

2-5-2 Details of the Request

1. Objectives

- (a) To upgrade productivity of pig production by introduction of appropriate breeds from foreign countries.
- (b) To produce young pigs and pig feed for meeting demands of local farmers.
- (c) To establish a system for extension of modern breeding technology to local farmers.
- (d) To increase and improve quality of pork production.
- (e) To lower production cost of pork through reduction of feed costs and efficient management.
- (f) To reduce importation of pork and pork products.

2. Facilities and Equipment

The following facilities and equipment have been requested by the Federated States of Micronesia.

- (a) A main breeding center at Pohnlangas Forestry Station, Madolenihmw to house 30 sows and 10 boars. The facility should be built for tropical conditions, and should be equipped with farrowing and weaner pens, AI collection dummy units, feed store/office, and a laboratory for routine disease diagnosis. The center will set aside land for growing and utilizing of forage crops for feeding pigs.
- (b) Six (6) sub-breeding units to house 10 sows and 2 boars. There will be one in each of the following municipalities; namely, Sokehs, Nett, U and Kolonia, whereas Kitti will have 2 sub-breeding units. The facilities should include farrowing, weaner and grower pens with an adjoining small feed/store building.

- (c) A fully equipped minislaughterhouse to handle slaughtering of about 10 pigs and 10 goats per day. The facility should be built to satisfy United States Department of Agriculture (USDA) standards to ensure that the animals are slaughtered under humane and hygienic conditions, and waste from the facilities disposed of properly. The facility should include the processing of blood, offal and bone for use in the preparation of animal feed. In addition, equipment should be added to process "junk" fish and fish offal for the production of fish meal.
- (d) A meat preparation area and a butcher shop should adjoin the minislaughterhouse. The meat preparation area should have appropriate equipment for the jointing of carcasses and processing of meat to produce sausages, bacon and ham. The butcher shop should have a refrigerator, deep freeze, refrigerated meat counter, scale and other related equipment.
- (e) A feed mill or mixing plant should only be constructed if it is found that feed can be economically produced on the island, whether by importing all the ingredients, or by incorporating some of the local ingredients available on the island. If it is found that locally produced feed cannot be produced at a price lower or similar to that of imported feed, then adequate warehouse and feed-storage facilities should be constructed at the Agricultural Station to store imported feed.
- (f) Associated equipment should include:
- A refrigerated vehicle
 - Truck (2) for feed transportation
 - Truck (1) for transportation of pigs
 - Pickup (3) for pig extension service.

The above mentioned were requested by the Federated States of Micronesia. It has been confirmed that the request would be studied within the scope of the Japanese economic cooperation program in grant form and would be proposed in the Draft Final Report.

CHAPTER 3 OUTLINE OF THE PROJECT SITE

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3-1 Location and Topography

The Federated States of Micronesia consists of four States (Yap, Kosrae, Truk, and Pohnpei), and the capital of the Federated States of Micronesia is Kolonia town in Pohnpei State. Pohnpei State is located at 7° north latitude and 158° east longitude within an east-west chain of islands known collectively as the Carolinian archipelago, and consists of Pohnpei Island, 25 smaller islands, and 137 widely scattered outer islands. The total land area is 133.22 square miles. Pohnpei Island is a steep mountainous area; the highest mountain is 2,595 feet above sea level. The climate of Pohnpei is characterized by high rainfall and high temperatures. The average annual rainfall measured in Kolonia is about 195 inches; sudden showers occur every day. Although it has no change of seasons, the average rainfall for January and February is about 30% less than the annual monthly average. The average annual temperature is 81.3 degrees F.

The objectives of this project are to improve the facilities for swine production, to upgrade productivity, to reduce the importation of pork and pork products which amounts to 85 tons every year, to improve the breed of swine, to produce pig feed, and to extend optimum pig raising methods to local farmers on Pohnpei Island.

To achieve these objectives, the Federated States of Micronesia has requested grant aid cooperation from the Japanese Government. The Government of Micronesia decided to build the main breeding center in the Pohnpei Agriculture Station in Kolonia town, and to build a sub-breeding station in each of the five municipalities.

As the five Project sites (Pohnpei Agriculture Station in Kolonia, Sokehs, Nett, U, and Madolenihmw) are on nationally owned land, landownership and waterownership, etc., will not be a question. And since a discussion between a landowner and the government was held concerning the Kitti site, it will not pose an obstacle to the Project's implementation.

3-2 Social and Economic Conditions

Table 3-1 Population by Municipalities

Municipality	1973		1985	
	Total	Percent	Total	
1. Kolonia	4,565	24	6,506	23
2. Sokehs	3,043	16	5,091	18
3. Nett	2,282	12	3,394	12
4. U	1,903	10	2,546	9
5. Madolenihmw	2,473	13	3,960	14
6. Kitti	2,282	12	3,677	13
7. Pingelap	571	3	1,131	4
8. Mokil	380	2	566	2
9. Sapwufik	571	3	566	2
10. Nukuoro	380	2	283	1
11. Kapinganarangi	571	3	566	2
Total	19,021	100	28,286	100

Source: Office of Planning, Budgeting and Statistics, Pohnpei State.

The population distribution among municipalities is shown in Table 3-1, the population on the island proper of Pohnpei (Kolonia, Sokehs, Nett, U, Madolenihmw, Kitti) is 25,174, and the area of Pohnpei Island is 129.04 square miles. The population concentration in Kolonia Town is 24% percent of Pohnpei Island's total population. The population density on Pohnpei Island is 85 person/km². The population growth rate of Pohnpei state was 4.06% during 1973-1985, which means that the FSM is one of the highest population growth rate nations in the world. The results of the 1985 census shows that a prevailing 46.25 percent of the population is within the age group of fourteen years or less. This clearly indicates that Pohnpei has a population base which is highly weighted towards the younger ages.

Although the rapid rate of population growth produces an increase in the labor force, the unemployment rate increases also. In Pohnpei State, the unemployment rate for men was 19.6 percent and 24.3 percent for women (1980).

Table 3-2 Population

ITEM	1973		1981		1982		1983		1984		1985	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1.1 Age Groups												
0 - 4	1,860	1,724	1,990	1,900	2,130	2,030	2,310	2,190	2,460	2,330	2,427	2,313
5 - 9	1,518	1,397	1,780	1,710	1,760	1,680	1,760	1,680	1,810	1,730	2,390	2,213
10 - 14	1,377	1,261	1,720	1,610	1,780	1,680	1,800	1,720	1,810	1,730	1,893	1,922
15 - 19	1,114	1,039	1,440	1,330	1,470	1,350	1,510	1,390	1,570	1,450	1,462	1,518
20 - 24	777	755	1,280	1,190	1,330	1,230	1,360	1,260	1,390	1,290	1,150	1,223
25 - 29	453	461	970	910	1,050	960	1,100	1,020	1,170	1,070	1,104	1,063
30 - 34	392	378	620	620	690	690	760	750	820	800	893	863
35 - 39	394	388	380	400	400	420	440	450	480	490	697	639
40 - 44	401	369	370	390	360	390	360	390	360	400	402	392
45 - 49	358	326	370	380	370	380	370	380	370	380	350	355
50 - 54	329	373	350	330	360	340	360	360	360	360	339	345
55 - 59	279	230	320	330	320	320	320	310	330	300	380	342
60 - 64	203	176	280	310	280	330	290	340	290	340	278	284
65 - 69	134	119	220	170	230	180	240	200	250	220	241	228
70 - 74	99	93	140	150	140	160	160	150	160	130	137	119
75 +	91	119	120	140	130	150	130	140	140	150	56	77
Unknown	15	19									91	100
1.2 Total	9,794	9,227	12,350	11,870	12,800	12,290	13,270	12,730	13,770	13,170	14,290	13,996
Total Population	19,021		24,220		25,090		26,000		26,940		28,286	

Source: Office of Planning, Budgeting, and Statistics (OPB&S) Pohnpei State.

Table 3-3 Births and Deaths in Pohnpei

	1981	1982	1983	1984	1985	Total
Deaths	104	106	99	116	96	521
Births	945	808	869	839	886	4,347

Source: Health Services, Pohnpei State

Table 3-4 Labor Force, Employment and Unemployment in Pohnpei

	1973			1980		
	Male	Female	Total	Male	Female	Total
Population 15 years and over	6,130	5,947	12,077	6,540	6,350	12,890
Labor Force participation %	81.3	36.7	59.3	76.5	47.4	62.1
Labor Force	4,983	2,185	7,168	5,000	3,010	8,010
Employed	3,857	1,256	5,113	4,020	2,280	6,300
Unemployed	1,126	929	2,055	980	730	1,710

Source: FSM First National Development Plan 1985 - 1989 pg 88

3-3 Physical Features

(1) Climatic Conditions

The climate of Pohnpei cannot be divided into four seasons. The weather is characterized by high temperatures and high humidity. There is cloud coverage most days of the year.

Climatic conditions in 1985

Rainfall		183.94 inches
Temperature	Average	81.3 Fahrenheit
	Maximum	92.0
	Minimum	70.0
Humidity		89 percent

Table 3-5 Mean Temperatures, Rainfall & Percent Sunshine by month
1985

Month in 1985	Average Temperature (Fahrenheit)	Rainfall (in)	Percent of Possible Sunshine
January	81.3	14.83	.42
February	81.9	12.91	.43
March	82.3	5.15	.48
April	81.0	24.22	.42
May	82.1	13.04	.41
June	81.1	13.80	.42
July	80.5	14.62	.44
August	80.8	14.02	.46
September	81.3	12.48	.47
October	80.9	18.81	.41
November	81.4	19.95	.43
December	81.5	20.11	.38

Source: Pohnpei State Weather Service

Table 3-6 Data by Year in 1985

	1981	1982	1983	1984	1985	Average
Mean Temperature (F)	81.8	81.2	82.1	81.7	81.4	81.64
Average Rainfall (in)	182.29	200.87	133.62	158.90	183.94	171.92
Average Number of Rainy Days	300	277	303	331	330	308
Average Humidity (%)	77	78	67	77	89	78

(2) Marine Conditions and Extreme Weather Conditions

The wind direction is from the northeast and is uniform throughout the year. Mean wind speed is 6-7 mph. The maximum difference of the tide is about 5 feet. Unlike much of Micronesia, the risk of typhoons on Pohnpei is minimum. The extreme conditions that have caused damage to Pohnpei Island recently are listed below:

Table 3-7 Extreme Weather Conditions

Weather Condition	Date
Typhoon Lola	November, 1957
Typhoon Ophelia	January, 1958
Tropical Storm Odessa	March, 1982
Drought	November, 1982 - April, 1983
Tropical Storm Elsie	January, 1985
Typhoon Lola	May, 1986

(3) Geological Conditions

The soils on Pohnpei Island are mostly clay and muck. More than six hundred species of plants are found on Pohnpei because of the abundant rainfall.

Table 3-8 Pohnpei Island Soil Types

Location	Type of Soil
Subtidal	
Barrier Reef Lagoon	Variable live corals Variable rocks, sand, silt
Intertidal Reef Flat	
Reef Flat Mangrove	Variable rocks, sand, silt Coral sand, silt, muck
Coastal Lowland	
Swamp Freshwater Swamp Secondary Forest	Muck, organic soil Muck Mostly clay
Mid-Island Highland	
Primary Forest Rain Forest Crest	Clays, thin organic soil Mostly clays Mostly clays

Source: Pohnpei Island Land Use Guide, Office of Planning & Statistics, TTPI

(4) Topographical Conditions

Pohnpei State consists of Pohnpei Island, 25 smaller islands within a barrier reef, and 137 widely scattered outer islands which are coral atolls. The total area of the state of Pohnpei is 133.4 square miles. Pohnpei Island itself is 129.04 square miles. It is located at 6° 45' north latitude and 158° 15' east longitude, and 750 miles from the equator. Pohnpei Island is a high volcanic island with 11 peaks rising over 2,000 feet. It is circled by an outer coral reef, a lagoon and an inner reef. Most of the shore is composed of mangrove swamps.

Table 3-9 Land Area

	Kittl	Kolonia	Madolenihmw	Nett	Sokehs	U	Total
<u>Pohnpei proper land area</u>							
Acres	25,594	826	23,942	17,338	9,909	4,954	82,563
Square kilo meters	103.57	3.34	96.89	70.16	40.09	20.04	334.09
Square miles	39.99	1.29	37.41	27.02	15.48	7.74	129
Percent Total	31%	1%	29%	21%	12%	6%	100%
Maximum Elevation							
Meters	670.73	16.15	726.19	609.75	670.73	609.75	
Feet	2,200	53	2,500	2,200	2,200	2,200	

Sources: Office of Planning, Budgeting & Statistics, Pohnpei State

There are four main rivers on Pohnpei Island; their names and their discharge rates are given as follows:

Table 3-10 Major Rivers

River	Average Flow (cfs) 1)	Drainage area (sq mi)
Lehnmasi River	37	8.75
Senpehn River	41	6.13
Dausokele River	10	10.90
Nanpil River	54	2.93

Note 1: cfs = (cubic feet)/second

Source: Pohnpei Island Land Use Guide, Office of Planning & Statistics, TTPI

3-4 Social Conditions

The present multiplication center is located at the Pohnpei Agriculture Station in Kolonia. A piggery (232 m²) was constructed twenty years ago, but has become too old for use. Most of the buildings on the islands are built of wood, concrete block, reinforced concrete and steel frame. All buildings are three stories or less. In Kolonia Town, a water supply, a sewerage system, electricity, telephone cables, and so on, are installed, but town gas is not supplied. No infrastructures are installed at other sites.

3-5 Construction Situation

3-5-1 Building Design

Local contractors can plan and execute the construction of small-scale buildings. There are no local building codes and design standards. Buildings, except small-scale buildings, are designed by overseas contractors.

3-5-2 Construction Supervision

There are no laws for construction supervision. The construction of private buildings is supervised by local contractors, but middle-scale buildings are constructed by local contractors under the supervision of overseas consultants. Large-scale buildings are constructed and supervised solely by overseas contractors.

3-5-3 Building Materials

Gravel, coral sand, concrete block, logs, and cobblestones can be provided on the spot. Small amounts of other materials can also be provided on the spot, but they are all imported. A very small sawmill is located on the island.

3-5-4 Labor Force

Although the labor force is growing step by step, few laborers are engaged in construction work. Wages are comparatively low. Working hours are normally from 8 o'clock in the morning to 5 o'clock in the afternoon. Tools, etc., are furnished by the contractors. No local labor law exists.

3-5-5 Laborers' Ability

The skilled workers who have graduated from the Palau Work Training School have great ability and, for forty years have produced satisfactory results performing construction work. However, these workers are advanced in age and are few in number. The ability of young workers is poor.

3-5-6 Purchase of Materials

Some types of building materials are sold in limited quantities at certain shops in Kolonia. Timber (2" x 4"), cement, reinforcing bars, iron goods, electrical apparatuses, water supply and sewerage articles, medical supplies, etc., are all imported. Gravel and sand is available locally. Material for use in constructing middle-sized and large-sized buildings are imported and distributed to each construction site. Therefore, if materials are properly ordered and distributed, work and costs will be minimized.

3-5-7 Transport

Although certain articles are brought into the country aboard aircraft, cargo ships normally handle the bulk of imported merchandise. Various overseas shipping agents can arrange regular monthly shipments to Pohnpei Port.

A relatively large ship can come alongside the pier, but, since the yard is comparatively small, the containerization method is used for loading and unloading cargo. A large fork-lift is located in the port.

In Kolonia, there are a number of trailers and heavy-duty trucks belonging to individuals; there are no transit companies. In order to cope with this situation, an appropriate transportation method should be taken into consideration. The loop road on Pohnpei Island is 52 miles long.

3-5-8 Water Supply and Electric Supply

Water and electricity are not supplied except in Kolonia Town. Even in Kolonia, water supply restrictions are imposed. Water is supplied from 0600 to 0900, and from 17:00 to 20:00 daily. Electricity is often cut off without warning. Voltages in Pohnpei are 240V, and 120V, 60Hz.

3-5-9 Construction Machinery

Construction machinery belonging to the government includes some bulldozers, dump trucks, graders, concrete mixers, trailers, tank cars, pickups, etc.

3-6 Salt Damage

(1) Salt Damage

Being an island country, salt damage -- caused by sea breezes and coral sand -- can be seen everywhere. Salt has caused the rusting of buildings and facilities; machine made of iron do not last long under these conditions.

The fence at the Agriculture Station (built in 1984) was damaged by salt as shown in the picture.

Only a portion of the road in the Kolonia site is paved. Roads at other sites are not paved. Coral sand from the sea is used for repairing roads; therefore, sand containing salt is sprinkled over roads at any given time. Because of salt damage, a car cannot last longer than two years.

(2) Measures to be taken to Prevent Salt Damage

To cope with the salt damage situation, measures should be taken to have iron material brought in from Japan treated with a special coating or plating.

The steel fence post shown in the picture rusts, but the crimped wire netting does not. The reason for this is that the plating made in the USA provides long-lasting protection. By applying a rustproof coating, an automobile can last from two to five years longer.

Further, sand to be used in concrete should be thoroughly washed prior to mixing.

The above matters should be taken into consideration for Project implementation.

CHAPTER 4 CONTENTS OF THE PLAN

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4-1 Objectives of the Plan

The objectives of the Project are: (1) to reduce the amount of pork being imported (presently 85 tons annually); (2) to improve pork quality and effect its distribution; (3) to improve the quality of feed, thereby reducing meat prices; (4) to improve the breed in order to increase swine productivity; and (5) to strengthen the organization that provides swine production extension activities to the local farmers.

In order to achieve the above objectives, the Project is to improve swine breeding in Pohnpei State by establishing a Main Breeding Center in Kolonia, the state capital, and a Sub-breeding Station in each of the state's five municipalities.

4-2 Study of the Request's Contents

4-2-1 Study of the Contents of the Plan

(1) The Site Selection of the Main Breeding Center

The Federated States of Micronesia requested the establishment of the Main Breeding Center to house 30 sows and 10 boars within the site of the Pohnlangas Forestry Station. However, for the following reasons it was decided to build the Center within the site of the Agriculture Station:

(a) Water Supply Facility

At the Pohnlangas Forestry Station there is no water supply facility for use at the laboratory or for cleaning the breeding facility. Three alternative plans were studied for bringing water into the Forestry Station area; they are:

- (i) To obtain water from an upstream dam. Presently, however, there are no plans for building a water

conveyance facility. Even if the construction of such a facility began at this time, it would take more than three years to complete.

(ii) To pump water from a small river:

The Pohnlangas forest, presently used for cattle grazing, is located upstream of a small river that flows near the planned Main Breeding Center site. As the water in this river is contaminated by cattle excrement, its use would present a sanitation problem.

(iii) To use well water:

The ground water level in the area is very deep, and it would be impossible to supply the necessary amount of water needed at the Main Breeding Center.

(b) Geological Conditions

Topsoil in the area is very thin and rock outcrops appear here and there.

During the field survey no forage plants, such as banana trees or breadfruit trees were found in the area. The Study Team concluded that the Forestry Station area would not be suitable for growing forage plants, judging from the soil conditions.

(c) Sea Winds

There are old palm trees in the Forestry Station area that, judging from their shapes, have been subjected to relatively strong sea winds; therefore, it would be necessary to plant a windbreak forest if the Main Breeding Center was to be built in the area.

The existing Agriculture Station site is surrounded by a windbreak consisting of trees. Soil in the site is terrarossa which is suitable for growing such forage plants as banana and breadfruit trees. The 2.5 ha area is the optimum size for keeping 25 sows and 15 boars. Further, water, gas, and electricity supplies, and drainage facilities are all available in the site.

(2) Reasons for Establishing the Sub-breeding Stations and their Extension Activities

(a) Reasons for Establishing the Sub-breeding Stations

As the existing boar and sow multiplication center in Pohnpei State only has a few boars and sows and their reproduction rates are low, it was planned to improve the swine breed by introducing new boars and sows. It is estimated that 83 gilts will be produced in the second year after introducing 15 boars and 25 sows. After the third year, 300 gilts will be produced annually. According to 1985 statistics, 15,000 pigs were raised on 2,500 swine breeding farms on Pohnpei Island. For example, 600 farms are to be selected as the nucleus swine breeding farms. If each nucleus farm receives one new breed gilt a year, all sows (native type) of the nucleus farms will be completely replaced with the new breed gilts.

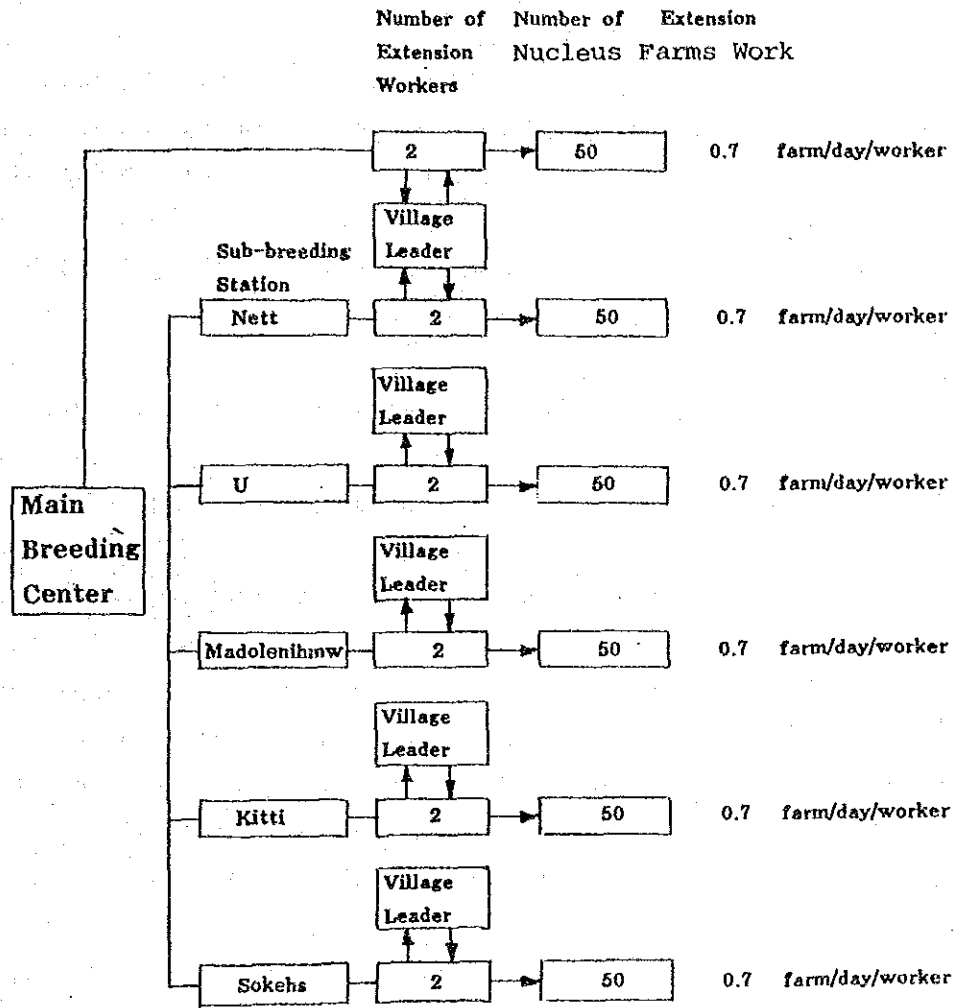
To move ahead successfully with the swine breeding improvement plans, it will be necessary not only to provide for the extension of swine breeding techniques, but to pay particular attention to people's eating habits. If people are to be able to eat pork (an important protein source) along with their normal food staples of rice and vegetables whenever they so desire, without first performing a "kamadipw" ceremony, it will be necessary to obtain maximum cooperation from village leaders.

Presently, there are only two swine breeding specialists at the Agriculture Station. For each specialist to perform extension work at one nucleus swine breeding farm eight times a year, it would require 4,800 days; each specialist would have to visit eight nucleus farms a day -- an impossible task.

Furthermore, the specialists would be unable to take care of their own work at the Agriculture Station.

The annual temperature on Pohnpei Island is relatively constant. However, the daily weather changes abruptly and, as a consequence, the daily temperature fluctuates also. Furthermore, due to differences in the island's topography, the daily temperature differs from place to place. For these reasons, the results of experimental pig breeding at the Main Breeding Center will not be always applicable for managing young pigs in all areas of the island. The results will be used most effectively with the cooperation of the local farmers who have lived and raised pigs in their villages for many years. The breed improvement work is not only for distributing high quality gilts to the nucleus swine breeding farms. The Study Team believes that the success of the breed improvement work depends upon efficient, well-organized swine breeding extension activities. For this reason, it is necessary that one Sub-breeding Station be established in each municipality.

The work flow of extension activities is shown in the following chart:



Source: Principles of Extension to Develop Villages; All Agriculture Improvement Extension Association

(b) Extension Activities

Items to be taken care of at each nucleus swine breeding farm

- 1 To know that improper feeding causes poor fertility and fattening.
- 2 To improve feeding to suit pigs' physical conditions (use of proper content and quality of coarse feed and nutritionally well-balanced mixed feed).
- 3 To provide the proper amount of feed and to rotate forage crops (cassava, etc.), especially for young pigs.
- 4 To improve feed by introducing forage crops.

Extension workers' activities

- 1 To hold seminars about pig feeding, multiplication, and growth rates.
- 2 To distribute record forms monthly to the nucleus farms in order to have them record daily the amount of feed and increments, and to examine the pigs and their feeding at each farm once a month. Extension workers will hold a meeting every six months to discuss the results of their activities.
- 3 To examine the soil of all nucleus farmers' farmland.
To demonstrate newly introduced forage crops (F1 corn, sweet potatoes, cassava, soybeans).
- 4 To counsel the nucleus farmers to maintain suitable feeding methods over a long period of time (more than three months). To advise the farmers to use a different type of coarse feed as a substitute when the supply of regular feed runs out (mixed feed should not be used as a substitute when the supply of coarse feed is depleted).

(3) The Necessity of Establishing a Main Breeding Center and Sub-breeding Stations

In Pohnpei State, virtually no original boars or sows (pure bred) have been introduced during the past ten years, and there has been no organization for swine breed improvement.

Having high quality boars and sows is a basic requirement for improvement swine production on Pohnpei Island. However, it is extremely difficult to secure the purebred pigs necessary for improving the island's boars and sows.

Pigs on the island have been inbred for many years. The bad effects of inbreeding are evident in the small body structure of the pigs, in the small number of piglets farrowed, in the uneven body sizes of piglets of the same age, in poor meat production per pig, in the poor growth rate of young pigs, etc.

The Project's breed improvement plan will attempt to eliminate the bad effects of inbreeding, thereby improving meat productivity.

At first, the Project will establish a Main Breeding Center and introduce original (purebred) boars and sows. Maintaining the original boars and sows, crossbreed gilts are to be produced by mating. Large White (W) sows with Hampshire (H) or Duroc (D) boars.

Even with the pure breed boars and sows widely distributed throughout the island, swine breeding will not improve over a short period of time. With the usual close relative mating, crossbred pigs will eventually be produced. For this reason, five Sub-breeding Stations will be established (one in each municipality) under the close cooperation of the Government of Pohnpei State.

At the Sub-breeding stations, F1 gilts (W x D or W x H) are to be produced by mating the purebred sows (W) and boars (H or D) that will be distributed by the Main Breeding Center.

Those gilts produced at the Sub-breeding Stations will be distributed to the nucleus breeding farms in each municipality. Under the guidance of the Main Breeding Center, the nucleus breeding farms will then produce 3-way cross breed pigs (WD x H or WH x D) by mating the sows with the pure breed boars distributed by the Main Breeding Center.

All the 3-way cross breed pigs will be raised for fattening, not for reproduction purposes. The 3-way cross breed pigs, produced by pure breed parents, will possess the strength of the crossbreeds (better fertility, better meat productivity, stronger body, and better uniformity than their parents) and will be easy to raise.

F1 sows will be replaced about every three years (after reproducing six times). As described above, swine breeding in each municipality will rapidly improve by providing technical guidance to nucleus swine breeding farms through the Sub-breeding Station with cooperation from the Main Breeding Center. This type of breed improvement method is regarded as the "Mass Improvement Method", and for the success of the Project's breed improvement plan, the establishment of Sub-breeding Stations is essential.

Table 4-1 Delivered Gilt (from Sub-breeding Station) Raising Plan

	First Year	Second Year	Third Year	Fourth Year	Fifth Year	Total
Number of F1 gilts delivered to nucleus farms	300	300	300	300	300	
Number of F1 gilt survival rate at nucleus farms	255	255	255	255	255	
		255	255	255	255	
			255	255	255	
Total	255	510	765	765	765	3,060

- Note: 1. Gilts' survival rates at nucleus farms are $300 \times 0.85 = 255$. The average gilt weighs 120 kg by the time it is 7 months old.
2. F1 gilts raised at nucleus farms are to be replaced about every 3 years (after reproducing six times).
3. Gilt survival rates in the sixth year and after will be identical to those in the fifth year.
4. Assuming the present number of sows on the island to be 2,500, it will be possible to replace all native sows with new F1 gilts within 5 years.

Table 4-2 3-way Cross Breed Pig Production Plan

	First Year	Second Year	Third Year	Fourth Year	Fifth Year
3-way cross breed pig production	3,900	3,900	3,900	3,900	3,900
		3,900	3,900	3,900	3,900
			3,900	3,900	3,900
Total	3,900	7,800	11,700	11,700	11,700

- Note:
1. The number of 3-way cross breed piglets is $255 \times 18 = 4,590$.
 2. The 3-way cross breed pigs' (100 kg at the age of six months) production rates: $4,590 \times 0.85 = 3,900$. An average of 15 grown pigs per one F1 sow.
 3. Piglets are assumed to become fully grown in the same year they are born.
 4. The production rates in the sixth year and after will be identical to those in the fifth year.
 5. After the third year, 11,700 fully grown pigs will be produced annually.

The pig production flow is shown as follows:

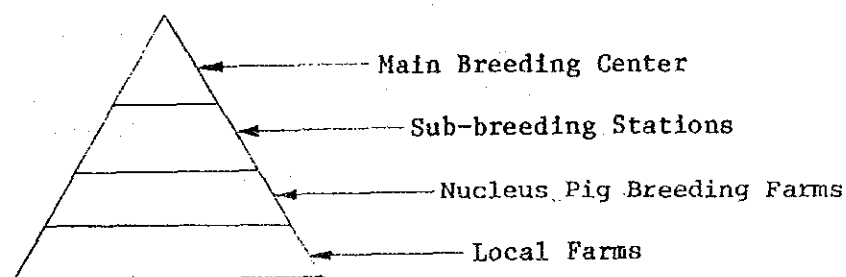


Fig. 4-2

(4) Analysis

- (a) Study of the optimum swine breed and the breed improvement method judging from the results of swine breeding in Japan, Taiwan, and the Philippines, it is considered that the following breeds will be the most suitable for raising in Pohnpei State's hot, humid climate:

1. Large White (W)

2. Duroc (D)
3. Hampshire (H)

Distributing the cross breed pigs of F1 gilts of the above species, pork production with 3-way cross breed pigs will be the most suitable; therefore,

(H)

W (♀) x D (♂) : F1 gilt

Then,

(H) (D)

WD (♀) x H (♂): Pork of 3-way cross breed.

The Main Breeding Center shall obtain purebred boars and sows, distribute young pigs for reproduction, and test pork quality. The Sub-breeding Stations shall produce F1 gilts and distribute them to swine breeding farmers. For this reason, it is extremely important to establish a system and organize for swine breeding improvement.

(b) Establishment Plan of the Main Breeding Center

After obtaining the original boars and sows (produced by certified purebred boars and sows), the Main Breeding Center will produce F1 sows and distribute them to swine breeding farms in order to produce improved pigs (fertile, having meat of good quality, and healthy) for reproduction.

Swine breeding farms will produce, under the guidance of the Sub-breeding Stations, 3-way cross breed pigs by crossing different species of boars with F1 sows. It is the objective of the Project to organize the swine breeding improvement system in order to raise 3-way cross breed pigs for pork production.

It is planned to establish five Sub-breeding Stations under the guidance of the Government of the Federated States of Micronesia, each municipality's administration, and the Main Breeding Center.

The major activities of the Sub-breeding Stations will be as follows:

- 1 Demonstrating the swine breeding facilities and feeding methods.
- 2 Teaching feed management techniques.
- 3 Mating
- 4 Providing training and conducting seminars.
- 5 Conducting follow-up studies on the young pigs distributed, and collecting related information.
- 6 With the cooperation of the Main Breeding Center, providing advice concerning swine breeding in general to the farmers.
- 7 Teaching domestic feed growing and feeding methods.
- 8 Conducting studies of pork quality, optimum slaughtering times, and a pork distribution system.
- 9 Others

4-2-2 Examination of the Plan

(1) Main Breeding Center

From the consideration that pork is the most important protein source available in Pohnpei State, it is planned to conduct swine breeding improvement and feeding techniques extension at the Main Breeding Center, and, as a result, to improve the quality of pork. Further, by increasing domestic forage crop production, it is planned to lower pork prices and to establish a pork distribution system. The Center will be the base for the swine breeding extension and technical guidance. The Main Breeding Center will carry out the following activities:

- (1) To keep original boars and sows and to distribute the produced young pigs, for reproduction purposes, to each Sub-breeding Station. Some of the produced young pigs will be raised for the purpose of conducting studies on meat quality.

- (ii) To conduct artificial insemination:
Presently, artificial insemination is not being performed. It is planned to artificially inseminate sows with sperm from high quality boars at the Sub-breeding Stations under the guidance of the Main Breeding Center.
- (iii) To increase domestic feed:
The Center will test the feed growing system in order to increase domestic feed production. Also, the Center will produce special cross feed by using imported raw materials in an effort to lower the cost of feed production.
- (iv) To improve pigpens:
The Center will promote the setting up of suitable pigpens that will fulfill established requirements. This will be done by improving farrowing and grower pens. The Center will try to improve the survival rates of young pigs by improving farrowing crates, nursery boxes, and nipple drinkers.
- (v) To improve sanitary conditions:
Presently there have been no occurrences of malignant contagious diseases. However, it is necessary to examine for and exterminate parasites, and to conduct periodic disinfection inside and around the pigpens. Further, it is necessary to prohibit outsiders from coming into the pigpens. Also, vehicles that enter the pigpens must be disinfected daily.
- (vi) To conduct extension work:
The Main Breeding Center will guide Sub-breeding Stations, and will conduct seminars and deliver lectures to swine breeding farmers.

(vii) To establish an optimum swine breeding scale:

<u>Species</u>	<u>Number of Boars</u>	<u>Number of Sows</u>	<u>Number of Fatteners</u>	<u>Number of Sows Artificially Inseminated</u>
W	5	15		
D	5	5	82	130
H	5	5		
Total	15	25	82	130

(2) Sub-breeding Station

The Sub-breeding Stations, whose staff will consist of municipality leaders, government staff, and employees, will be the bases for local swine breeding in general. Under the guidance of the Main Breeding Center, the five Sub-breeding Stations to be established will conduct swine breeding extension to farmers.

The Sub-breeding Stations will conduct following activities:

(i) To provide guidance in each municipality:

In close cooperation with the Main Breeding Center, the Sub-breeding Stations will improve swine breeding techniques, provide swine breeding extension to farmers, hold consultations, give lectures, conduct seminars to benefit the farmers, and will endeavor to gain an understanding of the situations actually confronting the swine breeding farmers.

(ii) To distribute young pigs for reproduction purposes:

A main objective of the Sub-breeding Stations will be to produce and distribute young pigs for reproduction purposes. The Sub-breeding Stations will raise well-controlled F1 sows under close cooperation with the Main Breeding Center, and distribute them to the farmers. The mating of sows to produce 3-way cross breed pigs will take place at the Sub-breeding Stations. The Stations will strive to have these pigs

used widely throughout the state. The Stations will promote swine breeding by the use of domestic feed or by having the pigs graze on suitable pastures in each area.

(iii) To improve pigpens:

The Sub-breeding Stations will conduct the same type of activities for improving pigpens as are carried out by the Main Breeding Center.

(iv) To establish suitable swine breeding scales at each Station.

<u>Species</u>	<u>Number of Boars</u>	<u>Number of Sows</u>
H	1	
D	1	
<u>W</u>	<u> </u>	<u>10</u>
Total	2	10

Note: The boars and sows are to be distributed by the Main Breeding Center.

(v) Improving Pork:

Pork quality testing is to be conducted with the cooperation of the Main Breeding Center.

(vi) To improve sanitary conditions:

The Sub-breeding Stations will carry out the same activities for improving sanitary conditions as are performed by the Main Breeding Center.

4-3 Contents of Plan

4-3-1 Project Implementation Organization

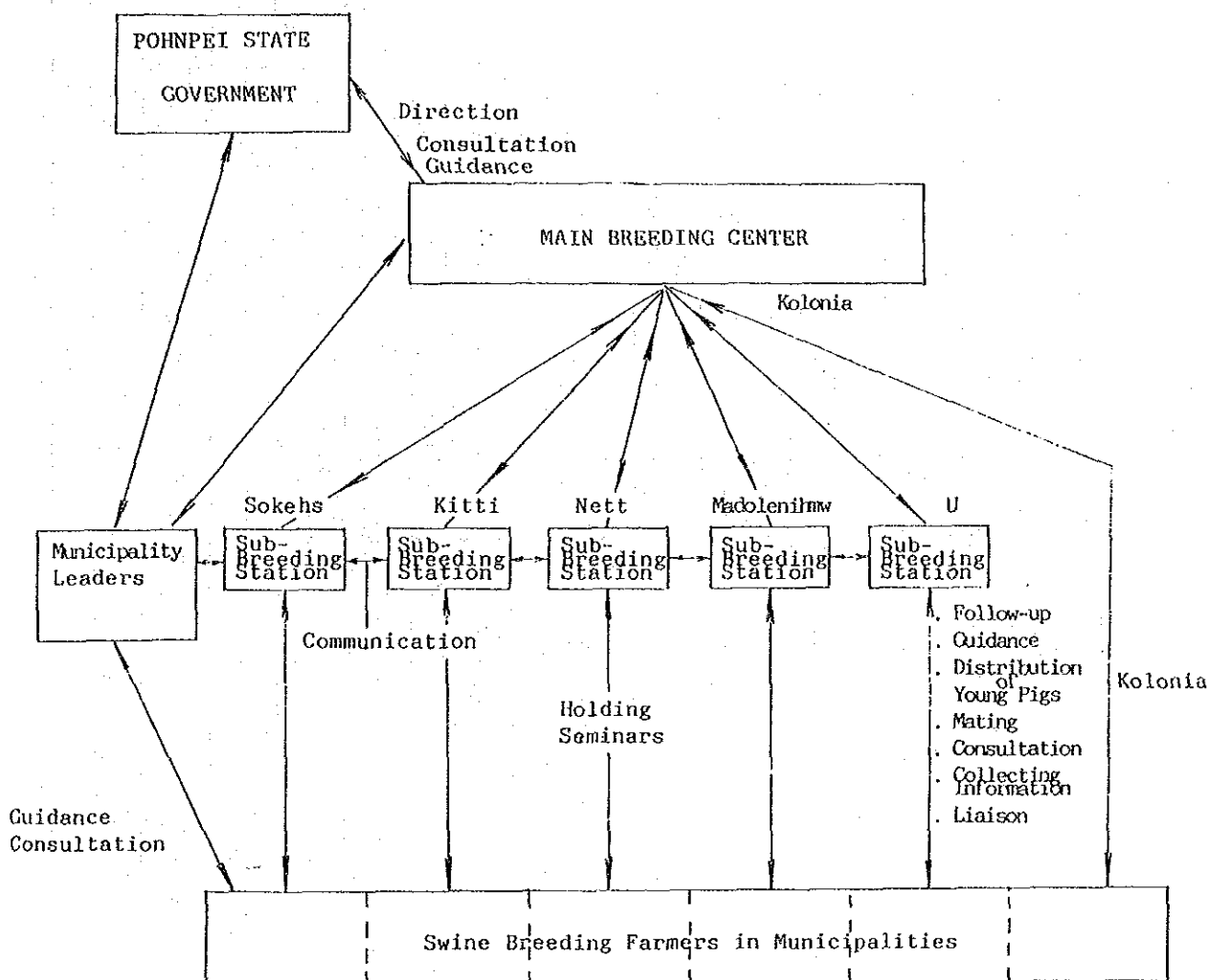


Fig. 4-3

- Note:
- i. This chart shows the activities of the Main Breeding Center and the Sub-breeding Stations.
 - ii. As the Sub-breeding Stations become the centers in municipalities, they will distribute F1 sows to swine breeding farmers, conduct mating of sows, provide technical guidance, and conduct seminars.
 - iii. The Sub-breeding Stations will be managed under the guidance of municipality leaders and government officials. The Sub-breeding Stations will conduct extension work under the guidance of the Main Breeding Center.

Swine Output Plan at the Main Breeding Center

Item	The 2nd Year												Total	Remarks		
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC				
Boars	W(Y) 5														R = 1	
	D 5														R = 5	Renewal: 11
	H 5														R = 5	
Sows	W(Y) 8														R = 6	Renewal: 21
	W(Y) 7														R = 6	Farrowed Sows : 53
	D 5														R = 5	
	H 5														R = 5	Farrowing Times : 2.12/y
Rearing	W															168
	W															144
	D															64
	H															64
For Substation	W															45
	W															-
	D															5
	H															12
For Porking	W															100
	W															48
	D															41
	H															34
Examination on the flesh side	W															58
	W															38
	D															9
	H															9
Artificial Insemination	12	10	10	10	15	12	15	8	10	15	11	12	140			
Notes	<p>----- Preparatory Rearing ⊗ Cross Breeding ● Breeding ○ Weaning ▲ Selection ■ Rearing End □ Slaughter ▽ Renewal</p> <p>~~~~~ Sucking Period ♂ Male (Boar) ♀ Female (Sow)</p>															

Table 4-4 Swine Output Plan at the Sub-breeding Stations

Item	The 1st Year												Total	Remarks	
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC			
Boars	RI													1	
	DI													1	
Sows	WS												Artificial	5	
	WS													5	
Rearing Swine	WH														
	WD														
For Key Farmers	WH														
	WD														
For Porkling	WH														
	WD														
Artificial Insemination	1	1	1	1	1	1	1	1	1	1	1	1	1	12	
Notes	----- Preparatory Rearing \times Crossbreeding \bullet Breeding \circ Weanling \blacktriangle Selection \blacksquare Rearing End ~~~~~ Sucking Period ∇ Renewal \square Slaughter $\hat{\Delta}$ Male $\hat{\square}$ Female														

Swine Output Plan at the Sub-breeding Stations

Item	The 2nd Year												Total	Remarks			
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC					
Boars	H1																
	D1																
Sows	W5	W×H	4×10	4×9	4×10	4×9	4×10	4×9	4×10	4×9	4×10	4×9	4×10	4×9	12	Breeding Sows :20	
	W5	W×D	4×10	4×9	4×10	4×9	4×10	4×9	4×10	4×9	4×10	4×9	4×10	4×9	8		
Rearing Swine	WH			♂ 18	♀ 18	15	15	18	18	15	15	18	18	15	15	60	
	WD					18	18	15	15	18	18	15	15	18	18	60	
For Key Farmers	WH					15	15			15	15			15	30	Total:60	
	WD													15	30		
For Porkling	WH					15	15			15	15			15	30	Total:60	
	WD													15	30		
Artificial Insemination.		5	5	5	5	5	5	10	15	20	20	20	20	100			
Notes	<p>----- Preparatory Rearing ▷ Crossbreeding ● Breeding ○ Weanling ▲ Selection ■ Rearing End</p> <p>~~~~~ Sucking Period ▽ Renewal □ Slaughter ♂ Male ♀ Female</p>																

4-3-2 Project Plan

(1) Plan to Introduce Boars and Gilts

It is planned to introduce the following boars and gilts into the Main Breeding Center.

. Boars:

W	5
D	5
H	5
Subtotal	15

. Gilts

W	15
D	5
H	5
Subtotal	25

Total 40

The boars and gilts to be introduced shall be six to seven months old having the specific characteristics of each species. They must be certified in herd books or by certification papers. Each boar and sow must be a distant blood relative. It is preferable to choose boars and sows that have strong cloven hooves (this is especially true for boars as they have greater influence over offspring than do the gilts).

In order to avoid any hindrance as a result of unexpected accidents, it is advisable to supply boars and sows each year at 10% of the total number of all boars and sows at the Main Breeding Center.

(2) Pork Production Costs

Feed costs and personnel expenditures at the Main Breeding Center and the Sub-breeding Stations will be as follows:

(a) Main Breeding Center

. Personnel expenditures:

4 employees: $\$0.6/\text{hr} \times 8 \text{ hrs/day} \times 4 = \$19.2/\text{day}$

Assuming there are 300 working days in a year,

$\$19.2/\text{day} \times 300 = \$5,760/\text{year}$

$\$5,760 \times 140 \text{ ¥/\$} = ¥806,400$

. Feed costs:

83,000 kg x ¥57/kg (average price of imported feed)

= ¥4,731,000/year

. Total Annual Costs:

¥806,400 + ¥4,731,000 = ¥5,537,400/year

. Estimated Subsidized Price:

Young pigs expected to be boars : 23 ea x ¥30,000 = ¥690,000

Young pigs expected to be sows : 53 ea x ¥20,000 = ¥1,040,000

Grown pigs : 82 ea x ¥25,000 = ¥2,050,000

Fatteners : 119 ea x ¥10,000 = ¥1,190,000

Artificial insemination:

fee 400 sows x ¥1,400 = ¥560,000

Total ¥5,530,000
per year

(b) Sub-breeding Station (calculated for one station):

. Replacement costs (the Sub-breeding stations will purchase boars and sows from the Main Breeding Center --¥30,000 per boar and ¥20,000 per sow): 1/3 of the boars and sows shall be replaced with younger ones annually:

Boars: 2 ea x ¥30,000 x 1/3 = ¥20,000

Gilts: 10 ea x ¥20,000 x 1/3 = ¥67,000

TOTAL ¥87,000/year

. Feed Costs:

20,000 kgs/year x ¥57/kg = ¥1,140,000/year

. Personnel expenditures:

2 employees: $\$0.60/\text{hr} \times 8 \text{ hrs/day} \times 2 = \$9.6/\text{day}$

Assuming there are 300 working days in a year,

$\$9.6/\text{day} \times 300 \text{ days} = \$2,880/\text{year}$

$\$2,880 \times 140\text{¥}/\$ = \text{¥}403,200$

. Total Costs:

$\text{¥}87,000 + \text{¥}1,140,000 + \text{¥}403,200 = \text{¥}1,630,200/\text{year}$

. Expected Subsidized Price:

Boars: 49 ea x $\text{¥}20,000 = \text{¥}980,000$

Fatteners: 49 ea x $\text{¥}10,000 = \text{¥}490,000$

Mating fee: 100sows x $\text{¥}1,400 = \text{¥}140,000$

TOTAL $\text{¥}1,610,000/\text{year}$

Summary:

Subsidized prices from the Main Breeding Center:

To the Sub-breeding Stations:

Boar: $\text{¥}30,000(\$214)/\text{ea}$; Sow: $\text{¥}20,000(\$143)/\text{ea}$

To Farmers

Fatteners: $\text{¥}10,000(\$71)/\text{ea}$

Subsidized prices from the Sub-breeding Stations to farmers:

F1 Sow: $\text{¥}20,000(\$143)/\text{ea}$

Fatteners: $\text{¥}10,000(\$71)/\text{ea}$

(3) Production Plan

1) Main Breeding Center

Tables through show the number of boars and sows and their offspring production plan.

(a) The Main Breeding Center will introduce six to seven month-old purebreds: 15 boars (5W,5D,5H) and 25 sows (15W,5D,5H)

In order to utilize piggens effectively, Large White sows will be kept in two groups; 7 in one group and 8 in the other. After rearing the introduced purebreds for about one month, it is planned to mate them.

(b) Offspring Production and Nursing:

A sow gives birth 114 days after mating. It was assumed that 7 out of 8 mated sows would become pregnant, and each pregnant sow would bear 10 piglets per farrow.

The piglets wean within 21 to 28 days after birth. It was assumed that at the time of weaning 9 piglets out of each litter would survive.

The weaned pigs will be reared at the Center until they are three and a half months old and weigh about 40 kg. During this time, the Center will select possible future boars and gilts. The selected young pigs will be distributed to the Sub-breeding Stations.

(c) Sows

Five to ten days after weaning its offspring, a sow will once again go in to heat; at that time, it is planned to mate the sow for reproduction purposes.

(d) Boars

It is planned to use boars for direct mating and for artificial insemination purposes at the Center. In order to increase the sperm fertility rate, it is planned to make the boar mate twice during each period of heat.

Artificial insemination will be applied to sows owned by farmers.

(e) Fatteners

Some of the fatteners will be reared on domestic feed (it is anticipated that young pigs will reach 100kg by the time they are six months old). The pork quality of each species will be examined.

2) Sub-breeding Stations

(a) Purebred pigs will be distributed to Sub-breeding Stations from the Main Breeding Center. Each Station will retain two boars (1H and 1D) and ten sows, and will produce the F1 cross breed of W (♀) x H (♂) and W (♀) x D (♂).

(b) Offspring production and nursing at the Stations will be conducted in the same manner as at the Main Breeding Center.

The newborn offspring will be nursed until they are three and one half months old and weigh about 40 kg/ea. During this time, the selection of the young pigs to become gilts will be made. The selected pigs will be distributed to swine breeding farmers.

(c) The Station will conduct the direct mating of boars and, using the sperm received from the Main Breeding Center, will artificially inseminate different species of sows. Farmers will produce the 3-way cross breed of WH (♀) x D (♂) or WD (♀) x H (♂).

1. Table 4-5 shows the numbers of the pig, boar and gilt production plans, and of the boar and gilt delivery plan at the Main Breeding Center and the Sub-breeding Stations.

2. The Main breeding Center will maintain the purebred boars and sows for reproduction purposes. Pigs that are potential boars and gilts will be delivered to the Sub-breeding Stations. The Sub-breeding Stations will produce F1 gilts by mating the boars and sows received from the Main Breeding Center. The offspring of F1 gilts will be delivered to the nucleus swine breeding farms. After raising the young F1 gilts, the nucleus farms will produce 3-way cross breed pigs by mating F1 gilts with the Main

Breeding Center's purebred boars, either by direct mating or by artificial insemination.

The 3-way cross breed young pigs will be raised for fattening, not for reproduction.

3. Each young F1 pig selected to be a gilt will be identified by an ear tag prior to being distributed.
4. The selection of F1 gilts to be delivered from the Sub-breeding Stations to the nucleus farms is to be made in accordance with the following procedures:
 - . Preliminary selection is to be made during the weaning stage: The piglets of a litter that are either extremely large or small (those having fat layers that are too thick or bodies that are too weak) shall be eliminated.
 - . The second selection is to be made at the age of three months. The female pigs having the following characteristics shall be selected: normal sized having glossy hair and more than 7 pairs of nipples, symmetrical strong front and rear hoofs, well-balanced body structures, well-grown legs, thin belly fat, and normal shaped vagina.
5. Pigs disqualified as potential gilts will be delivered to farms for fattening purposes.
6. The follow-up surveys on delivered F1 gilts will be conducted for future reference.

Table 4-5 Pig Production and Distribution Plan at the Main Breeding Center and Sub-breeding Stations

	Items	First Year	Second Year
Main Breeding Center	Number of purebred boars and sows	Boars: 5W,5H,5D Sows: 25W	
	Number of farrows	34	53
	Number of piglets	340	530
	Number of weaned young pigs	306	477
	Frequency of farrowing rotation	1.36 times	2.12 times
	Number of grown pig production	158	312
	Number of pigs to be delivered for fattening	75	192
	Number of pigs for meat quality testing	40	87
	Number of boars and sows to be delivered to the five Sub-breeding Stations	65	62
	Sub- breeding Stations	Number of pure breed boars and sows (at five stations)	Boars: 5H,5D (1H,1D,50W at one station) Sows: 50W
Number of farrows		Growing stage	20
Number of piglets		"	200
Number of weaned young pigs		"	180
Frequency of farrowing rotation		"	2.0
Number of grown pig production		"	120
Number of pigs to be delivered for fattening		"	60
Number of F1 gilts to be delivered to nucleus farms		"	60

- Note: 1. The total number of F1 gilts to be delivered to nucleus farms in the second year will be $60 \times 5 = 300$.
2. In the third year and after, pig production and distribution at the Main Breeding Station and Sub-breeding Stations will be identical to those in the second year.

4.3.3 Summary of Facilities and Equipment

(1) Pig house

Design Policy:

- . **Buidling Type:**
Open type, concrete floor for flat, group feeding; steel frame structure; galvanized steel sheet roofing; 3/10 roof slope; no roof gutter. Farrowing crates are to be installed in farrowing pens.
- . **Kinds of Piggens:**
Main Breeding Center: Pens for boars and sows; farrowing and weaner pens; grower pens (for newly introduced pigs); test grower pens.
Sub-breeding Stations (5 places): Pens for boars and sows: farrowing and weaner pens; grower pens (for pigs from 30 to 40 kg/ea).
- . **Feeding and Watering Method:**
Feed is to be distributed manually to a tray or feed basin installed in each pigpen. A water dispenser is to be installed in each pigpen.
- . **Waste Removing Method:**
Basically, waste will be flushed into the drainage ditches installed on both sides of the piggens.
- . **Electrical Facilities:**
Lighting fixtures in piggens and heating facilities in the pens of young pigs are to be installed.
- . **Arrangement of Piggens:**
Main Breeding Center: Piggens will be arranged in double rows. Pens for boars and sows, farrowing and weaner pens, grower pens, and test grower pens shall be partitioned.
Sub-breeding Stations(5 places): Pens will be arranged in a single row.

(2) Waster Treatment Facilities

Design Policy:

Main Breeding Center: A settling tank and an infiltration tank are to be installed.

Sub-breeding Stations: A settling tank is to be installed at each Station.

(3) Feeding Facility

Design Policy:

Feed Crops: Breadfruit, taro, sweet potatoes, bananas, coconuts.

Domestic Feed Processing Equipment: for domestic feed processing, it is planned to provide a chopper, mixer, weighing scale, and handcarts for carrying feed. Sufficient spare parts to last for five years are to be provided.

The above noted facility and equipment are to be installed at the Main Breeding Center. Each Sub-breeding Station will have a feed storage space.

(4) Slaughtering Facility

Design Policy:

The capacity of the slaughterhouse shall be sufficient to handle 200 pigs a year. A compact facility for meat testing shall be installed. Major equipment and tools to be provided are: Electric Hog Stunning Apparatus, Hanger Rail Set, Hoist, Hog Scalding Vat, Dehairing Burner, Stainless Processing Table, Refrigerator Unit.

(5) Management Building

Design Policy:

The Main Breeding Center's management room (75m²) will be in the Agriculture Station's management building. No building at the Main Breeding Center will be built specifically as a management building. An office, a testing and examination room, and an artificial insemination sperm testing room are to be housed in a new building. The management room at each Sub-breeding Station will be of sufficient size to allow for the Station's smooth operation and management work.

(6) Others

Isolation fence:

To prevent the invasion of epidemics, all pigpens shall be isolated by the use of fencing.

Water storage tanks and wells for drinking and cleaning water:

Water storage tanks shall be installed in the Main Breeding Center and Sub-breeding Stations. Wells shall be installed at two Stations.

Disinfection facility at the entrance of the Main Breeding Center:

As the Main Breeding Center will keep original purebred boars and sows, special attention shall be paid to the prevention of epidemics.

Vehicles entering the Center will be disinfected by use of a sprayer.

4.3.4 Project Sites

(1) Project Sites

The objectives of the Project are: to reduce the rate of interbreeding between closely related pigs; to demonstrate that, by breed improvement, swine breeding can result in a high reproduction rate; and, through extension, make high reproduction rate swine breeding the major source of animal protein and pigs that are necessary for the traditional culture throughout the entire Federated States of Micronesia.

For the above stated purposes, the Government of the Federated States of Micronesia selected a Project Site for building the Main Breeding Center within the Agriculture Station site in Kolonia Town on Pohnpei Island, which has the largest area and population in the Federated States of Micronesia and has the greatest potential for future development.

Five Sub-breeding Stations will also be built on Pohnpei Island.

(2) Site Condition Surveys

1) Legal Aspects

Regarding the construction of the Main Breeding Center and Sub-breeding Stations, there are no existing legal restrictions covering city planning, area zone planning, construction regulations, building coverage rates, building volume rates, wall materials codes, building standards, view control, various municipality standards, zoning restrictions, fire zones, etc.

Project sites are either owned or rented by the government.

2) Site Conditions (Main Breeding Center site in Kolonia)

The construction site in Kolonia Town is a 2.5 ha rectangular shaped piece of land that stretches in an east-west direction and is located in the southern part of the Agriculture Station. The elevation difference on the site is about 6 m (the level rises towards the western side). The site faces a 6 m wide paved road to the east and residential areas to the south and west. No building exists within the site. However, 36 mohogany trees having trunk diameters of from 30 to 60 cm exist in the center of the site -- the trees are in rows running in a south-north direction. In the southwest part of the site there are many rocks having diameters of from 40 to 80 cm. It is assumed that there are many rocks beneath the topsoil.

Topsoil at the site is organic and is about 20 cm thick. Beneath the topsoil there is a sandy terrarossa layer that is about 80cm thick. Further below the terrarossa layer there is a sandy silt layer.

It is assumed that the soil has a long-term bearing strength of 5.0 tons/m². Drainability from the site is normal. The ground water level at the site is about 10 m below ground level. Two-thirds of the site is well reclaimed. Additional land adjustment will not be required.

3) Natural Conditions

The predominant wind on Pohnpei Island is from the north or northeast direction with velocities of from 0.5 to 1.0 m/sec. However, there are "no wind" time periods daily. The average annual rainfall is 4,200 mm, ranging from less than 3,500 mm to more than 5,000 mm. The average temperature and humidity are 27°C and 89%.

Strong sunlight from the N6'45" direction lasts from 4 to 5 hours daily. It rains daily in the morning and evening, during the period from December through February it rains less and the humidity level is relatively low. Flood and earthquake damage is not experienced on the island. However, typhoons inflict damage on the island about once every ten years.

Sea winds also cause damage to the island. There is no lightning damage. There are more than 330 days a year when rain occurs.

4) Urban Environmental Conditions

In urban areas, not many people walk; they use automobiles to travel about in. There are no traffic rules or regulations on Pohnpei Island. There is no large public facility nor parking area. The only planned road is the 53 mile long island circular road. There are no noise, vibration, smoke, dust, or odor problems on the island.

5) Public Facilities at the Main Breeding Center Site in Kolonia

The water supply main runs underneath the road in front of the Center. Water is supplied for a three-hour period from six o'clock in the morning, and a four-hour period from five o'clock in the evening.

Water drains from the Center site either by seeping into the ground or flowing into the frontal road's "U-shaped" drain gutter (60cm wide).

There is no city gas supply on the island. Propane gas, charcoal, wood, and kerosene are used for fuel.

It is possible to obtain 3-phase 240V power from the transformers on the electric poles located along the frontal road. However, the capacity of the existing transformer is 30 kw.

Telephones can be connected to the telephone wire strung on poles located along the frontal road.

No fire hydrants nor fire alarms exist in or around the Center site. Police and fire stations are located in the center of Kolonia Town which is about 1.6 km away from the Center site. In the stations there are four staff members and one fire engine.

The island's harbor can accommodate a 6,000 to 7,000 DWT ship. However, its cargo handling yard is relatively small and there is only one forklift truck.

There are two power generating stations on the island. However they occasionally suspend service.

6) Main Breeding Center Site Conditions

The site is located about 1.6 km away from the beach and is at an elevation of about 30 m above sea level.

The site adjoins the Agriculture Station and is surrounded by a wooded area wherein several houses have been built. The environmental conditions at the site are very nice.

There are no public facilities near the site. The house closest to the site is more than 10 m away from the site boundary.

The 6.0 m wide asphalt paved road in front of the site connects with the island circular road.

The distance from the site to the airport and Kolonia harbor is 3.2 km.

The major means of transportation on the island is privately owned cars and 1-ton passenger trucks. There are several medium-sized buses on the island, but they are not for public transportation.

7) Construction Work Situations

All construction materials and equipment, except for sand, gravel, and concrete blocks, are imported, and as a consequence, construction costs become high.

As the number of rain days in a year exceeds 330 days, construction work takes long periods of time.

After ordering construction materials and equipment, it takes a long time for them to be imported.

Many young laborers who work for low wages are available on the island. The skilled workers are old and their numbers are few.

Thus, construction work requiring skilled workers takes a great deal of time to complete. Old people on the island can understand Japanese.

There are several large trucks, trailers, large truck cranes, and large bulldozers owned by local contractors. It would be rather difficult, however, to use this equipment for long-term construction work.

As there are no transportation companies on the island, special attention shall be paid to transporting construction materials and equipment for Project construction.

All medium- and large-scale construction projects are undertaken by foreign contractors.

Construction sand material is beach sand. It takes a long time to remove the salt from this sand, and there is no salt removing facility on the island. As the beach sand originates from coral, the sand remaining after removing the shells by sieving amounts to about 50%.

Gravel and cobblestones are made from basalt.

Telephone communications are possible with most villages.

When cargo boats cannot get to the island for about a month due to rough seas, most vegetables, grain, meat, etc. disappear from the markets. At these times, prices for such commodities almost equal the prices paid in Japan.

There is no malaria nor are there other parasitic diseases on Pohnpei. There is one small hospital on the island.

Fuel oil, gasoline and diesel oil are not as expensive as in Japan.

Governors of states have great influence in government affairs.

8) Site Conditions of Sub-breeding Stations

Station No.1 (in Nett.):

The site is 0.27 ha area of square-shaped land that slopes mildly from east to west. The elevation difference on the site is only 30 cm. The site faces farmland in the east, grassland in the south and west, and a housing area in the north. A 4 m wide by 20 m long access road connects the site to a 6 m wide paved public road.

The distance from the site to the Main Breeding Center is 2.9 km.

There are no buildings nor surface and underground obstructions on the site.

Topsoil at the site is 20 cm thick organic soil. Terrarosa lies beneath the topsoil. It is assumed that the ground has a long-term bearing strength of 5.0 tons/m². The ground water level is relatively high (about 6 m below ground level). The site is well reclaimed.

A water supply pipe runs beneath the 6 m wide public road. Drainage from the site flows into the public road's "U-shaped" gutter.

There is no city gas supply in the vicinity of the site. A telephone cable is installed parallel to the public road.

Electrical power is available from wiring installed along the public road. However, a new transformer shall be installed.

Station No.2 (in U):

The site is a 0.21 ha area of rectangular-shaped land that slopes mildly from west to east. The elevation difference on the site is about 90 cm. The site faces a wooded area in the north, a housing area in the east, and an elementary schoolground in the south and west. The site's access road from the 8 m wide unpaved public road is about 140 m long. The distance from the site to the Main Breeding Center is 12.8 km. There are no existing buildings on the site.

Soil at the site is terrarossa. It is assumed that the soil has a long-term bearing strength of 5.0 tons/m². Drainability from the site is normal. Electrical power supply lines, telephone cable, and water supply main are installed along or beneath the 8 m wide public road. The site is in an unreclaimed heavily wooded area.

Thus, site reclamation work will be required.

Station No.3 (in madolenihmw):

The site has an area of 0.28 ha. There are no power, gas, water supply lines, or telephone lines in the vicinity of the site.

The distance from the site to the Main Breeding Center is 32 km. The site faces an 8 m wide public road in the east, and farmland in the west, north, and south.

The elevation difference on the site is 1.7 m. There are no existing buildings or obstructions on the site.

Topsoil here is 20 cm thick organic soil. Beneath the topsoil is terrarossa. It is assumed that the ground has a long-term bearing strength of 5.0 tons/m². The site is relatively well reclaimed. Drainability from the site is normal.

Station No.4 (in Kittl):

The area of the site is 0.25 ha. There are no power or gas supply lines, no telephone lines, and no sewer main in the vicinity of the site. However, there is a water supply line. The distance from the site to the Main Breeding Center is 24 km. The existing access road from the island circular road to the site is 3 m wide and 500 m long. The site is surrounded by a wooded area that, as yet, is not reclaimed. The elevation difference on the site is 4 m, having a mild slope. The site is lower than the access road. There are no existing buildings on the site. The only existing obstructions on the site are nine large trees.

Soil conditions at the site indicate a 20 cm thick organic topsoil with terrarossa underneath. The assumed long-term bearing strength of the ground is 5.0 tons/m². Drainability from the site is comparatively good.

Station No.5 (in Sokehs):

The site has an area of 0.25 ha. There are power supply and telephone lines in the vicinity of the site, but there are no water supply, sewer pipes, or city gas supply lines. The site is 8 km away from the Main Breeding Center. It faces an 8 m wide public road in the west, and farmland in all other directions. The elevation difference on the site is 3.2 m, having a mild slope. There are no existing buildings or obstructions on the site.

Soil at the site is terrarossa; there is no topsoil. It is assumed that the ground has a bearing strength of 5.0 tons/m².

The site is relatively well reclaimed. The ground water level is assumed to be relatively high. Water intake is possible from a small stream that is 800 m away from the site. Infiltration draining from the site is virtually impossible.

CHAPTER 5 BASIC DESIGN

CHAPTER 5 BASIC DESIGN

5-1 Basic Design Policy

As the Main Breeding Center is slated to be the central organization for preserving and extending boar and sow resources in the Federated States of Micronesia, it was designed to have the appropriate facilities and functions for achieving its objectives.

The Center's facilities were designed to be independent, in so far as its operations and management are concerned, in order to properly carry out its mission on the island through a network of Sub-breeding Stations.

The design of Project buildings was made to suit the natural conditions in the Federated States of Micronesia and to be adaptable to the area's environment and existing scientific facilities.

The purpose of the Main Breeding Center is to safely preserve and extend boar and sow genetic resources. Its facilities, therefore, were designed so that its staff members would be able to operate, maintain, and manage them on their own. Furthermore, the Center's facilities were designed to function with minimum operation and maintenance costs.

As maintenance costs increase in proportion to time, the cost incurred for repairing or replacing facilities or equipment at the end of each of their serviceable years will steadily increase; this cost is unavoidable but necessary for continuing Project functions. Additionally, the consumption of electric power will represent the greatest percentage of the facilities' operation costs.

In view of the above, the Project facilities were designed by taking the following aspects into account:

- (1) The building design shall be made to create comfortable room conditions through the use of natural ventilation and lighting, and with the minimum use of electrical equipment.

Basically, the width of the rooms shall be narrow, but the area of each room shall be sufficiently large by having a high ceiling and a wide passageway.

- (2) The rooms requiring air conditioning shall be sufficiently insulated and damp-proofed in order to conserve electricity.
- (3) Buildings shall be types having long eaves for preventing the entry of direct rays from the strong tropical sun. The buildings will have corridors to isolate the rooms from humid air, and will have large openings to allow natural ventilation.
- (4) In order to keep the operation and maintenance costs low, buildings shall be made of durable local materials, using local construction methods as much as possible.
- (5) The types of equipment, machinery, and tools shall be kept to a minimum, and, if feasible, their parts should be interchangeable. The selection of equipment, machinery, and tools for Project use shall be made from the viewpoint of simple operation, repair, and maintenance -- durability is also of great importance.
- (6) Project facilities shall be designed with allowances made for future modification and expansion.

5-2 Facility Size

The size of the Main Breeding Center was determined based on the Center's staffing plan. The staffing plan prepared by the

Federated States of Micronesia in 1987 includes a total of 32 staff members (19 officers and 13 assistants): 4 officers and 3 assistants at the Main Breeding Center; 3 officers and 2 assistants at each of the five Sub-breeding Stations.

(1) Main Breeding Center

1) Testing and Examination Building for Artificial Insemination(72m²)

Table 5-1

Name of Room	Referenced Design Criteria	Area (m ²)
1. Reception Room Office	For the Management of the Main Center	36
2. Laboratory		36

2) Mini Feed Processing Plant (128m²)

Table 5-2

Name of Room	Referenced Design Criteria	Area (m ²)
1. Feed Processing Room	Spaces for preparation, testing, mixing machinery, and working	64
2. Natural Drying Room	Spaces necessary to dry 3 to 6 different domestic feeds	64

3) Pig House (660m²)

Table 5-3

Name of Room	Referenced Design Criteria	Area (m ²)
1. Pens for Boars and Sows	15 boars and 25 sows, total 40 pigs	360
2. Farrowing Pen		300
3. Grower Pen		

4) Mini Slaughterhouse (72m²)

Table 5-4

Name of Room	Referenced Design Criteria	Area (m ²)
1. Slaughtering Room Meat Preparation	Capable of 40 heads slaughtering and meat preparation per day	72

5) Water Supply and Chlorination

Table 5-5

Name of Room	Referenced Design Criteria	Capacity/Area
1. Water Receiving Pond	Pig breeding use: 40x100 litres=4m ³ Slaughterhouse use: 5m ³ Management building and feed processing use 2m ³ Allowance: 2m ³	13 m ³
2. Water Storage Tank	Steel frame structure, 10m high	2 m ³
3. Chlorination Basin	4.0m (W) x 6.0m (L)	24 m ²

6) Other Facilities

Table 5-6

Name of Room	Referenced Design Criteria	Capacity/Area
1. Waste Treatment Tank	For 165 pigs. Primary and secondary treatment tanks: 8m ³ x 2 =16 m ³	16 m ³
2. Incinerator	3.6 m ² incinerator with roof Space: 3.5m x 5.0m = 17.5m ²	17.5 m ²
3. Compost Storage	5.0m x 5.0m = 25m ² , with roof	25m ²

(2) Sub-breeding Stations (Total 5 stations)

1) Pig House (210.2m²)

Table 5-7

Name of Room	Referenced Design Criteria	Area (m ²)
1. Pens for Boars	2 boars	
2. Farrowing Pens	For 50 piglets	210.2m ²
3. Pens for Sows	10 sows	

2) Other Facilities

Table 5-8

Name of Room	Referenced Design Criteria	Capacity
1. Waste Treatment Tank	One settling tank for 65 pigs (8m ³), and one infiltration tank (4m ³)	12 m ³
2. Elevated Water Tank	H = 5m, Capacity of Tank 2 tons	17 m ³
3. Water Storage Tank	Capacity of Tank 5 tons	
4. Water Supply Well	Madolenihmw, Sokehs	2 places

5-3 Facilities' Basic Plan

As described in the previous section, various facilities are to be built on the Project sites. Judging from the configuration of the sites, the buildings and facilities shall be built at locations where it is convenient to make contact with the Agriculture Station's staff members.

5-3-1 Arrangement Plan of Main Breeding Center

(1) Facilities' Arrangement Plan

- 1) The testing and examination building for artificial insemination, slaughterhouse, and feed processing house are to be built at the center of the site, and two Pig House are to be built at the west side of the site.
- 2) The incinerator, water supply tank, waste treatment tank, and Pig House are to be fenced in.
- 3) Based on the above arrangement principles, the Center's facilities arrangement was studied. As a result, Pig House were arranged 45° (in a northwesterly direction) to the frontal road in order to take in natural draft from the northeast direction as well as to match the area elevation contour lines. All buildings were designed as flat type to correspond to the existing buildings of the Agriculture Station. As there is sufficient area at the site, all buildings were arranged to have ample space between them.

Building heights were designed to correspond to the surrounding natural and environmental conditions.

(2) Yard Plan

In order to prevent rainwater from overflowing into the buildings, an important aspect of the yard plan will be the installation of drain gutters around the buildings. The drain gutters shall be designed to collect the site's rain water.

The site's water supply system shall be designed to provide a sufficient supply of water at any given time.

(1) Plane Plan

1) Main Breeding Center

The functions of the sperm testing room for artificial insemination and the management room shall be clearly separated. Shelves for medicine, tools and instruments shall be installed in the sperm testing room. A toilet facility shall be installed for the combined use of office personnel and conference attendees.

The Mini Slaughterhouse, Mini Feed Processing Plant, and Pig House shall be so arranged as to make moving from one house to the other an easy operation.

Other major facilities, such as the electric power receiving facility and transformer, the pump unit, the water storage tank, and the waste treatment tank, shall be installed at proper locations.

2) Sub-breeding Stations (5 stations)

Pig House buildings will each have an office room, service rooms, a toilet facility, and a generator room.

A pump unit, water storage tank, and waste treatment tank are to be installed at each station.

(2) Three-dimensional Plan

The three-dimensional plans of buildings, as well as the facilities' formative plans, shall be made so as to be compatible with the traditional style by designing flat type buildings that have long eaves for preventing the entry of strong sun rays and rain. Building walls shall be designed to have large windows to allow for natural ventilation.

(3) Sectional Plan

Roofs shall be designed to have slopes of more than 30% so that rainwater will drain quickly. Insulation material is to be installed beneath the roofs and inside walls as protection against the sun's strong heat.

Openings shall be allowed for under the roofs for ventilating the air between the roofs and ceilings.

To permit natural ventilation without the use of airconditioning, buildings shall be designed having eaves high enough to create rooms with high ceilings.

The Mini Slaughterhouse, Mini Feed Processing Plant, sperm testing house, and Pig House will have minimum eave heights of 4.7m, 4.1 m, 3.5 m, and 2.5 m above ground level respectively.

The installation of electrical wiring and outlets, and water supply and drainage pipes in the laboratory and test room shall allow for easy maintenance and repair as well as for possible future modification.

(4) Building Material Plan

Construction materials to be used for Project construction shall be compatible with the natural conditions of the area and the functions of Project facilities. The materials shall be durable, making the facilities easy to operate. Locally available materials shall be used as much as possible.

5-3-3 Structure Plans

Regarding the structure plans for Project buildings, a decision was made to adopt the use of reinforced concrete-block structures. Reinforced concrete blocks are commonly used in the construction of flat buildings on the island: they are in-expensive. Locally used design loads were applied for analyzing building structures that are based on Japanese Design Standards.

(1) Ground Conditions

Test-pit digging revealed that the ground at building construction sites is composed of clayey terrarossa.

The N values of the grounds at depths shallower than 1m were in the range of 2 to 4.

The direct foundation type, which is widely used around the Project sites, would be sufficient for the Project's buildings. The ground bearing strength, at a depth of about 1m from the surface, was assumed to be 5 tons/m².

(2) Structure Design

Project buildings are to have reinforced concrete-block structures with concrete-block walls. Steel simple beam structure types are to be used for roof structures. As there are no design standards in Micronesia, Japanese Building Design Standards and British Standards (BS) were adopted. A wind load of 35 m/sec (wind load in monsoon area in BS) was used for the building design. Seismic forces were not taken into consideration as no earthquakes have ever been recorded on the island.

Table 5-9 Live Load on the Major Building Floors

Name of Room	Live Load (kg/m ²)
Office	225
Laboratory	306
Storage	510
Hallway	306

Source: British Standard, 6399 Part 1, 1984.

(3) Interior Finish Materials:

Table 5-10 Mini Feed Processing Plant

Name of Room	Floor	Wall	Ceiling
Drying room	Cement-mortar steel trowel finish	Cement-mortar steel trowel finish	Polycarbonate boards
Mixing room	Cement-mortar steel trowel finish	Cement-mortar steel trowel finish	Polycarbonate insulation panels

Table 5-11 Mini Slaughterhouse

Name of Room	Floor	Wall	Ceiling
Slaughtering room	Clinker tile	Semi-ceramics tile	Asbestos insulation panels
Testing room	Terrazzo tile	Upper parts: Cement-mortar Dadoes: Vinyl paint	Asbestos insulation panels
Equipment and tool room	cement-mortar steel trowel finish	Cement-mortar steel trowel finish	Asbestos insulation panels
Lavatory	Ceramic tile	Cement-mortar steel trowel finish	Asbestos insulation panels

(4) Construction Materials

Locally available construction materials shall be utilized as much as possible. The design strength of concrete shall be 180 kgs/cm².

Cement: Ordinary Portland cement

Coarse aggregate: Local crushed stone

Fine aggregate: Local beach sand

Reinforcing bars: Japanese made deformed bar SD30, SD35
(JIS G3112)

Steel materials: Japanese made H-beams, light-weight steel bars, SS41 (JIS G 3101), SS11 (JIS G 3350)

5-3-4 Facilities and Equipment Plan

The facilities and equipment plan was made to suit the objectives of the Project by taking into account the following aspects: Low operation and maintenance costs, easy operation and management, energy saving economical types, reliability, and compatibility.

- (1) Dehumidifying equipment is required to maintain room humidity at certain levels in order to allow the normal operation of various equipment and tools.

There are two different types of dehumidifying equipment: one removes room moisture by physical means, and the other by chemical means. By taking into account the water quality management of the artificial insemination test room, after installing air-conditioning units, a decision was made to install dehumidifying equipment using the physical means.

- (2) Rooms to be provided with air-conditioning systems.

Table 5-12 Air-conditioned Rooms

Name of Room	Design Temperature	Design Humidity	Air-conditioning Method
Meat Storage	5°C	To a degree not to form fog	Refrigeration unit
Artificial Insemination Test Room	25 to 27°C	40-50%	Separate type room cooler

- (3) Water Supply Facility (Main Breeding Center)

The water necessary for use at the Main Breeding Center is to be taken from the water supply main that runs underneath the frontal road. The water will first be fed into a receiving tank, and then pumped up into an elevated storage tank.

The water in the tank is to be distributed separately for office use and facility use.

The following assumed figures were used for calculating the necessary amount of water to be supplied:

Center's staff members:	4
Visitors:	10
Pigs:	40
Pig slaughtering:	5/week

. Office use (without disinfecting):

4 persons x 120 liters/person/day = 480 liters/day
10 persons x 120 liters/person/day = 1,200 liters/day

. Facility use (without disinfecting):

Pigpens:

40 pigs x 100 liters/pig/day = 4,000 liters/day

Slaughtering:

5 pigs x 1,000 liters/pig/week = 5,000 liters/week

The receiving tank capacity is to be 10.68 m³; a one day supply. The tank shall be separated into two sections for cleaning and maintenance purposes.

The amount of water for office use was calculated taking into account Micronesian water use situations and based on the Japanese Air-conditioning and Sanitary Engineering Manuals (office use amount: 100 to 120 liters/person/day, laboratory use: 100 to 200 liters/person/day).

(4) Hot Water Supply Facility

Independent supply type electrical hot water heaters are to be installed in the kitchenette and artificial insemination test room.

(5) Sanitation Equipment and Tools

It is planned to install the necessary sanitation equipment and tools at each Project facility.

(6) Sewage Facility

It is planned to use four types of drains at the Project facilities: (1) Ordinary sewer drains, (2) drains from the slaughterhouse and test room, (3) drains from pigpens, and (4) rainwater drains. Drainage from sewers, the slaughterhouse and test room, and pigpens is to be treated in a sewer treatment tank and a neutralizing tank. The treated water will be disposed of by natural evaporation and infiltration within the Project facility sites. Rainwater will be discharged directly into the existing gutters of adjacent roads.

(7) Fire Extinguishing Equipment

Plans call for installing small portable fire extinguishers at each Project facility.

(8) Electrical Facility Plan

The electrical facility plan was made with a view to providing facilities that are energy saving, safe, reliable, and easy to operate and maintain. It is particularly important to supply a reliable electrical source for operating pigpen water supply pumps. Therefore, special attention was paid in the planning of emergency generator and transformer units.

1) Transformer Units:

Transformer units shall be installed at the Main Breeding Center and all Sub-breeding Stations.

2) Emergency Power Supply Facility:

Emergency power supply facilities shall be installed at the Madolenihmw and Kitti Sub-breeding Stations.

3) Main Power Lines:

The electrical power source is to be fed through transformer units to distribution panels located in power rooms at each Project facility. Power will be distributed to each building's lighting fixture distribution box and equipment control panels. The voltage at the facilities are as follows:

- (a) Major equipment: 3 phase, 240 V
- (b) Lighting fixtures: Single phase, 120 V

4) Lighting Fixtures:

Fluorescent lamps are to be installed to minimize electricity consumption. Taking into account energy savings, the lighting fixtures are to be installed by dividing lighted areas into small zones. Hallway switches are to be installed as to be able to control every other lamp.

Illumination standards are as follows:

- (a) Office and test rooms: 300 to 350 Lucas
- (b) Hallways, lavatory, and storage: 50 to 100 Lucas

5) Electrical Outlets:

Properly rated electrical outlets are to be installed in offices and test rooms where various types of electrical appliances and tools are to be used.

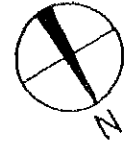
6) Heavy Duty Electrical Equipment:

Heavy duty electrical equipment power control panels are to be installed at each Project facility.

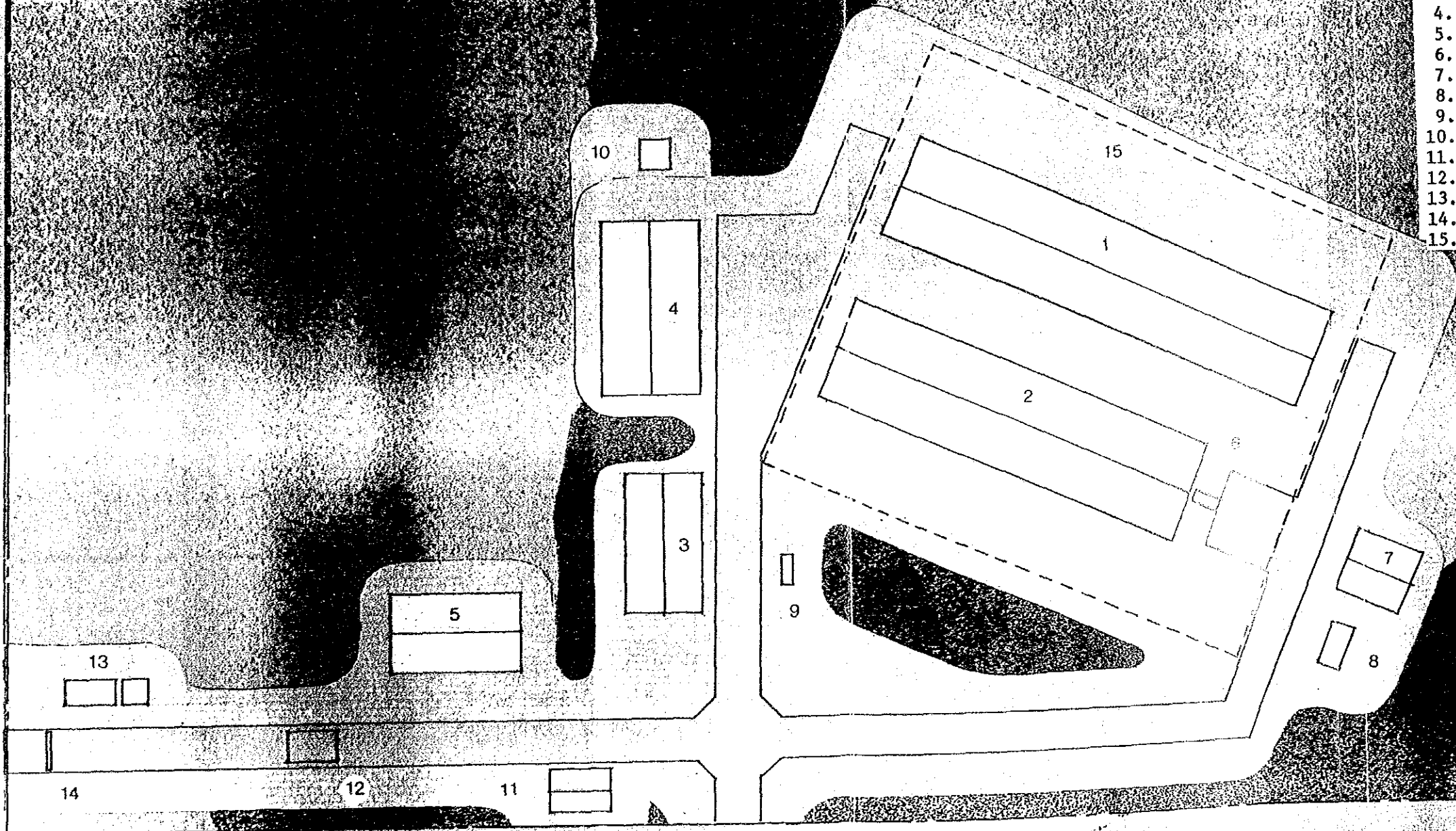
5-3-5 Basic Design Drawings

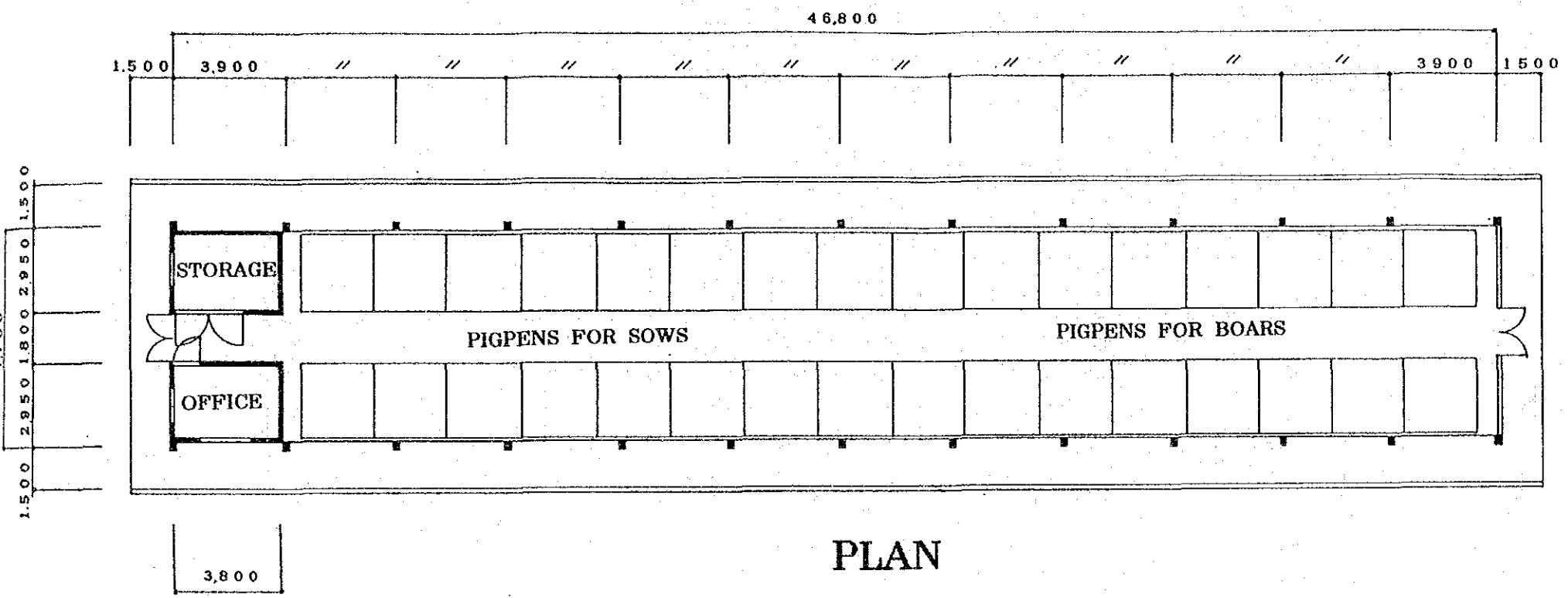
1. Main Breeding Center Building Arrangement Plan, Scale: 1/500
2. Main Breeding Center Pigpen (Boars and Sows) Details, Scales: 1/200 and 1/100
3. Main Breeding Center Pigpen (Farrowing, Weaning, Growing, and Testing) Details, Scales: 1/200 and 1/100
4. Main Breeding Center Feed Processing House Details, Scale: 1/100
5. Main Breeding Center Slaughterhouse Details, Scale: 1/100
6. Main Breeding Center Artificial Insemination Test Room Details, Scale: 1/100
7. Sub-breeding Station Pigpen Details, Scale: 1/200 and 1/100
8. Nett Sub-breeding Station Arrangement Plan, Scale: 1/500
9. U Sub-breeding Station Arrangement Plan, Scale: 1/500
10. Madolenihmw Sub-breeding Station Arrangement Plan, Scale: 1/500
11. Kitti Sub-breeding Station Arrangement Plan, Scale: 1/500
12. Sokehs Sub-breeding Station Arrangement Plan, Scale: 1/500

MAIN BREEDING CENTER

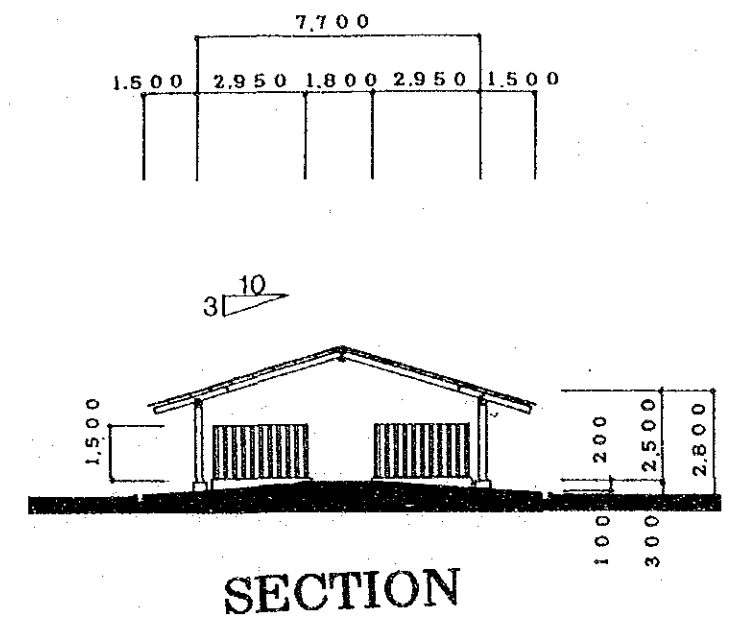


- 1. Breeding House
- 2. Farrowing, Weaner, Grower, and Fattener House
- 3. Testing and Examination Building for Artificial Insemination
- 4. Mini Feed Processing Plant
- 5. Mini Slaughterhouse
- 6. Chute
- 7. Compost Storage
- 8. Waste Treatment Tank
- 9. Flagpole
- 10. Water Storage Tank
- 11. Incinerator
- 12. Chlorination Basin
- 13. Water Receiving Pond
- 14. Gate
- 15. Isolation Fence

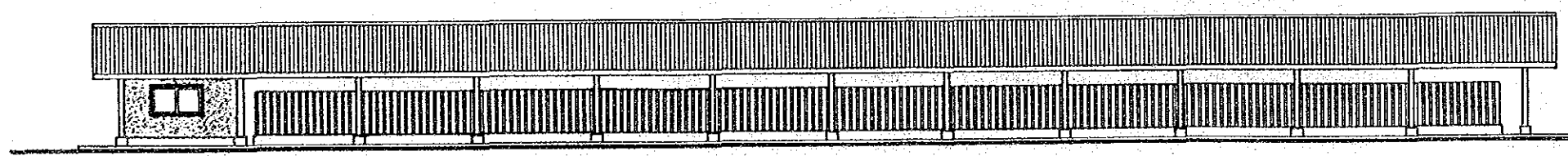




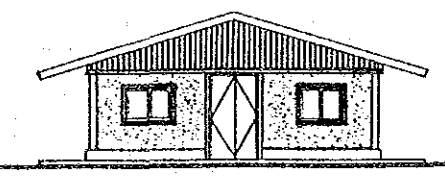
PLAN



SECTION

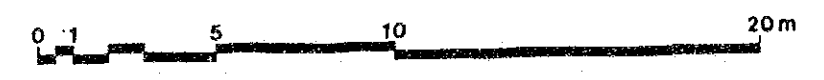


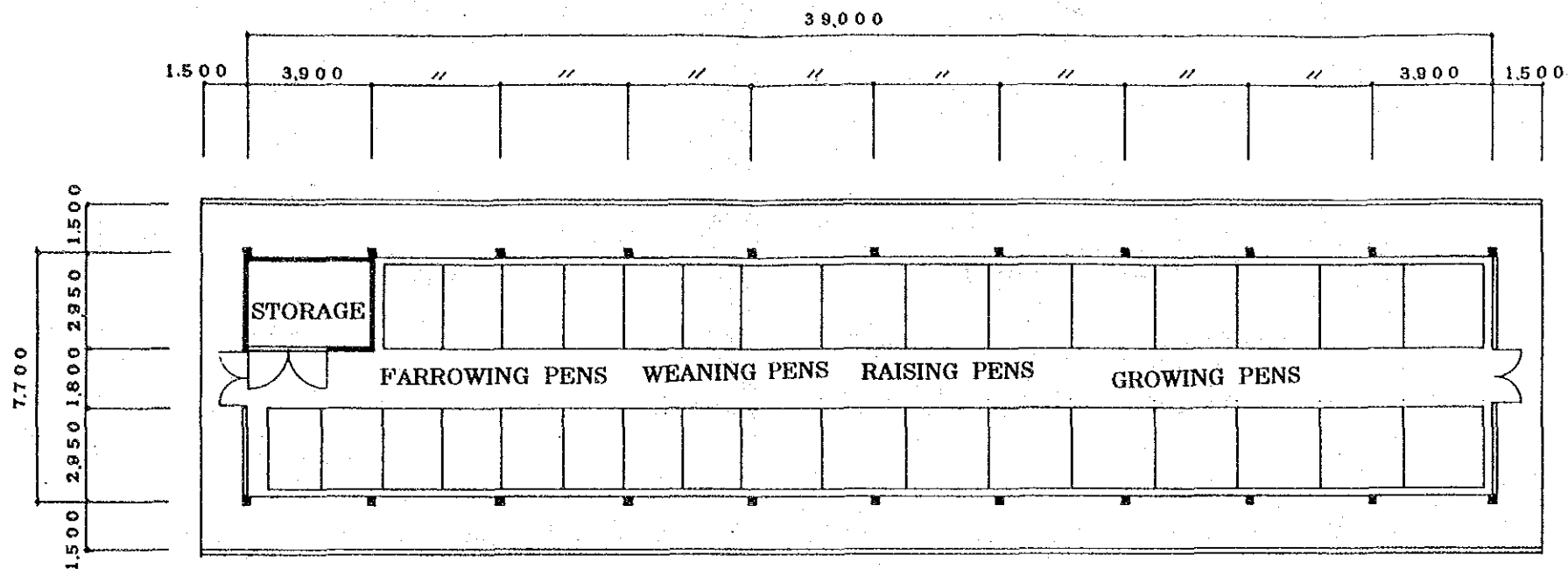
ELEVATION A



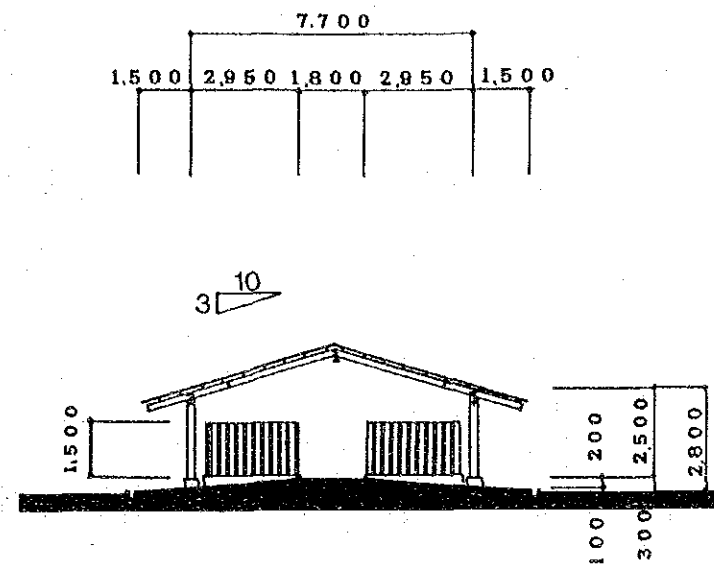
ELEVATION B

MAIN BREEDING CENTER
Breeding House

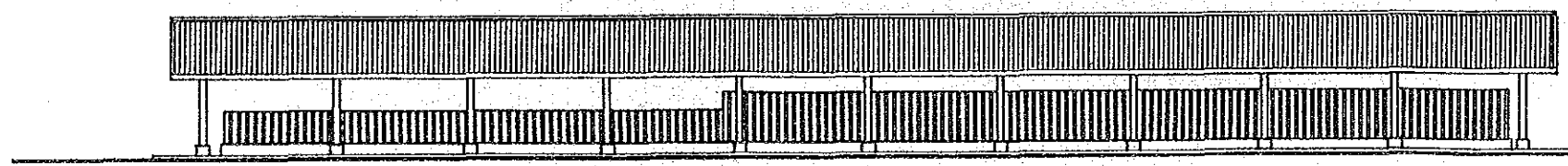




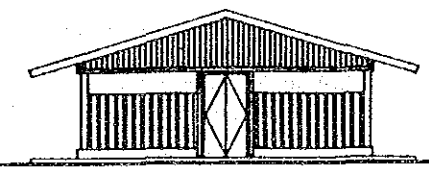
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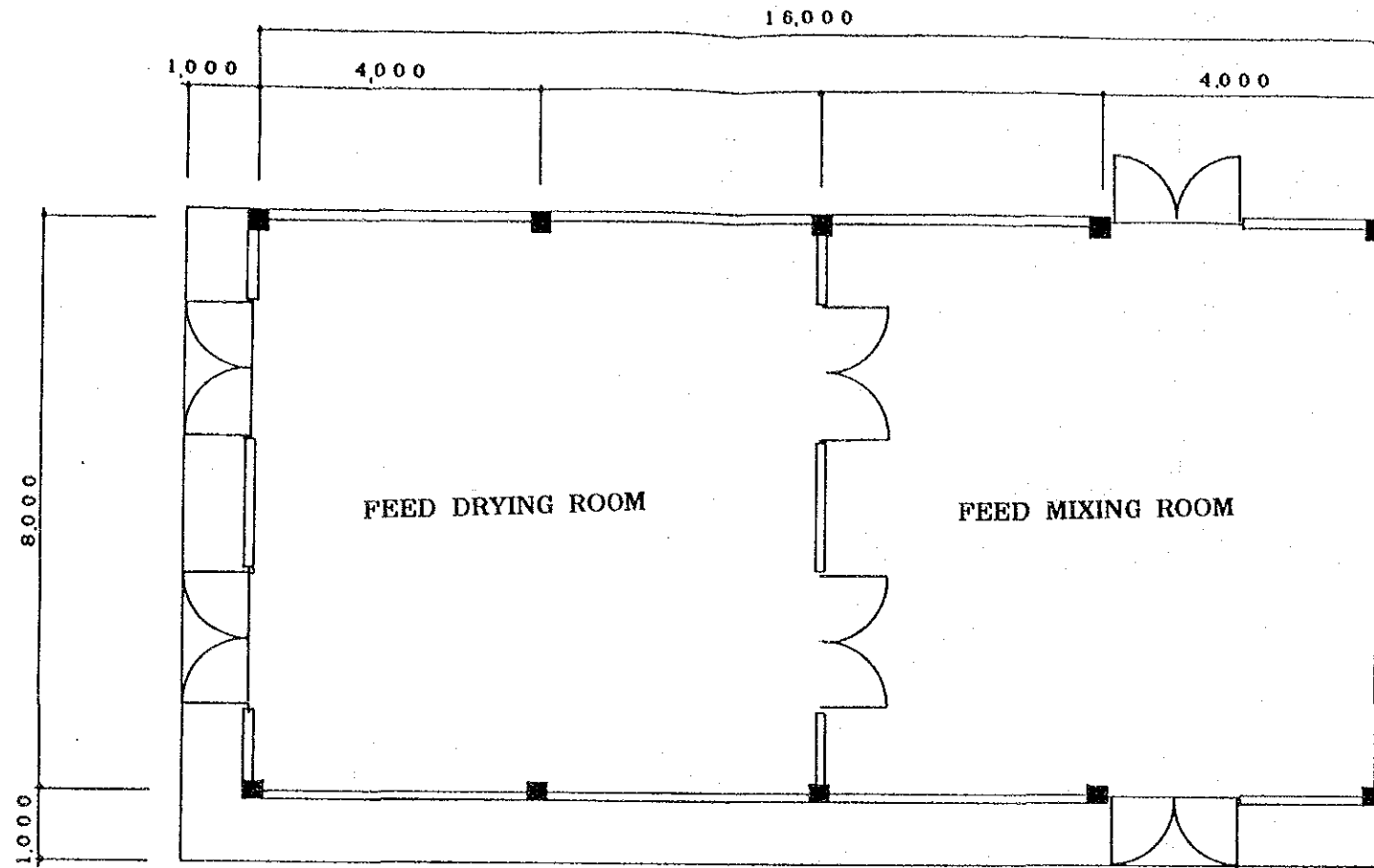
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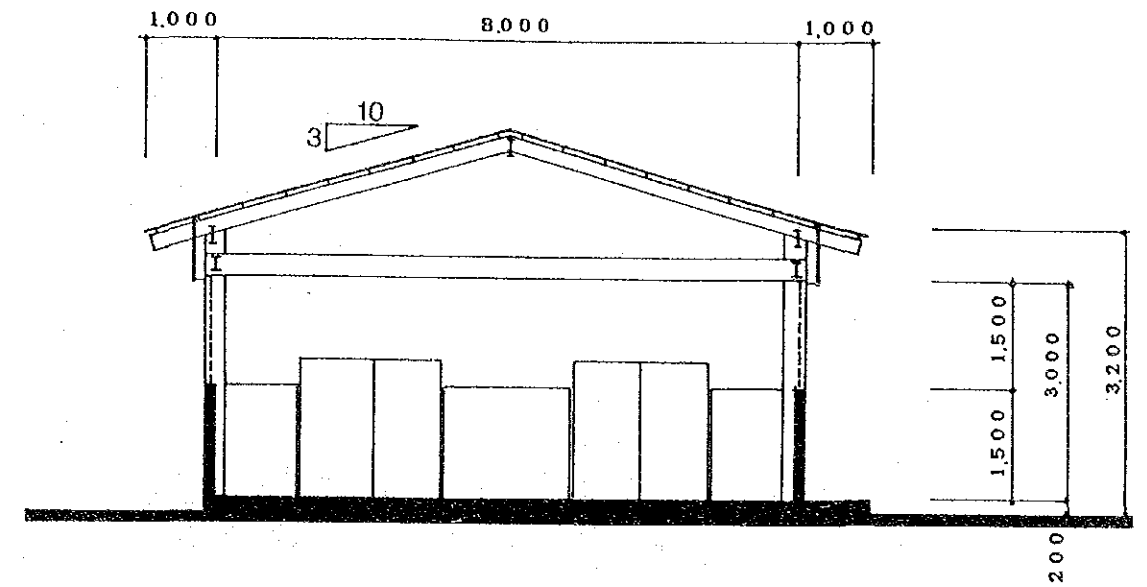
ELEVATION B

MAIN BREEDING CENTER
 Farrowing, Weaner, Grower,
 and Fattener House

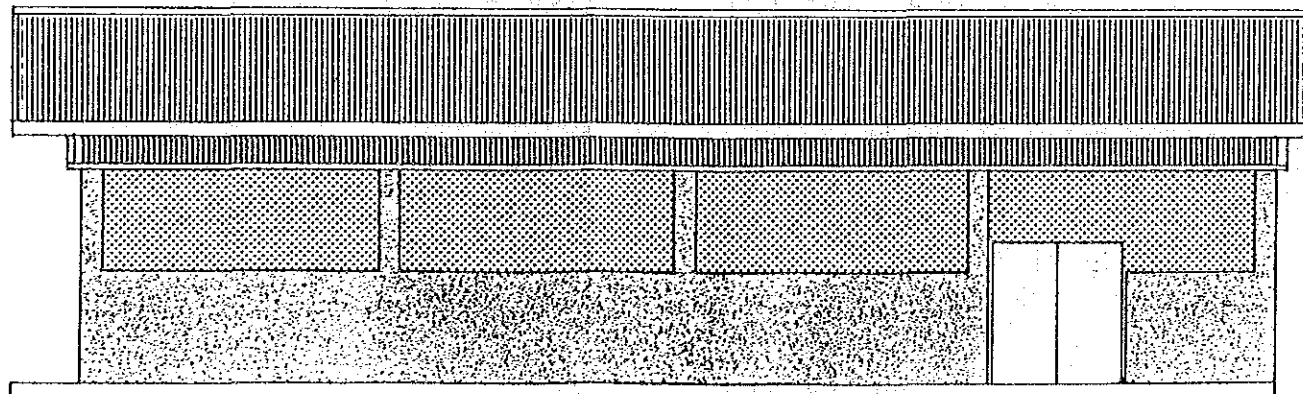




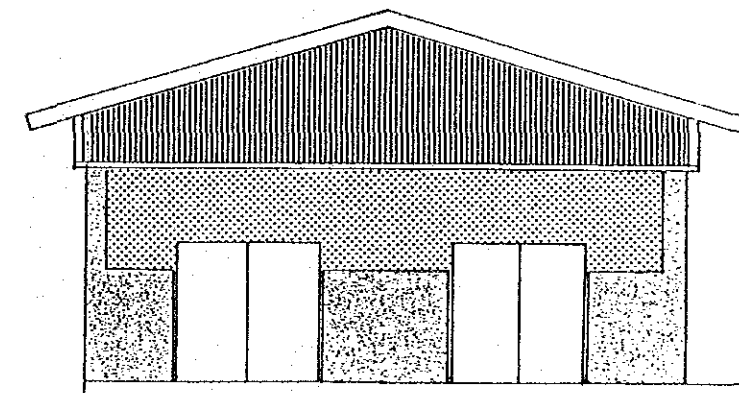
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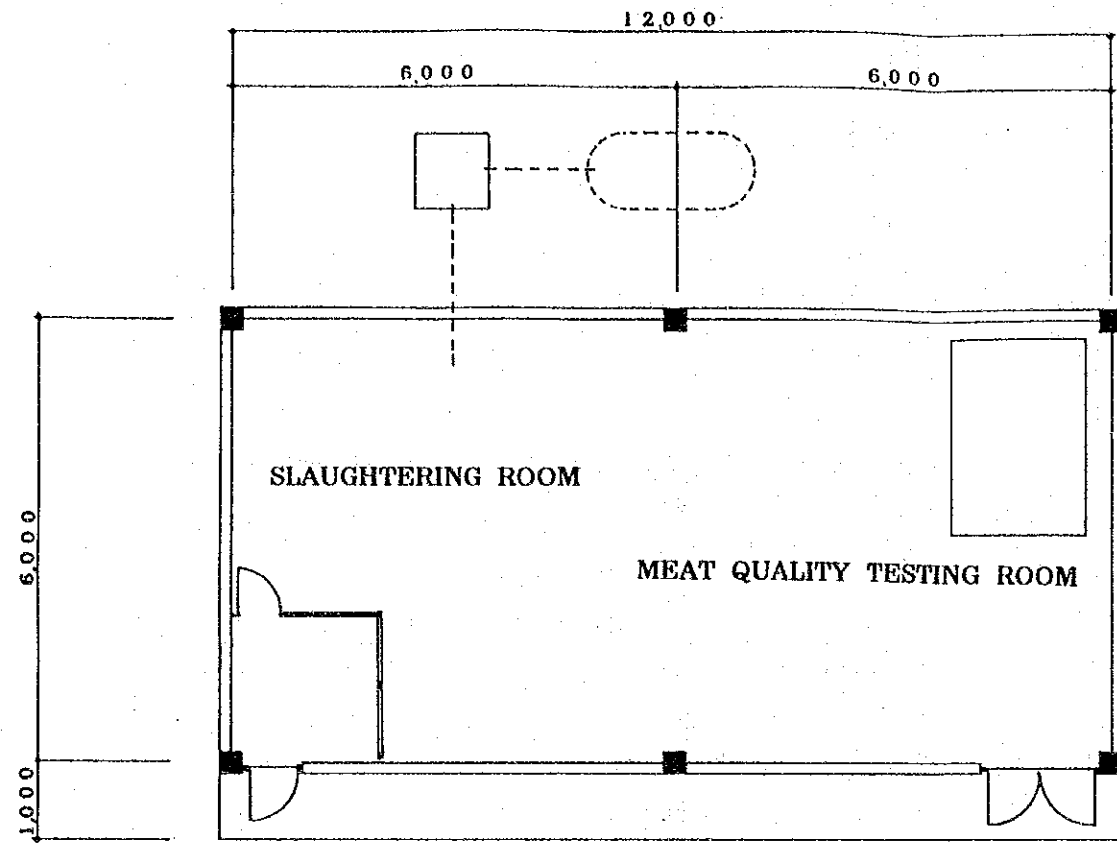


ELEVATION A

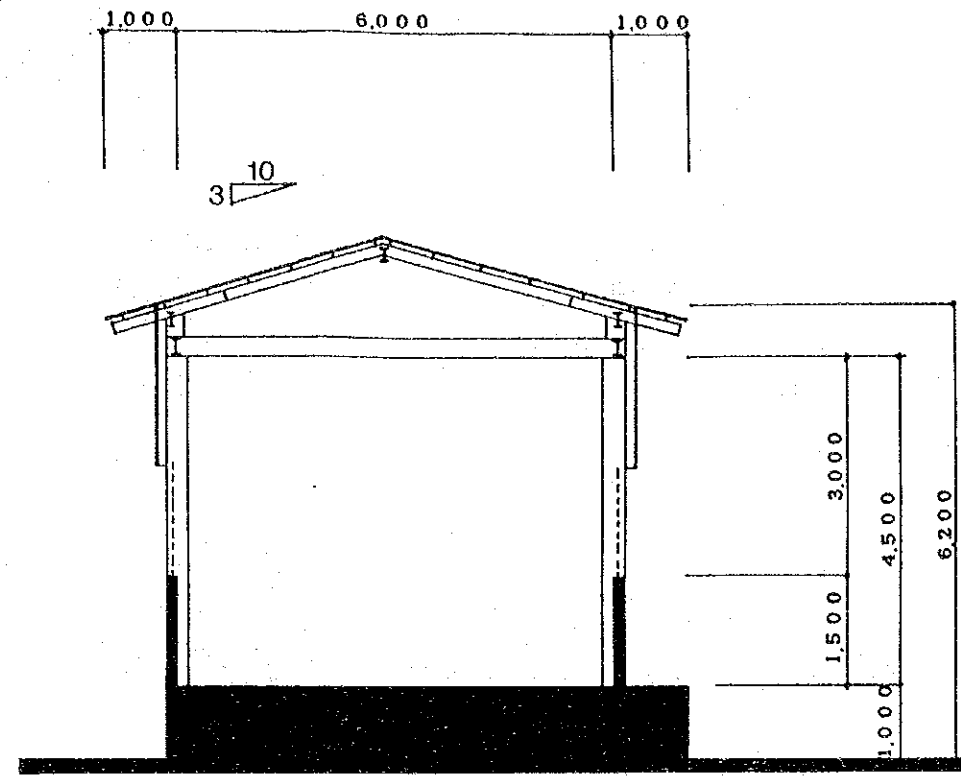


ELEVATION B
 MAIN BREEDING CENTER
 Mini Feed Processing Plant

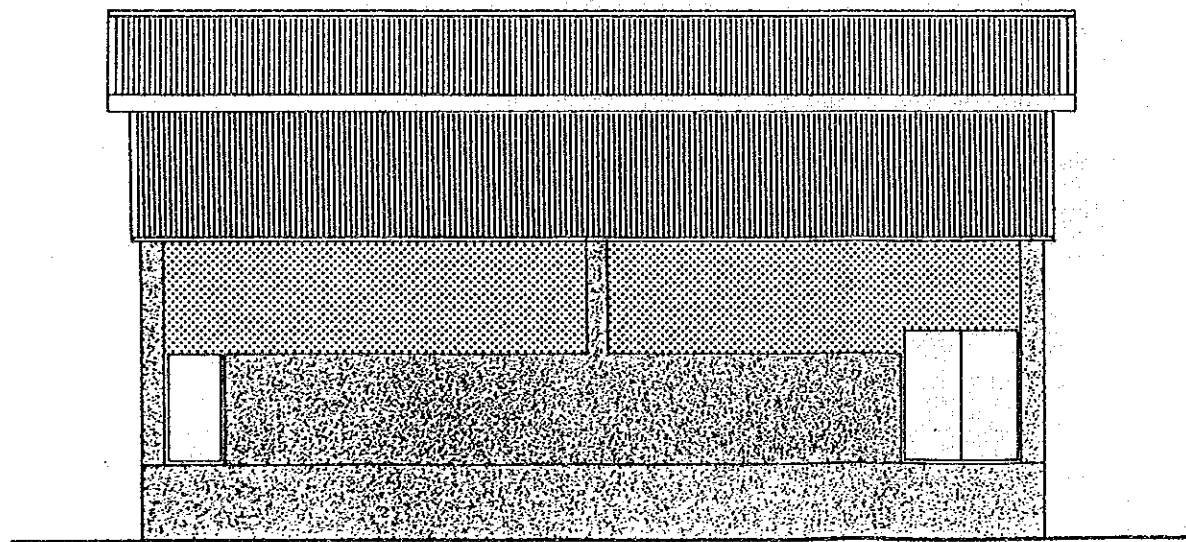




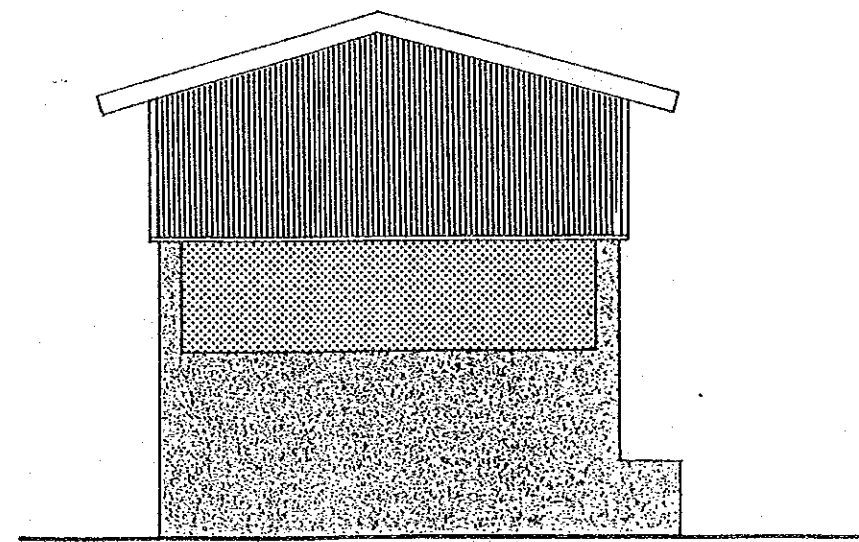
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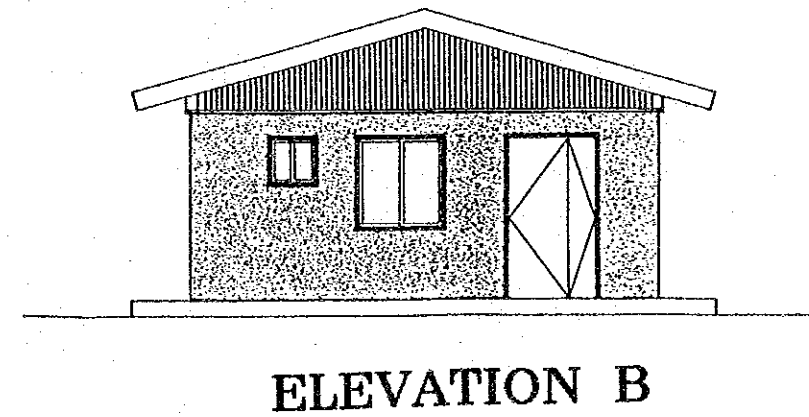
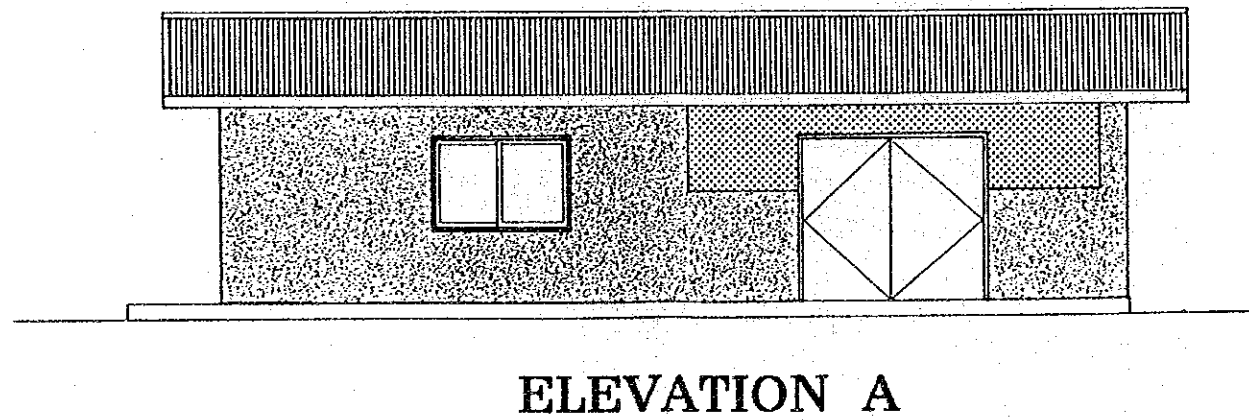
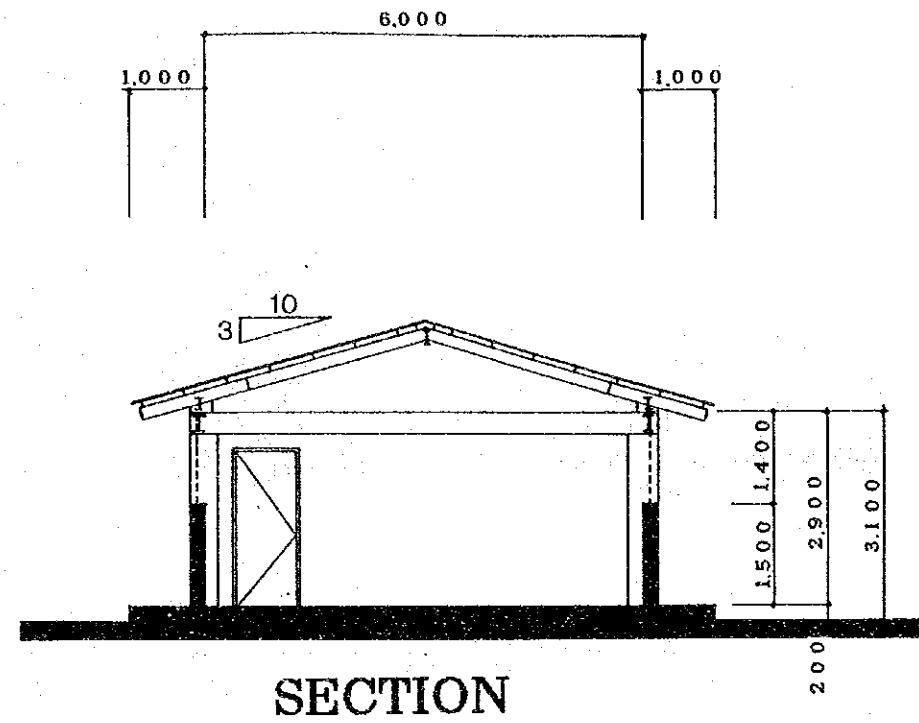
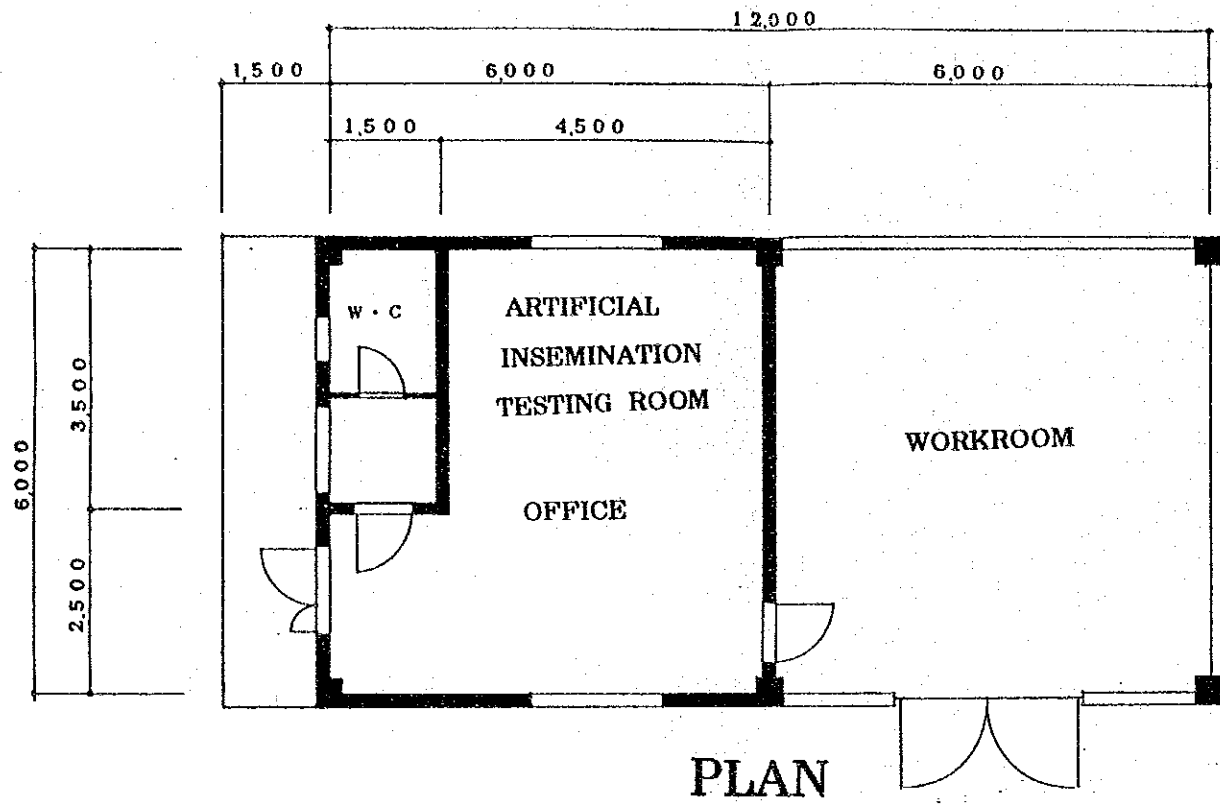
ELEVATION A



ELEVATION B

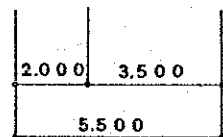
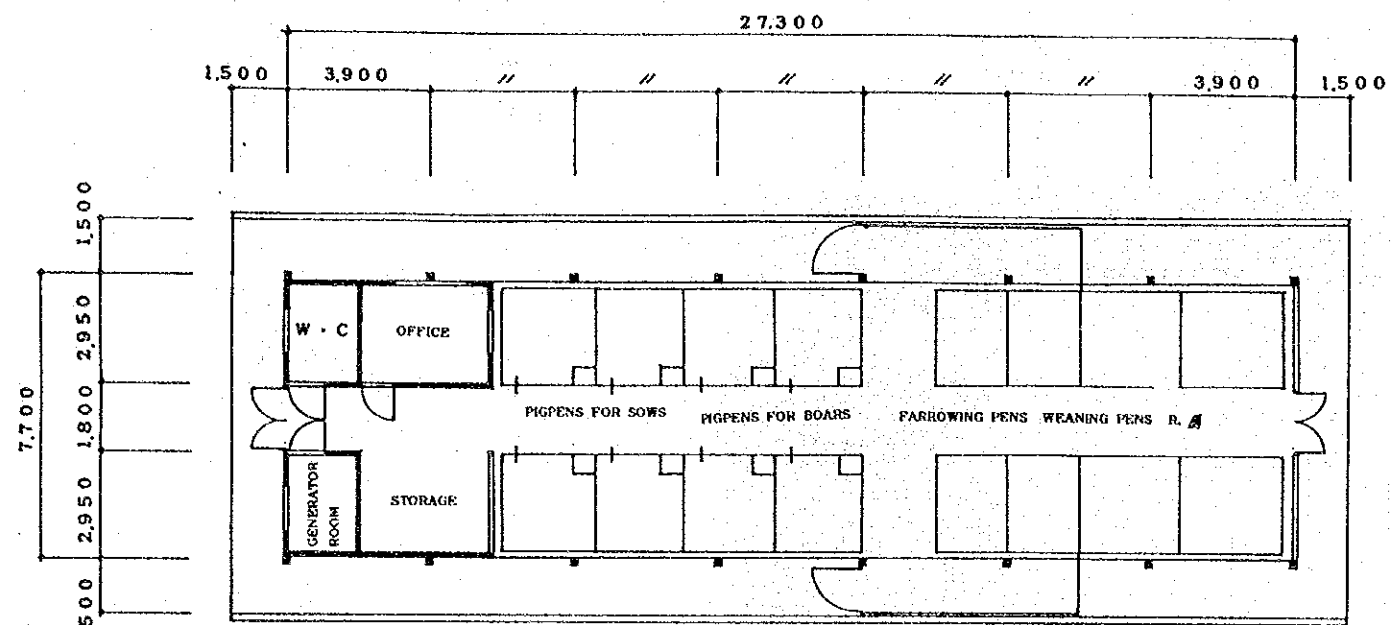
MAIN BREEDING CENTER
Mini Slaughterhouse



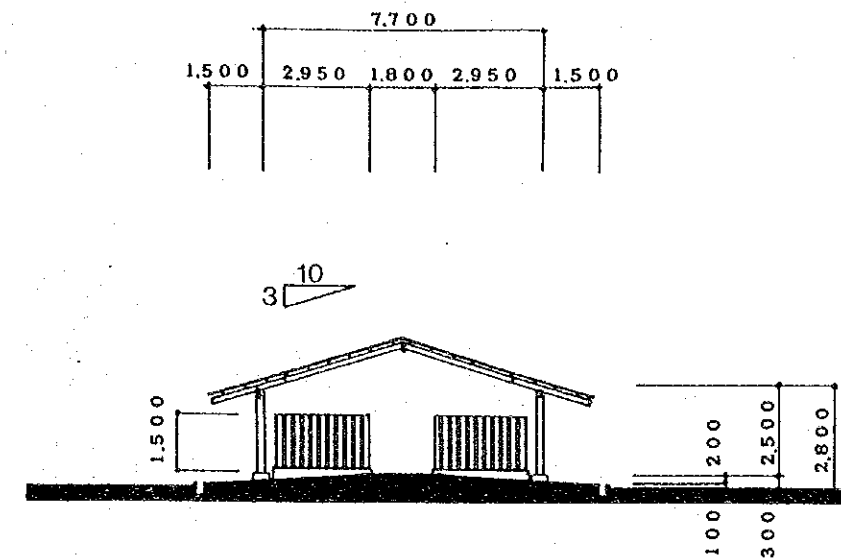


MAIN BREEDING CENTER
Testing and Examination Building
for Artificial Insemination

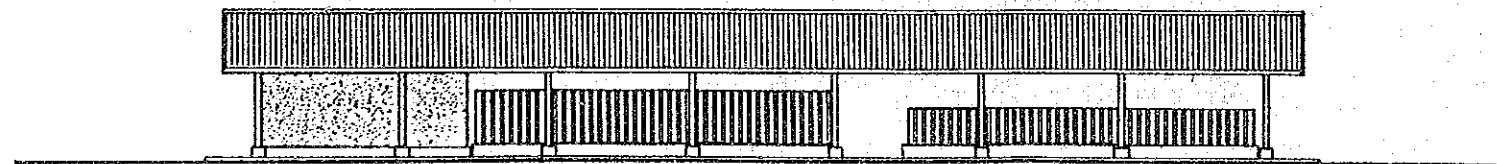




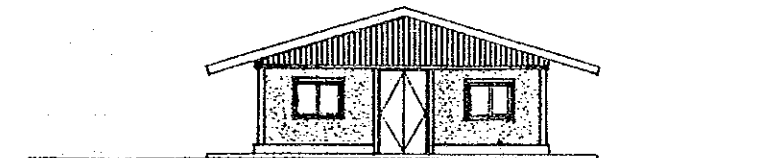
PLAN



SECTION



ELEVATION A

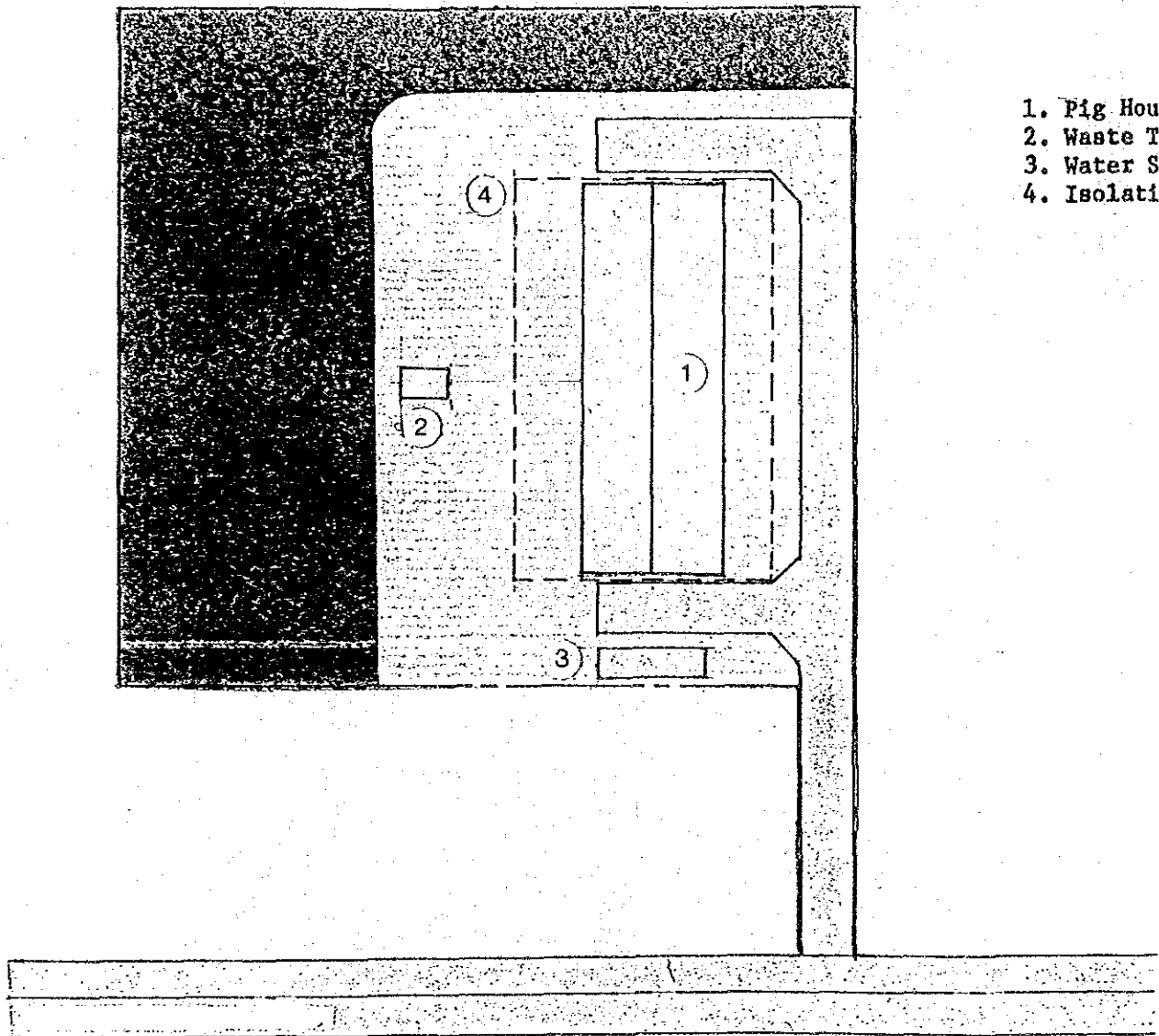
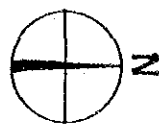


ELEVATION B

SUB-BREEDING STATION
Pig House



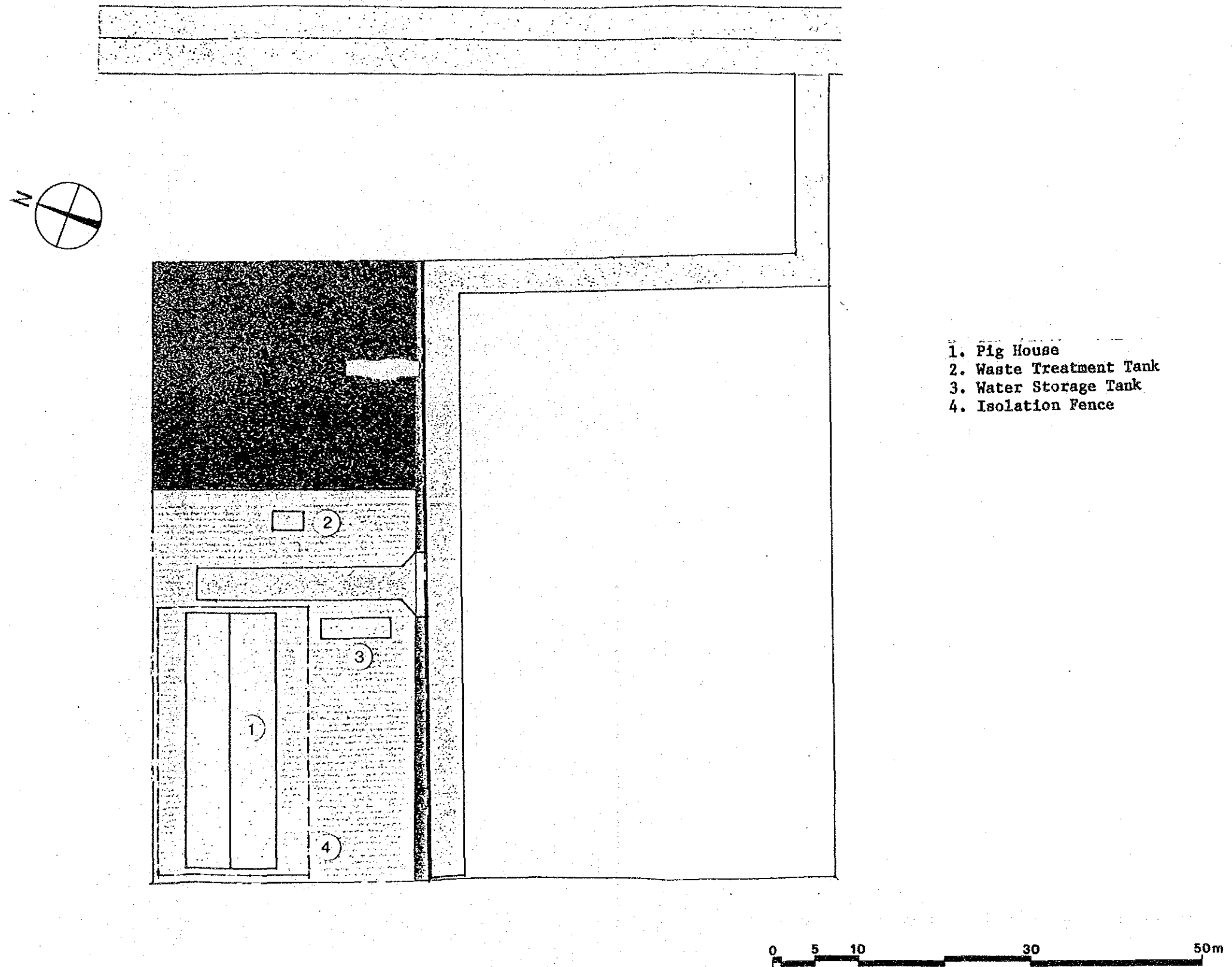
SUB-BREEDING STATION (NETT)



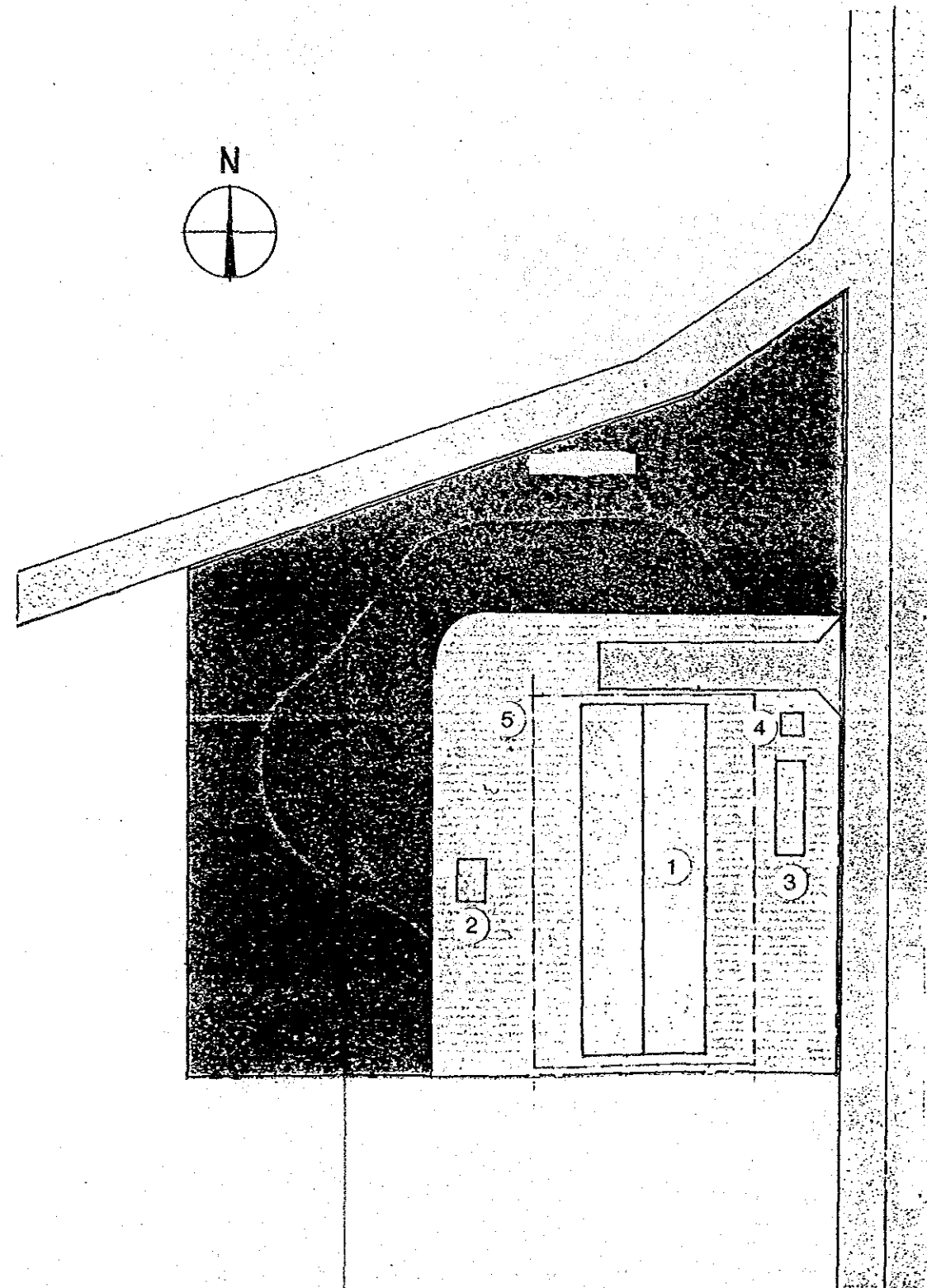
- 1. Pig House
- 2. Waste Treatment Tank
- 3. Water Storage Tank
- 4. Isolation Fence



SUB-BREEDING STATION (U)



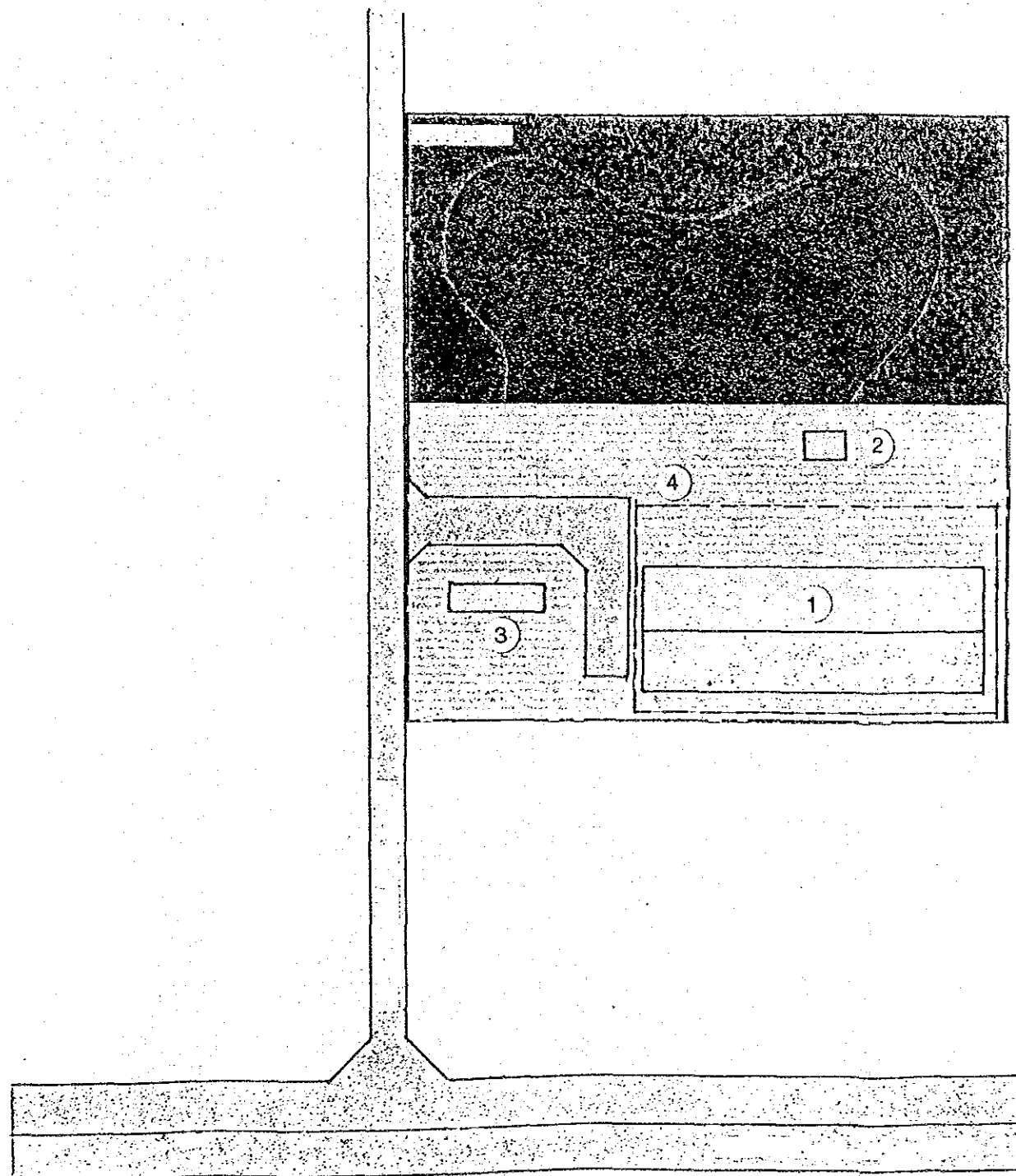
SUB-BREEDING STATION (MADOLENIHMW)



- 1. Pig House
- 2. Waste Treatment Tank
- 3. Water Storage Tank
- 4. Isolation Fence



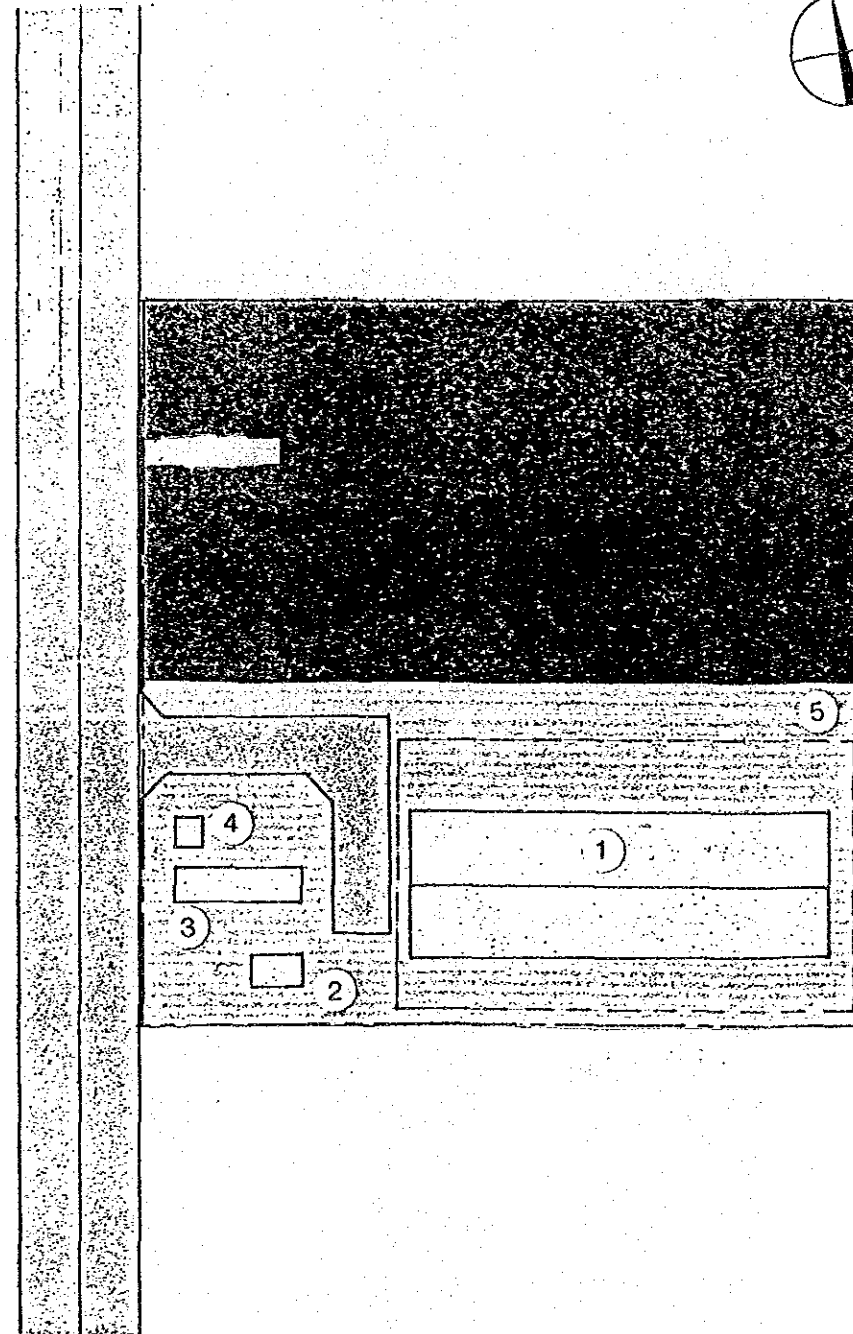
SUB-BREEDING STATION (KITTI)



- 1. Pig House
- 2. Waste Treatment Tank
- 3. Water Storage Tank
- 4. Isolation Fence



SUB-BREEDING STATION (SOKEHS)



- 1. Pig House
- 2. Waste Treatment Tank
- 3. Water Storage Tank
- 4. Isolation Fence



5-4 Tools and Instrument Plan

The selection of tools and instruments to be provided for Project use was made after carefully examining their purposes and functions, and as a result of a series of discussions with the Micronesian Government officials concerned, which were based on the following general principles:

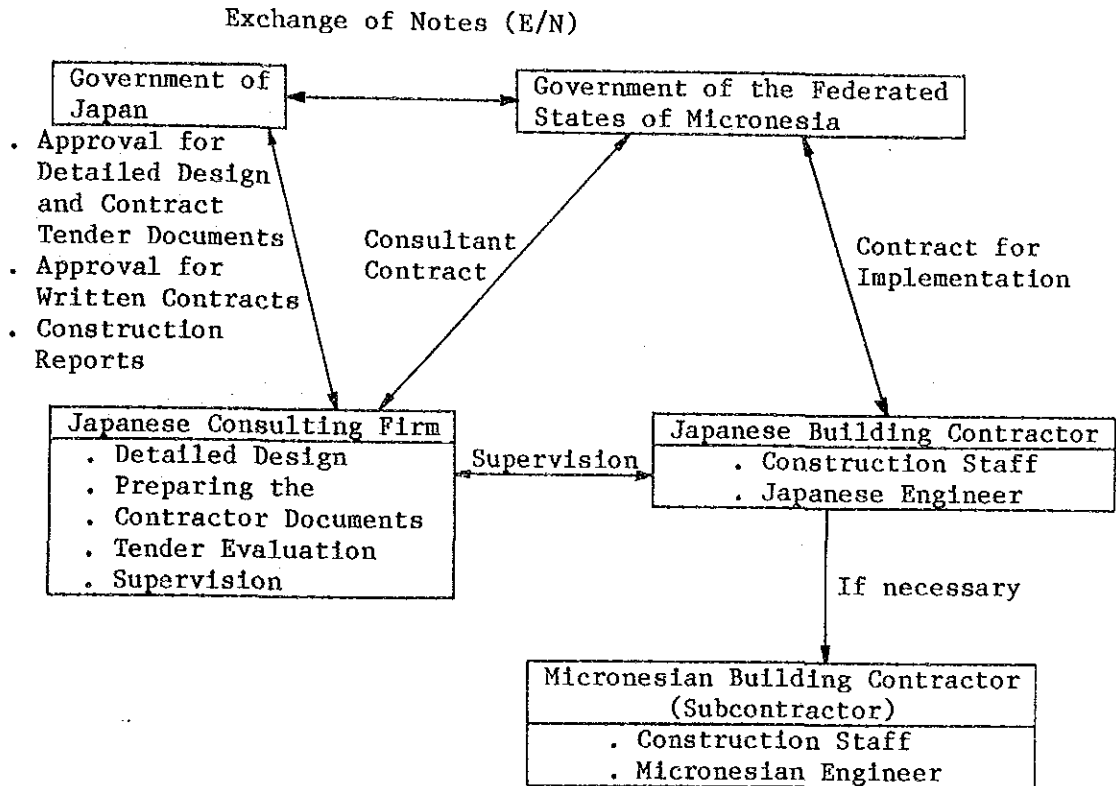
- (1) As plans call for the Main Breeding Center and Sub-breeding Stations to be basic facilities for boar and sow reproduction, the tools and instruments selected shall be types that can fulfill the objectives of said Center and Stations.
- (2) Tools and instruments shall be applicable not only for boar and sow reproduction purposes, but also for use in researching breeding diseases.
- (3) Tool and instrument types shall be energy saving and have simple functions in order to keep operation and maintenance costs as low as possible.
- (4) Tools and instruments shall be simple to use and easy to operate, taking into consideration the technical level in Pohnpei State.
- (5) Spare parts for some equipment shall be prepared in advance in consideration of the time difficulty involved in providing the materials through the Pohnpei State Government.

CHAPTER 6 PROJECT IMPLEMENTATION PLAN

CHAPTER 6 PROJECT IMPLEMENTATION PLAN

6-1 Project Implementation Schedule

The Project will be implemented through grant aid cooperation from the Japanese Government. The whole implementation system is as follows:



After the Exchange of Notes (E/N), a Japanese consulting firm is selected, and the Government of the FSM selects a Japanese building contractor to implement the Project through a tender. Thereafter the mechanism of the grant aid program will function as follows: Invitation for Tender - Conclusion of Contract - Preparation of Materials and Equipment - Transport - Construction of Facilities - Inspection. The executive agency for the Project is the Department of Conservation and Resources Surveillance, Pohnpei State Government. The Division of Agriculture will be the direct executive agency on the spot on behalf of the Department, and will act in close coordination with the Japanese consulting firm and building contractor.

6-2 Areas of Responsibility for the Project

- (a) Necessary equipment facilities to be supplied by the Government of Japan

1. Main Breeding Center

- (a) Breeding Pens, Raising Pens, Fattening Pens, and Supplementary Facilities (Slaughterhouse, Sterilizing Facilities, Feed Mill, Water Supply Facilities etc.).
- (b) Equipment (Equipment for Artificial Insemination, Vehicles, Feed Mixing Equipment, Raising Equipment, Farrowing Equipment, Sterilizing Equipment etc.).

2. Sub-breeding Station

- (a) Breeding Pens, Raising Pens and Supplementary Facilities (Feed Storage, Water Supply Facilities, Isolating Fence, etc.).
- (b) Equipment (Lighting for Farrowing, Farrowing Equipment, Raising Equipment, Pots for Feed etc.).
- (b) Necessary Measures to be undertaken by the Government of the Federated States of Micronesia.

Those described below are the necessary measures for carrying out the Project that shall be taken care of by the Government of the FSM.

1. To secure land and water rights for the proposed facilities of the Project.
2. To clear, level and reclaim the sites whenever required before the start of construction.

3. To bear commissions to the Japanese foreign exchange bank for the banking services based on the Banking Arrangement.
4. To exempt materials from duties and to take necessary measures for customs clearance at the port of disembarkation for the materials and equipment intended for the Project.
5. To provide Japanese nationals, whose services may be required in connection with the supply of products and services under the verified contract, with such facilities as may be necessary for their entry into and stay in the FSM and for the performance of their work.
6. To organize the project office and to hire necessary staff.
7. To secure the annual budget for the project office.
8. To maintain and use properly and effectively the facilities constructed and the equipment purchased under the grant aid.
9. To bear all the expenses, other than those to be borne by the grant aid, that are necessary for construction of the facilities as well as for the transportation and installation of the equipment.