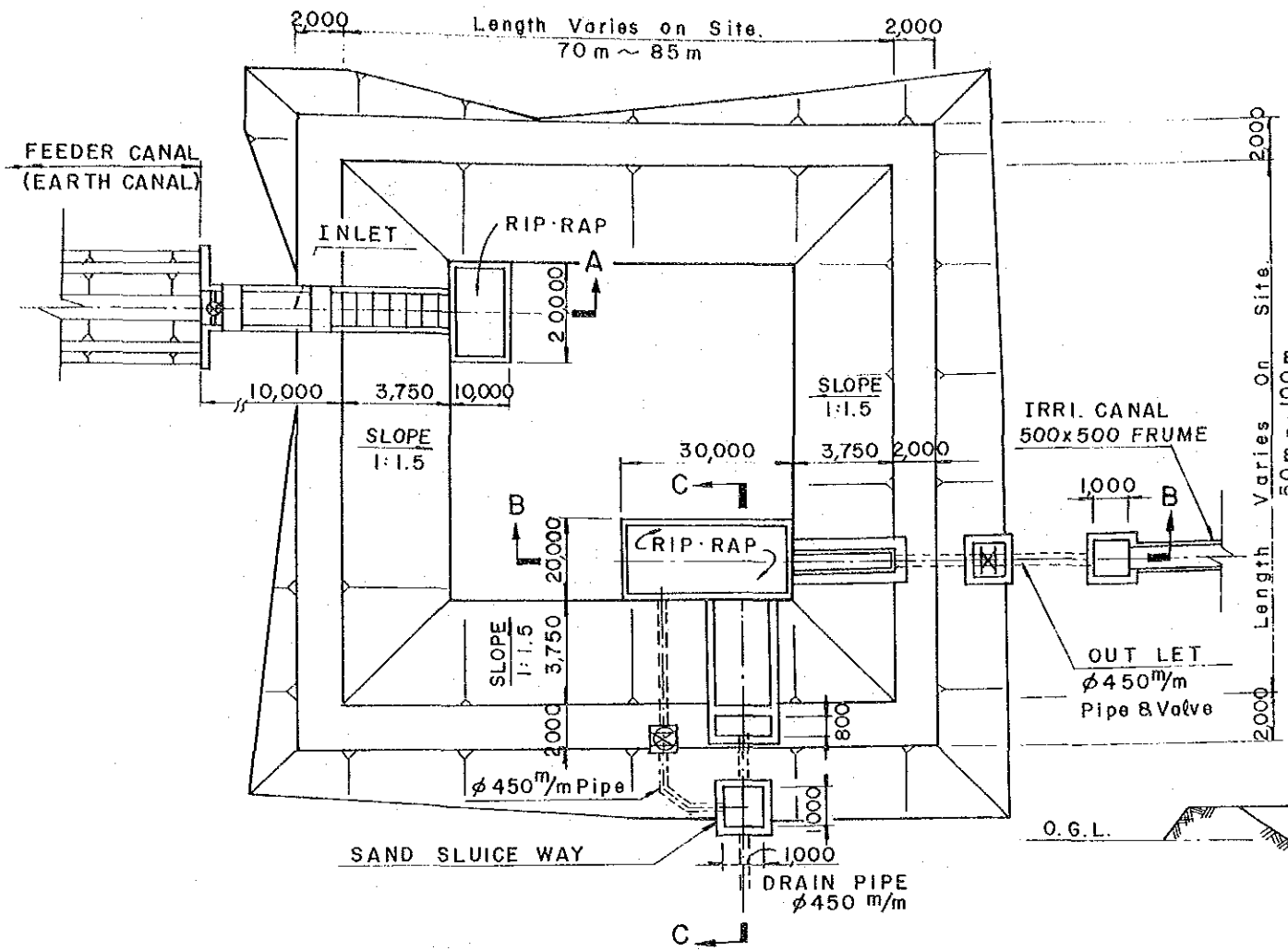
TABLE 8-1. FIRST PRIORITY DEVELOPMENT SCHEMES IN SIRDP

<u>Schemes</u>		<u>Quantity</u>
a)	Agricultural Infrastructure Development Plan	
	- Small Scale Irrigation Scheme	: 3 areas
	- Spring Water Tank Irrigation Scheme	: 6 areas
	- Sandai-Aloch Irrigation Scheme	: 352 ha
b)	Agricultural Supporting Service Development Plan	
	- Extension and Seed Multiplication	
	◦ ATTD Farm	: 1 (main)
		: 5 (branch)
	◦ Agricultural Training Center	: 1 place
	◦ Seed Farm	: 1 place
	◦ Transportation of Extension Services	: L.S
	◦ Fruit Nursery Station	: 1 place
	◦ Fruit and Vegetable Training Office	: 1 place
	◦ Bee-keeping Center	: 1 place
	- Animal Husbandry	
	◦ Veterinary Hospital	: 4 places
	◦ Natural Breeding Center	: 4 places
	◦ Artificial Insemination Sub-Center	: 1 place
	◦ Animal Nutrition Improvement Center:	: 1 place
	◦ Poultry Hatchery	: 1 place
	◦ Animal Distribution	: 1 place
	- Agricultural Engineering and Soil Conservation	
	◦ Tractor Station	: 2 places
	◦ Soil Conservation Office	: 1 place
	- Cooperative and Input Supply	
	◦ Inspector Office	: 1 place
	◦ Cooperative Bank	: 1 place
	◦ Women Handicraft Center	: 1 place

<u>Schemes</u>		<u>Quantity</u>
°	Agricultural Input Warehouse	: 1 place
-	Small Industry	
-	Marketing Facilities	
°	Main Marketing Center	: 1 plac
°	Marketing Sub-Center	: 3 places
c)	Road and Communication Development Plan	
-	Road Improvement	: 76.5 km
d)	Rural Electrification Plan	
-	Micro-Hydel Power Station (200 kw)	: 1 place
e)	Village Water Supply Development Plan	
-	Village Water Supply System	: 3,440 houses
f)	Rural Infrastructure Development Plan	
-	Education Facilities	
°	Improvement/Upgrading of Existing Facilities	: 30 places
°	Construction of Primary School Buildings	: 10 places
-	Health Care Facilities	
°	Improvement/Upgrading Existing Facilities	: 3 places
°	Construction of BHUs	: 2 places
°	Construction of Residence for Doctors	: 2 places
°	Ambulances	: 3 units
-	Sanitation Facilities	
°	Establishment of Office	: L.S
°	Construction of Latrines	: 520 houses
g)	Project Cost	: 427 million Rupee

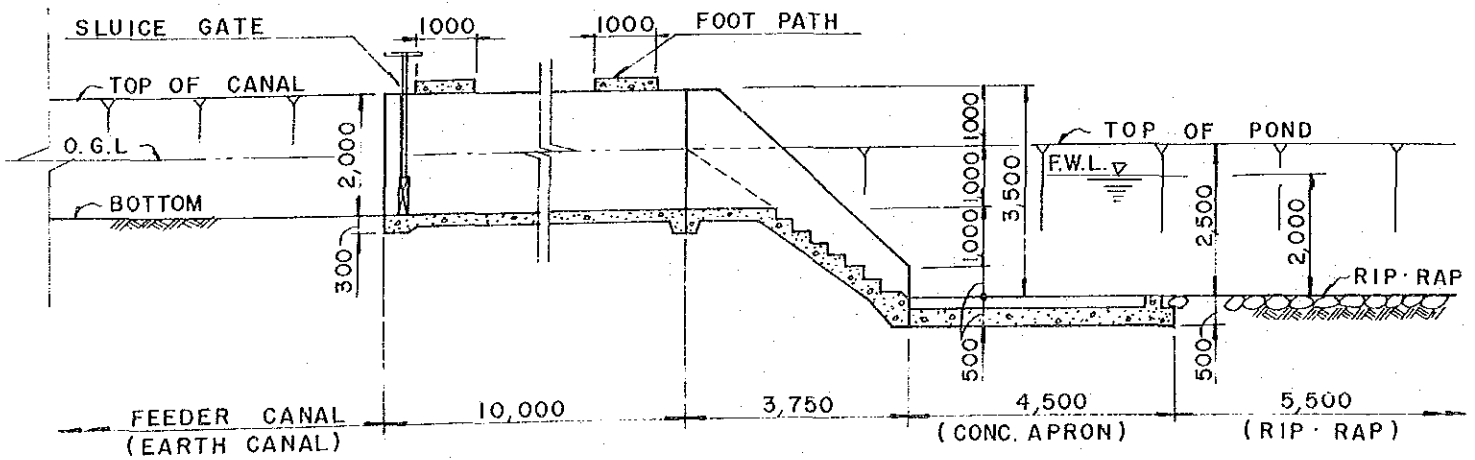
LIST OF DRAWINGS

DWG.No.1	Small Scale Irrigation Scheme
DWG.No.2	Spring Water-Tank Program
DWG.No.3	Irrigation and Hydel Power Scheme
DWG.No.4	Agricultural Supporting Facilities (1)
DWG.No.5	Agricultural Supporting Facilities (2)
DWG.No.6	Agricultural Supporting Facilities (3)
DWG.No.7	Agricultural Supporting Facilities (4)
DWG.No.8	Agricultural Supporting Facilities (5)
DWG.No.9	Agricultural Supporting Facilities (6)
DWG.No.10	Jambal Derai Hydel Power Scheme (1)
DWG.No.11	Jambal Derai Hydel Power Scheme (2)
DWG.No.12	Standard Design of Roads
DWG.No.13	Standard Design of Water Supply Facilities
DWG.No.14	Standard Design of Education Facilities
DWG.No.15	Standard Design of Health Facilities
DWG.No.16	Standard Design of Sanitation Facilities

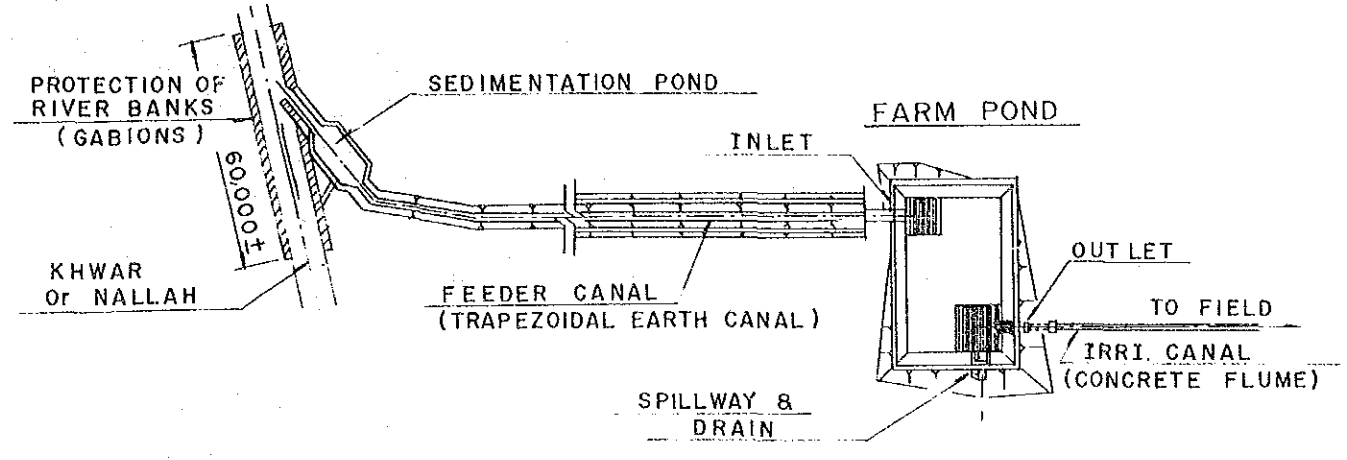


PLAN OF FARM POND
N.T.S.

INLET

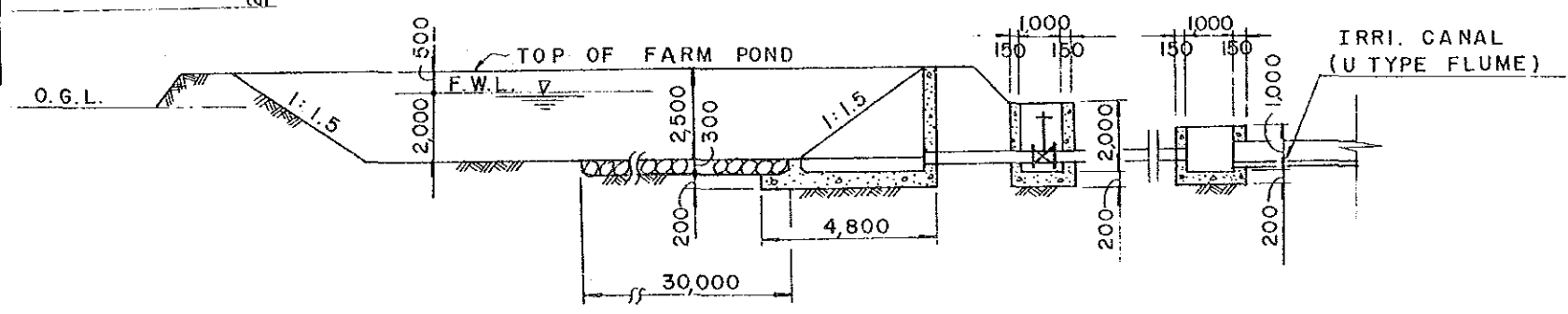


SECTION A-A
N.T.S.



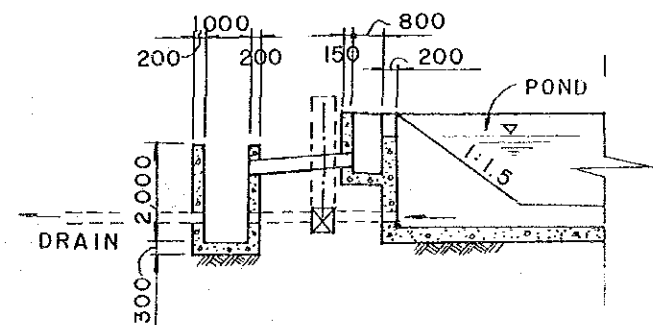
LAYOUT OF S.S.I.S
N.T.S.

OUTLET



SECTION B-B
N.T.S.

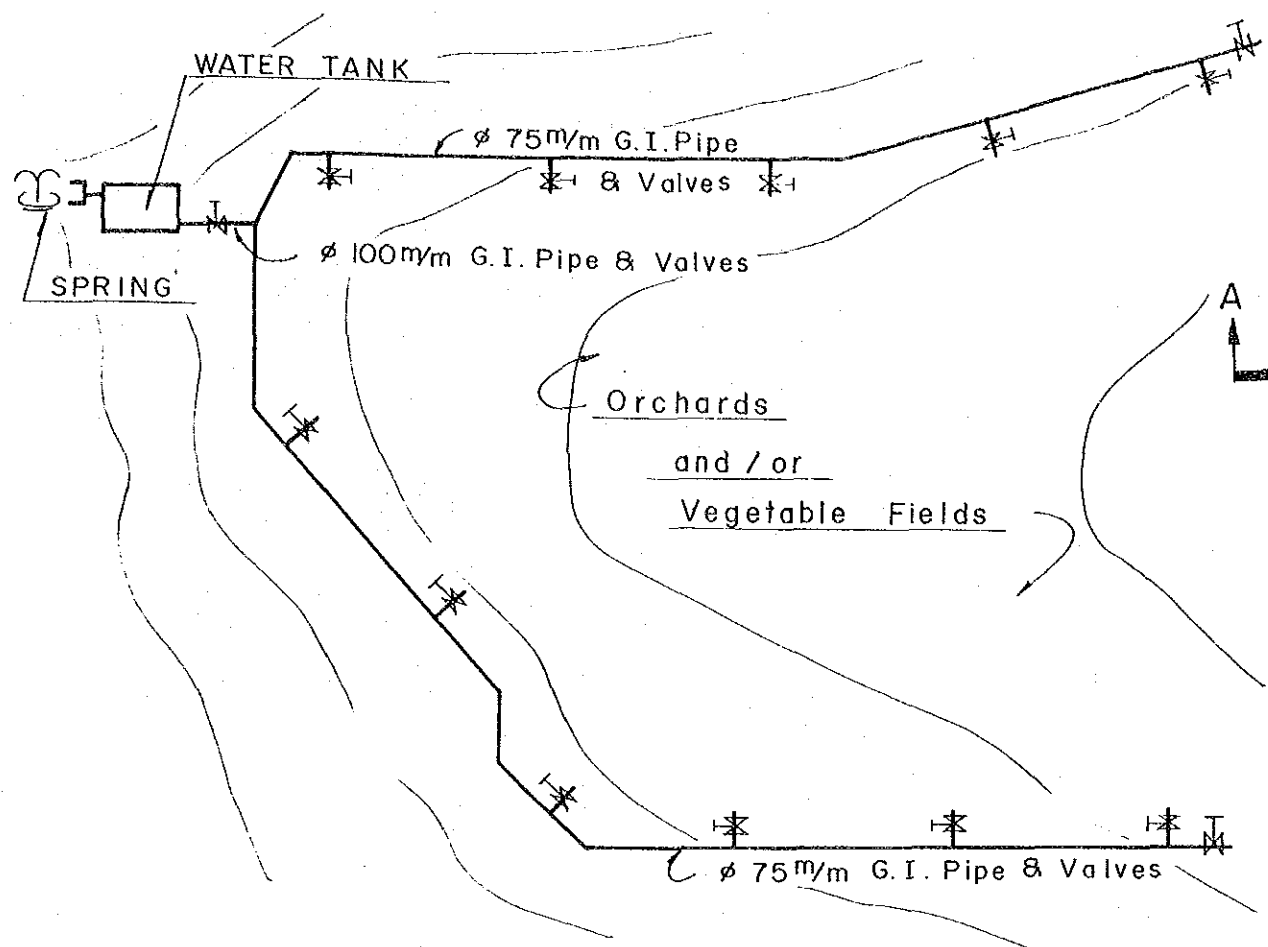
SPILLWAY & DRAIN



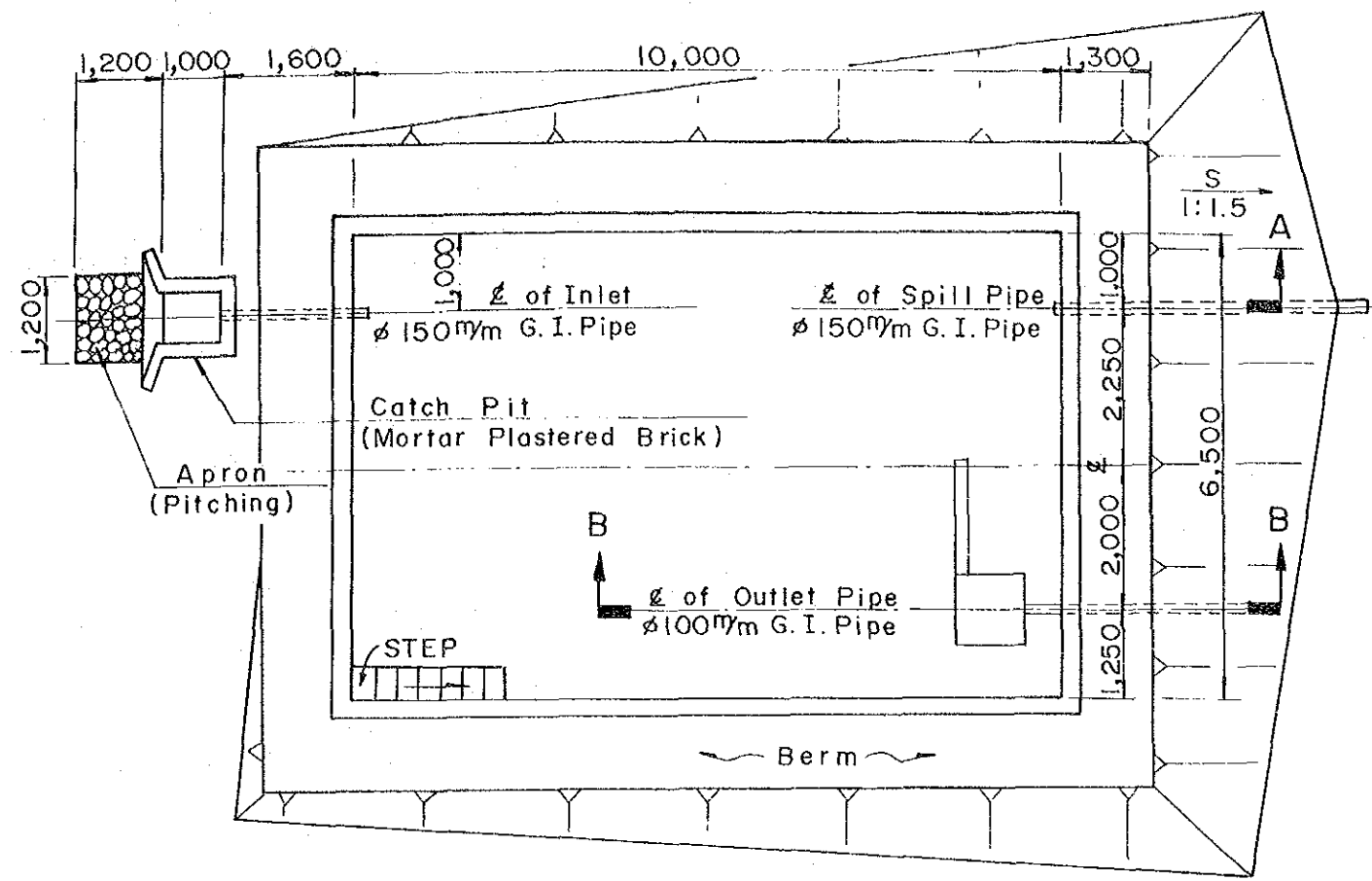
SECTION C-C
N.T.S.

NOTE:
1. Unless otherwise indicated, all the dimension are given in mm.

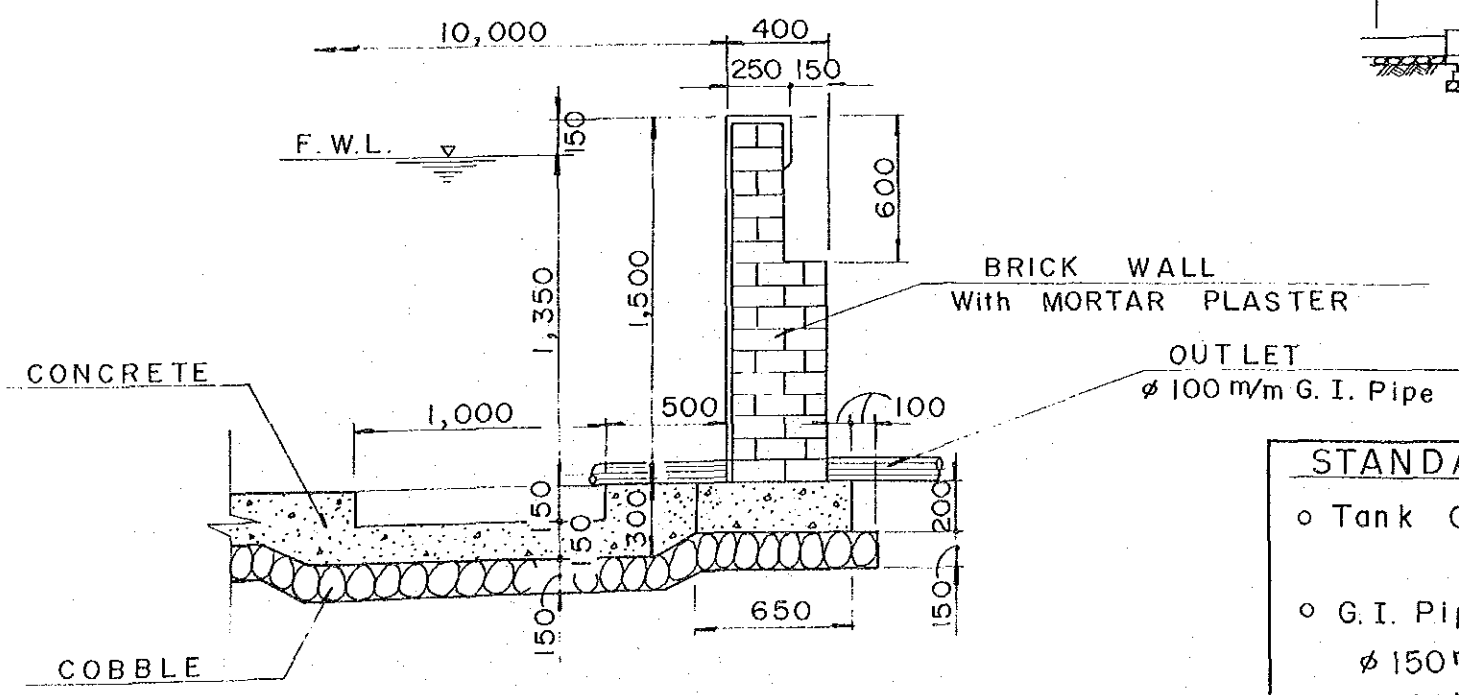
MASTER PLAN STUDY
ON
SWAT DISTRICT IRDP
SMALL SCALE
IRRIGATION SCHEME
DRAWING NO. : 1
JAPAN INTERNATIONAL COOPERATION AGENCY



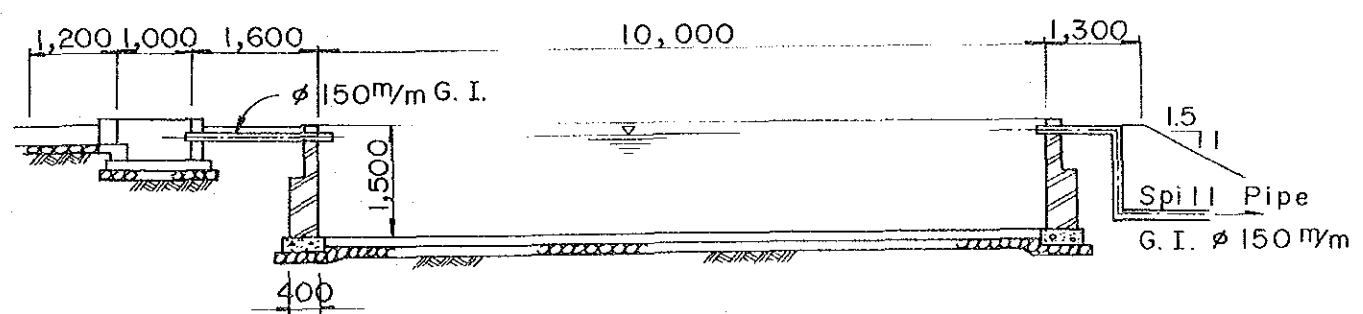
LAYOUT OF PIPE & VALVES
1: 1,000



PLAN
1: 100



SECTION B - B
1: 30

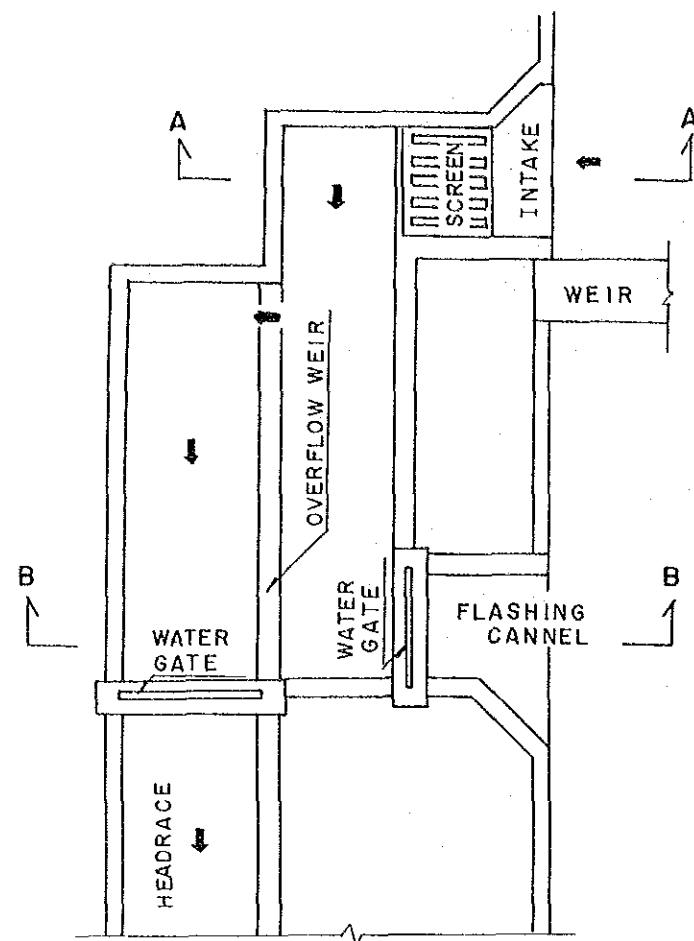


SECTION A - A
1: 100

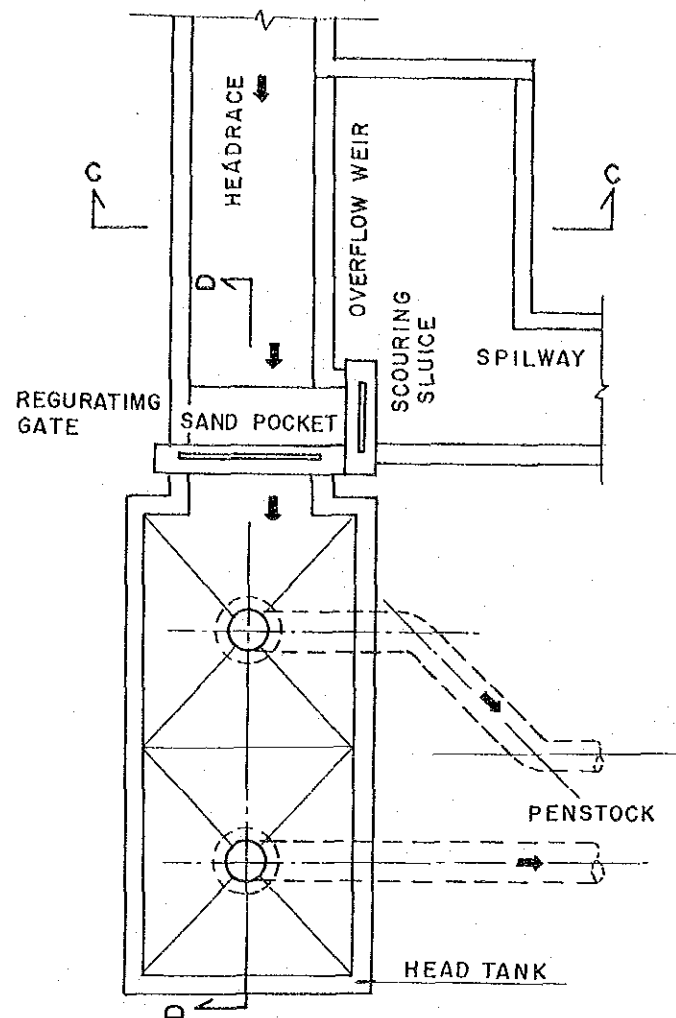
NOTE:
1. All dimensions are given in mm.

STANDARD	
o Tank Capacity :	$10^m \times 6.5^m \times 1.35^m = 87.8 \text{ m}^3$ (1 1/2 s x 24 hrs.)
o G.I. Pipe & Valves :	<ul style="list-style-type: none"> φ 150^m/m , ℓ = 10m, for Inlet & Spillway φ 100^m/m , ℓ = 10m, 1 no. of Valve for Outlet φ 75^m/m , ℓ = 340m, 13 nos of Valve for Distribution

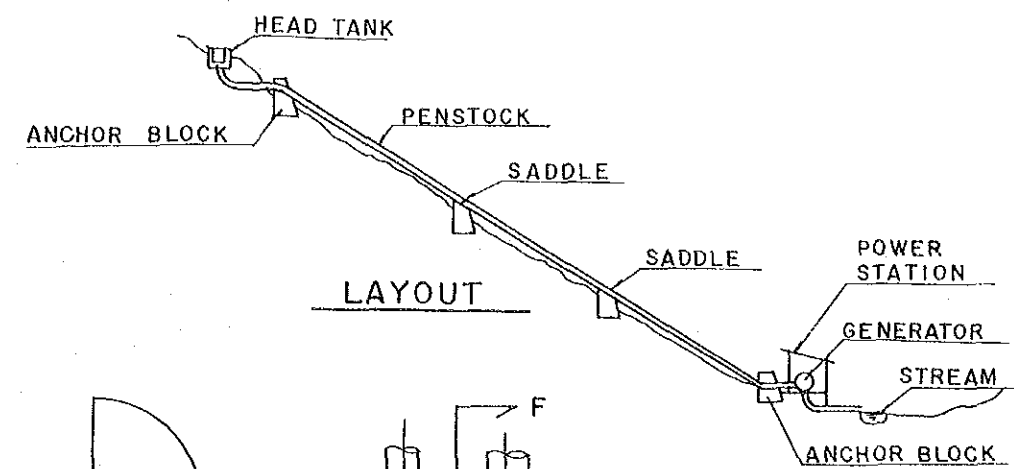
MASTER PLAN STUDY ON SWAT DISTRICT IRDP
SPRING WATER - TANK PROGRAM
DRAWING NO. : 2
JAPAN INTERNATIONAL COOPERATION AGENCY



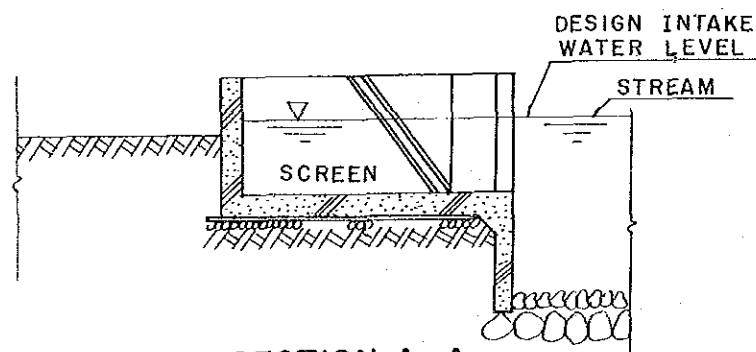
PLAN OF SETTLING BASIN



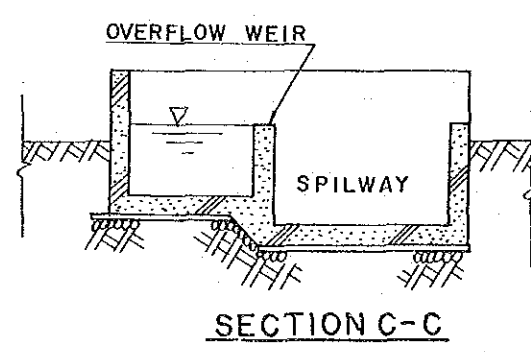
PLAN OF HEAD TANK



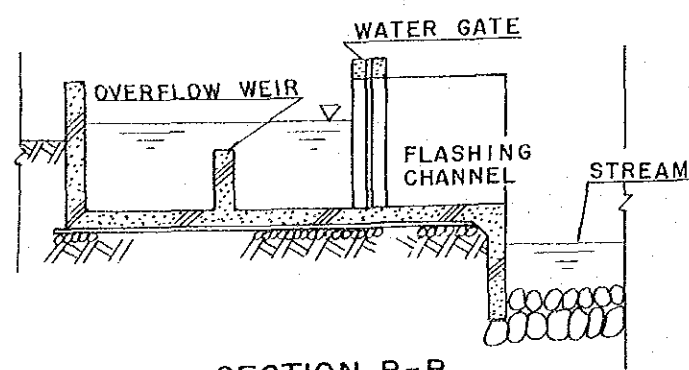
PLAN OF POWER STATION



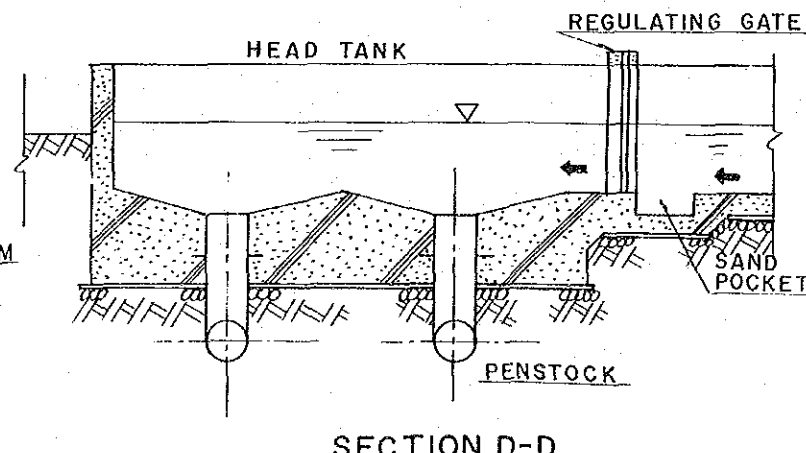
SECTION A-A



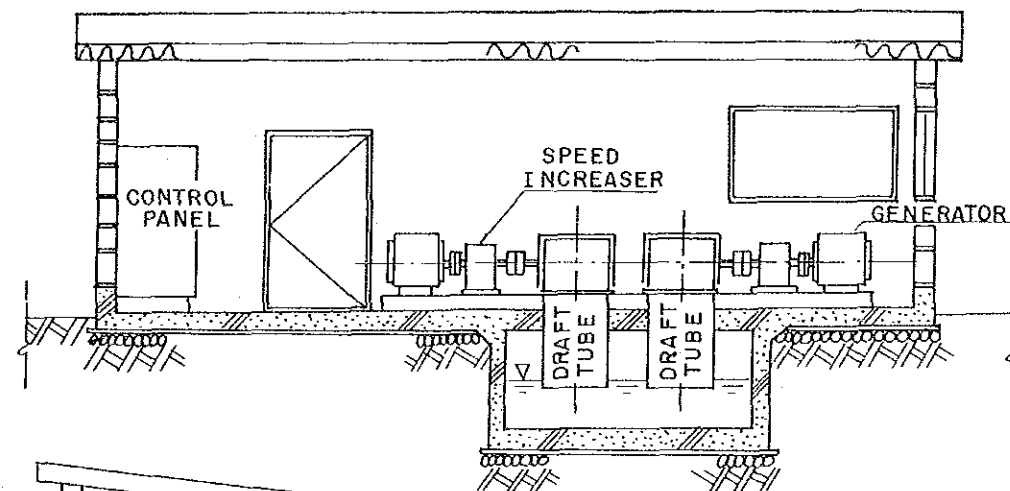
SECTION C-C



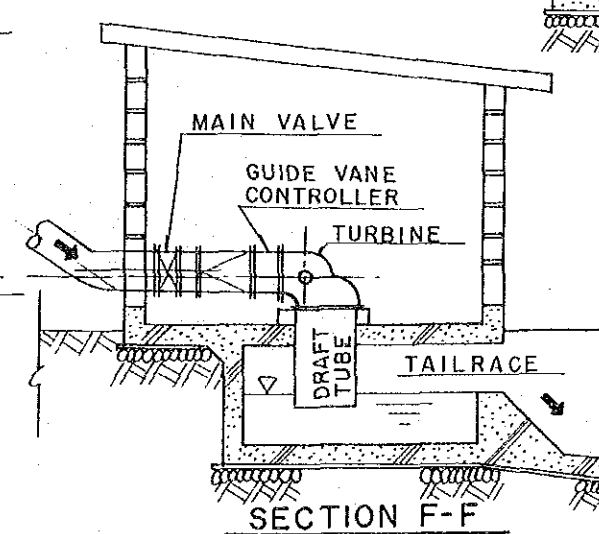
SECTION B-B



SECTION D-D

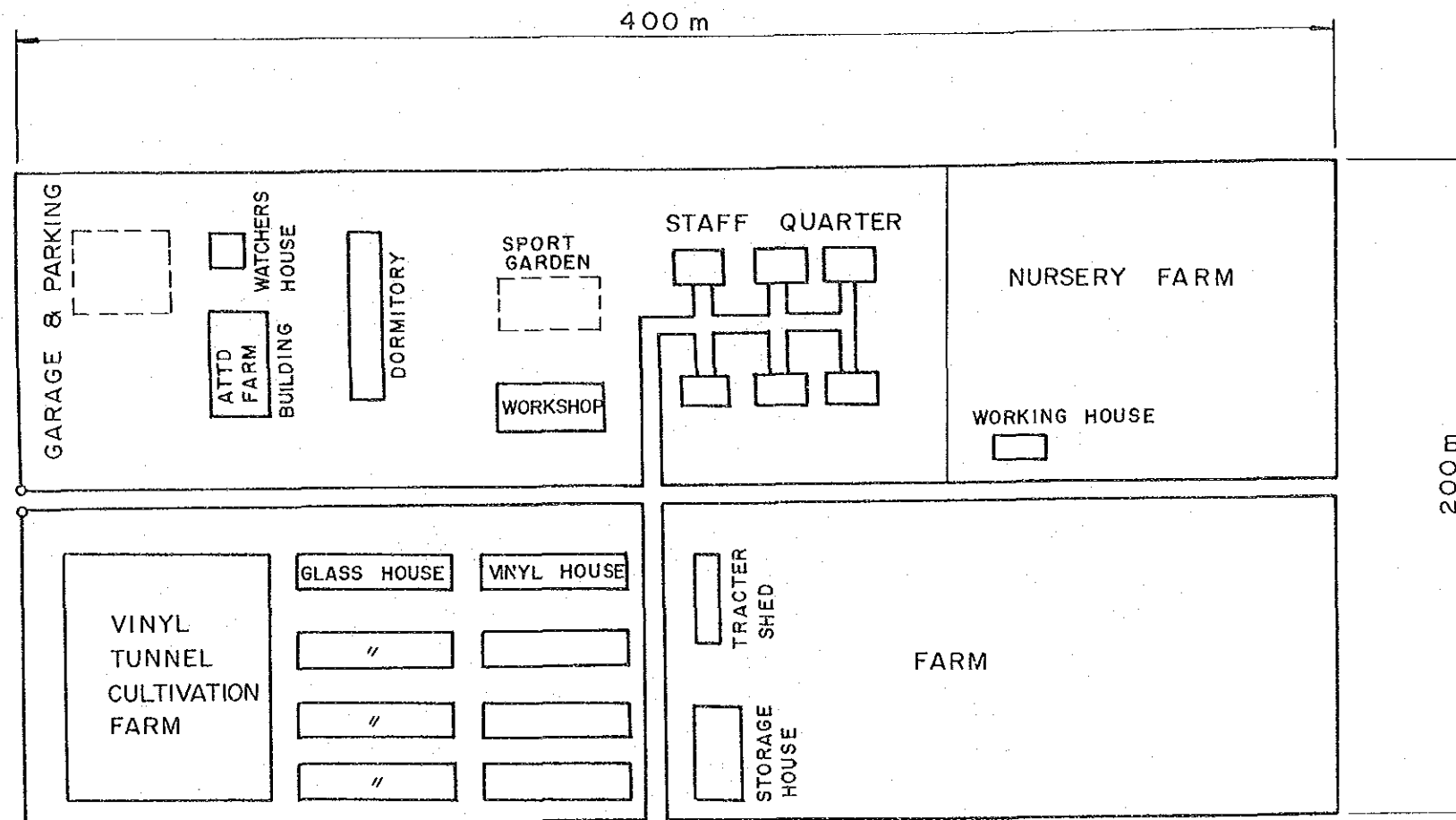


SECTION E-E



SECTION F-F

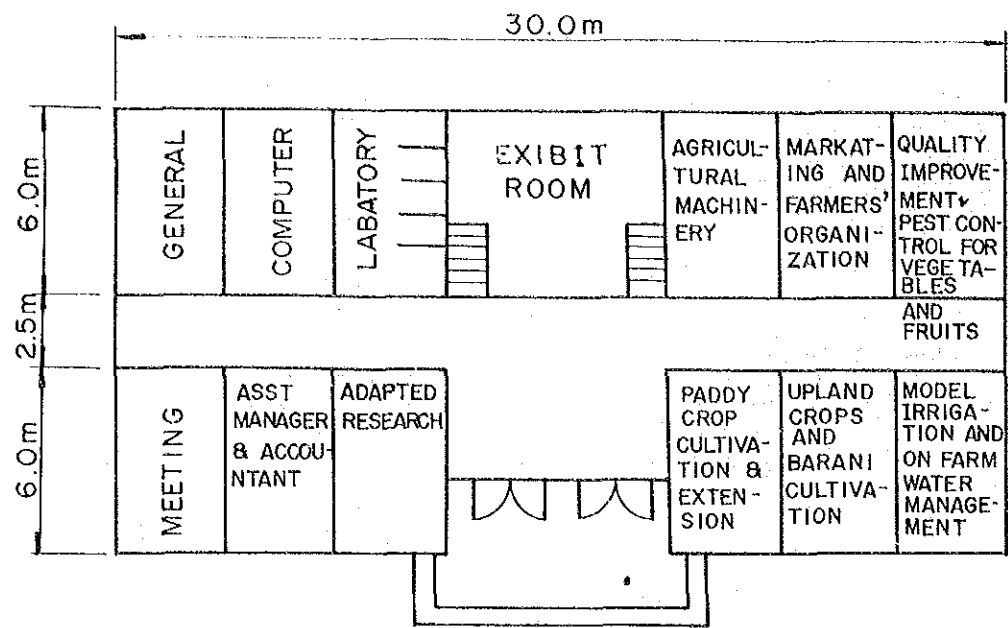
MASTER PLAN STUDY
ON
SWAT DISTRICT IRDP
SMALL SCALE IRRIGATION
AND HYDEL POWER SCHEME
DWG. NO. 3
JAPAN INTERNATIONAL COOPERATION AGENCY



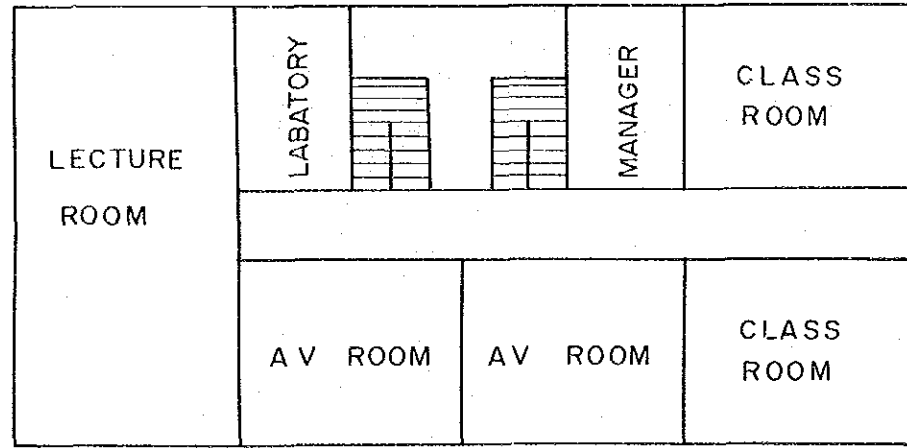
PROPOSED SITE OF ATTD FARM

SCALE 1: 50,000

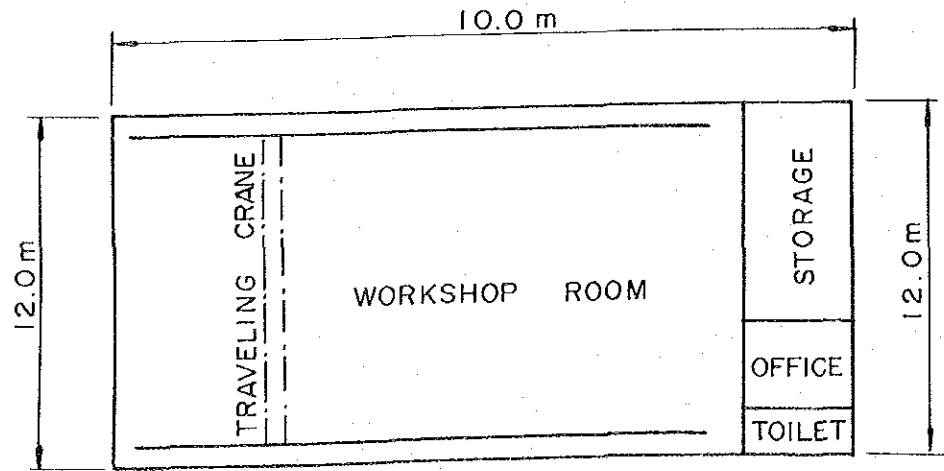
MASTER PLAN STUDY ON SWAT DISTRICT IRDP
AGRICULTURAL SUPPORTING FACILITIES (1)
DRAWING NO. : 4
JAPAN INTERNATIONAL COOPERATION AGENCY



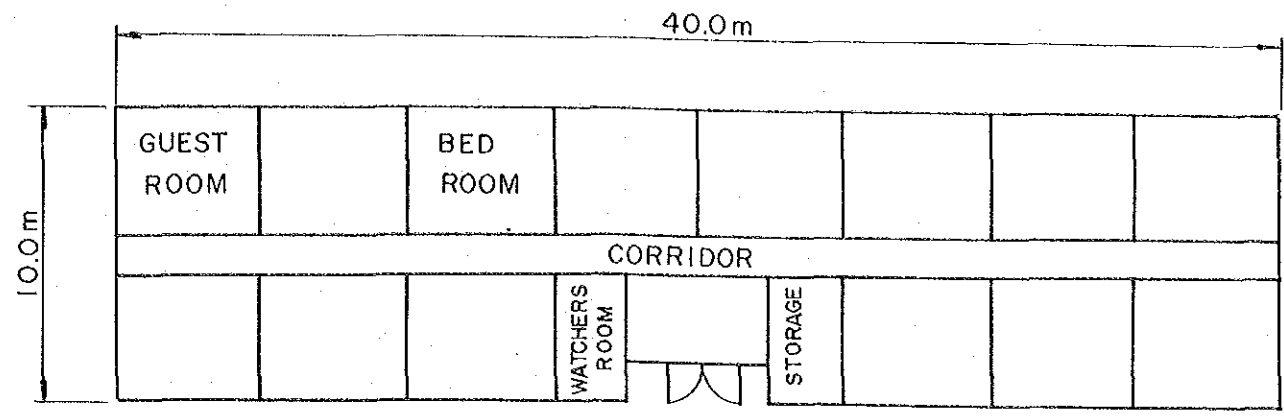
MAIN BUILDING (GROUND FLOOR)



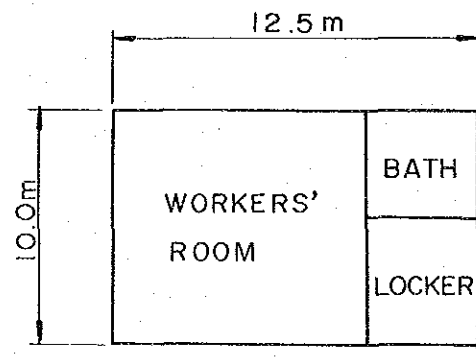
MAIN BUILDING (FIRST FLOOR)



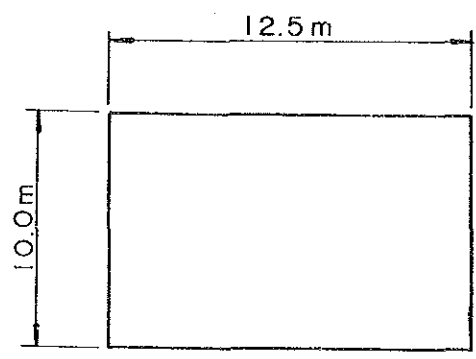
WORKSHOP



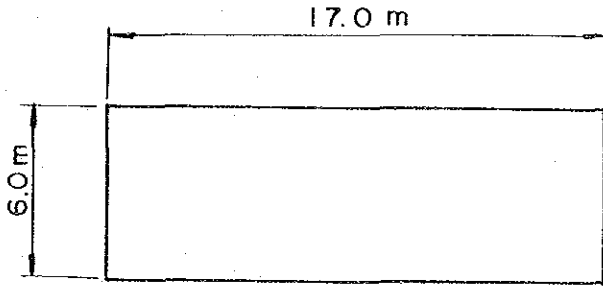
GUEST HOUSE DORMITORY



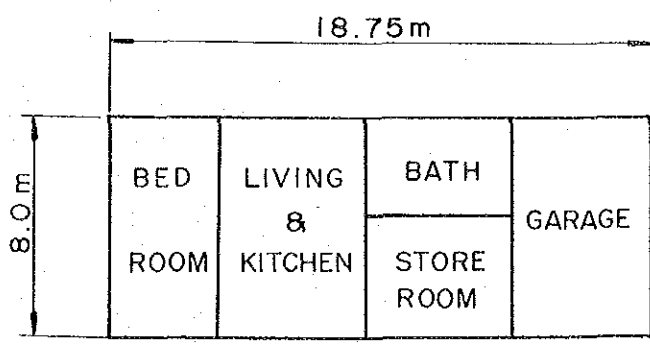
WORKING HOUSE



STORAGE HOUSE



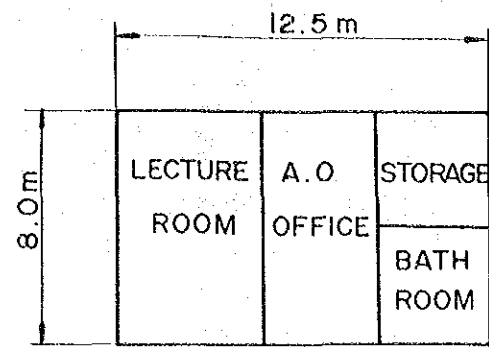
TRACTOR SHED



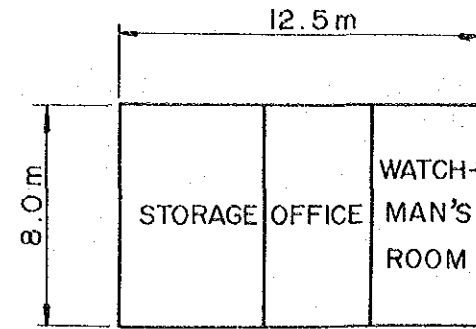
WATCHER'S HOUSE / GARAGE

SCALE 1:4,000

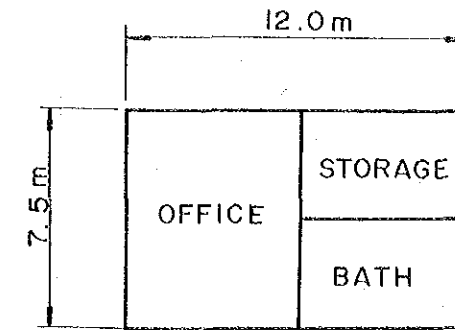
MASTER PLAN STUDY
ON
SWAT DISTRICT IRDP
AGRICULTURAL SUPPORTING
FACILITIES (2)
DRAWING NO. : 5
JAPAN INTERNATIONAL COOPERATION AGENCY



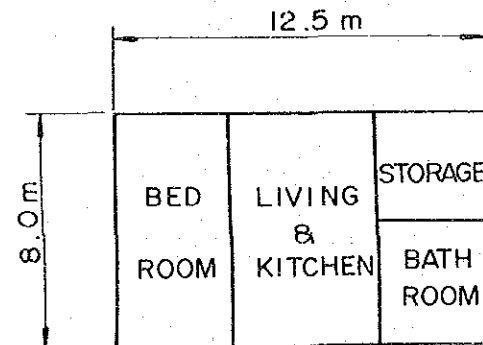
AGRICULTURAL TRAINING CENTER



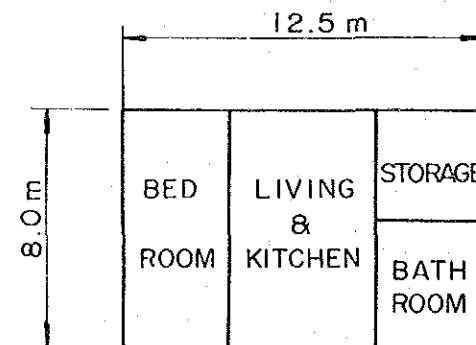
SEED FARM



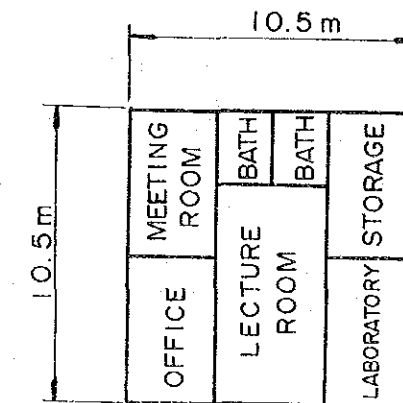
FRUIT AND VEGETABLE TRAINING CENTER



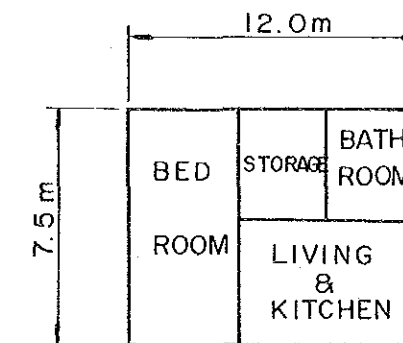
AGRICULTURAL TRAINING CENTER RESIDENCE



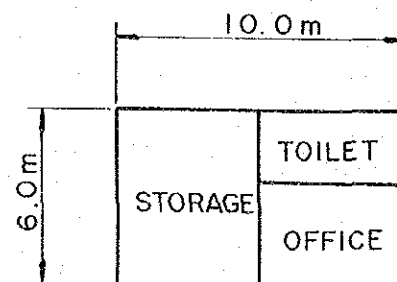
RESIDENCE OF SEED FARM



BEE - KEEPING CENTER



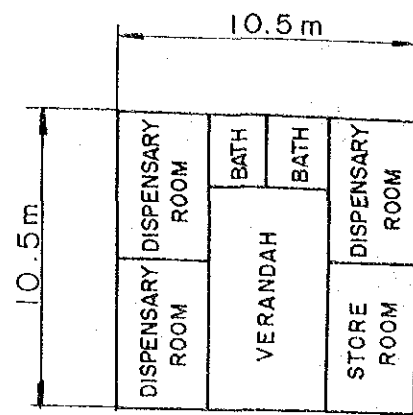
RESIDENCE OF BEE KEEPING CENTER



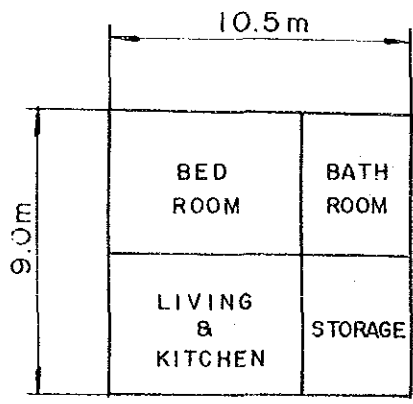
NURSERY STATION

SCALE 1:4,000

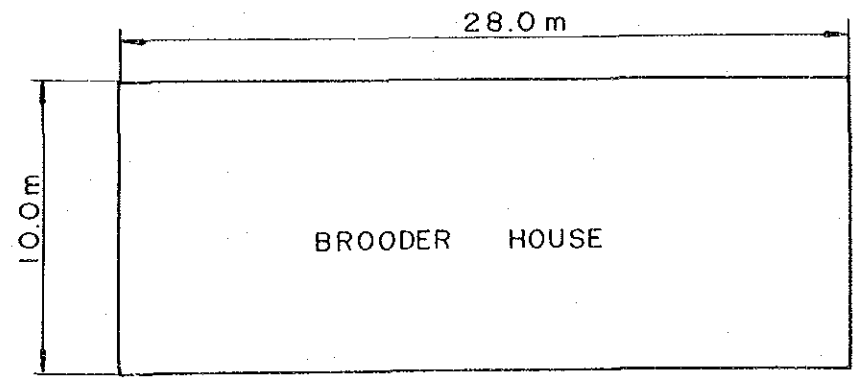
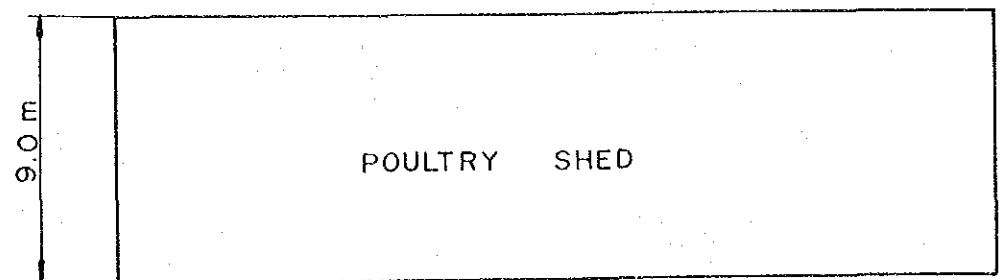
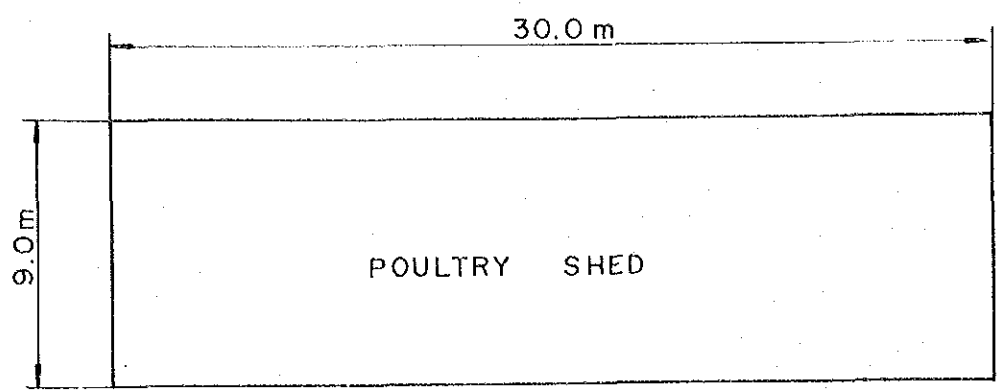
MASTER PLAN STUDY ON SWAT DISTRICT IRDP
AGRICULTURAL SUPPORTING FACILITIES (3)
DRAWING NO. : 6
JAPAN INTERNATIONAL COOPERATION AGENCY



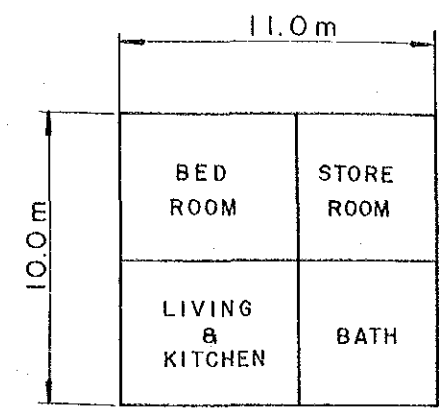
VETERINARY HOSPITAL



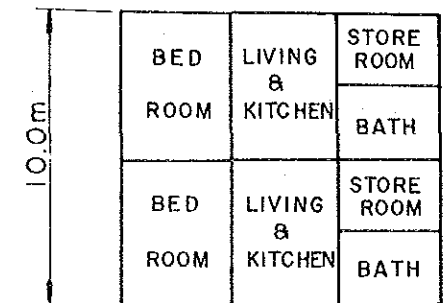
RESIDENCE OF VETERINARY HOSPITAL



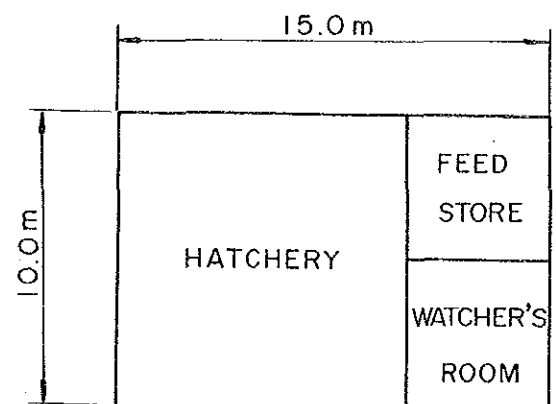
POULTRY HATCHERY FARM



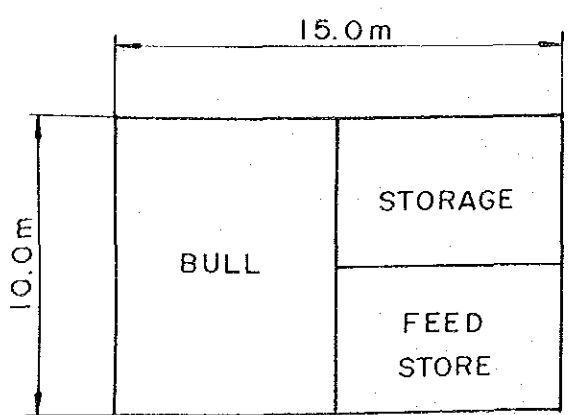
RESIDENCE OF MANAGER



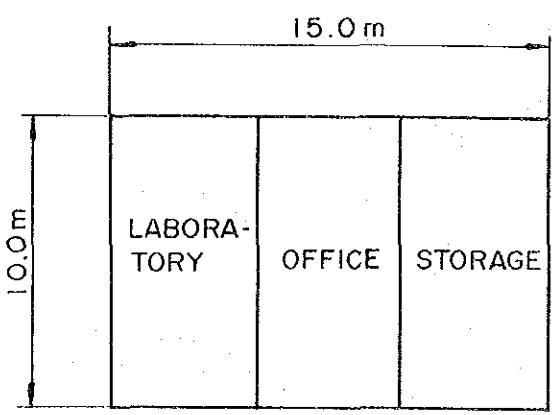
RESIDENCE OF ATTENDANT



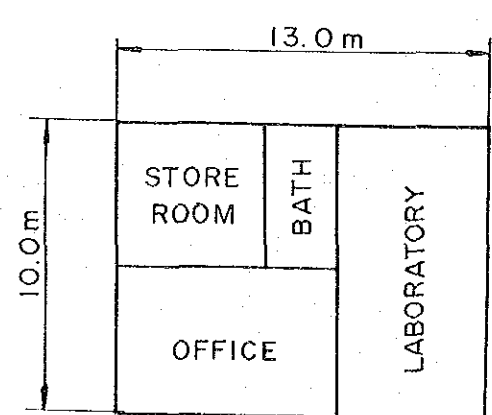
HATCHERY



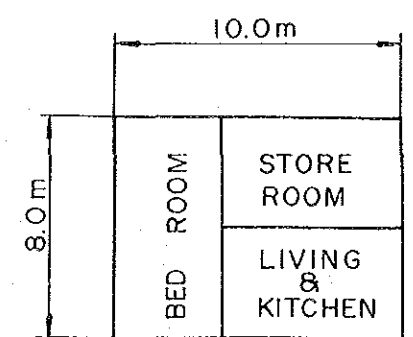
NATURAL BREEDING CENTER



A-1 SUB CENTER



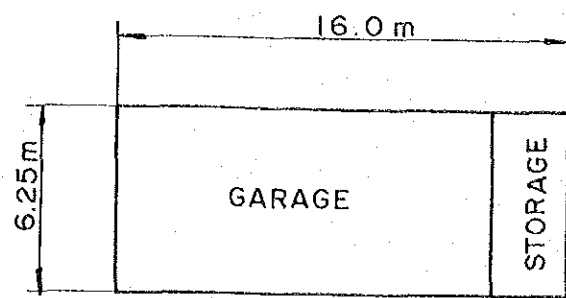
ANIMAL NUTRITION CENTER



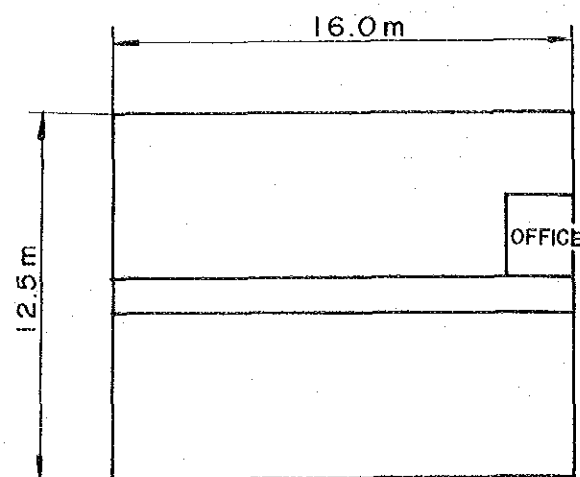
RESIDENCE OF ANIMAL NUTRITION CENTER

SCALE 1:4,000

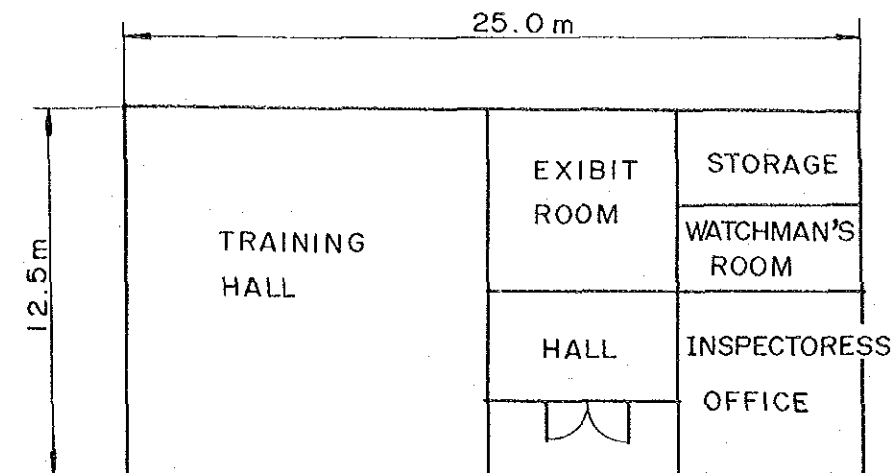
MASTER PLAN STUDY ON SWAT DISTRICT IRDP AGRICULTURAL SUPPORTING FACILITIES (4)
DRAWING NO. : 7
JAPAN INTERNATIONAL COOPERATION AGENCY



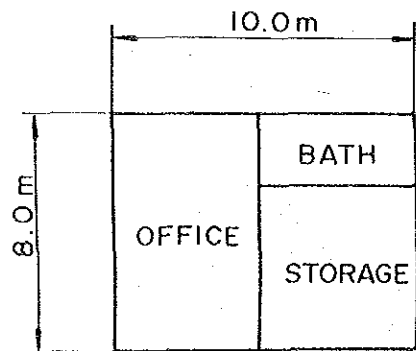
TRACTOR STATION



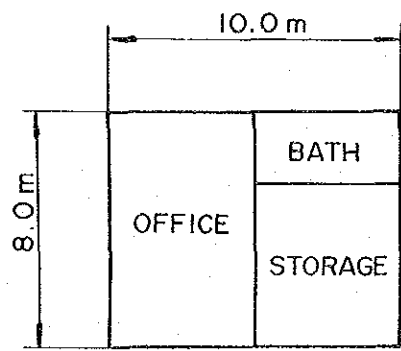
ADA WAREHOUSE



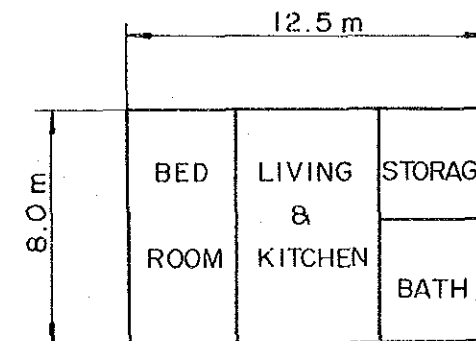
WOMEN HADICRAFT INSPECTRESS AND WOMEN HANDICRAFT CENTER



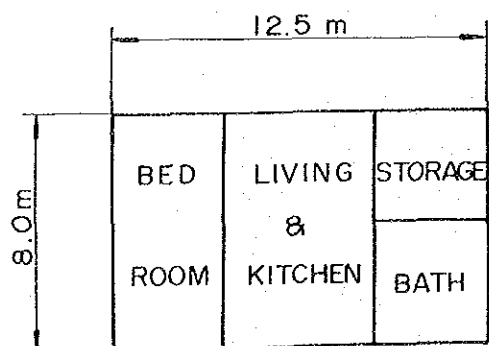
INSPECTOR OFFICE



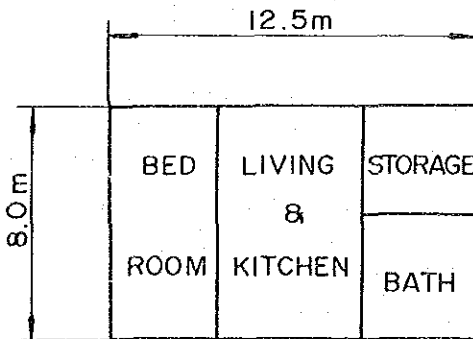
COOPERATIVE BANK OFFICE



RESIDENCE OF INSPECTRESS



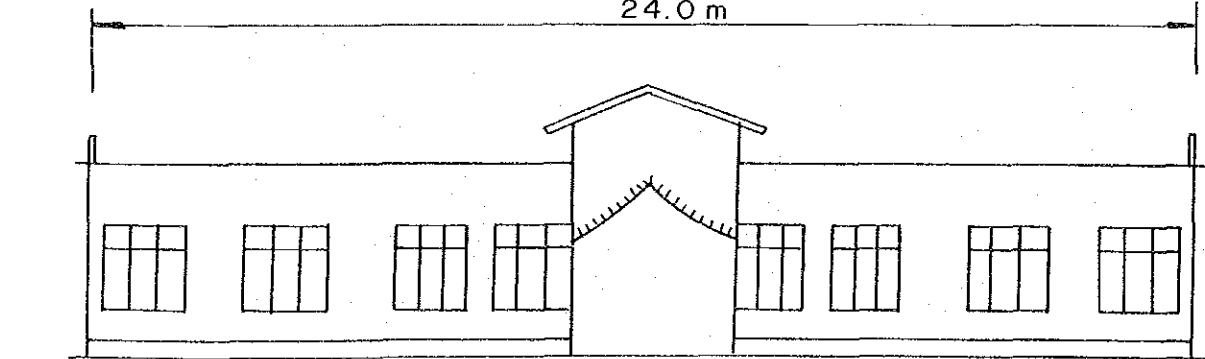
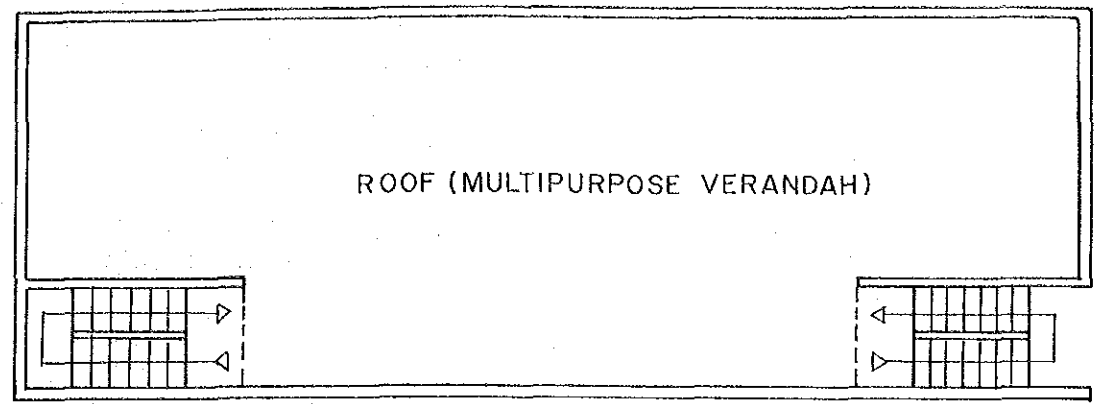
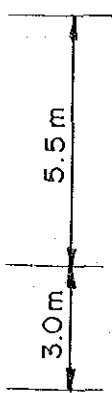
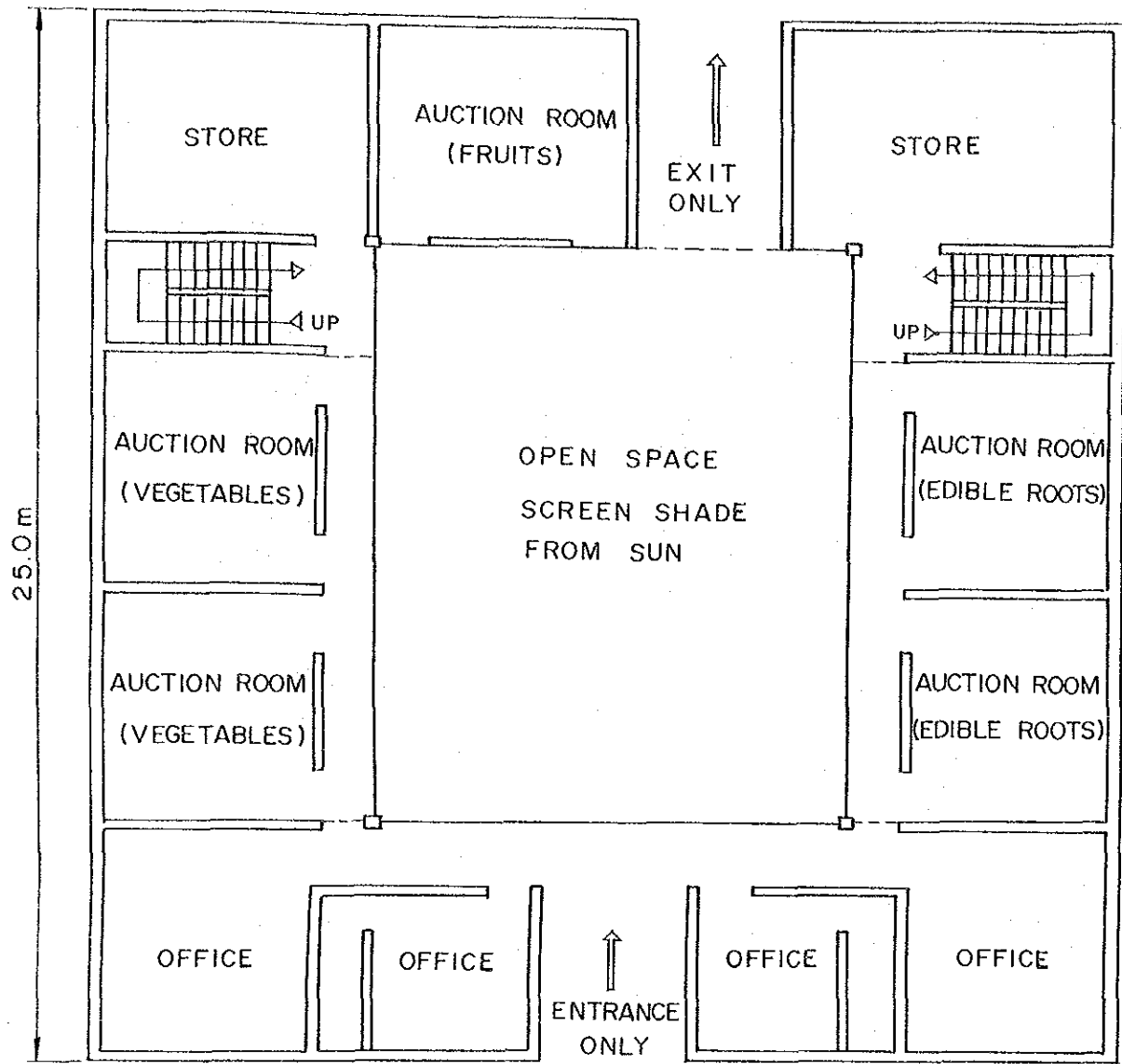
RESIDENCE OF INSPECTOR HOUSE



RESIDENCE OF COOPERATIVE BANK

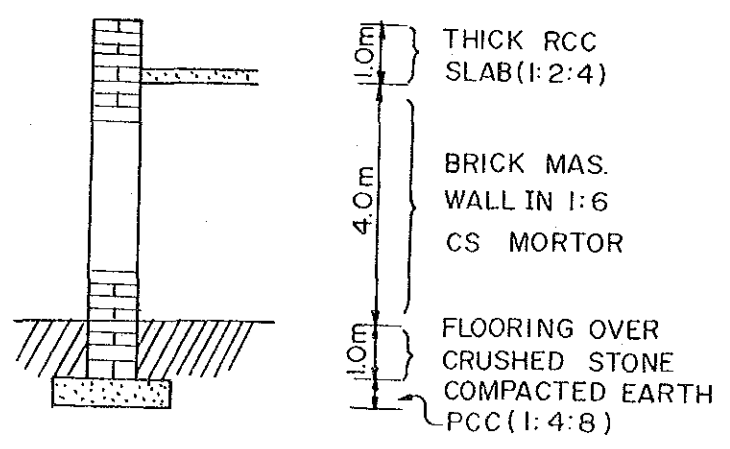
SCALE 1:4,000

MASTER PLAN STUDY ON SWAT DISTRICT IRDP
AGRICULTURAL SUPPORTING FACILITIES (5)
DRAWING NO. : 8
JAPAN INTERNATIONAL COOPERATION AGENCY



AGRICULTURAL MARKETING FACILITIES

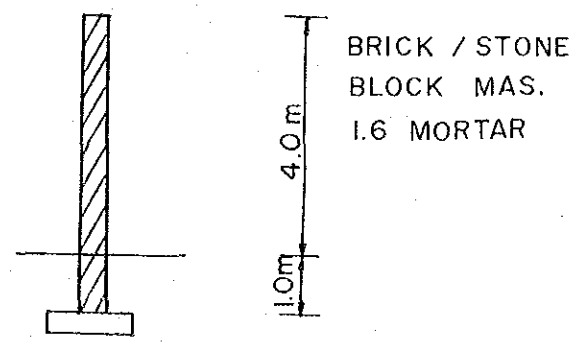
BRICK MASONRY WALL



SPECIFICATION

1. FOUNDATION - PCC
2. FLOOR - PCC
3. S. STRUCTURE - BB
4. JOINTRY - D. WOOD
5. ROOF - RCC
6. ELECTRIFICATION - COMPLETE
7. SANITATION - CULVERT

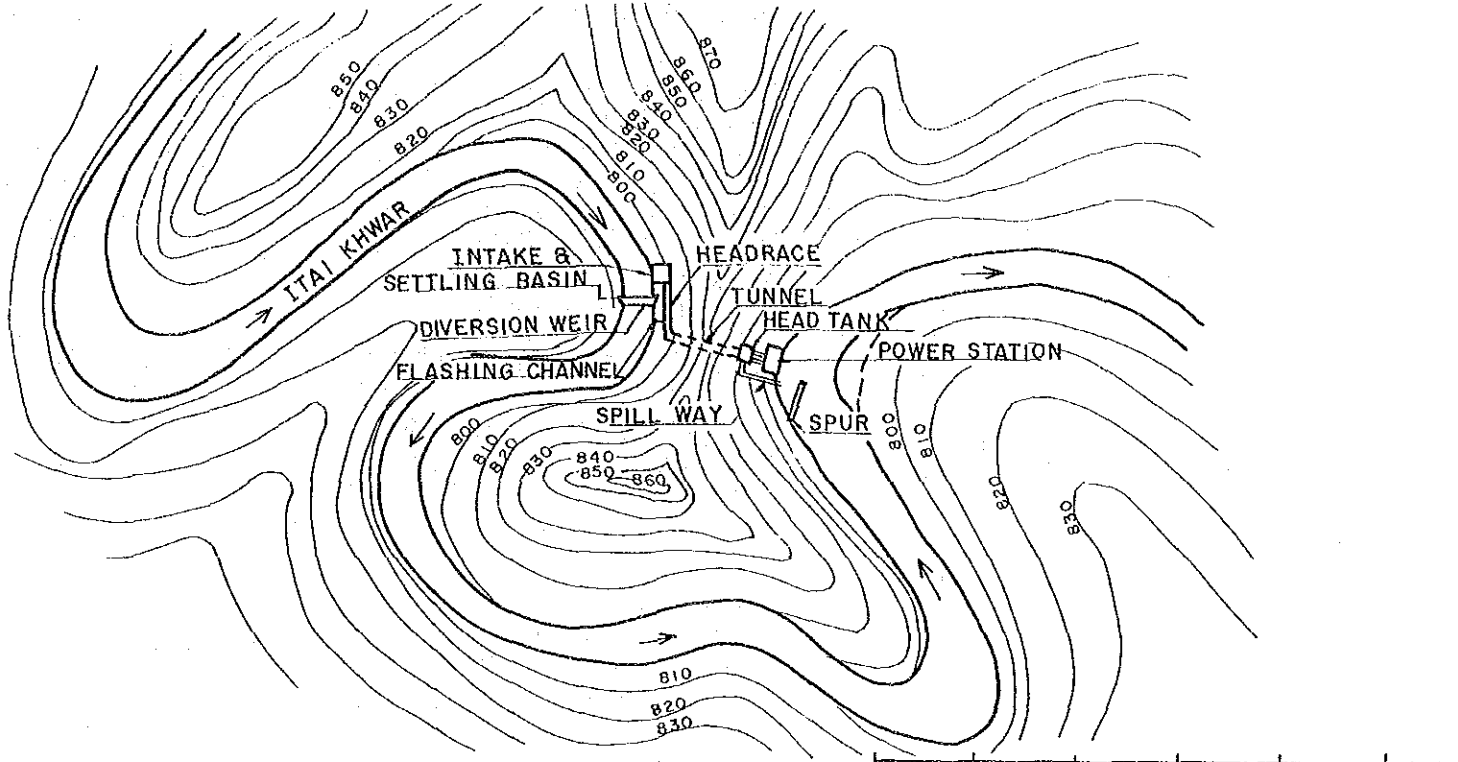
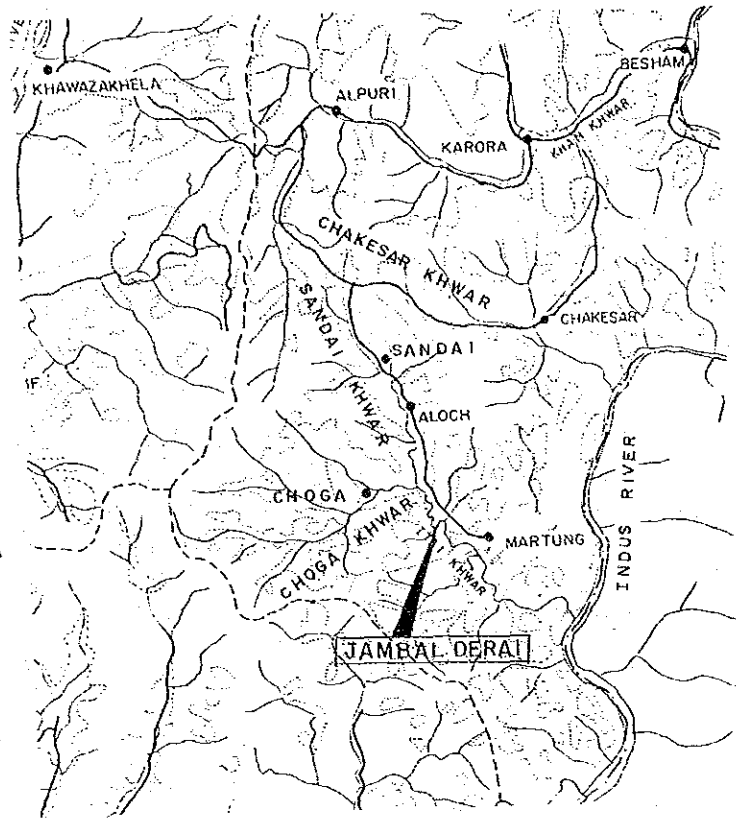
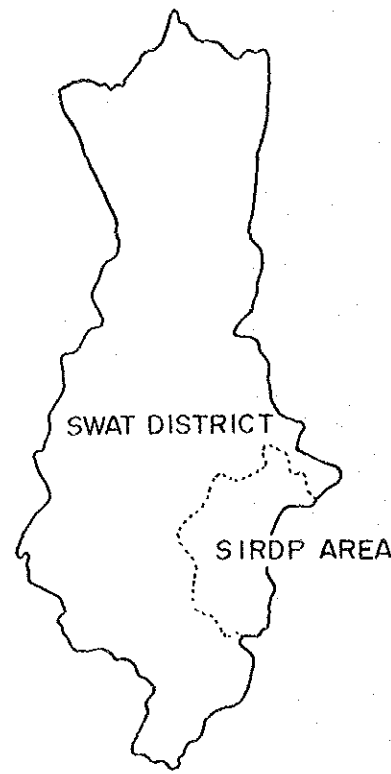
COMPOUND WALL



AREA

1. TOTAL AREA - 600 m²
2. COVERED AREA - 420 m²
3. OPEN AREA - 180 m²

MASTER PLAN STUDY
ON
SWAT DISTRICT IRDP
AGRICULTURAL SUPPORTING
FACILITIES (6)
DRAWING NO. : 9
JAPAN INTERNATIONAL COOPERATION AGENCY

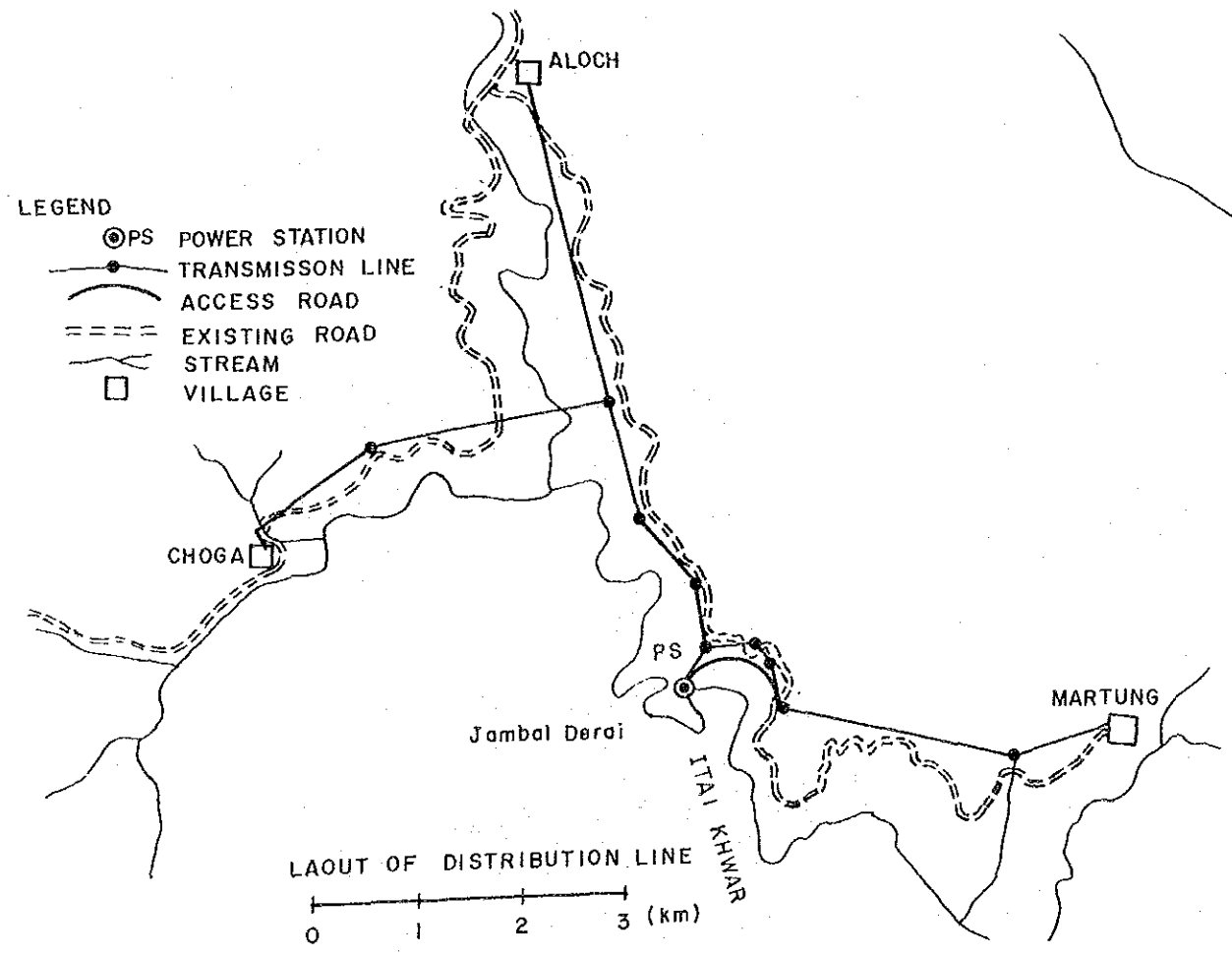


PLAN OF JAMBAL DERAI

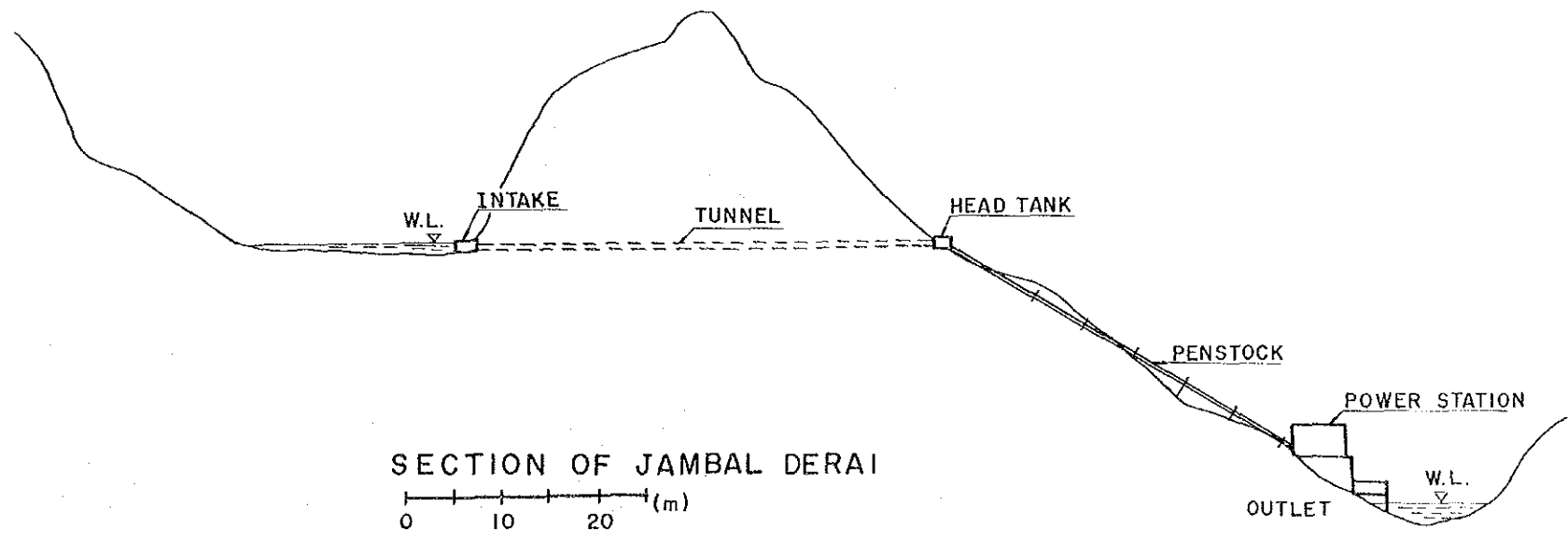
0 50 100 150 200 250 (m)

KEY MAP

LOCATION MAP



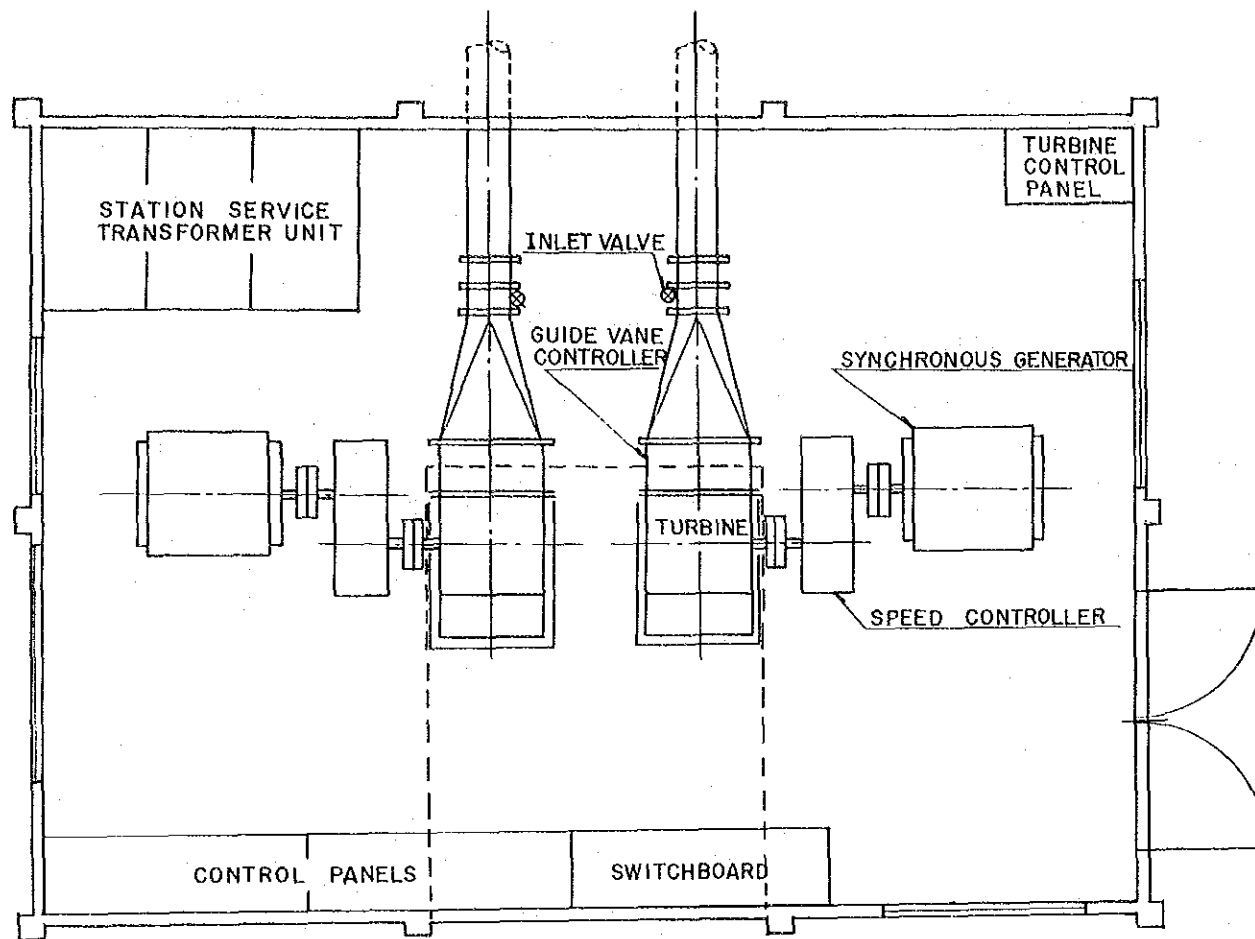
0 1 2 3 (km)



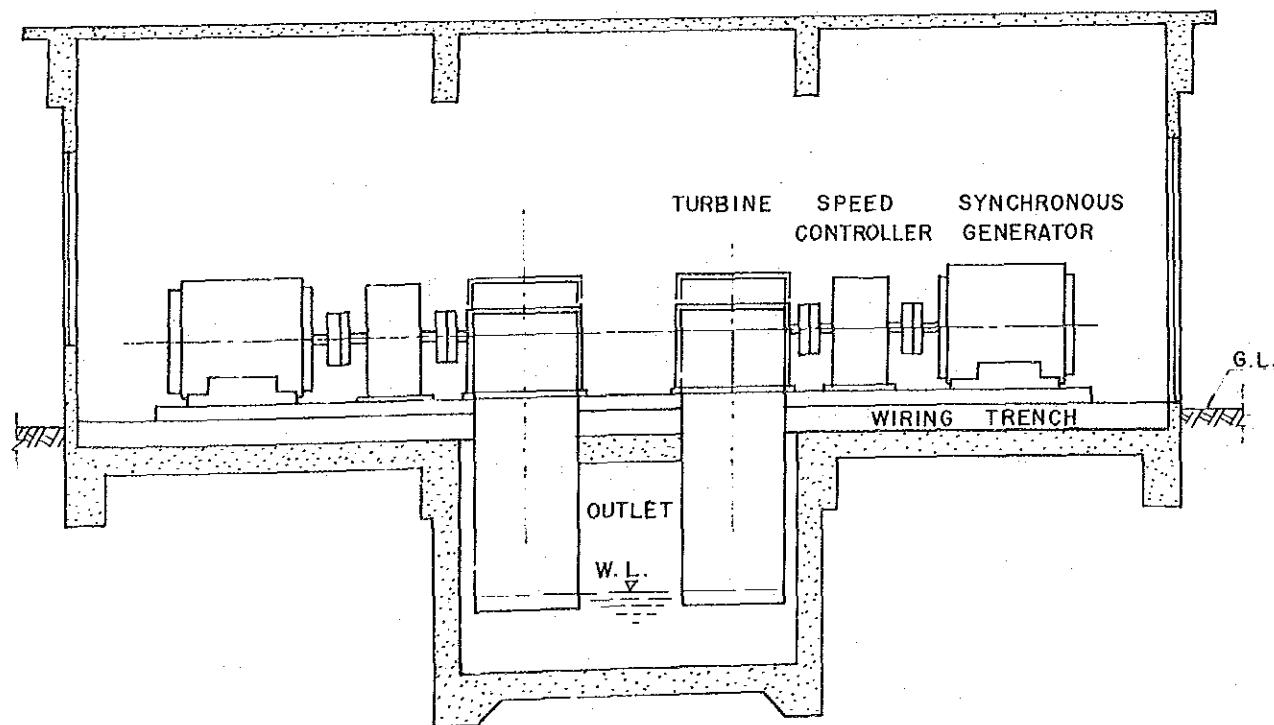
SECTION OF JAMBAL DERAI

0 10 20 (m)

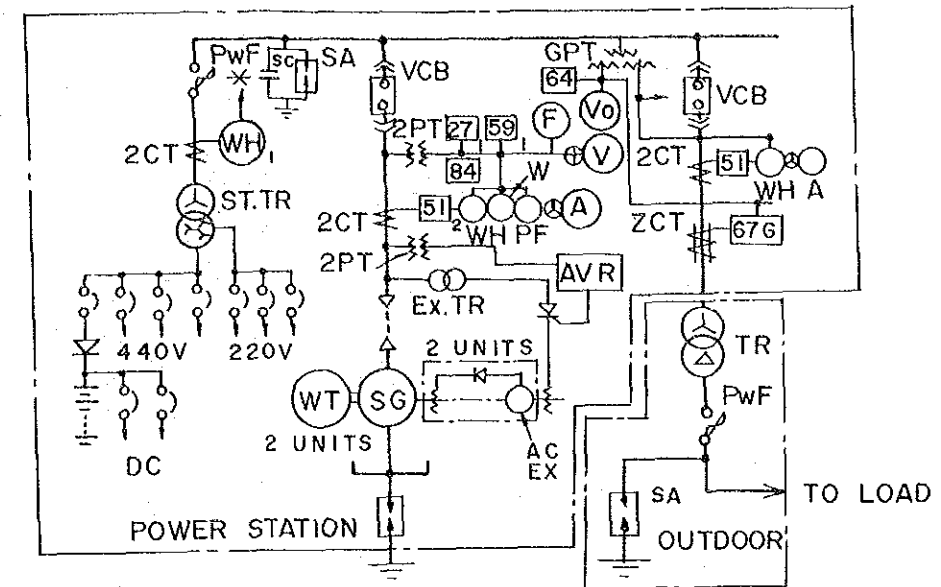
MASTER PLAN STUDY ON SWAT DISTRICT IRDP	
JAMBAL DERAI HYDEL PLANT GENERAL	SCHEME PLAN (I)
DWG. NO. 10	
JAPAN INTERNATIONAL COOPERATION AGENCY	



PLAN OF POWER HOUSE



SECTION



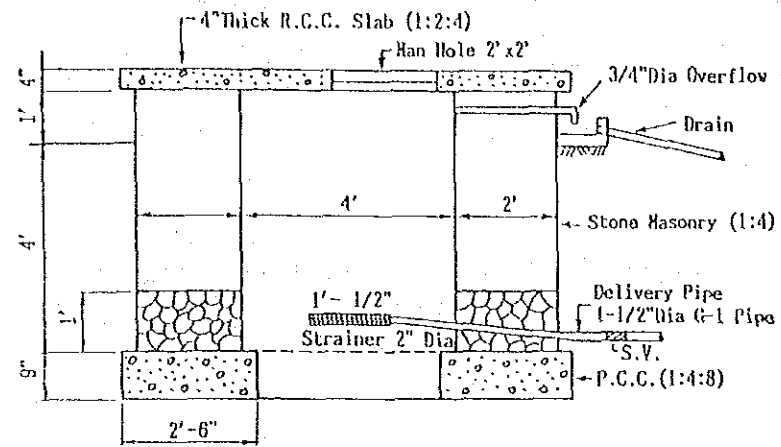
SINGLE LINE DIAGRAM (SYNCHRONOUS GENERATOR)

- | | |
|-------------------------------------|----------------------------|
| WT : TURBINE | SG : SYNCHRONOUS GENERATOR |
| ACEX : AC EXCITER | CT : CURRENT TRANSFORMER |
| AVR : AUTOMATIC VOLTAGE REGULATOR | SA : SURGE ABSORBER |
| ST.TR : STATION SERVICE TRANSFORMER | WH : WATT HOUR METER |
| EX.TR : EXCITING TRANSFORMER | W : WATTMETER |
| VCB : VACUUM CIRCUIT BREAKER | PF : POWER FACTOR METER |
| PWF : POWER FUSE | V : VOLTAMETER |
| SC : CAPACITOR | A : AMMETER |
| PT : TRANSFORMER FOR METER | N : TACHOMETER |

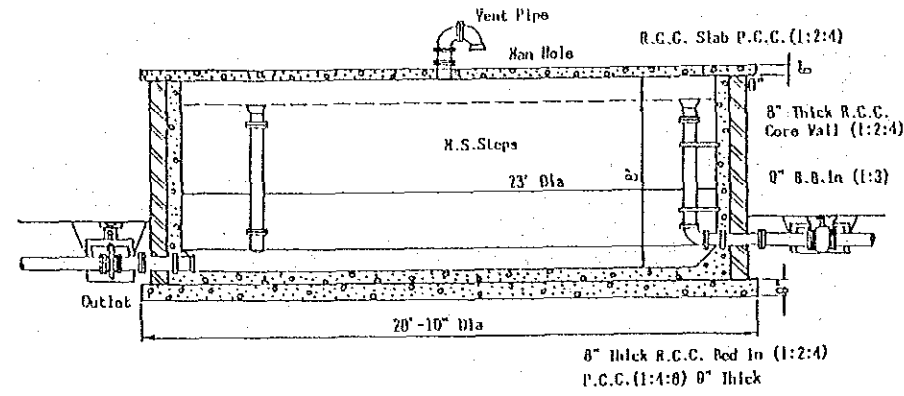
MASTER PLAN STUDY
ON
SWAT DISTRICT IRDP
JAMBAL DERAI
HYDEL PLANT SCHEME
PLANT HOUSE (2)

DWG. NO. 11

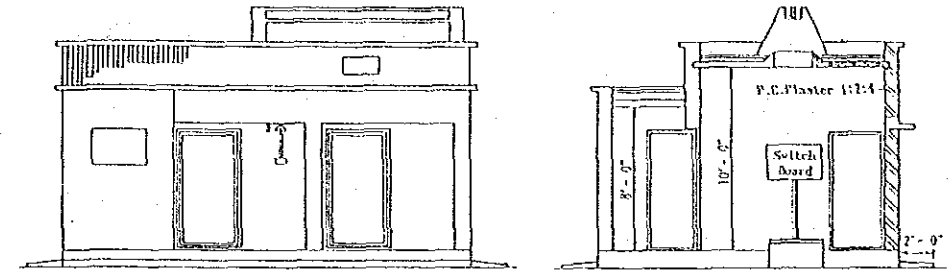
JAPAN INTERNATIONAL COOPERATION AGENCY



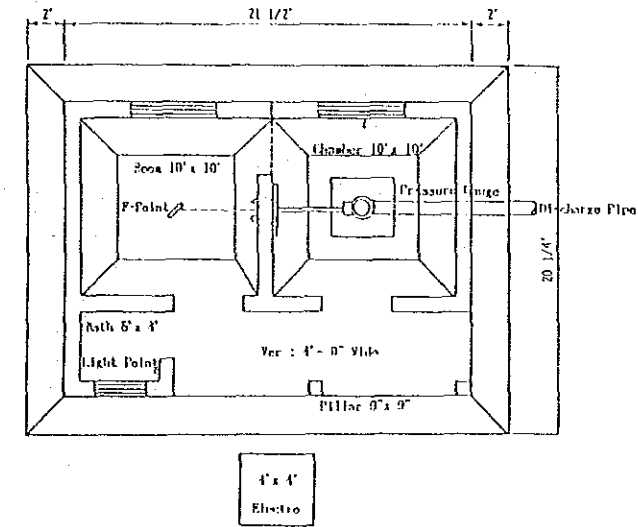
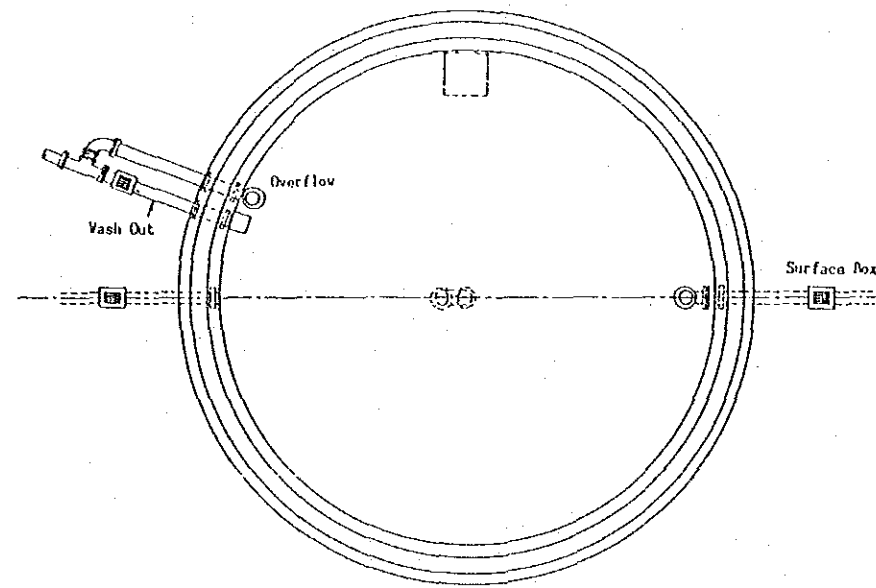
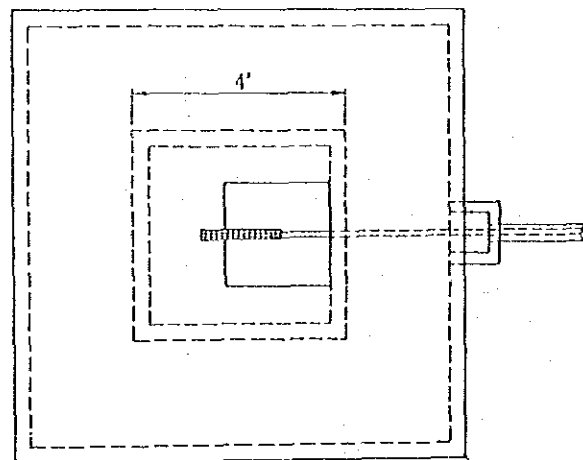
Spring Intake



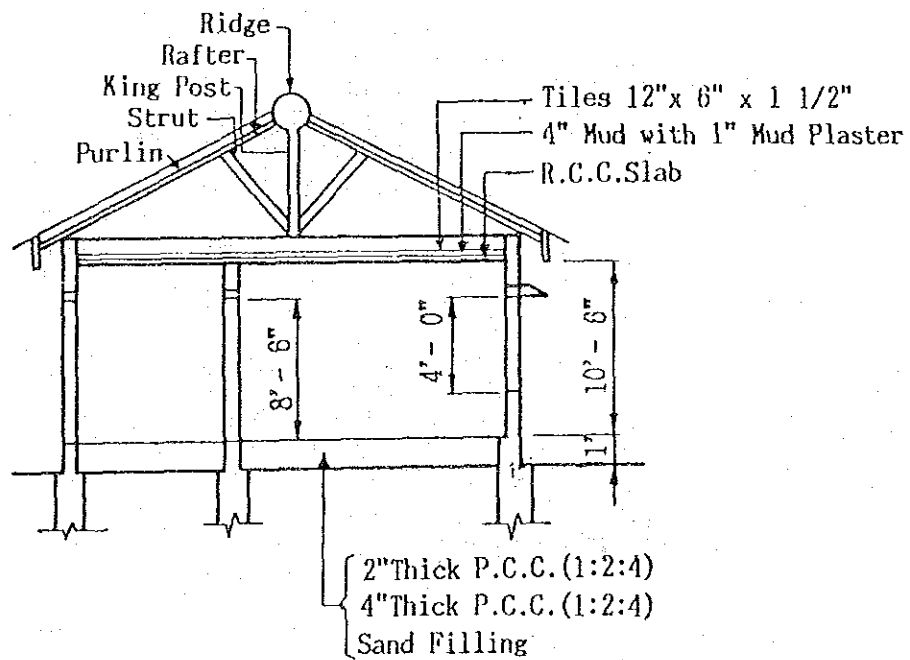
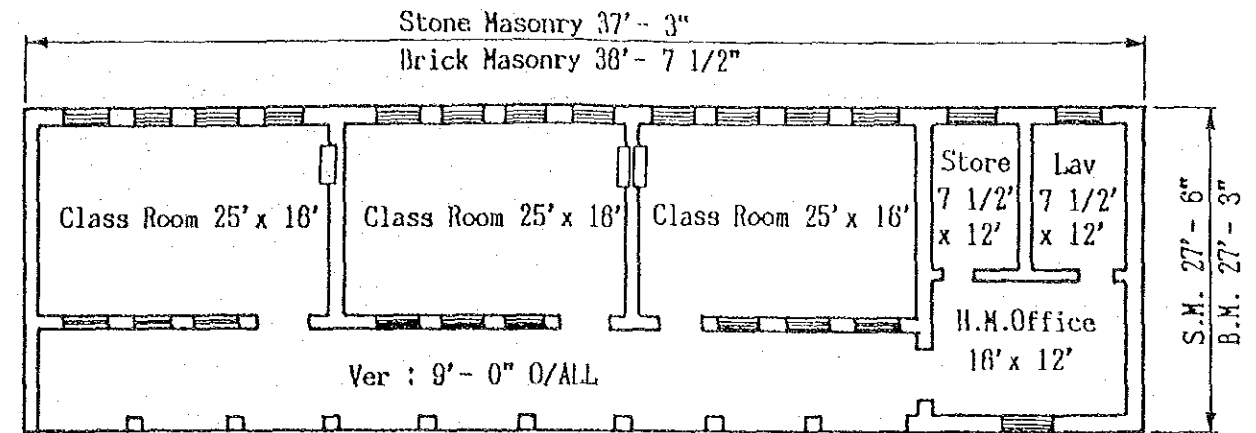
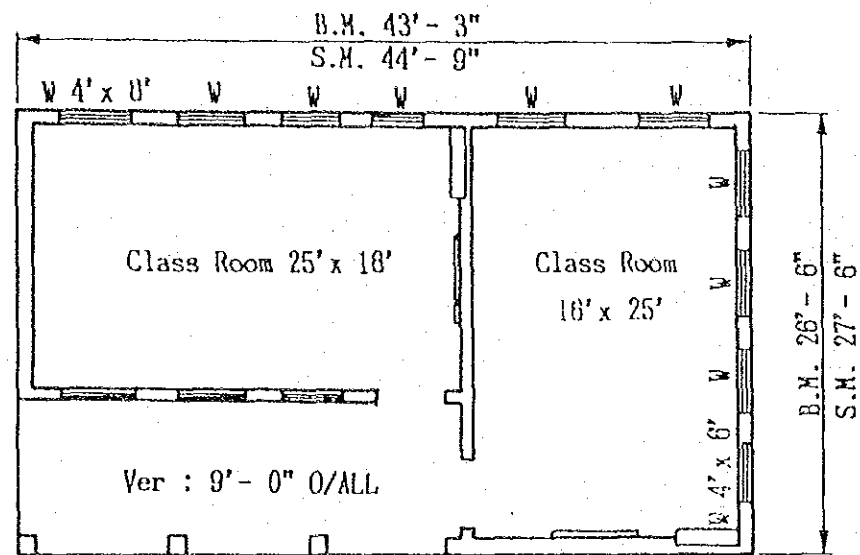
Water Tank



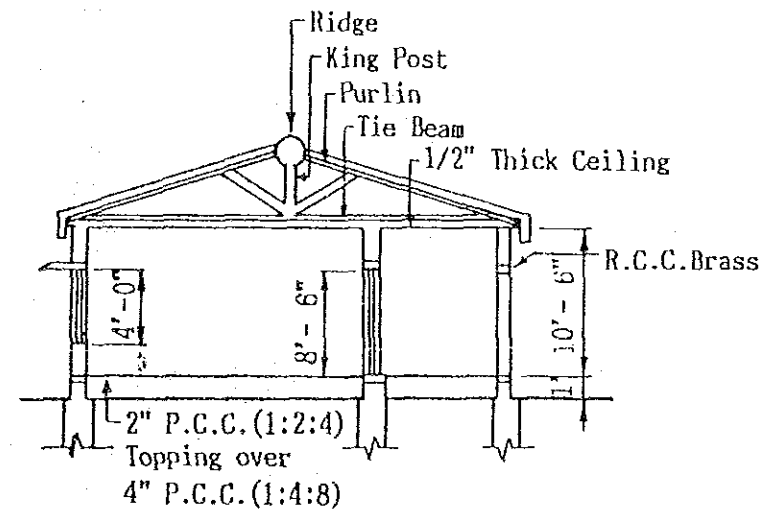
Tube Well Pump House



<p>MASTER PLAN STUDY ON SWAT DISTRICT IRDP</p>
<p>Standard Design of Water Supply Facilities</p>
<p>DRAWING NO. : 13</p>
<p>JAPAN INTERNATIONAL COOPERATION AGENCY</p>



Primary School



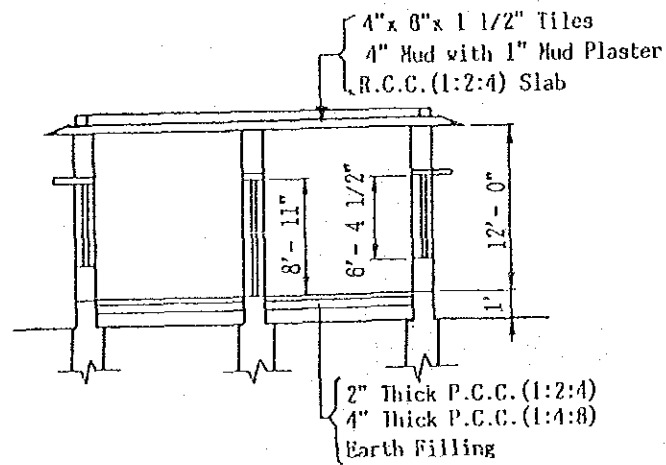
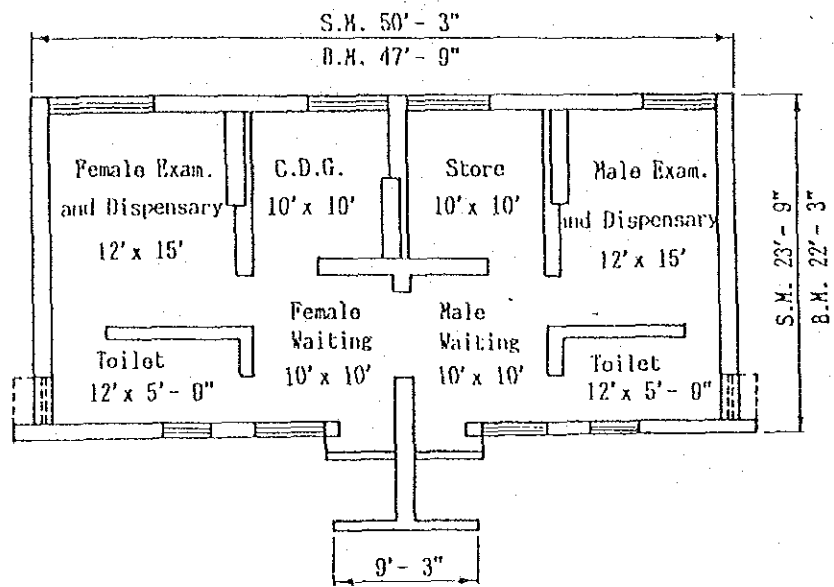
Middle School

MASTER PLAN STUDY
ON
SWAT DISTRICT IRDP

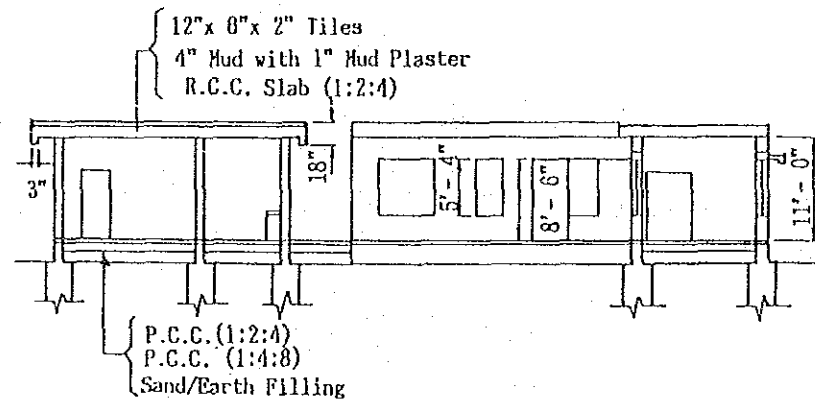
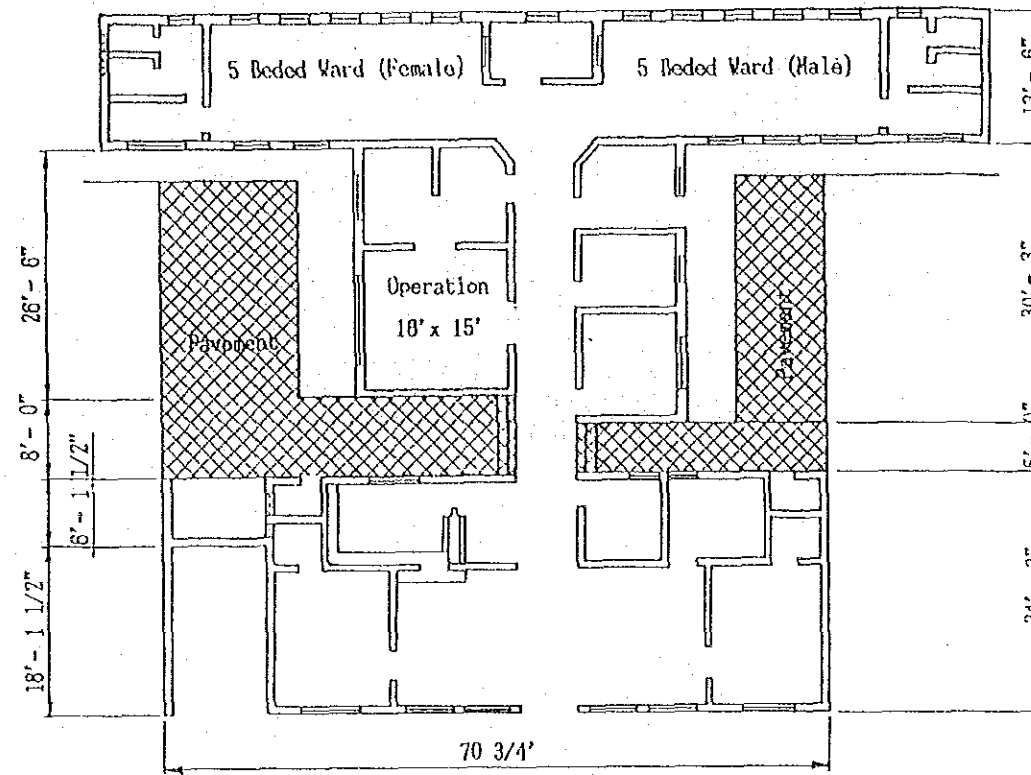
Standard Design of
Education Facilities

DRAWING NO. : 14

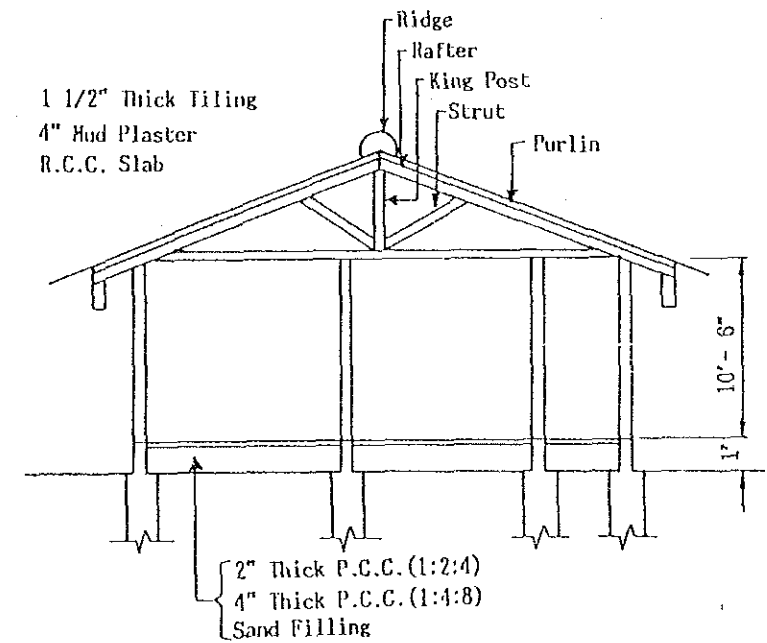
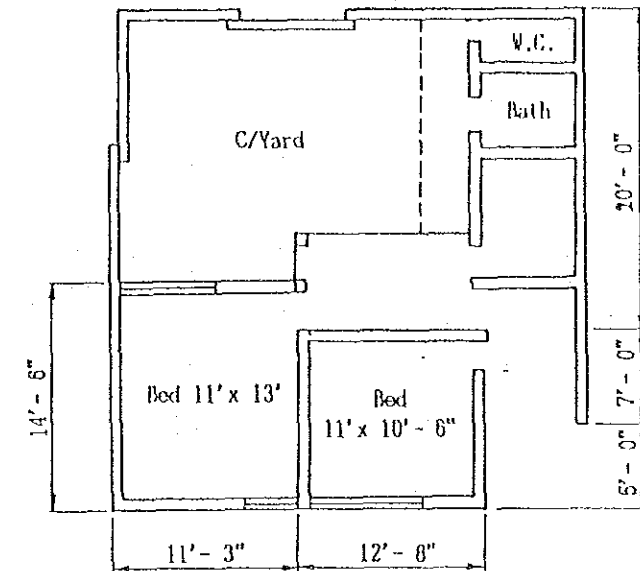
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BHU(Basic Health Unit)

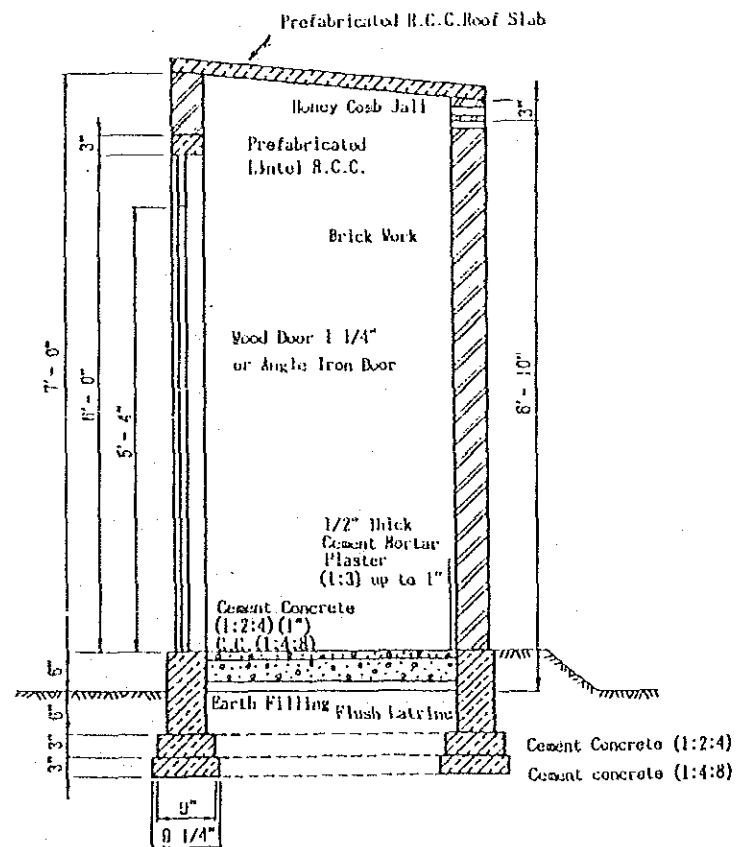
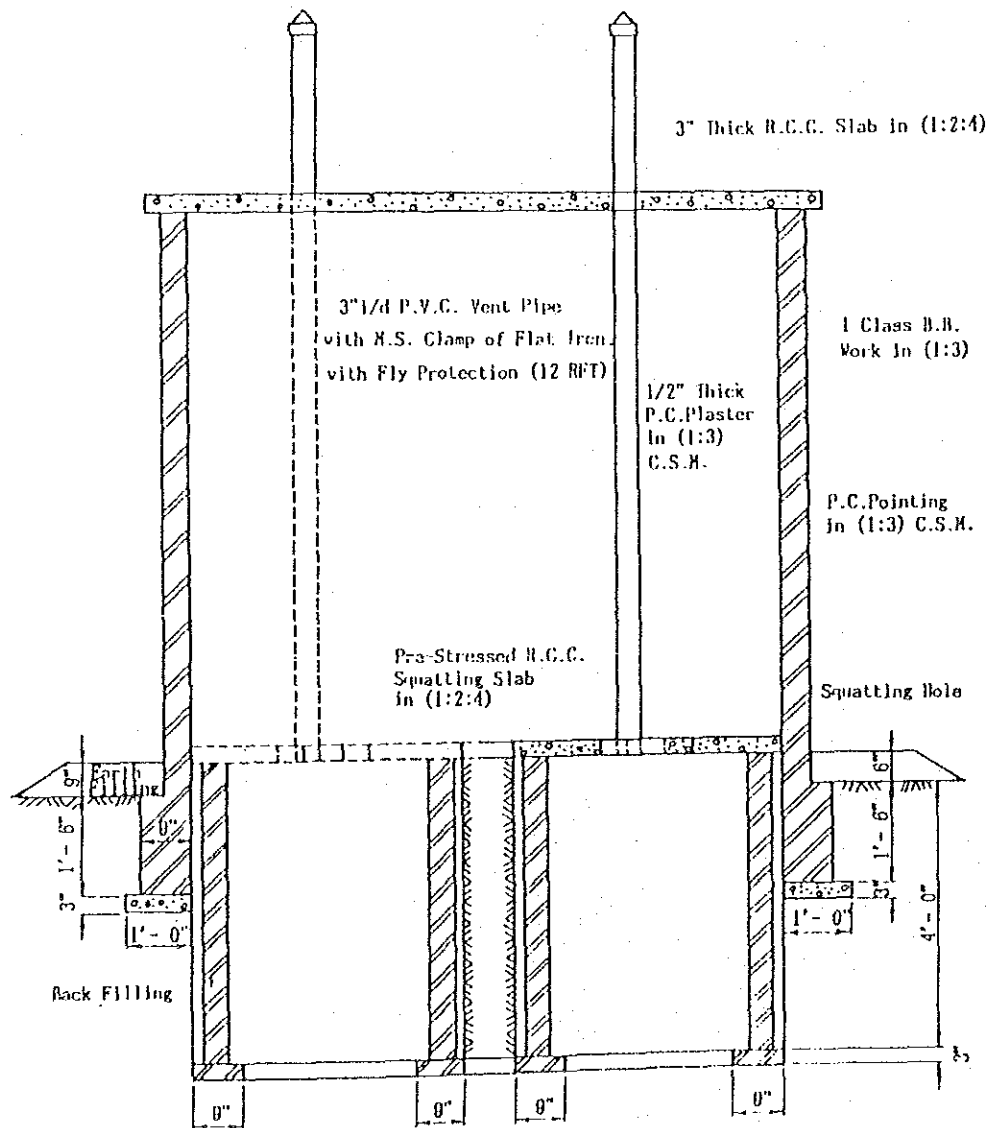
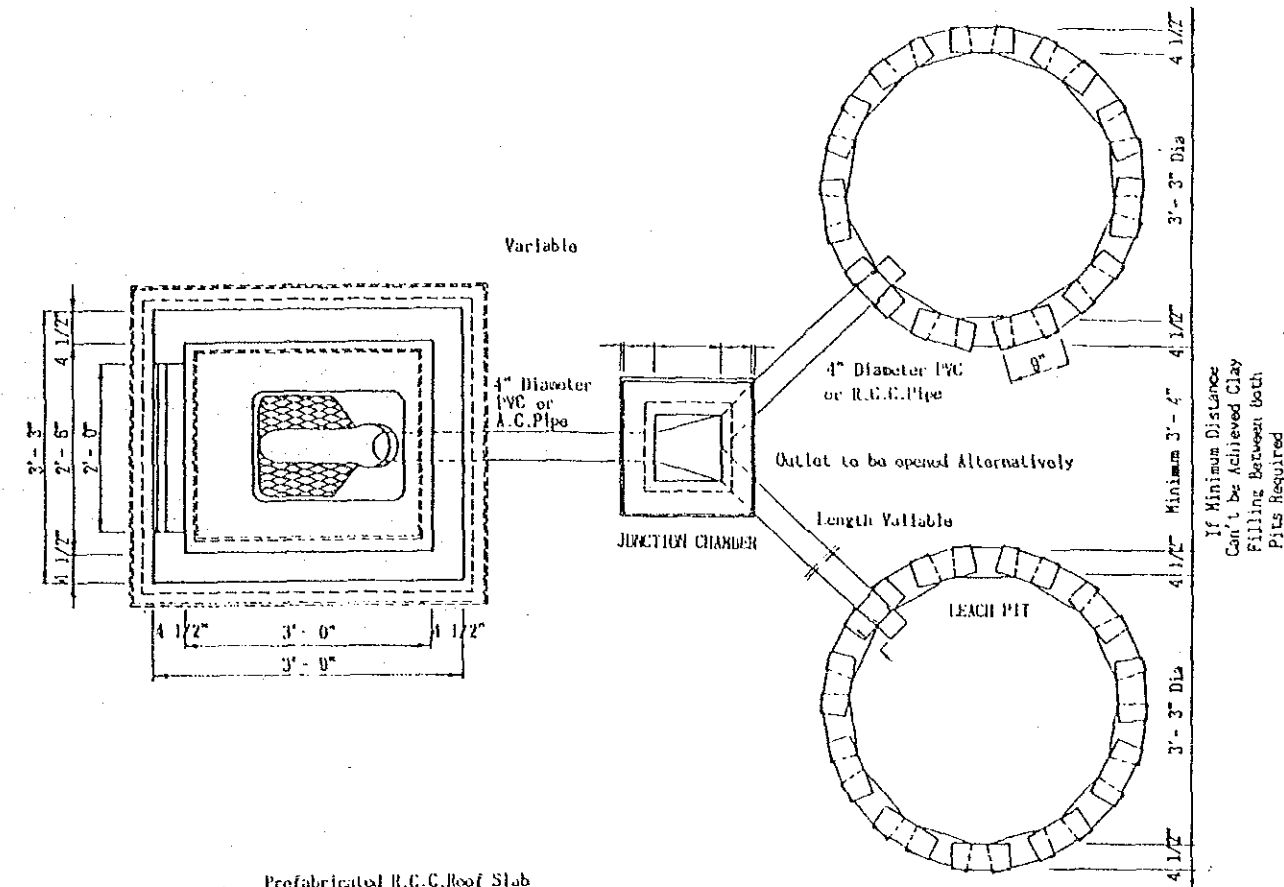
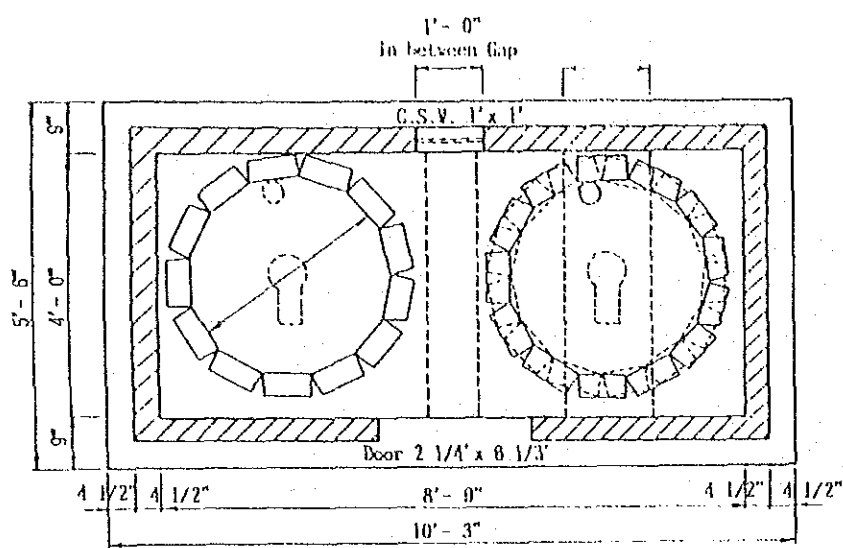


RHC(Rural Health Centre)



Doctor's Residence

MASTER PLAN STUDY ON SWAT DISTRICT IRDP
Standard Design of Health Facilities
DRAWING NO. : 15
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Double Pits Latrine

Pour Flush Latrine

MASTER PLAN STUDY ON SWAT DISTRICT IRDP
Standard Design of Sanitation Facilities
DRAWING NO. : 16
JAPAN INTERNATIONAL COOPERATION AGENCY

JICA