

3.3.2 Maintenance Plans

The project hospitals, Kundiawa Provincial Hospital, Rabaul Nonga Base Hospital, and Madang Provincial Hospital, serve as the referral hospitals for each province and the management system for facilities, equipment, and medical equipment has a high degree of commonality. In addition, the Department of Health of the central government while maintaining the policy of decentralization, seeks to eliminate the differences between the provinces by adjustment and direction. The maintenance and management of facilities, equipment, and medical equipment that will be procured by the Project is the responsibility of the medical superintendents with the hospital secretary of each hospital handling the actual management. The Department of Works provincial level staff respond to requests for service and handle repairs. The Department of Works engineers responsible for field service and repairs when necessary can consult with the central level hospital facility and medical equipment engineering sections to conduct service while receiving appropriate advice. Also, the engineers from the Department of Works hospital facility and medical equipment engineering sections will conduct periodic visits to hospitals about twice a year to conduct schedule maintenance and inspection of equipment handle by each engineer. Also, trips are made to make repairs that provincial level staff are unable to handle. For this project, basic parts necessary for repairs and maintenance will be handled by the project hospitals and entrusted to the hospital secretaries. For other parts such as hospital facility related parts or medical equipment related parts, requests are made to the hospital facility and medical equipment engineering sections. Lesser costs for facility maintenance are borne by hospital operating budget while the costs for other facility and medical equipment repair, service, and parts are borne by the Department of Health of the central government.

In regard to maintenance and management staff, the staff of hospital facility and medical equipment engineering sections of the Department of Works are the charge of the central government. At the provincial level, provincial equipment sections are responsible. While there is experienced staff for maintenance of hospital buildings and equipment like boilers and air conditioner at the provincial level, there are very few engineers at the provincial level for handling medical equipment and other specialized equipment and their capabilities are not necessarily adequate. Thus, cases of repairs handled directly by the medical equipment engineering section are frequent. However, the staff of the medical equipment engineering section is also

insufficient. For equipment such as x-ray units where there is some danger related to repairs, the staff of representative offices of manufacturers in Australia provide training and other cooperation. There are few equipment manufacturers representative offices in Papua New Guinea and thus its difficult to obtain technical assistance from private sectors. It would be desirable to have the manufacturers providing the equipment procured by the Project to setup representative offices in Papua New Guinea and have those offices provide technical support to the medical equipment engineering section, etc.. Expendable supplies used by hospitals like pharmaceuticals are provided by medical supplies center under the Department of Health.

Training of hospital staff in the operation and routine maintenance of equipment to be procured by the Project will be conducted when the equipment is installed. Also, the staff of each hospital are educated and trained at the teaching and training base hospitals. In addition, technical guidance in the operation and routine maintenance of equipment is provided by the appropriate sections of the Port Moresby General Hospital which is the referral hospital for this matter.

The responsible staff members of the Kundiawa Provincial Hospital, Rabaul Nonga Base Hospital, and Madang Provincial Hospital are proficient in the operation and routine maintenance of equipment through the process described above. Although there may be no problems with the routine operation of current equipment, adequate training will have to be conducted when the new equipment is installed. In regard to maintenance, the current equipment are utilized very high but there are serious problems which is the long time required for these repairs in some cases, and these problems are resulted by assignment of staff, way of parts acquisition and other measures, and are needed to be solved.

3.3.3 Location and Condition of Project Sites

(1) Kundiawa Provincial Hospital

The planned site is east of the Kundiawa Town at the end of a road that runs towards the airport. There are valleys on both sides of the site which is a table land. The area of the site is 5.23 ha and from the access area the site slopes down towards the rear of the site. The slope which is about 1% will not hinder the site planning. The site which is surrounded by 3,000 m class mountains is a plateau area at about 1,500 elevation. Thus the climate is different from the coastal area with low temperatures of about 8°C have been recorded. Annual rainfall at about 2,500 mm is relatively low for Papua New Guinea.

Although connection to the city water supply is easy, the water because of its high hardness will have to be softened depending upon the application. As mentioned previously, the site is not located near city sewers and the difficulty in connecting to sewers will require some inventiveness. Electric power is already available on the site.

Patients will arrive at the hospital by car or by foot.

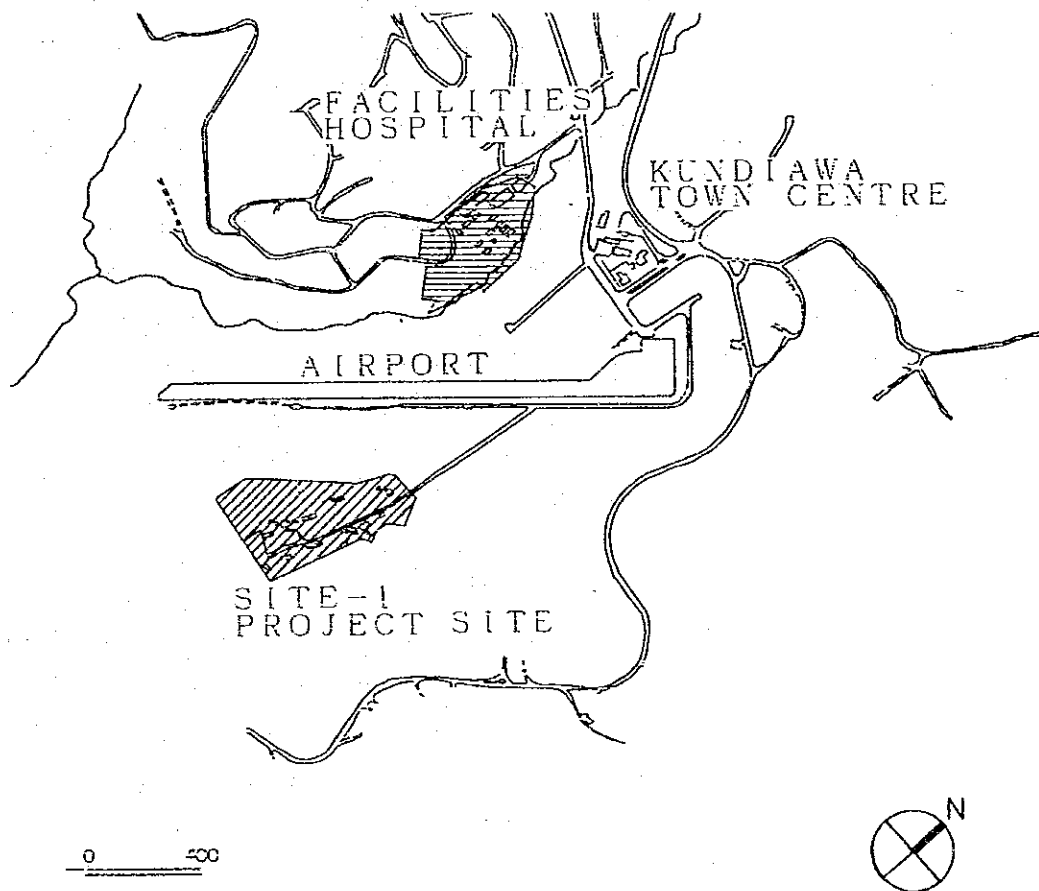


Fig. 3.3-1 Location Map of Project Site for Kundiawa Provincial Hospital

(2) Rabaul Nonga Base Hospital

The project site is located on the grounds of the Rabaul Nonga Base Hospital. The existing outpatient, laboratory, and CSSD building will be demolished and about 2,400 m² space will be prepared. It is necessary to prepare temporary facilities for the areas that will be forced to move the buildings are demolished to house them until construction of the new facilities are completed and attempts will be made to avoid hindrances to diagnostic and treatment activities by the Papua New Guinea side. The hospital grounds are located at the northwest foot of Mount North Daughter. From the front of the site to rear of the site, that is from east to west moving towards the coast, there is a gentle (3%) slope. There is about an 80 cm difference in elevation on the project site in the east to west direction. The island of New Britain lies in the monsoon belt and is a rainy tropical climate. The project site is on the north side of the island and the rainy season is from December to April. The Rabaul area is an area where rainfall is relatively low at about 2,000 mm/year. The hospital has water supply and sewer pipes installed. The water supply is rainwater and well water. The well water is very hard and water softening is necessary. Waste water composed for rain-water runoff and sewage is discharged into the ocean without treatment. The electric power supply has a 400 KVA transformer and that is currently adequate capacity. The hospital is located on the west side of the road running from the center of Rabaul Town through the Tunnel road to Tavui Point. Access to the site is easy and patients arrive at the site by walking or by motor vehicle including buses. Patients from surrounding islands will come to Rabaul by boat or by airplane.

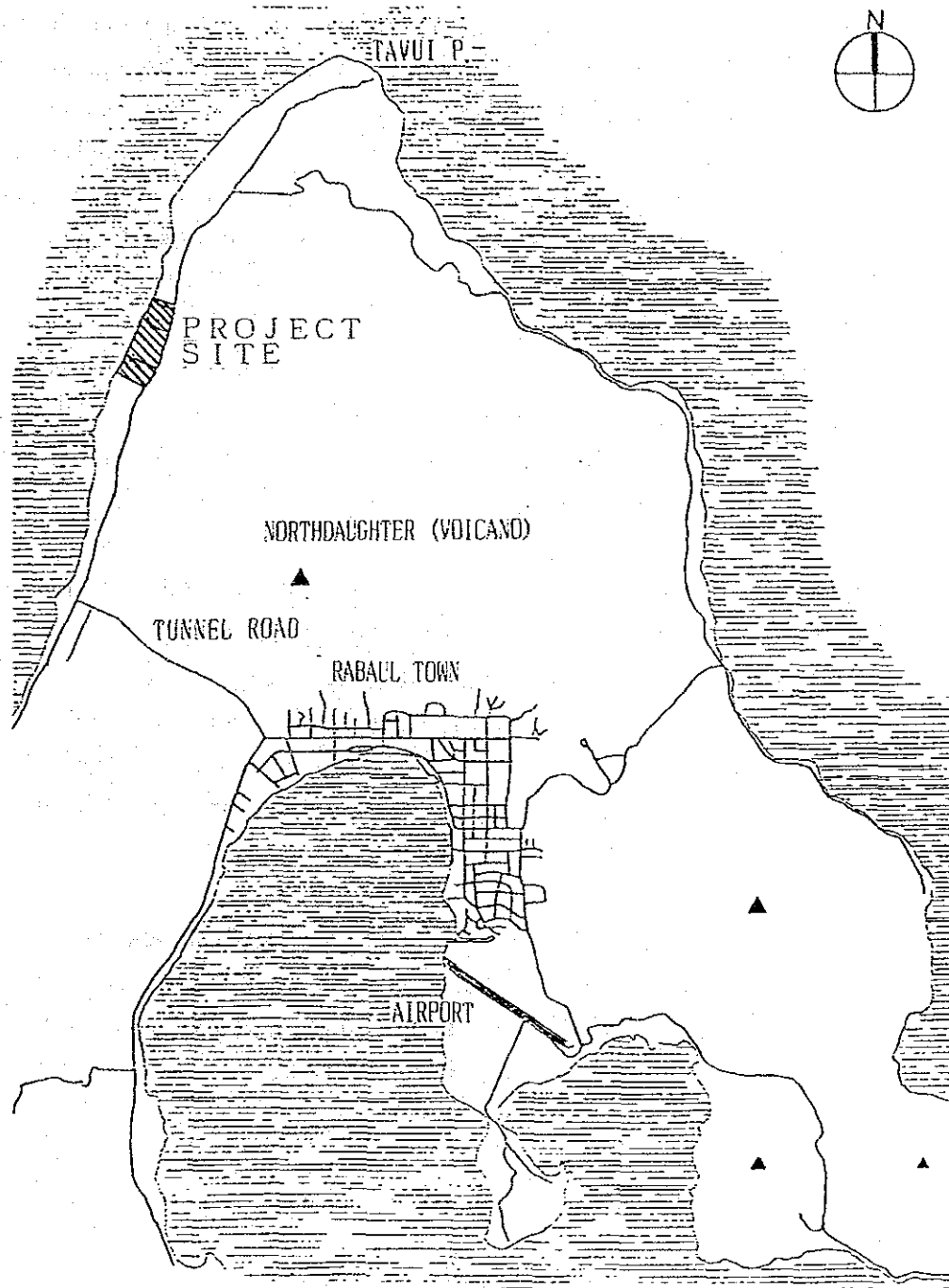


Fig. 3.3-2 Location Map of Project Site for Rabaul Nonga Base Hospital

(3) Madang Provincial Hospital

The project site is located on the grounds of the Madang Provincial Hospital and the existing outpatient, specialty diagnosis and treatment building, and intermediate ward will be demolished and an area of 2,700 m² will be cleared. It is necessary to prepare temporary facilities by the Papua New Guinea side to use by the various departments until construction of the new facilities is completed in order to not hinder the activities of the outpatient department and is also considering utilization of the town clinic in Madan for outpatient. The site of this hospital rises gently from front to rear, northwest to southeast, an about 1.8% grade. There is about a 1 m elevation difference in the project site. The location of the outpatient building, maternity ward, and intermediate ward is the lowest in the surrounding area and it has been reported that flooding occurs in the area up to the floor of the facilities during heavy rains.

The climate is hot and humidity is high. November to May is the rainy season and lightning storms occur frequently during this period. Water supply is a combination of city water and rainwater. The city water is very hard and depending upon the application needs to be softened. Rainwater runoff is connected to the city sewer while sewage is discharged without treatment into the ocean. The electric power supply equipment has a 300 KVA transformer and currently this is adequate.

The hospital is located close to the center of Madang Town and the main road of the Town, Modilon road, runs along the northwest side of the site. Thus access to project site is easy. Madang and other local residents arrive at the hospital mainly by foot or motor vehicles including buses.

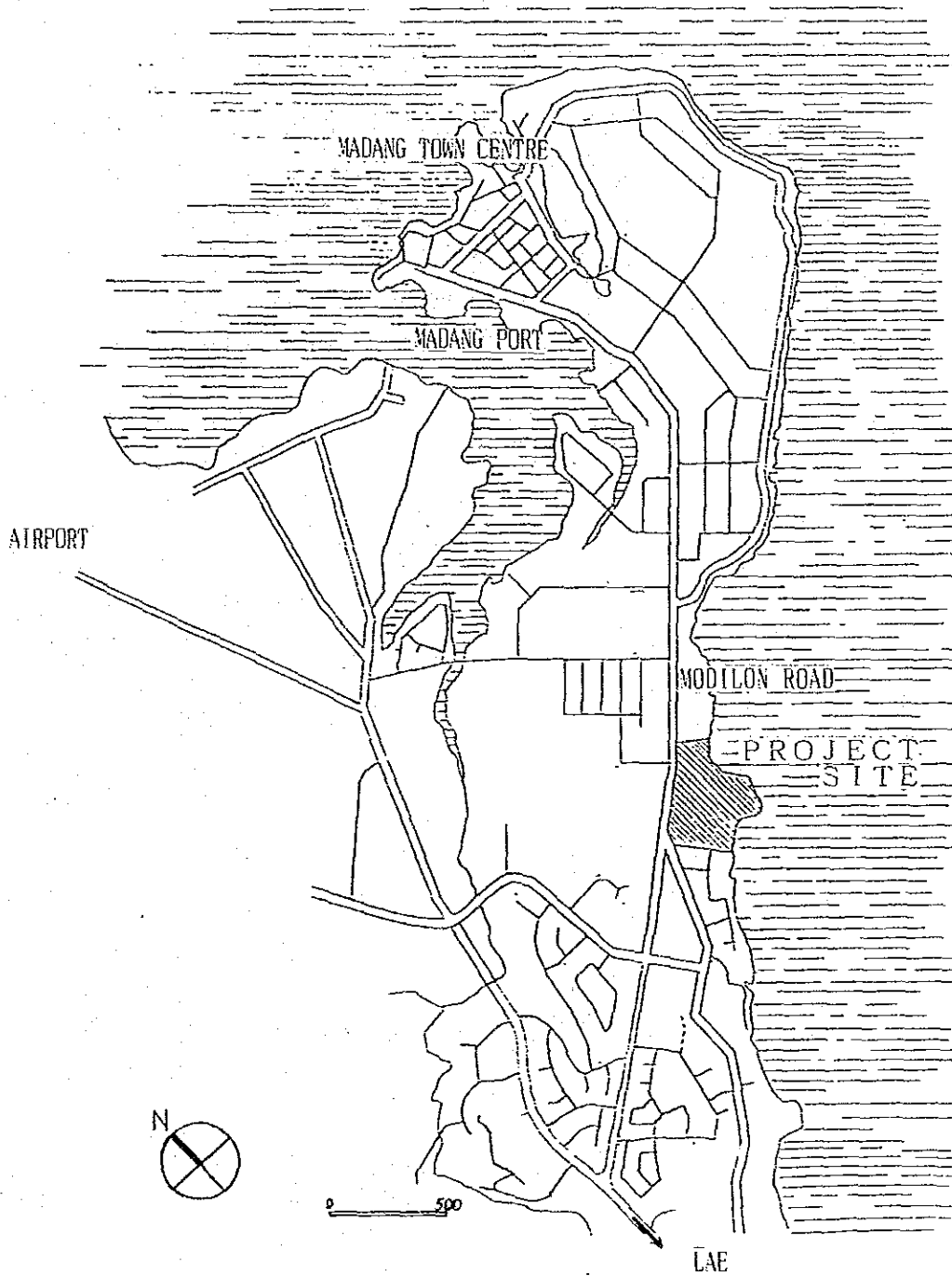


Fig. 3.3-3 Location Map of Project Site for Madang Provincial Hospital

3.3.4. Outline of Facilities and Equipment

(1) Kundiawa Provincial Hospital

The necessary facilities for a general hospital including health care facilities outpatient, operating theatre, laboratories, wards, and dispensary and the required facilities for administration and service and the equipment necessary for these facilities will also be provided. However, that equipment currently in use that can be used will be used in the new facility. The equipment that needs to be supplied will be selected appropriately at the working level.

1) Outline of Facilities is as follows:

- i. Main Building : single story, 1,898 m² floor space
general, pediatric, obstetric, dental, and
specialty outpatient, x-ray, pathology,
blood bank, dispensary, and administration
- ii. Operating Theatre : single story, 447 m² floor space
operating theatre and related rooms, CSSD
- iii. Ward Building : single story, 2,496 m² floor space
medicine, surgical, pediatric, maternity,
and isolation (240 beds)
- iv. Mortuary Building : single story, 40 m² floor space
autopsy room, refrigerated room
- v. Ablution Building : single story, 144 m² floor space
sinks, showers, and toilets for patients
- vi. Supply Warehouse : single story, 101 m² floor space
general and medical supply storage
- vii. Kitchen Building : single story, 151 m² floor space
kitchen and related rooms, staff mess

- viii. Laundry : single story, 67m² floor space
laundry and related rooms
- ix. Workshop : single story, 50 m² floor space
workshop room and related rooms
- x. Incinerator : single story, 19 m² floor space
incinerator
- xi. Generator Room : single story, 19 m² floor space
emergency generator
- xii. Water Treatment Facility : water softener
- xiii. Water Receiving Tank : gravity feed water system
Elevated Water Tank
- xiv. Sewage Treatment Facility : sewage treating

2) Outline of Equipment is as follows:

- i. Outpatient Diagnosis and Treatment Equipment
- ii. Emergency Room Equipment
- iii. MCH Room Equipment
- iv. Ultrasound Scanner
- v. X-ray Room Equipment
- vi. Pathology Laboratory Equipment

- vii. Dental Clinic
- viii. Blood Bank
- ix. CSSD
- x. Operating Theatre Equipment
- xi. Obstetric and Gynecology Ward Equipment
- xii. Pediatric Ward Equipment
- xiii. Ward Equipment
- xiv. Dispensary Equipment
- xv. Autopsy, Mortuary Equipment
- xvi. Nurse Station Equipment

(2) Rabaul Nonga Base Hospital

Main building to house outpatient, laboratories, dispensary, CSSD, and administration and the necessary equipment for those facilities. The selection of equipment assumes that existing equipment will be used when possible.

1) Outline of facility is as follows:

- i. Main Building : 2 story, 2,567 m² floor space
general, pediatric, dental, specialty, and emergency outpatient, ICU, dispensary, x-ray, pathology, CSSD, administration, and other rooms for staff

2) Outline of Equipment is as follows:

- i. Outpatient Examination Equipment
- ii. Emergency Room Equipment
- iii. Ultrasound Scanner
- iv. Electrocardiograph Diagnosis Room Equipment
- v. X-ray Room Equipment
- vi. ICU Equipment
- vii. Pathology Equipment
- viii. CSSD Equipment
- ix. Dispensary Equipment
- x. Blood Bank Equipment
- xi. Dental Clinic
- xii. Nurses Station Equipment

(3) Madang Provincial Hospital

A main building to house outpatient, part of the wards, dispensary, and administration and the necessary equipment for the various health care units will be provided. This equipment selection assumes that existing equipment will be used where possible.

1) Outline of facility is as follows:

- i. Main Building : single story, 1,967 m² floor space
general, pediatric, obstetric, specialty, and
emergency outpatient, ICU, full nursing

ward, dispensary, and administration

- ii. Ablution Building : single story, 36m² floor space
sinks and toilets for outpatients

2) Outline of equipment is as follows:

- i. Outpatient Examination Equipment
- ii. Emergency Room Equipment
- iii. MCH Equipment
- iv. Ultrasound Scanner
- v. Electrocardiograph, Diagnosis Room Equipment
- vi. ICU Equipment
- vii. Specialty (Tuberculosis, Hansen's disease) Examination Equipment
- viii. Ophthalmological Equipment
- ix. Dental Clinic
- x. Intermediate Examination Room Equipment
- xi. Dispensary Equipment
- xii. Nurses Station Equipment

CHAPTER 4 BASIC DESIGN

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4.1. Basic Plan

4.1.1. Design Policy

(1) Basic Policy

The facilities included in this project are central facilities in Papua New Guinea's health care system and play important roles in the Government of Papua New Guinea's medical service improvement plan. Thus, the optimal facilities and equipment will be designed to allow efficient and rationalized health care service. (i) basic design plans that are appropriate for the environments of the proposed hospital sites. (ii) Attempt to lower cost where possible. (iii) strive for energy conservation and low running cost. (iv) consideration of durability of facility and easy of maintenance.

The above form the basic design policy and the conditions related to the design policy are described in the following paragraph (2) - (4).

(2) Natural Conditions

Papua New Guinea is located between 6° to 12° South Latitude and most of the country is located in tropical rain forest or tropical savannah climate zones. Although these project sites are located in three towns, the average annual temperature of the three sites is about 27°C to 28°C. The annual average high temperature is about 30°C to 31°C and the annual average humidity is 80% and shows high temperature, high humidity, and high rainfall of the tropical climate. December to March is the rainy season while June to October is the dry season for the three sites. The annual insolation hour is 1,800 to 2,400 hours and the average of 5 to 7 hours per day. The elevation of the Rabaul and Madang sites are within 10 meters of sea level and are similar while the Kundiawa site has an elevation of 1500 meters which must be considered in the design conditions. All three sites are within seismic zones designated by the Government of Papua New Guinea. The natural conditions of the three sites are listed in Table 4.1-1.

Table 4.1-1 Project Sites Natural Condition

	Kundiawa	Rabaul	Madang
Latitude (South)	6°	4° 13'	5° 13'
Elevation	1,495m	3.2 ~ 9.71m	6.0 ~ 8.0m
Annual Mean Temperature	20.4°C	27.8°C	27.2°C
Mean Max.	30.8°C (Oct.)	35.3°C (Nov.)	34.4°C (Dec.)
Mean Min.	7.6°C (Nov.)	21.3°C (Sep.)	21.0°C (Jun.)
Mean Relative Humidity	—	77%	73%
Annual Rainfall	2,249mm	2,343mm	2,575mm
Monthly Rainfall Max.	288mm (Mar.)	399mm (Jan.)	525mm (Dec.)
Monthly Rainfall Min.	84mm (Jul.)	34mm (Oct.)	58mm (Aug.)
Annual Sunshine	—	2343hr.	2575hr.
Mean Daily	—	6.4hr.	7.1hr.
Annual Rainy Day	—	199 day	184 day
Wind Direction	Particular wind from mountain, and valley	West	East
Seismic Zone	3	1	2

Source: National Weather Service

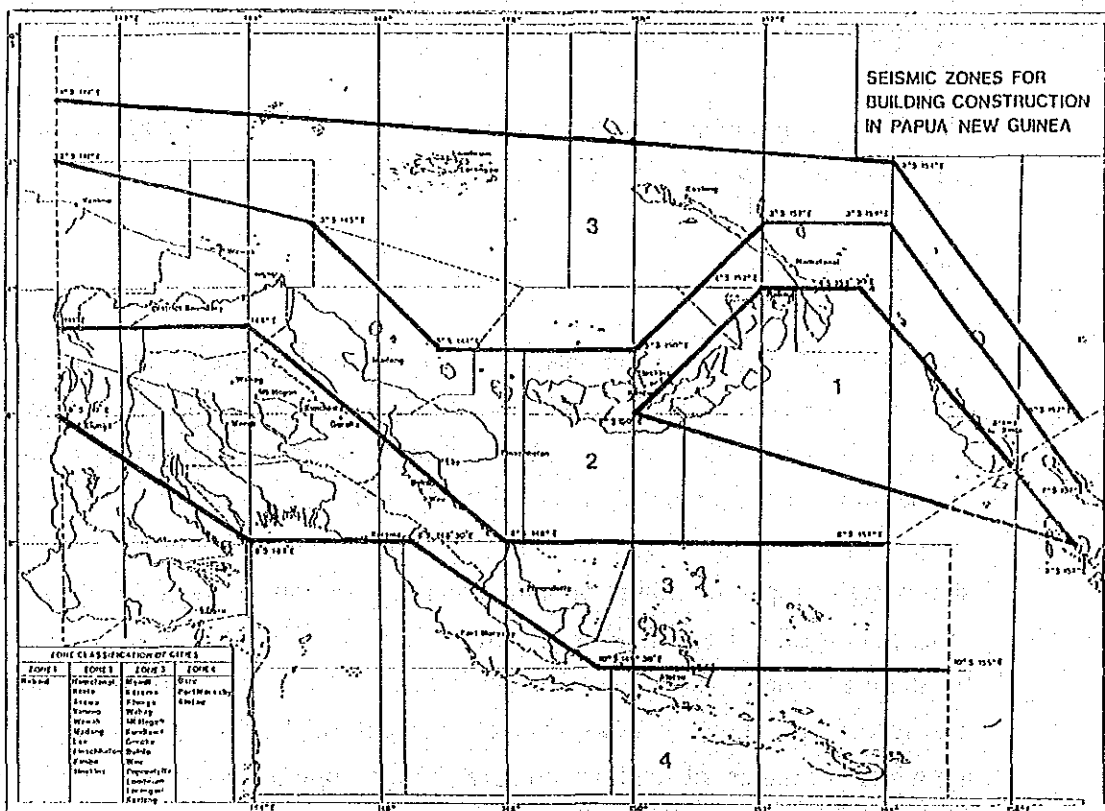


Fig. 4.4-1 Seismic Zone by PNG Standard

(3) Social Conditions

The usual working hours in Papua New Guinea are 8:00 AM to 4:00 PM and the longer morning working hours reflect the tropical region lifestyle pattern. The usual days off are Saturday and Sunday while there are many members of Christian Churches so citizens are often seen on their way to church on Sunday. Also, because of the beliefs of certain sects, there are many who will not work on certain days which must be considered when setting working hours.

Also, long term employees have annual leaves of up to a month and a half. This annual leave period tends to be concentrated in the period between Christmas and the end of January and thus activity in Papua New Guinea comes to a halt during this period. This needs to be taken into account when scheduling time regarding the Project implementation.

While there are many types of building construction in the capital, in provincial cities, the typical construction tends to be raised floors and concrete block construction, corrugated metal sheet or slate roofs while windows tend to be glass louvers. Most roofs are designed to collect rainwater and solar water heater are widely used.

(4) Construction Situation

The Papua New Guinea has the building standard which is the Independent State of Papua New Guinea, Chapter No. 301, Building. This law is currently being revised by the Department of Works and by the time this project is implemented, the revision will have been completed. Thus, the study team obtained a copy of the revised law draft from the Department of Works and the facilities will be designed according to this. This law is consists of three chapters:

- i. Building Act (law)
- ii. Building Regulation
- Schedules
- iii. Subsidiary Legislation

The structural designs and calculations must conform to Papua New Guinea standards.

The following are the Papua New Guinea standards for structural design:

- 1001-1982 Parts 1 - 4: General Structural Design and Design Loading for Buildings
 - Part 1&2: General Design Requirements, Dead and Live Loads
 - Part 3: Wind Loads
 - Part 4: Earthquake Loadings
- 1002-1982 Reinforced Concrete Structures
- 1003-1982 Steel Structures
- 1004-1982 Reinforced Masonry Structures
- MP1 -1982 (Design Manual)

The load and external forces equations and values used in the above standards are as below.

Dead Load: Calculations are done according to the conditions of the finishing materials, etc.

Live Load: Calculated using the values listed in the following table.

	Value of Live Load		Remarks
	KPa	Kg/m ²	
Roof	0.25	25	Reductions of Live Load In structural calculation, if live load was 5KPa (500 kg/m ²) or less, following reduction may be applied, $R = 0.86A$ R: Reduction percentage A: Floor Area supported by column, bearing wall and foundation $R \geq 50\%$ and $100 \times (D+1)/(4.33L)\%$ D: Dead Load (kg/m ²) L: Designed Live Load
Ward	2.0	200	
Treatment Room	3.0	300	
Office Room	3.0	300	
Laboratory	3.0	300	
Class Room	3.0	300	
Storage	5.0	500	
Meeting Room	3.0	300	

Seismic forces are calculated following equation, the values for each project site are as listed in the table below:

$$\text{Seismic Force : } V = C I K Wt$$

- V : total horizontal seismic base shear
- C : basic seismic coefficient
- I : importance factor of the building
- K : structural type factor
- Wt : total of the vertical loads above the level of lateral restraint

$$0 < L < 1.5 \text{ Kpa} \quad : Wt = D$$

$$1.5 \text{ KPa} \leq L < 5.0 \text{ KPa} \quad : Wt = D + 1/3L$$

$$5.0 \text{ KPa} \leq L \quad : Wt = D + 2/3L$$

	Kundiawa	Rabaul	Madang
Seismic Zone	3	1	2
C	0.16	0.25	0.2
I	Hospital I = 1.5		
K			
V			

Wind Load is calculated using the equation below:

$$P = C q_z$$

- C : a pressure coefficient
- q_z : the free-stream dynamic pressure resulting from the basic design wind velocity at any height z above the ground
 $0.6 V_z^2 10^{-3}$
- V_z : the design wind velocity at height z

Electrical equipment, cooling and sanitary equipment design standards are based on the Standards Association of Australia mandated Australian Standards (AS).

(5) Policy Regarding Construction Period

From the various conditions described through the preceding section, the scale of facilities and the framework of Japan's Grant Aid Cooperation system described in the Project Description presented in 3.3 of the previous chapter, it is preferable that it would be appropriate to divide the execution of the projects into two stage, while local construction methods would be used as much as possible and construction work would be proceeded on the appropriate schedule.

4.1.2. Study and Examination on Design Criteria

(1) Design Criteria for Facilities

The deteriorated conditions of the facilities and the increasing demand for health care means that the current capabilities are inadequate. By improving the facilities, it is anticipated that provision of efficient and rational health service will be possible. The design of the facilities will take current demand for medical care into account.

1) Design Policy for Facilities

- (i) A master plan will be set for each hospital that the capabilities necessary for each location into account and this plan will be used as a basis for designing facilities.
- (ii) The various elements within facilities will be organized and functional flow line will be put in order.
- (iii) It will be attempted to effectively link existing facilities and planned facilities
- (iv) Avoiding hindrance of medical activity in existing facilities during the project implementation will be considered
- (v) The climate, natural features, construction situation, and other local

factors and characteristics will be taken into account in the design of a facility that is harmony with these factors

- (vi) In order to easily cutoff direct solar radiation, the south and west walls will be used for lighting and insulating materials will be used on the exterior walls to reduce heat transmission.
- (vii) In order for the facility and equipment to be easy to maintain, parts that are available domestically will be selected to the extent possible.
- (viii) In order to maintain interior temperatures, natural ventilation will be used to maximum possible extent while air conditioning will be used only in the minimum possible areas. Natural lighting will be used to the maximum possible extent.
- (ix) Locally available construction materials will be used to the maximum possible extent as will local construction methods. Local construction techniques, capabilities, and economy will be considered in the designs.

2) Design Policy for Equipment

The following will be especially considered in the equipment plans for each hospital.

- (i) The staff available for operating hospital will not increase beyond current levels
- (ii) Operating funds, especially running cost for facility equipment, lighting, and other maintenance costs and funds for facilities and equipment will not be increased
- (iii) Develop a proposed design that includes those points that should be improved and not be overly influenced by existing facilities

(iv) Simple daily operation and use

The following approaches can be considered in regard to (ii).

a) Reducing running cost

It is necessary to consider the reduction of the cost for electricity, water, and other running costs for the various facilities by selection of systems and equipment. The following can be adopted:

- * Select energy conserving equipment (low loss type)
- * Consider use of solar energy
- * Use rainwater and consider reuse of waste water
- * Make equipment and systems simpler
- * Avoiding overabundance equipment

b) Reducing maintenance costs

In order to reduce the cost for repair and maintenance of malfunctions, damage, wear, corrosion, etc. of equipment, pipes, etc., it is important to carefully select materials used in equipment and pipes. The following selection criteria can be considered:

- * Avoid selection of advanced, complicated equipment
- * Attempt to use compact pumps, electric motors, etc.
- * Use equipment that are common in the region and easy to obtain
- * Use equipment of the same specification and that are exchangeable
- * Avoid requirements for high levels of maintenance
- * Select materials that are resistant to damage from small animals, termites, and other vermin

(2) Facility Components

The project facilities for each hospital was covered in 3.3.4 Outline of Facilities and Equipment. Within this, the main required rooms composing each department are as follows:

Table 4.1-2 Principal Rooms for Departments

No	Department	Principal Room
1	Outpatient General, Pediatric MCH - Obstetric Speciality	Sub-waiting, Nurse Station, Primary Examination, Treatment
2	Outpatient [Dental]	Sub-waiting, Dental Treating, Dental Laboratory, Dentist Office
3	Out Patient [Emergency]	Nurse Station, Emergency Treating, Equipment Store, Minor Operating Theatre, Observation
4	X-ray	Waiting, Xray Examination, Operation, Office, Dark Room, Film Store
5	Pathology	Waiting, Office, Laboratory, Wash & Sterilizing, Staff Room
6	Blood Bank	Waiting, Office, Donner's Bed Room, Examination, Blood Preservation
7	Dispensary	Office, Dispensary, Pharmaceutical Store
8	Operating Theatre	Hall, Nurse Station, Scrub, Operating Theatre, Recovery, Equipment Store, Staff Dressing, Staff Room, Preliminary Washing
9	Central Sterilizing Supplies Dept.	Washing, Preparation, Slerilizing, Steril Store, Medical Supplies Store, Office
10	Wards	Nurse Station, Office, Ward, Isolation Ward, Linen Store, Pantry, Dirty Utility, Staff Room, Milk Room (for Pediatric and Obstetric) Labour Room, Clinic & Treatment, Nursery (for Obstetric)
11	ICU	Nurse Station, ICU-(Ward & Isolation), Dirty Utility
12	Administration	Reception, Cashier, General Office, Hospital Secretary's, Matron's, Medical Superintendent's, Secretaries', Doctor's, Meeting, Library
13	Kitchen & Mess	Office, Food Store, Storage, Kitchen, Staff Mess,
14	Laundry	Office, Laundry, Sewing & Ironing, Linen Store

(3) Facility Scale

In regard to the scale of the various rooms composing the planned facilities at the hospitals, the numeric values contained in the Hospital Service Project report that was prepared by the Government of Papua New Guinea with the cooperation of the Asian Development are as the standard for floor space of the rooms for each medical service area while the Government of Papua New Guinea standard for office and administrative field area calculation is used for the administrative department rooms. For rooms not covered by the above, values used in the most recent health care facilities in Papua New Guinea are used to the maximum possible extent as standards. The following table lists the floor space for the various rooms based the above standards.

Table 4.1-3 Standard of Floor Space for Required Rooms

Department	Room Name	Standard Floor Space	Remarks	
Outpatient	Common for each unit	Waiting Hall	2m ² /person	include clean utility
		Sub-waiting Room	2m ² /person	
		Nurse Station	16m ²	
		Preliminary Examination	6m ²	
		Clinic	12m ²	
		Injection	10m ²	
		Medication	10m ²	
		Treatment	15m ²	
		Dirty Utility	10m ²	
		Staff Room	3m ² /person	
		Staff Toilet	5m ²	
	Speciality and Intermediate	Clinic	12m ²	
		Treatment	12m ²	
Dental	Treatment	12m ²		
	Dental Laboratory	12m ²		
Emergency	Nurse Station	12m ²		
	Emergency Treating	20m ²		
	Minor Operating Theatre	25m ²		
	Observation	10m ² /bed		
	Dirty Utility	5m ²		
Integrate Care Unit	Nurse Station	12m ²		
	ICU	13.5m ² /bed		
	Isolate Unit	15m ² /bed		
Operating Theatre	Operating Theatre (major)	36m ²		
	Operating Theatre (minor)	25m ²		
	Recovery	10m ² /bed		
	Equipment Store	15m ²		
	Nurse Station	12m ²		
	Staff Room	3m ² /person		
Central Sterilizing Supplies Dept.	Washing	42m ²		
	Preparation	36m ²		
	Sterilizing	30m ²		
	Steril Store	24m ²		
	Medical Supplies Store	12m ²		
Xray	Office	12m ²		
	Xray Examination	36m ²		
	Dark Room	9m ²		
	Operation	6m ²		
Pathology	Office	12m ²		
	Laboratory	72m ²		
	Wash & Sterilizing	12m ²		
Blood Bank	Office	7m ²		
	Donner's Room	21m ²		
	Examination	7m ²		
	Blood Preservation	7m ²		
Dispensary	Dispensary	48m ²		
	Pharmaceutical Store	72m ²		
	Office	9m ²		
	Staff Room	3m ² /person		

Table 4.1-3 continued

	Department	Room Name	Standard Floor Space	Remarks
Ward	Common for each Ward	Ward	7m ² /bed	
		1Bed Room	12m ²	
		2Bed Room	20m ²	
		Nurse Station	15m ²	
		Clinic	12m ²	
		Treatment	20m ²	
		Linen Store	6m ²	
		Storage	6m ²	
		Pantry	10m ²	
		Dirty Utility	6 ~ 9m ²	
		Sister's Office	8m ²	
		Ward Office	12m ²	
		Staff Room	3m ² /person	
		Patient Toilet	8m ²	
		Patient Shower	10m ²	
Handicapped Persons Toilet	4m ²			
Obstetric		Labour Room	10~12m ² /unit	
		Abnormal Labour Room	15m ² /unit	
		Neo-natal Room	3.5m ² /bed	
		Milk Room	6m ²	
Administration		Medical Superintendent's	25m ²	
		Typist Room	15m ²	include waiting space
		Hospital Secretary's	15m ²	
		Typist Room	10m ²	include waiting space
		Doctor's	15m ²	
		Matron's	15m ²	
		Sister's	8m ²	
		O.I.C. for Dept.	12m ²	
		General Office	6m ² /person	
		Meeting	3m ² /person	
		Library	2m ² /person	
		Medical Record Store	36m ²	

(4) Design Criteria for Medical Equipment

1) Design Policy for Medical Equipment

In regard to planning medical equipment, it is assumed existing equipment that can be moved will be used where feasible and new equipment will be selected based on the following criteria:

- (i) Disease trends and technical capabilities of the medical professionals and other staff of each hospital will be taken into the account in selection in order to provide the most effective contribution to health care service.
- (ii) The scale, service area, size of benefiting population, and status of other factors for each facility will be taken into considered in the selection of equipment.
- (iii) Designs will allow operation and maintenance within the framework of the existing Government of Papua New Guinea health care budget.
- (iv) The natural environment of Papua New Guinea and the electric power supply situation will be taken into account to select equipment with appropriate durability.

2) Demand Related Conditions

- (i) Replacement or supplementing of equipment at the project hospitals which has inadequate capability due to deterioration from age or inadequate capacity relative to demand will be attempted.
- (ii) Equipment will be selected taking the health care trends for the service area of each hospital into account.
- (iii) Equipment which can be easily maintained and repaired and for which expendable supplies and spare parts can be readily be acquired will be selected. Most of the existing medical equipment has been procured

via Australia. If procurement of equipment from a third country is advantageous (price, maintenance, etc.), then procurement from third countries will be pursued and procurement will not be limited to Japan.

- (iv) Equipment will be selected so that major increases in operating and maintenance budgets will not be required.

3) Technical Conditions

- (i) Equipment procured for this project will be simple to operate, will be usable at its full capability at the standards of health care service and health care technical level in Papua New Guinea, and will have operating and service manuals clearly written in English.
- (ii) Equipment will be selected taking the possibility of training and direction in operation and maintenance into account.
- (iii) Ability of the existing maintenance and repair system to handle equipment will be taken into account.
- (iv) Selection of equipment will take Papua New Guinea's tropical climate and the ability to withstand heat, humidity, salt, and dust into account.

4.2. Basic Design

4.2.1. Facility Design

(1) Kundiawa Provincial Hospital

1) Plot Planning

The site for the project facility is currently used for a Technical Training School. Overall, the site is basically flat and no earth cutting or filling will be required beyond some minor leveling. The existing road in the site is to

be disused and the new road will be constructed on the east side of it.

In regard to overall zoning of the site, the area of northern part which is close to the access to the site will be the zone for medical service facilities while the area close to the south end will be the zone for supporting facilities.

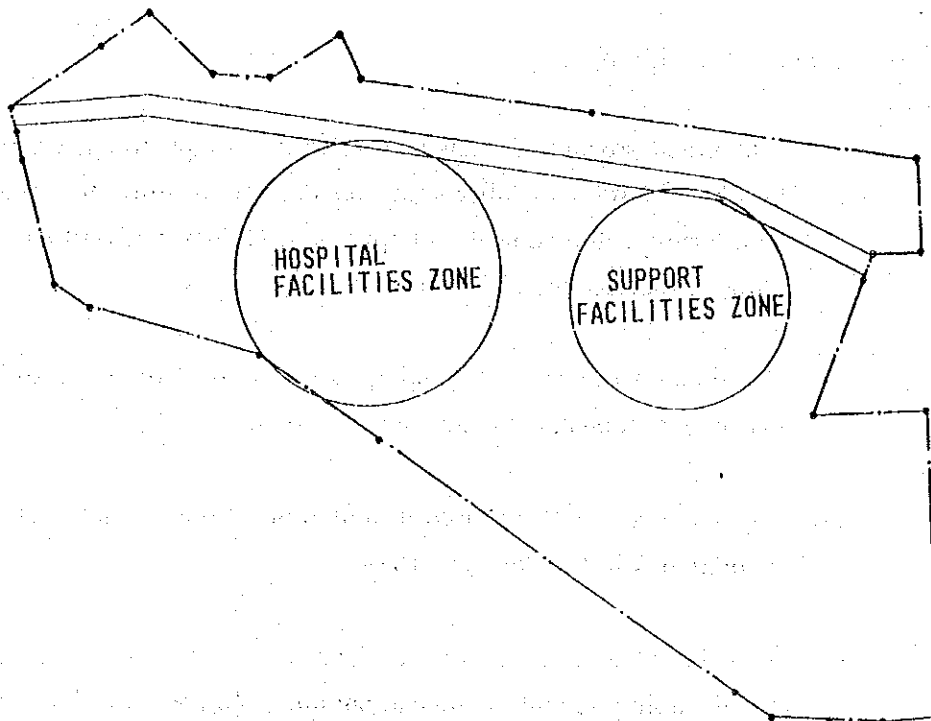


Fig. 4.2-1 Kundiawa Hospital Zoning No.1

Starting with the area close to the north end, the medical service zone will start with the outpatient department, pathology laboratory department, surgical department, and ward department. The zone for the service facilities will be to the south of these department.

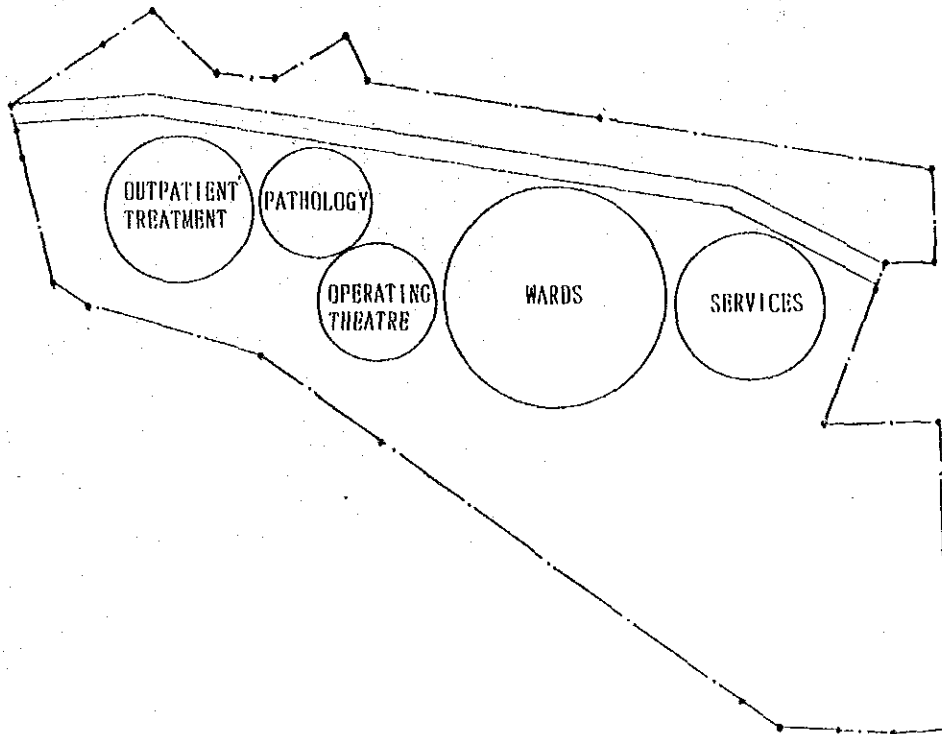


Fig. 4.2-2 Kundiawa Hospital Zoning No.2

In regard to flow line of patients, patients will enter the medical service zone from the center of the north side into the outpatient department and pass through the facilities of pathology, surgical, the wards. Entries for the delivery of medical supplies to the dispensary and emergency patients will be set along the west side of the on site road. Services to the related supporting facilities will move along the on site road and connect from the south end of each of the facilities.

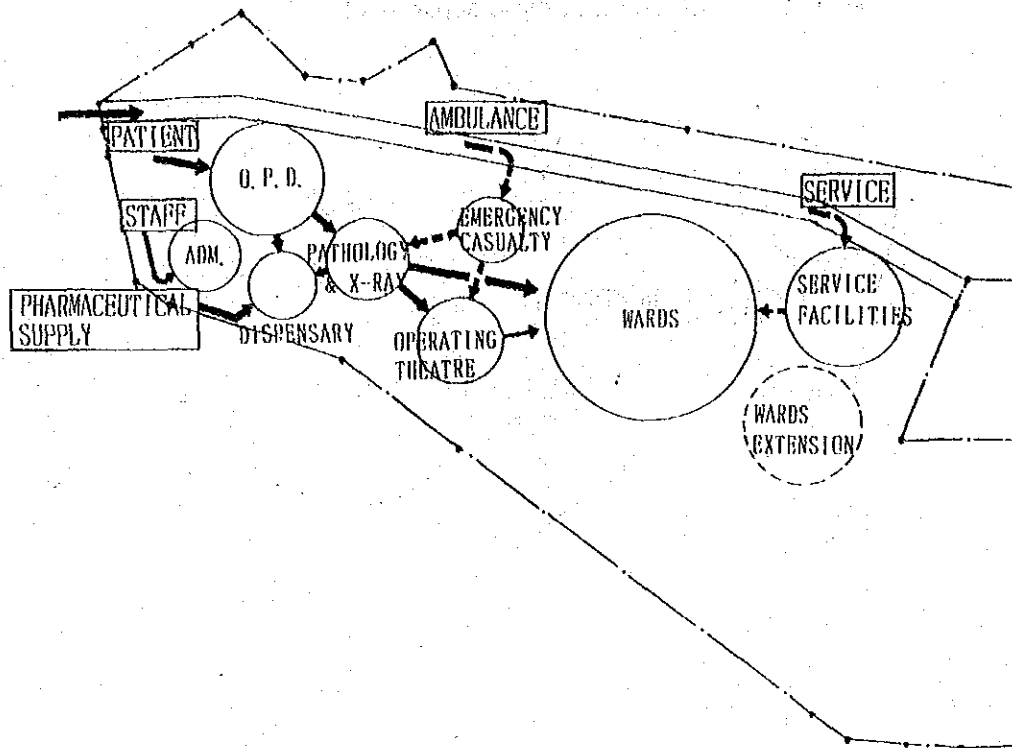


Fig. 4.2-3 Kundiawa Hospital Flow Planning

Based on the zoning and movement plans describes above, the various facilities are planned to be located as follows. The main building housing outpatient, emergency outpatient, pathology, dispensary, and administration will be located at the position closest to the site access. The operating theatre building housing the operating theatre and the central sterile supplies department will be located near emergency outpatient and pathology. The various wards will be located to the south of the operating theatre building. The mess building, laundry building, workshop building, and other service facilities will be located behind the wards to the south in a group.

2) Architectural Design

(i) Floor Plan Design

a) Standard Space

[Span Dimention]

- o In regard to the unit span for ward building, since 2 meters are allocated for each bed in the wards, if 3 beds are allocated per each span in the longitudinal directions, then the standard for each span will be about 6 meters.
- o The span in the transverse direction will be based on the standards for each bed in Nightingale style wards and will be about 7.2 m.
- o For other facilities, the span will be spaced at 6 m from the size of examination cubicles and laid out in a square grid.

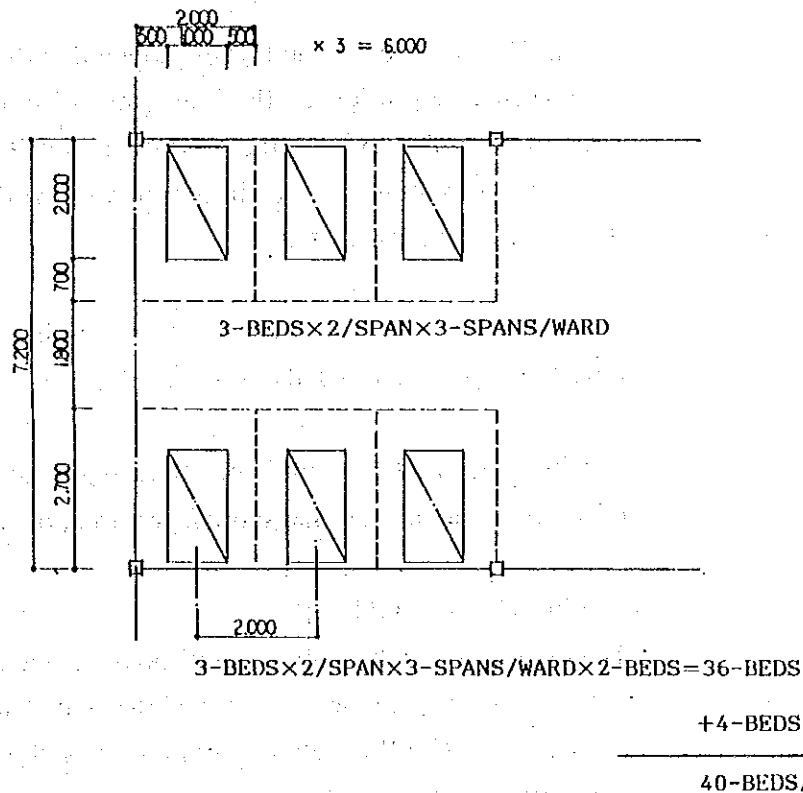


Fig. 4.2-4 Module for Ward

[Examination Cubicles]

- o Many of the existing examination cubicles are cramped so the new examination cubicles will be 2.0 m x 3.6 m in order to house an examination bed and equipment stand. This will be the standard for all three hospitals.

b) Major Facilities

[Main Building]

The hospital's functions other than the wards, service, and surgery will be located in this building. As the various units located in the outpatient building of the current hospital function well together, outpatient, dispensary, and pathology will follow the current linkage while the units of administration not located in the outpatient building will be brought together to make unified administration possible.

As Simbu Province has the highest population density in Papua New Guinea, in order to alleviate congestion in the waiting room of general outpatient, the waiting room will not be located in the entrance hall of the main building but will be relatively dispersed in various locations.

The number of entries to the outpatient building will be minimized to make security and management easier.

The building will be a one story building in order to economized construction cost and shorten construction period.

[Operating Theatre Building]

The operating theatre building will house 2 operating theatres and one minor operating theatres, and the central sterile supplies department. The floor plan is prepared based on discussions with officials concerned of the Papua New Guinea Department of Health and consideration of the master plan in the Hospital Service Project Report, and the following factors

- i) Flow line of patients
- ii) Flow line of surgical staff
- iii) Movement of surgical equipment and management

[Wards]

Given that the nursing unit of 40 beds is quite a bit larger than the situation in Japan and few nurses much take care of many patients, it is planned that the inpatient bed room will be setup as Nightingale style wards with 2 meters per bed, 1.8 m wide halls, and 7.0 m² per bed.

Also, in order to minimize the perimeter wall area and increase the air volume, adjoining two rooms of 20 beds will be setup as per one nursing units.

In order to make efficient use of necessary facilities, the facilities which require water supply and waste water equipment will not be scatter but concentrated and it is planned to layout these facilities for use by two nursing units as much as possible.

[Patient Toilets]

Based on the condition of the existing patient toilets and showers, the patient toilets will not be located in the ward building but in an independent building.

(ii) Sectional Design

In planning the facilities, securing natural wind ventilation, avoiding direct insolation, insulating the roof, preventing the intrusion of rainwater into the facilities, and ease of maintenance of facilities will be considered in planning the vertical section.

[Floor Height]

Considering the high moisture retention of the soil at the project site, the height of the floor will be 600 mm above the ground level. In order to ensure that the minimum ceiling height is 2.8 m, the height of the eaves will be 3.2 m.

[Eaves]

As the incidence of solar radiation is high from north and south, the east and west walls will be gabled while the south and north walls will be shaded by the eaves. The depth of the eaves will be 1.8 m. Also by making the area of openings on the east west walls small will minimize the heat gain.

[Openings]

In general, glass louver windows will be used to provide ventilation and lighting. As the current wards seemed to be dark, these will be made as wide as possible without resulting in hindrances during the cold season.

[Roof]

Folded galvanized iron sheet which can be used to provide a gentle slope will used for the roof. Also, since it will be necessary to collect rainwater, metal eaves gutter will be provided.

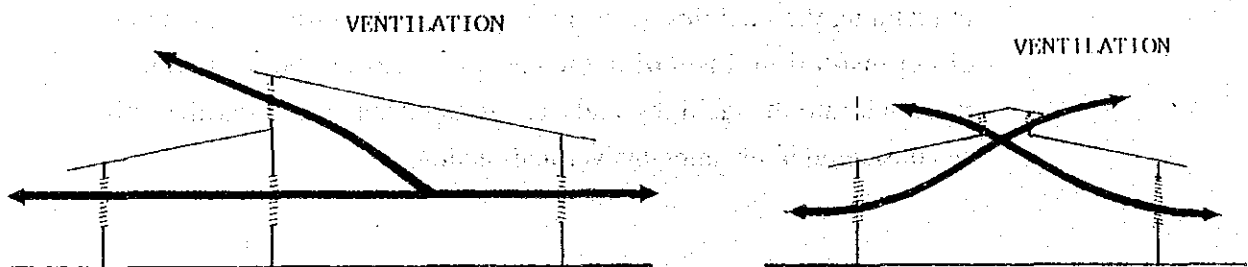


Fig. 4.2-5 Concept for Sectional Design

[Flooring]

In general concrete slabs will be used, if locations where facility piping is necessary, the use of pits will make maintenance easy.

3) Structural Design

The structural design shall be prepared in accordance with the Papua New Guinea standards. The index and values for live load, earthquake loading, and wind load will be taken from the appropriate codes.

[Building Structure]

All of the buildings will be one story buildings and reinforced mason structure with concrete blocks that can be procured in Papua New Guinea.

[Foundation]

From the height of the building, site, surrounding conditions, and the location in seismic zone 3 where earthquakes do not occur frequently, *direct foundation should be appropriate.*

4) Utility Design

(i) Water Supply, Drainage and Sanitary Installation

a) Water Supply

Two water supply systems can be considered. One is the system which will receive its supply from the city water supply while the other system will be based on storage of rainwater. City water will be stored in the receiving tank and then pumped to the elevated tank from which gravity feed will be used to supply water to the various locations. Storage tanks for rainwater will be located on each building and after disinfection, this water will be distributed

by pumping. Since city water is extremely hard, rainwater will be supplied to facilities requiring softened water such as the sterilizing apparatus, water purifier, etc.. However, amount of rainfall during the dry season from April to September is extremely low and rain water shortages will be taken account in the dry season. Thus, water softening equipment for the city water supply will also be indispensable at such circumstances. The following is a flowchart of the water supply system.

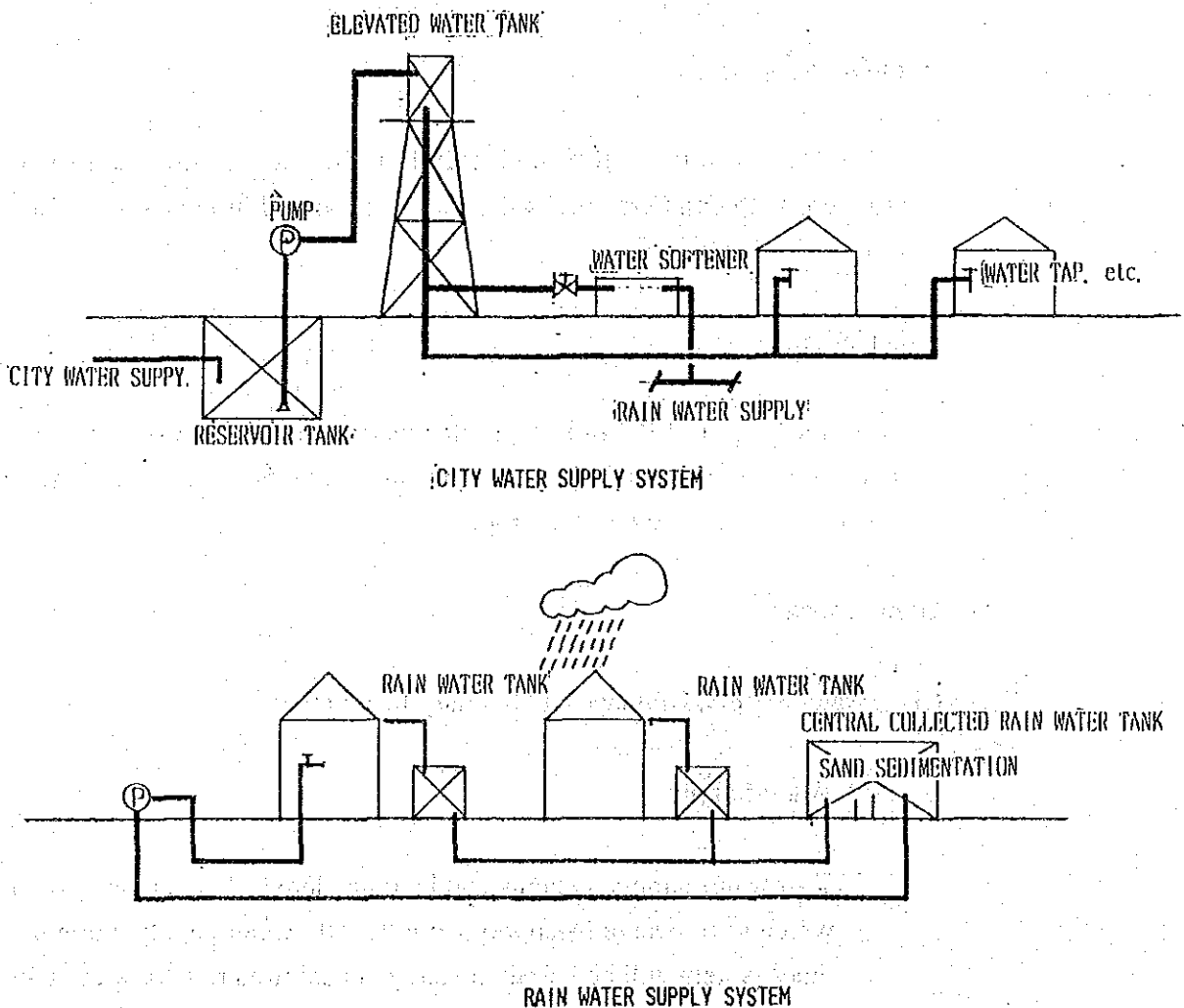


Fig. 4.2-6 Water Supply System

b) Drainage

The drainage system must deal with sewage and rainwater runoff. In addition, the sewage from the kitchen will contain oils and fats while the sewage from the autopsy room will contain blood, flesh fragments, etc.. These will be respectively separated in grease traps and blood traps and then the sewage will be discharged to the sewage line. The sewage will be collected in the treatment tank and then disinfected prior to final discharge. The public sewer main is about 3 km from the hospital site and as it is at a higher elevation, a pump will be required for pressurized transport. Rainwater will be stored in tanks for use in the water supply system and the remainder will be allowed to percolate into the ground on the site.

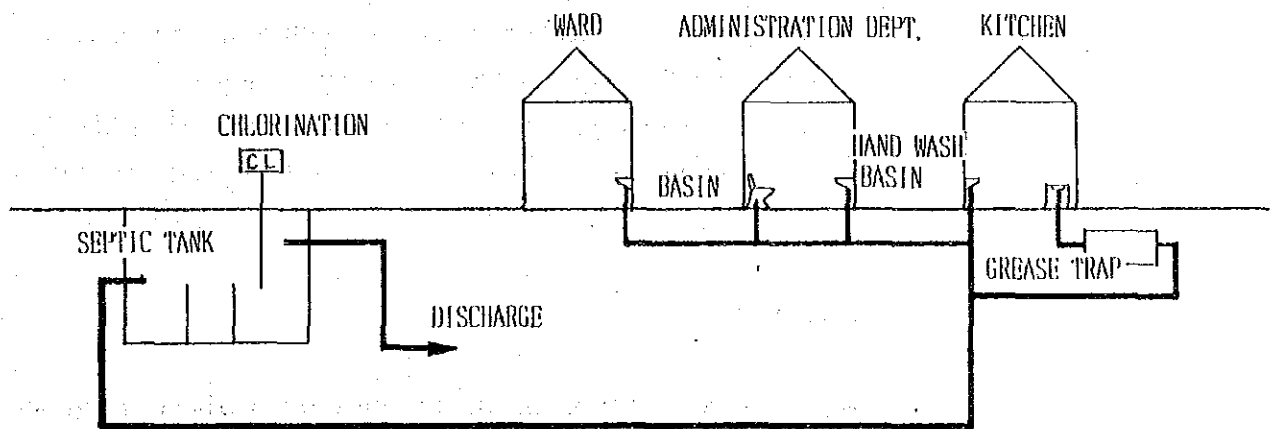


Fig. 4.2-7 Drainage System

c) Sanitary Installation

Although it is only natural to locate appropriate sanitary facilities for the operating theatre, labour room, and other locations within the hospital, the local populace is not accustomed to western style toilets, prevention of plugging of pipes and other problems is necessary. Thus, the use of Asian style toilets which are easy to clean is desirable in facilities for use by patients.

d) Fire Protection System

Fire extinguisher will be provided for the places required.

e) Hot water Supply

For the locations needing hot water, hot water supply equipment capable of meeting the various needs for hot water will be installed. Locations with small requirements will be equipped with small electric water heaters. Locations with somewhat large requirements will be equipped with medium or large electric water heaters. Locations consuming large amounts of hot water like the kitchen and laundry facilities will also be equipped with solar water heaters.

f) Incinerator

An incinerator will be installed to burn raw garbage, surgical waste, and other trash discharged within the hospital.

(ii) Electrical Installation

In designing electrical facilities, points that have to be taken into consideration in the selection of equipment are the location in the tropics and the fact that the site is 1,500 m to 1,600 m above sea level. As electrical equipment is generally designed to operate at less than 1,000 m above sea level, electrical equipment used at higher eleva-

tions are subject to special specification to be applied.

a) Trunk Lines

The electric power company (ELCOM) will supply power of 3 phase 4 wire 415/240 V, 50 Hz which will be distributed to the switch panel and power panel of each building. The main lines will be both underground cables and overhead lines. As overhead lines are easier to maintain, if there are no hindrances, overhead lines will be used.

b) Generator

A diesel engine generator will be installed to provide emergency power during power failure. The capacity of the generator will be available for the load required by the operating theatre, labour room, water supply pump, waste water pump, refrigerator, and other key points. The generator is an indoor, radiator cooled unit, with an output of 150 KVA for 3 phase, 4 wire 415/240 V, 50 Hz power. The fuel supply tank will provide for more than 30 hours of operation. The operation will be automatic.

c) Automatic Voltage Regulator

Medical equipment can be adversely impacted by voltage fluctuations and automatic voltage regulator (AVR) will be installed to prevent this. However, this will be limited to equipment in the laboratories.

d) Power Circuit

The power circuit will be provided to supply electric power for the water supply system pump, water pump, other motors, and control panels will be installed.

e) Lighting and Outlets

The electric power for the lighting fixtures and outlets in each building are supplied from the switch panel for each building and each circuit will be equipped with a circuit breaker for protection. Fluorescent lighting will be used in the main rooms and subdivision of switch areas and high lighting efficiency fixtures will be used to attempt to conserve energy. Outlets will be supplied with 240 V power and be grounded. The outlet circuit in the operating theater will be ungrounded and will be equipped with an isolation transformer and isolation monitoring equipment for safety.

g) Public Address

Public address equipment will be installed for internal announcements and paging within the hospital. The amplifier will be installed in the telephone switchboard room.

h) Telephone

The telephone switchboard will be installed in the switchboard room. Telephones will be provided in each of the main rooms. The telephone switchboard will be capable of handling 5 lines and over 100 extensions. Telephone apparatus will be pushphone type.

(iii) Air Conditioning and Ventilation Installation

a) Air Conditioning

In order to maintain the capabilities of this building, air conditioning equipment will be installed for required rooms. The rooms, air conditioning system, and conditions for air conditioning are as follows.

Air Conditioning System	Requirement	
Central & Ducting System	25°C, 60%	Operating Theatre
Separate Type A.C. Unit	27°C, 55%	Xray, Pathology, Blood Bank, Dark Room, CSSD, Dispensary, Labour Room, Isolation Bed Room, Telephone Exchanger Room
Separate Type A.C. Unit	25°C, 50%	Pharmaceutical Store
Wall Through Type A.C. Unit	27°C, 55%	Administrative Principal Staff Room [Medical Superintendent, Hospital Secretary, Doctors, Matron, etc.]

The design criteria for the above is based on outdoor condition of DB 30°C, RH 80% (1,600 m above sealevel.)

b) Ventilation

In rooms other than the ones listed above, ceiling fans will be installed. Ceiling fans will be propeller type and the size will be selected from 1,200 ϕ , 1,400 ϕ , etc. depending upon the room size.

(2) Rabaul Nonga Base Hospital

1) Plot Planning

The sites for the project facilities is located on the sites of the existing outpatient and pathology/central sterile supplies/physiotherapy buildings which will be demolished. This location is on the east side of the grounds and faces a trunk road which is at the same level across an open space. This location is being close to main access road and is an appropriate place for locating the planned main building which is housing major functions and center for this hospital. However, the grounds gently slope towards the ocean to the west and there is about a 3% grade between the planned project site and the group of wards to the west. General patients will enter the hospital from the east through the main entrance to the outpatient area while it is planned that the entry for emergency patients through the south end will link with the existing operating theatre building.

The project facilities based on the above and will be sited taking linkage with existing facilities into account.

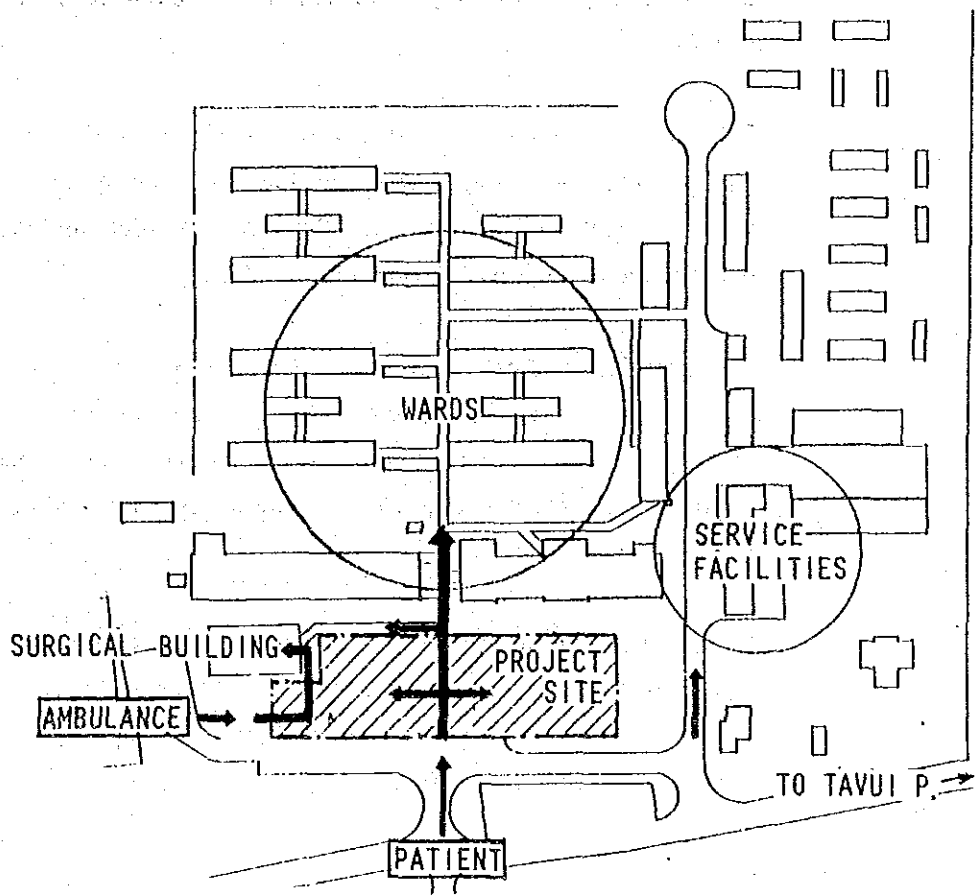


Fig. 4.2-8 Rabaul Nonga Hospital Flow Planning

2) Architectural Design

(i) Floor Plan Design

The topography of the project site gives some restriction on design and the floor plan for the project will take the existing floor plan into account.

The current emergency outpatient facility in addition to being cramped has bad linkages with the operating theatre and pathology which is planned to be improved. Pediatric outpatient and general are also cramped which will also be improved.

The administrative offices which are scattered will be brought together and increase administrative efficiency will be planned. As the administrative units are an area for health people, it is not necessary to be on the same level as that used by patients and it would be possible to locate on an upper floor.

Also, as the diagnostic units face towards the outside, the waiting rooms are located in the interior of the building in a closed off location. In order to alleviate this closed off situation, appropriate vertical section planning will be undertaken.

(ii) Sectional Design

The roof slope, the depth of the eaves, etc. will be the same as for the Kundiawa Provincial Hospital. However, as water mains and other existing facilities are limited for the project site, part of the building will be constructed as a two story and the administrative units are plotted on the first floor. In order to alleviate the "closedness" of the waiting rooms, tall windows will be designed in order to take advantage of natural light and ventilation from both sides.

3) Structural Design

The structural design shall be prepared in accordance with Papua New Guinea standards. As Rabaul is in seismic zone 1 where earthquakes frequently occur, special attention will have to be paid to the seismic design.

4) Utility Design

(i) Water Supply, Drainage and Sanitary Installation

a) Water Supply

The water supply for the hospital is taken from the storage tank of a well located in the nearby mountains and storage tanks for rainwater which are supplied by separate water supply pipes by gravity feed. The main building will be served by a branch from the water supply main pipe.

b) Drainage

Waste water will be connected to the existing waste water line near the building. Work on waste water treatment will not be handled in this project.

c) Sanitary Installation

Sanitary fixtures for toilets, washrooms, and other facilities will be provided as necessary. Types will be follow that used in the existing facilities.

e) Hot Water Supply

Hot water supply equipment will be installed as necessary. The use of solar heat as a heat sources will be considered.

(ii) Electrical Installation

a) Main Lines

Electric power of 3 phase 4 wire 415/240 V, 50 Hz will be supplied from the existing transformer substation.

b) Lighting and Outlets

The existing facilities will be used as standards for lighting fixture configuration, number, and the number of outlets. No major changes on running cost from the current situation is to be considered. High output and efficiency lighting fixtures will be used and subdivision of switch areas and other energy saving measures will be attempted.

c) Telephone

Lines will be drawn from the switchboard in the telephone switchboard room. The existing telephone switchboard will be used. Existing telephone apparatus will be used for part of the facility and new ones will be provided in the new expansion as needed.

(iii) Air Conditioning and Ventilation Installation

a) Air Conditioning

Air conditioning equipment will be installed in the following main rooms: physician rooms, minor operating theatre, x-ray room, dispensary, dental clinic, pathology, blood bank, ICU, and the central sterile and supplies room. Both window and separate type units will be used and the design conditions will be to maintain 27°C and RH 60% when the outside is DB35°C and RH 80%.

b) Ventilation

In rooms other than the ones listed above, ceiling fans will be installed. Ceiling fans will be propeller type and the size will be selected from 1,200 ϕ , 1,400 ϕ , etc. depending upon the room size.

(3) Madang Provincial Hospital

1) Plot Planning

The sites for the project facilities is located on the sites of the existing general outpatient, specialty outpatient, and intermediate ward buildings which will be demolished.

The main road of the city, Modilon Road, runs along the northwest side of the site. The hospital grounds rise gently toward the south east and there is about a 1 m elevation difference. As it has been reported that the existing outpatient building is frequently flooded during heavy rains, the floor level of the project facilities will be 70 cm higher than the existing outpatient building floor. The main entrance to the project facilities will be on the northeast side facing the access road.

The flow line of general patients will be through the main entrance to the various outpatient units and wards. Access for emergency patients is planned to be from the northwest side to the emergency outpatient department and surgical department. The plot plan for the project facility which is the main building will be designed with regard to the above and taking linkage with existing facilities and future plans into account.

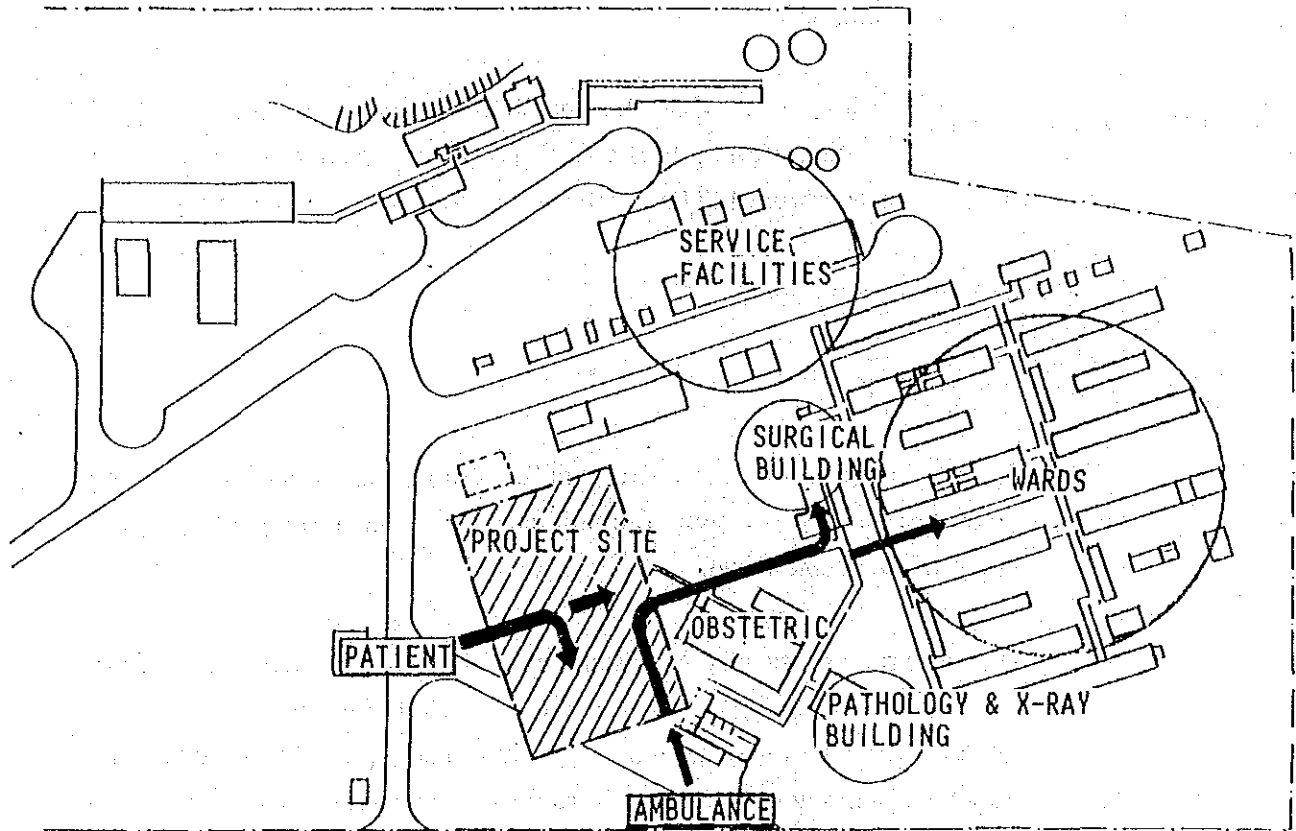


Fig. 4.2-9 Madang Hospital Flow Planning

2) Architectural Design

(i) Floor Plan Design

As it will be necessary to maintain the capabilities of the existing hospital while implementing this project, planning of the floor plan will be carried out with the relationship and linkage of existing and new facilities as the highest priority. Also, a project that will be able to take the the master plan for future into account is required. As there are only four examination cubicles in the current outpatient area and too small compared to the number of patients, the general outpatient unit in the new facility will have six examination rooms. As the climate is very hot, the floor plan will take the utilization of natural cross ventilation into account.

The angle of the axis between the outpatient unit and the general wards is 45° for the existing facilities. This was probably the result of topography of the grounds, location of the road, and restraints on the construction budget and other factors 30 years ago at the time of construction. If hospitals are considered to be facilities that grow and change, the potential use of surplus space in the future for expansion, relocation and reconstruction, and other uses must be taken into consideration. Thus, it is desirable to have the axes of the facilities at right angles in the floor plan in order to be more readily handle future modifications. In this project, the main entrances and exits will be moved in order to properly arrange the axes.

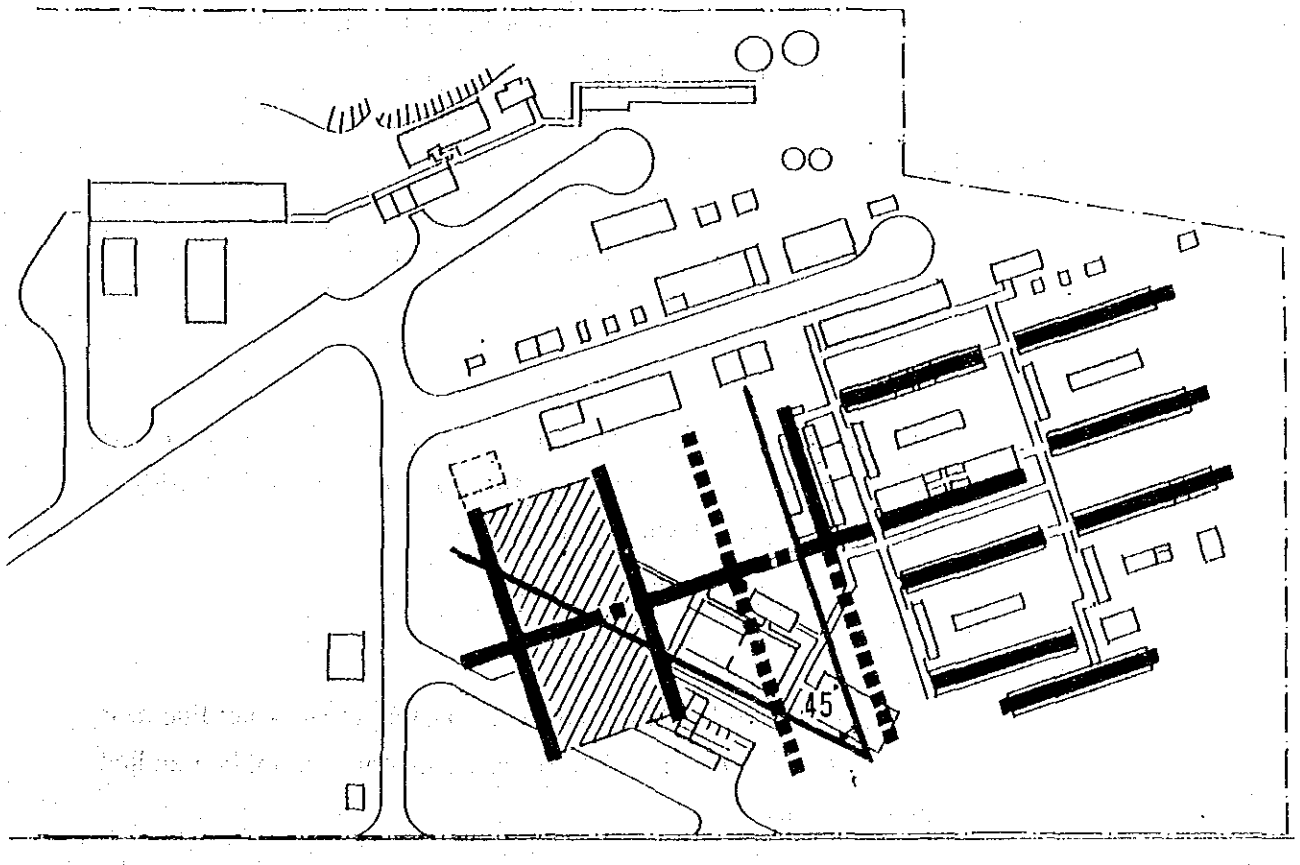


Fig. 4.2-10 Madang Hospital Plot Plan Concept

(ii) Sectional Design

The sectional design will be very similar to that for the other two hospitals. However, as this will be a deep building, providing natural lighting for the central parts will be difficult. Thus, a courtyard, providing high windows, and other measures for natural lighting and natural ventilation will be considered in the vertical section design. Also, considering that the existing outpatient building is occasionally flooded, the height of the floor will be 70 cm higher the current building as a preventive measure.

3) Structural Design

The design conditions for the structural design will be the same as for the other two hospitals. As the earthquake zone of the hospital is zone 2, attention will have to be paid to seismic design.

4) Utility Design

(i) Water Supply, Drainage and Sanitary Installation

a) Water Supply

The water will be supplied from the existing soft water tank and hard water tank. Connection to the water lines near the building will be the extent of design for this project.

b) Drainage

Waste water will be connected to the existing waste water line near the building. Work on waste water treatment will not be handled in this project.

c) Sanitary Installation

Sanitary fixtures for toilets, washrooms, and other facilities will be

provided as necessary. Types will be follow taht used in the exist-
ing facilities.

(ii) Electrical

a) Main Lines

Electric power of 3 phase 4 wire 415/240 V, 50 Hz will be sup-
plied from the existing transformer substation.

b) Lighting and Outlets

The existing facilities will be used as standards for lighting fixture
configuration, number, and the number of outlets. No major
changes on running cost from the current situation is to be consid-
ered. High output and efficiency lighting fixtures will be used and
subdivision of switch areas and other energy saving measures will
be attempted.

c) Telephone

Lines will be drawn from the switchboard in the telephone switch-
board room. The existing telephone switchboard will be used.
Existing telephones apparatus will be used for part of the facility
and new ones will be provided in the new expansion as needed.

3) Air Conditioning and Ventilation Installation

a) Air Conditioning

Air conditioning equipment will be installed in the following main
rooms: dental clinic, dispensary, ICU, telephone switchboard room,
medical superintendent's office, hospital secretary's office, matron's
office. Both window and separate type units will be used and the
design conditions will be to maintain 27°C when the outside is DB

33°C and RH 85%.

b) Ventilation

In rooms other than the ones listed above, ceiling fans will be installed. Ceiling fans will be propeller type and the size will be selected from 1,200 m/mφ, 1,400 m/mφ, etc. depending upon the room size.

4.2.2 Medical Equipment Plan

(1) Medical Equipment Planning

Medical equipment plan will be prepared based on prescribed Design Policy in 4.1.2-2 Design Criteria for Medical Equipment and taking demand related condition and technical condition into account.

1) Demand Related Conditions

- i) Replacement or supplementing of equipment at the project hospitals which has inadequate capability due to deterioration from age or inadequate capacity relative to demand will be attempted.
- ii) Equipment will be selected taking the health care trends for the service area of each hospital into account.
- iii) Equipment which can be easily maintained and repaired and for which expendable supplies and spare parts can be readily be acquired will be selected. Most of the existing medical equipment has been procured via Australia. If procurement of equipment from a third country is advantageous (price, maintenance, etc.), then procurement from third countries will be pursued and procurement will not be limited to Japan.
- iv) Equipment will be selected so that major increases in operating and maintenance budgets will not be required.

2) Technical Conditions

- i) Equipment procured for this project will be simple to operate, will be usable at its full capability at the standards of health care service and health care technical level in Papua New Guinea, and will have operating and service manuals clearly written in English.
- ii) Equipment will be selected taking the possibility of training and direction in operation and maintenance into account.
- iii) Ability of the existing maintenance and repair system to handle equipment will be taken into account.
- iv) Selection of equipment will take Papua New Guinea's tropical climate and the ability to withstand heat, humidity, salt, and dust into account.
- v) Selection of equipment will take reputation for quality, supply of spare parts in Papua New Guinea into consideration.

Principal medical equipment among those selected are listed below with description on considered condition, grade, specification and purpose of equipment.

	Name of Equipment	Conditions for Selection		A : Equipment grade, B : Specification C : Purpose
		Demand	Technical	
1	Dental unit	1) 2)	1) 2) 3)	(A) Economical type (B) Dental chair w/treatment instruments, compressor etc. (C) Dental treatment
2	Dental lab-equipment	1) 2)	1) 2) 3)	(A) Basic level instrument (B) Air compressor, Furnace, Micro motor etc. (C) Dental lab. instrument
3	Dental treatment instruments	1) 2)	1) 2) 3)	(A) Basic level equipment (B) Dental x-ray unit, Autoclave, Instrument cabinet & Amalgam mixer (C) Dental treatment
4	X-ray diagnostic unit	1) 2) 4)	1) 2) 3)	(A) Middle class (B) Tilting table w/chest stand, Output: 150KV/500mA approx. (C) General diagnostic purpose

	Name of Equipment	Conditions for Selection		A : Equipment grade, B : Specification C : Purpose
		Demand	Technical	
5	Darkroom accessories	1) 2) 4)	1) 2) 3)	(A) Basic instruments (B) Manual film processor, film drying machine, film hunger & dark room lamp etc. (C) Film processing purpose
6	Lab. table (central)	1) 3)	2) 4) 5)	(A) Standard type (B) Size: 4200x1500x1800 m/m (approx.) (C) Lab. working
7	Glucose meter	1) 4)	1) 2) 3) 5)	(A) middle class (B) Specimens: Blood, Serum, Urine (C) Measuring glucose value
8	Sputum examining equipment	1) 4)	1) 2) 3) 5)	(A) Basic instruments (B) Microscope, Isolated working box, sputum examining kit and sputum destroyer (C) Sputum examining
9	Multi purpose operating table	1) 2) 3)	1) 2) 5)	(A) Standard type (B) Hydraulic operating, Table size: 500x1900 m/m, up & down: 700~1080m/m (approx.) (C) Multiple purpose operating use
10	Anesthesia apparatus	1) 2) 3)	1) 2) 3) 5)	(A) Middle class (B) w/fluothane vaporizer, anesthesia ventilator and hyponic guard system (C) General purpose operation
11	ECG monitor	1) 2) 3)	1) 2) 3) 5)	(A) Middle class (B) ECG/Blood Pressure/Pulse and Temperature monitoring (C) Patient monitoring at recovery room
12	Bedside monitor	1) 2) 3)	1) 2) 3) 5)	(A) Middle class (B) ECG/Blood Pressure/Pulse and Temperature monitoring (C) Patient monitoring at ICU room
13	High pressure steam sterilizer	1) 2) 4)	1) 2) 5)	(A) Standard type (B) Chamber size: 500x500x900m/m (approx.), 3 patterns (Linen, Instrument & Option available, w/Safety device (C) Sterilizing linen and instruments

	Name of Equipment	Conditions for Selection		A : Equipment grade, B : Specification C : Purpose
		Demand	Technical	
14	Ultrasonic cleaner	1) 2) 4)	1) 2) 5)	(A) Standard type (B) Outer size: 1350x645x800m/m (approx.), Chamber size: 530x430x295m/m (approx.), Stainless steel, Tap water and hot water available (C) Cleaning of instrument
15	Autopsy table	1)	1) 2) 3) 4)	(A) Economical type (B) Stainless steel, 2600x750x800m/m (approx.) (C) Autopsy use
16	Mortuary refrigerator	1)	1) 2) 3) 4)	(A) Economical type (B) 2 bodies use, Temp. control: 0~5°C, Size: 900x2250x1855 mm(approx.) (C) Keeping bodies
17	Ultrasound scanner	1) 2) 3) 4)	1) 2) 3) 4) 5)	(A) Middle class (B) w/Convex probe, linear probe (C) Internal, Pediatrics, Gynecology & Absterics Dept. use
18	Electric tools	2) 3)	1) 4) 5)	(A) Minor class (B) Drill machine Portable Grinder, Spot welder, Tapper, Jig saw, Electric tool set etc. (C) Maintenance and repair

Regarding medical equipment for the projected hospitals, selecting basis and conditions for those are described as follows:

(2) Kundiawa Provincial Hospital

1) General, Pediatric, Specialty, and Intermediate Outpatient

General, Pediatric, specialty, and intermediate outpatient all have nurse stations and examination rooms while general and pediatric outpatient which are anticipated to have heavy patient loads will also be equipped with medication rooms, treatment rooms, and other facilities. Each unit will be equipped with the basic medical equipment need to fulfill it's role in outpatient capabilities. The major equipment is as follows:

a) Nurse Stations

Equipment currently in use will be moved to the new facility. Weighing scales, thermometer, etc. will be provided.

b) Preliminary Examination Cubicles

Diagnostic equipment for assessing the basic condition will be provided including sphygmomanometer, stethoscope, etc. used for patient examinations.

c) Consulting Rooms

Examination tables, wash basins, sphygmomanometer, stethoscopes, film illuminator, examining light stand, and other equipment will be provided

d) Medication Room

Medicine storing refrigerator and other equipment thought to be necessary. Other equipment can be filled in when existing equipment is moved.

e) Treatment and Injection Rooms

Equipment necessary for the treatment and injection of patients including utility work table, medication cart, boiling sterilizing unit, kick bucket, I.V. stands, and other equipment will be prepared.

f) MCH (Mother and Child Consulting)

Most of the capability of the MCH unit is the mother and child consulting room and equipment will be limited to chair for patients and infant treatment bed, to support the consulting work.

2) Emergency Outpatient

Recovery beds, patient treatment bed, emergency cart and other equipment will be supplied.

3) Dental

Dental treatment unit, and dental laboratory equipment is being considered

4) Examination

a) X-ray

Since it is unclear whether the necessary function for the existing x-ray unit can be obtained even after relocating it, a new unit will be provided. This will have similar capabilities to the current unit. The dark room will be equipped with a manual film development unit.

b) Pathology

Existing equipment will be moved in order to maintain pathology's testing capability. In order to supplement existing equipment, centrifuges, glucose meter, sputum examining equipment and water purifier will be installed taking the capabilities with current equipment into account.

c) Blood Bank

The transfer of part of the blood storing refrigerators was considered and the replacement of deteriorated units and providing adequate capacity will be supplemented. The donation section will also be used for taking samples for pathological testing and blood donor bed, blood collecting set, and other equipment will be provided.

5) Administration

Medical file cabinet will be provided, other equipment will be transferred or will depend upon supply from the Papua New Guinea side.

6) Dispensary

Existing shelves will primarily be moved while some lockable and insect proof cabinet will be procured. Also, pharmaceuticals storing refrigerator will also be provided.

7) Operating Theatre

Operating table, operating light, anaesthesia apparatus and other major operating theatre equipment will be replaced, smaller equipment will either be replaced or supplemented. This was due to the uncertainty whether the performance and safety of existing equipment could be guaranteed if transferred.

8) Central Sterile Supply Department

It would be technically very difficult to transfer the existing high pressure steam sterilizing unit as well acquire the various exchange parts that would be needed if moved. Also, since it would be difficult to guarantee performance after a move, it was decided that a new unit should be installed. Also other necessary equipment for the central supply room including ultrasonic cleaner, drying tank, boiling tank, and sterile instrument cabinet will be provided.

9) Wards

The wards are obstetrics and gynecology, pediatrics, medicine, surgical, and isolation. The nursing capabilities for the wards is basically the same for all of the wards. The patients rooms, paid beds, nurse stations, examination rooms, treatments rooms, doctor's room, and other rooms make up the wards. The major medical equipment that will be acquired includes patient

room beds, ultrasonic nebulizers, infusion pumps, sphygmomanometers, stethoscopes, ice makers, wheel chairs, aspirators, respirators, and medicine storing refrigerators. In addition, for the pediatrics ward, pediatric beds, electrocardiograph, and other equipment will be installed. In the obstetric and gynecology ward, delivery beds, doppler fetal heart detector, infant bassinet cot, incubators, phototherapy unit, ultrasound scanner and other equipment will be prepared. For the medicine ward a ECG unit will be provided while for the surgical ward, some beds will be equipped with traction frame, walkers, crutches, plaster cutters, and other equipment will be provided. The isolation ward will be provided with essentially the same equipment as the medicine ward. But patient bed will be covered with relocations of the existing ones.

10) Mortuary Room

The most basic autopsy equipment will be provided for conducting autopsies and pathological research. Equipment for removing organs and equipment for preservation has excluded. The equipment that will be provided includes autopsy table, equipment stand, operating light, mortuary refrigerator.

11) Workshop

The spare parts necessary for repairing the medical equipment that will be procured by the Project and which can be repaired by hospital and provincial level engineers will be stored in these workshop. Thus, shelves for spare parts storage, small parts and minor repair equipment will be provided.

(3) Rabaul Nonga Base Hospital

The equipment that will be procured by the Project for the Nonga Base Hospital will be used in general outpatient, pediatric outpatient, specialty outpatient, emergency outpatient, x-ray room, central sterilizing and supplies, pathology, blood bank, administration, and intensive care unit. Except for the emergency outpatient and the intensive care unit, the area of the units, capability, and tech-

nical level of the staff are all analogous to the Kundiawa Provincial Hospital. Thus, the medical equipment that will be provided will also be a analogous level. As a ultrasound scanner room will be attached to the x-ray room of the Nonga Base Hospital, a general purpose ultrasound scanner will be provided in order to respond to the extensive needs of medicine, obstetrics and gynecology, and other units. A dental unit will be introduced in specialty outpatient and will be used to treat the citizeness in the vicinity of the hospital. Also, as expanding the capability of the intensive care unit, intensive care beds, patient monitoring equipment, and other equipment will be provided. For emergency outpatient department, the treatment bed, emergency cart, ventilator, patient monitor and recovery beds will be provided.

(4) Madang Provincial Hospital

The facilities to be redeveloped primarily are in the outpatient building at the Madang Provincial Hospital. Thus, there is a high degree of commonality with the Nonga Base Hospital and Kundiawa Provincial Hospital described above in the outpatient area. Thus, the medical equipment plan of the Project will provide essentially the same equipment. However, as specialty outpatient at the Madang Provincial Hospital has an ophthalmology unit, equipment to strengthen this area including a slit lamp, eye testing set, and other equipment will be provided. As the dental unit will be provided with the same scale as the Kundiawa Provincial Hospital, this will include a dental unit, dental clinic set, and dental laboratory equipment. As the intensive care unit will be set up by the Project, intensive care beds and patient monitoring equipment will be installed. Beds for full nursing use will be provided.

4.2.3 Basic Design Drawings

(1) Facilities Floor Area Schedule

m²

Facility Name	Construction Category	Floor Area		
		Ground Floor	1st Floor	Total
Kundiawa Hospital				
1. Main Building	New Construction	1,898.29		1,898.29
2. Operating Theatre	New Construction	447.88		447.88
3. Obstetric Ward	New Construction	513.40		513.40
4. Pediatric Ward	New Construction	396.35		396.35
5. Medical Ward	New Construction	396.35		396.35
6. Surgical Ward	New Construction	396.35		396.35
7. Isolation Ward	New Construction	396.35		396.35
8. T.B. & Leprosy Ward	New Construction	396.35		396.35
9. Mortuary	New Construction	40.73		40.73
10. Ablution	New Construction	36.08 x 4		144.32
11. Kitchen & Mess	New Construction	150.89		150.89
12. Laundry	New Construction	67.51		67.51
13. Ration Store	New Construction	101.27		101.27
14. Workshop	New Construction	50.20		50.20
15. Incinerator	New Construction	19.09		19.09
16. Generator	New Construction	19.09		19.09
Total		5,434.42		5,434.42
Open Corridor	New Construction	477.60		477.60
Nonga Hospital				
Main Building	Re-construction	1,932.36	635.28	2,567.64
Open Corridor	Re-construction	88.90		88.90
Madang Hospital				
1. Main Building	Re-construction	1,966.97		1,966.97
2. Ablution	New Construction	36.08		36.08
Total		2,003.05		2,003.05
Open Corridor	New Construction	67.50		67.50
Grand Total				
Buildings		9,369.83	635.28	10,005.31
Open Corridor		634.00		634.00

(1)-1) Kundiawa Provincial Hospital

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[General O.P.D.]		[General O.P.D.]	
Waiting	72.0	Waiting	97.26
Clinic	10.8	Clinic	13.49
Injection	7.2	Injection	9.36
Medication (1)	7.2	Preliminary Examination x 4	32.25
Medication (2)	9.6	Treatment	88.95
Minor Operating Theatre	13.44	Nurse Station	8.30
Treatment	36.96	Clean Utility	5.76
Nurse Rm	5.4	Others	11.49
Sub-Total	162.60	Sub-Total	266.86
[Intermediate O.P.D.]		[Intermediate O.P.D.]	
Consulting	10.08	Consulting	10.14
Doctors Office	6.72	Doctor's	8.58
Waiting	10.8	Nurse Station	5.86
		Waiting	9.76
Sub-Total	27.60	Sub-Total	34.34
[Pediatric O.P.D. • MCH]		[Pediatric O.P.D. • MCH]	
Waiting	54.0	Waiting	34.34
Clinic	10.8	Sub-waiting	30.41
injection	7.2	Examination x 2	16.61
Medication	7.2	Clinic x 2	23.94
Treatment	10.08	Injection	10.14
Sub-waiting	7.2	Nurse Station	8.30
Staff Rm	6.72	Clean Utility	5.76
MCH	11.34	Dirty Utility	4.80
		Toilet	4.80
		Others	18.53
Sub-Total	114.54	Sub-Total	157.63

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[Emergency O.P.D.] No Function Provided		[Emergency O.P.D.] Examination Resuscitation Observation Equipment Store Dirty Utility & Toilet Laying Out Rm Others	27.31 27.31 68.68 11.97 8.58 8.58 25.47
		Sub-Total	177.90
[Speciality O.P.D.] T.B. Clinic STD Clinic STD Treatment Nurse Station Sub-waiting	10.24 7.68 14.4 11.76 5.6	[Speciality O.P.D.] T.B. Clinic S.T.D. Clinic S.T.D. Treatment Dirty Utility & Toilet Nurse Station Waiting	10.14 10.42 12.20 5.86 2.80 13.20
Sub-Total	49.7	Sub-Total	54.62
[Dental O.P.D.] Treatment-1 Treatment-2 Dental Laboratory Store Dentist Office Sub-waiting	12.96 12.96 12.6 7.2 9.0 14.4	[Dental O.P.D.] Treatment x 2 Dental Laboratory Store Dentist Office Waiting	25.50 12.75 6.84 7.82 16.18
Sub-Total	69.12	Sub-Total	69.09
[Xray Examination] Xray Examination-1 Xray Examination-2 Change Rm Sub-waiting Office Dark Rm Film Store	17.28 10.8 1.92 6.72 6.48 8.64	[Xray Examination] Xray Examination-1 Xray Examination-2 Operation Change Rm Toilet Waiting Office Dark Rm & Film Store Storage	43.42 16.66 3.84 2.40 2.42 18.66 14.65 16.66 18.77
Sub-Total	51.84	Sub-Total	137.48
[Pathology] Laboratory	56.16	[Pathology] Laboratory Washing Dirty Utility & Toilet Others	54.62 9.26 4.80 8.30
Sub-Total	56.16	Sub-Total	96.98

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[Blood Bank] Office Waiting Donner's Examination	} 34.56	[Blood Bank] Office & Waiting Donner's Refrigerator Rm Others	11.97 11.97 4.70 3.60
Sub-Total	34.56	Sub-Total	32.24
[Mortuary] Autopsy Mortuary Refrigerator Office	34.72 6.00 —	[Mortuary] Autopsy Mortuary Refrigerator Rm Office	20.08 12.25 8.4
	40.72		40.73
[Operating Theatre] Operating Theatre Minor Operating Theatre Scrub Preparation Recovery CSSD Sterilizer Rm Washing & Packing Dispatch Waiting Dressing Ante Rm	24.36 19.57 18.72 17.4 16.8 11.52 19.44 6.48 7.2 7.6 7.6	[Operating Theatre] Operating Theatre-1 Operating Theatre-2 Minor Operating Theatre Scrub Recovery Storage Preliminary Washing Nurse Station Clean Utility Doctors' Rm Change Rm (M & W) Dirty Utility Ent. & Trolley Bay Path etc. Washing & Packing Sterilizing Sterilizer Rm Steril Store Dressing Store A.C. Machine Rm	32.00 32.00 21.25 14.81 32.00 16.00 21.23 8.52 5.81 10.65 43.60 5.35 16.00 59.06 39.38 16.21 8.40 39.81 17.93 16.87
Sub-Total	156.69	Sub-Total	447.88
[Dispensary] Pharmaceutical Store Dispensary Office	49.68 18.72 9.36	[Dispensary] Waiting Dispensary Pharmaceutical Store Office Unpacking Area Others	17.17 17.17 35.16 8.79 14.24 10.90
Sub-Total	77.76	Sub-Total	103.43

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[Administration Office]		[Administration Office]	
Reception	10.80	Reception & Cashier	11.49
General Office-1	17.28	General Office	34.34
General Office-2	10.80		
Hospital Secretary	8.64	Hospital Secretary & Typist	29.65
Matron's	12.96	Matron's	17.17
Nurse Control Office	12.96		
Library	24.36	Library & Staff Rm	54.47
Medical Superintendent	15.12	Medical Superintendent	22.85
Typist	9.24	Secretary	16.17
		Doctors' Rm	40.02
Medical Record Store	15.12	Medical Record Store	54.47
Casher	10.80	Toilets (F & M)	23.44
		Corridor	45.59
Sub-Total	148.08	Sub-Total	349.66
[Medical Ward]		[Medical Ward]	
Ward	124.08	Ward (17Bed x 2)	255.60
	20 Beds	2 Bed Rm	14.06
No functions provided other than in patient bed and desk for Nurse		1 Bed Rm x 2	18.77
		Patient Toilet & Shower (M)	10.97
		Patient Toilet & Shower (W)	10.97
		Office	9.36
		Nurse Station	10.80
		Pantry	5.76
		Storage	3.62
		Path	44.52
		Clean Utility	7.46
		Staff Toilet (W)	4.46
Sub-Total	124.08	Sub-Total	396.35
[Pediatric Ward]		[Pediatric Ward]	
Ward	237.50	Ward (17Bed x 2)	255.60
Clinic	14.00	2 Bed Rm	14.06
Isolation Bed Rm	28.00	1 Bed Rm x 2	18.77
		Patient Toilet & Shower (M)	10.97
		Patient Toilet & Shower (W)	10.97
		Office	9.36
		Nurse Station	10.80
		Pantry	5.76
		Staff Toilet (W)	4.46
		Storage	3.62
		Path etc.	44.52
		Clean Utility	7.46
Sub-Total	279.50	Sub-Total	396.35

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[Surgical Ward] Ward	235.52 40 Beds	[Surgical Ward] Ward (17Bed x 2) 2 Bed Rm 1 Bed Rm x 2 Patient Toilet & Shower (M) Patient Toilet & Shower (W) Nurse Station Storage Office Path etc. Clean Utility Dirty Utility Staff Toilet (M)	255.60 14.06 18.77 10.97 10.97 10.80 3.62 9.36 44.52 7.46 5.76 4.46
Sub-Total	235.52	Sub-Total	396.35
[Intermediate Ward]		[Intermediate Ward] Not included	
Sub-Total	—	Sub-Total	—
[Isolation Ward] Ward	95.02 41 Bed	[Isolation Ward] Ward (17Bed x 2) 2 Bed Rm 1 Bed Rm x 2 Patient Toilet & Shower (M) Patient Toilet & Shower (W) Nurse Station Storage Office Path etc. Clean Utility Dirty Utility Staff Toilet (M)	255.60 14.06 18.77 10.97 10.97 10.80 3.62 9.36 44.52 7.46 5.76 4.46
Sub-Total	95.02	Sub-Total	396.35
[Full Nursing Ward] Ward	207.00 32 Bed	[Full Nursing Ward] Not included	
Sub-Total	207.00	Sub-Total	—

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[T.B. & Leprosy Ward] Ward	117.56 40 Bed	[T.B. & Leprosy Ward] Ward (17Bed x 2) 2 Bed Rm 1 Bed Rm x 2 Patient Toilet & Shower (M) Patient Toilet & Shower (W) Nurse Station Pantry Storage Office Path etc. Clean Utility Staff Toilet (W)	255.60 14.06 18.77 10.97 10.97 10.80 5.76 3.62 9.36 44.52 7.46 4.46
Sub-Total	117.56	Sub-Total	396.35
[Obstetric Ward] Labour Ward Nurse Station	12.00 138.00 12.00	[Obstetric Ward] Labour - 1 (4 Bed) Labour - 2 (1 Bed) Clinic & Treatment Office Nurse Station Nursery x 2 Milk Rm Patient Toilet & Shower Ward (17 Bed x 2) Dirty Utility Clean Utility Staff Toilet Storage x 2 Stretcher Bay Path etc. Patient's Toilet Patient's Shower	54.62 13.80 13.84 7.03 6.75 28.13 4.20 6.42 248.22 5.76 5.22 4.20 9.28 1.22 88.27 10.68 5.76
Sub-Total	162.00	Sub-Total	513.40
[Kitchen & Mess] Kitchen Food Store-1 Food Store-2 Refrigerator Rm Staff Dinning Office	47.90 13.44 9.00 4.44 28.80 6.50	[Kitchen & Mess] Kitchen Food Store-1 Food Store-2 Refrigerate Staff Dinning Office Path etc.	53.80 8.99 5.43 5.43 53.80 8.31 15.13
Sub-Total	110.08	Sub-Total	150.89
[Ration Store]		[Ration Store] Store-1 Store-2 Store-3	33.76 33.76 33.75
Sub-Total	67.72	Sub-Total	101.27

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[Laundry] Laundry	42.00	[Laundry] Laundry	34.34
Ironing	17.92	Linen	10.14
Sewing	7.80	Sewing	8.0
Storage	—	Ante Rm	5.86
		Office	9.17
Sub-Total	67.72	Sub-Total	67.51
[Workshop] Workshop	48.00	[Workshop] Workshop	35.17
Workers Rm	23.80	Tool Store	11.43
Tool Store	14.00	Office	3.6
Sub-Total	85.80	Sub-Total	50.20
[Generator House]	15.00	[Generator House]	19.09
[Incinerator House]	19.20	[Incinerator House]	19.09
[Water Treatment Plant] Plant House	24.00		
Pump House	3.75		
Sub-Total	27.75		
[Kiosk]	100.80		
[Ablution]		[Ablution] (36.08 x 4)	144.32
	66.80	Entrance Hall	137.36
		Corridor	300.76
Sub-Total	—	Sub-Total	438.12
Total	2,791.10	Total	5,434.42
Open Corridor	288.60	Open Corridor	477.60
Grand Total	3,079.70	Grand Total	5,912.02

(1)-2) Rabaul • Nonga Base Hospital

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[General O.P.D.] Waiting	33.66	[General O.P.D.] Waiting	74.13
Examinaion Clinic	11.34 18.24	Sub-waiting	18.53
Treatment Injection	47.52 12.00	Examination (x 4) Clinic	32.53 11.97
		Nurse Station	8.30
		Treatment	55.18
		Injection	8.30
		Clean Utility	3.22
		Dirty Utility	3.22
		Staff Toilet	3.84
		Path etc.	11.23
Sub-Total	122.76	Sub-Total	230.45
[Pediatric O.P.D.] Waiting	16.00	[Pediatric O.P.D.] Waiting	51.74
Examitnation Clinic		Sub-waiting	8.30
		Examination (x 3) Clinic	13.49 11.97
		Nurse Station	8.30
		Treatment	26.02
		Clean Utility	3.22
		Dirty Utility	3.22
		Path etc.	5.54
Sub-Total	16.00	Sub-Total	131.80
[Emergency O.P.D.] Emergency Treatment Nurse Station	9.00 18.72	[Emergency O.P.D.] Resuscitation	17.58
Minor Operating Theatre	12.96	Nurse Station	5.45
		Minor Operating Theatre	17.58
		Observation	48.40
		Laying Out Rm	8.58
		Ent. & Trolley Bay	8.58
		Equipment Store	5.45
		Dirty Utility	3.03
		Toilet	3.18
		Path etc.	40.62
Sub-Total	40.68	Sub-Total	158.45
[Speciality O.P.D.] Waiting	27.00	[Speciality O.P.D.] Waiting	34.34
Consulting (Obstetric)	27.00	Sub-waiting	24.30
Consulting (Medical)	27.00	ECG Rm	10.14
		Consulting x 4	42.80
		Dental Clinic	10.14
		Clean Utility	3.84
Patient Toilet	2.00	Nurse Station	7.03
Staff Toilet	2.00	Toilet	4.29
		Dirty Utility	4.29
		Path etc.	13.35
Sub-Total	72.00	Sub-Total	154.52

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[Xray Examination] Waiting Office	21.50 16.80	[Xray Examination] Waiting Office	19.46 9.60
Xray Examination-1	27.36	Xray Examination-1	27.31
Dark Rm • Drying Film Store	7.56 8.00	Xray Examination-2 Operation Dark Rm	23.95 5.76 8.30
		Change Rm & Toilet x 2 Ultrasound Scanner Rm Records Store Dirty Utility Others	6.72 12.80 13.05 3.72 6.69
Sub-Total	81.22	Sub-Total	137.36
[Pathology] Waiting Office	16.34	[Pathology] Laboratory Washing & Sterilizing Office	68.68 11.72 10.14
Laboratory-1 Laboratory-2 Washing & Sterilizing Toilet	62.35 10.32 11.61 2.00	Storage - 1 Storage - 2 Dirty Utility & Toilet Others	6.62 5.86 8.72 16.24
Sub-Total	102.62	Sub-Total	127.98
[Blood Bank]	—	[Blood bank] Office Waiting Donners' Bed Rm Examination	7.03 10.14 13.66
Donners' Bed Rm Examination	16.5 12.47	Refrigerator Rm	7.03
Sub-Total	28.97	Sub-Total	37.86
[Dispencery] Waiting Office Dispencery Pharmaceutical Store Storage	— 39.00 48.00 40.32	[Dispencery] Waiting Dispencery Pharmaceutical Store Unpacking Space Office Others	25.75 34.34 42.92 11.72 11.72 10.91
Sub-Total	127.32	Sub-Total	137.36

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[CSSD]		[CSSD]	
Washing	49.92	Receiving counter	5.45
Packing & Sterilizing	40.00	Washing & Packing	46.06
Steril Store	22.08	Sterilizing	20.28
Medical Supplies Store		Steril Store	20.41
Medical Supplies Store	11.18	Dispatching coulator	5.27
Office	8.40	Bandage Store	11.72
Sterilizers' Rm	10.50	Office	6.62
		Sterilizers Rm	14.06
		Others	7.49
Sub-Total	142.08	Sub-Total	137.36
[ICU]		[ICU]	
1 Bed Unit	12.00	ICU (5 Bed)	88.95
		Isolation Unit x 2	24.61
		Nurse Station	12.29
		Clean Utility	5.24
		Dirty Utility	5.24
		Toilet	2.71
		Others	38.87
Sub-Total	12.00	Sub-Total	177.91
[Administration]		[Administration]	
Matron	13.5	Matron	17.65
Assistant Matrons	15.0	Assistant Matron	13.49
General Office	15.0	Secretary	9.69
		Meeting Rm	18.16
Casher	7.68	Doctors' Rm	30.14
Telephone Operator Rm	4.32	Library	92.59
Typist	24.96	General Office	40.54
		Storage	11.72
Hospital Secretary	8.64	Secretary	11.72
		Hospital Secretary	20.02
PBX Rm	18.0	Secretary	16.00
Medical Superintendent	19.2	Medical Superintendent	22.85
Medical Record Rm	25.2	Storage	10.14
Typist	9.6	Kitchen	7.03
Library	93.5	Staff Rm	43.69
Meeting	40.0	Staff Toilet	17.17
		Reception & Cashier	14.33
		Medical Record Rm	28.65
		Office	16.92
		Path etc.	149.31
Sub-Total	294.60	Sub-Total	591.81
		[Others]	
		Entrance Hall	85.85
		Corridor	321.22
		Staff Toilet	17.17
		Patient Toilet	17.17
		Balcony	103.37
		Sub-Total	544.78
Total	1,040.25	Total	2,567.64

(1-3) Madang Provincial Hospital

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[General O.P.D.]		[General O.P.D.]	
Waiting	119.52	Waiting	163.64
Reception	6.48	Sub-waiting	10.90
Clinic	34.32	Nurse Station	11.50
Medication	39.96	Examination x 6	34.46
Treatment	16.64	Treatment & Medication	54.62
Consultation	20.80	Dirty Utility	4.46
Doctor's	10.40	Clean Utility	7.03
		Injection	9.60
		Clinic	13.84
		Path etc.	31.72
Sub-Total	248.12	Sub-Total	341.77
[Emergency O.P.D.]		[Emergency O.P.D.]	
Emergency Treatment	9.60	Observation	45.24
Minor Operating Theatre	19.76	Minor Operating Theatre	21.32
		Resuscitation	16.52
Shed for Ambulance	38.84	Ent. & Trolley Bay	8.59
Driver's Rm	5.40	Laying Out Rm	8.58
		Toilet	3.84
		Path, etc.	18.13
Sub-Total	73.60	Sub-Total	122.22
[Speciality O.P.D.]		[Speciality O.P.D.]	
Waiting	60.48	Sub-waiting	21.09
STD Clinic	39.31	STD Clinic - Examination	10.14
		- Treatment	11.72
T.B. Clinic	26.2	TB Clinic	10.14
Leprosy Clinic	26.2	Leprosy Clinic	10.14
		Toilet & Dirty Utility	5.45
Ophthalmic Clinic	16.64		
Sub-Total	168.830	Sub-Total	68.68
[Consultation O.P.D.]		[Consultation O.P.D.]	
Consultation	10.40	Sub-waiting	15.62
(Provided in General O.P.D.)		ECG Rm	15.62
		Ophthalmic Clinic	15.33
		Consultation	15.08
		Nurse Station	7.03
		Clean Utility	4.39
		Dirty Utility	4.19
Sub-Total	10.40	Sub-Total	77.26

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[Dental O.P.D.] Office	14.04	[Dental O.P.D.] Doctor's Office	15.62
Dental Clinic	29.64	Dental Clinic x 2	30.40
Dental Laboratory	18.72	Dental Laboratory	15.62
Doctor Rm	9.36	Sub-waiting	15.62
Sub-Total	71.76	Sub-Total	77.26
[MCH] Waiting	18.00	[MCH] Sub-waiting	17.17
Sub-waiting	51.84	Examination x 4	22.88
Examination x 4		Clinic x 2	20.28
Infant Treatment	13.52	Ultrasound Scanner Rm	10.14
		Clean Utility	3.45
		Dirty Utility & Toilet	4.39
		Nurse Station	3.61
		Others	21.10
Sub-Total	83.36	Sub-Total	103.02
[Pediatric O.P.D.] Waiting	50.00	[Pediatric O.P.D.] Sub-waiting	23.44
Treatment	25.00	Examination x 2	10.46
Clinic	25.00	Clinic	10.14
Preparation	25.00	Observation	17.17
Nurse Station		Dirty Utility & Toilet	7.03
Doctor's Office	25.00	Treatment	20.28
Toilet		Clean Utility	3.09
		Nurse Station	5.02
		Path etc.	6.39
Sub-Total	150.00	Sub-Total	103.02
[Others] Corridor	373.972		
Sub-Total	373.97		
[Dispencery] Pharmaceutical Store &Dispencery Office & Delivery	42.00 17.00	[Dispencery] Pharmaceutical Store Dispencery Delivery Bulk Store Refrigerator Rm Office Receiving Waiting	16.76 20.28 7.03 10.55 7.03 8.58 7.03 25.76
Sub-Total	59.00	Sub-Total	103.02

Current Facilities		Designed Facilities	
Room Name	Floor Area m ²	Room Name	Floor Area m ²
[Administration]		[Administration]	
Medical Superintendent	10.88	Medical Superintendent	13.84
Typist	5.76	General Office	56.14
Accounting Office	37.44	Reception	5.74
General Office	9.36	Casher	5.71
Hospital Secretary	21.6	Telephone Exchange	5.71
		Secretary	9.60
		Hospital Secretary	11.72
Matron		Matron & Nurse Control	17.44
& Nurse Control Office	17.4	Medical Record Store	23.44
Medical Record Rm	11.7	Meeting Rm	11.72
Telephone Exchange	6.48	Staff Toilet	12.75
Stationary Store	18.0	Path etc.	19.01
Sub-Total	138.62	Sub-Total	192.82
[Intermediate Ward]		[Ward]	
Ward 20 Bed	372.65	Nurse Station	5.45
ICU (Planning)	80.85	Dirty Utility	10.14
		Clean Utility	4.69
		1 Bed Rm x 10	101.38
		Path etc.	56.25
Sub-Total	453.50	Sub-Total	177.91
[ICU]		[ICU]	
		ICU (4 Bed)	54.61
		Nurse Station	6.44
		Clean Utility	5.54
		Toilet	4.15
		Dirty Utility	4.15
		Others	11.97
		Sub-Total	86.86
		[Others]	
		Entrance Hall	117.08
		Lobby	64.56
		Corridor etc.	331.46
		Sub-Total	513.10
Total	1,831.16	Total	1966.97

(2) Basic Design Drawings

1) Kundiawa Provincial Hospital

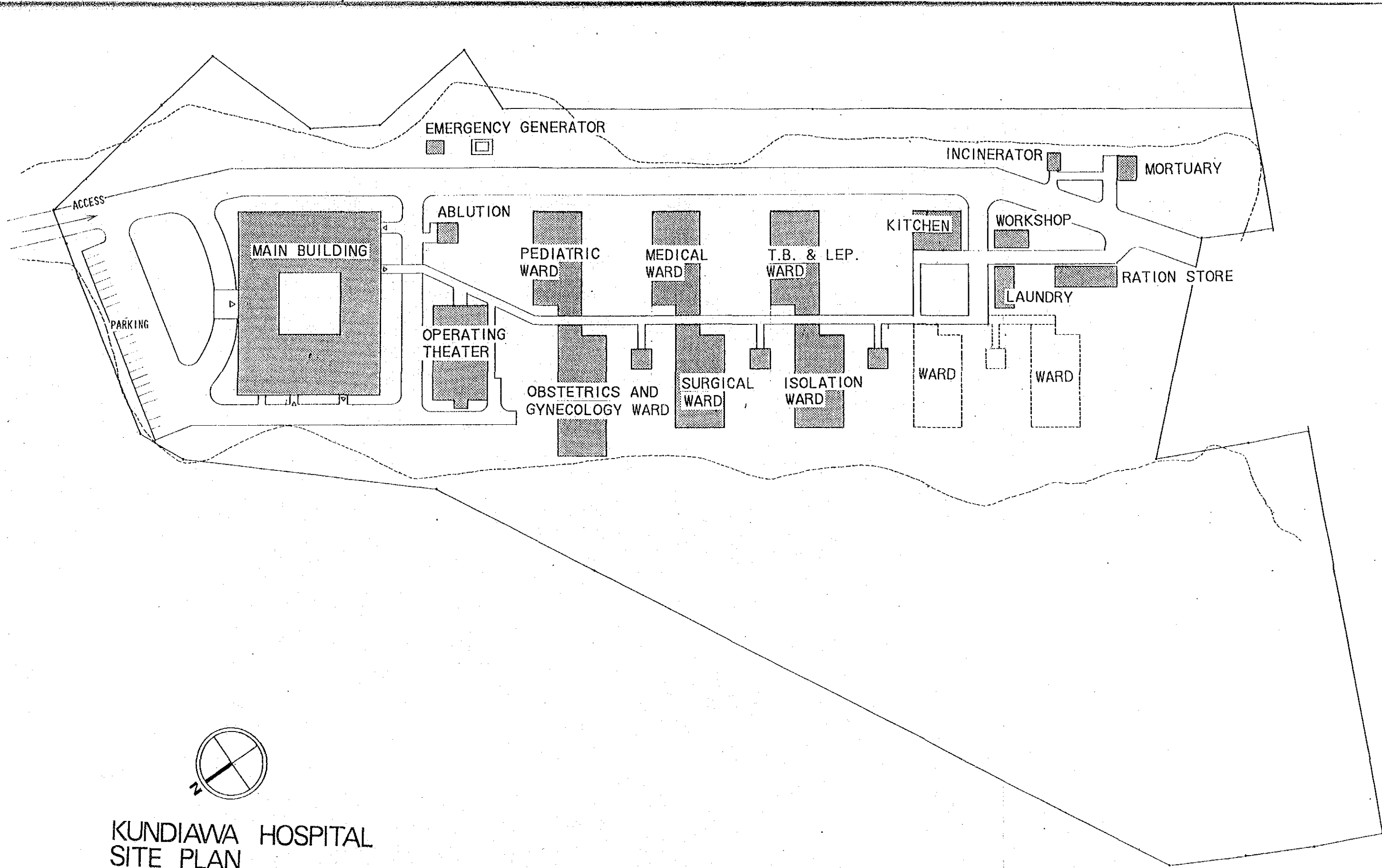
• Plot Plan		1/1000
• Main Building	: Floor Plan	1/ 300
	Elevations & Section	1/ 300
• Operating Theatre	: Floor Plan, Elevations & Section	1/ 300
• Ward (Obstetric & Pediatric)	: Floor Plan, Elevations & Section	1/ 300
• Ward (Medical, Surgery & Others)	: Floor Plan, Elevations & Section	1/ 300
• Kitchen & Mess	: Floor Plans, Elevations & Sections	1/ 300
Laundry, Mortuary		
Incinerator House		
• Workshop	: Floor Plans, Elevations & Sections	1/ 300
Ration Storage		
Ablution		
Generator House		
• Electric Power Supply System		1/1000
• Water Supply & Drainage System		1/1000

2) Rabaul Nonga Base Hospital

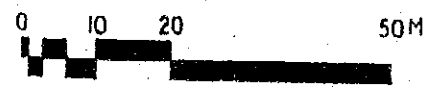
• Plot Plan		1/1000
• Main Building	: Ground Floor Plan	1/ 300
	1st Floor Plan	1/ 300
	Elevations & Section	1/ 300

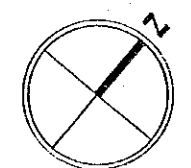
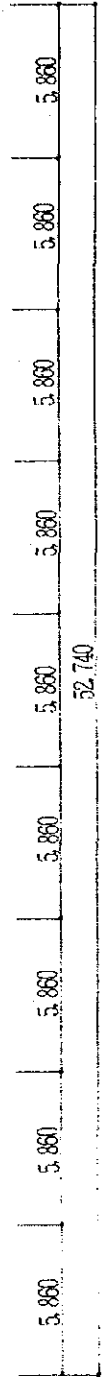
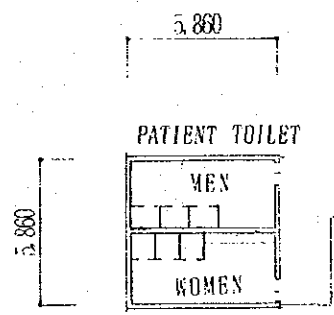
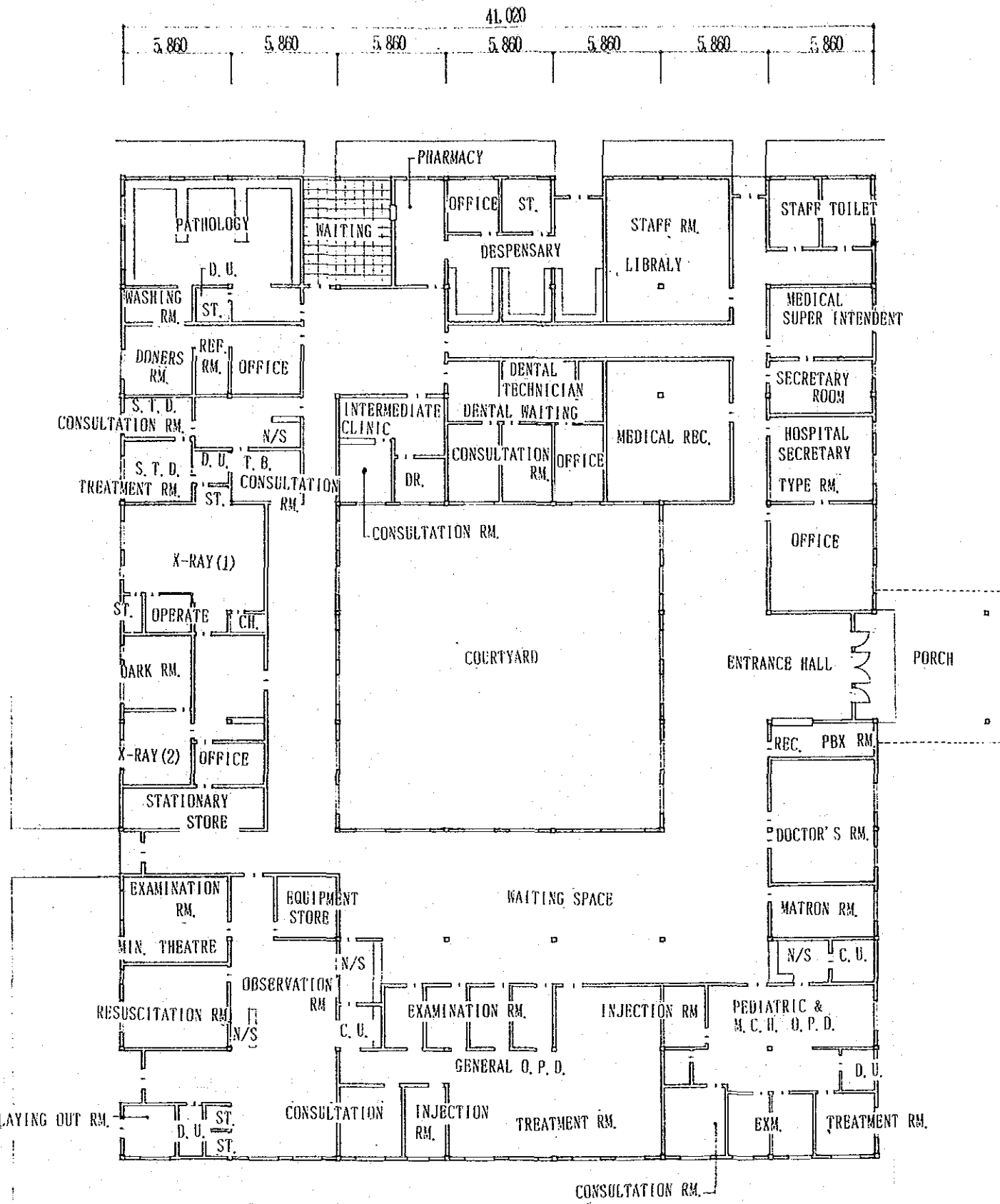
3) Madang Provincial Hospital

• Plot Plan		1/1000
• Main Building	: Floor Plan	1/ 300
	Elevations & Section	1/ 300

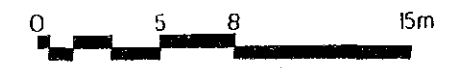


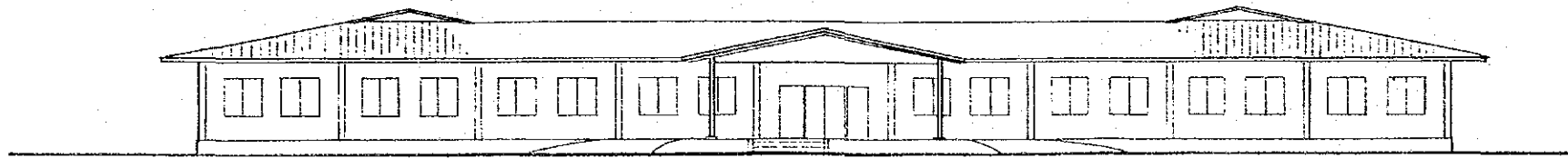
KUNDIAWA HOSPITAL
SITE PLAN



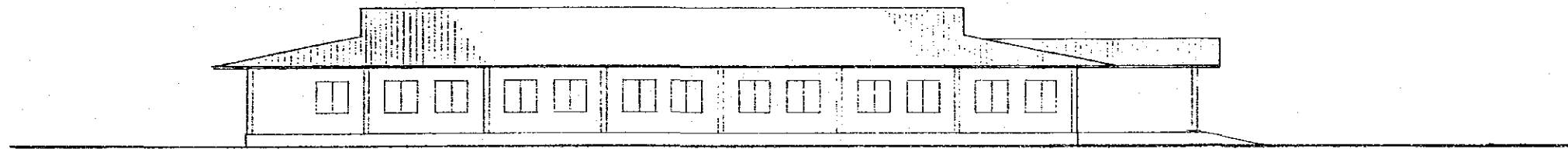


**KUNDIAWA HOSPITAL
MAIN BUILDING
FLOOR PLAN**

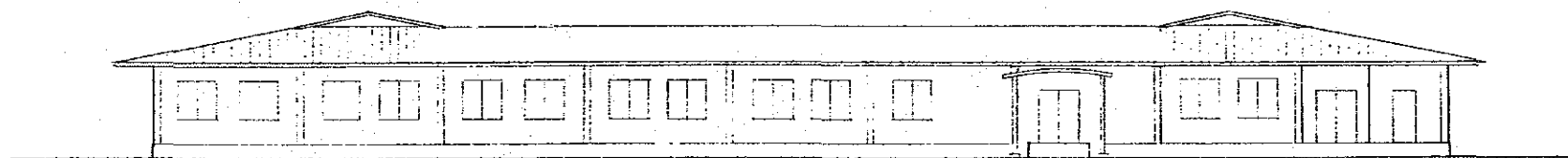




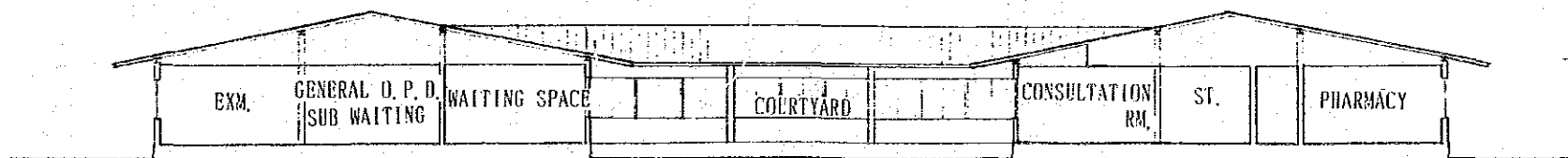
NORTH ELEVATION



EAST ELEVATION



SOUTH ELEVATION

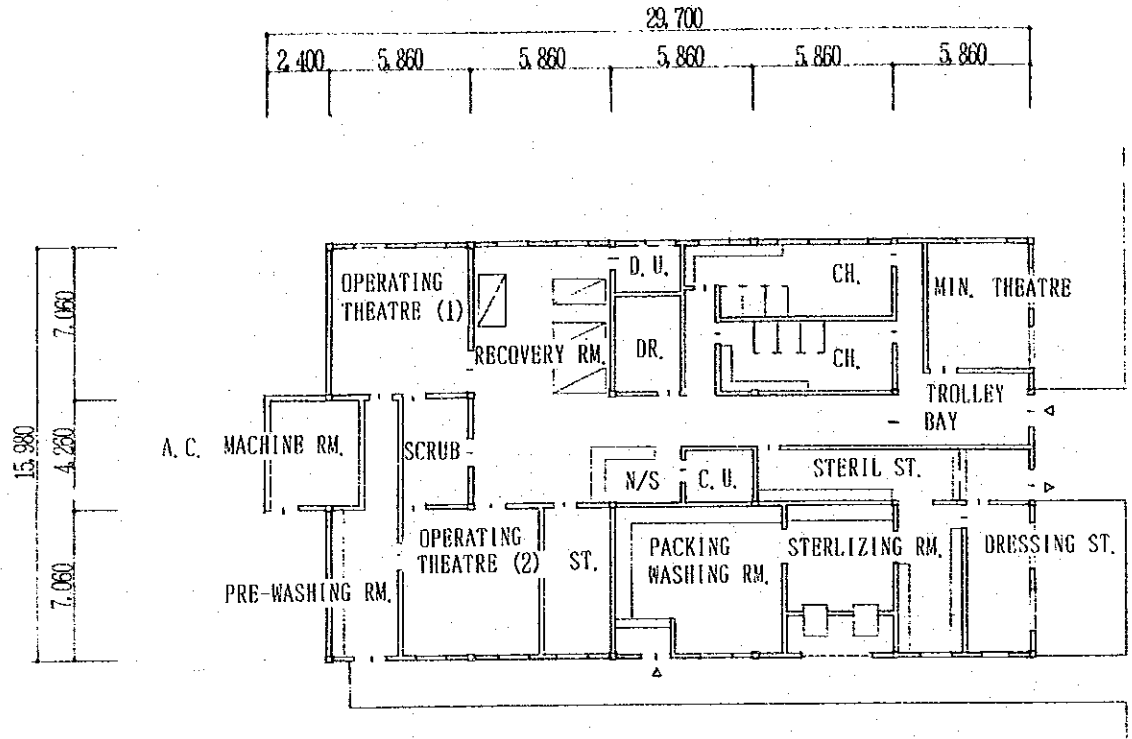


SECTION

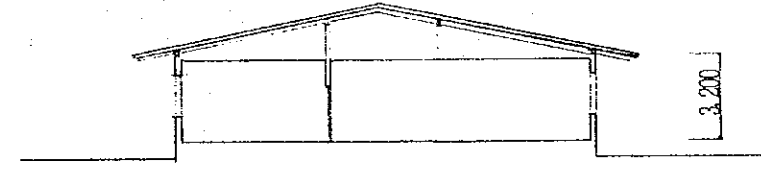
KUNDIAWA HOSPITAL
MAIN BUILDING
ELEVATIONS SECTION

0 5 8 15m

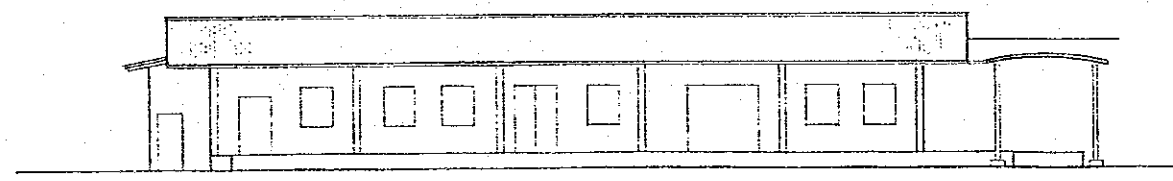




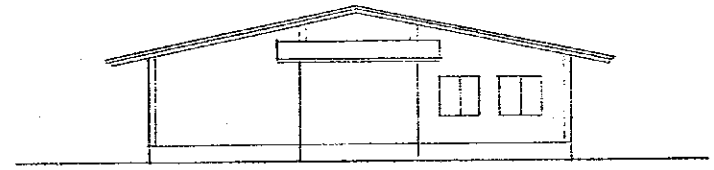
FLOOR PLAN



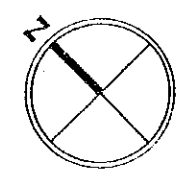
SECTION



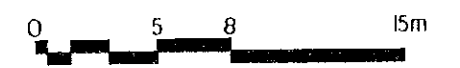
SOUTH ELEVATION

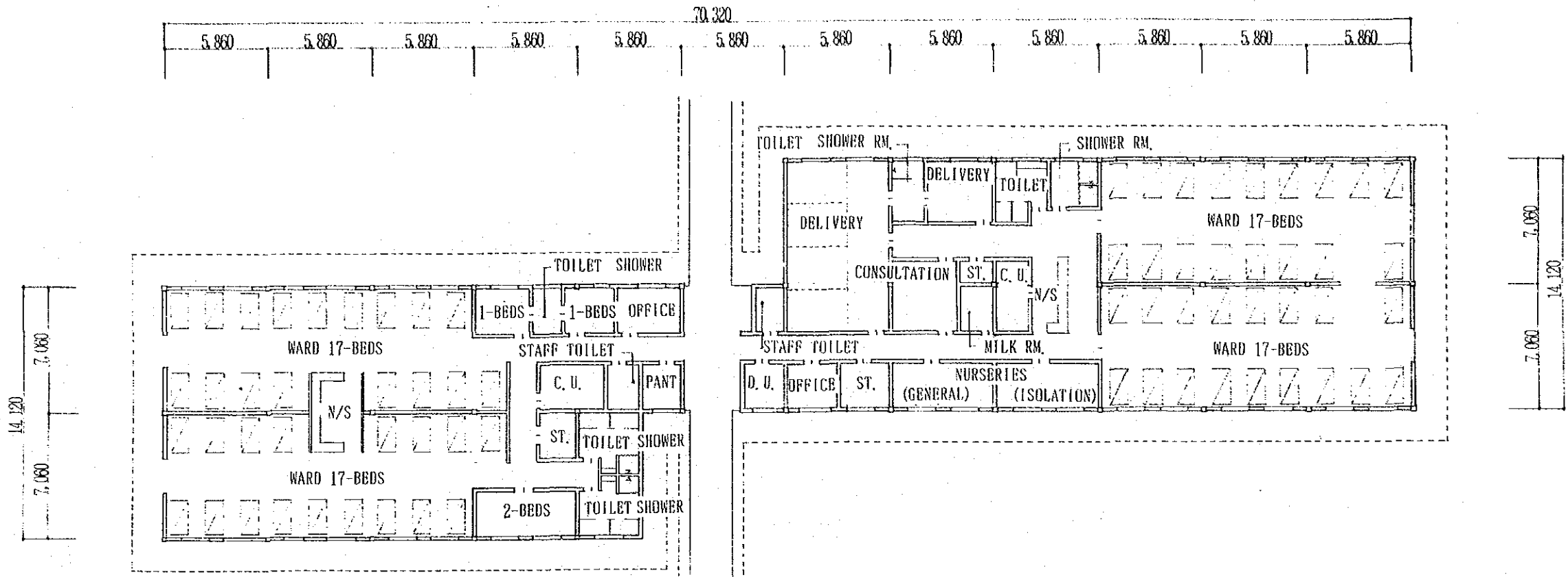


WEST ELEVATION

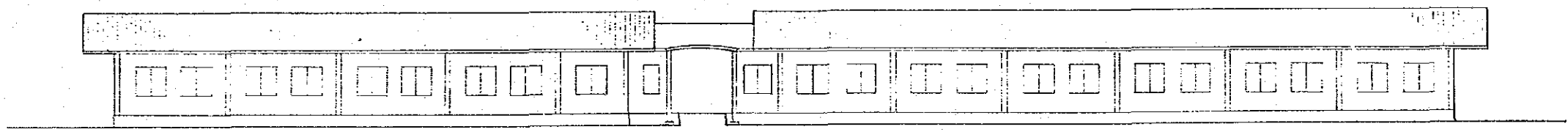


KUNDIAWA HOSPITAL
OPERATING THEATRE

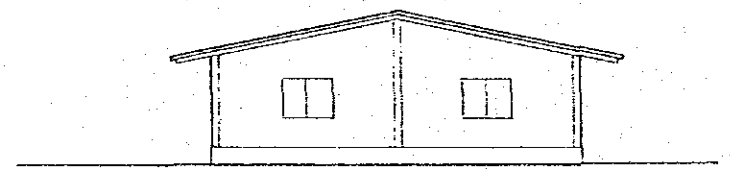




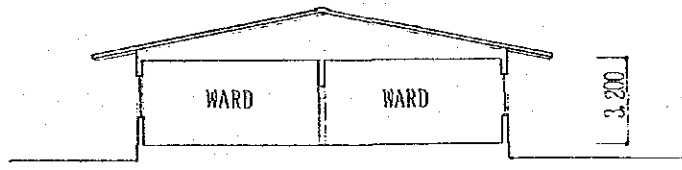
FLOOR PLAN



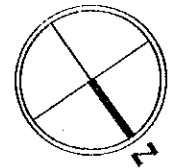
NORTH ELEVATION



EAST ELEVATION

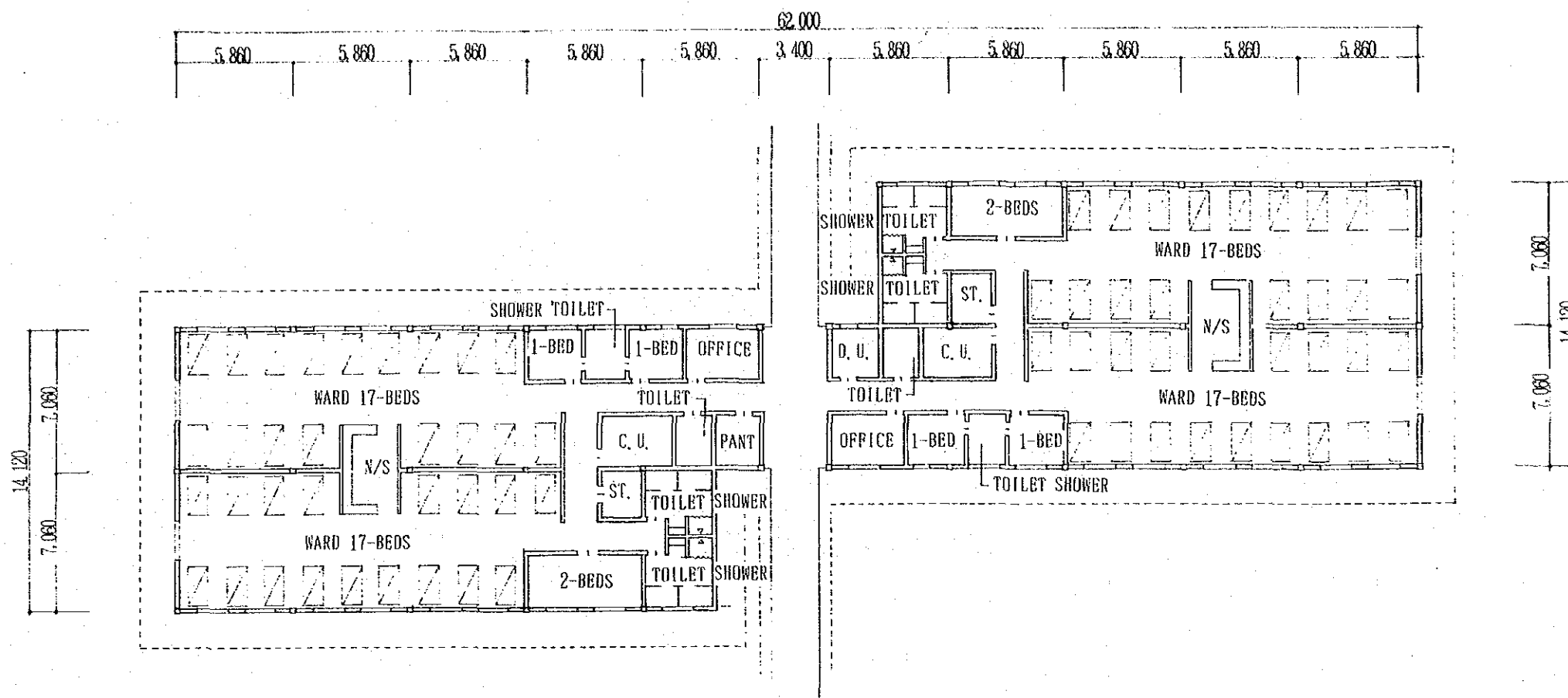


SECTION

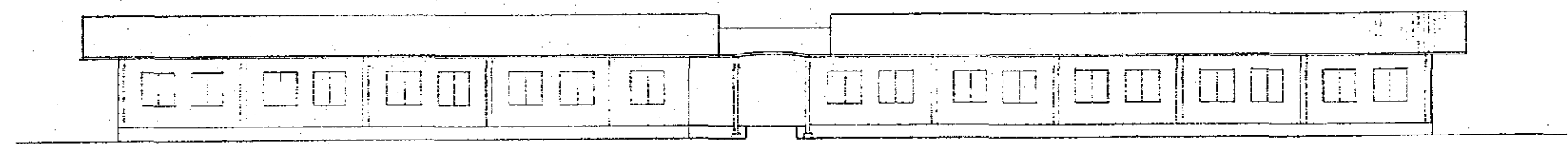


KUNDIAWA HOSPITAL
WARD-1

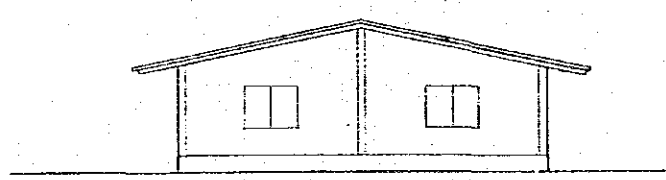




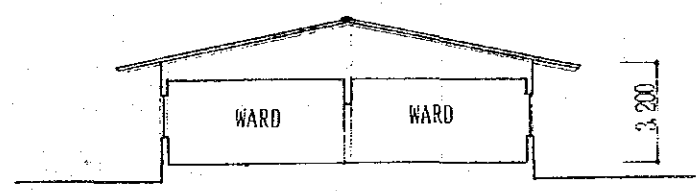
FLOOR PLAN



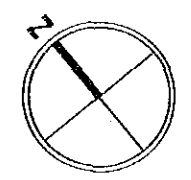
SOUTH ELEVATION



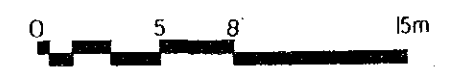
WEST ELEVATION

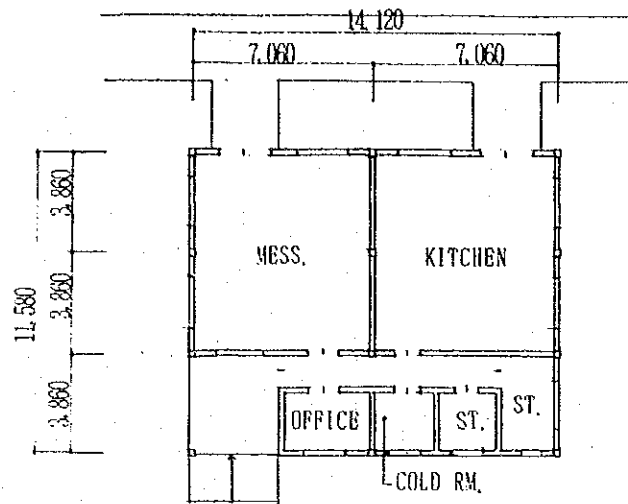


SECTION

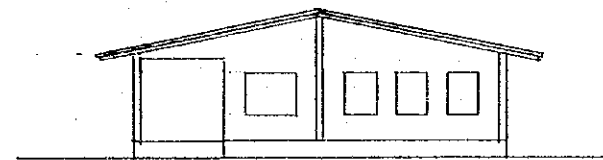


KUNDIAWA HOSPITAL
WARD-2

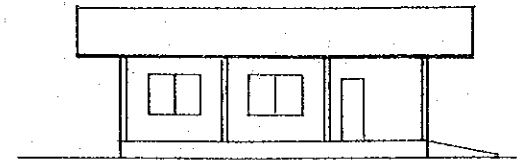




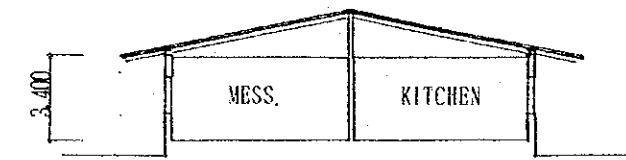
KITCHEN PLAN



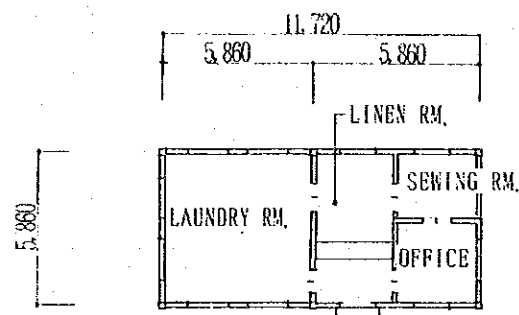
EAST ELEVATION



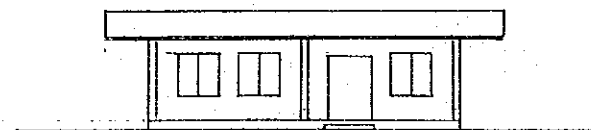
SOUTH ELEVATION



SECTION



LAUNDRY PLAN



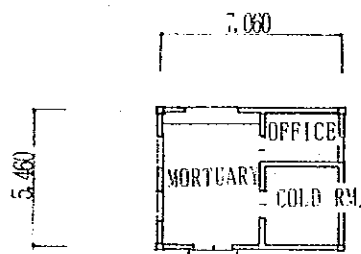
EAST ELEVATION



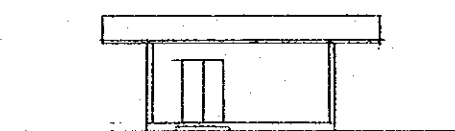
NORTH ELEVATION



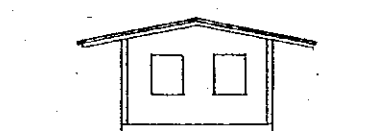
SECTION



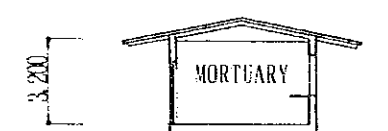
MORTUARY PLAN



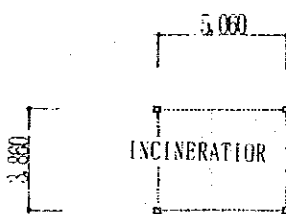
NORTH ELEVATION



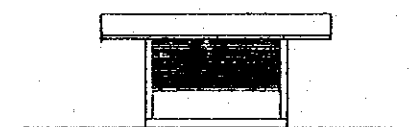
EAST ELEVATION



SECTION



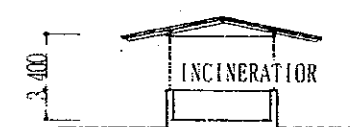
INCINERATOR PLAN



SOUTH ELEVATION

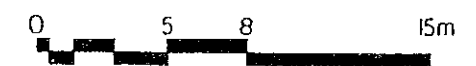


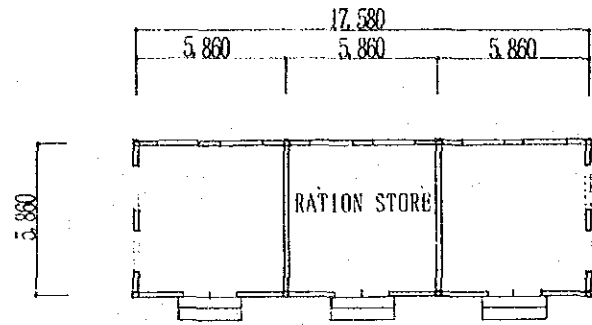
EAST ELEVATION



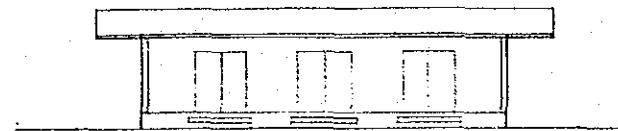
SECTION

KUNDIAWA HOSPITAL
 KITCHEN LAUNDRY
 MORTUARY INCINERATOR

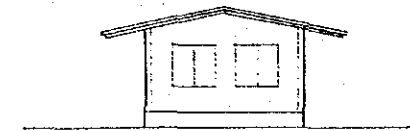




RATION STORE PLAN



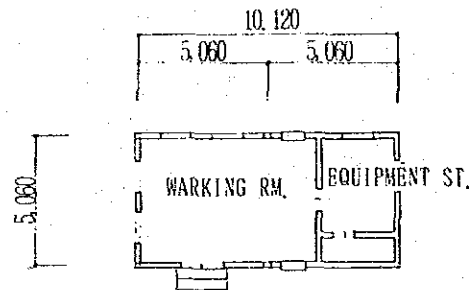
SOUTH ELEVATION



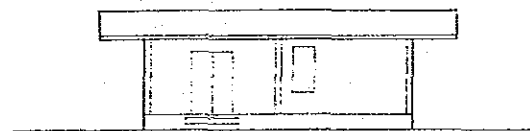
EAST ELEVATION



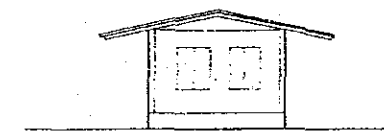
SECTION



WORKSHOP PLAN



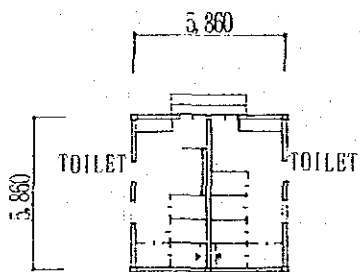
NORTH ELEVATION



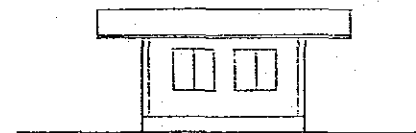
EAST ELEVATION



SECTION



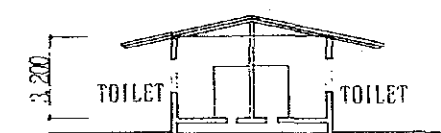
ABLUTION PLAN



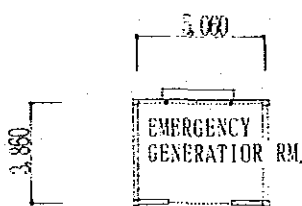
SOUTH ELEVATION



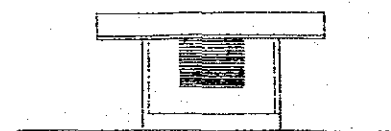
EAST ELEVATION



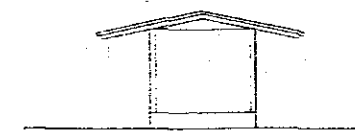
SECTION



EMERGENCY GENERATOR PLAN



EAST ELEVATION



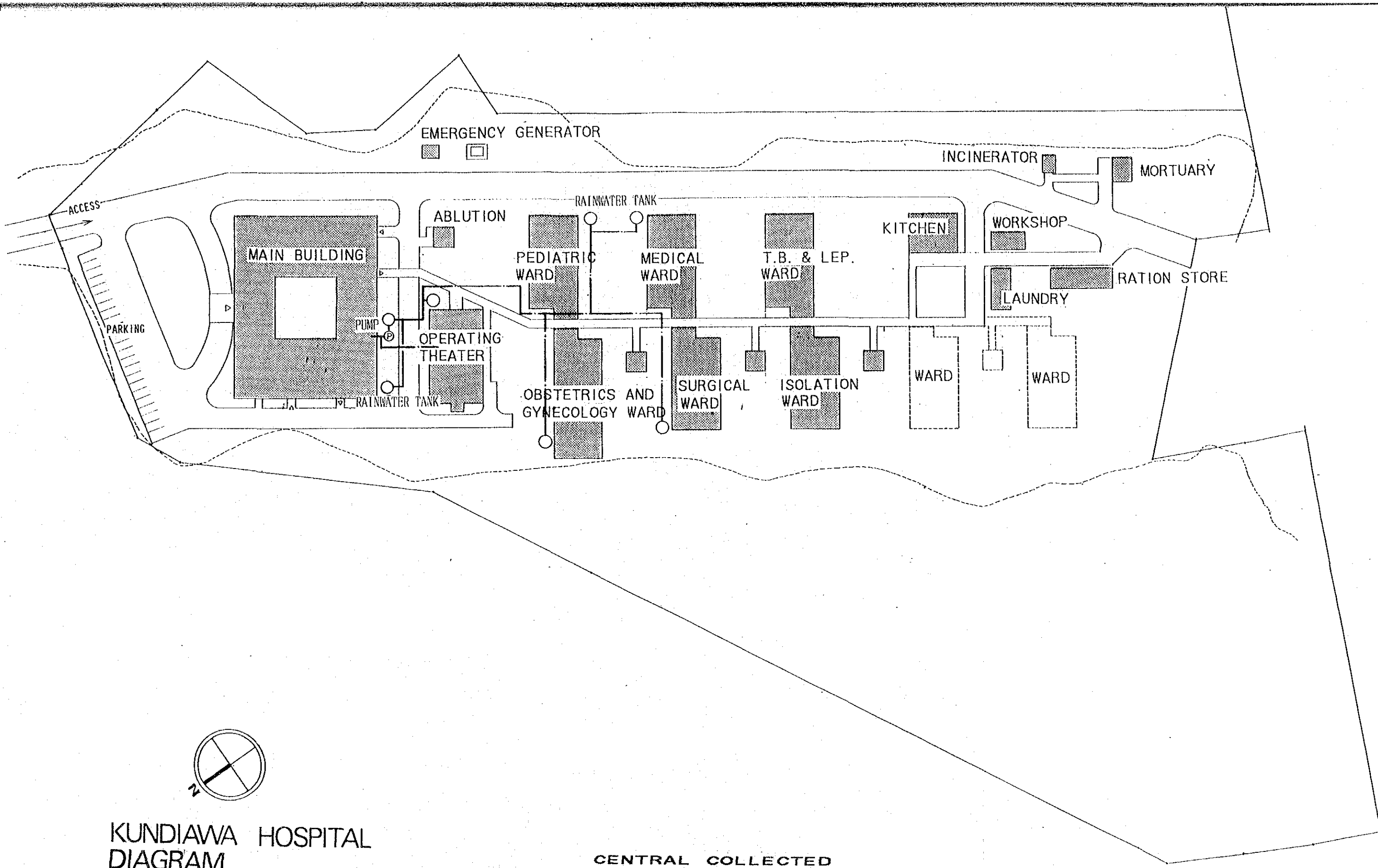
SOUTH ELEVATION



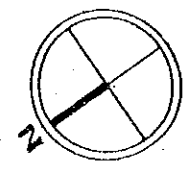
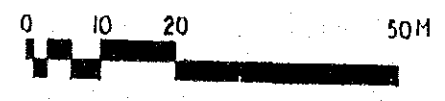
SECTION

KUNDIAWA HOSPITAL
 RATION STORE
 WORKSHOP
 EMERGENCY GENERATOR
 ABLUTION

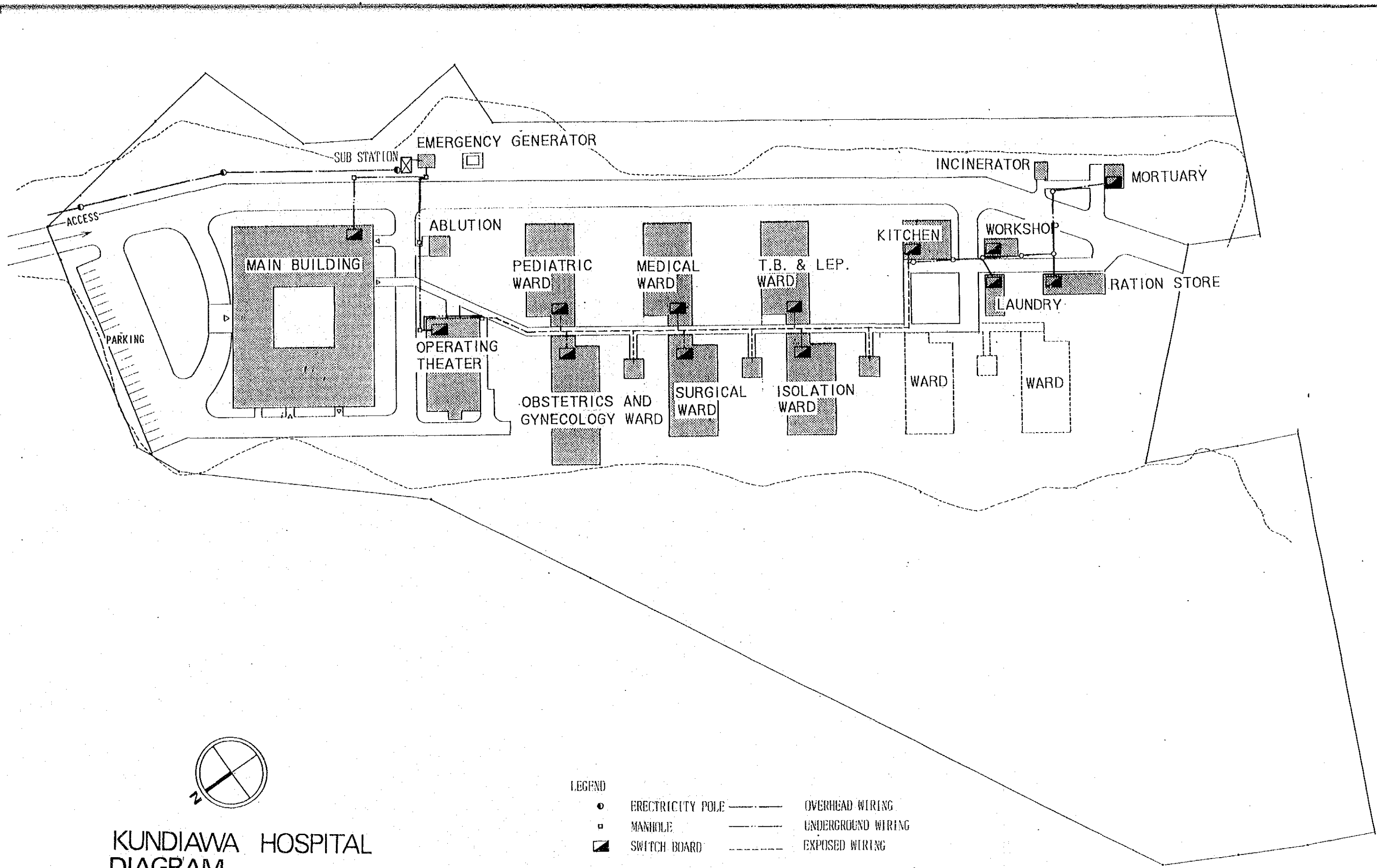




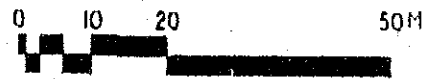
KUNDIAWA HOSPITAL
DIAGRAM



CENTRAL COLLECTED
RAIN WATER

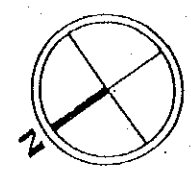
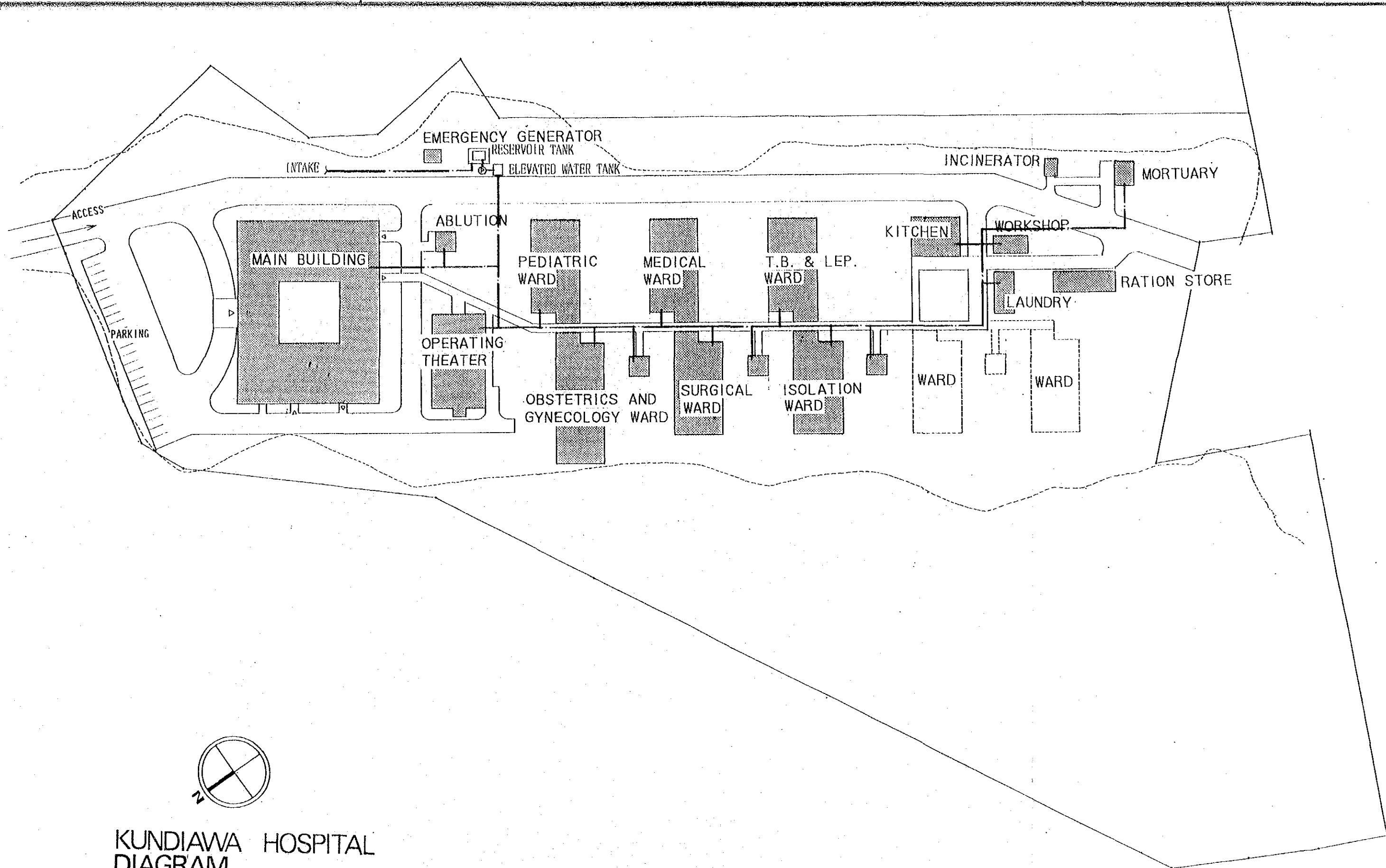


**KUNDIAWA HOSPITAL
DIAGRAM**

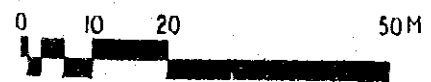


- LEGEND**
- ELECTRICITY POLE
 - MANHOLE
 - SWITCH BOARD
 - OVERHEAD WIRING
 - - - UNDERGROUND WIRING
 - · · EXPOSED WIRING

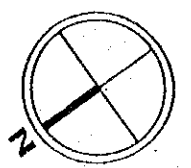
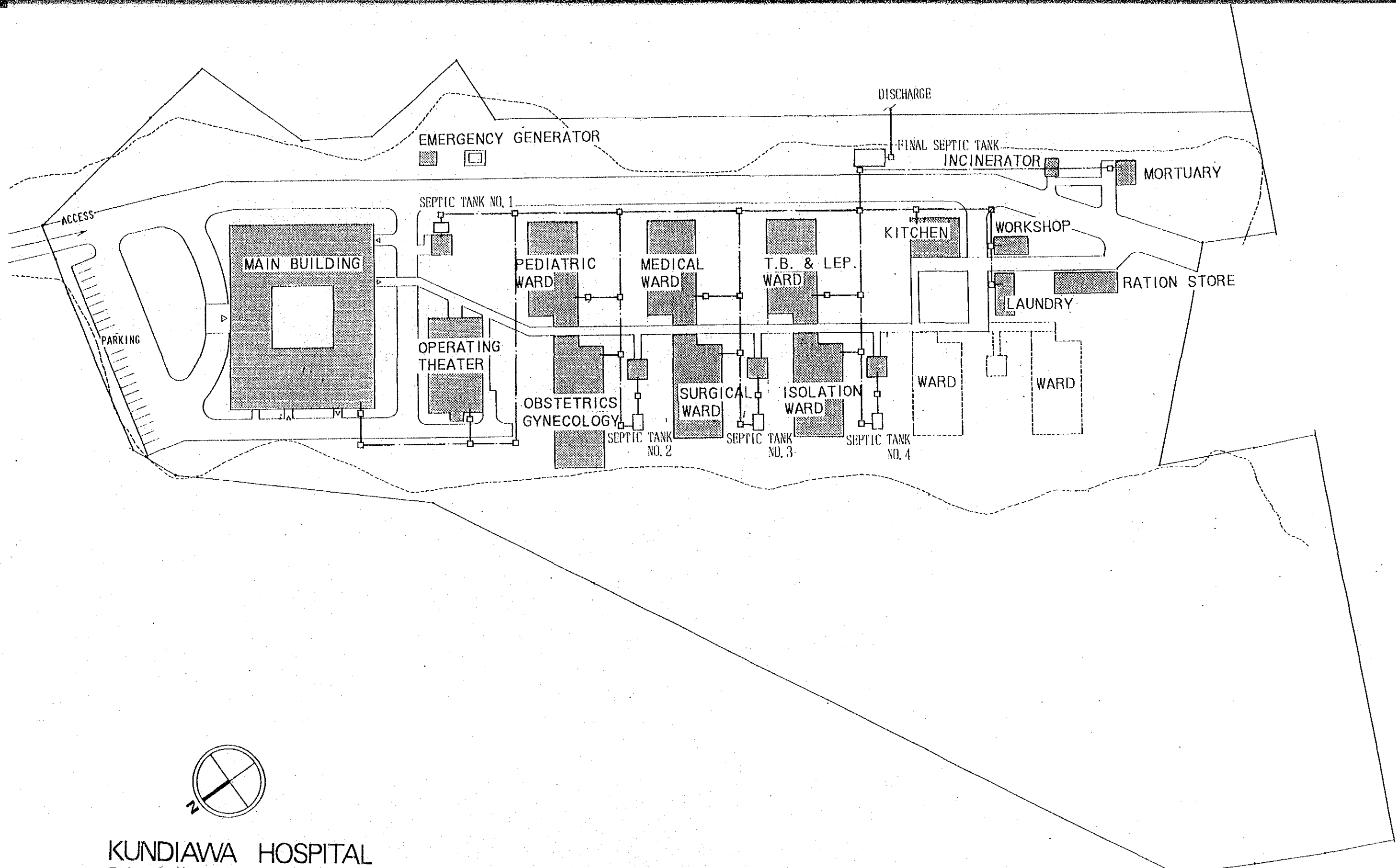
ELECTRIC BASIC SYSTEM



**KUNDIAWA HOSPITAL
DIAGRAM**

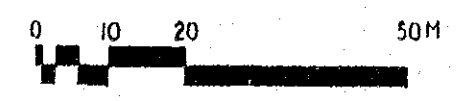


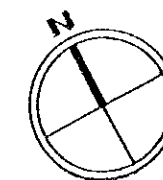
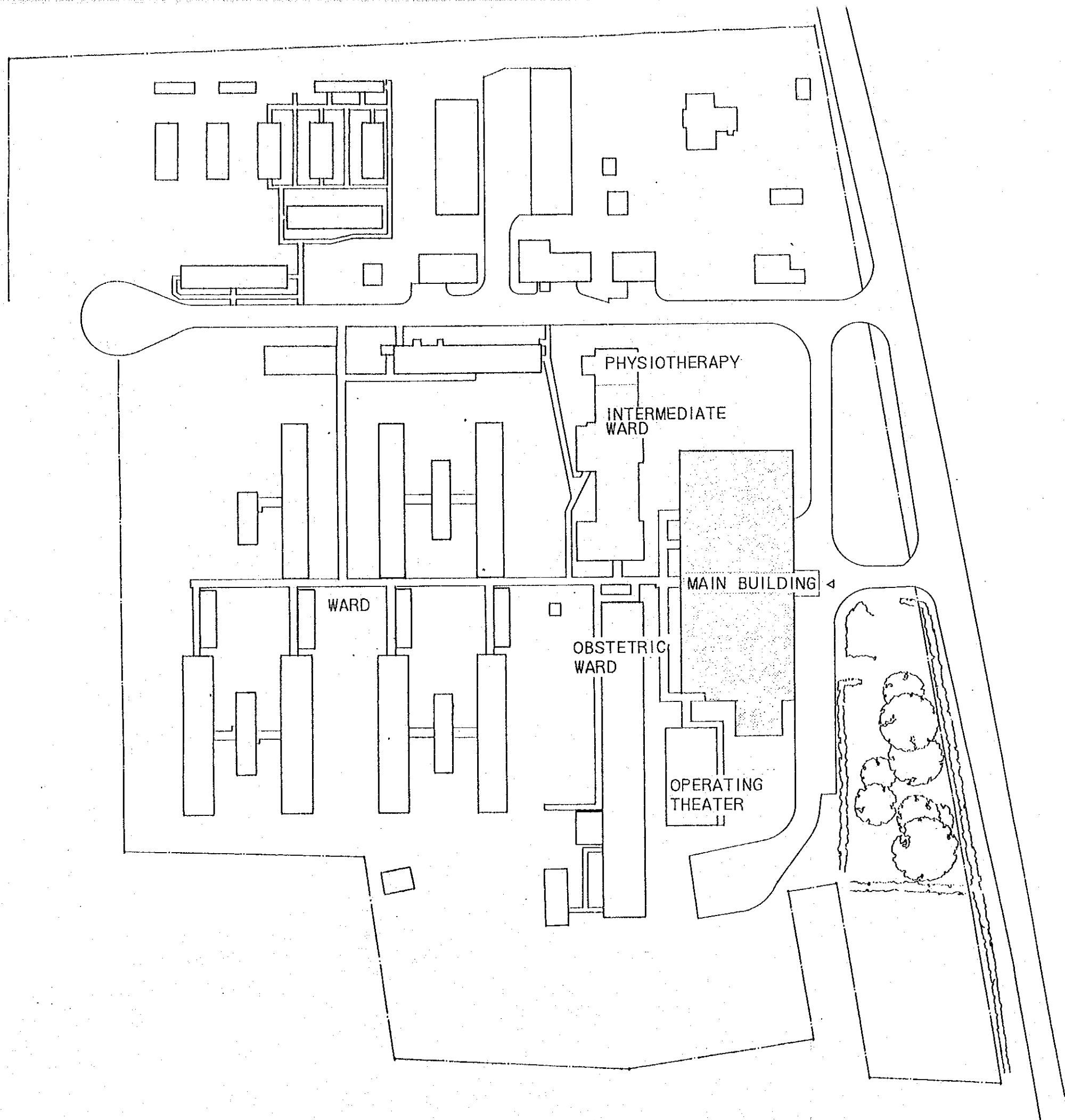
WATER SUPPLY SYSTEM



**KUNDIAWA HOSPITAL
DIAGRAM**

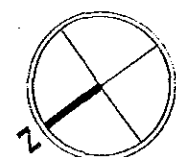
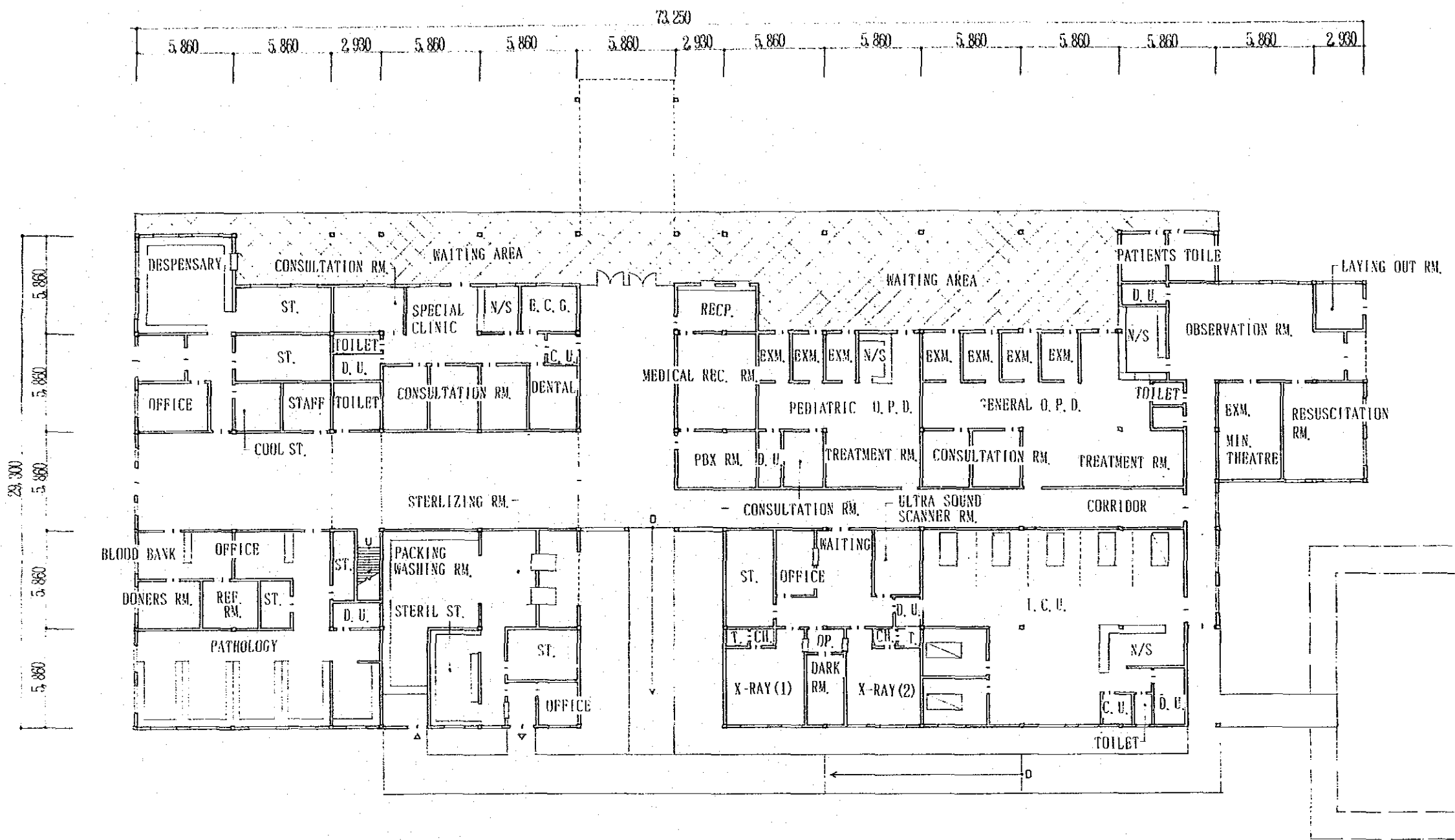
DRAINAGE SYSTEM





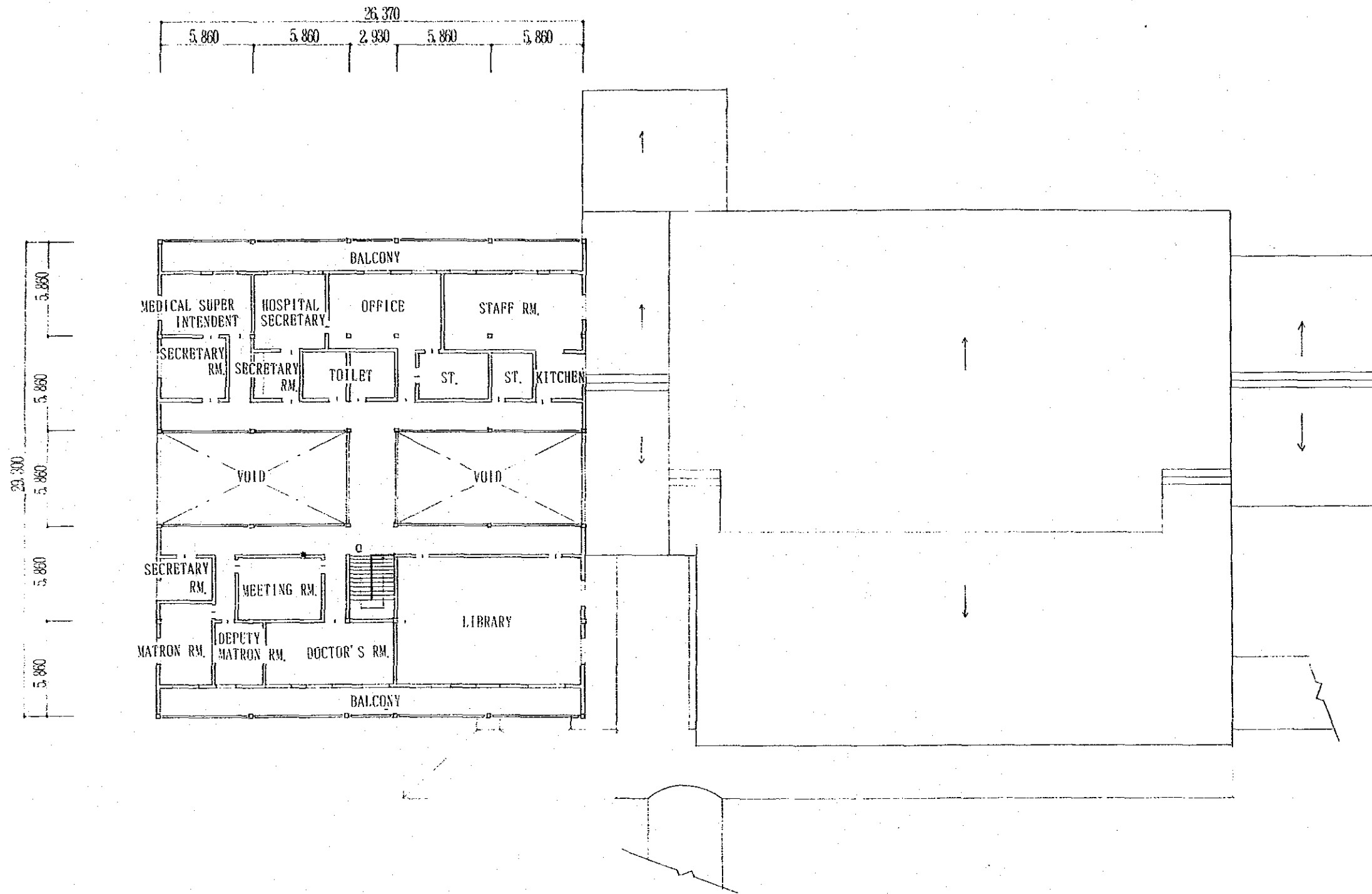
NONGA HOSPITAL SITE PLAN





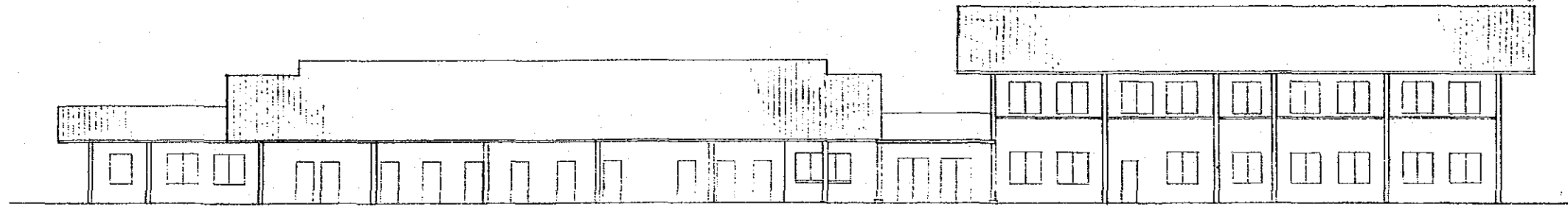
NONGA HOSPITAL
 MAIN BUILDING
 GROUND FLOOR PLAN



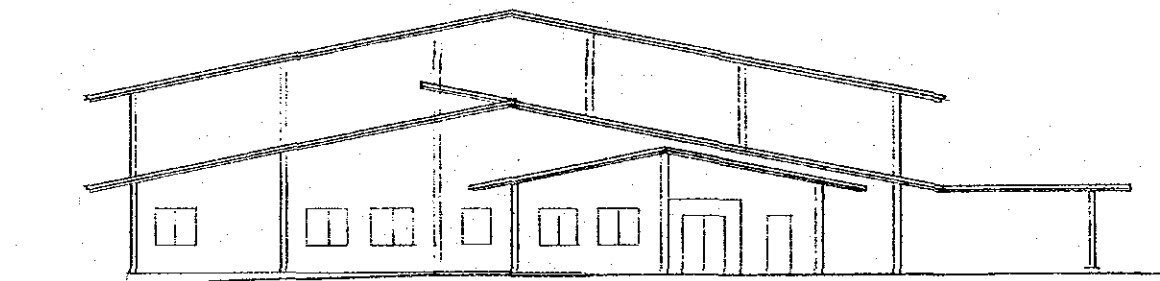


NONGA HOSPITAL
 MAIN BUILDING
 FIRST FLOOR PLAN

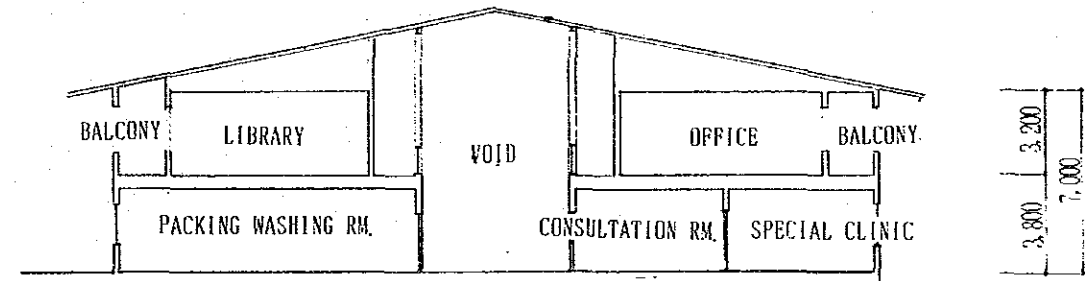




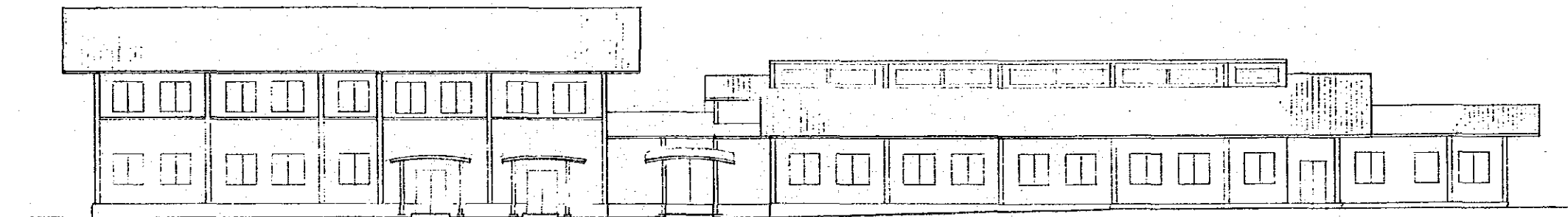
EAST ELEVATION



SOUTH ELEVATION



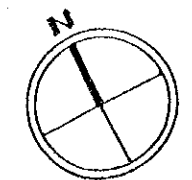
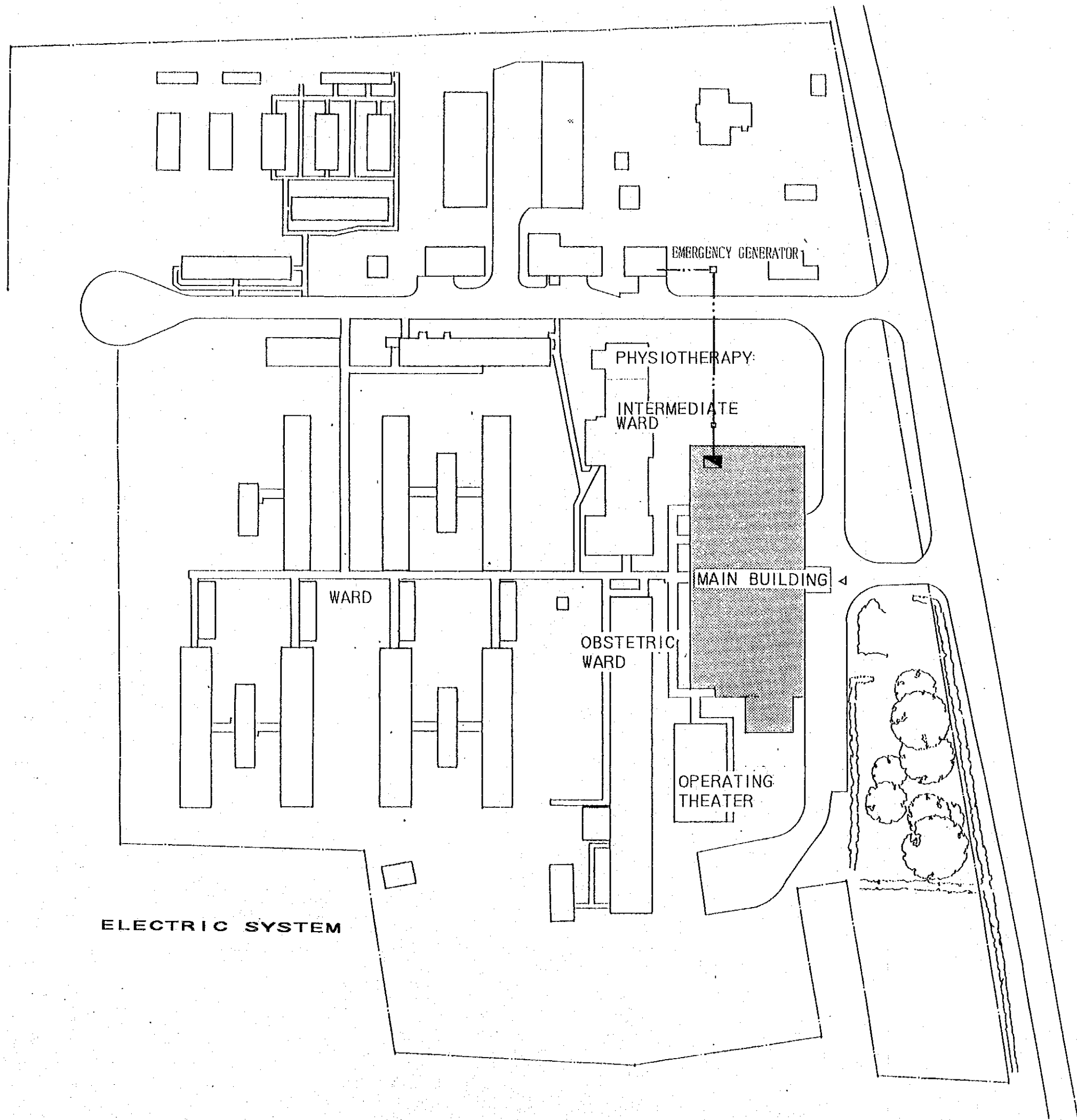
SECTION



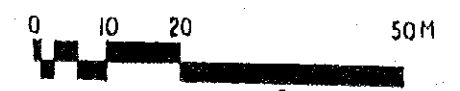
WEST ELEVATION

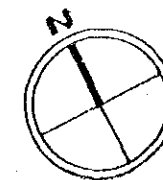
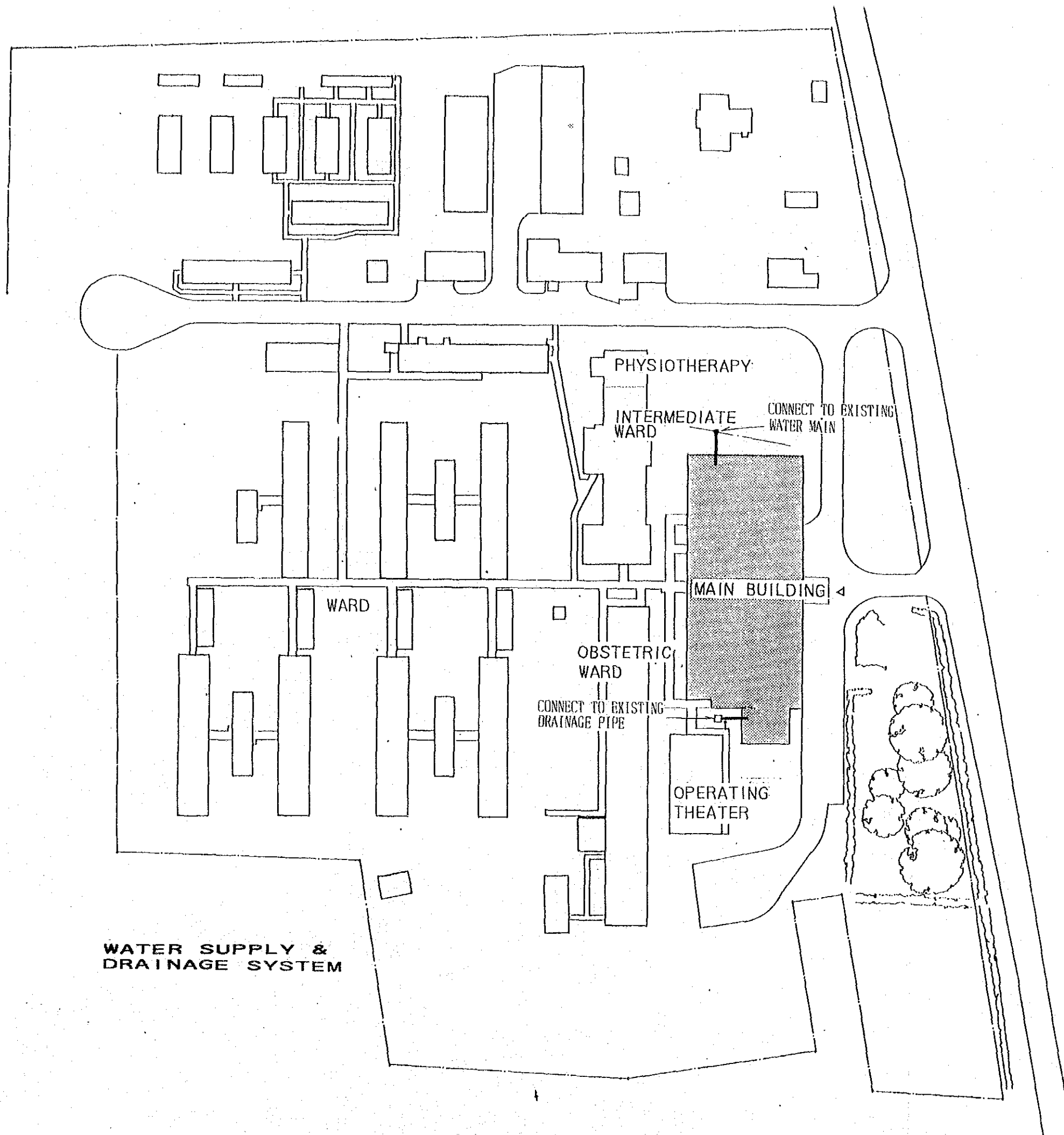
NONGA HOSPITAL
 MAIN BUILDING
 ELEVATIONS SECTION



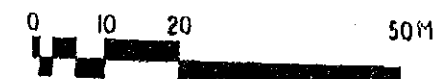


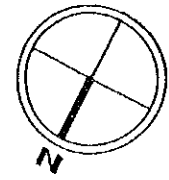
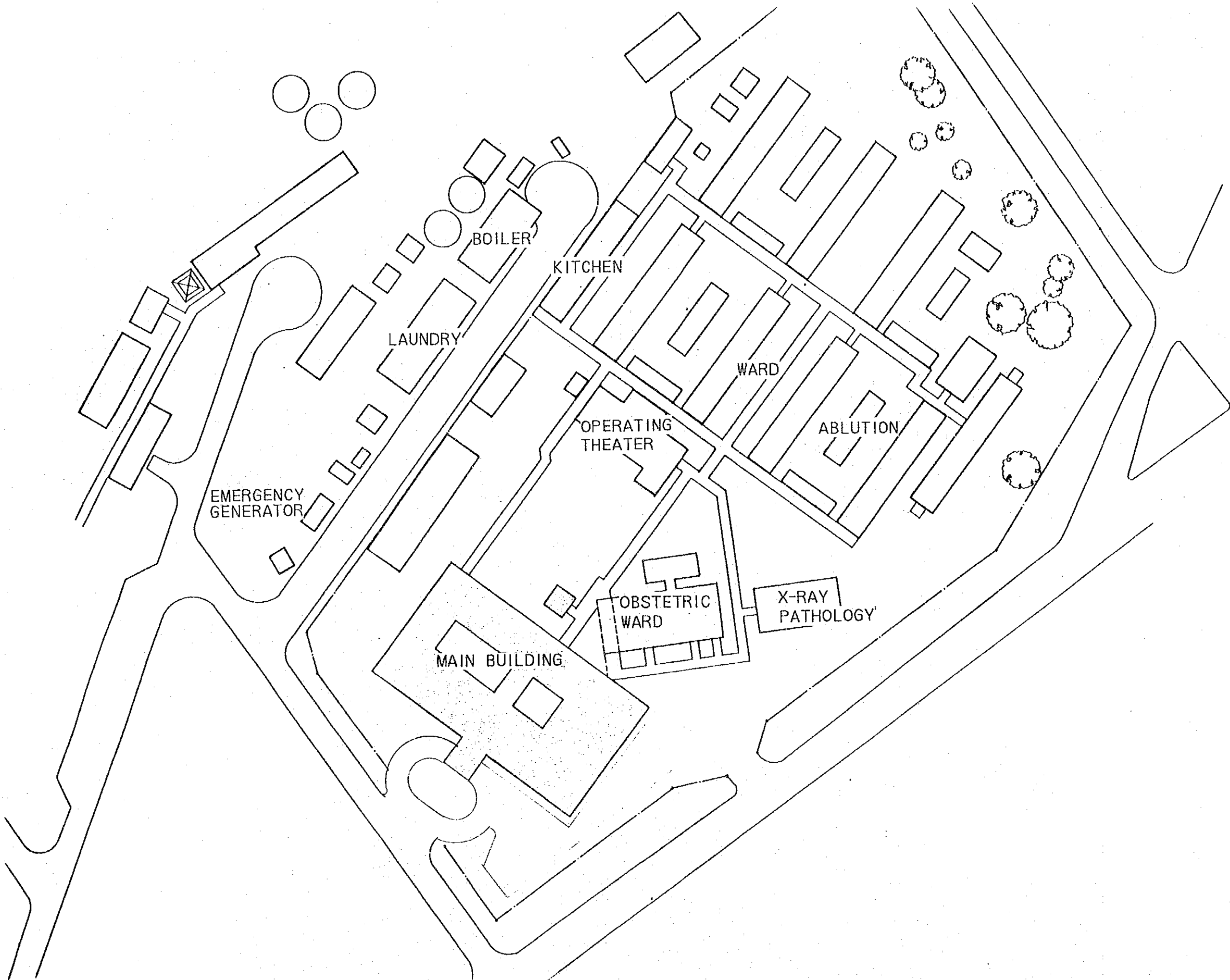
**NONGA HOSPITAL
DIAGRAM**



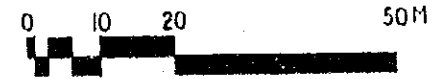


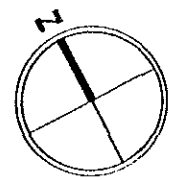
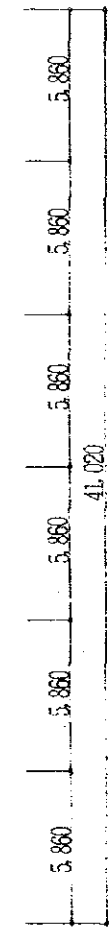
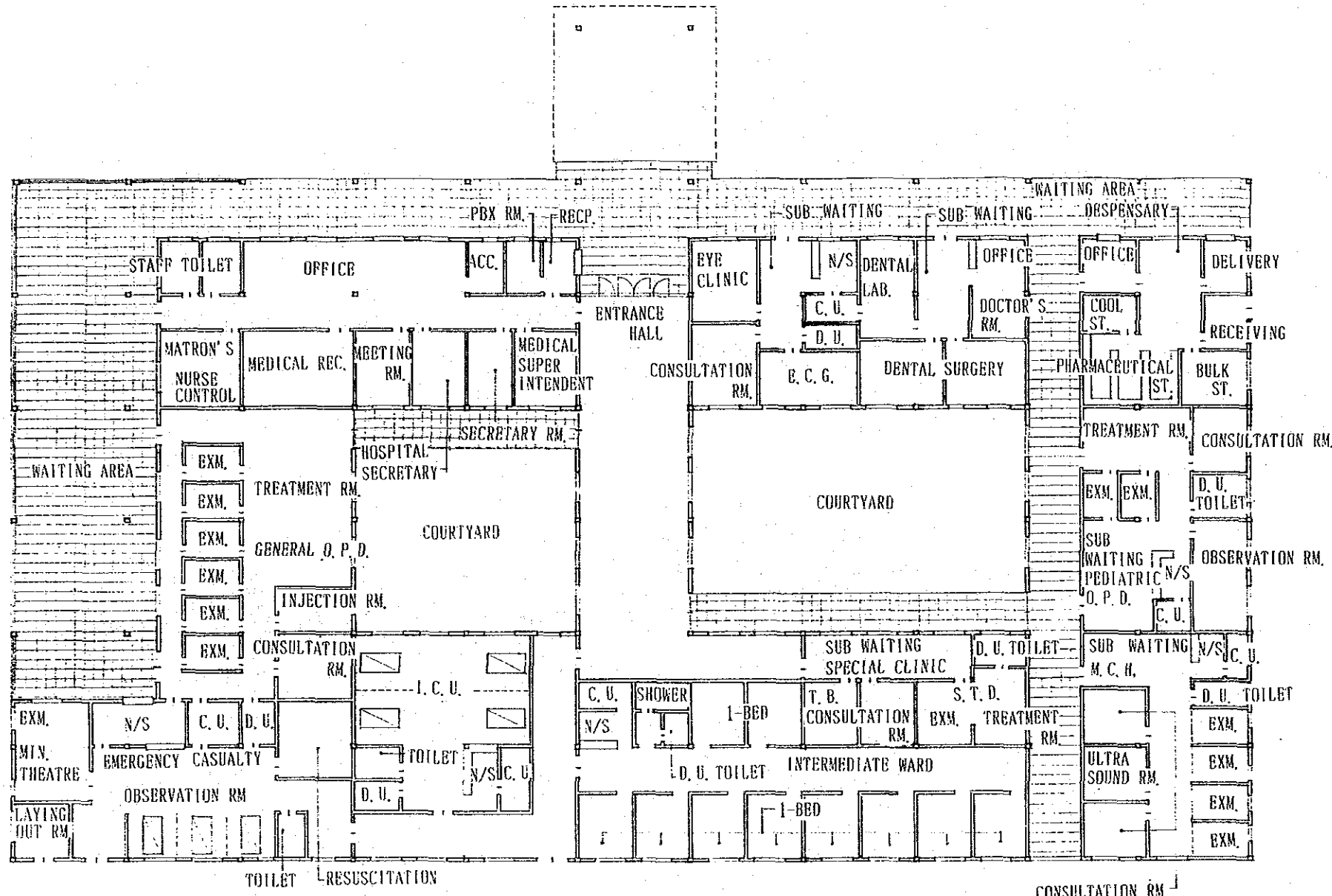
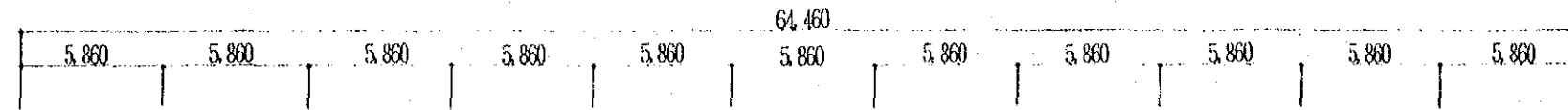
**NONGA HOSPITAL
DIAGRAM**



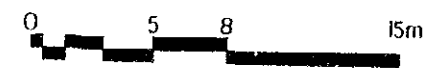


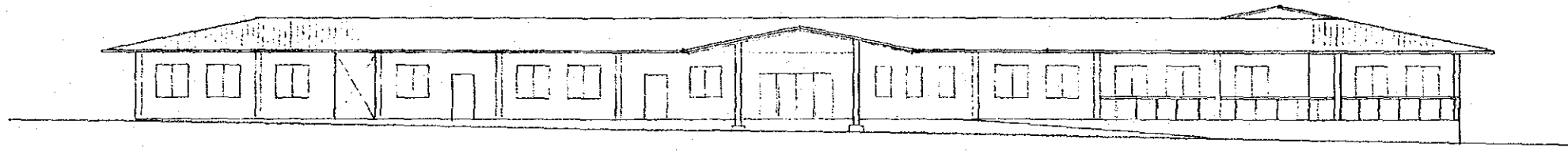
MADANG HOSPITAL
SITE PLAN



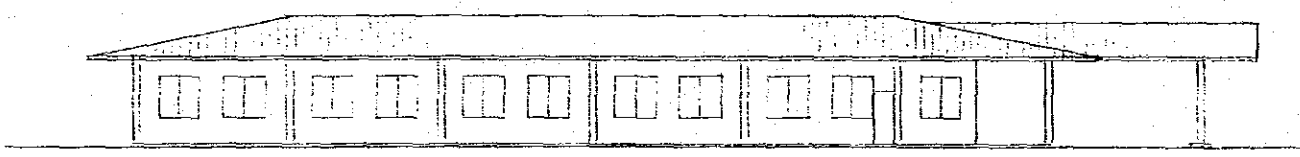


MADANG HOSPITAL
MAIN BUILDING
FLOOR PLAN





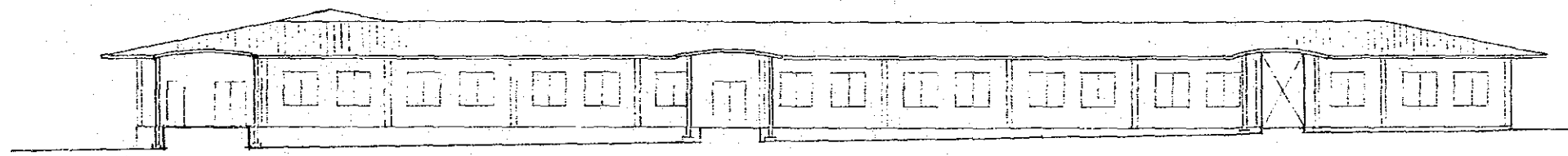
NORTH ELEVATION



EAST ELEVATION

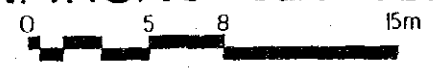


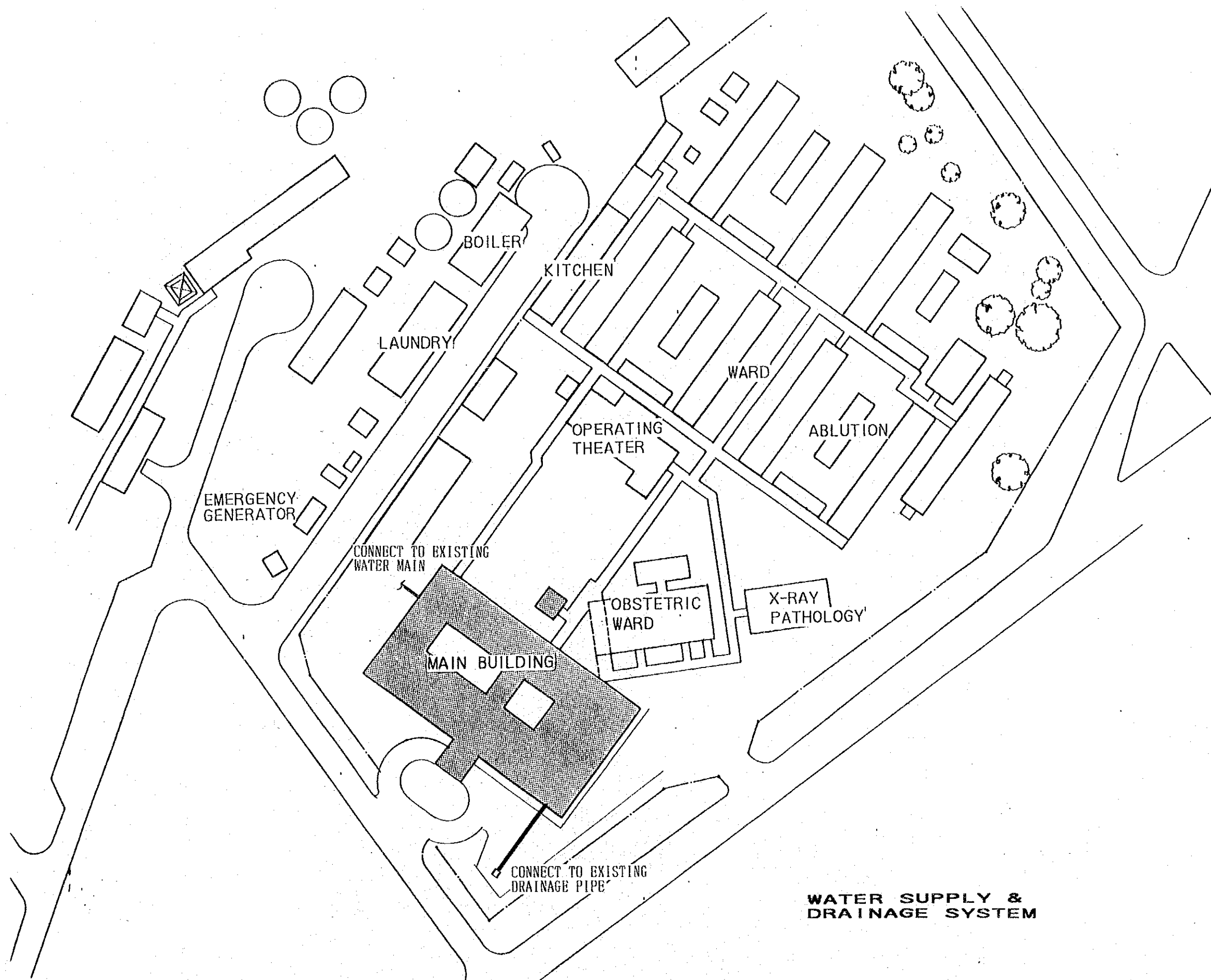
SECTION



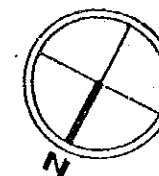
SOUTH ELEVATION

MADANG HOSPITAL
MAIN BUILDING
ELEVATIONS SECTION

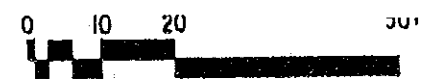


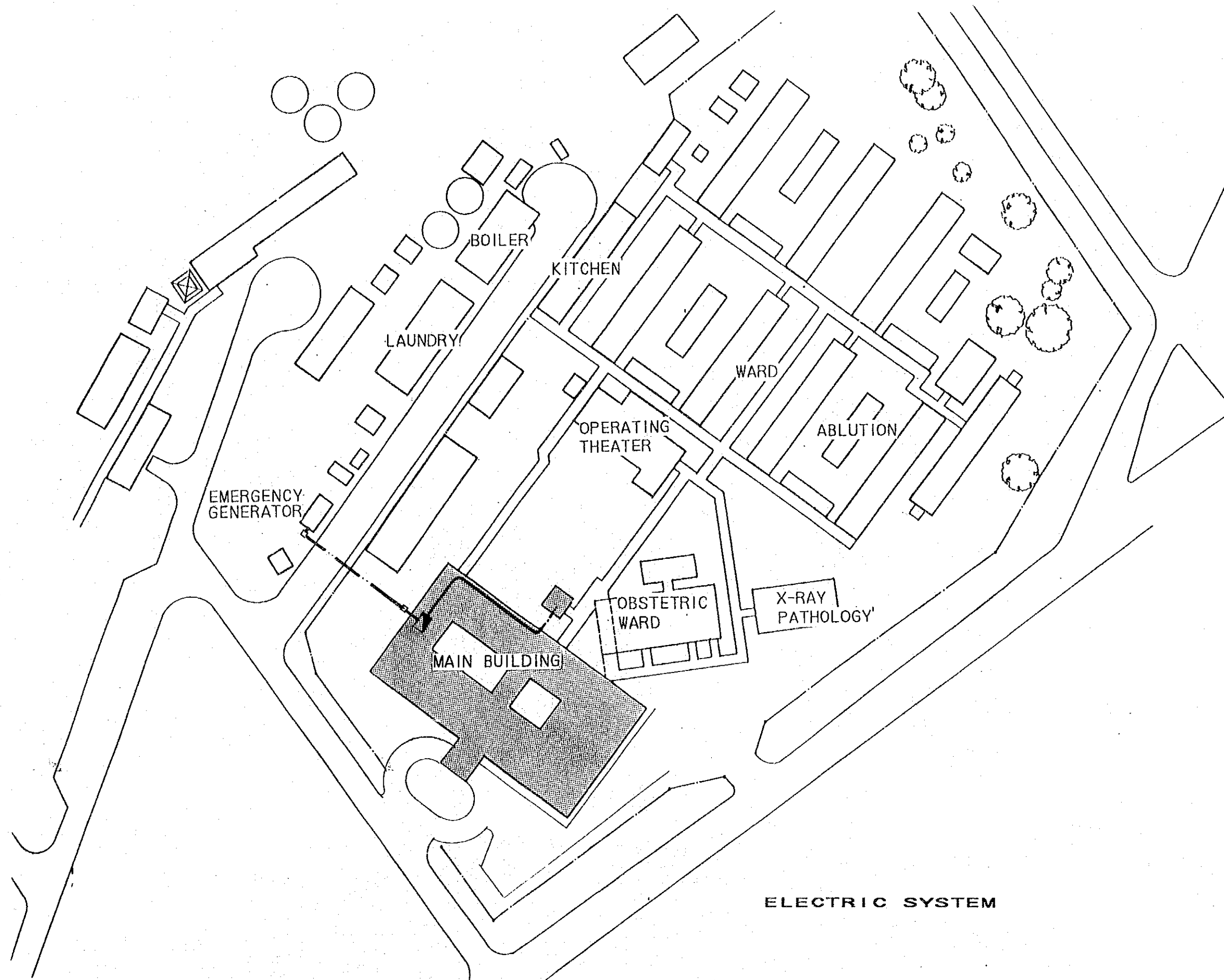


WATER SUPPLY & DRAINAGE SYSTEM

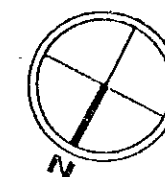


**MADANG HOSPITAL
DIAGRAM**





ELECTRIC SYSTEM



MADANG HOSPITAL DIAGRAM

