

**MINISTRY OF HEALTH  
THE REPUBLIC OF KENYA**

**BASIC DESIGN STUDY REPORT  
ON  
THE PROJECT FOR IMPROVEMENT  
OF  
HEALTH CENTERS IN THE WESTERN PART OF KENYA  
IN  
THE REPUBLIC OF KENYA**

**MARCH 2001**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
YAMASHITA SEKKEI INC.**

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***YAMASHITA SEKKEI INC***

## PREFACE

In response to the request made from the Government of the Republic of Kenya, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Health Centers in the Western Part of Kenya, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Kenya a study team from September 2 to October 11, 2000.

The team held discussions with officials concerned of the Government of Kenya, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Kenya in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Kenya for their close cooperation extended to the teams.

March 2001



Kunihiko Saito  
President  
Japan International Cooperation Agency

March 2001

**LETTER OF TRANSMITTAL**

We are pleased to submit to you the basic design study report on the Project for Improvement of Health Centers in the Western Part of Kenya in the Republic of Kenya.

This study was conducted by Yamashita Sekkei Inc., under a contract to JICA, during the period from August 21, 2000 to March 29, 2001. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Kenya and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

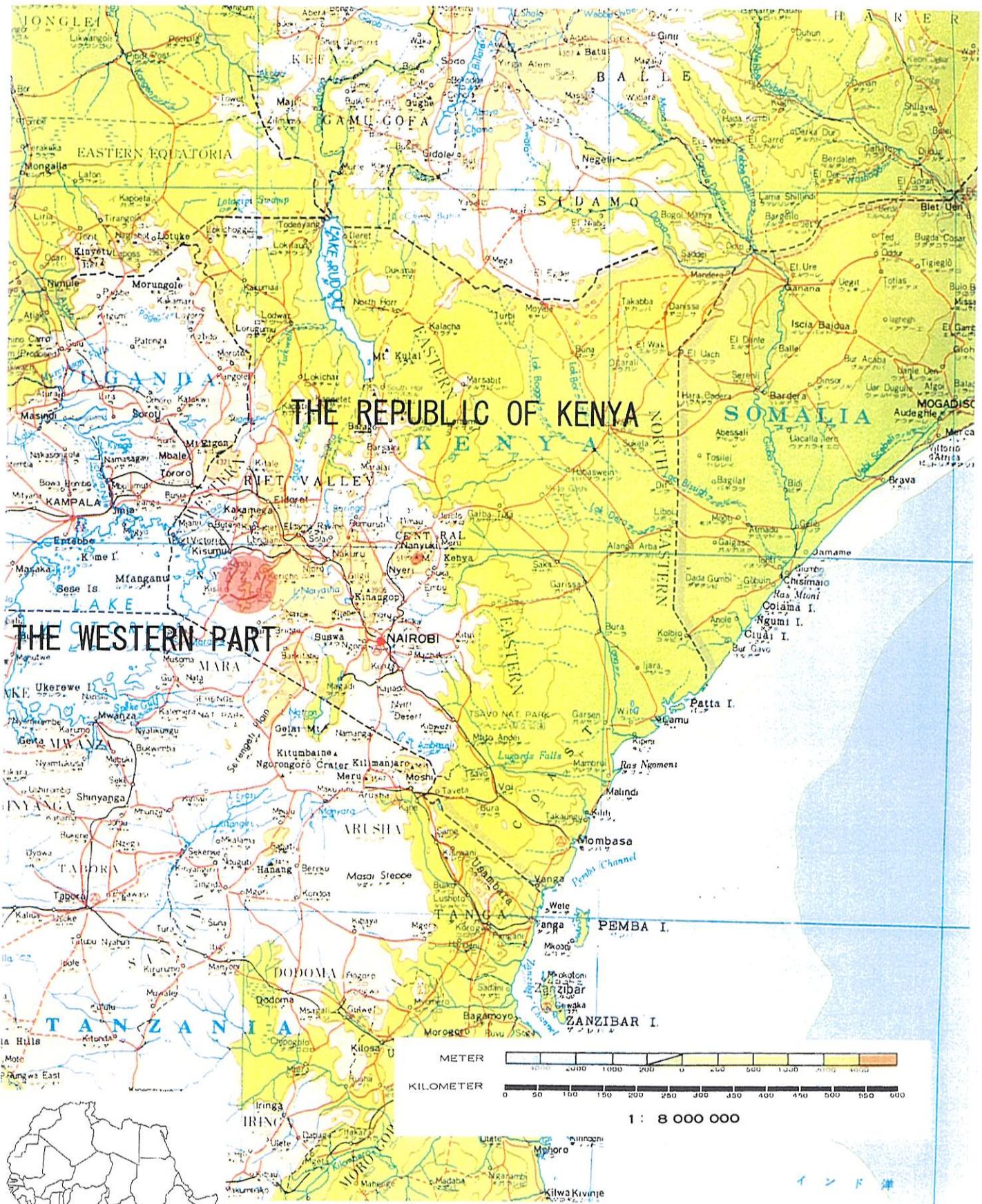
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



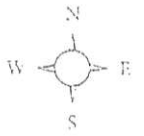
Fumio Arai  
Project Manager,  
Basic design study team on the Project  
for Improvement of Health Centers in  
the Western Part of Kenya  
Yamashita Sekkei Inc.



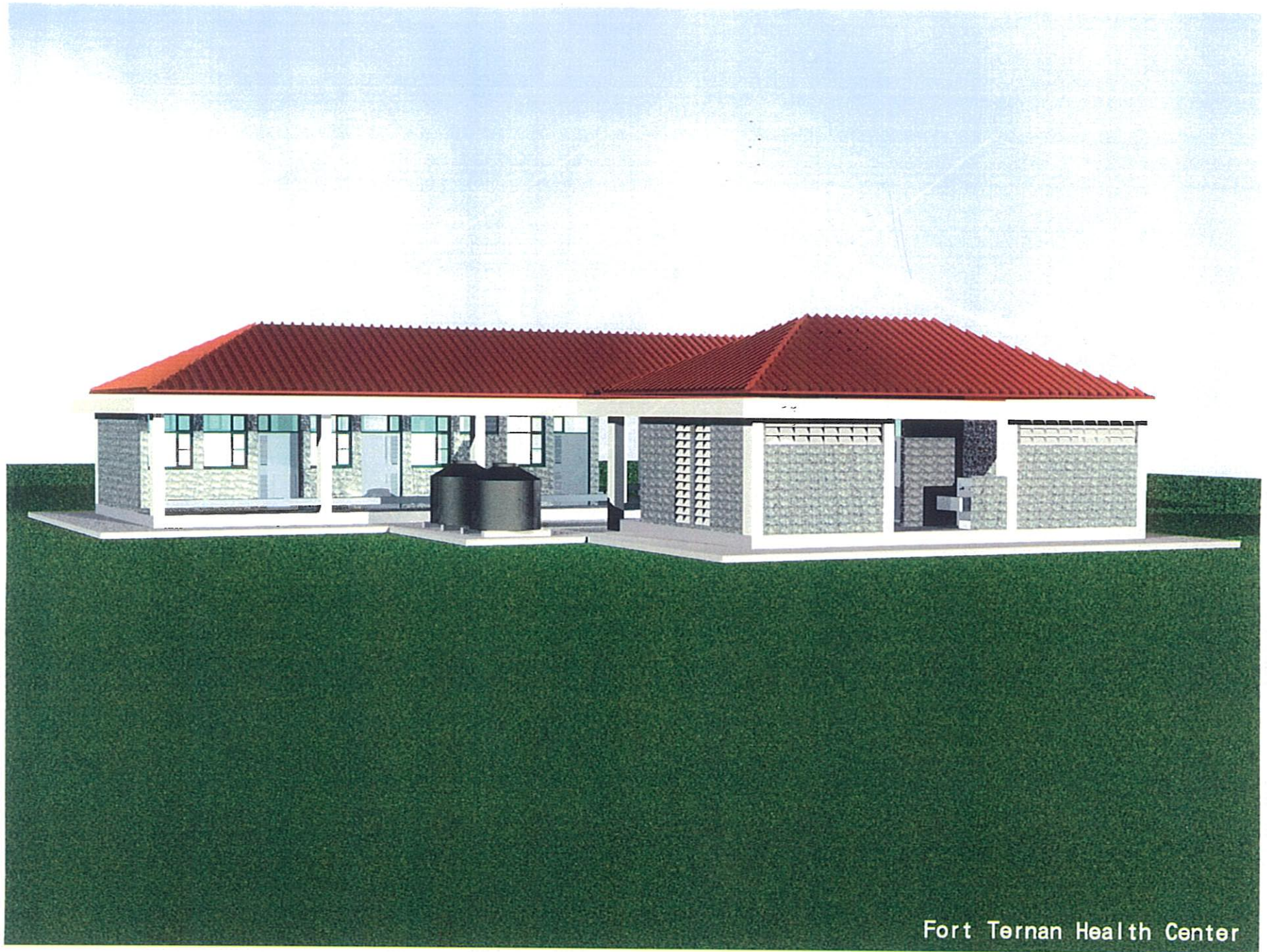


The Republic of Kenya

THE WESTERN PART OF KENYA

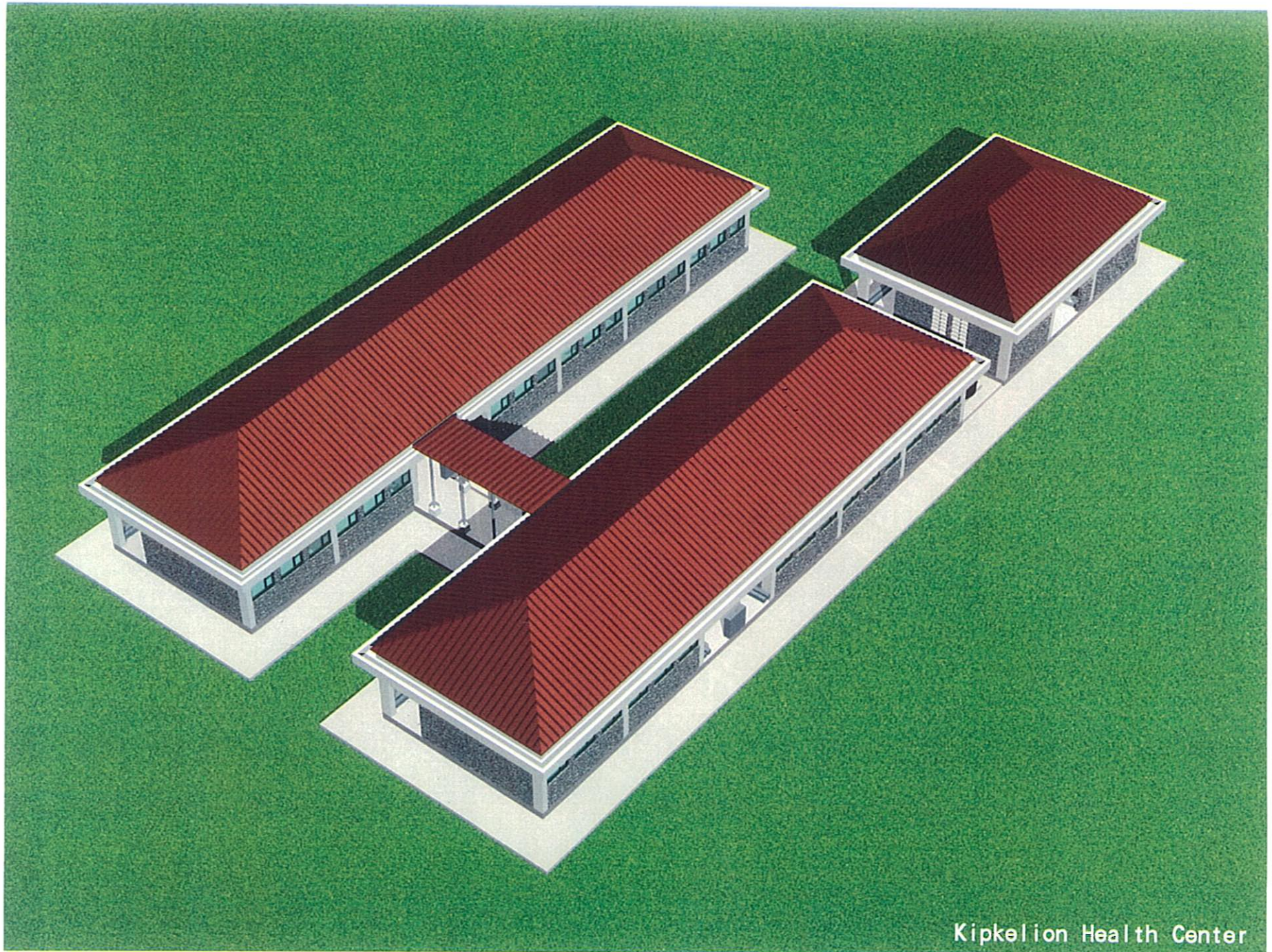






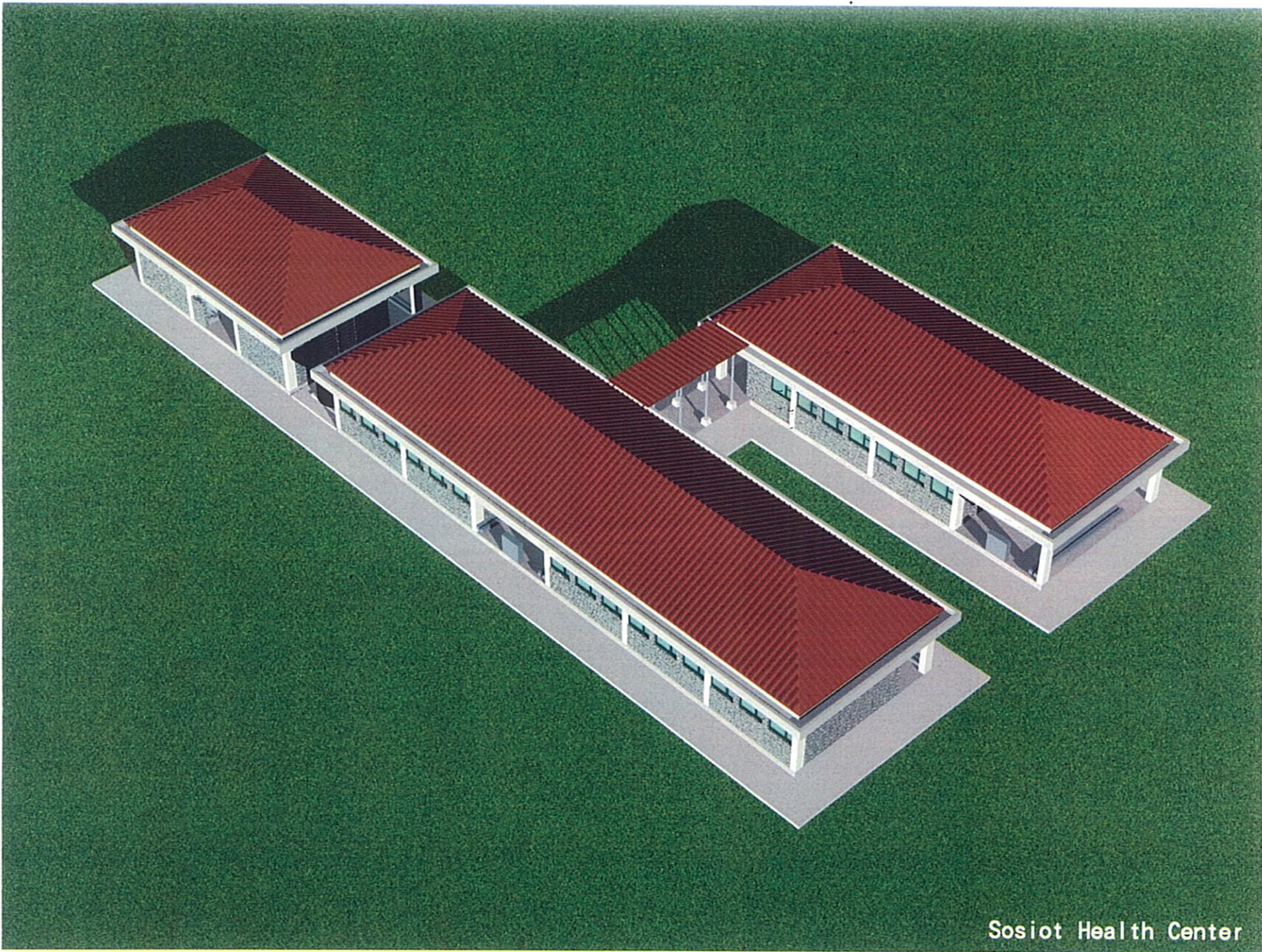
Fort Ternan Health Center





Kipkelion Health Center





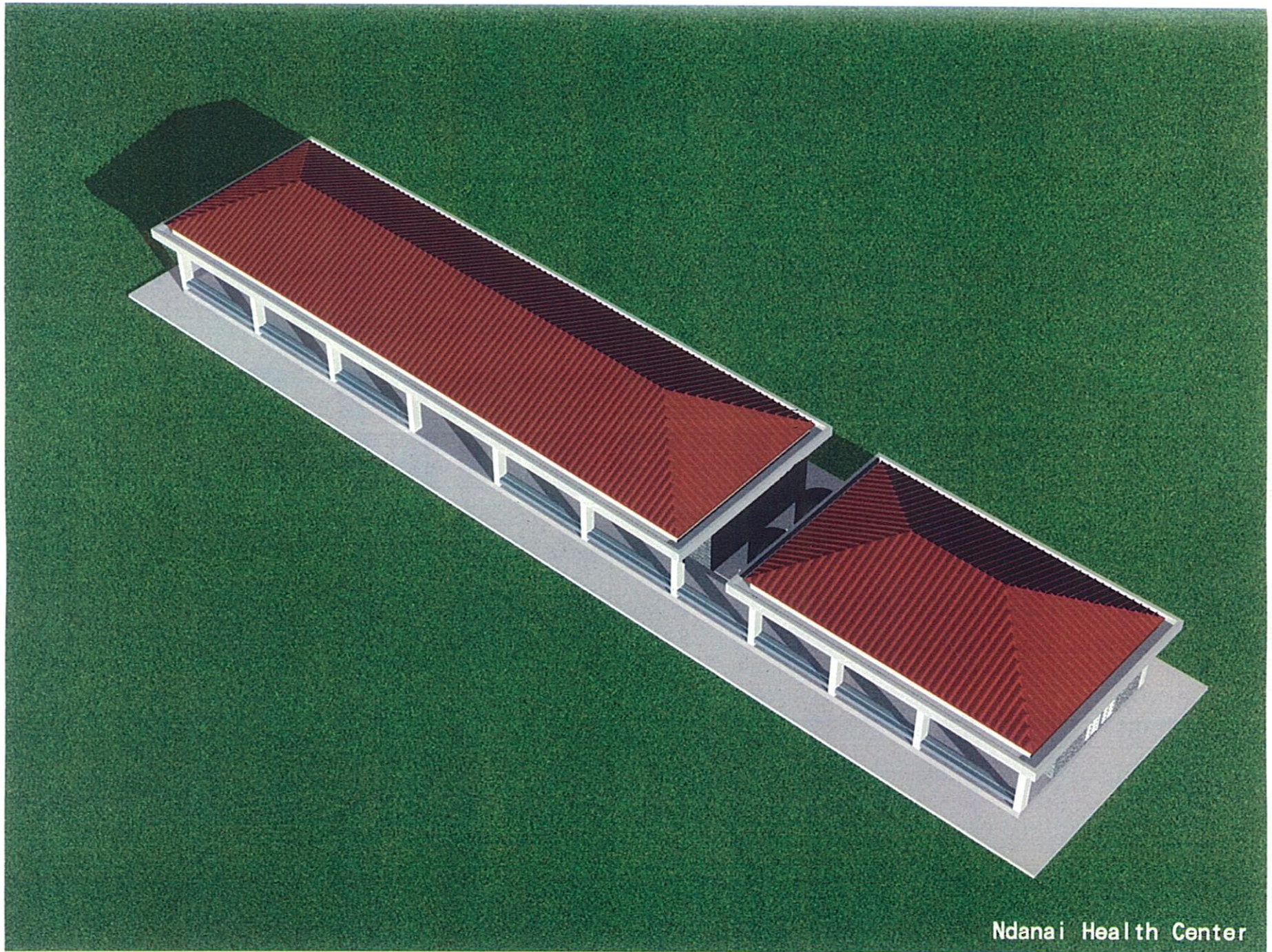
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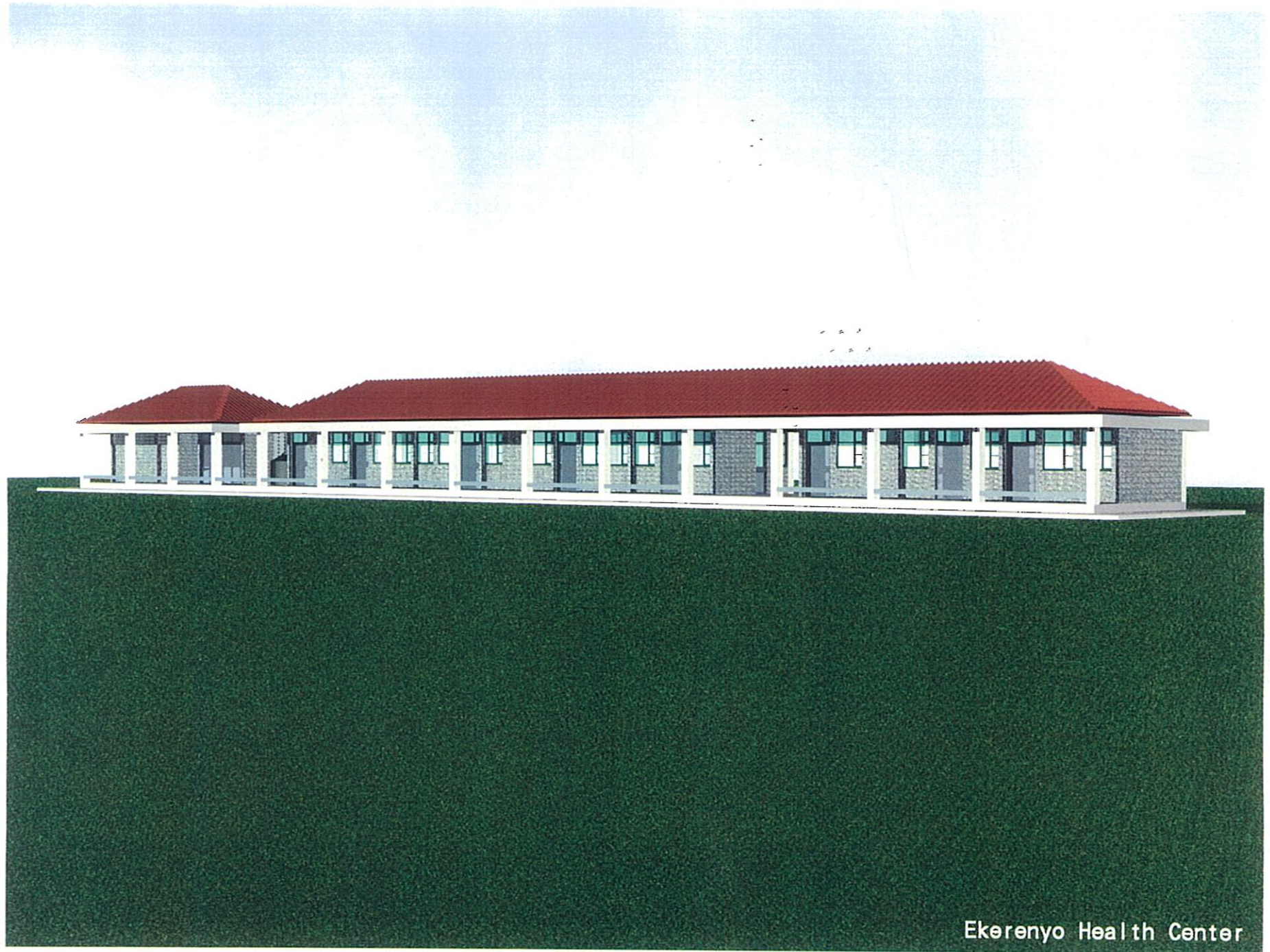
Kapkoros Health Center





Ndanai Health Center





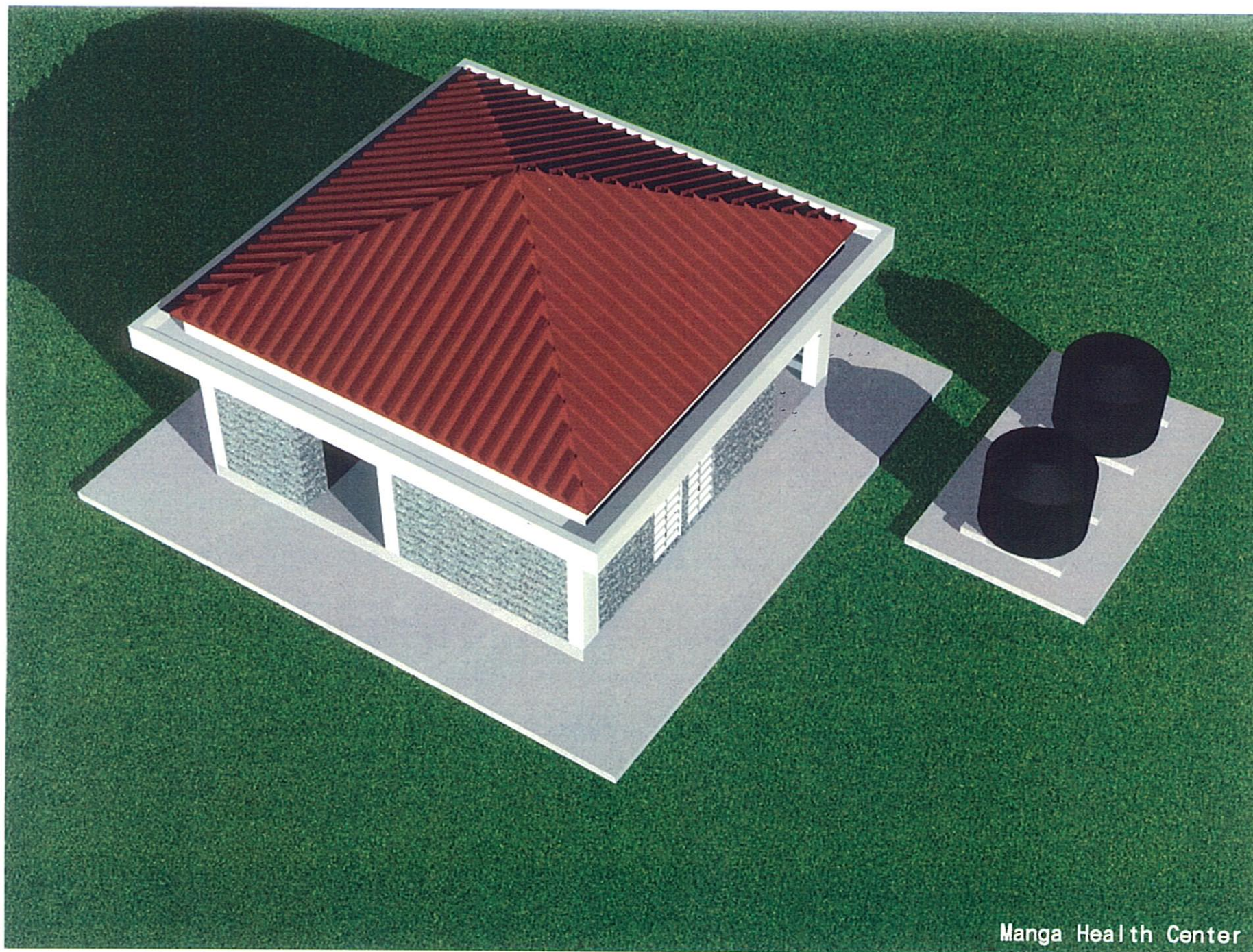
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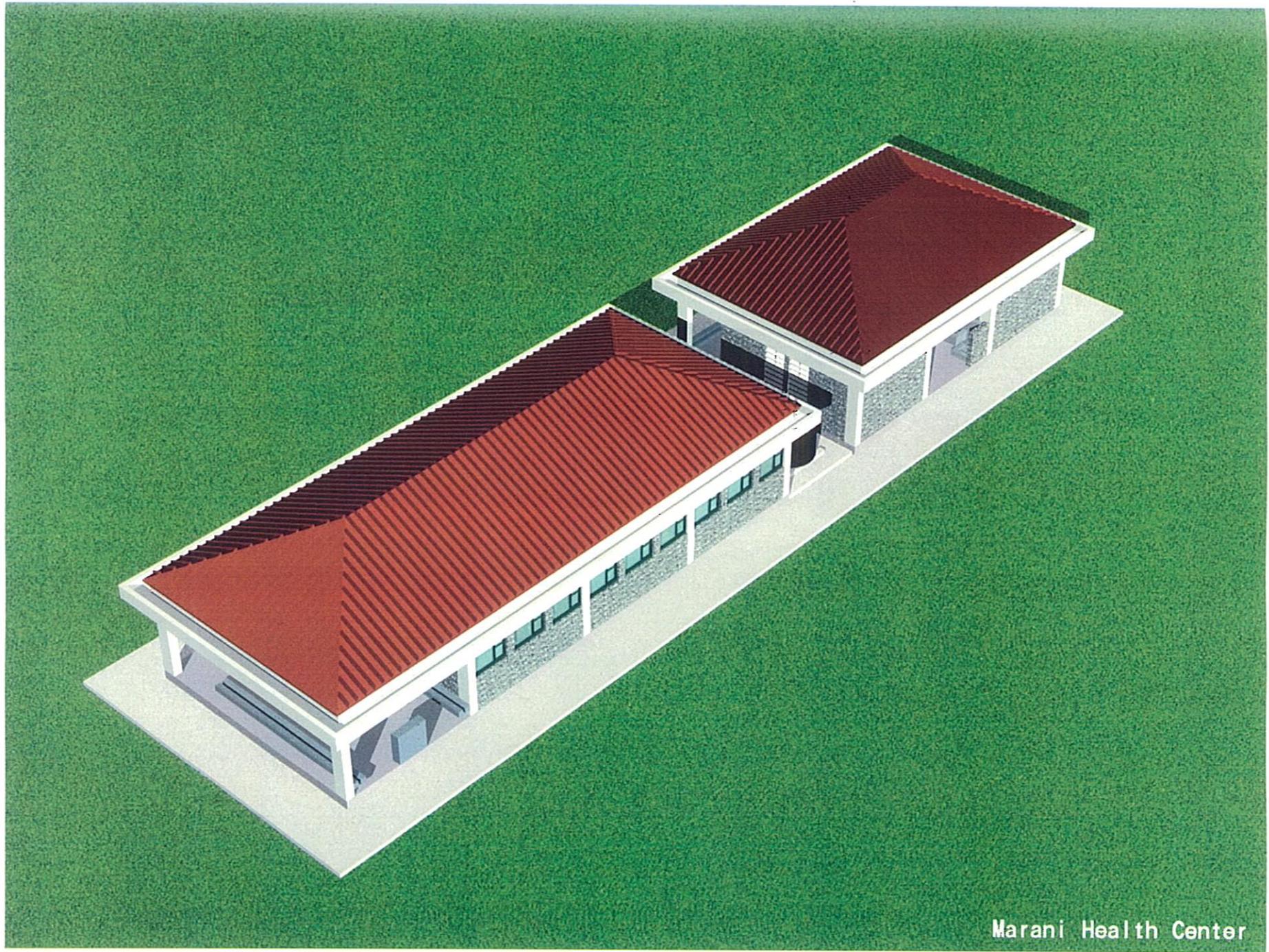
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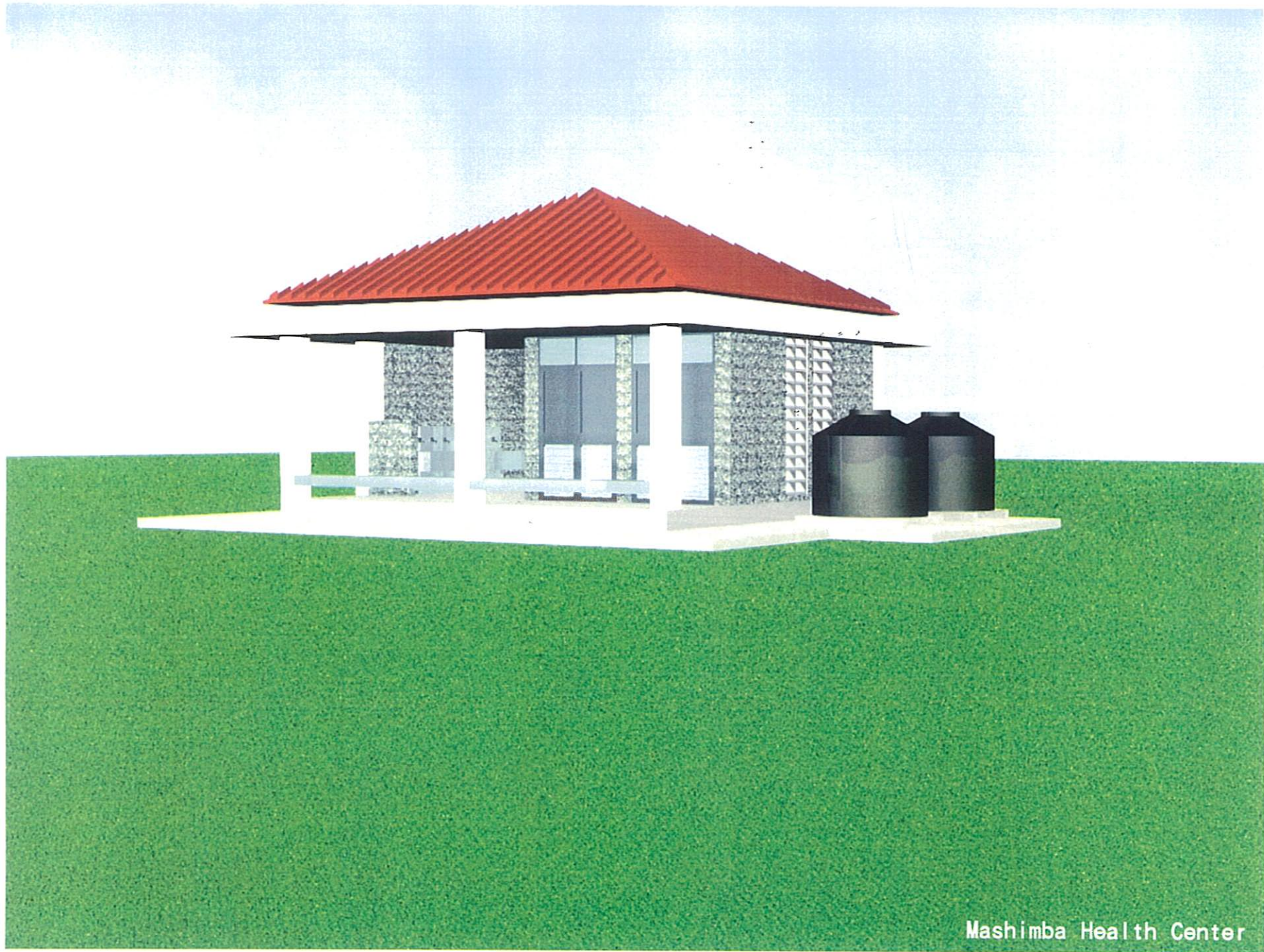
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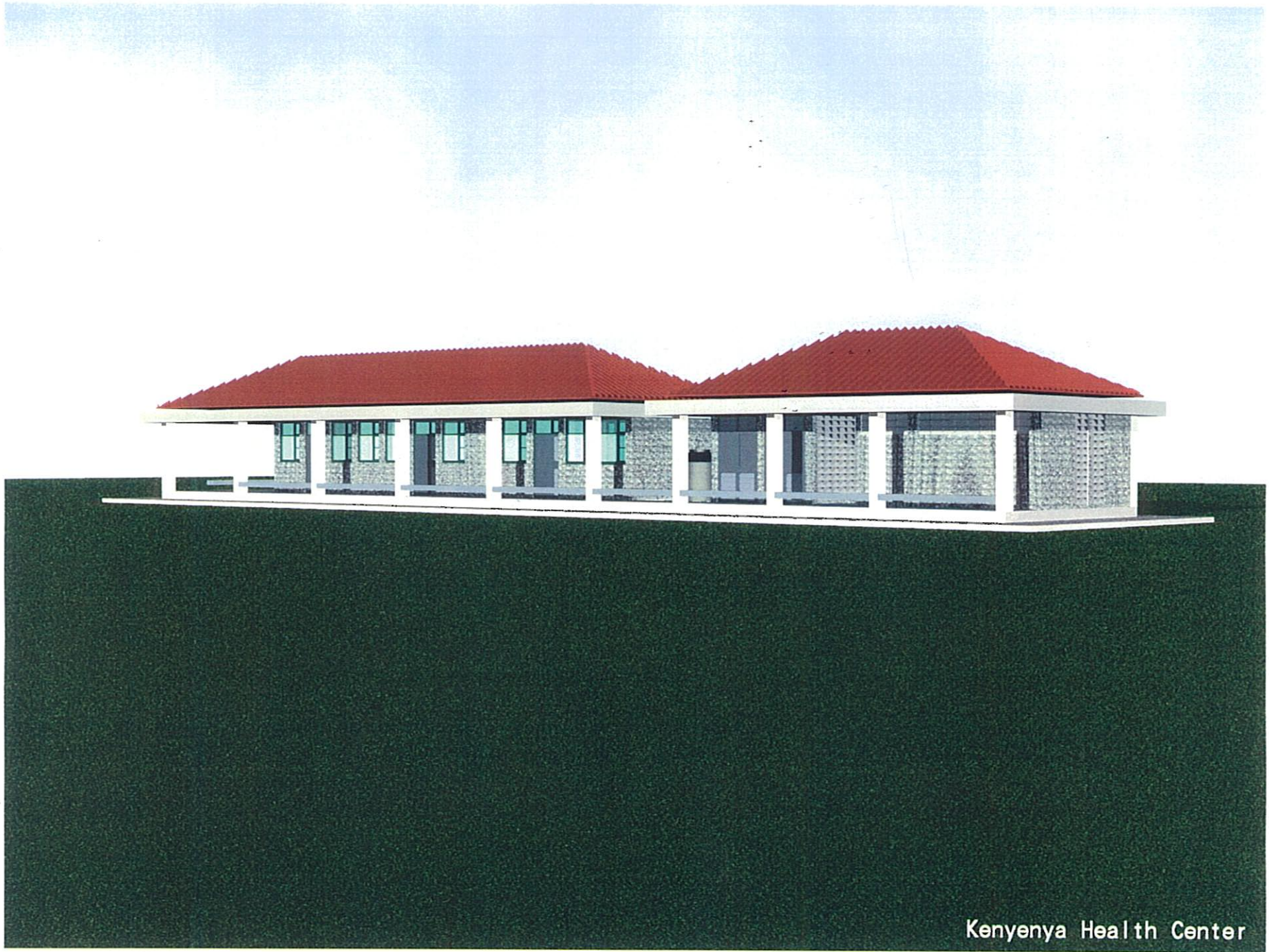
Marani Health Center





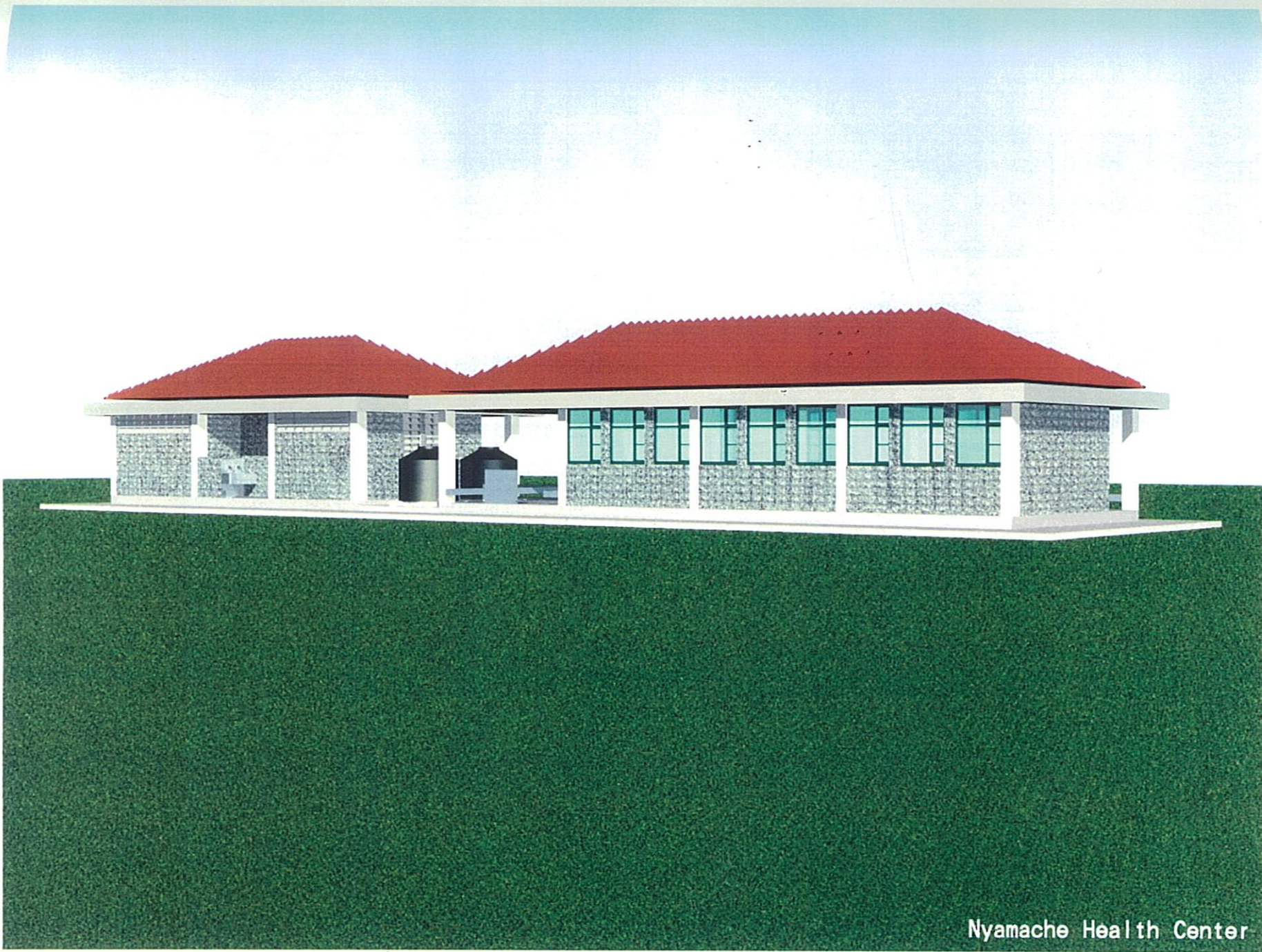
Mashimba Health Center





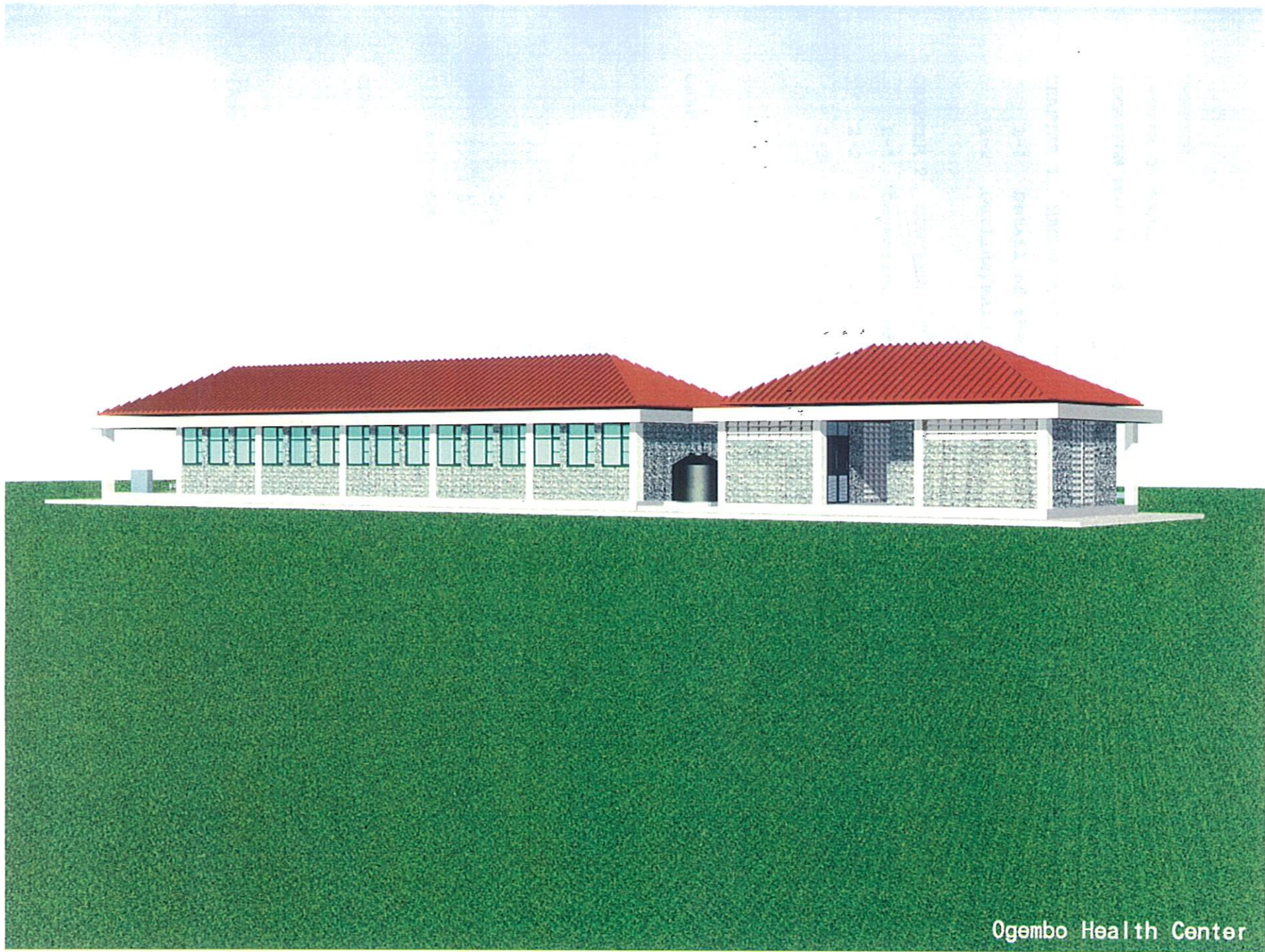
Kenya Health Center





Nyamache Health Center





Ogembo Health Center



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## **CHAPTER 1      BACKGROUND OF THE PROJECT**



# CHAPTER 1 BACKGROUND OF THE PROJECT

## 1-1 Details of the Request

In the Provinces of Rift Valley and Nyanza, both of which are to be covered by this project, there are more than 300 health care facilities. Of these health care facilities, the public health care facilities are characterized by a referral system consisting of provincial hospitals, which are at the highest level, district hospitals, health centers, and dispensaries.

However, the health centers, which are expected to play an important role in making the district hospitals and the dispensaries work closely with each other within the framework of the referral system, are finding it next to impossible to provide appropriate and quick health care services due to the shortfall and/or superannuation of facilities and equipment. As a result, the district hospitals are visited by too many patients.

Under such circumstances, the Government of Republic of Kenya made a request to the Government of Japan for grant aid cooperation for the rehabilitation of facilities and the procurement of medial equipment for 16 out of the 39 existing health centers in the western region of the country, in an attempt to improve the quality of the health care system in the region. These 16 health centers were judged to be high in order of priority.

In order to improve the regional health care system efficiently utilizing the country's limited resources, the Government of the Republic of Kenya designated the 16 health centers as "priority health centers" based on the details of the Development Study on Strengthening District Health System in the Western Part of Kenya (conducted from August 1997 to December 1998)--geographical conditions of the location of, physical access to, and present conditions of operations carried out at each of these health centers--in selecting the health centers to be covered by this project. This project is therefore aimed at helping strengthen the entire regional health care system by improving the functions of these priority health centers.



## **1-2 Outline/Main Components of the Request**

### (1) Outline of the Request

As a result of the Development Study on Strengthening District Health System in Western Part of Kenya (conducted from August 1997 to December 1998), which covered the western region of the country, the following five specific programs was proposed in the form of a program package.

- (1) Priority Disease Program
- (2) District Hospital Rehabilitation Program
- (3) Rural Health Care System Improvement Program
- (4) Community-based P/PHC Program
- (5) District Health Service Education Program

This project is to be implemented in response to the Government of the Republic of Kenya's request for the Government of Japan's grant aid cooperation for [the district hospital facility/equipment improvement plan], which is part of "(2) District Hospital Rehabilitation Program" above, and [the priority health center facility improvement plan], which is part of "(3) Rural Health System Improvement Program" above. In making the request, the Government of the Republic of Kenya decided on the order of priority (Phase I: the priority health center facility improvement plan; Phase II: the district hospital facility/equipment improvement plan). From the standpoint of improvement of the referral system, however, it is appropriate to first procure and improve health care facilities at lower levels. For this reason, the basic design study was conducted for only [the priority health center facility improvement plan].

### (2) Main Components

The main components of the request made by the Government of the Republic of Kenya are the improvement of the facilities of the 16 priority health centers located in the five districts in the western region of the country and the procurement of necessary items of medical equipment for these



priority health centers.

<Facilities>

District	Health Centers	Request
Kerechoi	Fort Ternan/Kipkelion/Sosiot	Improvement of Facilities
Bimet	Kapkoros/Ndanai/Sigor	Improvement of Facilities
Nyamira	Ekrenyo/Keroka/Monga	Improvement of Facilities
Kisi	Kembu/Marani/Masimba	Improvement of Facilities
Gucha	Kenyanya/Nduru/Nyamache/Ogembo	Improvement of Facilities

<Medical equipment>

Health Centers	Medical Equipment
Fort Ternan/Kipkelion	Fort Treatment room, etc. 15 items
Sosiot/Kapkoros/Ndanai/Ekerenyo/Keroka/Nyamache	For Treatment room, Laboratory, Delivery room, etc. 64 items
Sigor/Manga/Keumbu/Marani/Mashimba/Nduru/Ogembo	For Treatment room, Laboratory, Pharmacy, Minor Operating room, Ward, etc. 111 items



Name of Health Centers

1. Fort Ternan H/C
2. Kipkelion H/C
3. Sosirot H/C
4. Kapkoros H/C
5. Ndanai H/C
6. Sigor H/C
7. Ekerenyo H/C
8. Keroka H/C
9. Manga H/C
10. Keumbu H/C
11. Marani R. H. D. C.
12. Mashimba H/C
13. Kenyenyia H/C
14. Nduru R. H. D. C.
15. Nyamache H/C
16. Ogembo DH.

**Facility Type**

- Hospital
- ▣ Sub District Hospital
- Health Centre
- ▲ Dispensary
- ★ Other
- △ Mobile Clinic
- ⊙ Priority Health Centre

**Boundaries**

- Division Boundary
- - - District Boundary

**Road Type**

- All Weather Roads
- - - All Weather Roads (Loose Surface)
- ⋯ Dry Roads (Track)

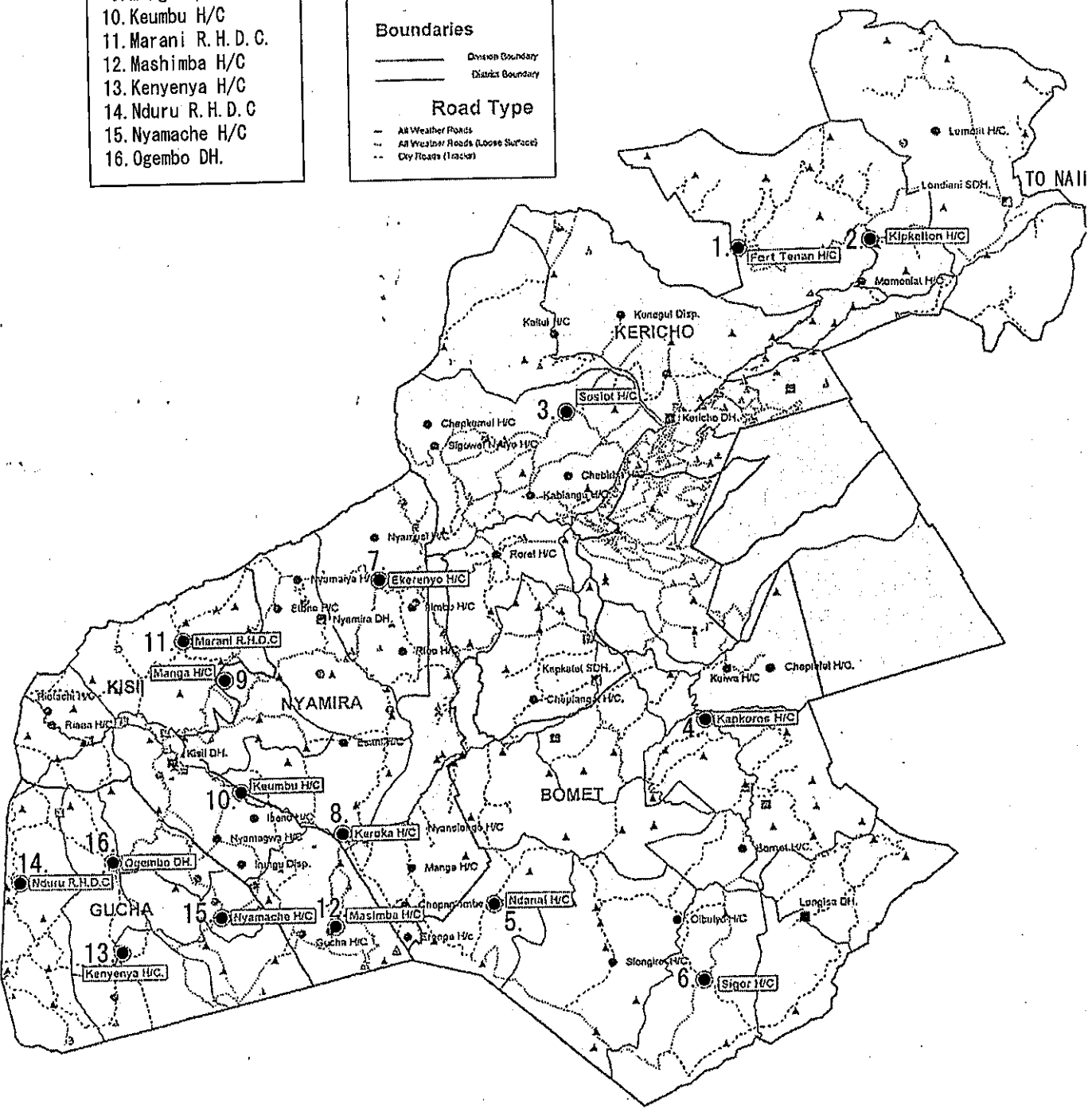


Fig. 1-1 Location of the Health Centers



## **CHAPTER 2      CONTENTS OF THE PROJECT**



## CHAPTER 2 CONTENTS OF THE PROJECT

### 2-1 Objective of the Project

In the Republic of Kenya, the national per capita health care budget has been on the decrease since the 1980s to the 1990s period, with the result that there has been a decline in the quality of the public health care facilities' services as well as in community residents' trust in these health care facilities. Residents of the rural areas, which are characterized by lower incomes and a shortage of medical professionals, are finding it difficult to receive sufficient medical care services. In an attempt to overcome such problems, the Ministry of Health of the Republic of Kenya started on a reform of the country's health care system in 1989. The Ministry of Health formulated the "Kenya Health Care Policy Framework" in 1994. The National Health Sector Strategic Plan 1999-2004, which was worked out within the above-mentioned policy framework, focuses on decentralization and proper staffing.

The western region of the country, which is to be covered by this project, is a rural area with a high infant mortality rate and a below-average life span. This is in part of the region designated a highland malaria-infected region. The health care facilities in this region is characterized by a referral system consisting of provincial hospitals, which are at the highest level, district hospitals, health centers, and dispensaries. Since the health centers, which are to function as connecting points within the referral system, are unable to provide appropriate health care services due to the shortfall and/or superannuation of facilities and equipment. In consequence, many patients visit the district hospitals, making it difficult for the referral system to function smoothly. Particularly noteworthy is the excessive increase in the district hospitals' workloads during the period of large outbreaks of malaria. During such period, it becomes difficult for these hospitals to provide appropriate community wide health care services.

Furthermore, malaria, acute respiratory diseases, tuberculosis and measles,



all of which are prevalent in the region, can be coped with effectively through prevention and early diagnosis/treatment. These diseases can be more effectively dealt with at the health centers than at the district hospitals. It is necessary, therefore, to improve the facilities and equipment of the health centers in the western region.

Under such circumstances, the Development Study on Strengthening District Health System in the Western of Kenya was conducted from August 1997 till December 1998. The Study included a total of four field surveys. Four district hospitals and 39 health centers, which are at higher levels of the referral system in the region, were investigated as health care facilities requiring facility/equipment improvement. In this Study, a total of 16 health centers, each of which has the ability to operate existing facilities and equipment and is also conveniently located in terms of access for all residents of the five districts in the region, were selected.

This project is to be implemented to improve the quality of medical care services provided in the region by procuring new facilities and equipment for the 16 health centers which were selected as a result of the above-mentioned Development Study, in line with objectives of the above-mentioned National Health Sector Strategic Plan 1999-2004.

## **2-2 Basic Concept of the Project**

### **1. Facility**

#### **(1) Basic Components of Health Centers**

In the Definition and Categorization of Health Facilities, which are the Ministry of Health of the Republic of Kenya's guidelines for health centers, and the General Drawings and Specifications (example: floor plan for health centers), which are the guidelines of the Ministry of Public Works, the Republic of Kenya prepared for the design of health centers, including consultation

room, treatment/injection room, laboratory room, dispensary (drug store), maternal health care room, maternal health examination room, delivery/sterilization room, labor/recovery room and ward room (with six beds each for men, women and children, and two isolation rooms) are cited as the functions required of each health center. It has been verified through an investigation of the use of, and demand for, these rooms that each health center must be equipped with these rooms. As regards facilities for inpatients, the necessary number of beds differs from one district to another, and there is no confirmation on shortage of isolation rooms.

The following table shows, as a result of the study of the above-mentioned facts, the rooms and functions which each department of the priority health centers should be equipped with. The development of infrastructure is indispensable in ensuring a stable supply of medical care services and maintaining the sanitary conditions of medical equipment.

**Table 2-1 Necessary Room for Health Centers**

Department	Room	Uses
Obstetrical/ Maternity	Delivery room/ sterilizing room	Management of delivery (to be equipped with a room for cleaning equipment and a show room.)
	Labor room	Management of labor before delivery
	Recovery room	Management of recovery after delivery
	Maternity health room	Maternity examination of pregnant women and monitoring of the growth of infants
	Maternity health examination	Medical examination of pregnant women
	Family Planning room	Education on family planning
Outpatient	Consultation room	Medical examination and treatment of patients Instructions are given by the clinical officer or the nurse
	Treatment/injection room	Application of bandage and simple surgery, Injections are given to patients who have purchased drugs and syringes at the pharmacy as prescribed by the clinical officer or the nurse.
	Laboratory room	Testing for malaria, parasites, anemia as well as urine analysis
	Pharmacy (/drug warehouse)	Drug management. / Drugs and medical supplies are sold to patients as prescribed by the clinical officer or the nurse.
Ward	Bed room (for women)	Mainly medical treatment of inpatients suffering from acute disease
	Bed room (for men)	Mainly medical treatment of inpatients suffering from acute diseases
	Bed room (for children)	Mainly medical treatment of inpatients suffering from acute diseases



## (2) Basic Concept of the Project

Shown below are the basic concepts of the rooms required if the priority health centers are to fulfill their standard functions under this project.

- When the existing maternal department is unable to provide sufficient, high-quality services, a new maternal department is to be established. In this case, those facilities of the existing maternal department which it is inappropriate to renovate are to be used for other purposes to make up the shortfall of such facilities. At the same time, the function of other existing facilities are to be rearranged.
- The rooms as listed in Table 2-1 above should all be independent if they are to fulfill their respective functions. If some of the existing rooms are insufficient, new room should be provided.
- As to the ward, the use of the existing room should be adjusted taking into account the possible increase in the incidence of malaria, the additional ward installation plan and the present use of equipment. In the case of the health centers which require more ward, the necessary number of ward should be newly provided. The seasonal variation in the number of inpatients should be dealt with by adjusting the necessary number of items of equipment (folding beds).

As to the rehabilitation of the existing facilities, it is more appropriate and more feasible, to use a method of rehabilitation work through the efforts at the community level.

## 2. Medical Equipment

### (1) Selection of Basic Items of Equipment

The requested facilities are basic health care facilities, and therefore

only those items of medical equipment perform basic functions were considered. The necessary items of equipment for each room were selected in accordance with the Ministry of Health's relevant standard and the following principles, with consideration of equipment which were proposed as a result of the Development Study.

[Principles of Priority and Deletion]

1) Principle of Priority

Items of equipment to replace the superannuated

Items of equipment to be procured to make up the shortfall

Items of equipment indispensable in providing basic health care services

Items of equipment which are easy to operate and maintain

Items of equipment which are expected to produce many benefits

Items of equipment which are expected to result in high degrees of cost effectiveness

Items of equipment whose medical utility has been established

2) Principle of Deletion

Items of equipment which require high maintenance and management costs

Items of equipment which are expected to produce limited benefits

Items of equipment which are expected to result in low degrees of cost effectiveness

Items of equipment which are to be used for scientific rather than clinical purposes

Items of equipment for which simpler replacements are available

Items of equipment which may cause environmental pollution



Items of equipment whose medical utility has not yet been established

Items of equipment which are to be used for hospital staffers' personal practice

Items of equipment whose quantity exceeds the minimum requirement

[Principles to Be Added According to Local Conditions]

1) Principle of Priority

Items of equipment which can be operated at the existing technical level of the hospital

Items of equipment for which maintenance and management staffers (including temporary staffers) have been, or are likely to be, assigned

Items of equipment which are in line with the hospital's social positioning (referral system, local needs, etc.)

Items of equipment for which cooperation with other donors can be expected

2) Principle of Deletion

Items of equipment for which it is difficult to procure spare parts and expendables

Items of equipment which cannot be operated at the existing technical level of the hospital

Items of equipment for which maintenance and management staffers (including temporary staffers) cannot be assigned

Items of equipment which are not in line with the hospital's social positioning (referral system, local needs, etc.)

Items of equipment which require a great improvement of utilities (water supply, electric power and drainage equipment)

Items of equipment which can be done without through more efficient

use of the existing

## (2) Quantity of Equipment

The quantity of the required items of equipment should be decided taking into consideration its consistency with the number of rooms and the quantity of the existing items of equipment which still can be used. In principle, one package is to be procured for one room, but the quantity can be adjusted relative to the number of patients and/or medical professionals. In light of the present occupancy rate of beds, the number of beds is to be decided based on the present number of patients.

## **2-3 Basic Design**

### **2-3-1 Design Concept**

#### (1) Design Policy for Natural Conditions

Although situated right on the equator, the western region of the Republic of Kenya, where the project sites are located, has an annual average temperature ranging from 18 to 24 because the region is a highland which is 1,500 to 2,500 meters above sea level. The region has a high rainfall, the average annual rainfall in the region being about 1,400 mm. In consideration of the above-mentioned natural conditions, the following designing guidelines for natural conditions were set.

- No air-conditioning equipment is to be installed. The temperature is to be controlled by means of natural ventilation, more specifically the opening and closing of the windows.
- Rainwater collecting equipment is to be installed for the supply of a sufficient quantity of water to the sites.
- The roofs are to be insulated sufficiently, the attic spaces are to be well ventilated, and the buildings are to be arranged from east to west in order to prevent the room temperature from rising sharply due to direct



sunshine.

## (2) Design Policy for Social Conditions

All the floors of the facilities to be newly constructed, including the connecting passageways, are to be of barrier-free architectural design. From the standpoint of benefits to the physically handicapped, the other architectural design elements and the relevant grades and specifications for facility design are to comply with the following standards.

- General Drawings for Health Centers Type 1 (largest health centers)
- The Ministry of Public Works of the Republic of Kenya's general specifications
- The Ministry of Public Works of the Republic of Kenya's general detail drawings
- The Republic of Kenya's Building Code

## (3) Design Policy for the Situation of the Local Construction Industry

In the Republic of Kenya, most basic building materials are local products. Since the facilities to be constructed under this project do not require building material which must comply with rigid specifications, no imported building materials are to be used in the construction of these facilities. However, those building materials which are manufactured and distributed in the western region of the country, where the project sites are located, are mostly sand, gravel, natural stones and lumber used for molding concrete. On the other hand, manufactured products such as concrete blocks and aluminum products are manufactured in and around Nairobi. These products are in short supply and are therefore more expensive in the western region of the country. Such being the market conditions for building materials in the region, utmost emphasis is to be placed on ease of maintenance and management in working out the architectural plan, and in principle building materials which are supplied in ample quantities in the region and a method of construction which is used widely in the region are to be chosen. Selection of the items of

materials which are in line with the market conditions for building materials should be the focus of the materials procurement plan.

#### (4) Design Policy for the Situation Peculiar to the Local Construction Industry

The facility plan is to comply with the following laws and standards.

- Architectural plan : Building Code of the Republic of Kenya
- Structural plan : Code of Practice for the Design and Construction of Building and Other Structures in Relation to Earthquakes  
BS. CP110 Concrete Structure Design Standard
- Ventilation plan : BS  
Technical Instruction - Ministry of Public Works
- Mechanical plan : Civil Engineering Section - Ministry of Public Works
- Other : General Specifications for Building Works  
Standard Method of Measurement of Building Works

#### (5) Design Policy for the Term of Work

When this project is implemented with the Government of Japan's grant aid cooperation, the term of work is estimated to be 18 months--Phase I: 6 months; Phase II: 12 months--on the basis of the sizes of the planned facilities and the situation peculiar to the local construction industry. During Phase I the work to install utilities, including the procurement of equipment for Sigor Health Center, Manga Health Center, Keumbu Health Center, Mashimba Health Center and Nduru Health Centers, none of whose facilities are to be extended, is to be carried out, and during Phase II the work to extend the facilities of the other 11 health centers and procure equipment for these health centers is to be carried out.

#### (6) Design Policy for the Health Centers' Maintenance and Management Capabilities



Under the Republic of Kenya's health policy, the health centers can use 75 percent of the total amount of income from medical service at their own discretion through cost sharing. In actuality, however, most of the income received are used to cover the shortfall in the central government's budget and to purchase drugs, with the result that only a fraction of the incomes are used to cover their facility/equipment maintenance costs. Some of the health centers to be covered by this project are collecting extra medical fees in order to operate and manage their facilities and equipment on their own. It is desirable, therefore, that individual health centers' maintenance and management capabilities be enhanced. At the same time, it is necessary that additional maintenance and management costs to be incurred in the course of implementation of this project be minimized. It is essential to work out the plan to implement the project paying careful attention to the following.

- In relation to the method of construction of the planned facilities, priority should be given to the use of materials which are highly durable and which do not easily become damaged. These materials should also be available from distributors operating near the project sites and can easily be maintained and managed.
- As to the equipment, including those items of equipment which are to be imported from Japan, priority should be given to those whose spare parts can be purchased, maintained and managed in the country.
- Full use should be made of natural lighting and ventilation to reduce expenses of electricity and fuel as well as to produce a comfortable health care environment.

## 2-3-2 Basic Design

### (1) Site/Facility Arrangement Plan

In working out the facility layout plan, due consideration should be given to the following to ensure an effective connection of the flow of patients and the staff members with maximum protection of privacy.

- The existing trees and other natural resources in the project site should be preserved.
- Measures should be taken to prevent the possible inflow of a large quantity of rainwater from the existing buildings in the project site.
- The possibility of extension of facilities in the unused spaces in the project site should be studied.
- Careful attention should be paid to the visibility from the approach of the planned facilities.
- Careful attention should be paid to the minimization of adverse effects on the surroundings from the land preparation in the project site and to the maximum of cost reduction for the project. The buildings to be built on the slope should be arranged along the contour lines as the existing buildings are.
- The new buildings should be so arranged that the distance between them and the existing buildings may be minimized.

### (2) Architectural Plan

#### 1) Floor Plan

In order to achieve the new buildings' harmony with the existing ones,



the plan of the new buildings should be a rectangle which is in parallel with the existing ones. Since power supply to the project site will be unstable, it is necessary to make full use of natural lighting and ventilation in consultation and examination. In this connection, the depth of each room should be minimal. It is essential, therefore, to work out a flexible floor plan that makes possible longtime use of the planned facilities and an structural plan emphasizing a simple and rigid frame. The sizes of the main rooms of the health centers were determined with reference to the Ministry of Public Works' general drawings, the facilities which the Ministry constructed.

**Table 2-2 Standard Size of Each Main Room of the Health Center**

Department	Room	Floor space (m <sup>2</sup> )				Remarks
		MOW Standard	Existing health center		Applicable value	
			Nduru	Sigor		
Outpatient	Consultation room	23.4	20.8	24.6	24	Includes attached rooms.
	Treatment room	23.4	20.8	24.6	24	
	Health guidance room	11.7	20.8	9.6	21	
	Pharmacy/drug stockroom	23.4	27.5	24.0	24	
	Testing room	15.6	20.8	14.0	21	
Maternity	Delivery room	30.6	17.6	26.2	30	
	Ante natal		17.6	23.6	18	
	Recuperation room		35.2	34.8	24	
	MCH consultation	11.7	20.8	11.8	21	
	Family Planning	11.7	20.8	11.1	12	
	MCH examination	9.4	20.8	8.5	10	
Ward	Two-bed room	11.7				Existing centers share the ante natal room
	Six-bed room	36.0			36	
	Area per bed	apr. 6.0				

2) Section Plan

In working out the section plan, due consideration should be given to the use of natural ventilation and lighting, the interception of direct sunshine, and the prevention of inflow of rainwater. The ceilings and the eaves should be high enough to create a comfortable indoor environment. As in the case of the ceiling height and the eaves height should also

be followed the existing facilities with consideration cost performance and ease of maintenance and management. The material for the roof framing and roofing should be steel and metal so that they may meet the specified conditions, especially in terms of harmony and continuity. A roof truss is to be installed on a concrete rigid frame so that the roofs may be highly durable.

### 3) Structural Plan

#### Foundation Plan

According to the geological survey of the project sites, which was conducted mainly by means of visual inspection and hearing during the field survey, the layer of each project site is volcanic silty clay layer. However, black cotton soil, which is very likely to expand when it becomes wet, was discovered in more than one project site. In these places, it is necessary to remove black cotton soil as deep as 1.5 meters to the bearing layer. It is appropriate, therefore, that the planned buildings be one-storied buildings and that continuous footing with a bearing layer at a depth of 1.0 to 1.5 meters be adopted. The design allowable bearing capacity of the bearing ground should be about 7.0 tons/m<sup>2</sup>.

#### Building Structure Plan

Judging from the size (one-storied buildings; maximum floor space: 200 m<sup>2</sup> per building), the workability and the economic efficiency of the planned buildings, as well as the natural conditions of the project sites (possibility of uneven settlement), it is appropriate to adopt reinforced concrete rigid-framed structure as the structure of the building frame. From the standpoint of workability, economic efficiency and environmental protection, the walls should be made of natural stones. In consideration of dampproofing, settlement of



filling soil, and prevention of cracking and other damage to the floors due to expansion, the floors should be supported floors. In consideration of durability and damage caused by insects and bats to the existing buildings, the roof truss should be steel truss.

#### Structural Standards

Specifications to be used in the stress analysis of the planned buildings should be in compliance with National Building Code 1997, Structural Manual 1973, and British Standards 648.

#### 4) Utility Plan

##### Electrical Plan

Of the 16 priority health centers, eight (Sosiot Health Center, Sigor Health Center, Ekerenyo Health Center, Keroka Health Center, Keumbu Health Center, Marani Health Center, Mashimba Health Center, Nyamache Health Center, and Ogembo Health Center) receive electric power from electric mains (415V/240V) of Kenya Electric Power and Electric Light Corporation, but the other health centers cannot receive electric power since there are no electric mains installed nearby. However, there are planned power stoppages at all the health centers receiving electric power, electric power being supplied for 6 to 12 hours a day. In addition, since the voltage fluctuates widely, it is necessary that each planned facility be equipped with a generator. Electric power should be supplied to only those departments which provide medical care services common to all the priority health centers and which require the minimum supply of electric power so that the cost of fuel used in operating the generator may be saved. The size of the generators should be determined in a manner that meets the following requirements.

Of the 16 priority health centers, eight (Fort Ternan Health Centers,

Sigor Health Centers, Ekerenyo Health Centers, Keumbu Health Center, Marani Health Center, Nduru Health Center, Nyamache Health Center, and Ogembo Health Center) are provided with telephones but there are no telephone wires installed near the other eight priority health centers.

#### Plumbing Equipment Plan

To secure a sufficient supply of city water is one of the greatest challenges facing the western region of the Republic of Kenya. If only the minimum required quantity of water is to be used a day (about a twentieth of the Japanese standard daily requirement, 22 liters/day • square meter), the minimum daily water requirement is about 1 liter/day • square meter. The total floor space for the existing and planned facilities varies from 500 to 1,000 m<sup>2</sup>. But the necessary number of rooms which require plumbing equipment will remain constant after the construction of the new facilities. Consequently, the minimum daily water requirement for a facility with a total floor space of 500 m<sup>2</sup> will be about 500 liters/day (500 m<sup>2</sup> x 1 liter). The storage capacity of the water tank should be about 10,000 liters (500 liters x 5 days x 4 weeks) so that the water tank may continue to work during the period of the lowest rainfall which usually lasts for about a month.

The western region of the Republic of Kenya is a farming region with a high rainfall and therefore water from the rivers and the shallow wells in the region is very likely to be contaminated by agricultural chemicals and/or household wastewater. In order to secure a sufficient supply of water, full use should be made of rainwater. The quantity of rainwater collected is estimated at about 8 liters/m<sup>2</sup> for a rainfall of 1 mm. The area of the rainwater collecting roof will be more than 300 m<sup>2</sup>.

300 (m<sup>2</sup>: roof area) x 8 (liters/m<sup>2</sup> x 1 mm) x 1,400 (mm: annual rainfall)



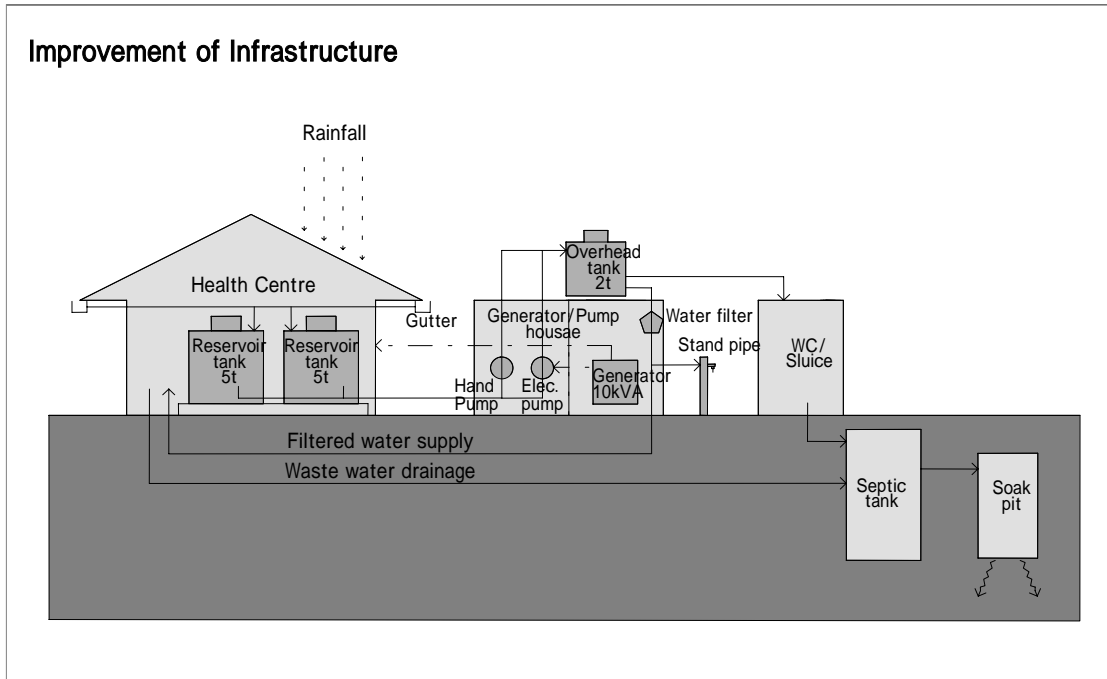
x 0.7 (evaporation rate: 30%) = 2,352,000

It will be possible to collect a rainfall of 2,352 tons/year, or 6.44 tons/day.

As it is expected that the tank will overflow due to the seasonal fluctuations in rainfall, the water storage rate is set at about 30 percent. It will be possible, therefore, to store about 2 tons a day on average. In light of frequent power stoppages in and around the project sites, it will be necessary to store rainwater at places where city water is supplied. Two rainwater tanks, each with a storage capacity of 5,000 liters, are to be installed from the standpoint of ease of cleaning and maintenance/management. An elevated water tank is to be installed in the roof truss of each new facility so that flush toilets may be installed.

Water is to be pumped up into the elevated water tank by means of an electric pump or a manual pump. The storage capacity of the elevated water tank should be 1,500 liters so that the tank may supply water for three days and that the power rates for the use of the electric pump may be saved. At each of those facilities which are not to be extended, a water tank with a faucet and rainwater gutters are to be newly installed.

Sewage and other liquid waste are to be discharged into the septic tank, from where they are to penetrate into the ground.



**Fig.2-1 Conceptual Diagram of the Utility Plan**

5) Building Materials Plan

Building materials to be used for this project should be those which are suited for the local climatic condition and the local method of execution and can fulfill required functions. They should also be easy to maintain and manage and high in economic efficiency so that they may secure sufficient durability of the planned facilities.

Main Structural Materials

**Table 2-3 Table of Building Materials (classified by part)**

Portion	Material	Remarks
Foundation/c column/beam/floor	Reinforced concrete	Used widely in the country.
Wall	Stone	Used widely in the country, workable, economical
Roof truss	Steel truss	Durable, preventable against animals and insects.

## Exterior Finishing Materials

**Table 2-4 Table of Building Materials (classified part)**

Portion	Material	Remarks
Roof	Steel corrugated sheet	Long sheets are available in the country. reliable quality
Wall	Stone	Maintenance-free, flexible for design
Furniture	Aluminum sash	More durable than domestic wooden type

## Interior Finishing Materials

**Table 2-5 Table of Building Materials (classified part)**

Room	Floor	Wall	Ceiling	Remarks
For medical activities	Cost in place Terrazzo	Vinyl paint on cement mortal Wainscot: ceramic tile	Rock wool (for soundproofing)	Durable, functional, flexible for design.
Warehouse/machine room	Cement mortar	Vinyl paint on cement mortal	Painted waterproof board	

The facility plan and the planned areas for the priority health centers, which are based on the results of the examination of the facility plan, are as shown in the following table.

**Table 2-6 Facility Plan for Each Priority Health Center**

Health centre	Departments	Facilities
Fort Ternan Health Centre	Delivery, MCH	Water supply/Sewage facility, toilet, laundry
Kipkelion Health Centre	Delivery, MCH, outpatient (partly)	Water supply/Sewage facility, toilet, laundry
Sosiot Health Centre	Delivery, MCH, outpatient (partly)	Water supply/Sewage facility, toilet, laundry
Kapkoros Health Centre	Delivery, MCH	Water supply/Sewage facility, toilet, laundry
Ndanai Health Centre	Delivery, MCH	Water supply/Sewage facility, toilet, laundry
Sigor Health Centre	no	no
Ekerenyo Health Centre	Delivery, MCH	Water supply/Sewage facility, toilet, laundry
Keroka Health Centre	Delivery, MCH	Water supply/Sewage facility, toilet, laundry
Manga Health Centre	no	Water supply/sewage facility (including repair of existing facility)
Keumbu Health Centre	no	Rainwater storing facility



Health centre	Departments	Facilities
Marani Health Centre	Delivery	Water supply/Sewage facility, toilet, laundry
Mashimba Health Centre	no	Water supply/sewage facility (including repair of existing facility)
Kenyenia Health Centre	Ward	Rainwater storing facility
Nduru Health Centre	no	Rainwater storing facility
Nyamache Health Centre	Delivery	Water supply/Sewage facility, toilet, laundry
Ogembo Health Centre	Delivery, MCH	Water supply/Sewage facility, toilet, laundry

**Table 2-7 Floor Spaces of Existing/New Facilities of Each Priority Health Center**

Department	Room	Floor space(m <sup>2</sup> )			Remarks	
		Existing	New	Total		
1. Fort Ternan Health Centre		343.2		298.1	641.3	
Outpatient	Examination room	9.5			21.4	
	Treatment room	11.6			9.8	
	Pharmacy		incl. T/I		14.1	
	Health guidance room		incl. T/I		9.8	
	Laboratory room		incl. T/I			
MCH/Delivery	Labor room			16.1	16.1	
	Recovery room			24.3	24.3	
	Delivery room			32.4	32.4	
	MCH (Examination)	9.8		24.3	24.3	
	MCH (Laboratory)	9.8		12.1	12.1	
Ward	Family planning room	9.8		12.1	12.1	
	Bed room for men	28.4			28.4	Ward under constructed
Other	Bed room for women	26.0			26.0	Ward under constructed
		238.4		176.8	410.6	
2. Kipkelion Health Centre		102.8		521.6	624.4	
Outpatient	Examination room	15.2		24.3	24.3	
	Treatment room	15.2		24.3	24.3	
	Pharmacy		incl. Treat.	24.3	24.3	
	Health guidance room			24.3	24.3	
	Laboratory room	15.2		24.3	24.3	
MCH/Delivery	Labor room			16.1	16.1	
	Recovery room			24.3	24.3	
	Delivery room			32.4	32.4	
	MCH (Examination)	15.2		24.3	24.3	
Ward	MCH (Laboratory)		incl. MCH	12.1	12.1	
	family planning room			12.1	12.1	
Other	Bed room for men				15.2	
	Bed room for women				15.2	
		42.0		278.8	351.2	
3. Sosiot Health Centre		285.3		432.5	717.8	
Outpatient	Examination room	11.6			11.6	
	Treatment room	12.2		22.4	24.3	
	Pharmacy	10.4		24.3	15.6	
	Health guidance room	10.2				

Department	Room	Floor space(m <sup>2</sup> )			Remarks
		Existing	New	Total	
MCH/Delivery	Laboratory room	15.6		31.3	
	Labor room	18.9		16.1	16.1
	Recovery room	65.3		24.3	24.3
	Delivery room	12.6		32.4	32.4
	MCH (Examination)	19.3		24.3	24.3
	MCH (Laboratory)		incl. MCH	12.1	12.1
	family planning room		incl. MCH	12.1	12.1
Ward	Bed room for men	16.9		38.3	
	Bed room for women			65.0	
Other		92.3		286.9	388.0
4. Kapkoros Health Centre		251.0		291.6	542.6
Outpatient	Examination room	14.1		14.1	
	Treatment room	29.0		29.0	
	Pharmacy		incl. Treat.	21.5	21.5
	Health guidance room	21.5		21.2	21.2
	Laboratory room	15.7		15.7	
MCH/Delivery	Labor room		incl. MCH	16.1	16.1
	Recovery room	25.3		24.3	24.3
	Delivery room	15.2		32.4	32.4
	MCH (Examination)	21.2		24.3	24.3
	MCH (Laboratory)			12.1	12.1
	Family planning room		incl. PHO	12.1	12.1
Ward	Bed room for men			15.2	
	Bed room for women			25.3	
Other		109.1		170.3	279.4
5. Ndanai Health Centre		302.1		281.9	584.0
Outpatient	Examination room	12.8		12.8	
	Treatment room	21.6		21.6	
	Pharmacy	6.8		18.8	18.8
	Health guidance room	19.5		19.5	19.5
	Laboratory room	12.0		31.5	31.5
	MCH/Delivery	Labor room		incl. Fwd	16.1
Recovery room			incl. Fwd	24.3	24.3
Delivery room		18.5		32.4	32.4
MCH (Examination)		18.8		24.3	24.3
MCH (Laboratory)			incl. MCH	12.1	12.1
Family planning room			incl. MCH	12.1	12.1
Ward	Bed room for men	29.5		19.5	
	Bed room for women	31.5		29.5	
Other		131.1		160.6	309.5
6. Sigor Health Centre		1029.8			1029.8
Outpatient	Examination room	24.6		24.6	
	Treatment room	24.6		24.6	
	Pharmacy	24.0		24.0	24.0
	Health guidance room	9.6		9.6	9.6
	Laboratory room	14.0		14.0	14.0
MCH/Delivery	Labor room	23.6		23.6	
	Recovery room	34.8		34.8	
	Delivery room	26.2		26.2	

Department	Room	Floor space(m <sup>2</sup> )			Remarks	
		Existing	New	Total		
Ward	MCH (Examination)	11.8		11.8		
	MCH (Laboratory)	8.5		8.5		
	Family planning room	11.1		11.1		
	Bed room for men	73.2		73.2		
	Bed room for women	73.2		73.2		
Other		670.6		670.6		
7. Ekerenyo Health Centre		280.2		414.2	694.4	
Outpatient	Examination room	20.2		20.2		
	Treatment room	20.2		20.2		
	Pharmacy	4.8		23.3		
	Health guidance room	11.9		15.4		
	Laboratory room	13.2		25.7		
MCH/Delivery	Labor room	5.1		16.1		
	Recovery room		incl. Wd	24.3	24.3	
	Delivery room	18.3	use MCH	32.4	32.4	
MCH/Delivery	MCH (Examination)	25.7		25.7		
	MCH (Laboratory)		incl. MCH	11.9	11.9	
	family planning room		incl. MCH	inc MCH	inc MCH	
Ward	Bed room for men	25.7		36.5	36.5	
	Bed room for women		incl. MWd	36.5	36.5	
				36.5	36.5	
Other						
Outpatient	Examination room	135.2		231.9	369.7	Temp. Clinical Officer's house
8. Keroka Health Centre		380.2		281.9	662.1	
Outpatient	Examination room	12.4		12.4		
	Treatment room	12.4		12.4		
	Pharmacy	3.6		19.6		
	Health guidance room	12.4		14.8		
	Laboratory room		incl. Treat		26.2	
MCH/Delivery	Labor room		incl. MCHex	16.1	16.1	
	Recovery room			24.3	24.3	
	Delivery room	14.8		32.4	32.4	
	MCH (Examination)	26.2		24.3	24.3	
	MCH (Laboratory)	27.9		12.1	12.1	
	family planning room		incl. MCHc	12.1	12.1	
Ward	Bed room for men	95.8			95.8	
	Bed room for women		incl. MWd			
Other			160.6	359.6	include Male Ward	
9. Manga Health Centre		556.4			556.4	
Outpatient	Examination room	10.6		10.6		
	Treatment room	11.0		11.0		
	Pharmacy	11.0		11.0		
MCH/Delivery	Health guidance room	13.1			13.1	
	Laboratory room	9.1			9.1	
	Labor room		incl. Post			
	Recovery room	34.8		34.8	34.8	
	Delivery room	20.2		20.2	20.2	
	MCH (Examination)	11.0		11.0	11.0	
	MCH (Laboratory)	11.0		11.0	11.0	
Family planning room		incl. MCH				



Department	Room	Floor space(m <sup>2</sup> )			Remarks
		Existing	New	Total	
Ward	Bed room for men	33.1		33.1	
	Bed room for women		incl. Post		
Other		391.4		391.4	
10. Keumbu Health Centre		867.9		867.9	
Outpatient	Examination room	10.6		10.6	
	Treatment room	35.8		35.8	
	Pharmacy	22.8		22.8	
	Health guidance room	9.9		9.9	
	Laboratory room	10.6		10.6	
MCH/Delivery	Labor room		incl. MaWd		
	Recovery room	32.5		32.5	
	Delivery room	68.7		68.7	
	MCH (Examination)	10.6		10.6	
	MCH (Laboratory)	10.6		10.6	
	family planning room	9.9		9.9	
Ward	Bed room for men	31.9		31.9	
	Bed room for women	31.4		31.4	
		33.1		33.1	
Other					
Outpatient	Examination room	549.5		549.5	
11. Marani R.H.D.C.		954.1		217.1	1171.2
Outpatient	Examination room	10.6		10.6	
	Treatment room	20.8		20.8	
	Pharmacy	26.5		26.5	
	Health guidance room	20.8		20.8	
	Laboratory room	20.8		20.8	
MCH/Delivery	Labor room		incl. Del	16.1	16.1
	Recovery room	15.0		24.3	24.3
	Delivery room	21.0		32.4	32.4
	MCH (Examination)	20.8		20.8	20.8
	MCH (Laboratory)	20.8		20.8	20.8
	family planning room	20.8		20.8	20.8
Ward	Bed room for men	17.5		17.5	
	Bed room for women	24.8		24.8	
Other		713.9		894.2	
12. Mashimba Health Centre		679.3			679.3
Outpatient	Examination room	10.6		10.6	
	Treatment room	21.3		21.3	
	Pharmacy	20.4		20.4	
	Health guidance room	10.6		10.6	
	Laboratory room	8.0		8.0	
MCH/Delivery	Labor room		incl. Wd		
	Recovery room	33.6		33.6	
	Delivery room	26.0		26.0	
	MCH (Examination)	10.6		10.6	
	MCH (Laboratory)	21.3		21.3	
	family planning room	10.6		10.6	

Department	Room	Floor space(m <sup>2</sup> )			Remarks	
		Existing		New		Total
Ward	Bed room for men Bed room for women	30.2	incl. MWd		30.2	
Other		475.9			475.9	
13. Kenyanya Health Centre		298.6		249.5	548.1	
Outpatient	Examination room	15.1			15.1	
	Treatment room				18.9	
	Pharmacy	19.0			19.0	
	Health guidance room	12.6			12.6	
	Laboratory room	18.9			13.2	
MCH/Delivery	Labor room		incl. Post			incl. Post
	Recovery room	31.9			31.9	
	Delivery room	21.6			21.6	
	MCH (Examination)	13.0			13.0	
MCH/Delivery	MCH (Laboratory)		incl. Mch		12.8	incl. MCH
	family planning room	8.0				
Ward	Bed room for men	16.3		36.5	36.5	
	Bed room for women		incl. Post	36.5	36.5	
Other		142.1		176.5	316.9	
14. Nduru R.H.D.C.		1171.3			1171.3	
Outpatient	Examination room	20.8			20.8	
	Treatment room	20.8			20.8	
	Pharmacy	26.5			26.5	
	Health guidance room	20.8			20.8	
	Laboratory room	20.8			20.8	
MCH/Delivery	Labor room	17.6			17.6	
	Recovery room	35.2			35.2	
	Delivery room	18.6			18.6	
	MCH (Examination)	20.8			20.8	
	MCH (Laboratory)	20.8			20.8	
	family planning room	20.8			20.8	
Ward	Bed room for men	9.6			9.6	
	Bed room for women	9.6			9.6	
Other		9.6			9.6	
Ward	Bed room for men	899.0			899.0	
15. Nyamache Health Centre		241.6		217.1	458.7	Total approx. 800 m <sup>2</sup>
Outpatient	Examination room	13.6			13.6	
	Treatment room	11.3			13.6	
	Pharmacy	3.5			16.8	
	Health guidance room				11.3	
	Laboratory room	13.6			26.2	
MCH/Delivery	Labor room		incl. Del	16.1	16.1	
	Recovery room	32.0		24.3	24.3	
	Delivery room	18.1		32.4	32.4	
	MCH (Examination)	26.2			32.0	
	MCH (Laboratory)		incl. MCH		18.1	
MCH/Delivery	family planning room	8.3			8.3	
	Ward	Bed room for men Bed room for women				Wards underconstructed Approx. 350 m <sup>2</sup> (70% done)
Other		114.9		144.3	245.9	

Department	Room	Floor space (m <sup>2</sup> )			Remarks	
		Existing	New	Total		
16. Ogembo District Hospital		648.1		281.9	930.0	
Outpatient	Examination room	34.2			34.2	
	Treatment room	10.6			18.5	
	Pharmacy	22.1			12.2	
	Health guidance room				22.1	
	Laboratory room	18.5			22.0	
MCH/Delivery	Labor room			16.1	16.1	
	Recovery room	27.8		24.3	24.3	
	Delivery room	22.1		32.4	32.4	
	MCH (Examination)	12.2		24.3	24.3	
	MCH (Laboratory)	11.4		12.1	12.1	
	family planning room	9.1	12.1	12.1		
Ward	Bed room for men	13.8			31.2	
	Bed room for women	13.8			13.8	
Other		452.5		160.6	654.8	

### (3) Equipment Plan

In view of the fact that the planned facilities are very basic such as consultation room, treatment room, pharmacy, delivery room, and ward. At the Basic Design Study, the basic items of equipment and the present situation of the priority health centers, were investigated. And the basis of the results of the investigation, a list of standard items of equipment to individual rooms were prepared.

Due to the limitations on electric capacity, power-driven items of equipment were excluded from this project. But the following items of equipment should be power-driven.

**Table 2-8 List of Power-Driven Items of Equipment**

Equipment	Power	Rationale
Refrigerator	Electric power/LP gas (Hybrid)	Some Health Centers supplied with public electric power. The refrigerators must be operating with electricity or gas.
Centrifuge	Electric power	Most of the health centers have only one Labo Technician. When there are many tests to be conducted, a manual centrifuge will prove inefficient.
Microscope	Light sources: lamps and sunlight	Some health centers are not provided with sufficient lighting.
Treatment light	Electric power (with batteries)	Used for delivery at night and treatment of emergency patients.
Sterilizer	Electric power	Some health centers find it difficult to secure the supply of LP gas, LP gas should be supplied only with refrigerators.

In the Republic of Kenya, only basic items of equipment such as bed for medical



care use, examination table, delivery table, trolley, and instrument cabinet are manufactured. Generally such items of equipment are not covered with a baked-on paint finish since advanced baking finish technique is not available. This causes problems such as early peeling of paint. But some local medical equipment manufacturers are capable of powder coating and their products are generally of high quality. In consideration of the cost of transportation, locally made large items of equipment should be procured in the country as much as possible. The local procurement of beds for medical care use and medical examination tables should be considered because these items of equipment rarely pose serious functional problems. In principle, all the other items of equipment should be procured in Japan because they are mostly basic items of equipment and are therefore easy to maintain and manage.

Those items of equipment which are to be procured in third countries and the rationale for their procurement in third countries are as shown in the following table.

**Table 2-9 Items of Equipment to Be Procured in Third Countries**

Item	Rationale
Refrigerator	Hybrid refrigerator are not manufactured in the Republic of Kenya.
Dental Unit	U.S-made stand-alone equipment for outdoor use, which is used by the U.S. armed force, can be used where there is no supply of electricity or city water. In addition, it is not required wiring or plumbing.

Shown below is a list of standard items of equipment for this project.

Table 2-10 List of Standard Items of Equipment

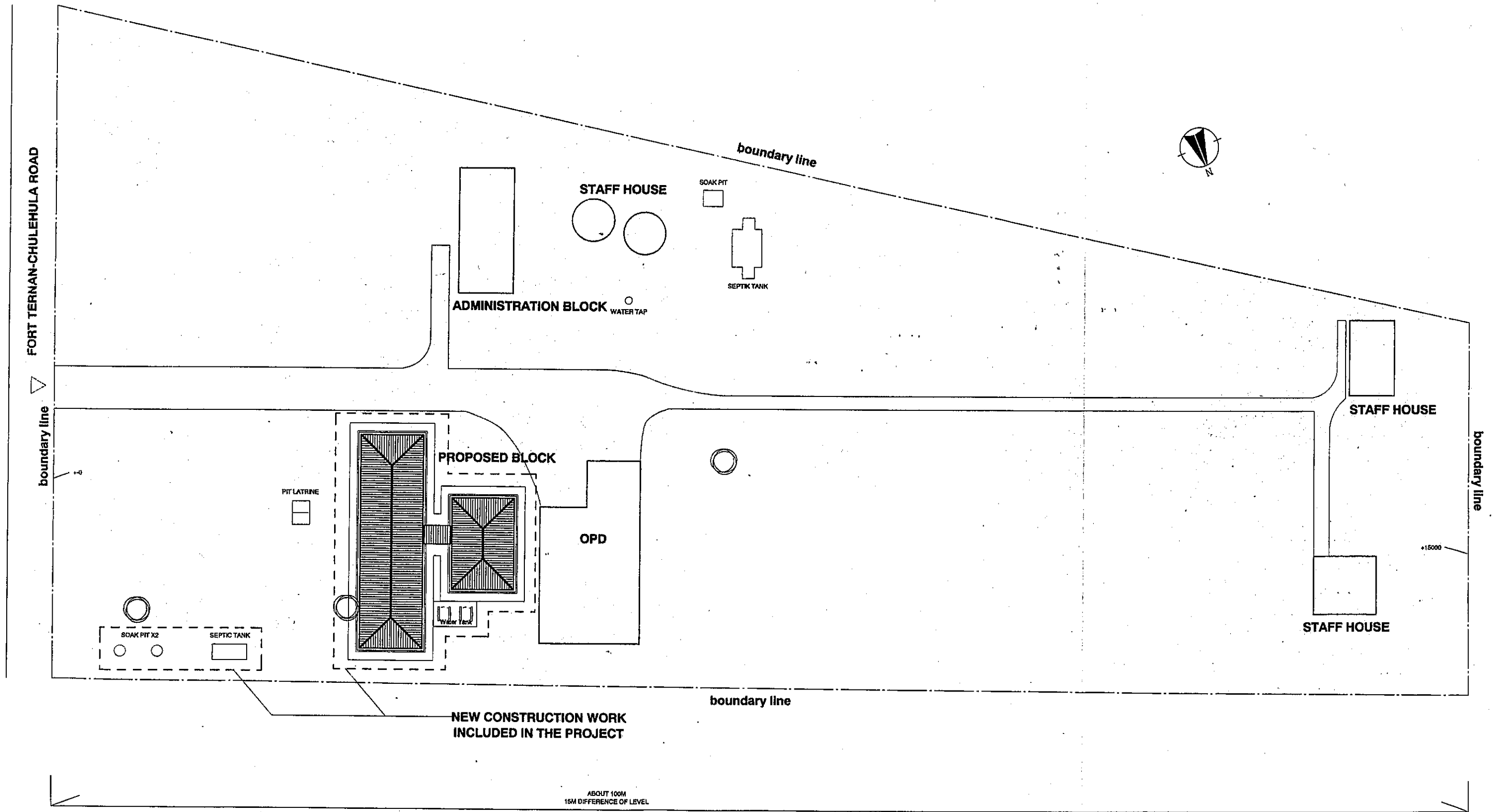
	FORT TERNAN	KIPELION	SOSIOT	KAPKOROS	NDANAI	SIGOR	EKERENYO	KEROKA	MANGA	KEUMBU	MARANI	MASHIMBA	KENYANYA	NDURU	NYAMACHE	OGEMBO	TOTAL
Examination Couch	4	4	4	4	4	5	4	4	4	6	4	4	4	4	4	5	68
Sphygmomanometer	5	5	5	5	5	6	5	5	5	6	5	5	5	5	5	6	83
Stethoscope	5	5	5	5	5	6	5	5	5	6	5	5	5	5	5	6	83
Diagnostic Set	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	2	19
Drip Stand	4	4	4	4	4	5	4	4	4	5	4	4	4	4	4	5	67
Suction Pump	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Weighing Scale	2	2	2	2	2	3	2	2	2	3	2	2	2	2	2	3	35
Baby Scale	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	32
Sterilizer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	32
Examination Lamp	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	33
Surgical Set	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	17
Body-height measuring rod for adult	2	2	2	2	2	3	2	2	2	3	2	2	2	2	2	3	35
Body-height measuring rod for infant	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Washing Basin Stand and basin	4	4	4	4	4	5	4	4	4	6	4	4	4	4	4	5	68
Treatment cart	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	49
Dressing Cart	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	17
Wast can	4	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	65
Arm rest for intravenous injection	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	17
Colse basket	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	32
Cabinet for equipment	3	3	3	3	3	4	3	3	3	4	3	3	3	3	3	4	51
Strecher	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	4	35
Screen	14	8	14	14	14	14	14	14	20	18	17	10	14	14	8	29	236
Resuscitation kit	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	33
Centrifuge	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Microscope	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16





(4) Basic Design Drawings

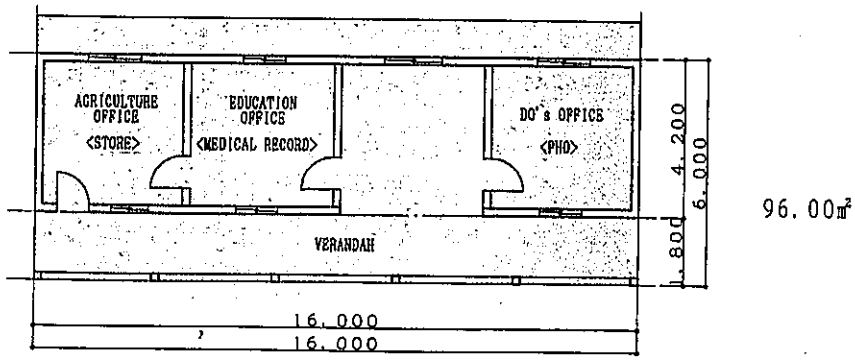
1.	Fort Ternan Health Centre	Site	Plan	Elevation
2.	Kipkelion Health Centre	Site	Plan	Elevation
3.	Sosiot Health Centre	Site	Plan	Elevation
4.	Kapkoros Health Centre	Site	Plan	Elevation
5.	Ndanai Health Centre	Site	Plan	Elevation
6.	Sigor Health Centre	Site	-	-
7.	Ekerenyo Health Centre	Site	Plan	Elevation
8.	Keroka Health Centre	Site	Plan	Elevation
9.	Manga Health Centre	Site	Plan	Elevation
10.	Keumbu Health Centre	Site	-	-
11.	Marani Health Centre	Site	Plan	Elevation
12.	Mashimba Health Centre	Site	Plan	Elevation
13.	Kenyenya Health Centre	Site	Plan	Elevation
14.	Nduru Health Centre	Site	-	-
15.	Nyamache Health Centre	Site	Plan	Elevation
16.	Ogembo Health Centre	Site	Plan	Elevation



NEW CONSTRUCTION WORK INCLUDED IN THE PROJECT

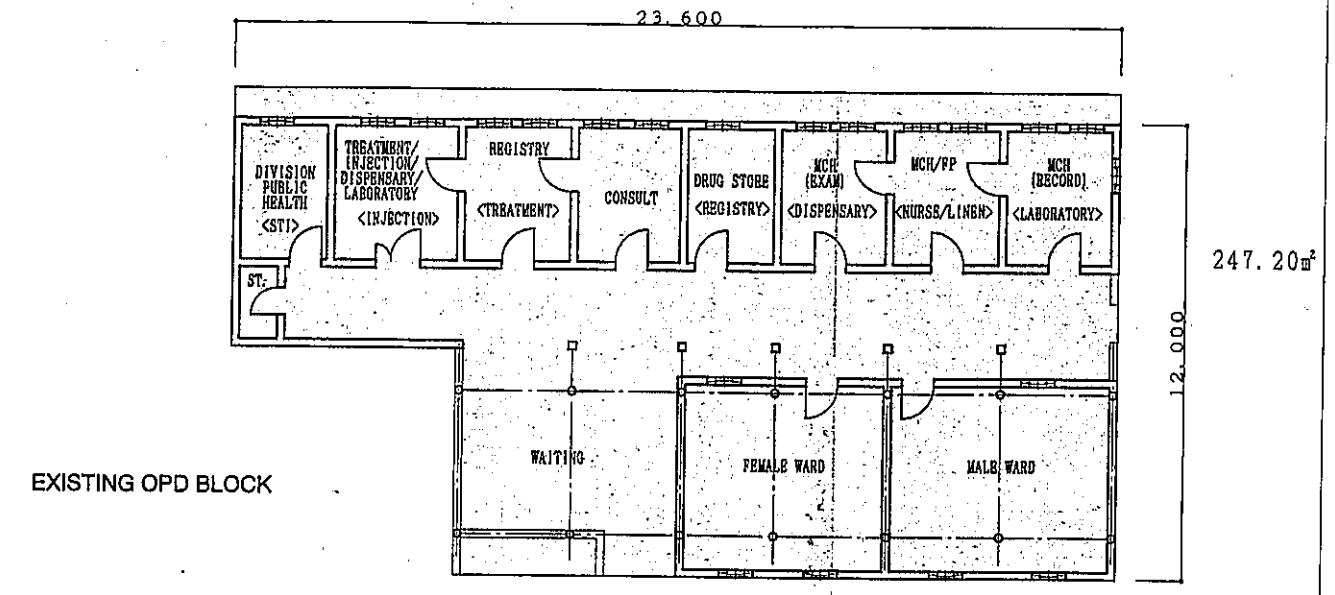
ABOUT 100M  
15M DIFFERENCE OF LEVEL



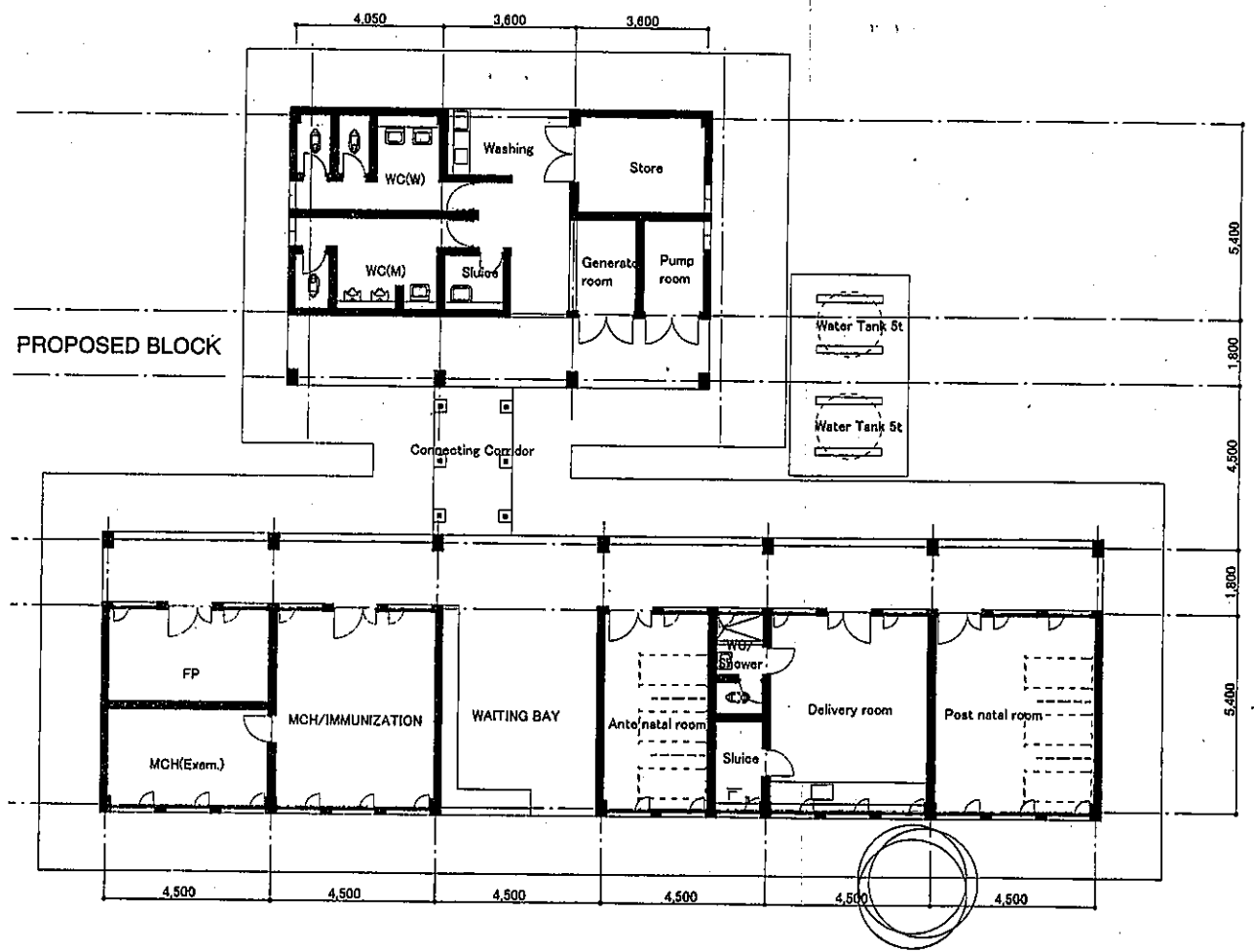


EXISTING ADM. BLOCK

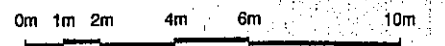
DIYISION ADM OFFICES  
(TO BE COVERED INTO MATERNITY WARD)



EXISTING OPD BLOCK

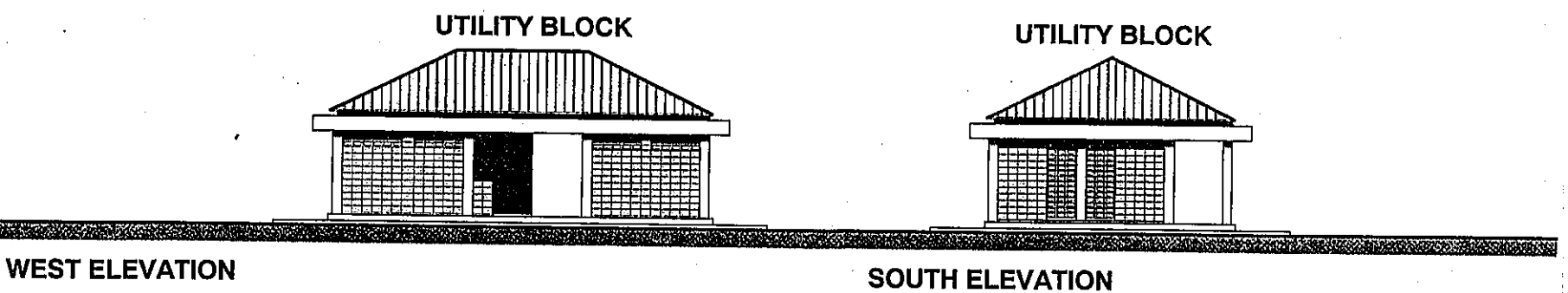
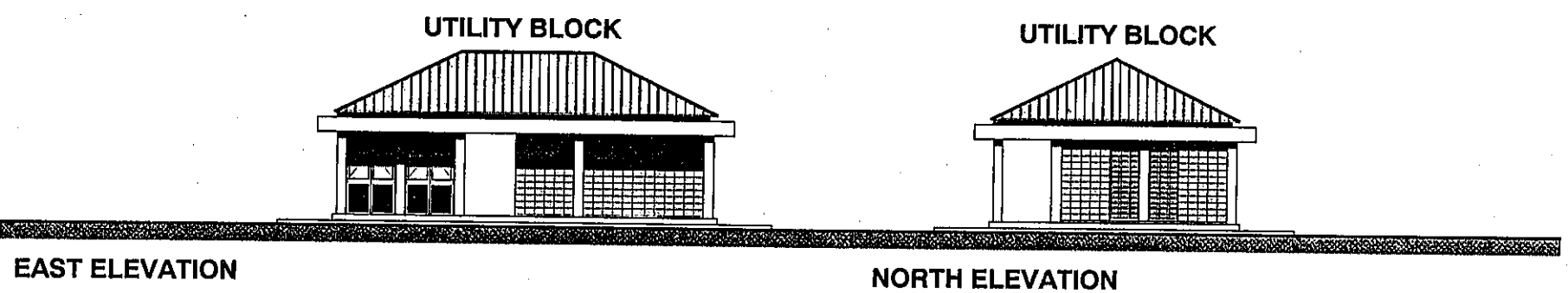
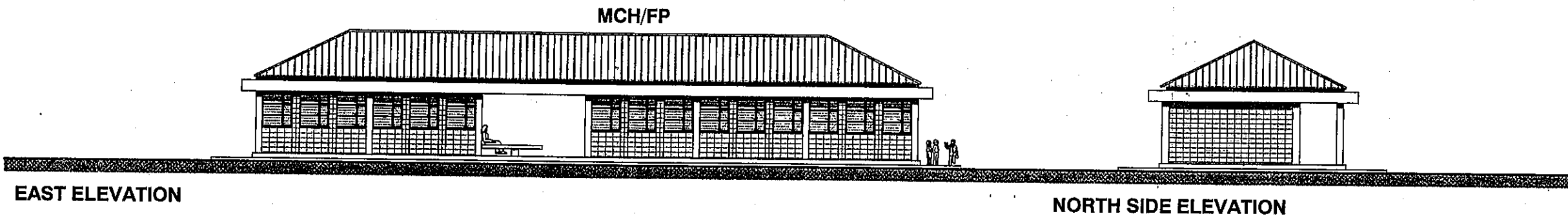
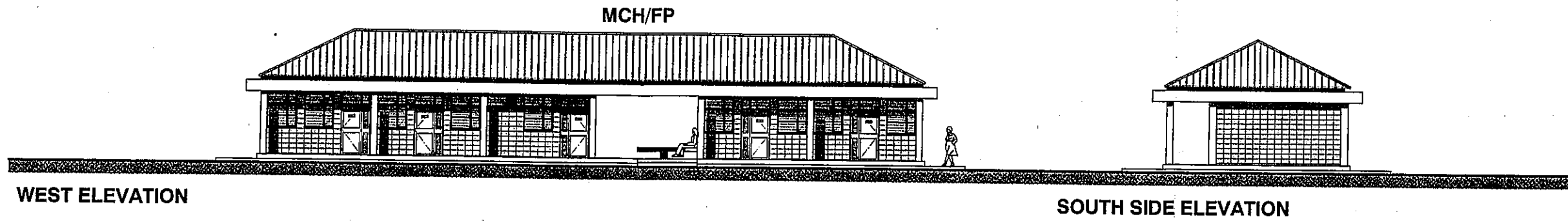


PROPOSED BLOCK

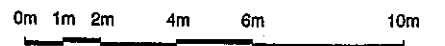


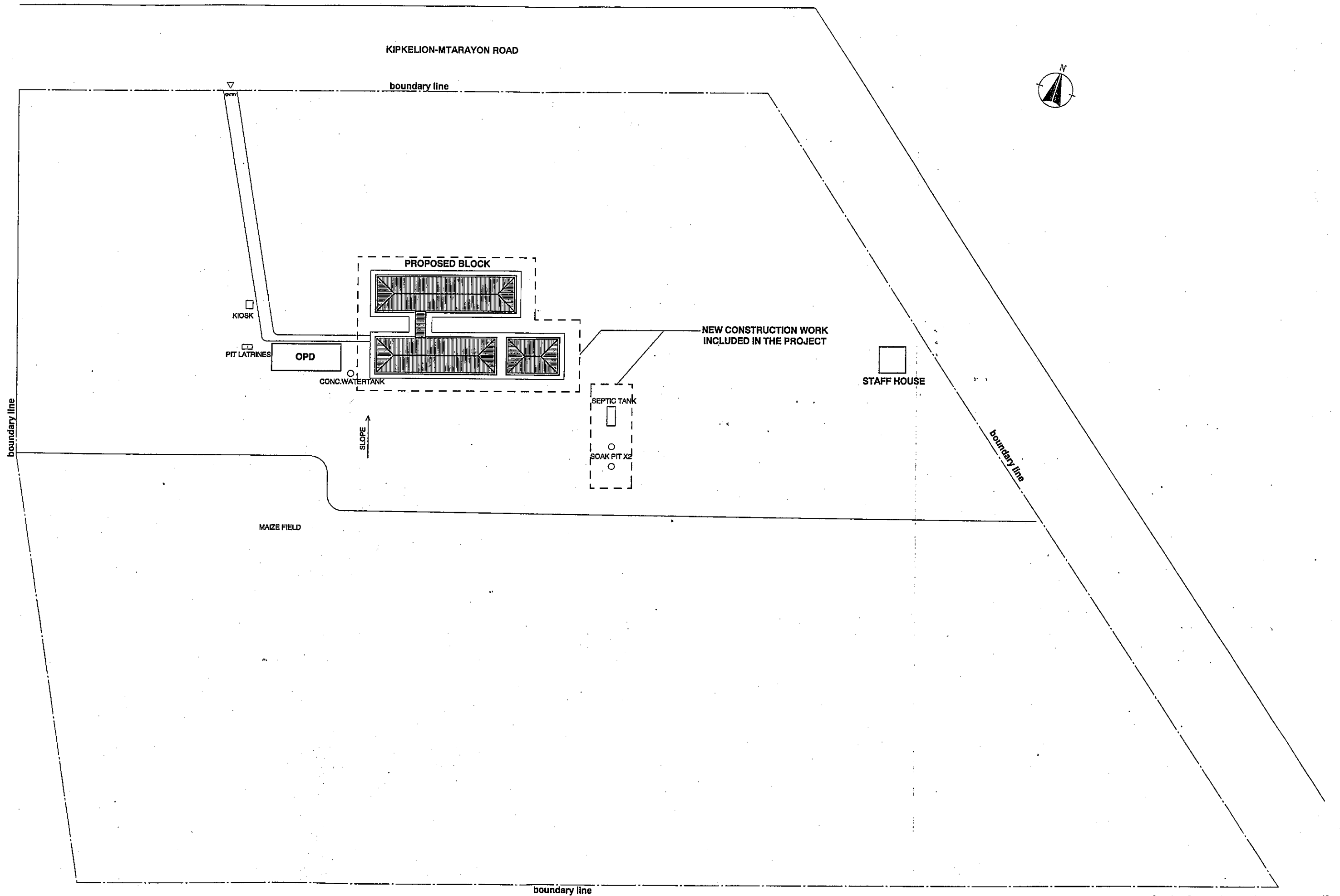
FORT TERNAN H/C

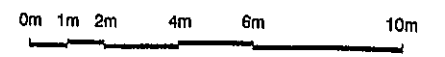
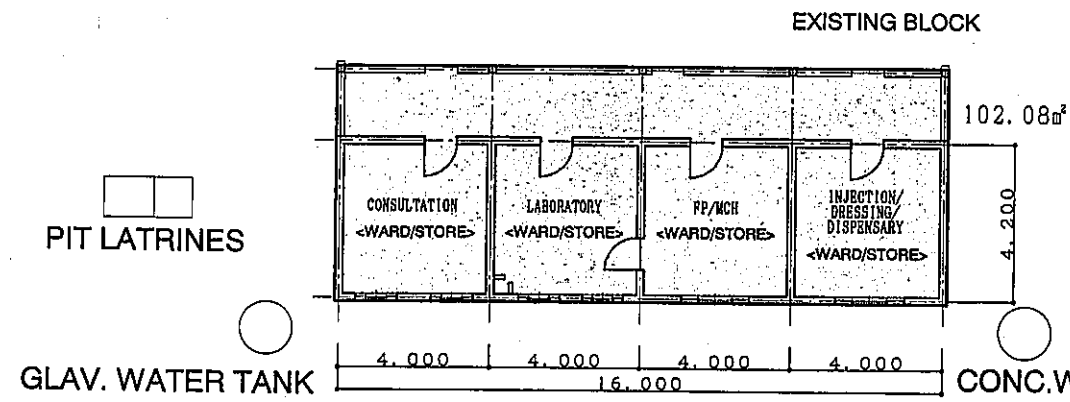
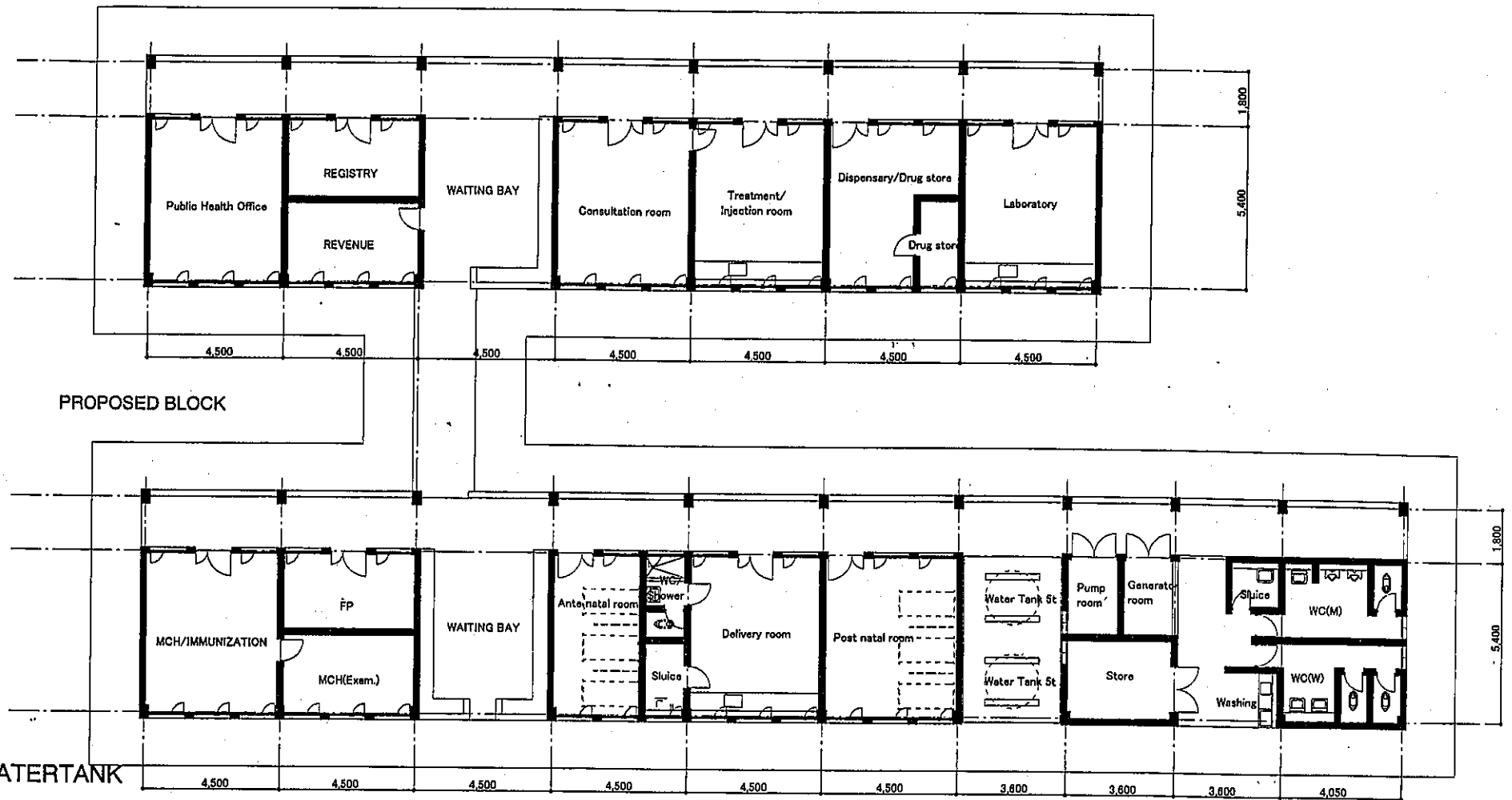




PROPOSED BLOCK



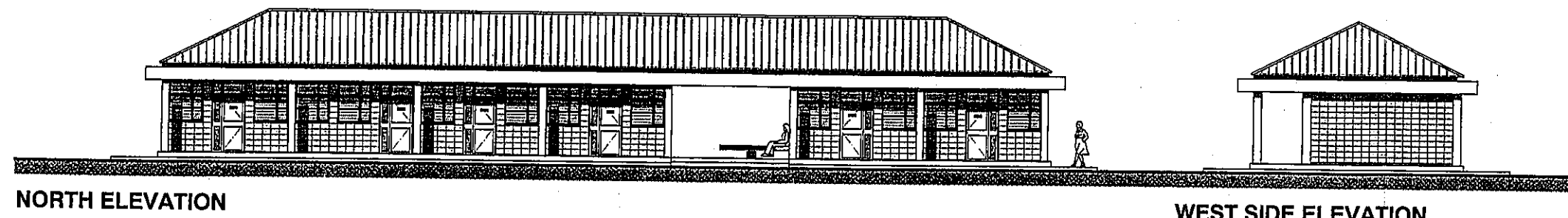




The Project for Improvement of Health Centres  
in the Western Part of Kenya

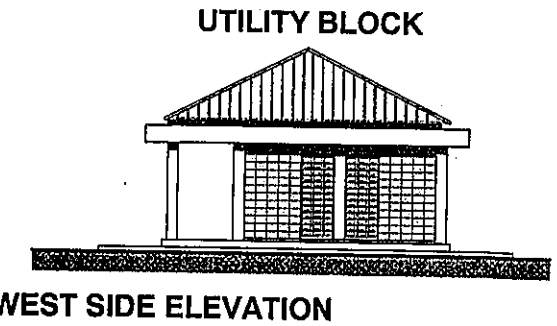
Kipkelion Health Centre

Floor Plan S=1/200

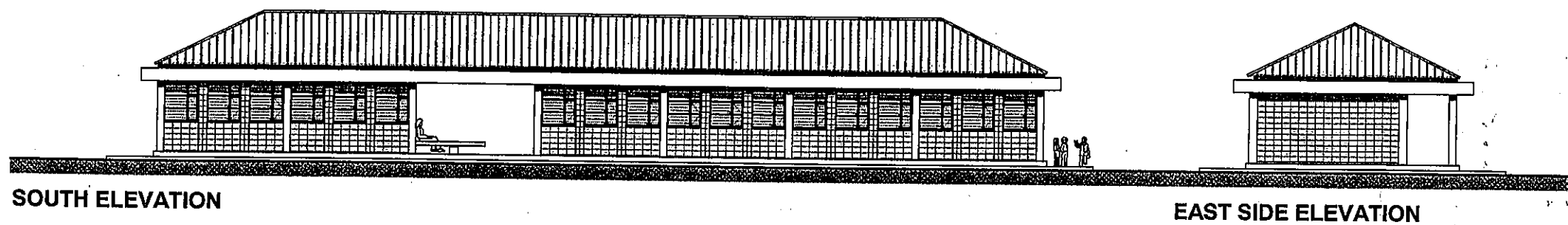


NORTH ELEVATION

WEST SIDE ELEVATION

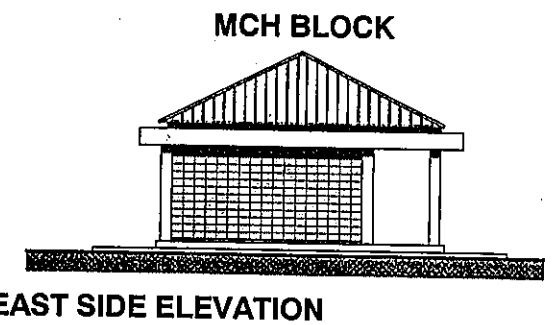


WEST SIDE ELEVATION

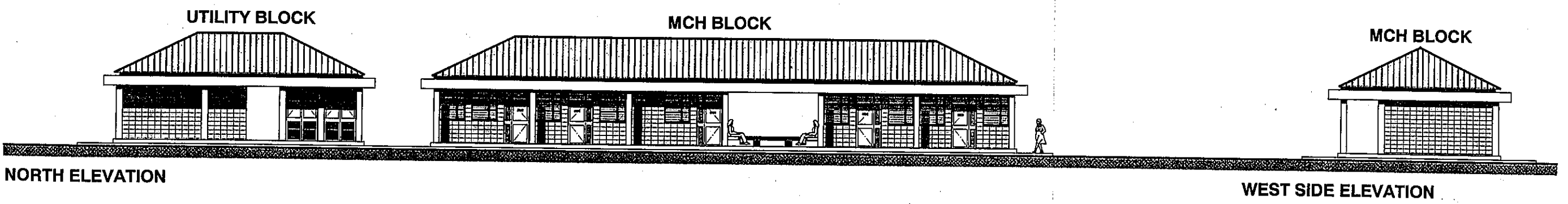


SOUTH ELEVATION

EAST SIDE ELEVATION

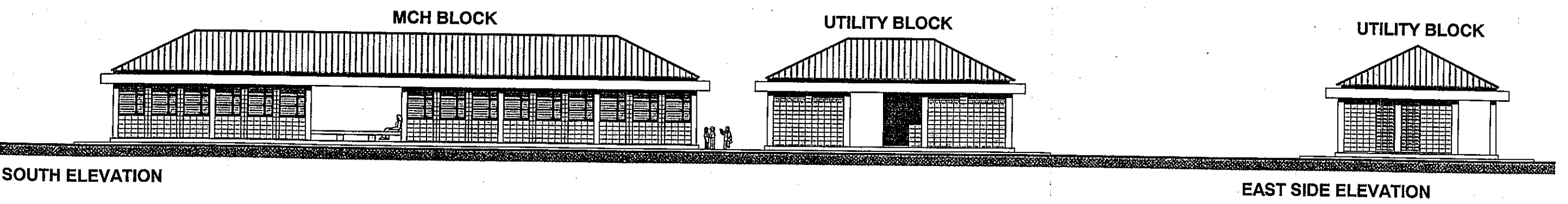


EAST SIDE ELEVATION



NORTH ELEVATION

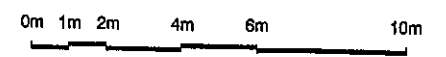
WEST SIDE ELEVATION



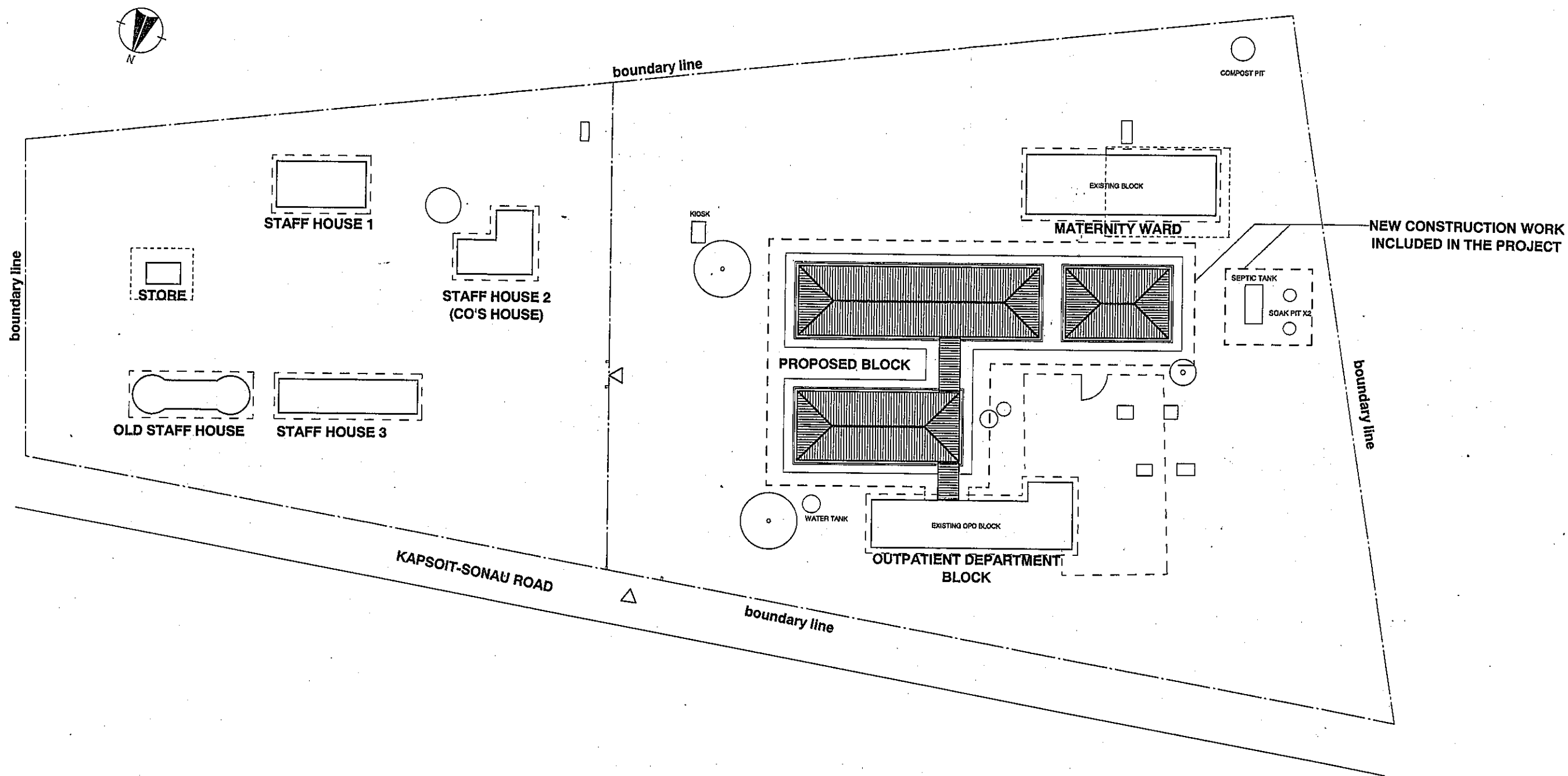
SOUTH ELEVATION

EAST SIDE ELEVATION

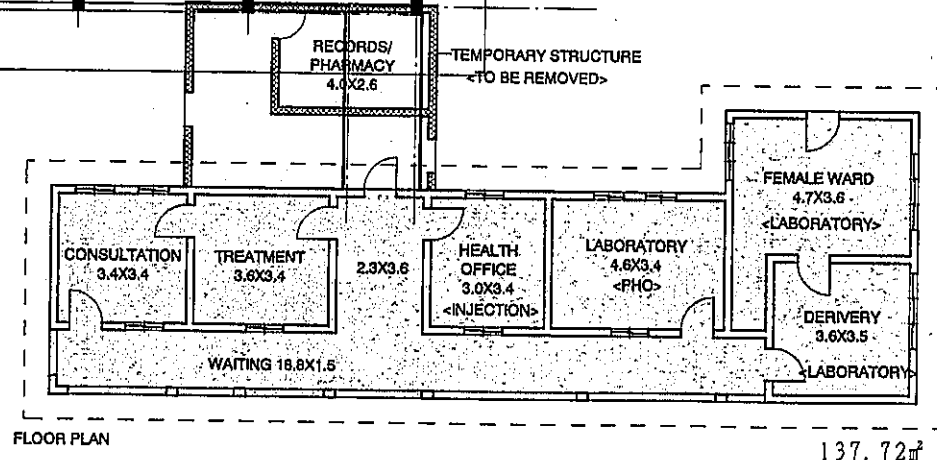
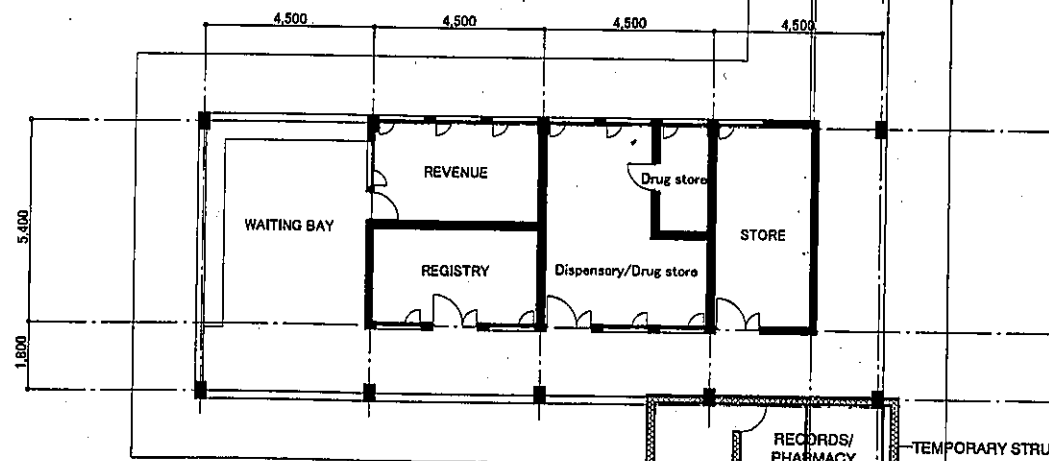
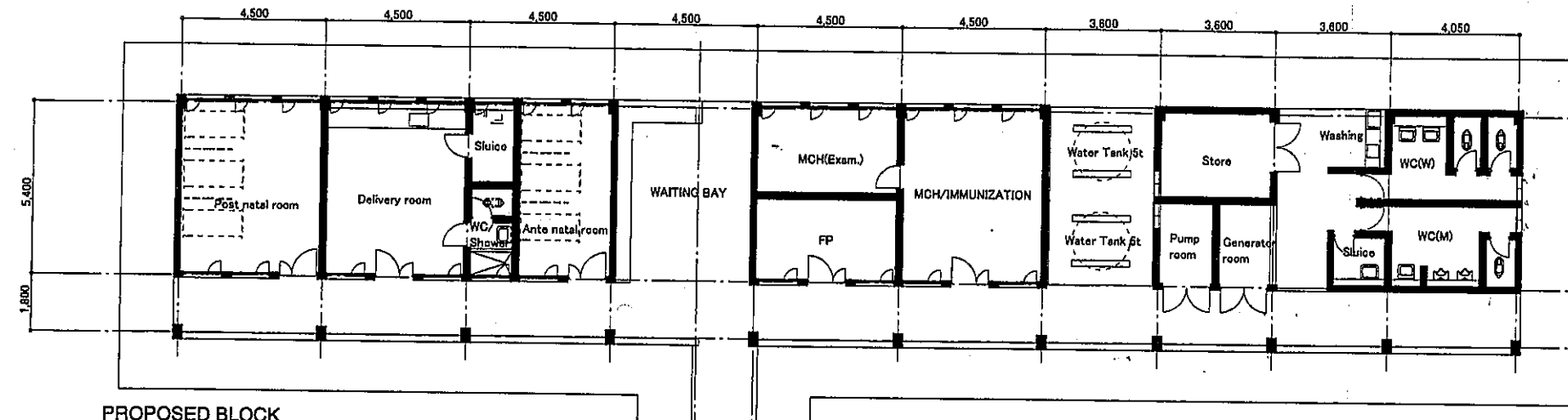
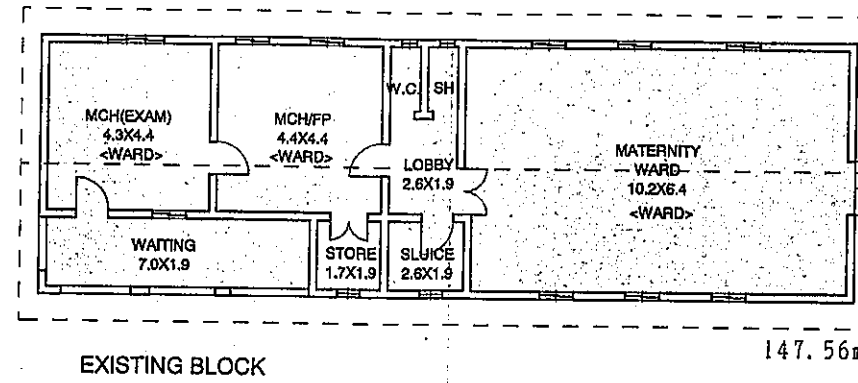
PROPOSED BLOCK



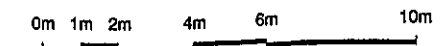


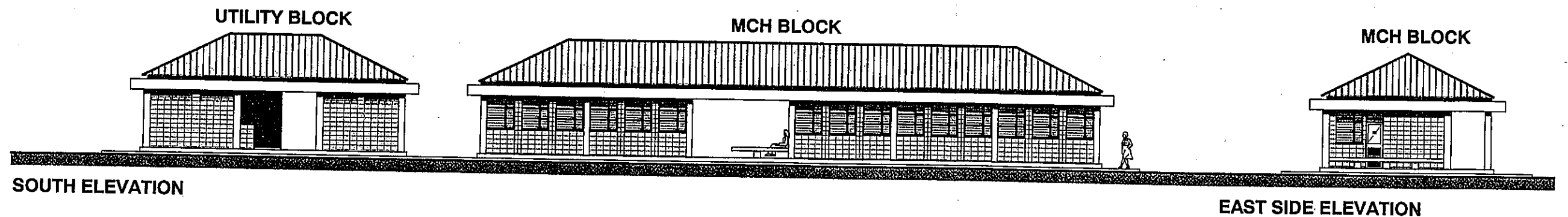
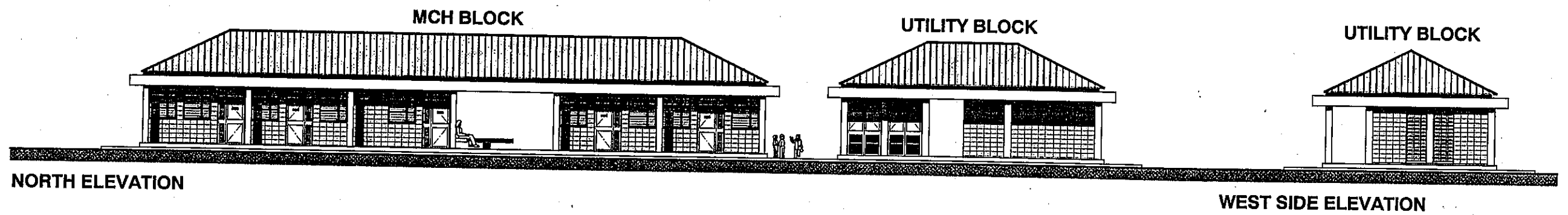
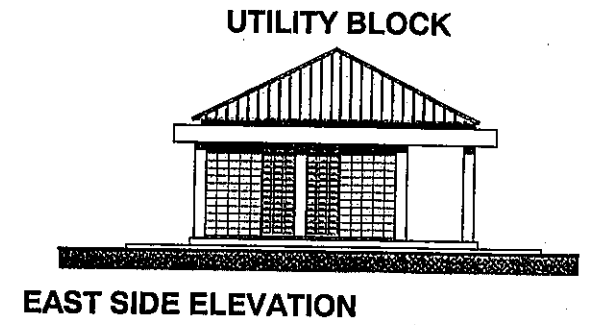
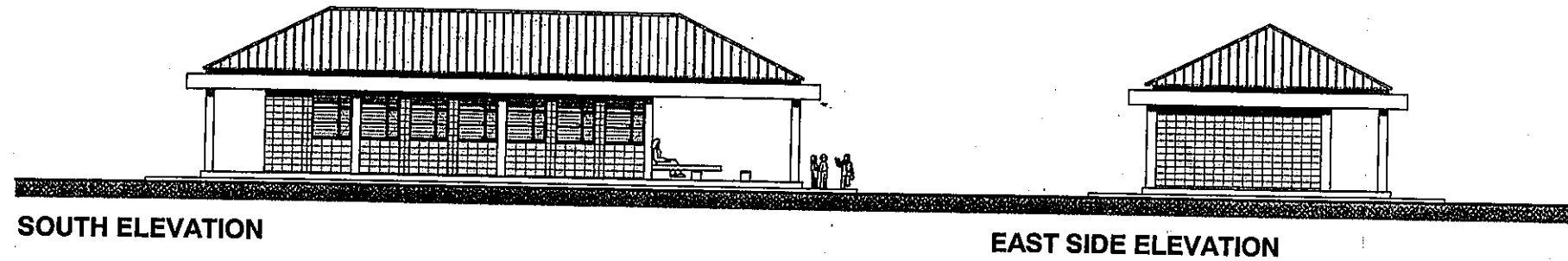
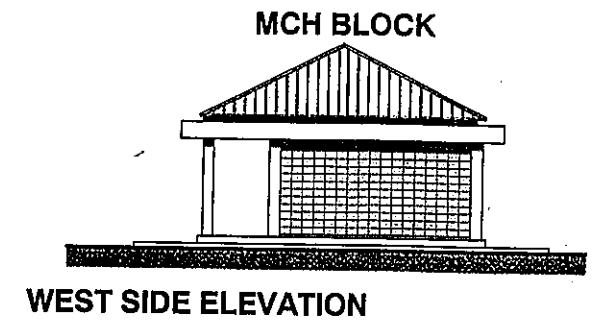
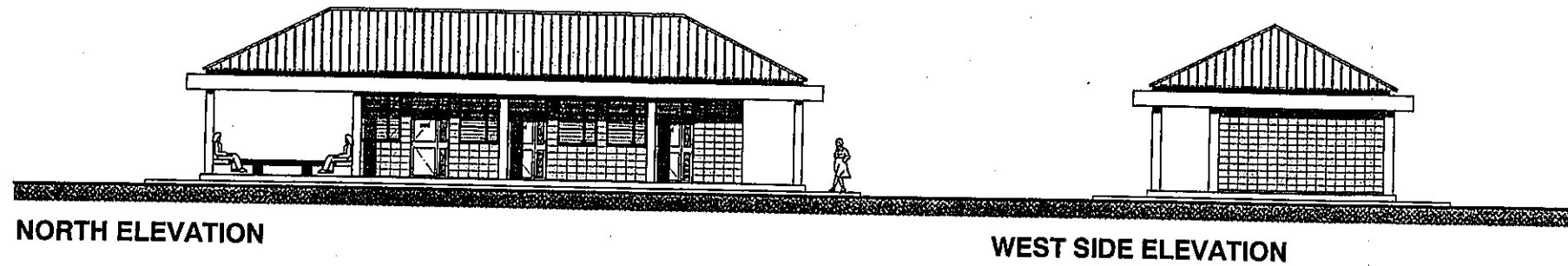


NEW CONSTRUCTION WORK INCLUDED IN THE PROJECT

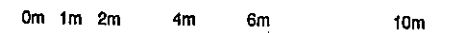


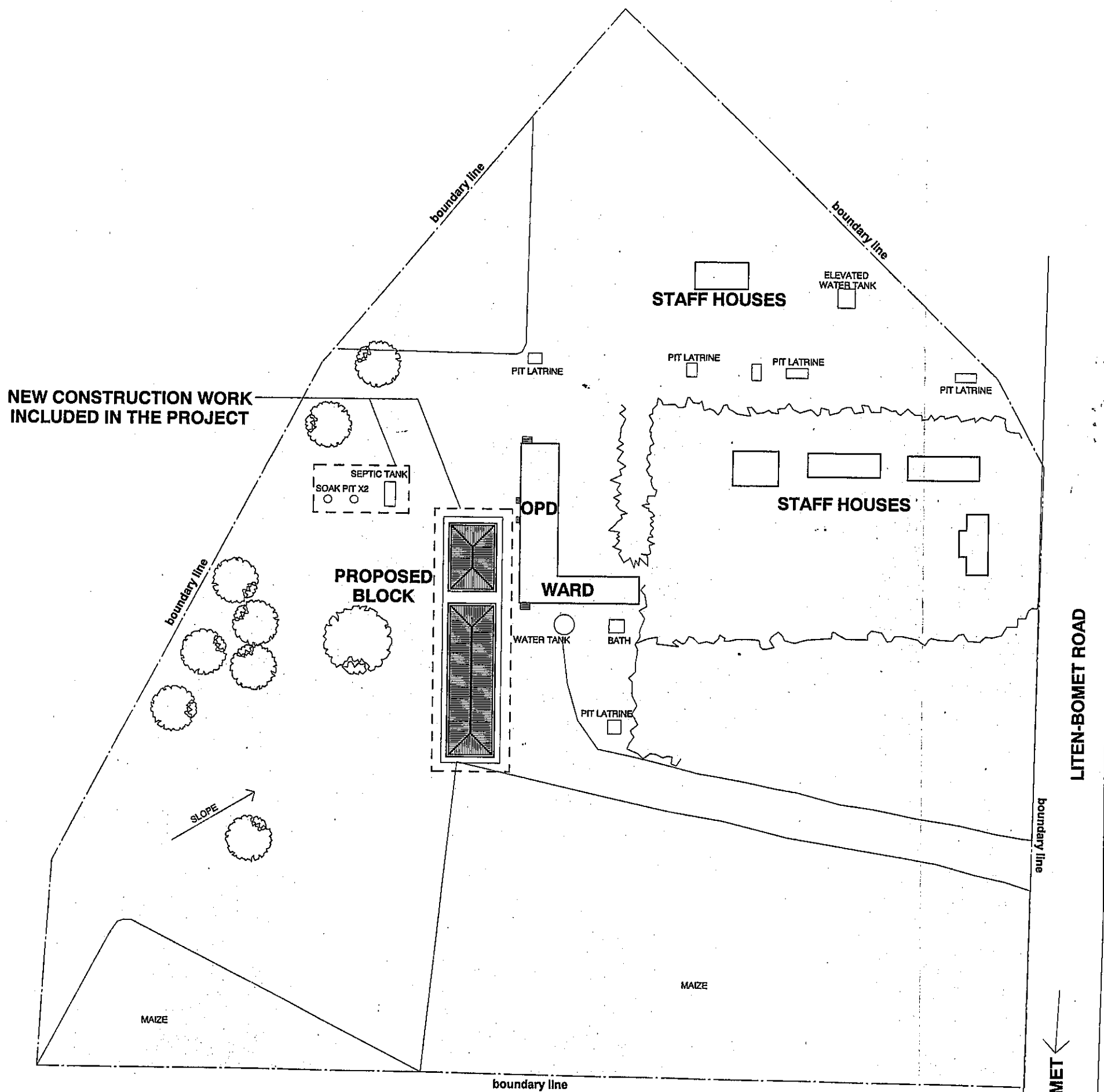
EXISTING OPD BLOCK





**PROPOSED BLOCK**





**NEW CONSTRUCTION WORK INCLUDED IN THE PROJECT**

SEPTIC TANK  
SOAK PIT X2

**PROPOSED BLOCK**

OPD

WARD

STAFF HOUSES

ELEVATED WATER TANK

PIT LATRINE

PIT LATRINE

PIT LATRINE

STAFF HOUSES

WATER TANK

BATH

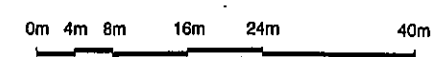
PIT LATRINE

LITEN-BOMET ROAD

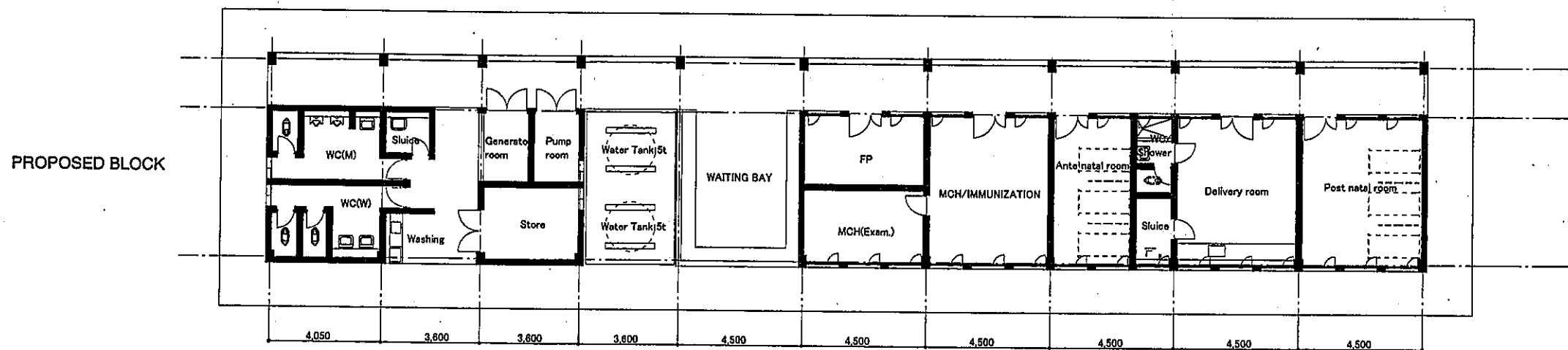
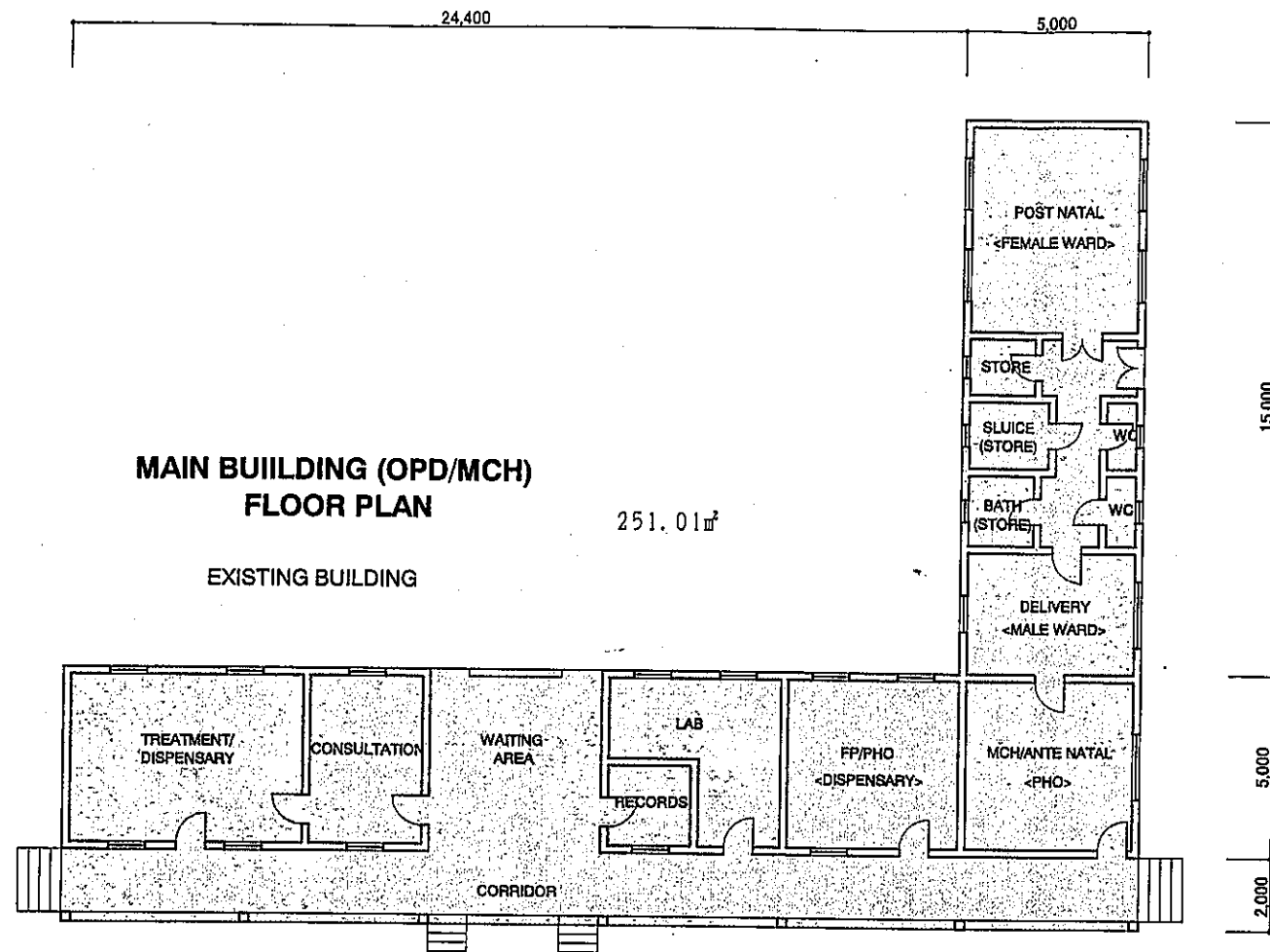
MAIZE

MAIZE

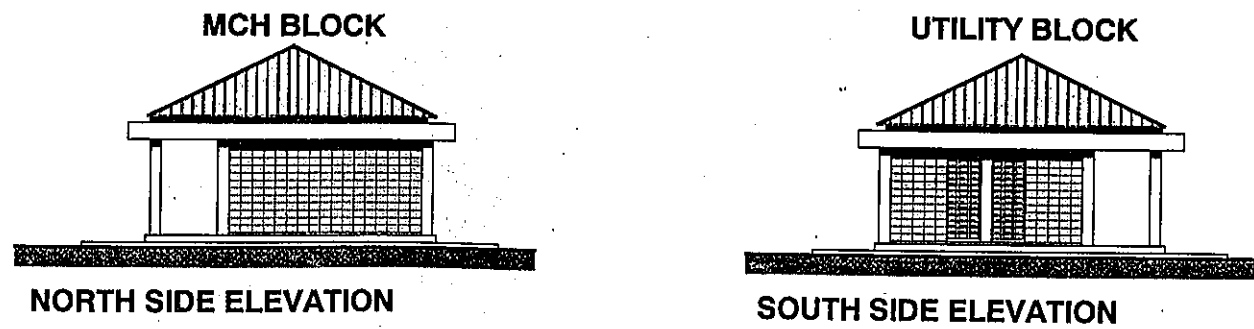
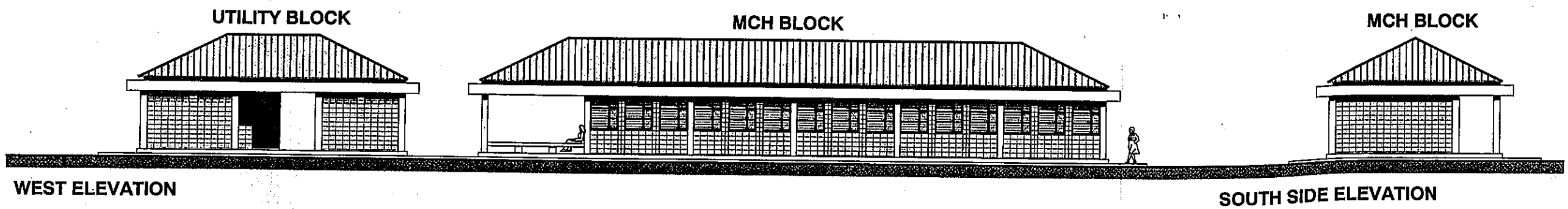
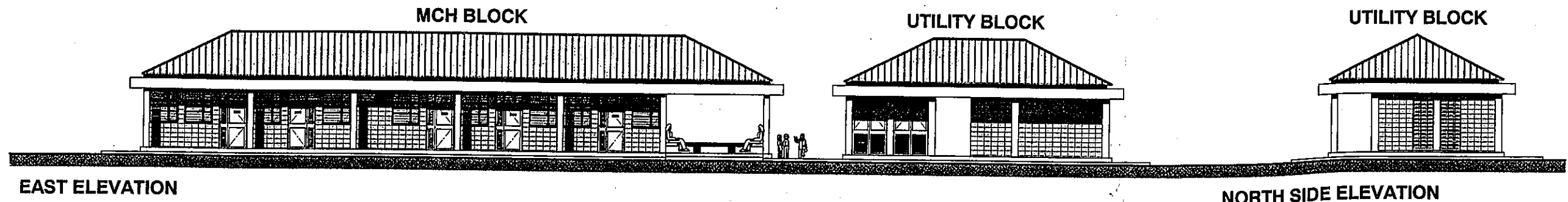
BOMET





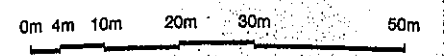
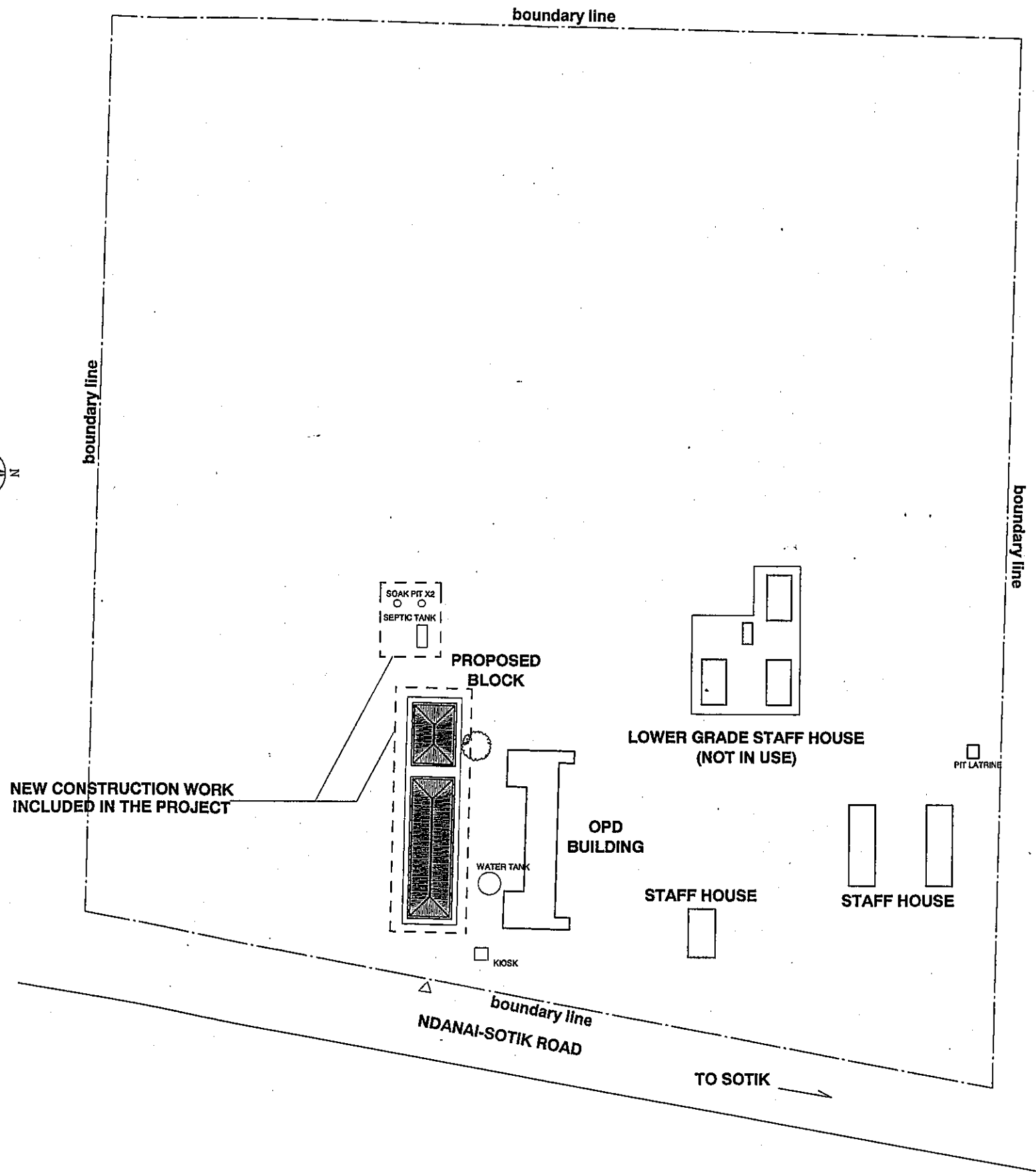
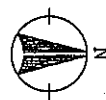


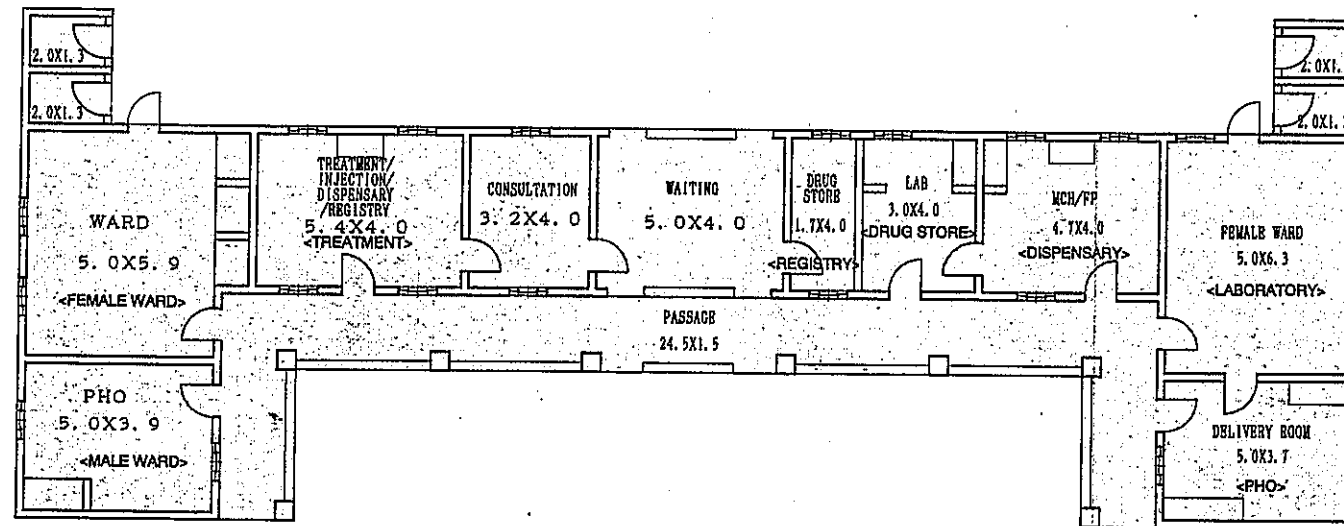
0m 1m 2m 4m 6m 10m



PROPOSED BLOCK



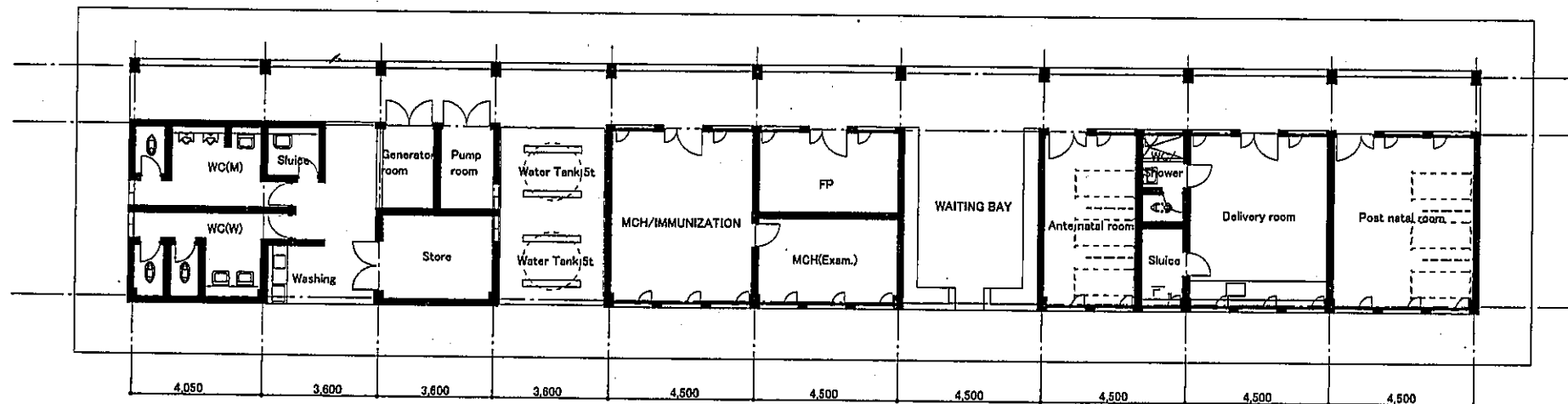




302.08<sup>m</sup>

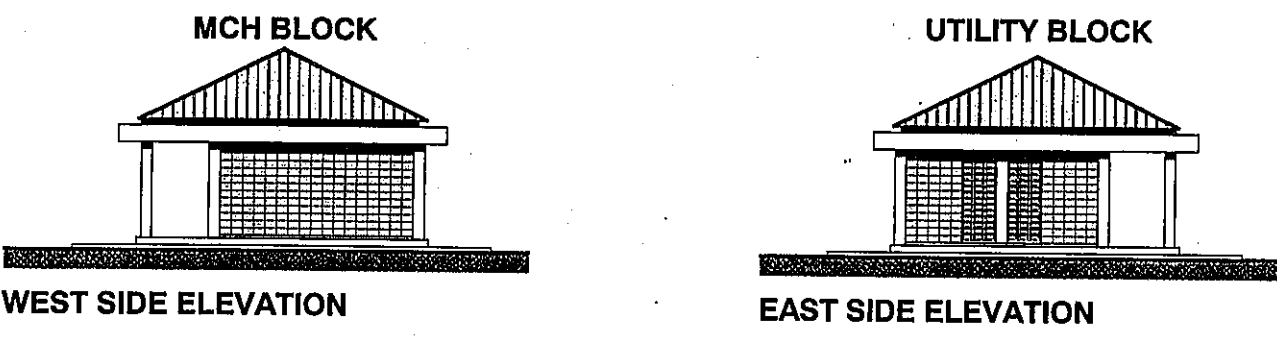
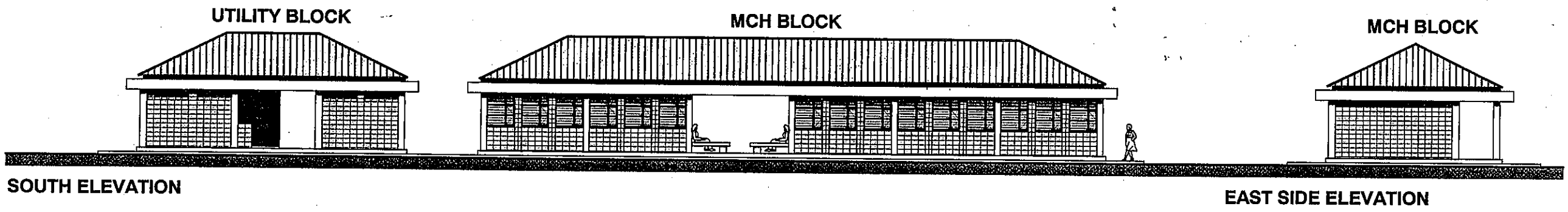
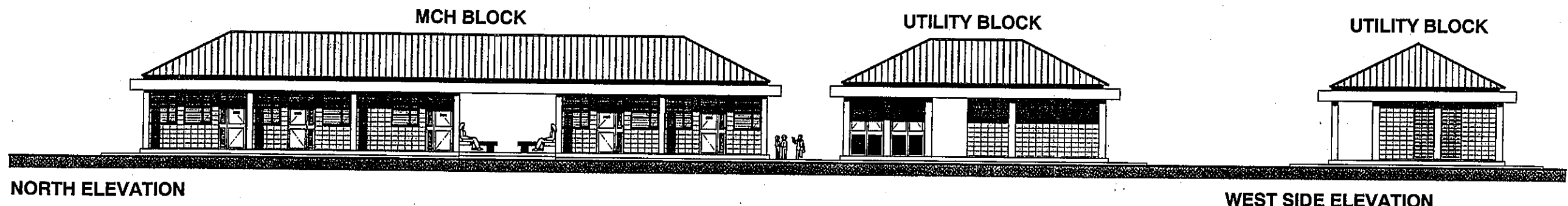
EXISTING BLOCK

PROPOSED BLOCK

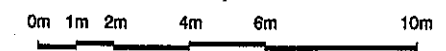


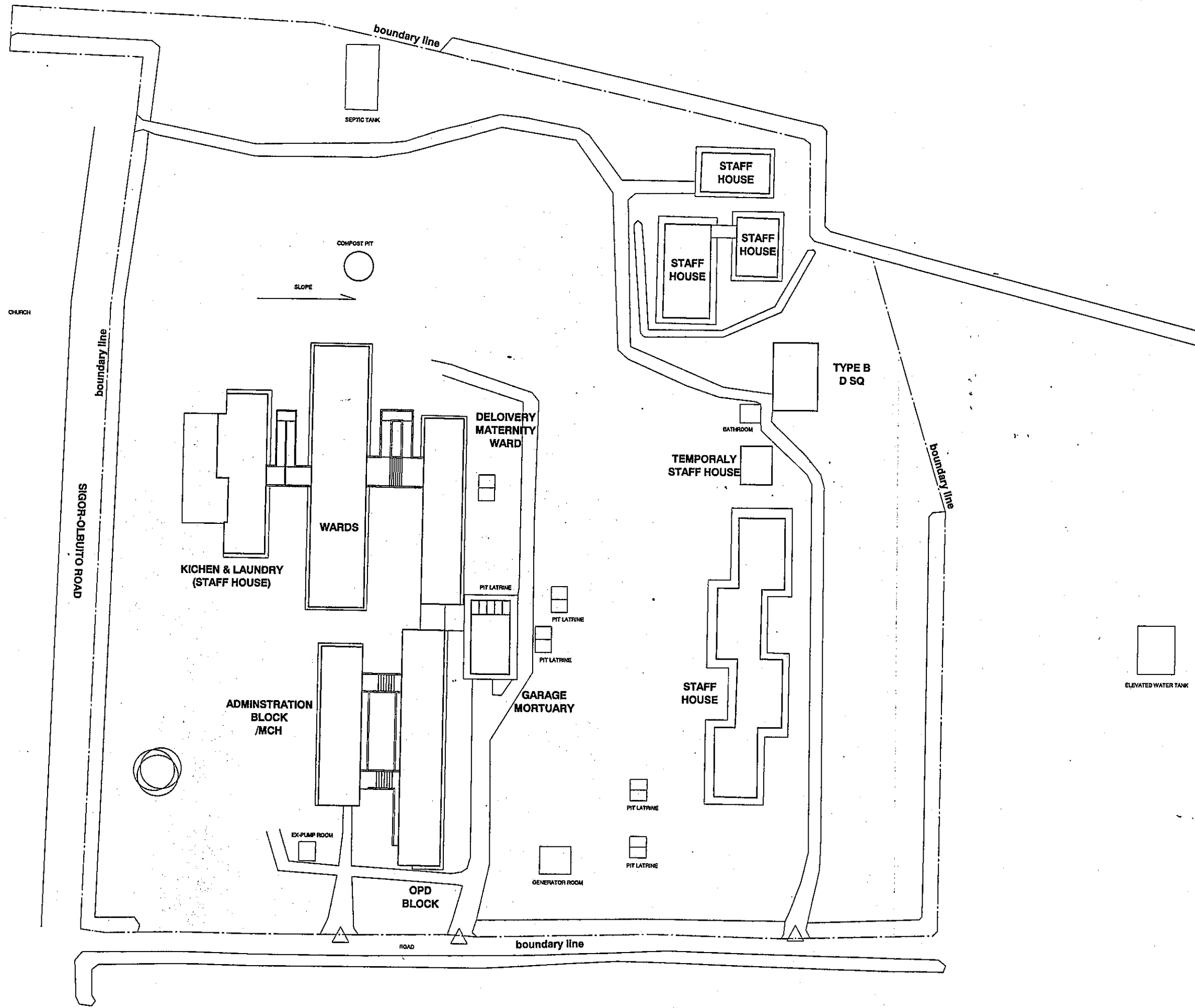
0m 1m 2m 4m 6m 10m



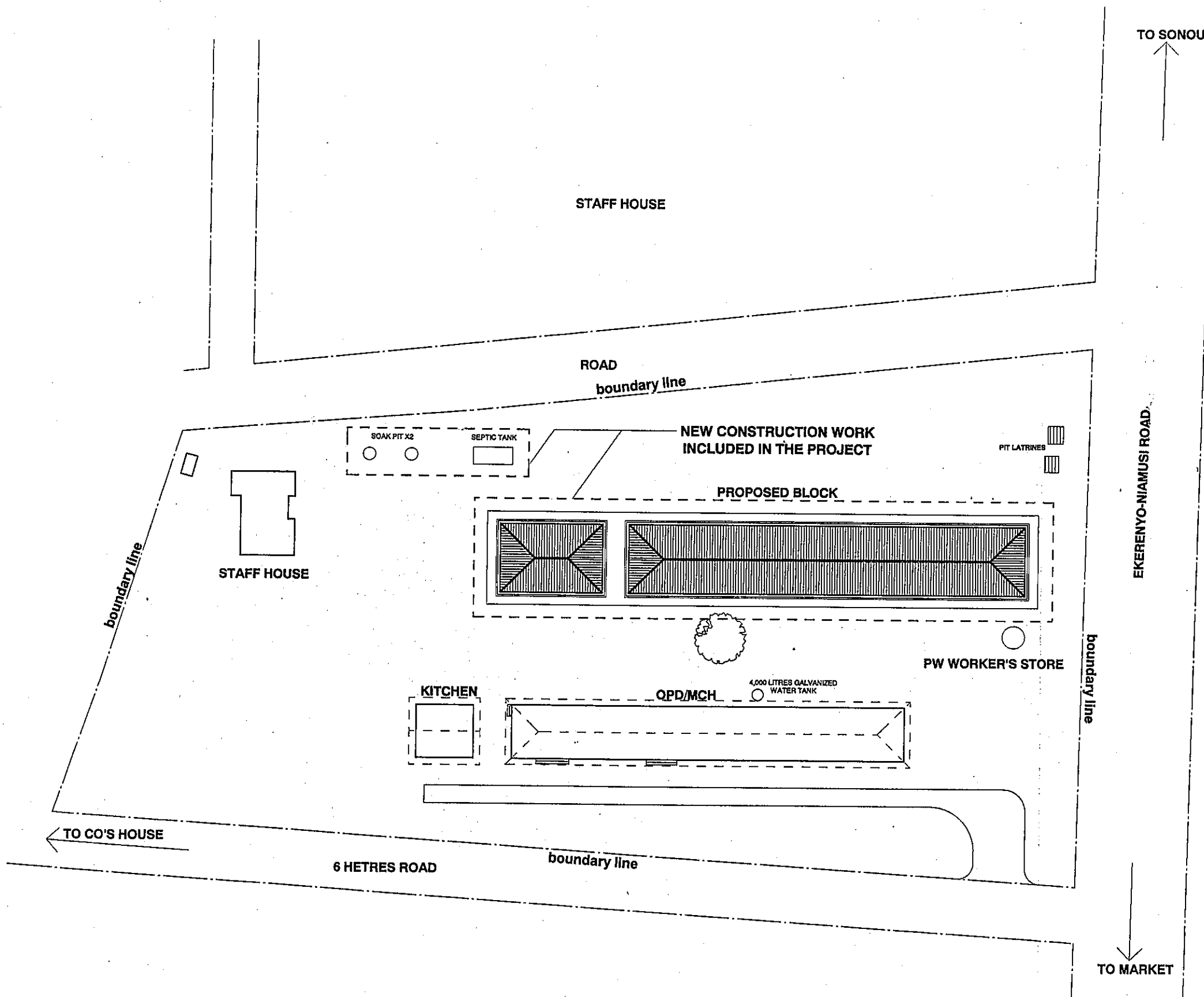


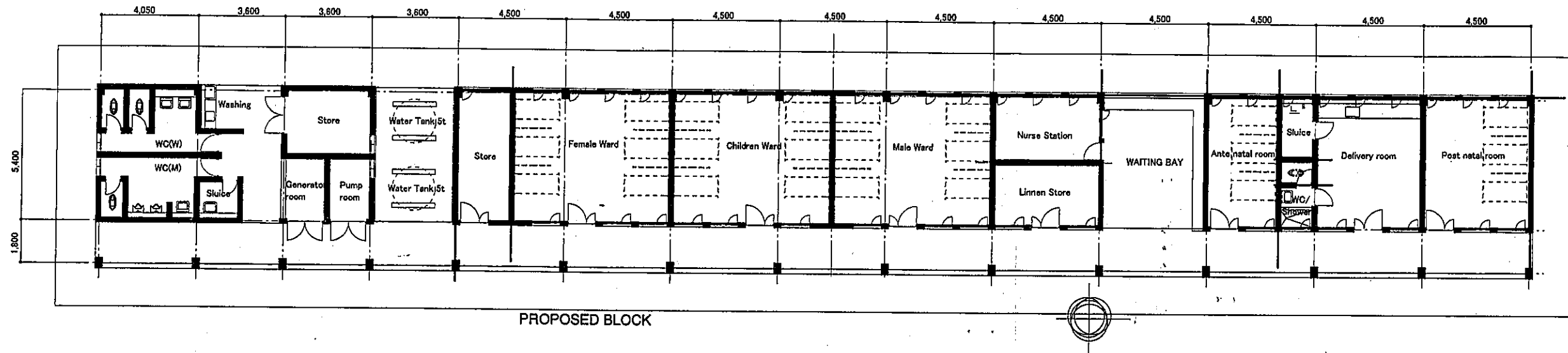
PROPOSED BLOCK



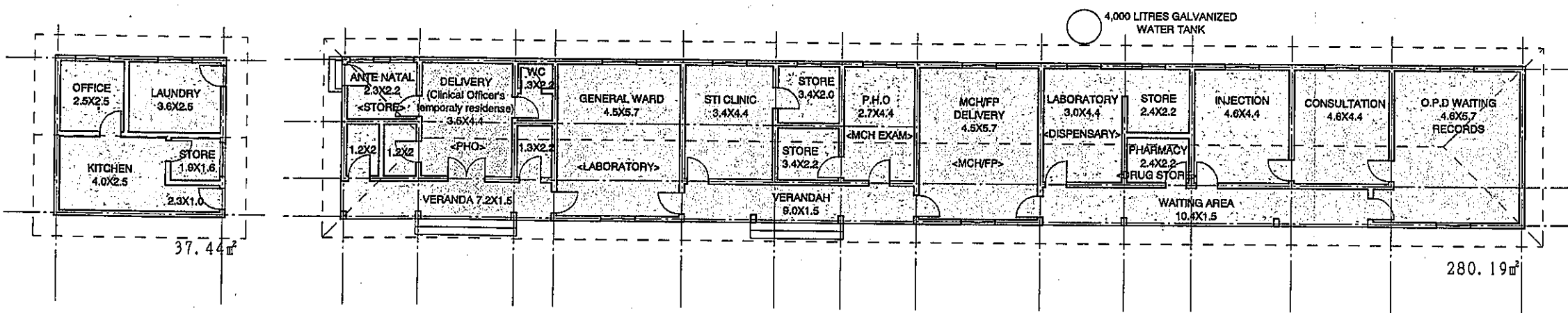


0m 3m 6m 12m 18m 30m

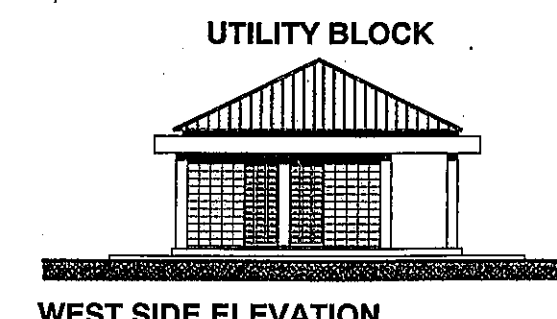
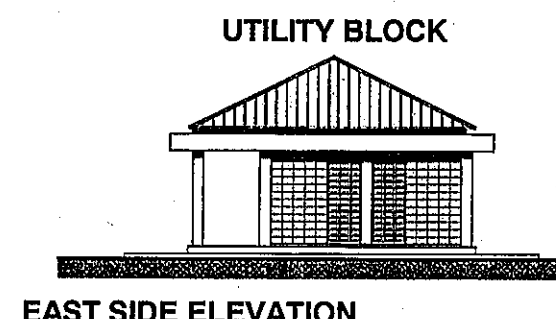
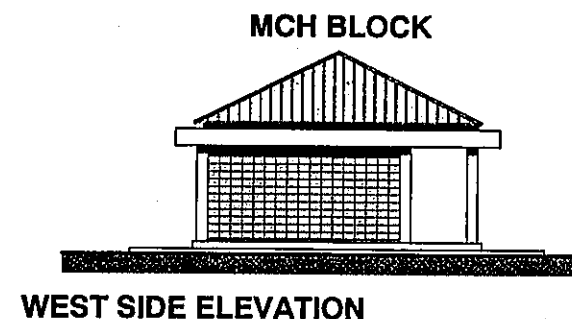
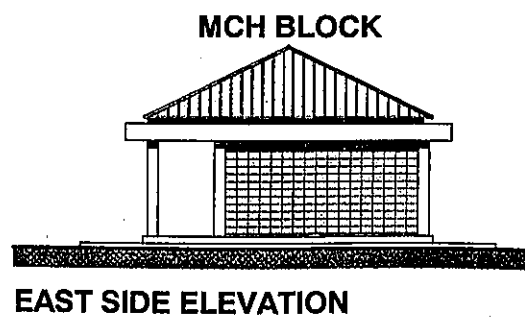
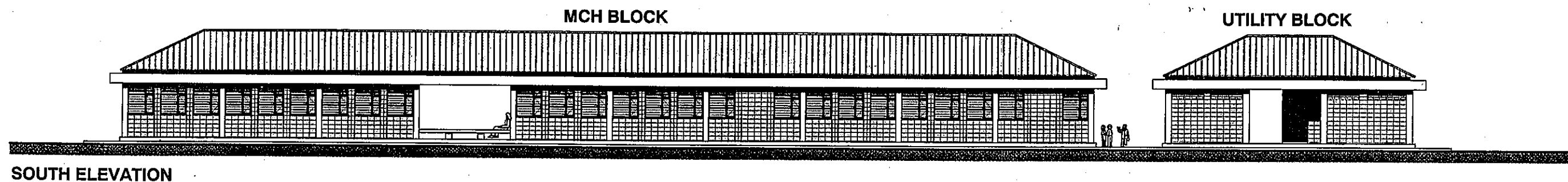
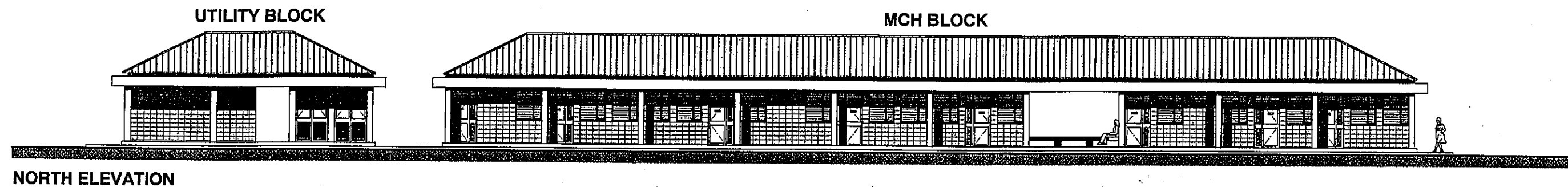




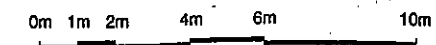
EXISTING BLOCK

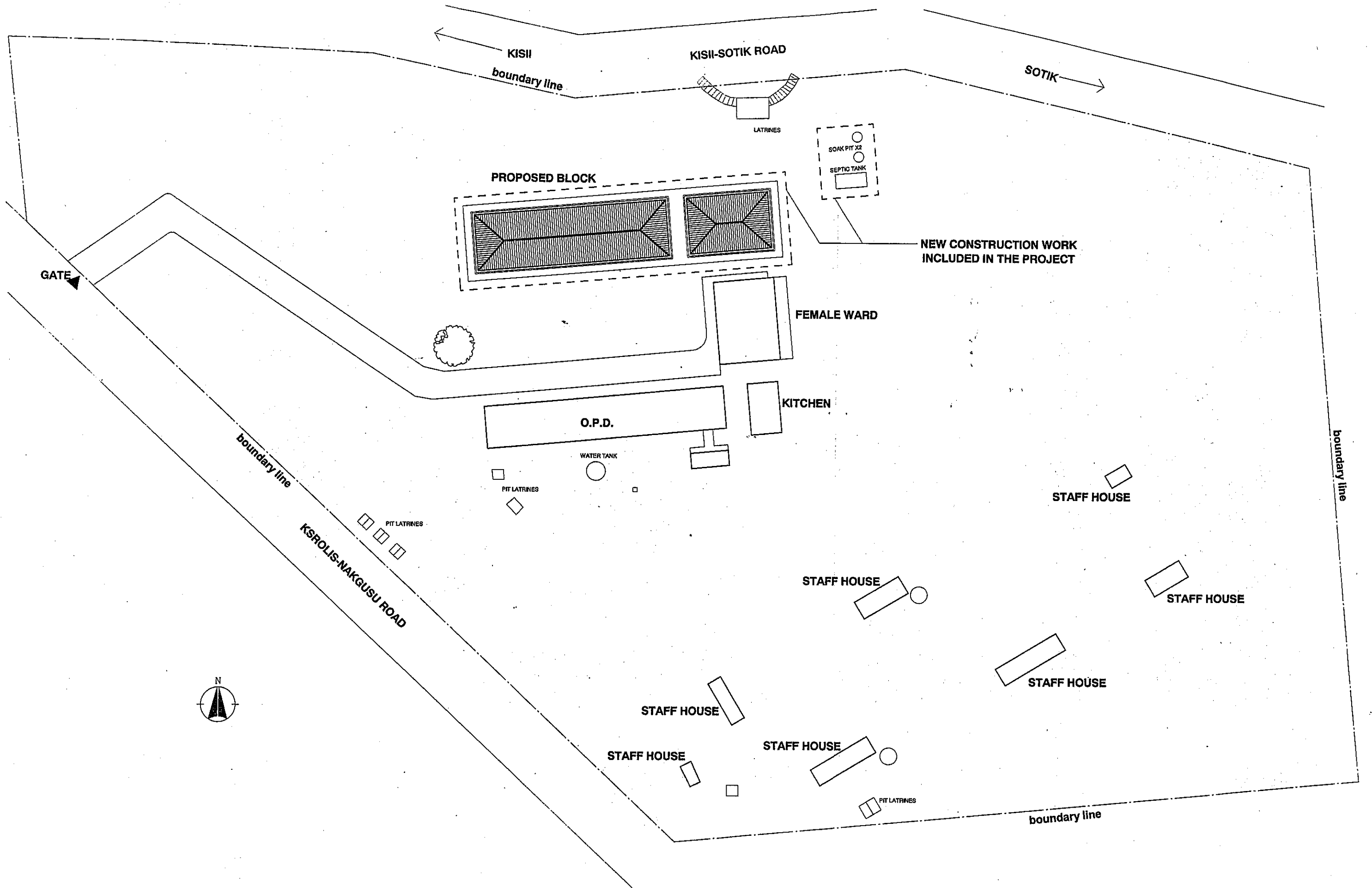


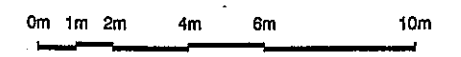
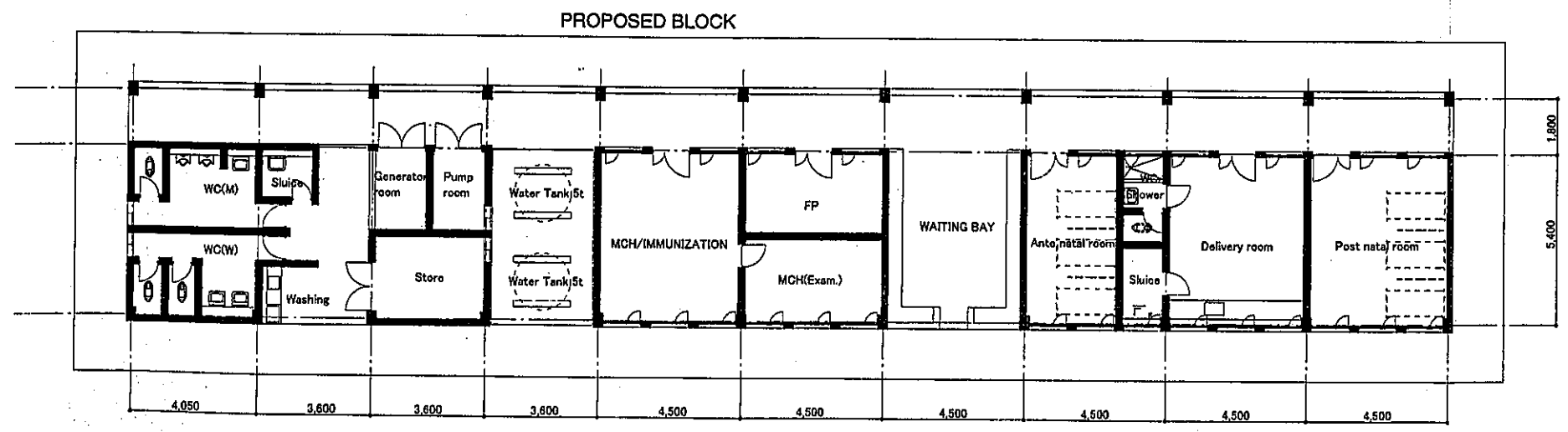
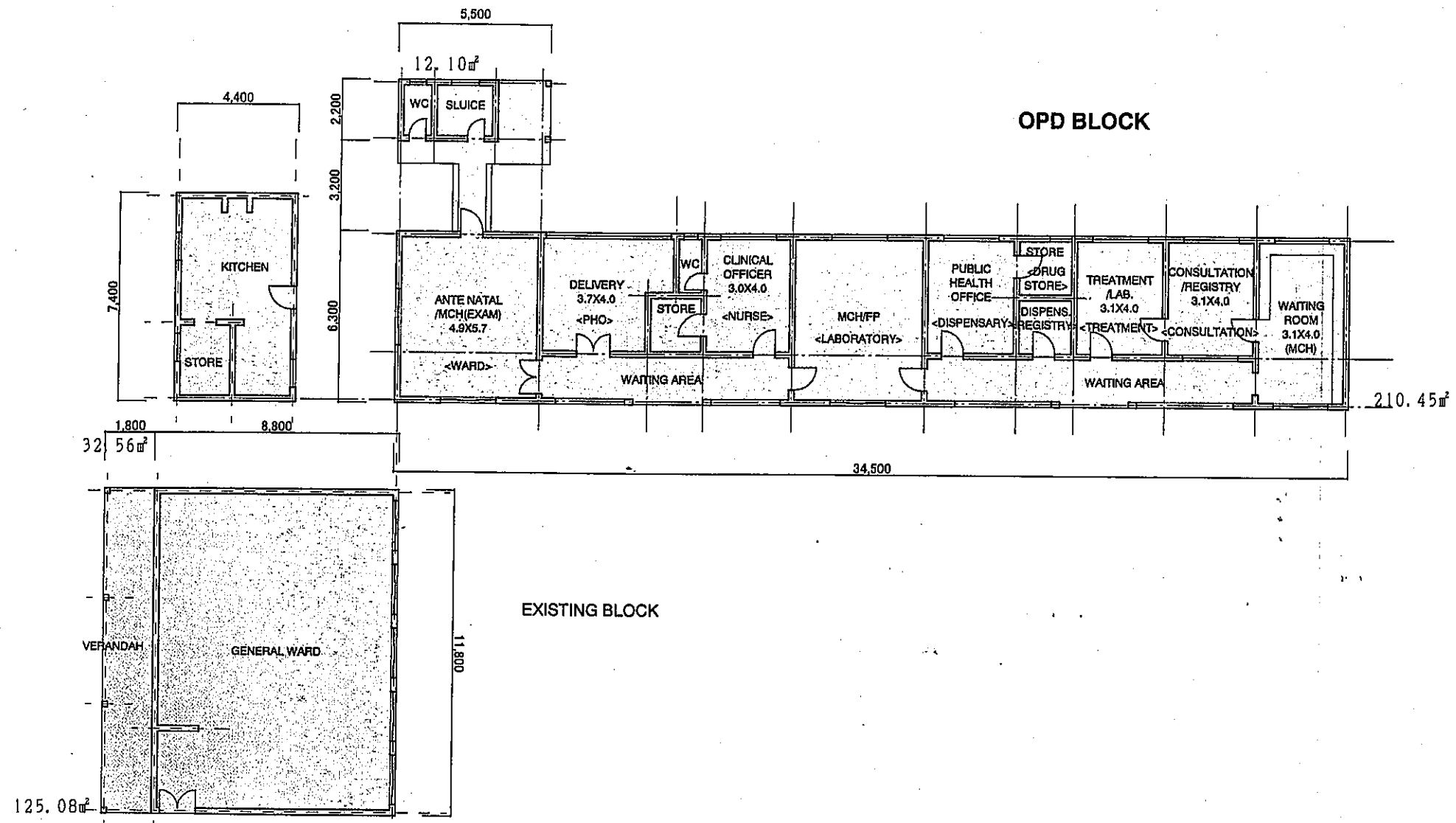


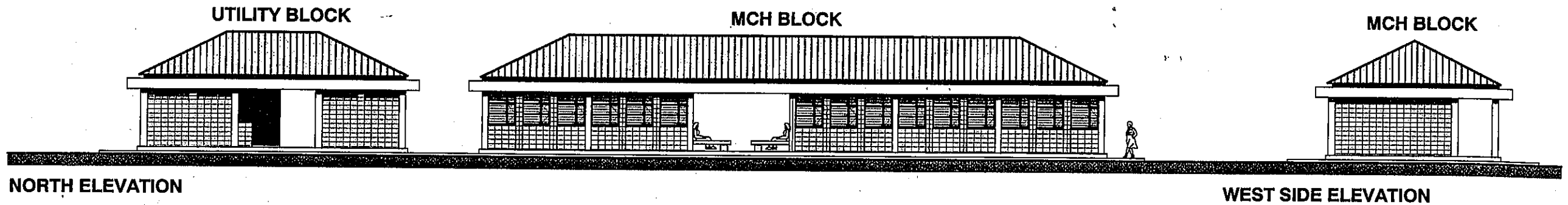
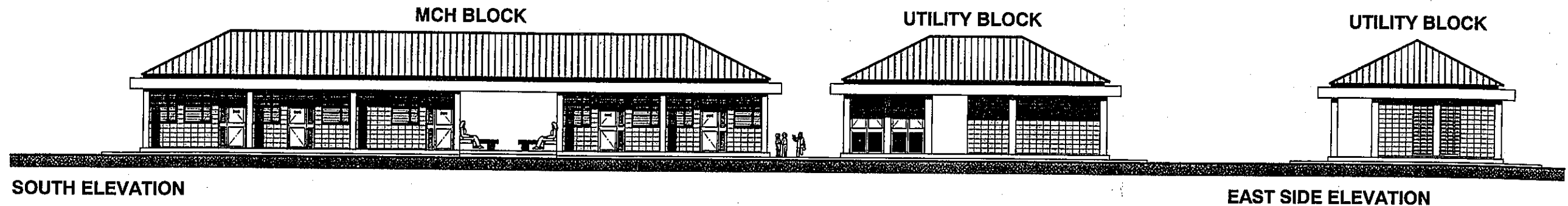


PROPOSED BLOCK

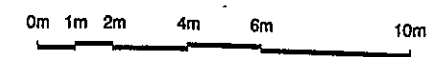




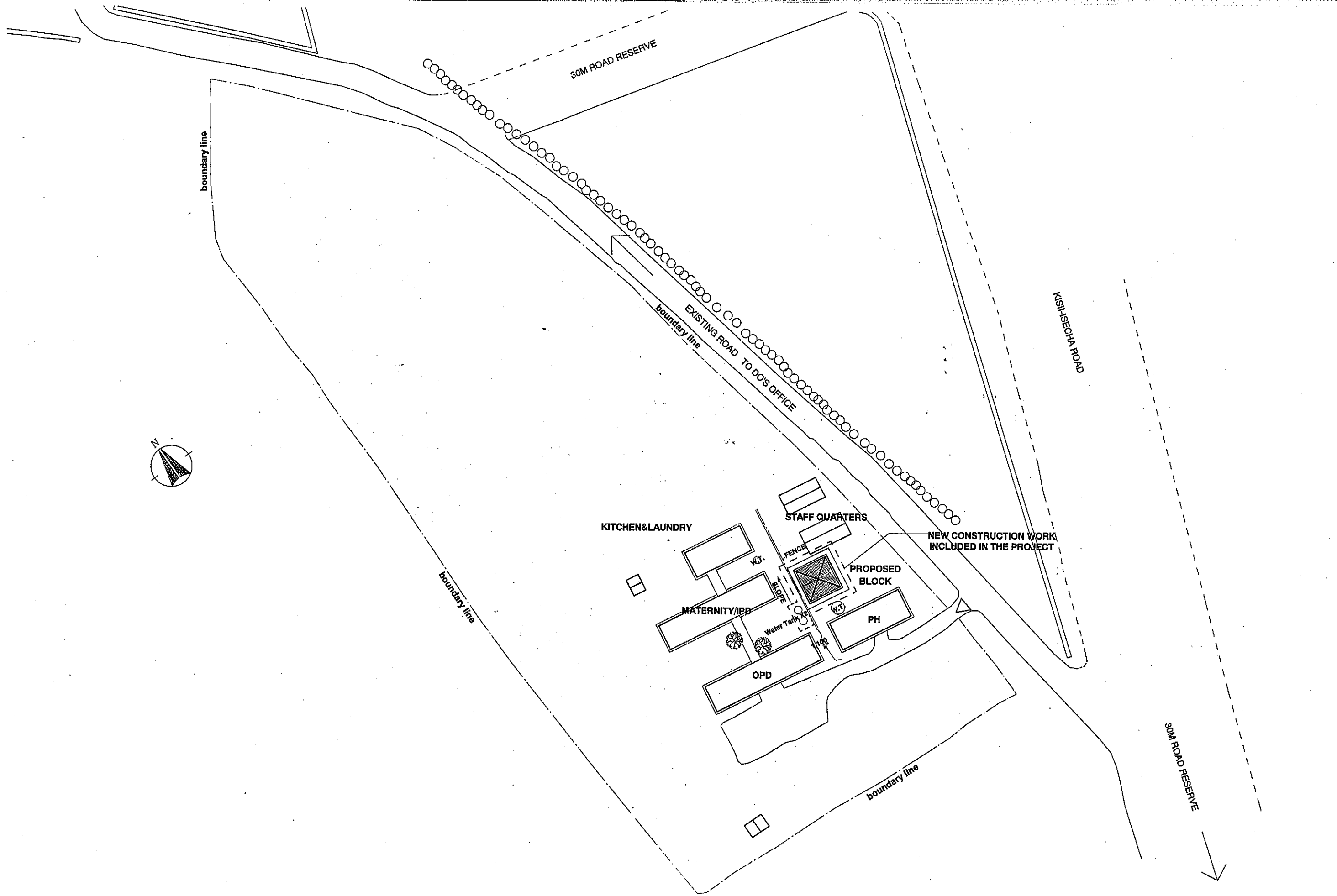


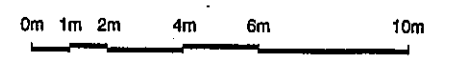
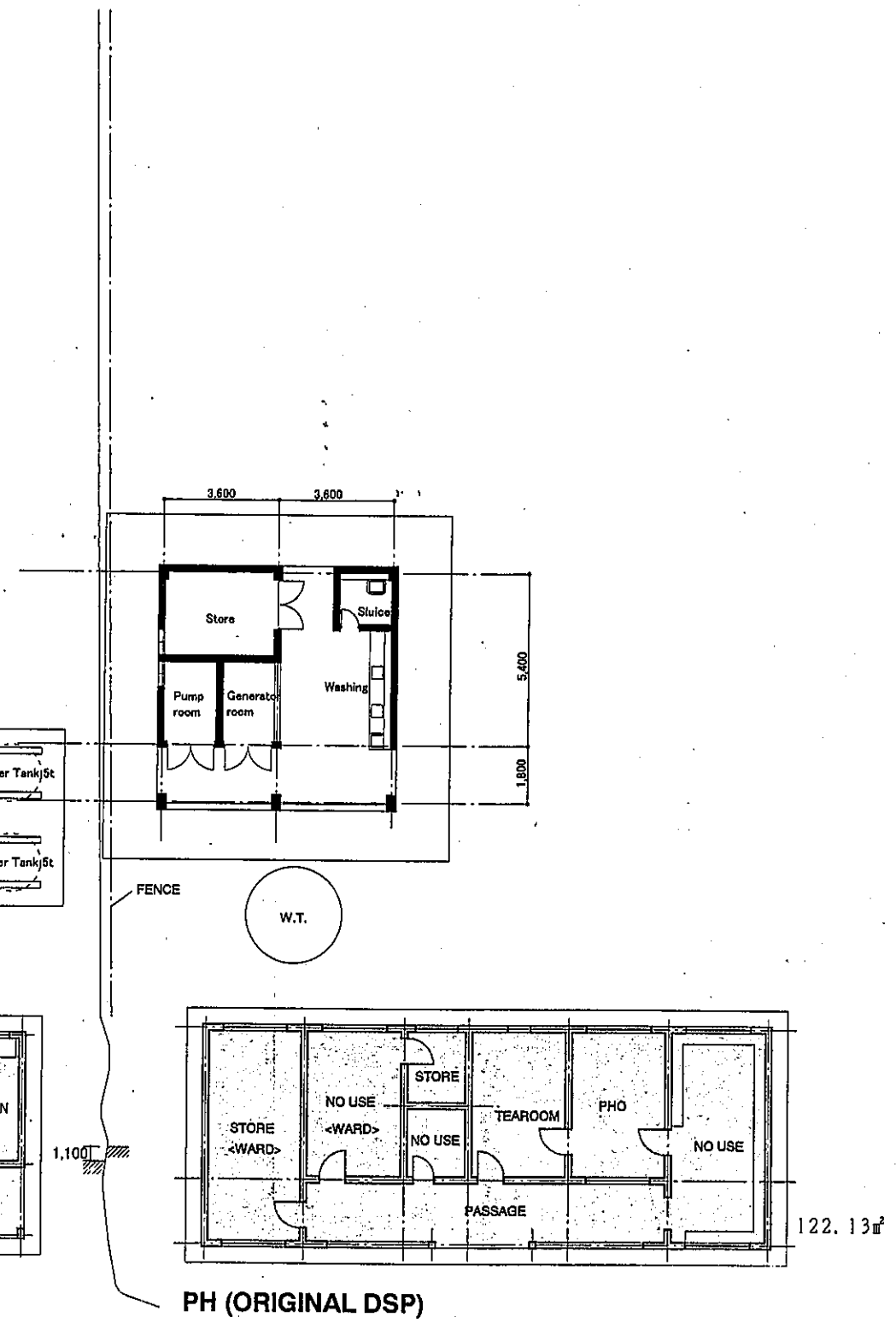
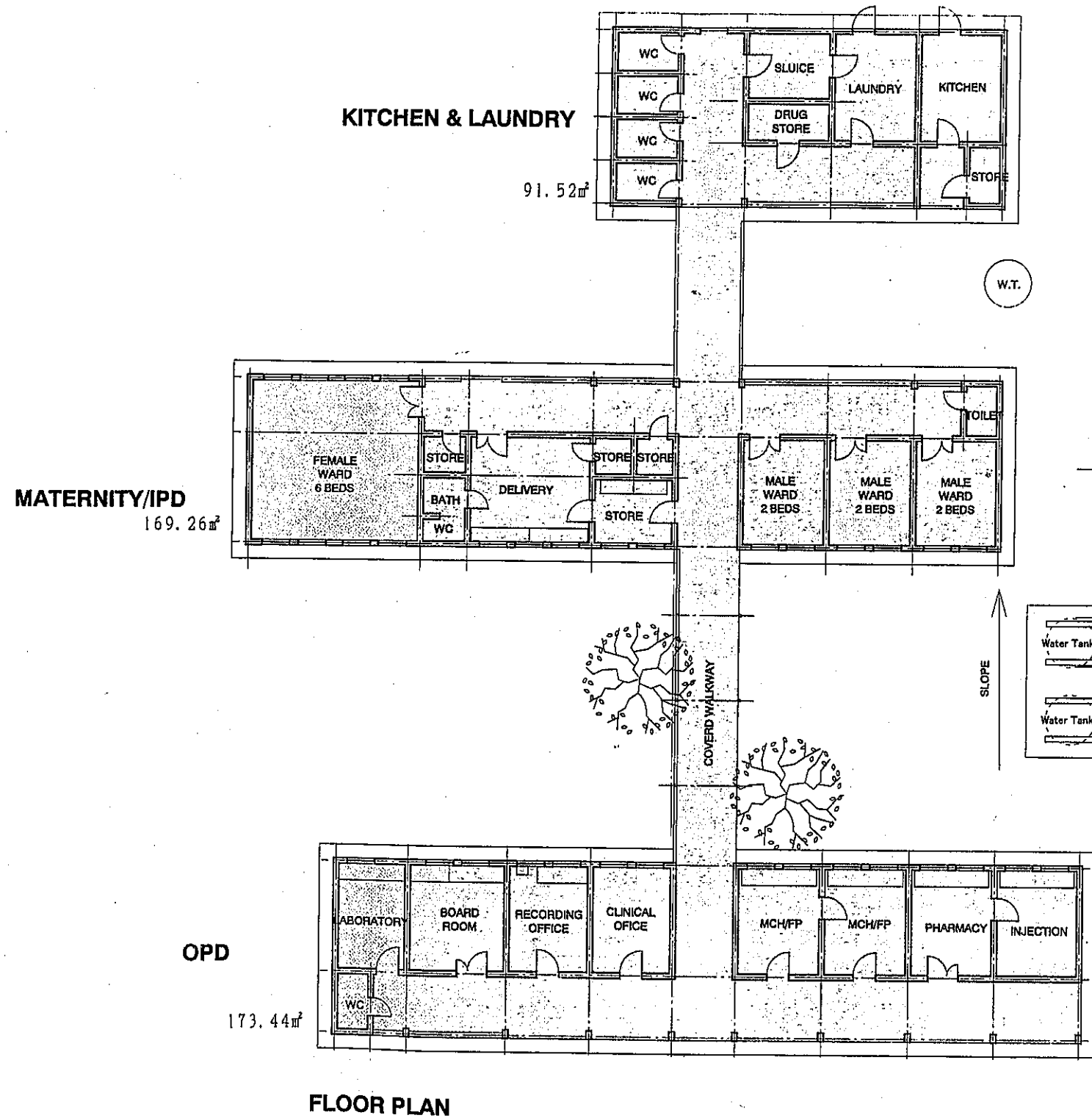


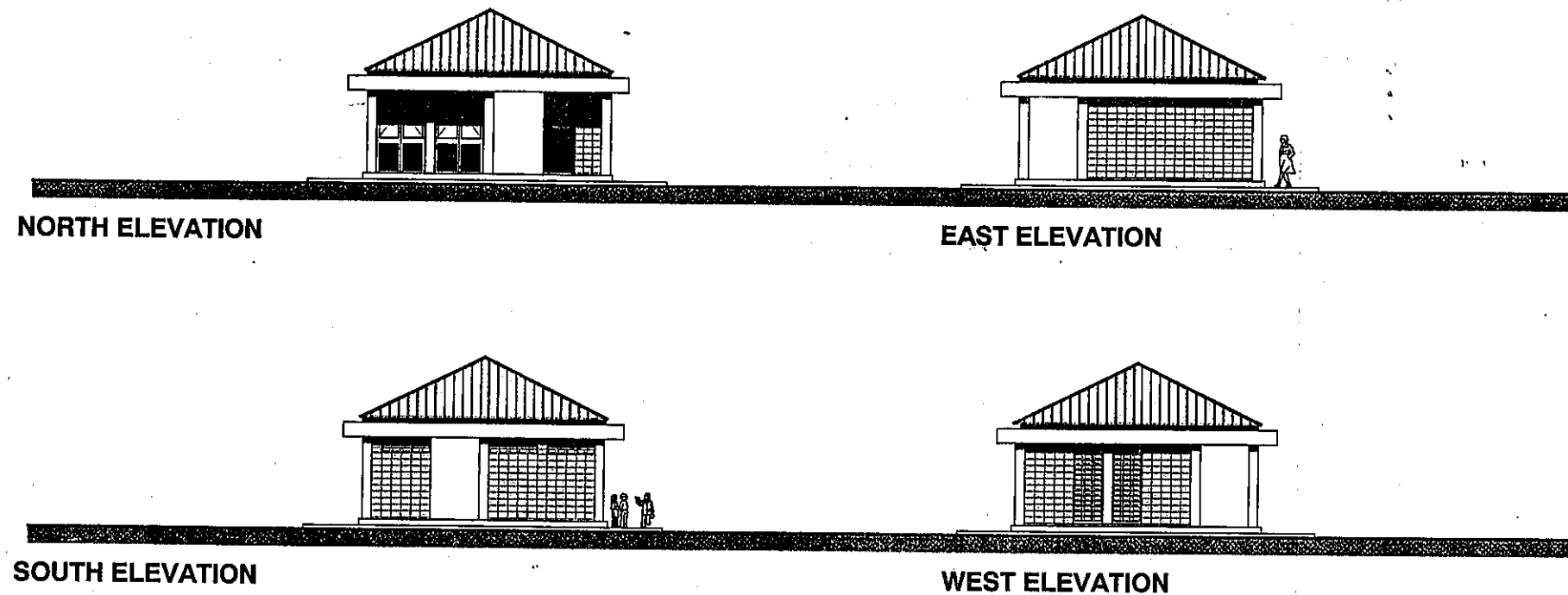
PROPOSED BLOCK





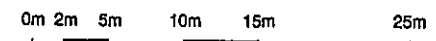
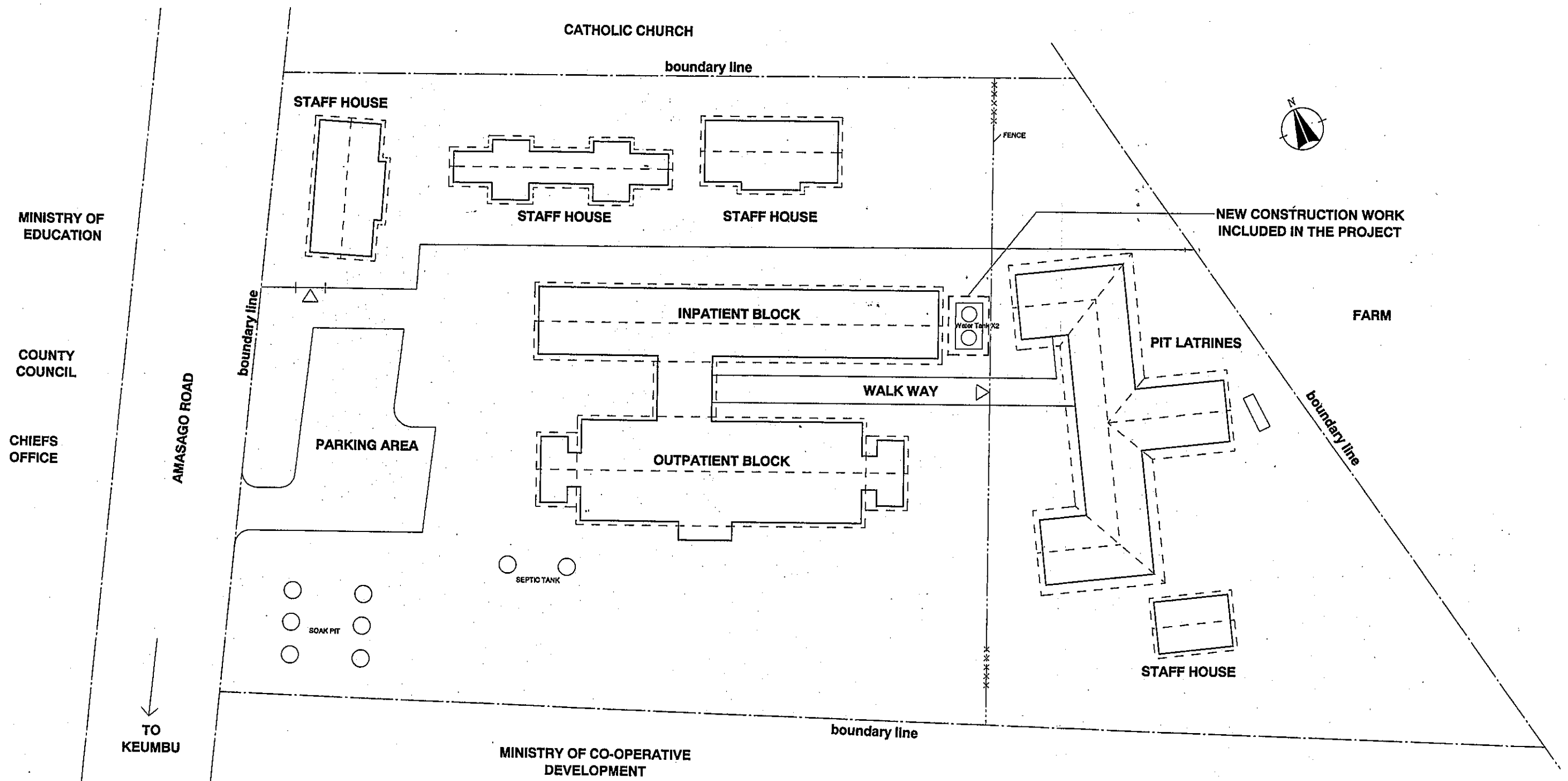




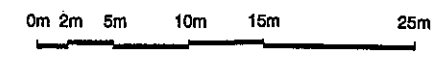
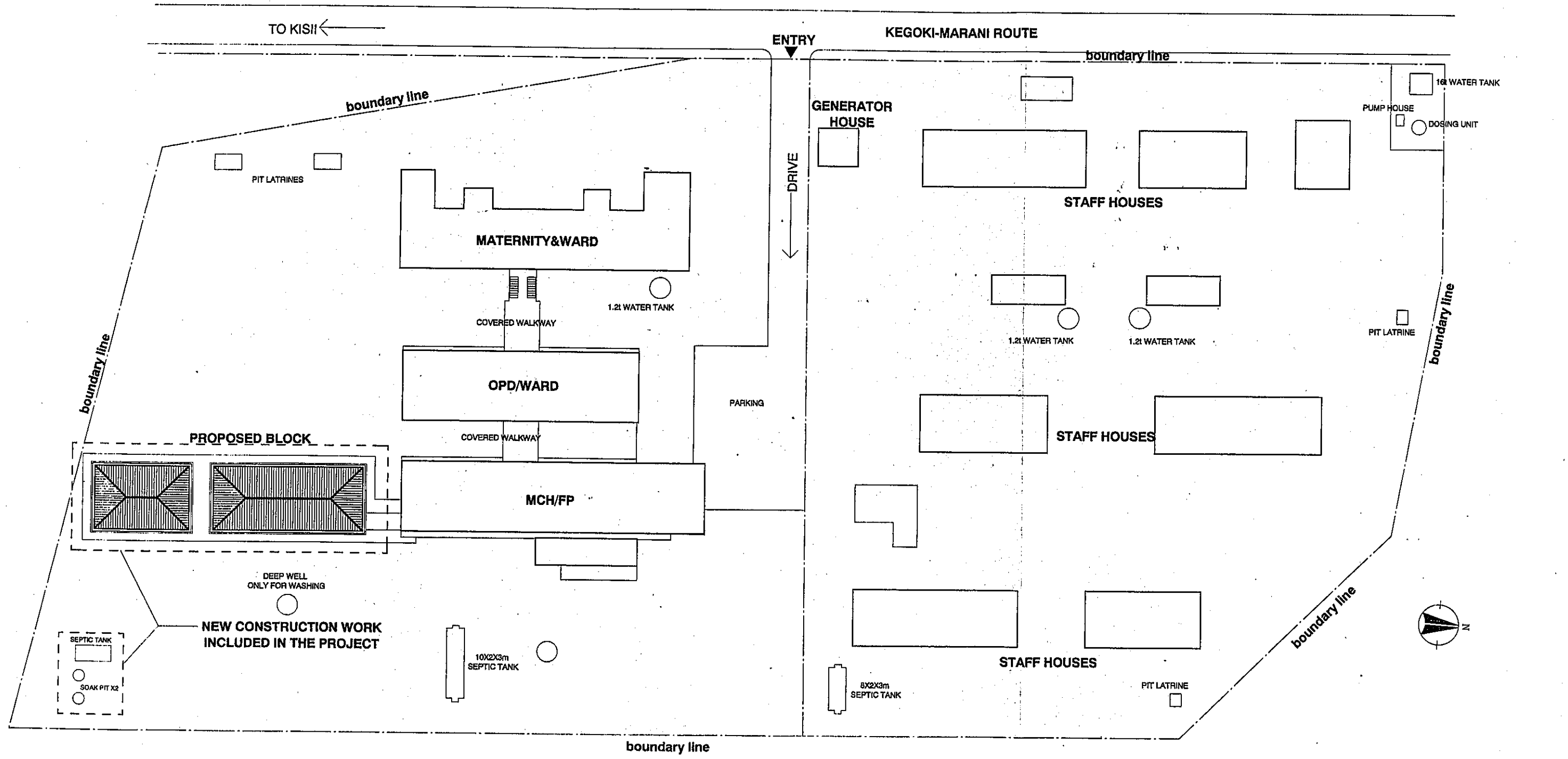


PROPOSED BLOCK

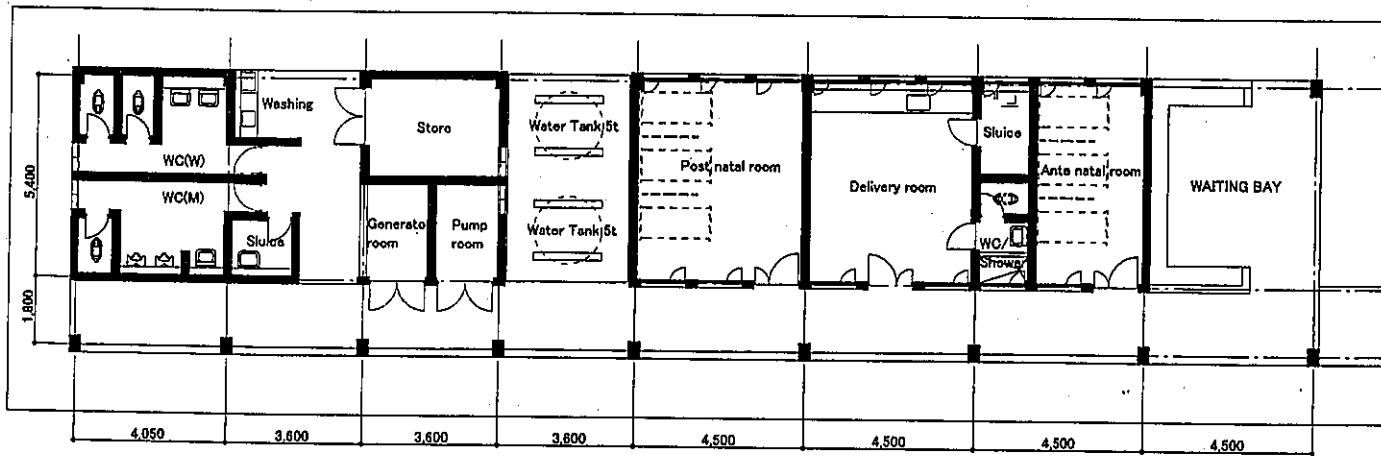
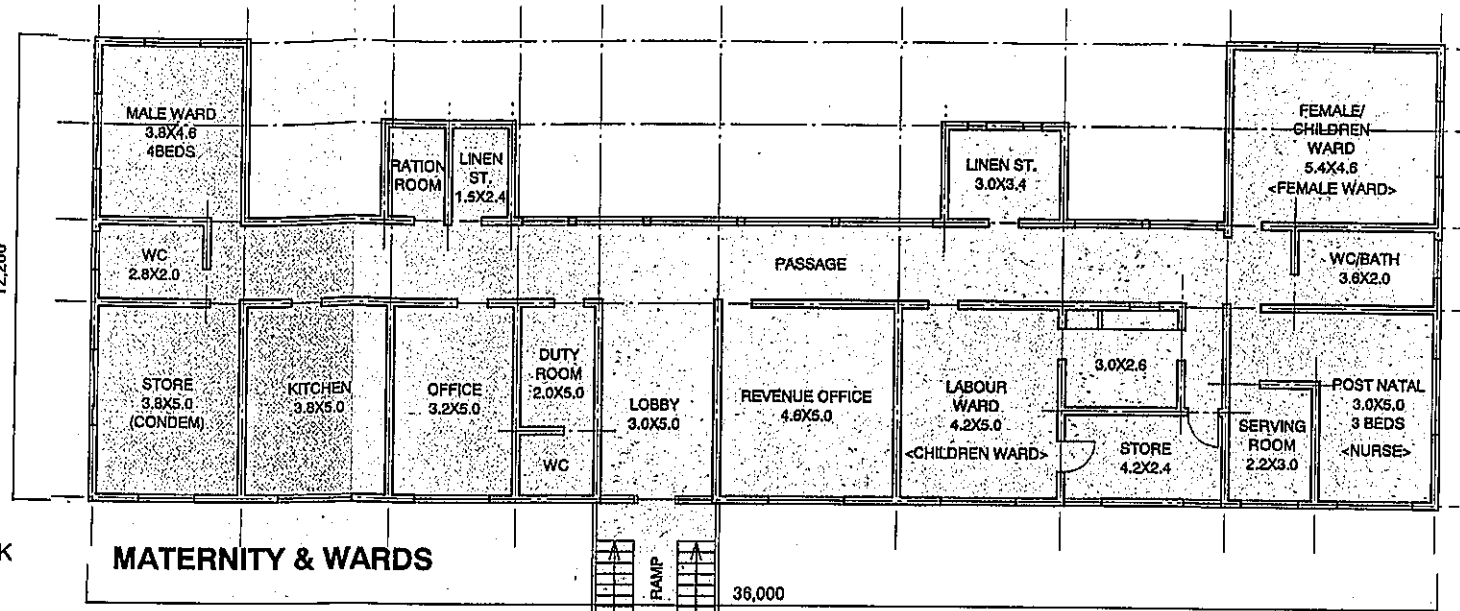




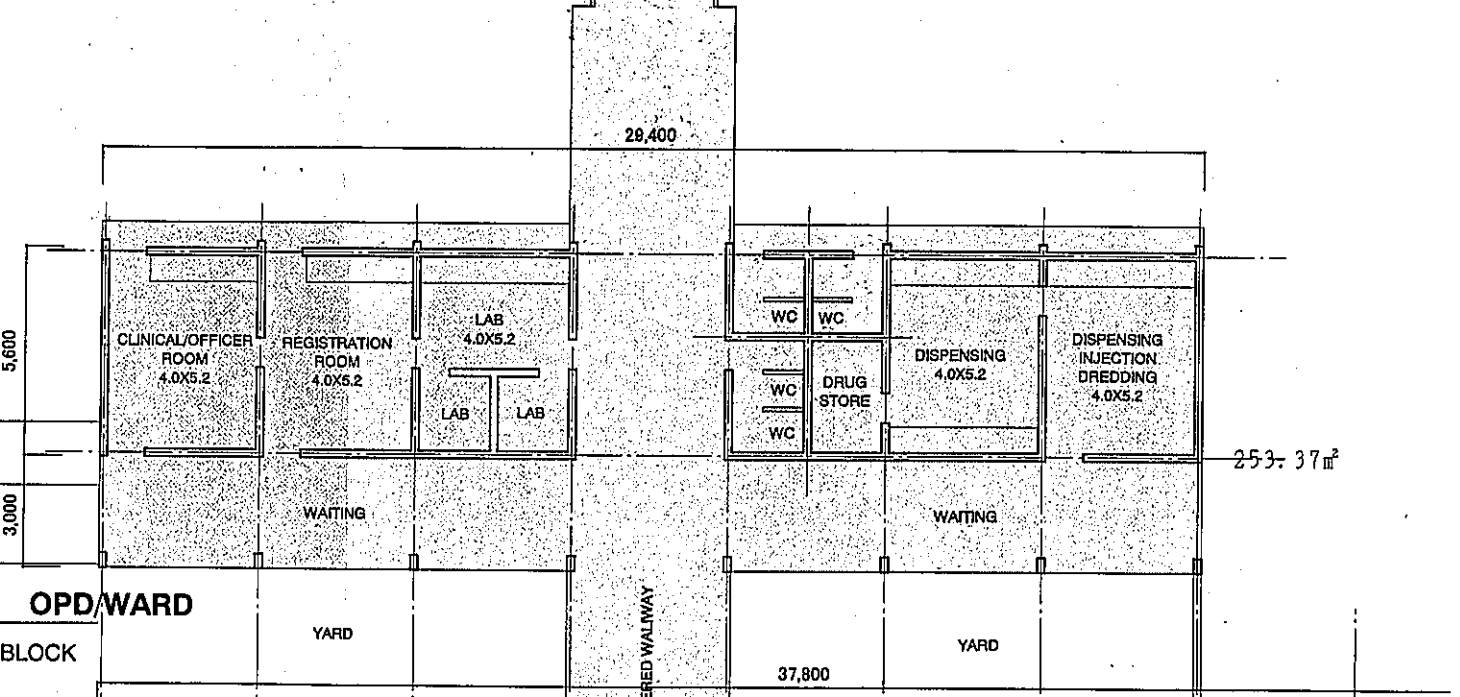




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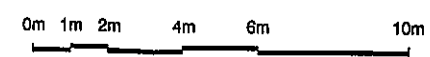
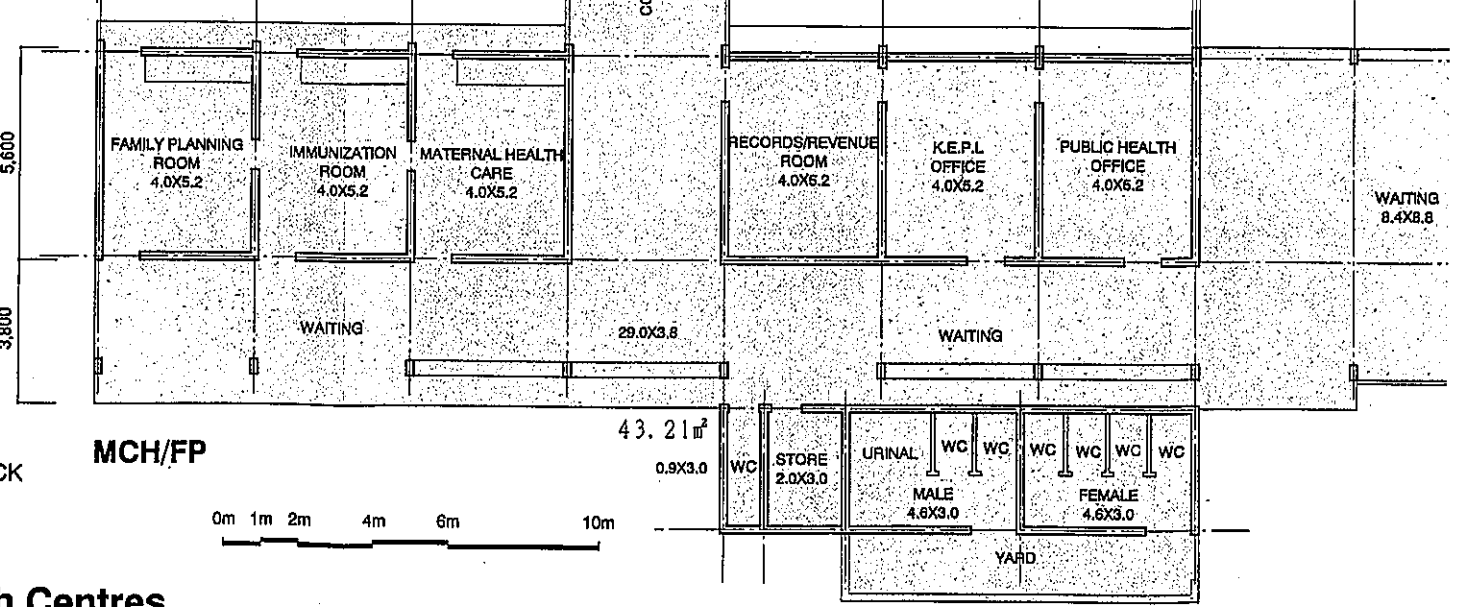


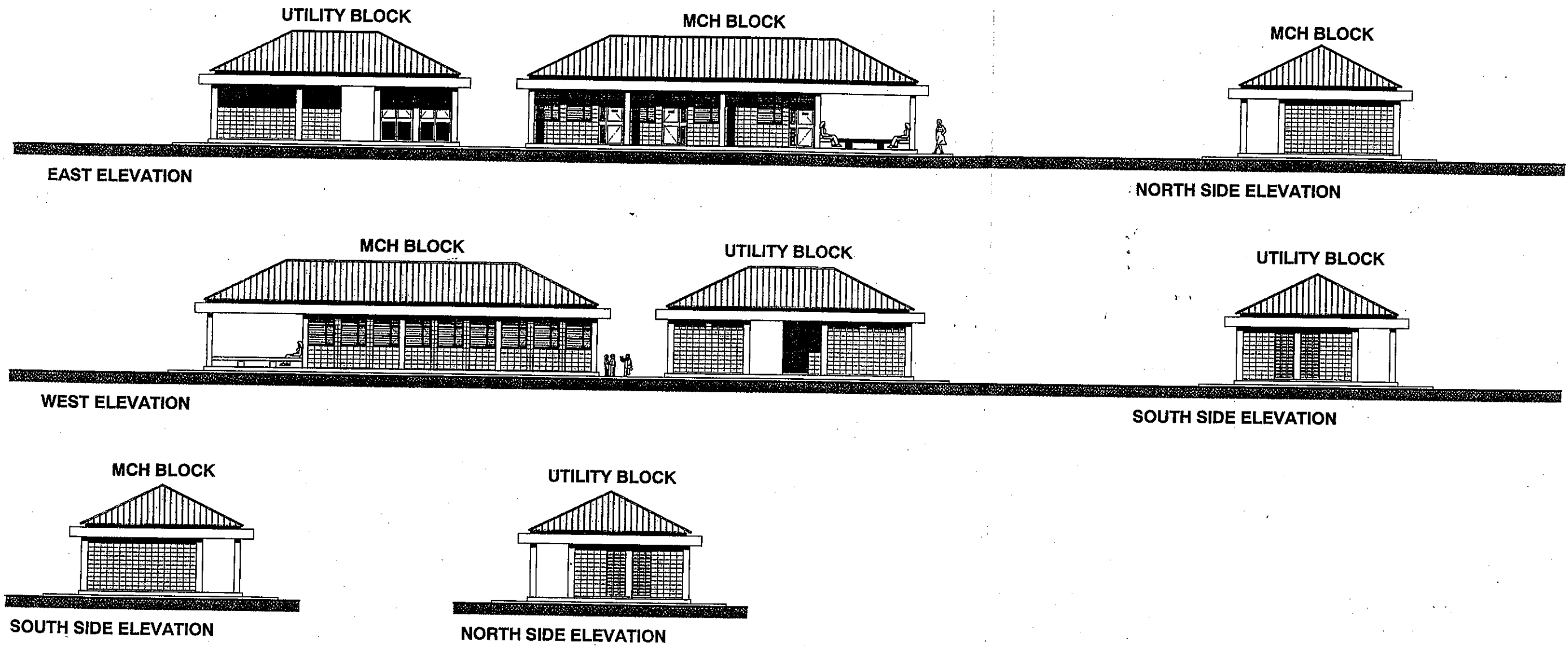
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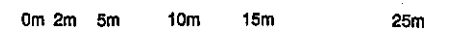
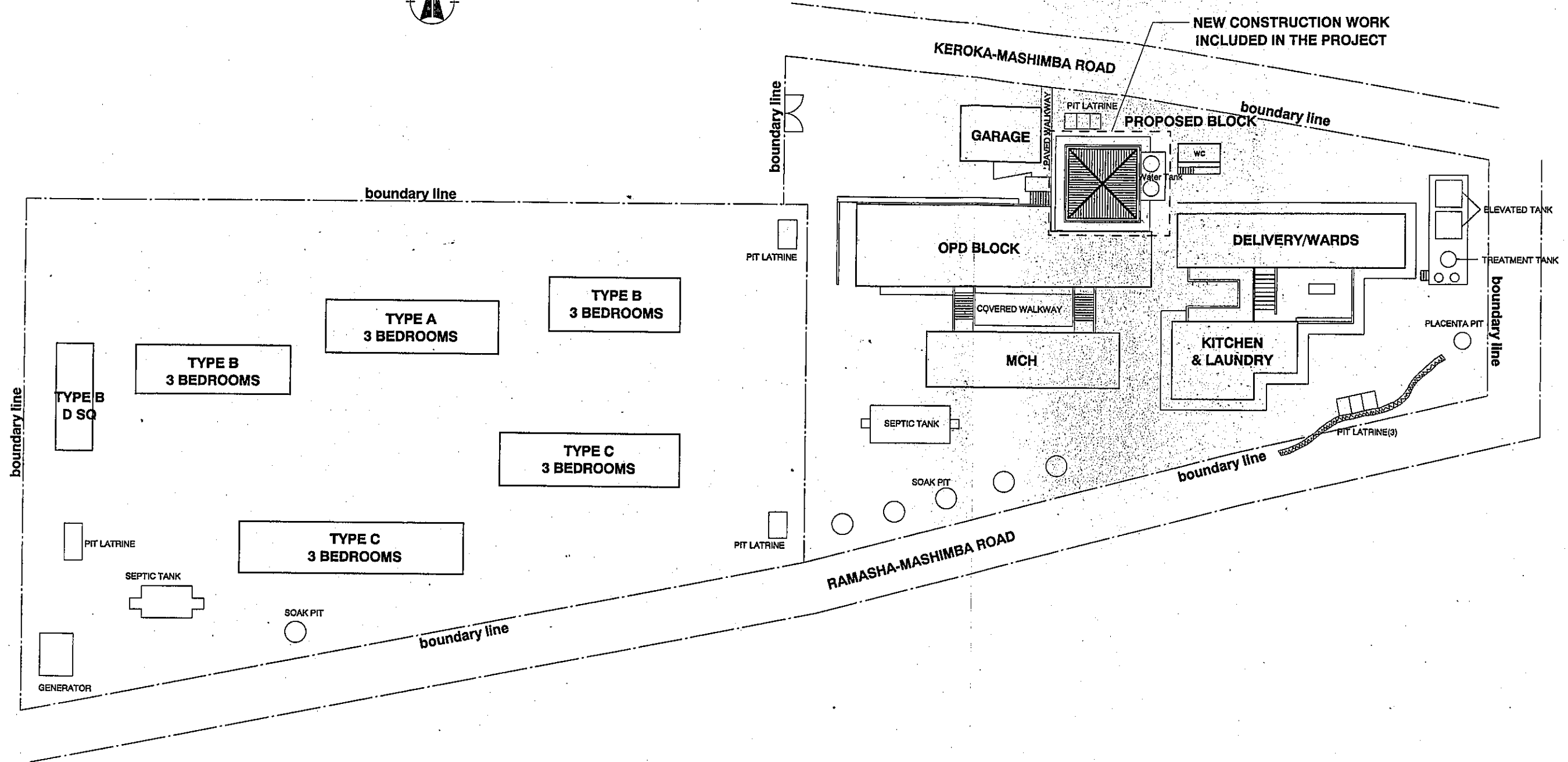
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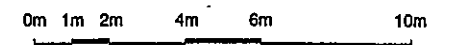
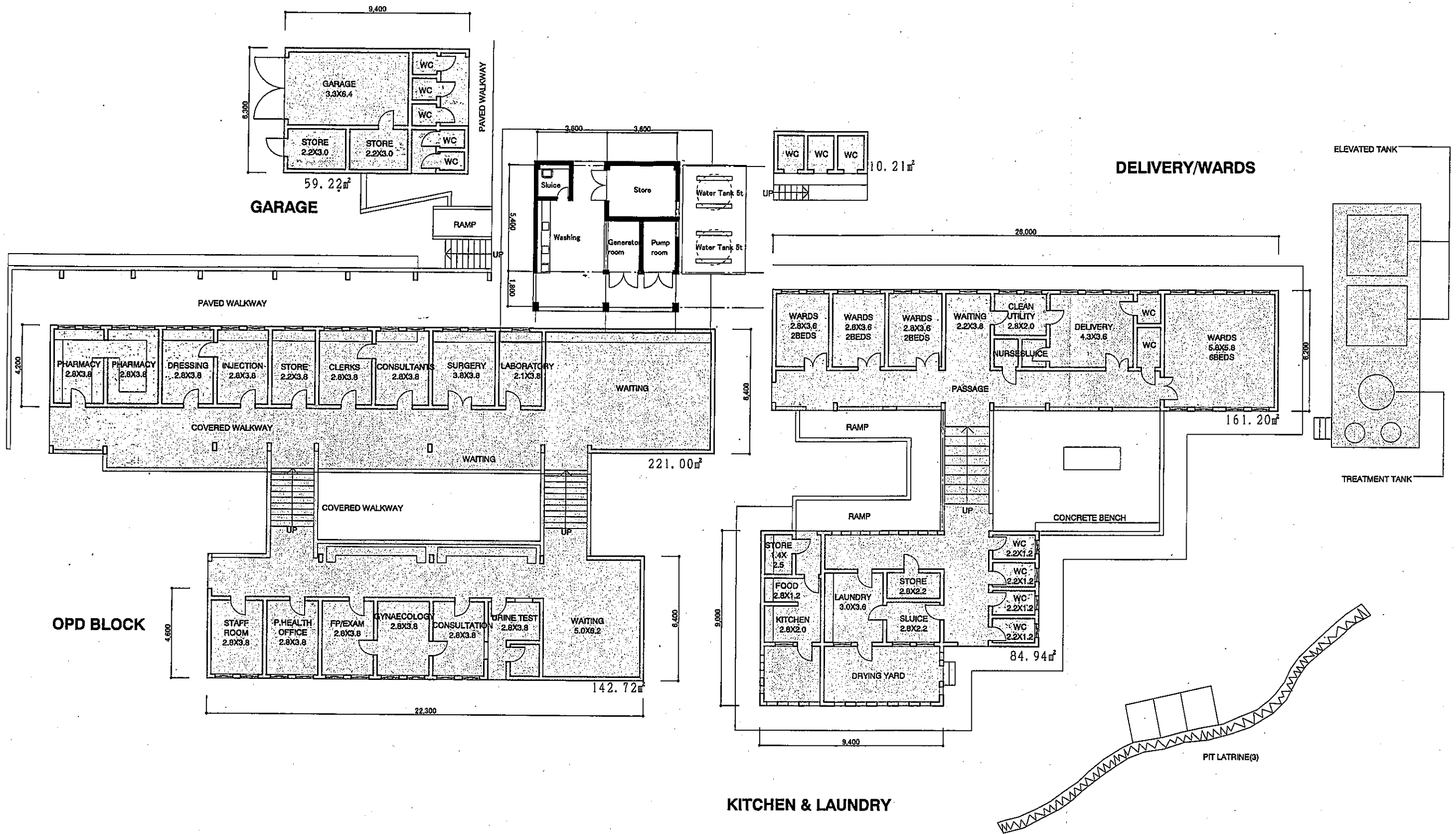
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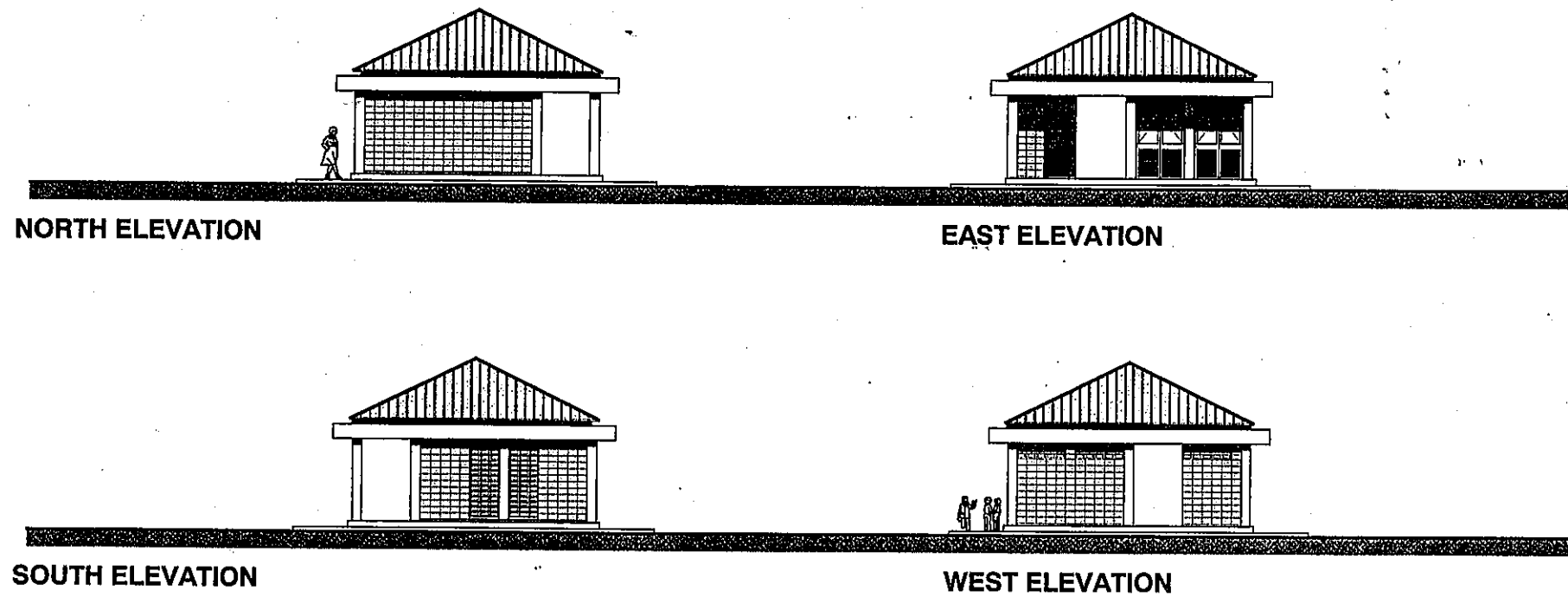


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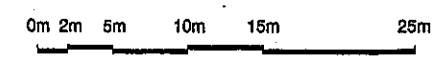
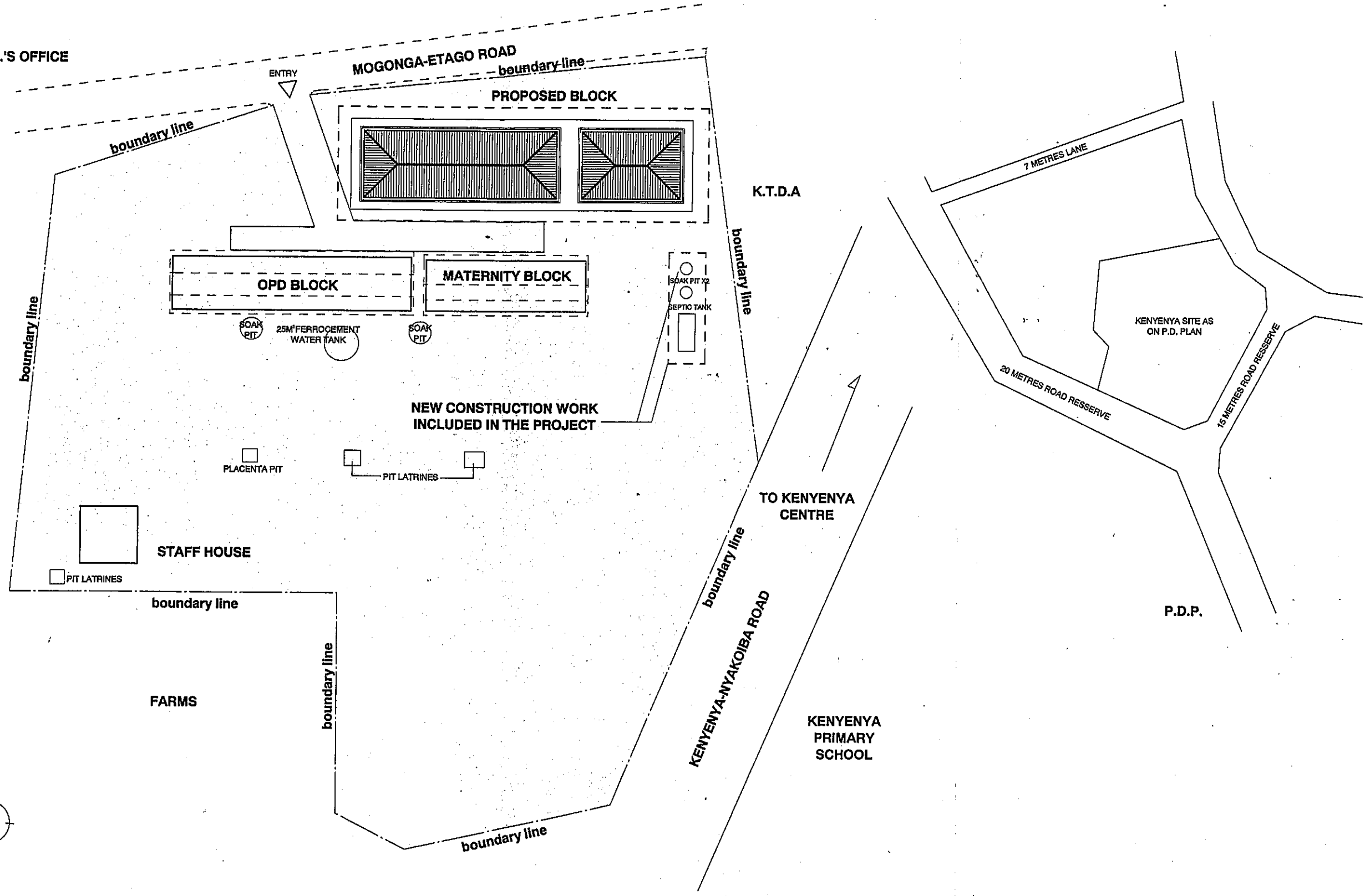


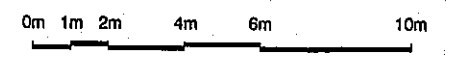
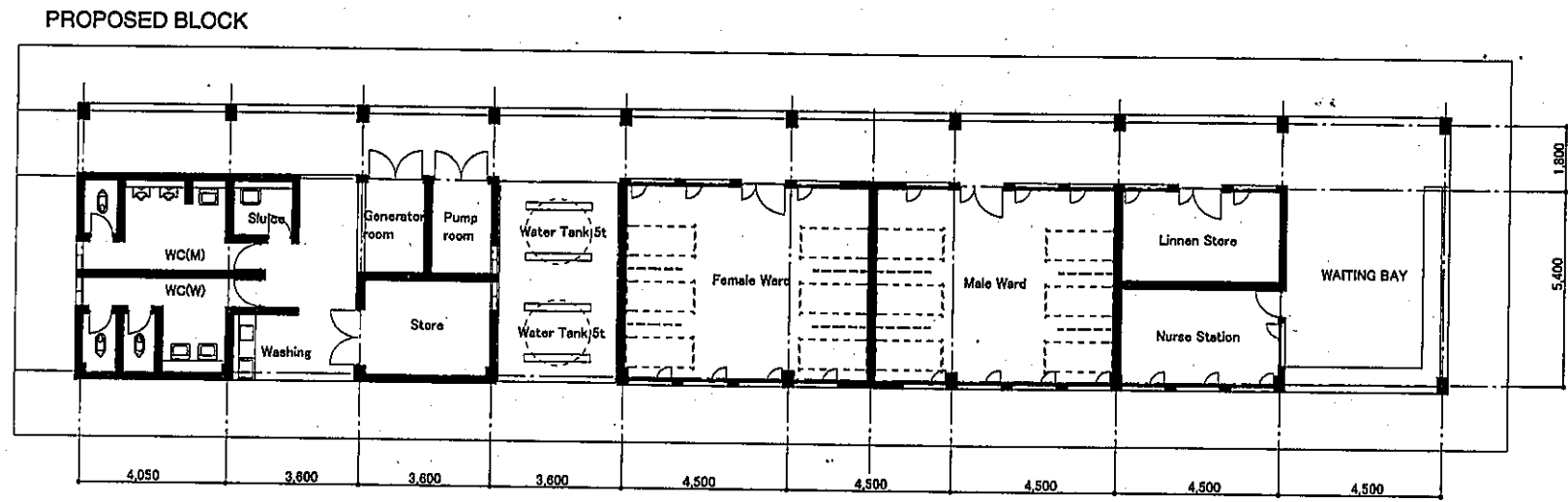
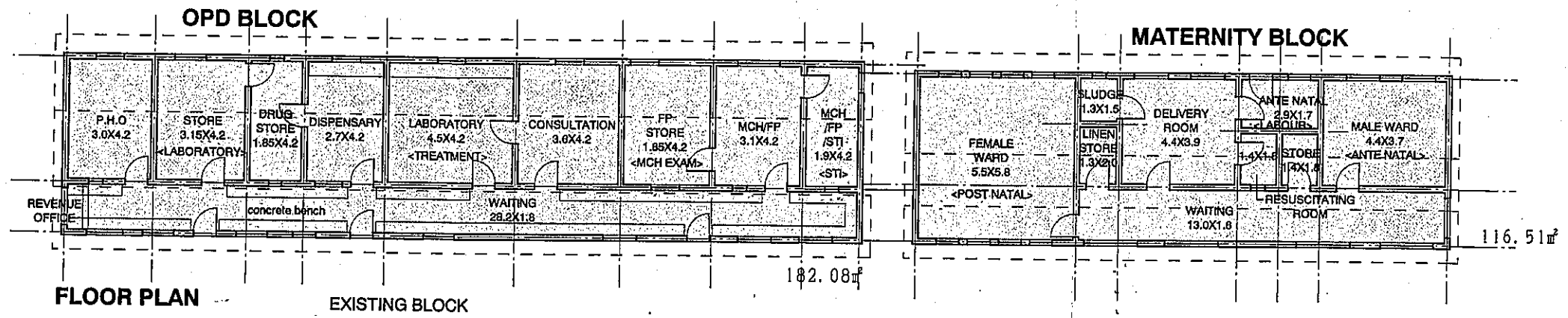


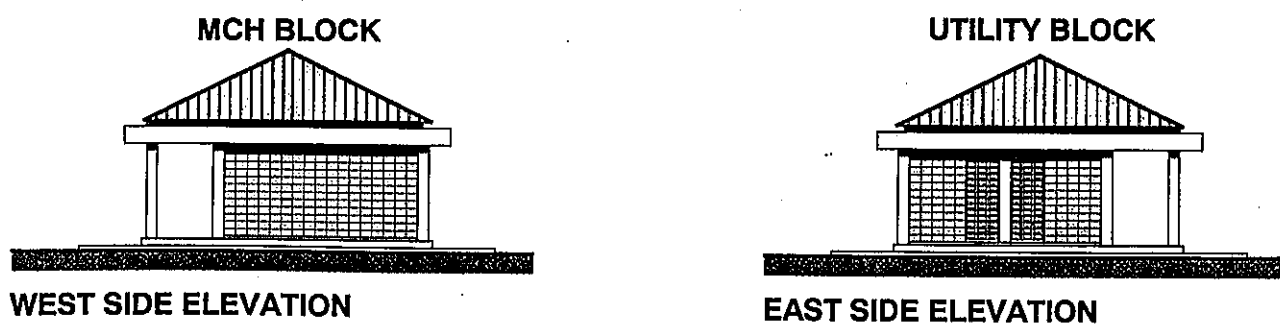
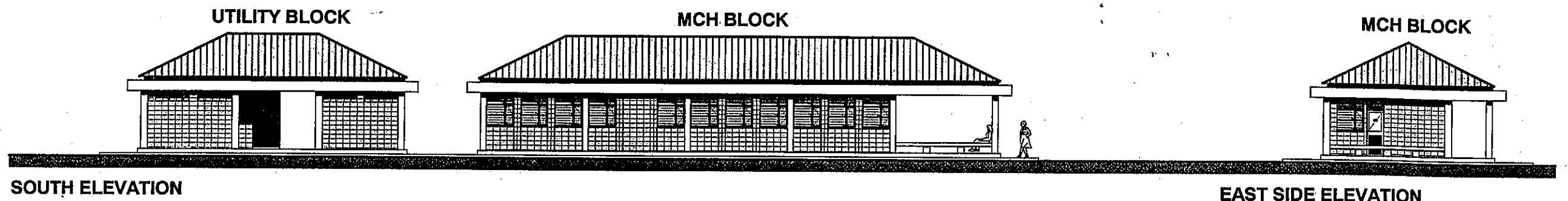
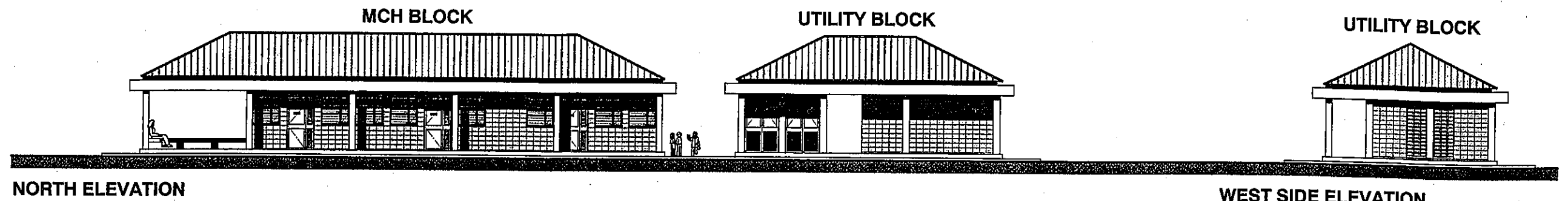
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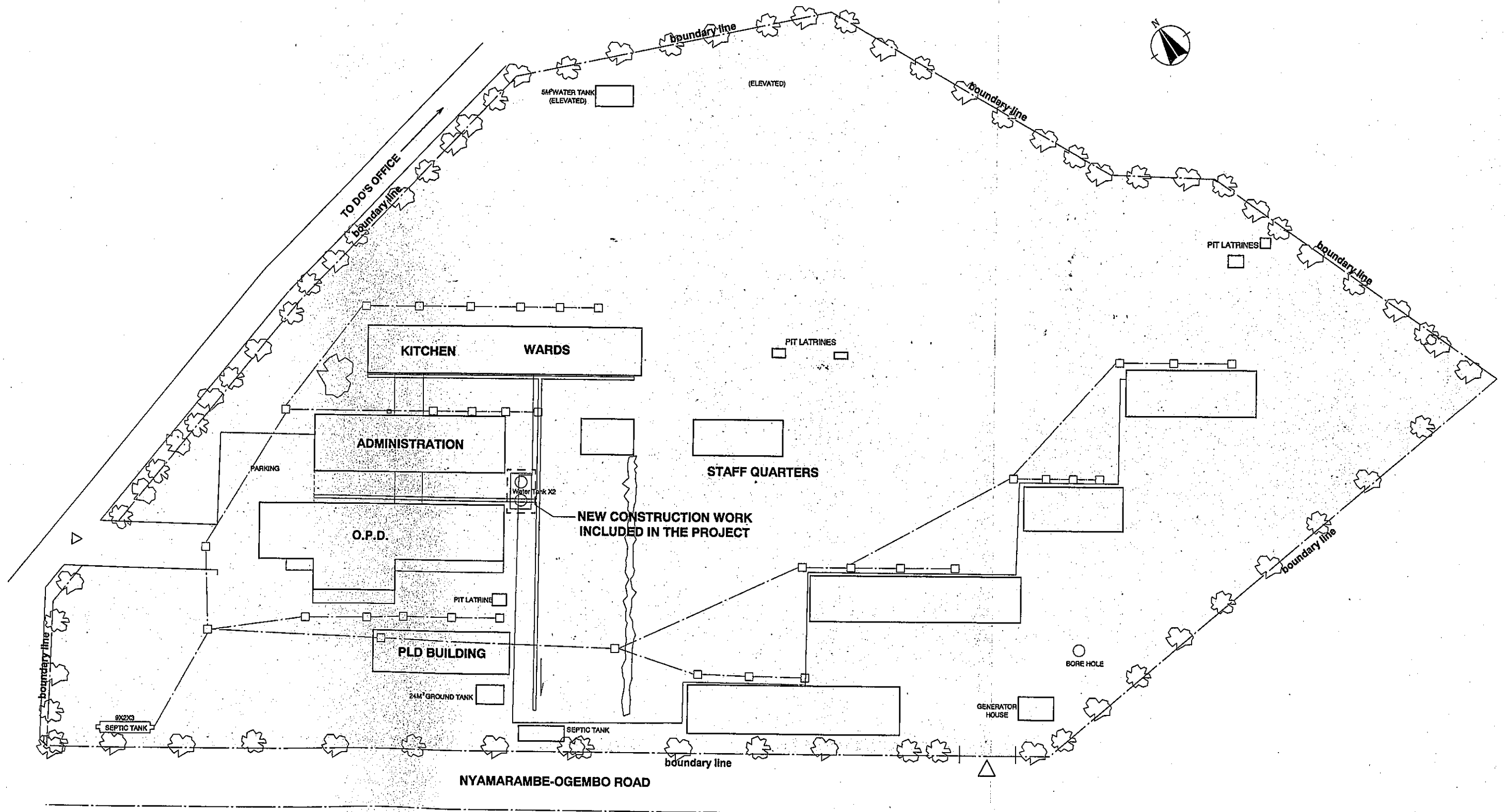




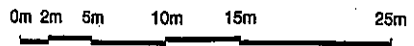
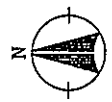
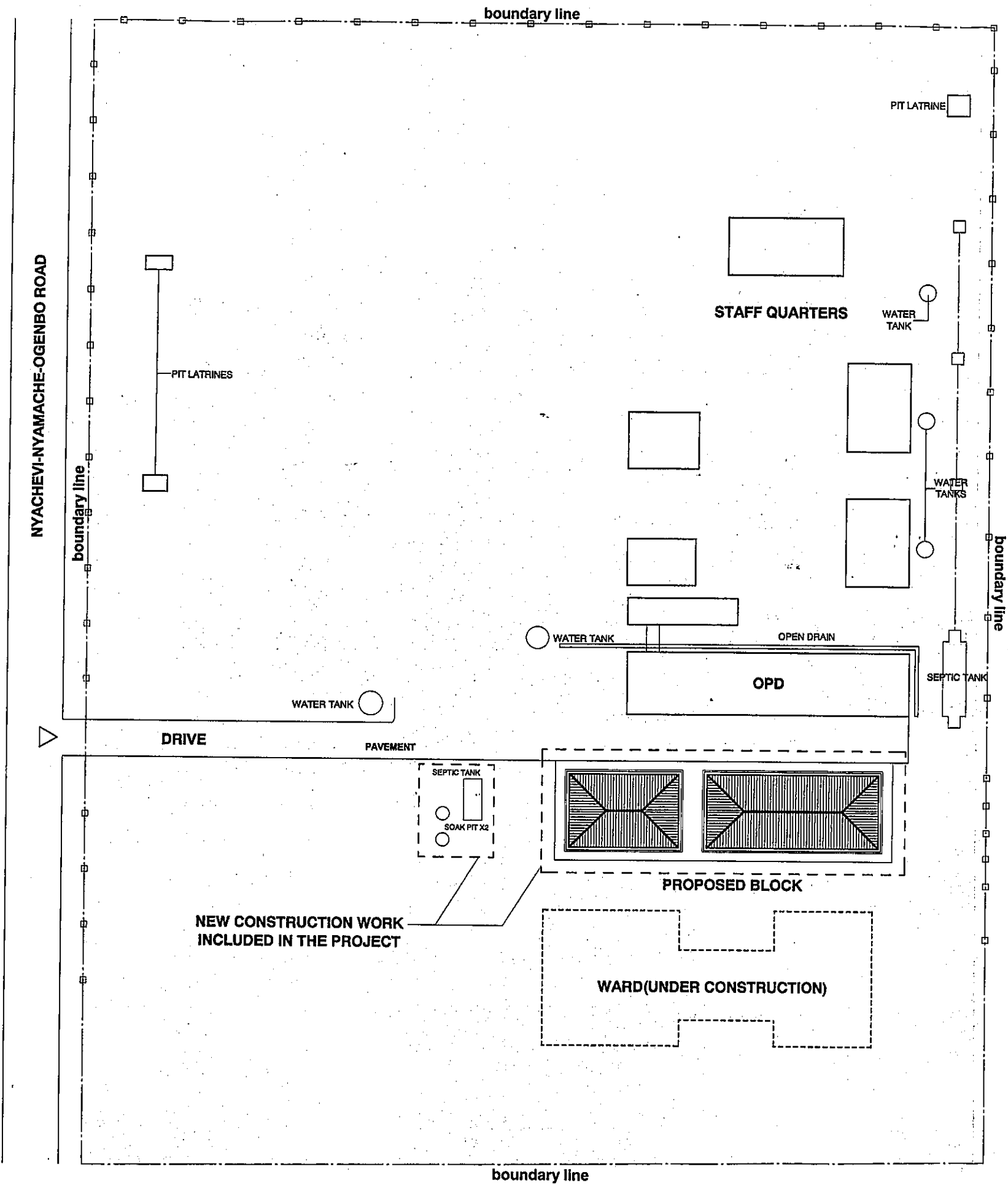


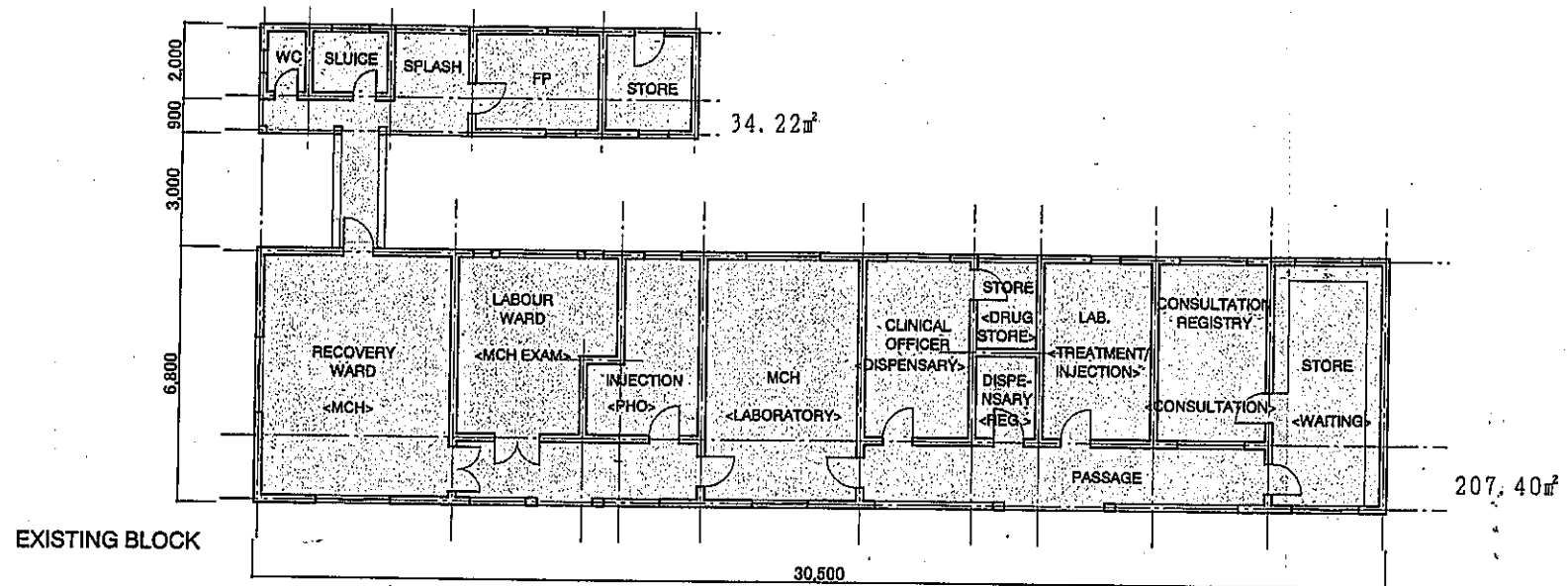
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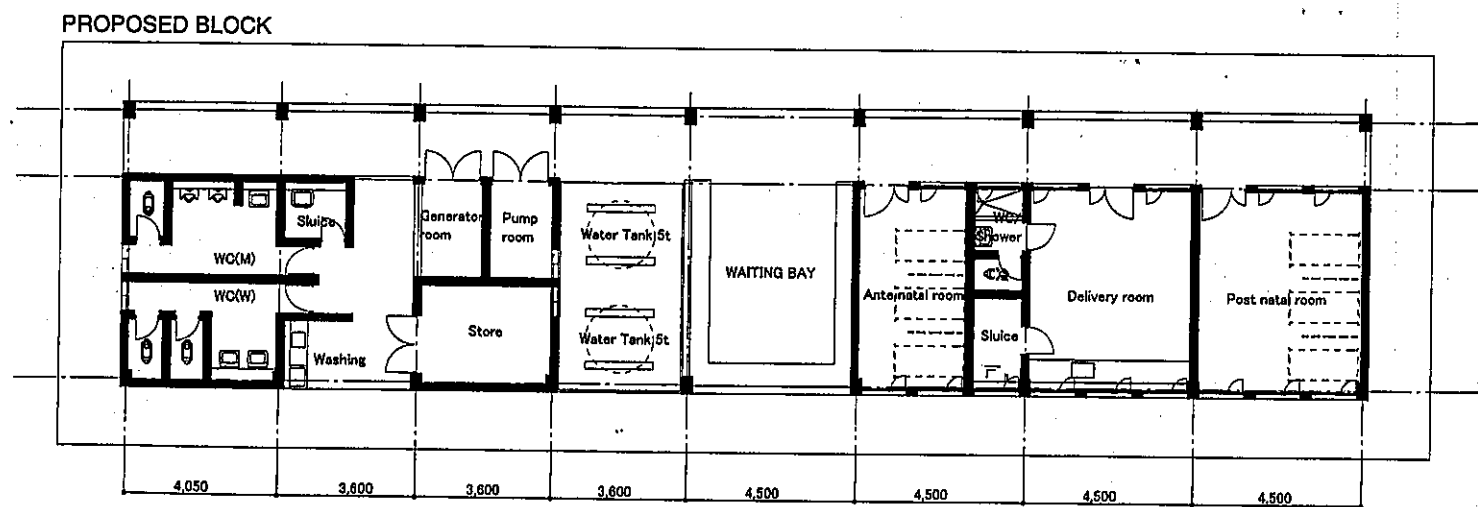




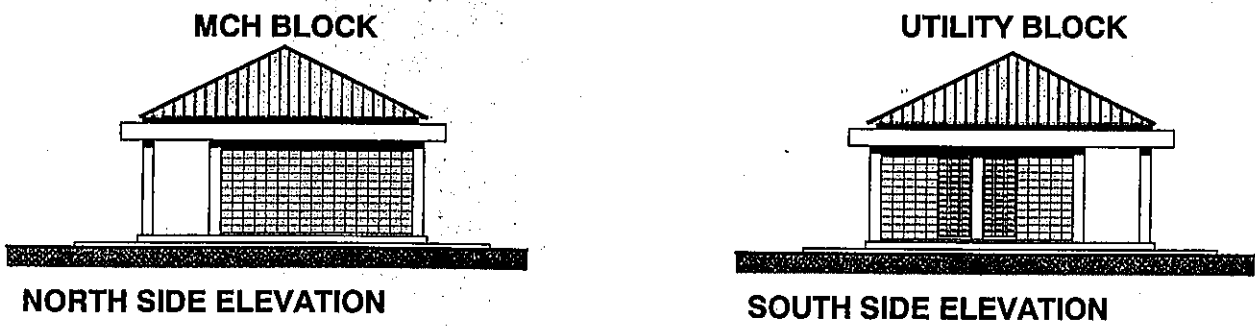
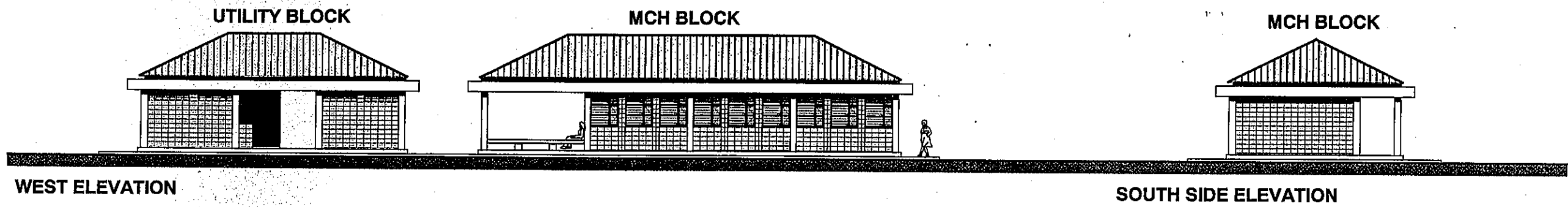
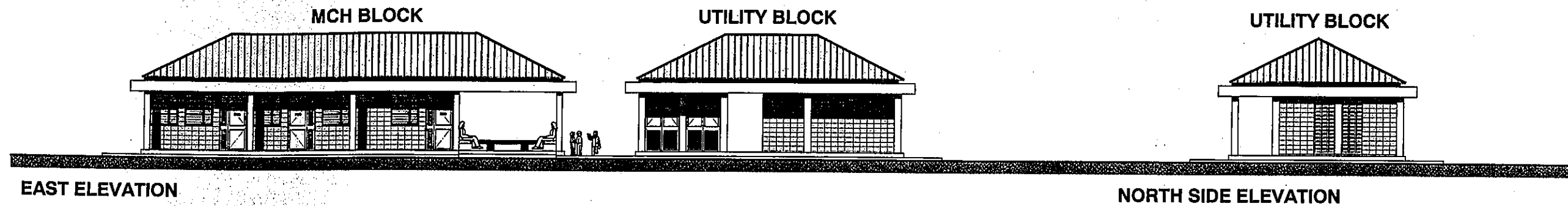




FLOOR PLAN

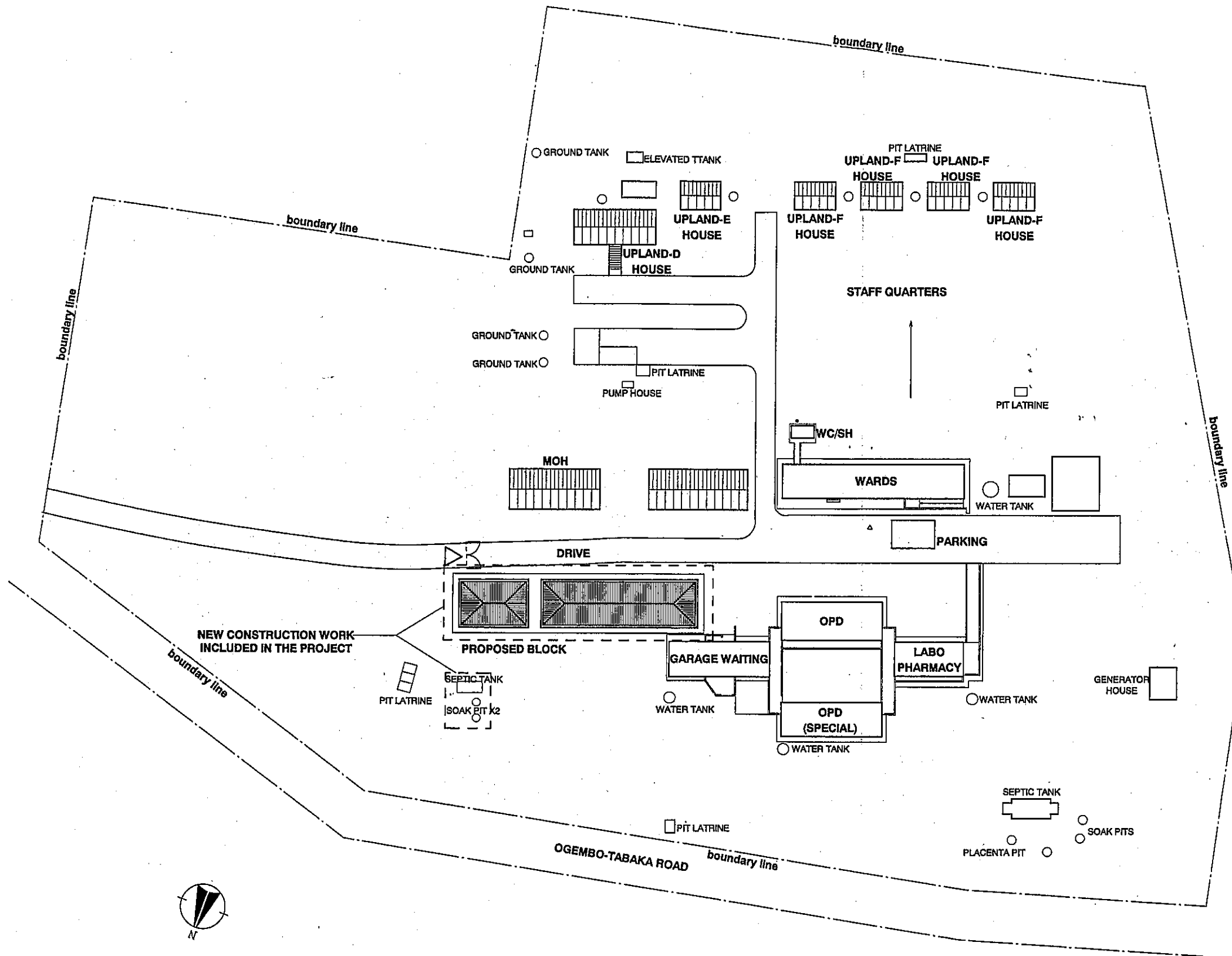


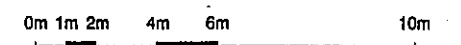
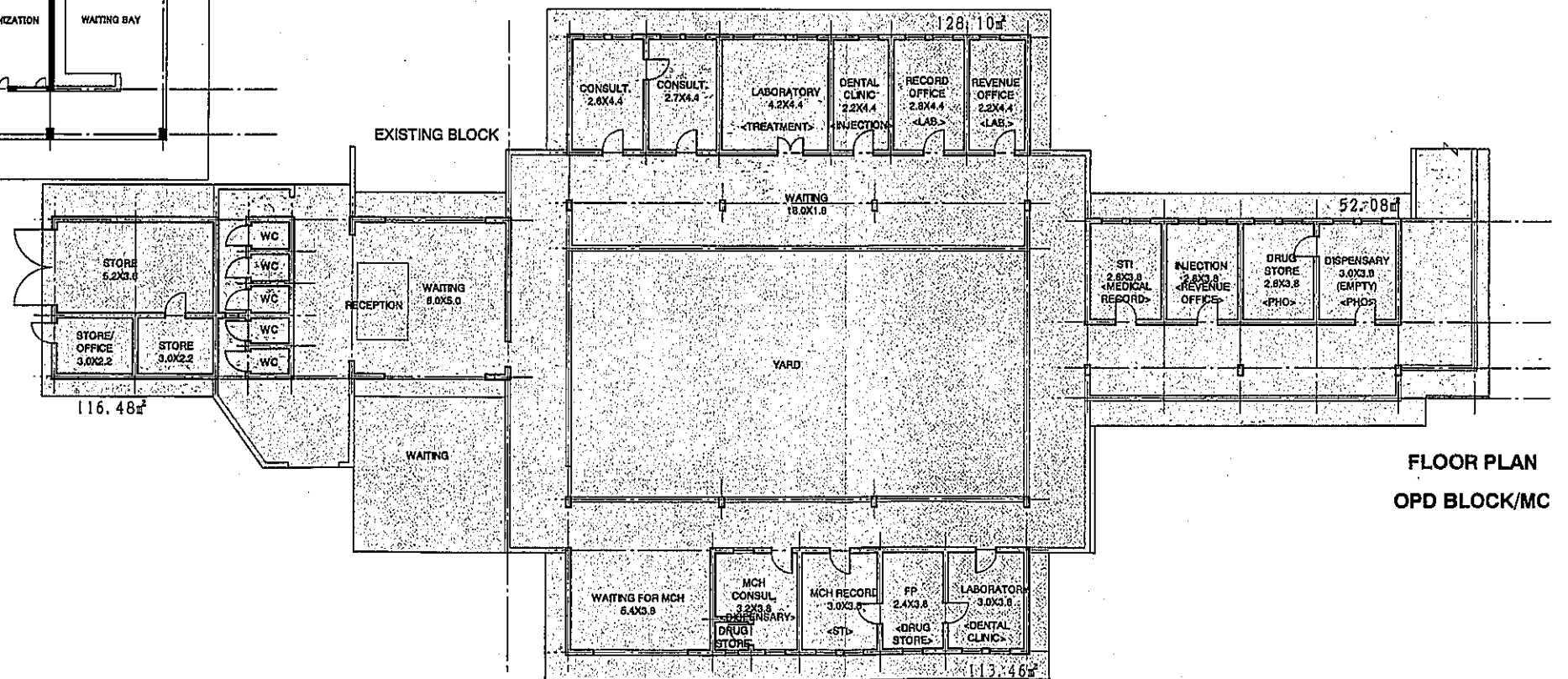
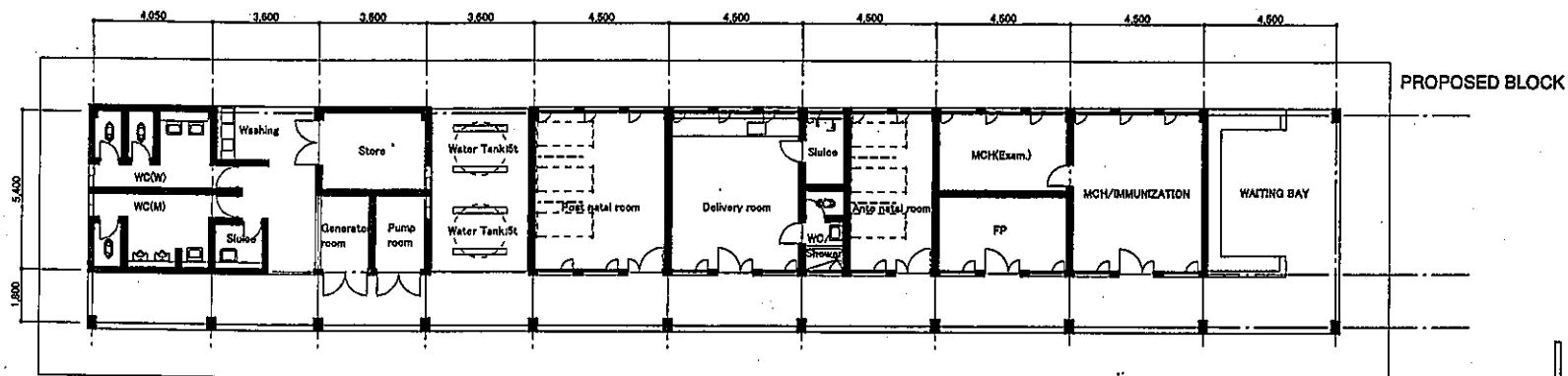
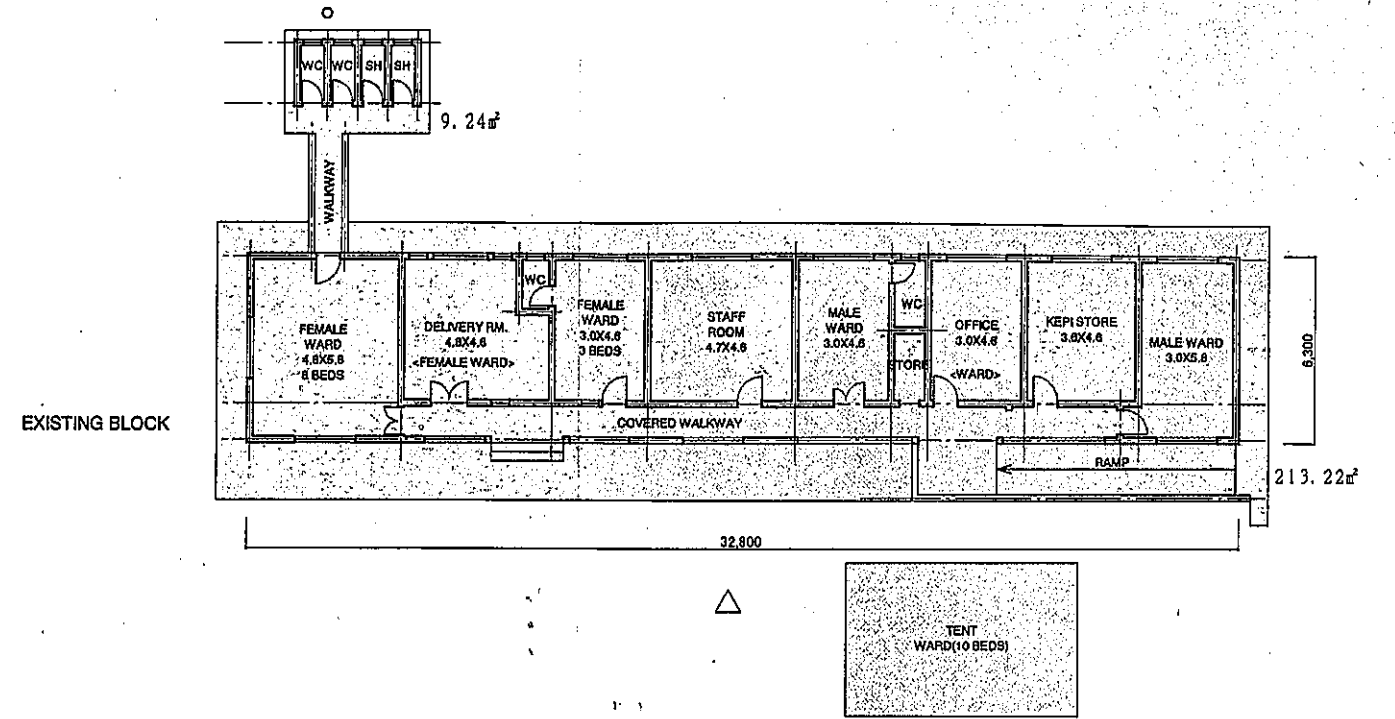
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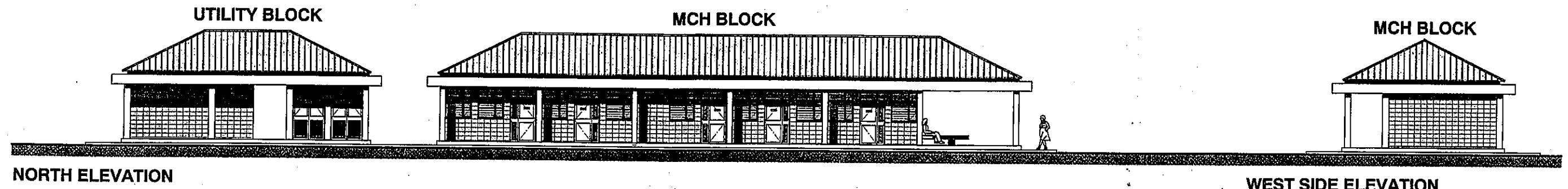
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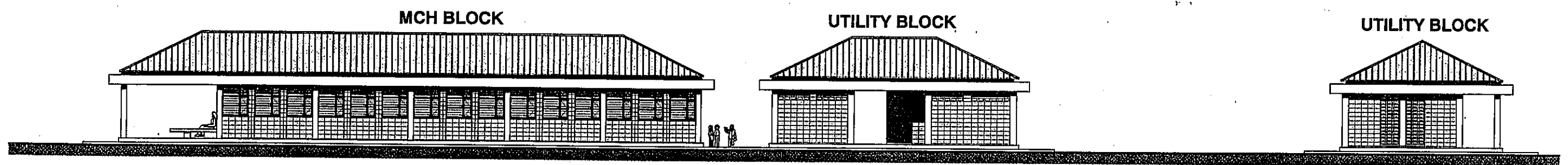






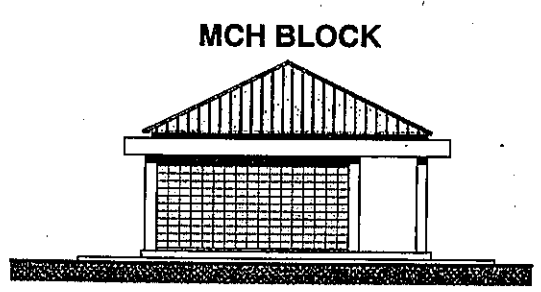
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**WEST SIDE ELEVATION**

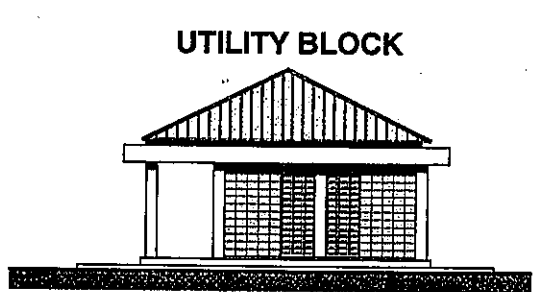


**SOUTH ELEVATION**

**EAST SIDE ELEVATION**

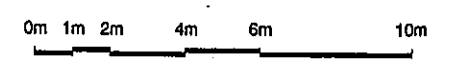


**EAST SIDE ELEVATION**



**WEST SIDE ELEVATION**

**PROPOSED BLOCK**



## **CHAPTER 3      IMPLEMENTATION PLAN**

## CHAPTER 3 IMPLEMENTATION PLAN

### 3-1 Implementation Plan

#### 3-1-1 Implementation Concept

##### (1) Basic Matters Relating to the Implementation of the Project

The Project for the Improvement of the Health Centers in the Western Part of Kenya is to be examined by the Japanese government agencies concerned on the basis of the contents of this report. The Exchange of Notes (E/N) concerning this project is to be concluded between the Government of the Republic of Kenya and the Government of Japan subject to its approval at a Cabinet meeting of the Government of Japan. In accordance with the provisions of the E/N, which is to be concluded within the framework of the Government of Japan's grant aid cooperation, the consultant and the contractor to be responsible for the implementation of this project should be Japanese corporations. The agreements which the consultant and the contractor conclude with the Kenyan side must be certified by the Government of Japan.

##### (2) Term of Work

This project is to consist mainly of the construction of new buildings (total floor space: 3,500 m<sup>2</sup>) and the supply of medical equipment. In consideration of the details of the project, the present state of the project sites, the situation of local procurement of building materials, and the operational policy for the existing facilities and the ongoing medical care services--continuation of operation of the existing facilities and current medical care services, it will take 18 months--Phase I: 6 months; Phase II: 12 months) to complete the project.

##### (3) Ordering System

Phase 1 of the project, which is small in scale but needs to be completed simultaneously in five places within each project site, is to be ordered

by a consortium formed by the contractor and a Japanese general trading company to take charge of the equipment work through open bidding.

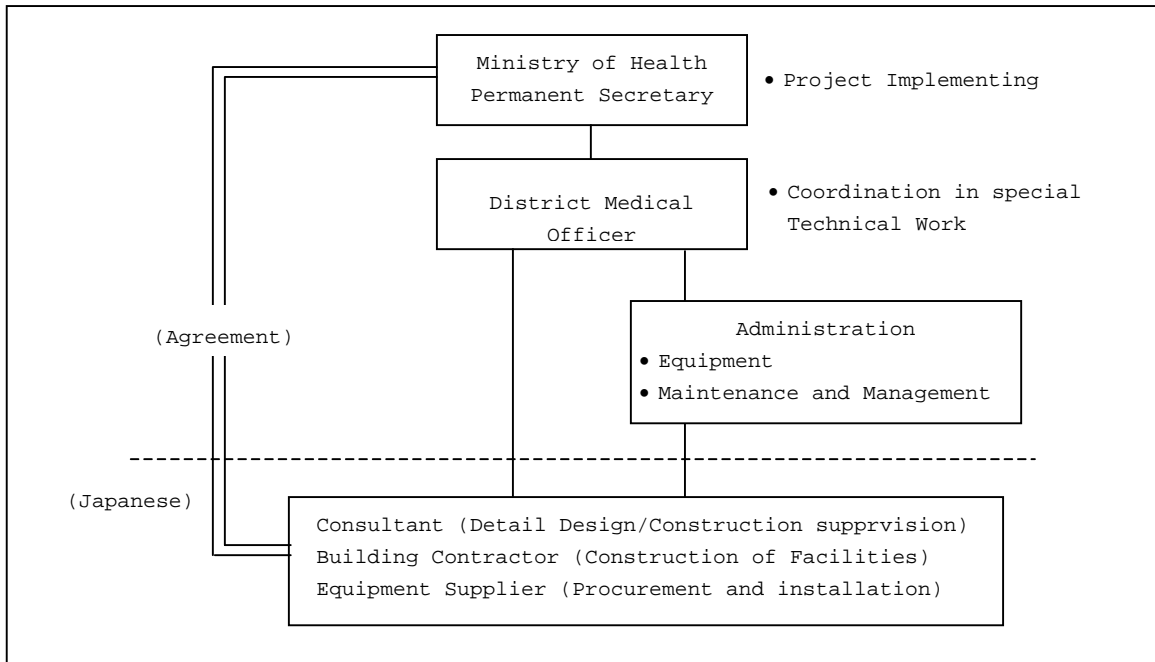
As to Phase II of the project, the order for the construction work is to be placed with the contractor, and the order for the equipment work with the general trading company because the construction work and the equipment work are both expensive and because it will be difficult to coordinate the two different types of work.

Orders for the construction work and the equipment work are to be placed with Japanese corporations. Those Japanese business corporations which prove qualified after preliminary screening are to bid for the construction work and the equipment work respectively.

#### (4) Project Implementing System

This project is to be implemented under the control of the Ministry of Health of the Republic of Kenya, and the District Hospital Management Board (DHMB) is to be responsible for the implementation of the project.

The Ministry of Health is to be a party to the design and supervision agreement, the construction/equipment procurement contracts, and the bank arrangement. The DHMB is to be responsible for consultation on the technical aspects of the project.



**Fig. 3-1 Project Implementing System**

(5) Execution System

1) Consultant

After the conclusion of the E/N between the governments of the two countries, the Ministry of Health of the Republic of Kenya is to conclude a consultant agreement concerning detail design and construction supervision for this project with the Japanese business corporation qualified as the consultant and to have such agreement certified by the Government of Japan. For the smooth implementation of the project, it is important that the agreement be concluded promptly after the conclusion of the E/N. After the conclusion of the agreement, the consultant is to prepare detail design and tendering documents in consultation with representatives of the Ministry of Health on the basis of the contents of this basic design study report, and then is to have such documents approved by the Ministry of Construction. The consultant is then to carry out the tender business and the construction supervision business in accordance with the detail design and the tendering documents.



## 2) Contractor

This project consists of the work to construct the planned facilities and the work to procure necessary items of medical equipment. The contractor to take charge of the construction work is to be selected from among qualified Japanese business corporations through open bidding with limitations on bidders.

In principle, the lowest bidder is to be the successful bidder. The contractor thus selected is to conclude a construction contract and have such contract approved by the Government of Japan.

### **3-1-2 Implementation Conditions**

Special attention must be paid to the following in implementing this project.

#### (1) Minimal Discontinuation of Provision of Medical Care Services During the Construction Work

The construction work is to be carried out on the premises of the 16 priority health centers. The length of discontinuation of provision of medical care services is to be minimized during the construction work. To this end, it is necessary that the expected date of completion of the planned facilities and the expected date of start of delivery of equipment be specified in the tendering documents. The contractor must be very punctual and at the same time take safety measures for patients, medical staffs and other staffs.

#### (2) Heavy Use of Building Materials to Be Procured in the Republic of Kenya and Third Countries

Building materials which can be procured in the Republic of Kenya include sand, gravel, and concrete blocks. Cement is also manufactured in the country and is exported to Uganda, Tanzania and other neighboring countries. Its production and market prices are stable. Sash, glass, steel frames, and ceiling materials can also be procured in the country, but they are mostly imports. It is therefore necessary to place orders for such materials well

in advance. Most items of medical equipment are to be procured in Great Britain, the Republic of South Africa, and other third countries. In this connection, it is necessary to work out a procurement plan taking into account the situation of procurement in third countries, means of transportation, packaging method, and necessary number of days.

### (3) Customs Clearance and Tax Exemption Procedures

In implementing this project, the consultant, the contractor and other Japanese business corporations concerned are to be exempted from all taxes imposed under the relevant laws of the Republic of Kenya.

### **3-1-3 Scope of Work**

This project is to be implemented through cooperation between the Government of Japan and the Government of the Republic of Kenya within the framework of the Government of Japan's grant aid cooperation. Given below is the outline of the work, for which each of the two countries is to be responsible.

#### (1) Work to Be Carried Out by Japanese Side

##### 1) Facilities

- Construction of the facilities specified in this basic design study report
- Procurement and installation of electrical and plumbing equipment
- Trial operation, operation, maintenance, inspection, maintenance and management of equipment

##### 2) Equipment

- Procurement of equipment
- Installation of equipment

3) Customs Clearance Procedure and Other Related Procedures

- Transportation of equipment from Japan/third countries to the Republic of Kenya
- Equipment transportation procedure and other related procedures

(2) Work to Be Carried out by Kenyan Side

1) Project Sites/Exterior Structures

- Securing sites for the planned facilities
- Removal of obstacles from the project sites and leveling of ground

2) Preparations for the Construction Work

- Provision of spaces for temporary offices, workshops and material sheds

3) Fixtures/Furniture

- Fixtures and furniture which are not included in the work to be carried out by the Government of Japan

4) Procedures/Costs

- Bank arrangement cost
- Tax exemption procedure cost
- Measures to be taken in relation to customs clearance and inland transportation
- Procedures for exempting Japanese nationals engaged in the implementation of the project in accordance with the provisions of the certified agreement and contracts from customs duties, domestic taxes and financial surcharges
- Provision of facilities to the above-mentioned Japanese nationals for entry into, and stay in, the Republic of Kenya

- Cost of maintenance and management of facilities and equipment for their proper and effective operation
- Costs of procedures related to the construction work

#### **3-1-4 Consultant Supervision**

The Japanese business corporation to serve as the consultant for this project within the framework of the Government of Japan's grant aid cooperation is to conclude a consultant agreement with the project implementing organization of the Republic of Kenya to carry out the detail design work and the construction supervision work. Construction supervision, whose objectives are to ensure that the construction work is carried out as provided in the drawings and specifications and to give guidance, advice and coordination during the construction period in order to ensure the high quality of the work, is to consist of the following activities.

##### **(1) Cooperation Concerning the Tender Business and the Construction Contract**

The consultant is to prepare tendring documents and other documents which are necessary for the selection of Japanese business corporations to take charge of the construction work and the equipment work, and carry out other tender-related activities such as public announcement of tender, acceptance of applications for tender, review of applicants' qualifications, acceptance of bids, and evaluation of the results of bidding. It is also to give advice about the conclusion of the construction contract between the Kenyan project implementing organization and the contractor.

##### **(2) Guidance, Advice and Coordination to the Contractor**

The consultant is to examine the process of execution, the execution plan, the building material procurement plan and the equipment procurement/ installation plan, and gives guidance, advice and coordination to the contractor.

(3) Examination of, and Approval for, Shop Drawings

The consultant is to examine and approve the shop drawings and other related documents which are submitted by the contractor. It is also to give relevant advice to the contractor.

(4) Verification of, and Approval for, Building Materials and Medical Equipment

The consultant is to approve the building materials and medical equipment which the contractor is to procure after verifying their consistency with the provisions of the agreement and contracts.

(5) Work Inspection

The consultant is to inspect the processes of manufacture of component parts for use in the construction work and medical equipment to verify their quality and performance on an as required basis.

(6) Reporting on the Progress of the Construction Work

The consultant is to gain a firm grasp of the process of execution and the project sites and then report the progress of the construction work to the organizations concerned of both countries.

(7) Completion Inspection and Trial Operation

The consultant is to conduct completion inspection of facilities and trial operation of equipment and submit a report of completion of inspection to the Kenyan side after verifying that the facilities and the equipment are in compliance with the provisions of the agreement and contracts.

(8) Training in Operation of Equipment

Included in this project are those items of equipment which require some special knowledge of their operation, maintenance and management. For this reason, it is necessary to give in-service training in operation and



troubleshooting of equipment to the persons concerned of the Government of the Republic of Kenya during the period of installation, adjustment and trial operation of equipment. The consultant is to give guidance and advice about such in-service training.

Judging from the dimensions of this project, it is appropriate that the consultant send one of its engineers to the Republic of Kenya throughout the period of implementation of this project. The consultant is also to send one or more of its engineers to the project sites in the course of progress of the project to carry out necessary inspections and give relevant guidance and coordination and at the same time assign an engineer to take charge of communications with, and support to, the project sites within its head office in Japan. Furthermore, the consultant is to report the progress of the project, the payment procedures and the completion and delivery of facilities and equipment to the persons concerned of the Government of Japan.

### **3-1-5 Equipment Procurement Plan**

#### (1) Policy for Equipment Procurement

Careful attention should be paid to the following points in procuring equipment for this project.

##### 1) Local Procurement

For easy repair and management of equipment after completion of the construction work, the necessary items of equipment should be procured in the Republic of Kenya as much as possible. It will be necessary to procure these items of equipment after gaining a firm grasp of the quantity of these items of equipment supplied for the smooth progress of the project.

##### 2) Import

Those items of equipment which are in short supply due to product quality problems are to be procured in Japan or third countries. In this case,

the contractor should consult with the Kenyan project implementing organization about import and customs clearance of these items of equipment to ensure that the necessary procedures are followed smoothly.

### 3) Unit Price of Equipment

The unit price of imported equipment, including packing, transportation and insurance costs, is to be compared with that of locally procured equipment. When the latter is lower than the former or when there is hardly any difference between the two, priority should be given to equipment which can be procured locally.

### (2) Building Materials Procurement Plan

Places of procurement of the main building materials are as shown in the following table.

**Table 3-1 Building Materials Procurement Plan**

Type of works	Materials/equipment	Countries			Remarks
		Kenya	Japan	Third countries	
Construction works	Cement				It supply situation is stable and it will be possible to procure the material in Kenya. It is possible to procure river sand in Kenya. It is possible to procure crushed stones in Kenya. Reinforcing bars made in Kenya are of high quality and there is a plentiful surplus of the materials. It is possible to procure imported in Kenya. Coral stones can be used as partition walls. Concrete blocks can be used as partition walls. Terrazzo tiles are used as flooring material in Kenya but they are available in only a few types. Ceramic tiles are manufactured in Kenya but they are available in only a few types.
	Sand				
	Gravel				
	Reinforcing bar				
	Form				
	Stone				
	Concrete block				
	Terrazzo tile				
	Ceramic tile				
	Glass				Glass is manufactured in Kenya.
	Roof tile (cement tile)				Roof tiles are manufactured in Kenya.
	Lumber				It is possible to procure lumber in Kenya.
	Calcium silicate board				It is possible to procure imported calcium silicate boards in Kenya.
	Wooden doors				No wooden doors are produced in Kenya.
	Paint				To be procured in Kenya.
Equipment works	Pump				General purpose imported pumps are to be procured in Kenya.
	Sanitary equipment				Imported sanitary equipment is to be procured in Kenya.
	Vinyl chloride pipe				Fittings are to be procured in Japan.
	White gas pipe				Local vinyl chloride pipes are to be used as outdoor underground pipes.
	Concrete pipe				Imported pipes are available.
	Water tank				Concrete pipes are manufactured in Kenya.
	Horse reel				Imported horse reels are to be procured in Kenya.
	Fire extinguisher				ditto

Type of works	Materials/equipment	Countries			Remarks
		Kenya	Japan	Third countries	
Electric work	Incoming panel/switchboard Power board/electric light board Lighting fixtures Electric wire pipe (PVC pipe) Electric wire				It is possible to procure in Kenya. ditto Local made lighting fixtures are to be used It is possible to procure these pipes in Kenya. Kenyan-made electric wires are to be used except for CV cable which is not available in Kenya.

### (3) Medical Equipment Procurement Plan

#### 1) Local Procurement

Ward beds are to be procured in the country.

#### 2) Procurement in Third Countries

Procurement of medical equipment in Japan and third countries is to be considered because it is difficult to procure locally made medical equipment.

#### 3) Period of Transportation

It usually takes about 4 weeks to transport by sea equipment procured in Japan, and about 3 weeks to transport by sea equipment procured in Western Europe or South Africa.

### 3-1-6 Implementation Schedule

When the E/N concerning the implementation of this project is concluded between the Government of Japan and the Government of the Republic of Kenya, the planned facilities are to be constructed and the necessary items of equipment are to be provided in stages, as stated below.

#### (1) Design

After the conclusion of the design and construction supervision agreement, the consultant is to prepare detail drawings, specifications, and tendering

documents on the basis of the contents of this basic design study report. In the meantime, the consultant is to have the design drawings and specifications approved in consultation with the persons concerned of the Government of the Republic of Kenya. It will take 2 months to complete this process.

#### (2) Tendering Business

Both the contractor and the business corporation to take charge of the equipment work are to be selected through open bidding. The tendering business includes public announcement of tender, preliminary screening of applicants, bidding, review of contents of bids, assignment of the contractor and the business corporation to take charge of the equipment work, and conclusion of contracts, in that order. It will take about 2 months to complete this process.

#### (3) Construction Work and Equipment Work

Judging from the details and the dimensions of the planned facilities and the situation of the local construction industry, it will take 18 months (Phase I: 6 months; Phase II: 12 months) to complete the project if the procurement and customs clearance of building materials go smoothly.

**Table 3-9 Execution Schedule**

		Month	1	2	3	4	5	6	7	8	9	10	11	12
Phase I	Detail Design		D/D		Approval	Tender		Approval						
	Constructoin Work	Preparation	Structural Work			Finishing work								
	Equipment Work	Manufacture Procurement		Transportation		Installation								
Phase II	Detail Design		D/D		Approval	Tender		Approval						
	Construction Work	Preparation	Structural Work						Finishing Work					
	Equipment Work	Manufacture Procurement			Transportation		Installation							

### 3-2 Operation and Maintenance Plan

#### (1) Extensions of the Facilities of the Health Centers

The financial viability of maintenance and management was investigated by comparing the increase in expenditures and the increase in the amount of medical care fees received for the extensions of the facilities of the health centers. The summary of the descriptions in (2) and (3) below.

#### (2) On the Increase in Expenditures

After completion of this project, each of the health centers can expect an increase in expenditures as a result of the increase in the cost of maintenance and management of the extensions of their facilities as well as in the number of medical professionals.

- Increase in Personnel Expenses

The amount of money paid to the staff members assigned to the health centers was calculated on the basis of the expected increase in the number of medical staff members as well as the Ministry of Health's present pay structure--84,000 Ksh/year for the clinical officers and 48,000 Ksh/year for the nurses, the testing engineers and the public health instructors.

- Increase in Facility Maintenance and Management Cost

The amount of cost per unit floor space in the facility maintenance and management cost over 20 years after completion of the project is estimated at about 50 Ksh/m<sup>2</sup>.

Case of extensions of 500 m<sup>2</sup> x 50 Ksh/m<sup>2</sup> · year = 25,000 Ksh/year

Case of extensions of 200 m<sup>2</sup> x 50 Ksh/m<sup>2</sup> · year = 10,000 Ksh/year

As is clear from the above calculations, the amount of increase in the facility maintenance and management cost will vary with the size of extensions of facilities.



- Increase in Equipment Maintenance and Management Cost

The necessary items of equipment are all basic items of equipment which do not require the conclusion of equipment maintenance contracts. If the increase in the cost of repair parts and expendables is taken into consideration and if the period of depreciation is set at 7 years, the amount of increase in the average annual equipment maintenance and management cost is estimated at about 8,000 Ksh based on the total cost of equipment.

- Increase in Power Bill

The cost of fuel of the generator is determined by the uptime of the generator regardless of annual power consumption. There are no facilities where it is necessary to install a new service wire to connect to the existing power cable or where it is necessary to increase power input capacity.

The cost of fuel of a 10 Kva diesel generator is 2.0 liters/hour.

The electric power cost is 4.46 Ksh/Kw·h.

- In the case of facilities where there is no power supply

The uptime of the generator is set at 3 hours/consulting day.

$3 \text{ hours} \times 2.0 \text{ liters} \times 45 \text{ Ksh/liter} \times 22 \text{ days} \times 12 \text{ months} = 71,280 \text{ Ksh}$

Total: about 71,000 Ksh/year

- In the case of facilities where electric power is supplied

The uptime of the generator is set at 1.5 hours/consulting day.

$1.5 \text{ hours} \times 2.0 \text{ liters} \times 45 \text{ Ksh/liter} \times 22 \text{ days} \times 12 \text{ months} = 35,640 \text{ Ksh/year}$

Total: about 43,000 Ksh/year

- Increase in Water Bill

At those health centers which are supplied with city water or community water, there will likely be an increase in the quantity of water consumed. Fixed water rates apply to all the health centers covered by this project, and therefore there will no increase in water bill.

- Increase in Telephone Bill

There will be no increase in the number of circuits and telephone calls as a result of the implementation of this project. So there will be no increase in telephone bill.

(3) On the Increase in Incomes

Incomes which are likely to increase as a result of the improvement of equipment and the extension of facilities at each of the health centers were examined.

- Medical Care Fees Received and Community Funds

The medical care fees received and the community funds will increase as the number of patients increases. In view of the fact that only a limited number of community residents visit the health centers due to the poor condition of their facilities, it will be possible to expect an increase of 30 percent in the number of community residents visiting these health centers. The amount of increase in medical care fees received and community funds can be calculated by multiplying the actual amount of medical care fees received and community funds for 1999 by the above-mentioned rate of increase.

- Hospital Charges

The increment of the number of beds for the health centers where the ward is to be extended was multiplied by the bed occupancy rate of 0.4 to calculate the increase in hospital charges. It is expected that there will be changes of uses of the existing facilities as a result of their extension. But this was not considered since when the existing facilities are to be extended was unclear.

- Delivery charges

For the health centers whose obstetrical department are not offering service due to defective facilities, the increase in incomes that will likely result from the establishment of the obstetrical department was

calculated by multiplying the childbirth charges per patient of 200 Ksh by the number of deliveries/week of 11.4.

(4) On the Possibility of Maintenance Facility

The increase in the health centers' and the local communities' expenditure as examined in (2) may be covered by the annual incomes that will result from the increase in incomes as examined in (3). In the case of Kipkelion Health Center, however, the existing facilities are so small in scale and are too much damaged for continued use. As a result, the health center has no choice but to provide medical care services in the planned building. For this reason, it is impossible to investigate this health center in the way that is meant to supplement the current activities. In the case of this health center, it is considered a priority at this point in time to construct the planned facilities without delay so that the health center may provide minimum required health care services to community residents.

**CHAPTER 4      PROJECT EVALUATION AND  
RECOMMENDATION**

## **CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION**

### **4-1 Project Effect**

Described below are the main benefits expected from the implementation of this project.

#### (1) Direct Benefits

##### 1) Improvement of the Quality of Medical Care Services Provided at the Priority Health Centers

It will be possible for residents of the areas covered by each of the 16 priority health centers to receive better medical care services as a result of the strengthening of each priority health center through the extension of facilities and the improvement of medical equipment. The total number of community residents to benefit from the health care services offered by these health centers (actual annual total number of patients) is 148,500.

##### 2) Reduction of Burden on Hospitals at Higher Levels

When these health centers are provided with facilities for the use of inpatients, it will be possible for the health centers to concentrate on the treatment of mild cases, serious cases being treated at hospitals at upper levels. This will reduce the burden imposed on these hospitals, with the result that the region's referral system is strengthened.

##### 3) Improvement of Self Sustainability on Finance

At these health centers and the local communities which are mainly responsible for their operation, there is a serious lack of knowledge of financial management concerning medical care fees received, which is indispensable for the autonomous operation of these health centers.

If technical guidance on the proper operation of the health centers is given, it will contribute to the improvement of the health centers' ability to operate their facilities and equipment on an autonomous basis.

(2) Indirect Benefits

1) Establishment of Facility/Equipment Models for the Health Centers in the Republic of Kenya

At present, there is a great disparity in scale and function among the health centers in the Republic of Kenya, which is a formidable obstacle to the improvement in the quality of the country's regional medical care services. This project for the improvement of the facilities and equipment of the priority health centers is expected to serve as an important guideline for the implementation of the future plans to improve the room arrangement within the health centers' facilities and the quality of their equipment.

2) Establishment of Regional Medical Care Services Covers Comprehensively

In order to improve the quality of region's health care services utilizing limited resources, it is necessary to select several health centers within the region strategically, expand the area covered by each of these facilities, and improve its organizational system. This project is expected to strengthen the vertical relationships within the referral system but also the horizontal relationships between the health centers. It is expected to eventually improve the quality of services and benefit as much as 2.7 million community residents.

#### **4-2 Problems and Recommendations**

The support of the Ministry of Health and other central government agencies and the cooperation of the local communities are indispensable for the smooth provision of regional medical care services by the 16 priority health centers



after the completion of this project.

Itemized below are our recommendations for the solution of the problems facing these health centers.

<Recommendations whose goals are unlikely to be attained unless the problems are solved or the situation is improved>

(1) Improvement of the Quality of Services Provided by Medical Professionals

It is necessary to the Ministry of Health to plan and implement the increase in the number of medical professionals proportionate to the extension of the facilities as well as medical professional reeducation programs.

(2) Effective Use of Facilities

After the extension of the facilities, it is necessary that plans to change the uses of the existing facilities (a proposal is included in the floor plan) and subsequently rearrange equipment and furniture be implemented by the local communities or the health centers' staff members.

(3) Repair of the Existing Facilities

It is necessary that repairs of the existing facilities be carried out by the local communities so that they may continue in use.

(4) Operation and Maintenance of Facilities

It is necessary that the District Departments of Health's procedures for the repayment of maintenance and management expenses be followed promptly in response to the health centers' applications so that the health centers' medical care services may be provided on a continual basis.

<Recommendations on the problems whose solution will contribute to the more

effective implementation of this project>

(1) Management Systems of Large-scale Health Centers

While the scale of individual health centers vary widely, the number of the clinical officer who is responsible for the management of each health centers is one. The Ministry of Health should consider the creation of a management system in which more than one clinical officer is responsible for the management of each health centers.

(2) Management of Sanitary Condition of Facilities

A staff member in charge of the management of sanitary conditions of facilities is to be appointed at each of the health centers by the local community or the health center's staff members for the better management of facilities.

(3) Maintenance of Utilities

Plumbing and electrical equipment is to be maintained sufficiently for their safe, continued use.

(4) Proper Disposal of Medical Waste

A staff member in charge of proper disposal of medical waste is to be appointed at each of the health centers for proper sorting of waste and incineration of dangerous waste.

It is requested that the Ministry of Health which is the Kenyan project implementing organization should conduct monitoring periodically and report the outcome of its evaluation of the results of such monitoring to JICA.