Chapter 2. Contents of the Project

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2-1 Basic Concept of the Project

In June 1999, the Government of Japan and the Government of South Africa have agreed to implement cooperation focusing on most demanded provinces as a part of "the new South Africa support package". After this agreement, KZN, in which many ex-“homelands” (black people habitation division) still remains was selected for the target province. Then the Project was formulated which focuses on the improvement of function of health facilities in DC28, an administrative district which provides health services for the people of most demanded in KZN.

The KZN Department of Health is under execution of "a five-year strategic plan (2000- 2004)" on the basis of "providing optimal health status to all the residents of KZN." Under “the strategic plan” they focus on the improvement of health services, establishing a local health system closely linked to primary health care, decrease in the morbidity / mortality rate and refining the hospital services. They also struggle against such organisational issues as human resource development and effective facility management to narrow the regional gap in the quality of health services.

For attaining the above-mentioned goal, this Project contains equipment procurement and a facility construction in DC28 and strengthens health activities of District Health Office (hereinafter referred to as “DHO”). Thereby, it is expected that the quality of health services in DC28 will improve through refining the health facilities and their activity, organising the referral system, stimulating the local health activity based on the primary health care and strengthening the equipment management system.
The Requested Japanese Assistance, for the purpose to benefit people in poverty area of DC28, covers equipment procurement to regional and district hospitals, clinics and DHO in DC28, establishment of the New CHC and equipment supply to this facility, as well as Technical Assistance by Consultant.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

(1) Policy on Equipment Selection

1) Priority Principle

The principle of priority and cancellation in the equipment plan is as follows.

1. Equipment with priority

- Equipment that renews the old equipment
- Equipment of which shortage is serious
- Equipment indispensable to activity of the facilities
- Equipment that are easily managed and maintained
- Equipment with large beneficiary effects
- Equipment with low cost effectiveness
- Equipment with usefulness
- Equipment which is needed for health education activities

2. Equipment cancelled

- Equipment that require large amount of maintenance costs
- Equipment with little beneficiary effects
- Equipment with cost ineffectiveness
- Equipment designed for purely academic purpose
- Equipment that can be substituted by other simple alternatives
- Equipment that may cause environmental pollution
- Equipment with little usefulness
- Equipment requested for personal purposes
- Equipment requested by the quantity more than necessary for normal activity
- Common furniture, general office apparatus, consumables, and accessories which do not influence activity of facilities

2) Equipment Specification

Such equipment as too sophisticated to be commonly used in the South Africa shall be excluded.

3) Quantity of Equipment

It is recognised that there are variations of scale among the Project sites. Since most of the health facilities have insufficient number of doctor compared to the scale of facilities, the equipment quantity shall be considered by number of patients for every facilities, the number of doctors and the contents of activity of the facilities. The equipment that can be used at two or more sections shall be shared.

Table 2-1 Number of Beds per Doctor

Hospital	No. of beds	No. of doctors	Beds / Doctors (%)
Ngwelezana Regional Hospital	607	50	12.1
Empangeni Regional Hospital	245	13	18.8
Catherine Booth District Hospital	167	2	83.5
Ekombe District Hospital	115	4	28.7
Eshowe District Hospital	460	11	41.8
Mbongolwane District Hospital	190	4	47.5
Nkandla District Hospital	276	6	46.0
St. Mary's Kwamagwaza District Hospital	165	4	41.2

Source : Questionnaire

The number of operation rooms which is used in determining the quantity of equipment was obtained by examining the contents of operations performed at Ngwelezana regional hospital and St.Mary's Kwamagwaza district hospital. As was the number of operation room for anaesthesia apparatus.

Table 2-2 Number of Operating Room and Anaesthetic Machine

No. of ope.	Operation. Time	Ope. Cases	%	Prep. & Clean	Ave. time	Time	Annual ope. Time	Working ope. Rooms	General anaesthetic cases	Anaesthetic time	Annual anaesthetic time	Working anaesthetic rooms
Ngwelezana Regional Hospital												
7906	< 30min.	3044	38.2	30min./case	0.75	2283	11697	5.5= 6 rooms	—	—	—	—
	31-60 min.	2305	29.0	30 min./case	1.25	2881			4324	740	7273	3.4=4 rooms
	61-90 min.	1184	14.9	30 min./case	1.75	2072				2072		
	91-120 min.	711	8.9	60 min./case	2.75	1955				1955		
	121-180 min.	716	9.0	60 min./case	3.50	2506				2506		
Empangeni Regional Hospital												
4295	< 30 min.	2053	47.8	30 min./case	0.75	1540	4903	2.3= 3 rooms	—	—	—	—
	31-60 min.	1121	26.1	30 min./case	1.25	1401			2243	1401	3363	1.6=2 rooms
	61-90 min.	1121	26.1	30 min./case	1.75	1962				1962		
Catherine Booth District Hospital												
795	< 30 min.	497	62.6	30 min./case	0.75	373	766	0.4= 1 room	—	—	—	—
	31-60 min.	257	32.3	30 min./case	1.25	321			198	196	268	0.1=1 rooms
	61-90 min.	41	5.1	30 min./case	1.75	72				72		
Ekombe District Hospital												
628	< 30 min.	393	62.6	30 min./case	0.75	295	603	0.3= 1 room	—	—	—	—
	31-60 min.	203	32.3	30 min./case	1.25	254			—	—	—	—
	61-90 min.	31	5.1	30 min./case	1.75	54			8	14	14	0.1=1 rooms
Eshowe District Hospital												
3928	< 30 min.	1500	38.2	30 min./case	0.75	1125	5329	2.5= 3 rooms	—	—	—	—
	31-60 min.	1139	29.0	30 min./case	1.25	1423			1606	397	3178	1.5=2 rooms
	61-90 min.	762	19.4	30 min./case	1.75	1334				1334		
	91-120 min.	526	13.4	60 min./case	2.75	1447				1447		
Mbongolwane District Hospital												
129	< 30 min.	80	62.6	30 min./case	0.75	60	125	0.1= 1 room	—	—	—	—
	31-60 min.	42	32.3	30 min./case	1.25	53			16	11	23	0.1=1 rooms
	61-90 min.	7	5.1	30 min./case	1.75	12				12		
Nkandla District Hospital												
2195	< 30 min.	1374	62.6	30 min./case	0.75	1031	2113	1.0= 1 room	—	—	—	—
	31-60 min.	709	32.3	30 min./case	1.25	886			494	478	674	0.3=1 rooms
	61-90 min.	112	5.1	30 min./case	1.75	196				196		
St. Mary's Kwamagwaza District Hospital												
486	< 30 min.	304	62.6	30 min./case	0.75	228	468	0.2= 1 room	—	—	—	—
	31-60 min.	157	32.3	30 min./case	1.25	196			—	—	—	—
	61-90 min.	25	5.1	30 min./case	1.75	44			25	44	44	0.1=1 rooms

Source : Questionnaire

4) Local Distributors

To use the supplied equipment more effectively, for the equipment that requires consumables / spare parts and periodical maintenance by manufacturer, it is considered to select the equipment from manufactures which have local distributors in South Africa. Some of the equipment are recommended to conclude a maintenance contract with a local agency for equipment management.

5) Operation and Maintenance

For effective maintenance of the supplied equipment, the supplier shall give the following training. They shall also provide technical information and service manuals necessary for maintenance and contact information of distributors.

- Operating procedure (overview of equipment, procedure, check points, etc)
- Periodical maintenance procedure (cleaning and adjustment, repair for minor trouble, etc)

6) Equipment Procurement

For the equipment which need neither spare parts nor consumables, Japanese products or South African products shall be selected on the basis of the specification of Japanese products. The equipment which do need consumables / spare parts and maintenance services shall be supplied from a distributor which can offer maintenance services, or from manufacturers who have a distributor to supply them in South Africa. The third country products shall be selected as necessity arises.

7) Implementation Period

Equipment procurement shall be divided into 2 patterns, for existing regional / district hospitals, clinics, DHO, and for the New CHC and they shall be examined individually. For procurement for the existing facilities, consideration on hospital activities shall be necessary at the time of equipment delivery. Especially for operation light and sterilizing machine to be installed in operation department and CSSD, adjustment on hospital activity such as postponement of operations, for example, might be needed from the viewpoint of infection prevention. Procurement schedule of equipment for health education and promotion supplied to DHO shall be adjusted according to the period of Technical Assistance by Consultant. For the procurement for the New CHC, it is necessary to set a schedule according to the schedule of construction work. It shall also be noted that beginning of December to beginning of January including Christmas Holiday season in South Africa is a season of winter vacation and that every business stops during that time.

Based on the policies mentioned so far, appropriateness and necessity for the requested equipment were

examined as follows. Appendices 7 “Examination of the Requested Equipment” shows the results of the examination by equipment.

Classifications

The requested equipment are classified as follows.

Renewal	:	The equipment to be renewed
New equipment	:	The equipment new to the facility and to be newly procured
Replenishment	:	The equipment to be replenished in quantity for the existing equipment

Criteria

- Purpose
  - ○ : Basic equipment compatible with the activities of the facility
  - × : Equipment not compatible with the activities of the facility, can be replaced by another simple equipment
- Necessity
  - ○ : Equipment necessary for the basic activities of the facility as the existing equipment has become too old or out of order
  - × : Equipment not necessary because of its cost-ineffectiveness and limited beneficiary group, furniture not essential for the activities of the facility, office apparatus, inexpensive equipment procurable in South Africa and small articles
- Technical Level
  - ○ : Equipment compatible with the technical level of the facility
  - × : Equipment that require higher level of technique than expected from the facility
- Administration and maintenance
  - ○ : Equipment that can be maintained by the facility, that the manufactures can offer the after sale services and that the consumables / spare parts are procurable
  - × : Equipment difficult to be maintained by the facility, that the manufactures can not offer the after sale services and that the consumables / spare parts are not procurable
- Administration and maintenance cost
  - ○ : Equipment whose maintenance cost is negligible or bearable by the facility
  - × : Equipment whose maintenance cost is not negligible or not bearable by the facility
- Quantity
  - ○ : Equipment whose requested quantity and allocation plan are judged appropriate by the contents of activities, number of patient and staff
  - △ : Equipment whose requested quantity and allocation plan are judged inappropriate or needed to be adjusted by the contents of activities, number of patient and staff
- Name
  - ○ : Equipment that may cause problems in the procurement stage under the name of the request stage (brand name or common name), whose name should be standardized
- Overall decision
  - ○ : Equipment judged appropriate and included in The Project

× : Equipment judged inappropriate and excluded from The Project

(2) Policy on Construction Design

1) Basic Policy of Construction Design

The construction design is based on the functional plan with a rational building size to reduce construction and maintenance cost. Circulation of staff / patients / services will be minimised and simplified for the ease of management and effective use of space. Moreover, the number of personnel and facility components can be reduced to get sustainability through downsizing of facility management by making full use of the referral hospital services.

2) Configuration of Community Health Centre

The term of "Community Health Centre " is defined by KZN Health Act, 2000 as follows; "Community Health Centre means a facility that provides primary health care, maternity care, accident and emergency services 24 hour a day. It does not have any operation rooms but it is furnished with treatment rooms and bed rooms where a patient is observed for maximum 48 hours". CHC is positioned at a midpoint between clinics and secondary medical facilities and expected to perform as a hub of local referral system. Since the CHC is the highest-level facilities in the primary health care system, it is often located near a densely populated local community to provide wide-ranging health services to many people.

The following diagram and table indicates the basic principle of services / functions of the CHC and its facilities components:

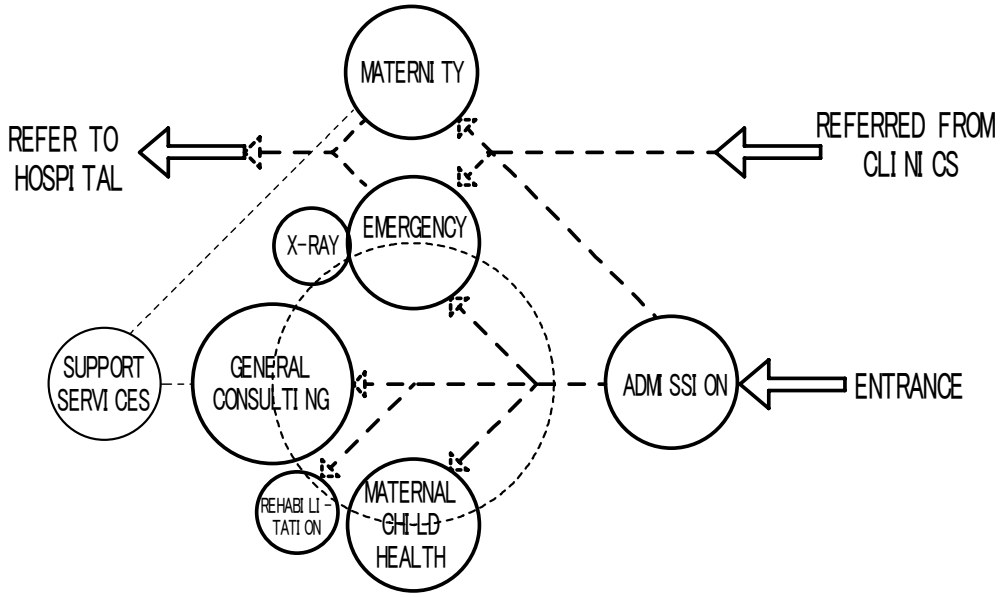


Figure 2-2 Basic Principle of Services / Function of CHC

Table 2-3 List of Facilities in CHC

HEALTH CARE SERVICES		
NO.	Department	Required Facilities
1	Admission / Waiting	Administration staffs are stationed in day and night shifts. Receptionists monitor the waiting area, manage medical records and operate the switchboard. Patients are directed to the relevant clinical sections at the reception.
2	24 Hrs Casualty / Emergency	This section provides emergency outpatient services around the clock. The treatment room, located adjacent to the X-ray examination room, is where mild cases are to receive medical treatment, including treatment of slight injuries, resuscitation treatment, intravenous drip injections and ordinary injections. Serious cases are to be sent to referral hospital after receiving emergency medical treatment.
3	Dentistry	This section provides dental clinic services and oral health service.
4	Laboratory	Basic laboratory test, e.g. blood test, urinalysis and sputum examination for TB, etc., and management of test samples for outsourcing test are conducted. Urine samples are passed via the pass box in front of the toilet.
5	Radiography / Ultrasound	X-ray examination unit including X-ray photography room, Darkroom for film developing and film store, and ultrasound examination room are required.
6	Maternity / Maternal and Child Health	Nurses' station/waiting: 24-hour nursing care services to patients are provided in this section. Crisis centre: Medical examination, treatment and counseling of victims of violence, including sexual assault are provided with privacy. This facility also utilized as a room for counseling, STD and family planning. Consultation (maternal & child health): Maternal & child health services including medical examination services for infants and prenatal women are provided. Delivery room: Delivery services are provided by midwifes. Abnormal deliveries are not conducted in this facility. Prenatal women, who need Caesarean section, shall be sent to the referral hospital. Ante natal ward: This room is also used as a labor room. Post natal ward: This room accommodates postnatal women at least 6 hours. Baby bathing equipment is installed in this room. Premature baby room: Incubators are installed in this room. The nurses' station has window for monitoring premature babies. Baby resuscitation/rehydration: Baby treatment services, e.g. resuscitation and drip infusion are provided.

HEALTH CARE SERVICES		
NO.	Department	Required Facilities
7	Out Patient Clinic	Consultation and treatment services by a medical doctor and nurses as well as counseling services are provided. Outpatients are directed to go to relevant clinical sections at the nurses' station. Patients who must receive medical treatment are directed to go to the treatment room, where slight injuries are treated and injections are given. The number of the consultation rooms is determined on the basis of the past record of the Nseleni clinic. In case the facilities have enough room, an isolated tuberculosis consultation room is planned.
8	Rehabilitation	A single room is to be used for rehabilitation, health education and meetings for maximum use of the room.
9	Short Stay Ward (Max. 48Hr.s)	This ward is for short stay observation up to 48 hours and patients are sent to the referral hospital in serious cases. The ward consists of two four-bed rooms, one for men and the other for women. Clean linen store: Cleaned linen This facility is for keeping.
10	Dispensary	Dispensary: This section has facilities for dispensing drugs to patients. Dispensary store: This facility is for receiving, keeping and managing drugs. All drugs are delivered directly to the dispensary. It also includes storage for drugs for the mobile service base.
SUPPORT SERVICES		
11	Administrative support	This section includes spaces and minimum welfare facilities for the administrative staff, facility operation/management, and preparation of healthcare statistics, facility maintenance and the support personnel.
12	Mobile Service Base	This section includes an office for three mobile clinic staff to be located adjacent to dispensary store.
13	Maintenance	This section includes workshop for maintenance work and store for maintenance equipment and parts.
14	Support Services	Essential supportive services, e.g. sterilization, cleaning, warehousing, mortuary, and transport and disposal of waste, are provided in this section. These services are possibly be provided from the referral hospital or outside service providers.
15	Equipment / Machinery	Necessary machinery rooms for electricity, telephone and plumbing and medical gas equipment are required.

3) Facility Plan

In South Africa, "R158 Regulation" stipulates health facility regulations, on which the policy on facility plan shall be based. Medical room specifications and layouts, issued by CSIR and commonly used in public health facilities, will be used as a reference for planning (e.g. dimension of the rooms, etc.) with accordance to the local conditions.

4) Site Conditions

The proposed Project site is located at a distance of 5km from the National highway (N2). The front road of the site, a major trunk road in the region with a wide walkway, is suitable as an access road to the facilities. The site is positioned in a sloped area with a maximum level deference of approx. 7m. With this level difference, the layout plan of the facility will be designed to leave the existing topography as much as possible in order to minimise the amount of site development and environmental impact.

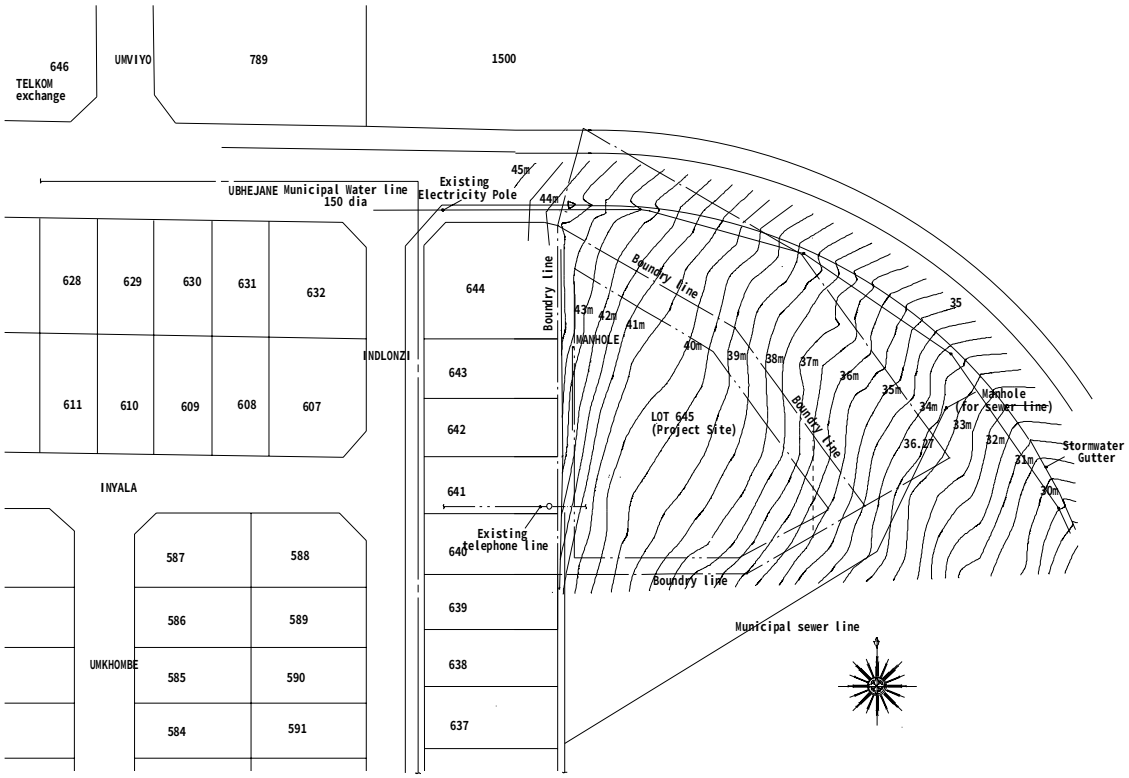


Figure 2-2 Site Conditions and Infrastructure

5) Environmental Conditions

The Project site is characterised by high temperature and high humidity. In principle, no heating apparatuses are to be installed in the planned facilities. The air conditioning load is to be reduced by increasing the heat insulating effect of the walls and the roofs, and avoid direct sunlight penetrating into the rooms by the use of deep eaves. Furthermore, consideration should be given to the ceiling height to ensure a comfortable environment, and protection against heat gain by western sunlight. Since the Project site is situated in an area which has a high incidence of malaria, the windows are to be equipped with insect screen and other devices to protect against insects.

Special attention should be paid to the possibility of rainwater inflow and chloride erosions of exterior structures. Highly durable exterior finishing materials shall be selected to resist deterioration by chloride erosion and strong sunshine.

6) Building Code and Building Permit

South Africa has a well-established building code, and the details of every architectural plan must be

subject to official approval prior to the commencement of the construction work, according to the building code. In implementing the architectural plan, it is essential to comply with the local building code, at the same time follow the appropriate procedures for obtaining the building permit.

The building laws and regulations which are applicable to the facility plan for the New CHC are as below.

- National Building Regulations and Building Standard Act 1997
- R158 Regulations

Major design and specification standards prescribed by the South Africa Bureau of Standards (SABS) are as below.

Table 2-4 List of SABS's Major Standards

SABS 0400 The Application of the National Building Regulations
SABS 0161-1980 The design of foundations for buildings
SABS 0160-1989 The general procedures and loadings to be adopted in the design of buildings
SABS 0100-1:1992 The structural use of concrete Part 1: Design
SABS 0139-1981 The prevention, automatic detection, and extinguishing of fire in buildings
SABS 0114-1:1996 Interior lighting Part 1: Artificial lighting of interiors
SABS 241-1984 Water for domestic supplies
SABS 543:1992 Fire hose reels (with hose)
SABS 1128: Part I-1977 Fire fighting equipment Part I:Components of underground and above hydrant systems
SABS 1253:1994 Fire-door and fire-shutters

For the urban planning-related regulations, the Project shall comply with the following regulations which are enforced by the uMhlathuze Municipality.

Table 2-5 Regulations Applicable to the Project Site

Building type:	Institution restricted to medical use
Size restriction:	Floor coverage: 60%、Floor area rate: 50%
Height restriction:	Unrestricted
Building lines:	on street:7.5m, side and rear spaces: 4.5m+（1.5m × storey）
Parking requirements:	150 ㎡ per car
Connection to road:	up to 2 points（location unrestricted）

It is necessary to obtain the building permit thorough a formal application for approval for the detail design prior to the commencement of the construction work. In principle, the signatures of a locally qualified engineer or architect are required for application of the building permit according to the

regulation. The following table gives an outline of the procedures for the building permit.

Table 2-6 Outline of Procedures for Building Permit

Authority:	Mhlathuze Municipality（at the stage of April, 2000）
Submission date:	Upon substantial completion of Detail Design
Period of evaluation:	3~4 weeks
Departments to confirm:	Town planning dept., Fire dept., Health dept., Electrical dept., Engineering dept.
Necessary documents:	Application form、Engineering certificate、Architectural drawings
Application fee:	120 ZAR up to 20 ㎡, 36 ZAR per 10 ㎡ for additional 20 ㎡

7) Local Construction Condition

South Africa outperforms other African countries in terms of the level of building technology and experience of construction work. South Africa also has its own building standards, which are based on the British Standard. All major building materials are manufactured in compliance with the local standard and available in local market. Therefore, the application of Japanese standards for construction work is not effective for local construction. For this reason, local construction methods, which are considered highly reliable in compliance with the local building standard, should be used for construction.

8) Local Consultants and Contractors

In South Africa, local consultants and contractors have experience in construction of public health facilities, of which qualities are very sophisticated. Thus, their experience and construction technology are judged reliable to be utilised to the Project.

However, because company stabilities and technical skills of local contractors are diversified, it will be necessary to screen their capabilities by examining their financial stability, experience, etc. in selecting local sub-contractors.

9) Grade of Facilities

The grade of machinery equipment and finishing materials should be determined on the basis of other existing community health centres, and the standard of health facilities in South Africa. The centralised air-conditioning system and hot water supply system, which requires high-level maintenance and

management capabilities and high operation costs, are not considered to this Project. For the selection of building materials, priority should be given to durable and locally common materials in terms of reducing the maintenance and management cost.

10) Maintenance and Management

The New CHC will be supported by the referral hospital and DHO of DC28 for facility management. As qualified engineers may not be assigned to the New CHC, attention should be paid to the selection of machinery equipment and materials in terms of required technical skills for operation and maintenance. With respect to routine maintenance, utmost emphasis is to be placed on simple specifications and ease of procurement of consumable parts for the reduction of maintenance and management costs.

11) Construction Schedule

It must be considered in the construction scheduling that in South Africa the construction industry is under vacation from December 15 to January 10. During this period, no progress will be expected in any construction work in principle. Since the climate condition around the Project site is fairly mild, it is not necessary to consider seasonal variations in the progress of construction except for the rainy season between October and March. To avoid negative effect of heavy rainfall, neither earthwork nor roofing work should be carried out during this period.

2-2-2 Basic Plan

2-2-2-1 Equipment Plan

(1) Overall Plan

In principle, the Project site must belong to the KZN Department of Health, the operation budget must be secured, the staff must be stationed and presently functioning and must cover certain catchment area.

At the request stage, the facilities which offers secondary health service had contained two regional hospitals and five district hospitals. Then St.Mary's Kwamagwaza district hospital was added to one of the Project sites, which had been transferred form missionary hospital to the control of KZN Department of

Health on November 2000. After the site survey, 44 clinics were included in the Project sites except one that is not functioning. The DHO was also included in the Project site since it carries out not only management of health facilities of DC28 but maintenance management of equipment and health educational activities

The Project sites covered by the Requested Japanese Assistance are as follows,

1) Regional Hospitals (2 sites)

Ngwelezana hospital, Empangeni hospital

2) District Hospital (6 sites)

Ekombe hospital, Mbongolwane hospital, Catherine booth hospital, Eshowe hospital, Nkandla hospital, St. Mary's Kwamawaza hospital

3) Clinic (44 sites)

Mabhuqwini, Malunga, Manyane, Mfongosi, Mthungwini, Xulu, King-Dinuzulu, Nkwalini, Mathungela, Ngudwini, Ntumeni, Osungulweni, Samungu, Nxamalala, Chwezi, Esibhudeni, Ewangu, Halambu, Mandaba, Ndabaningi, Nongamlane, Thaleneni, Vumanhlamvu, Ensingweni, Mvutshini, Khandisa, Ngwelezane, Ntuze, Phaphamani, Thokozani, Luwamba, Nomponjwana, Ntambanana, Ndlangubo, Kwayangue, Ndundulu, Ekuphumuleni, Dondotha, Sokhlu, Kwambonambi(Mbonambi), Kwambonambi(Sappi), Nhlabane, Cinci, Ocilwane

4) District Health Office (1 site)

5) Nseleni Community Health Centre (1 site)

(2) Equipment Analysis

Based on the Section "2-2-1 Design Policy", validity and necessity of the requested equipment were examined in detail after due consideration of function, role, technical, financial and maintenance ability of each facility. Analysis on each equipment is shown in Appendices 7 "Examination of the Requested Equipment".

The following equipment are examined individually.

- Color doppler ultrasound / Ultrasound (B/W)

Both main unit and transducer have become too old and caused many troubles in screening images.

Number of ultrasound diagnosis per year is as follows.

Ngwelezana hospital	:	4,173 patients/year
Catherine booth hospital	:	1,122 patients/year
Nkandla hospital	:	1,093 patients/year

Color doppler ultrasound apparatus, designed to examine blood flow, is important for screening of cardiovascular disease or infant's craniovascular disease. Requested by Radiology department of Ngwelezana hospital, Nkandla hospital, Empangeni hospital and NICU department of Empangeni hospital, the apparatus shall be made available by both Radiology and NICU department of Empangeni hospital. Transducers necessary for general organs, circulatory organs, obstetrics and gynecology and pediatric examination shall be selected. The unit requested by Nkandla hospital is rejected as there are no specialists of color doppler operation in that hospital.

The components of this equipment shall be modified according to the activities of Empangeni and Ngwelezana hospital. Aside from the basic probes, a transrectal probe shall be added to the unit of Ngwelezana's which examines more cases of internal diseases while a transvaginal probe shall be planned for Empangeni hospital which specializes in obstetrics and gynaecology.

Ultrasound apparatus (B/W) is indispensable for fetus monitoring and minimum number of the apparatus for each facility shall be renewed. The components of probe shall be based on obstetric and gynaecological examination.

- Ventilator (ICU)

The ICU departments of the 2 regional hospitals are equipped with ventilator. The 2 hospitals requested the same manufacture and same type as the existing ventilator (Newport/USA), which can be used for both neonatal and adult. They insisted that it was because the hospital nurses were well used to the existing apparatus and because even after reshuffling of staff they could be operated without any trouble. They also insisted that if a different type of ventilator was installed in the same facility, it would cause serious problems that might influence patients life. When the Study Team explained that it was against the procurement principle of the Japan's Grant Aid scheme to specify the type and manufacture of equipment, they said that if it was impossible to procure the ventilator that they specify, they would buy one by themselves. Therefore, the ventilator shall be excluded from the Project.

- Endoscopy system

Ngwelezana hospital requests electron endoscopy system. Currently they have fiber optic endoscope (upper gastrointestinal, bronchial and recto scope). It can be said that electron endoscopy system has just begun to spread and not common in a regional hospital. Therefore, it shall be excluded from the Project.

- Anaesthetic apparatus with ventilator, Anaesthetic apparatus with ventilator, spirometry function

Each facility has 8 to 10 year-old anaesthesia related equipment but many of them are out of order.

Table 2-7 shows the contents of operation and anesthesia performed by each facility. Except intrathecal anesthesia and local anesthesia, operations under general anesthesia exceed 60 minuets. In district hospitals, they are cesarean operation, bone fracture, celectomy and no operation takes more than 120 minuets. In regional hospitals, since operation for craniocerebral trauma, cardiovascular disease, complex fracture are performed, they need more sophisticated anesthesia machine. In this Project, appropriate level of anesthesia machine shall be selected after the present situation of operation being considered. Requested ventilator and anesthesia machine shall be regarded as one item and thus 2 items, Anaesthetic apparatus with ventilator, Anaesthetic apparatus with ventilator, spirometry function shall be included in the Project.

Table 2-7 Contents of operation and anesthesia

Duration	Contents of operation	Contents of anesthesia
-30 min.	Minor operation, abortion	Local anesthesia
31 – 60	Minor operation, cesarean operation, laparotomy, simple fracture	Local or general anesthesia
61 – 90	Laparotomy, simple fracture	General anesthesia
91 – 120	Lparotomy, thoracic, simple fracture	General anesthesia
121 – 180	Skull, cardiovascular disease, complex fracture	General anesthesia

- Argon laser photocoagulater, phako emulsification unit, other ophthalmology equipment

In DC28 there are many ophthalmology patients, 8700 outpatients/year and 735 operations/year (Ngwelezana hospital annual report), most of which are diabetic retinopathy, glaucoma and cataract. Yet only Ngwelezana hospital can perform ophthalmologic examination. It may be meaningful to include in the Project these ophthalmologic equipment since most of the operations are cataract and since there are many diabetic retinopathy patients in DC28.

- Automatic film processor

Number of X-ray film processed in Ngwelezana and Empangeni hospitals are as follows. Each facility has one film processer (Ngwelezana has 2 but 1 of them is out of order).

Ngwelezana hospital : 1,807 / yea / patient ÷ 260 days ≒ 320 / day

Empangeni hospital : 17,705 / year / patient ÷ 260 days ≒ 140 / day

The processors in both hospitals can process 1 film for 90 seconds (200 films/hour), dark/light room type. Since they are more than 8 years old and consumables and spare parts have become difficult to procure,

they need to be renewed soon. However, considering their present activities, the specifications of the existing processors are more than they actually need. Thus table-top type processor shall be planned.

- Blood gas analyzer, Blood gas monitor cassette type

Reagent costs of blood gas analyzer, indispensable in an operation room, are very high and, from a viewpoint of cost-effectiveness, there need to be as many samples as possible for this 24-hour operating equipment. So it is appropriate to procure one in Ngwelezana hospital. Blood gas monitor, on the other hand, can not process so many samples but does not cost so much. It also measure and calculate Na, K, CL as well as pH, pCO2 and pO2, which make it more suitable for ICU department in district hospital. The number of equipment procured shall be readjusted on condition that they shall be procured in operation department and shall be made available by other departments.

- C-arm image intensifier

There are many fracture patients caused by accident in Ngwelezana hospital; 2311 orthopedic surgeries (1576 open surgeries) and 364 general surgeries. C-arm image intensifier is useful in surgical operation or fluoroscopy diagnosis in fracture operation. Considering the activities of the hospital, it is appropriate to procure this equipment in Ngwelezana hospital.

- Defibrillator

Defibrillator is used in ICU, OPD, emergency, delivery department in all of the facilities and the number is enough for their present activities. Most of them are various European products, and they are more than 10 years old. Since it has become difficult to repair them or find spare parts, they shall be renewed by the Project.

Defibrillator is a basic emergency medical equipment designed to electrically remove fibrillation in patient's heart. External paddle is used for OPD, emergency, delivery and ICU department while internal paddle shall be included for operation. Since it is portable, one defibrillator per department shall be procured in principle.

- X-ray unit general, Portable X-ray unit, Mammography

Portable X-ray unit is used for the patients who can not move to the Radiology room and it is a basic equipment for the hospital with Orthopaedic department. In general there are many orthopaedic patients in DC28. All of the existing units in Ngwelezana, Empangeni, Mbongolwane and Nkandle hospital that request Portable X-ray unit are out of order and have become too old to repair so renewal of the equipment shall be rational.

X-ray unit is a basic medical equipment used for chest and extremities X-ray diagnosis. All of the existing equipment in Empangeni, Eshowe, Nkandla and St.Mary are 10 to 15 years old and procurement of spare

parts has become difficult. So renewal of the equipment is necessary. The equipment is also necessary for the New CHC. In accordance with the activities of each facility, Eshoew and Nkandla hospital shall be supplied with the ceiling type X-ray unit with height adjustable bucky table while Empangeni, St. Mary and the New CHC shall be provided with the floor-mounted type with height fixed bucky table.

Mammography is a radiology equipment indispensable for breast cancer diagnosis along with ultra sound apparatus. However, since it is categorized as a new equipment and there are other equipment with higher priority, it is excluded from the Project.

-Equipment for health education and promotion activities

Each facility only distribute a brochure or pamphlet published by the Ministry of Health or the KZN Health Department to the people and it has not been much effective. The problem is that the people do not have much confidence in the present health services and that they are not ready to accept educational activities by hospital. The requested equipment for health education and promotion activities and vehicle will be useful in changing the situation and enhancing the people's awareness towards health. During the Explanation of Draft Report, it was confirmed that the activity would be performed the 8 staff, 2 teams consisting of 4 persons (1 primary health care, 1 infection prevention and 2 social workers) and that production of one story and the promotion activity would be done simultaneously. Therefore, 2 units shall be necessary.

-Autoclave, large

It became clear during the Explanation of Draft Report that both Ngwelezana and Eshowe hospital have a procurement plan of large autoclave, this equipment shall be excluded from the Project.

-Autoclave, small

There is a reorganisation program of DC28 which aims at separation and independence of clinic from hospital. At present, however, each clinic shares autoclave with its higher ranked hospital. As a prevention of infectious disease it is also useful for sterilisation of stainless steel instruments that can not be done by boiling steriliser. In this Project, the clinics that have power supply shall be supplied with this equipment.

-Laminar safety cabinet, Microscope and Centrifuge

Laminar safety cabinet, microscope and centrifuge requested by the New CHC shall be excluded from the Project since it became clear during the Explanation of Draft Report that they already have a procurement plan of this equipment.

-Vacuum extractor

Of 31 clinics, 12 clinics where well experienced nurses are stationed shall be supplied with vacuum extractor.

-Computer with printer

Computer with printer requested by DHO shall be excluded from the Project since it became clear that the NDOH is now preparing for the tender of computer and software designed for database of equipment management by CMTD.

-Haemoglobin meter

The request for haemoglobin meter is considered appropriate since examination by haemoglobin meter is important for pregnant women that suffer from anaemia. Many clinics have handy type of haemoglobin meter.

-Glucose meter

The request for glucose meter is considered appropriate since it is indispensable for prevention and early detection of diabetes. It is especially useful in DC28 where there are many diabetes patients. It is also important for prevention of pregnancy toxemia in clinic.

-Blood pressure monitor

The clinics with more than 10,000 outpatients per year shall be supplied with blood pressure monitor. It is effective for reduction in working hour of nurses.

2-2-2-2 Construction Plan

(1) General Scheme of the New CHC

The New CHC in Nseleni Township, one of the highest density population areas in DC28, provides primary health care services to the catchments area of eight clinics in northeastern part of DC28 and improve referral system with the support of Ngwelezane hospital as a referral hospital.

Total population of these catchments areas is over 150,000 with more than 200,000 outpatients per year in the clinics. The existing Nseleni clinic will be utilized as an orphanage to accommodate rapidly increasing orphans resulting from HIV epidemics within this area after establishment of the New CHC. Therefore, demanding number of outpatients of the New CHC for facility planning is expected to be the same as those in the existing Nseleni clinic.

The followings show the catchments area of the New CHC, and the locations and activities of the existing clinics.

Figure 2-3 Location and Catchment Areas of the New CHC

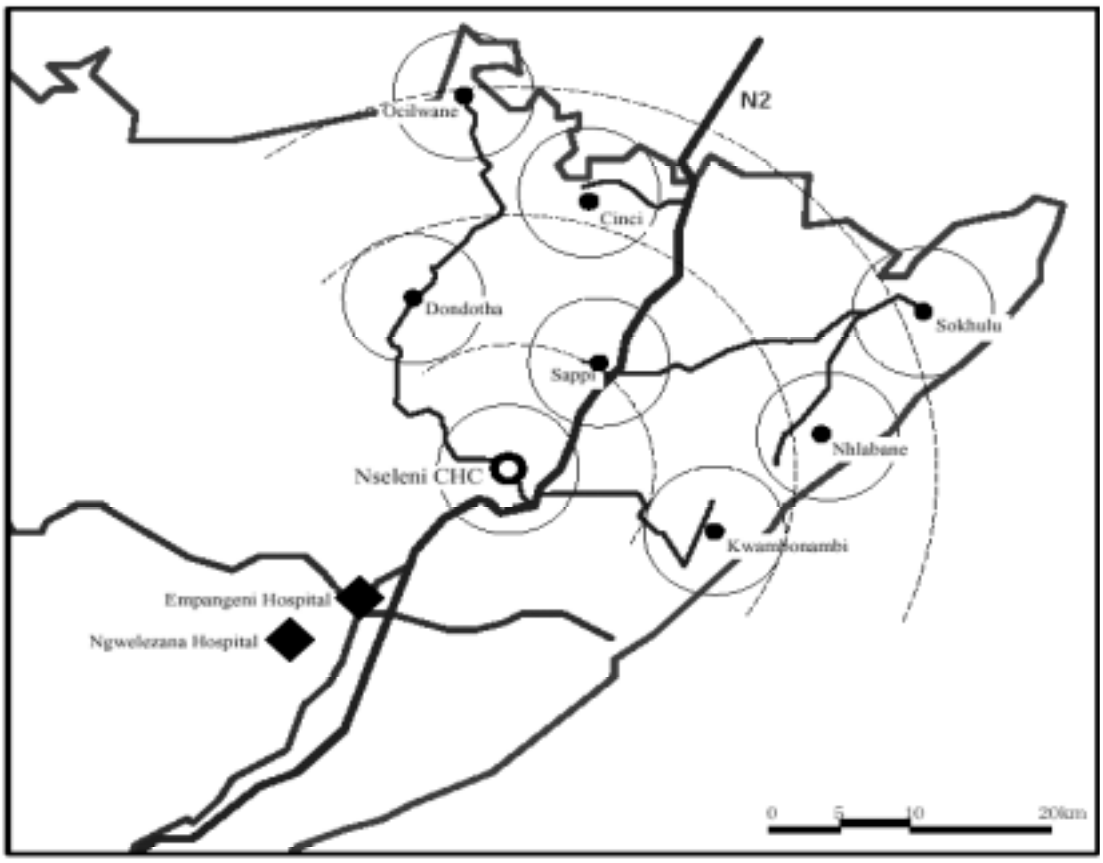


Table 2-8 Population of Clinics in the New CHC Catchment Area

Clinics			Coverage population	No. of outpatients	No. of patients referred to hospitals	No. of deliveries
Total of 45 clinics in DC28 area		Annual sum.	703,531	904,606	16,435	1,454
		Average (A)	15,634	20,102	444	33
Existing Nseleni Clinic		Annual sum. (B)	60,221	95,953	2,262	277
		Ratio to total average of DC28 (B/A)	385%	477%	509%	839%
Annual record of clinics in Nseleni CHC catchment area	Cinci		11,082	13,572	189	0
	Dondotha		35,989	32,597	263	186
	Kwambonambi (Sappi)		2,000	8,094	280	0
	Kwambonambi (Umbonambi)		12,134	35,626	537	127
	Nhlabane		9,650	4,321	146	0
	Ocilwane		5,210	14,473	248	5
	Sokhulu		12,848	3,360	26	0
	Total of the above 7 clinics		88,913	112,043	1,689	318

Source : Questionnaire

(2) Site Plan

1) Access to the Facilities

As there is a wide space between the Project site and the public road, the approach to the Project site is to be located on the north-western side of the Project site, which is easier to be connected to the front road and closer to the center of the town. This will avoid the connection work between the Project site and the public road from becoming excessively large in scale. In the building layout plan, special attention should be paid to the visibility to the entrance from the approach.

2) Shape of the Project Site

The Project site slopes from west to east. In the building layout plan, special care should be taken to retain the natural features of the Project site as much as possible. The facility lies parallel to the contour lines and the floor level adjusts to the ground level of the Project site.

3) Connection to the Infrastructure

Since the connection points to the infrastructure service lines are concentrated in the north-western side of the Project site, the machinery facilities to be connected to service line is also to be located on the north-western side of the Project site.

(3) Architectural Plan

1) Concept of the Layout Plan

The authority regulations applicable to the Project site include no restrictions on the number of stories or the building height. However, a multi story building needs a long slope or elevator, which might be not effectively applied to the Project because of total floor space and operation cost. Accordingly, the new facility will be planned in a single-story.

In case the new facility is separated into number of buildings to adapt the restrictions of the sloped ground level, the land development work will entail high construction cost. Therefore, in this Project, all the facilities and their respective functions are to be integrated into a single building. Specifically, the medical services facilities will take up a large space in the centre of the building, and the

service/management area shall be connected to it. This enables to position the building in the centre of the site where the slope is gentle, and leave the sever slope which runs across from east to west to reduce the amount of retaining walls and land development.

Since the maximum floor space is restricted by the shape of Project site and local regulations, the building is planned in a rectangular shape with a courtyard in the middle, which maximizes effective use of floor area. To reduce circulation areas, central corridors will be designed. Moreover, to make maximum use of the facility, similar function rooms should be integrated into one room.

2) Concept of Facility Configuration

The basic concept of facility planning diagram is as below.

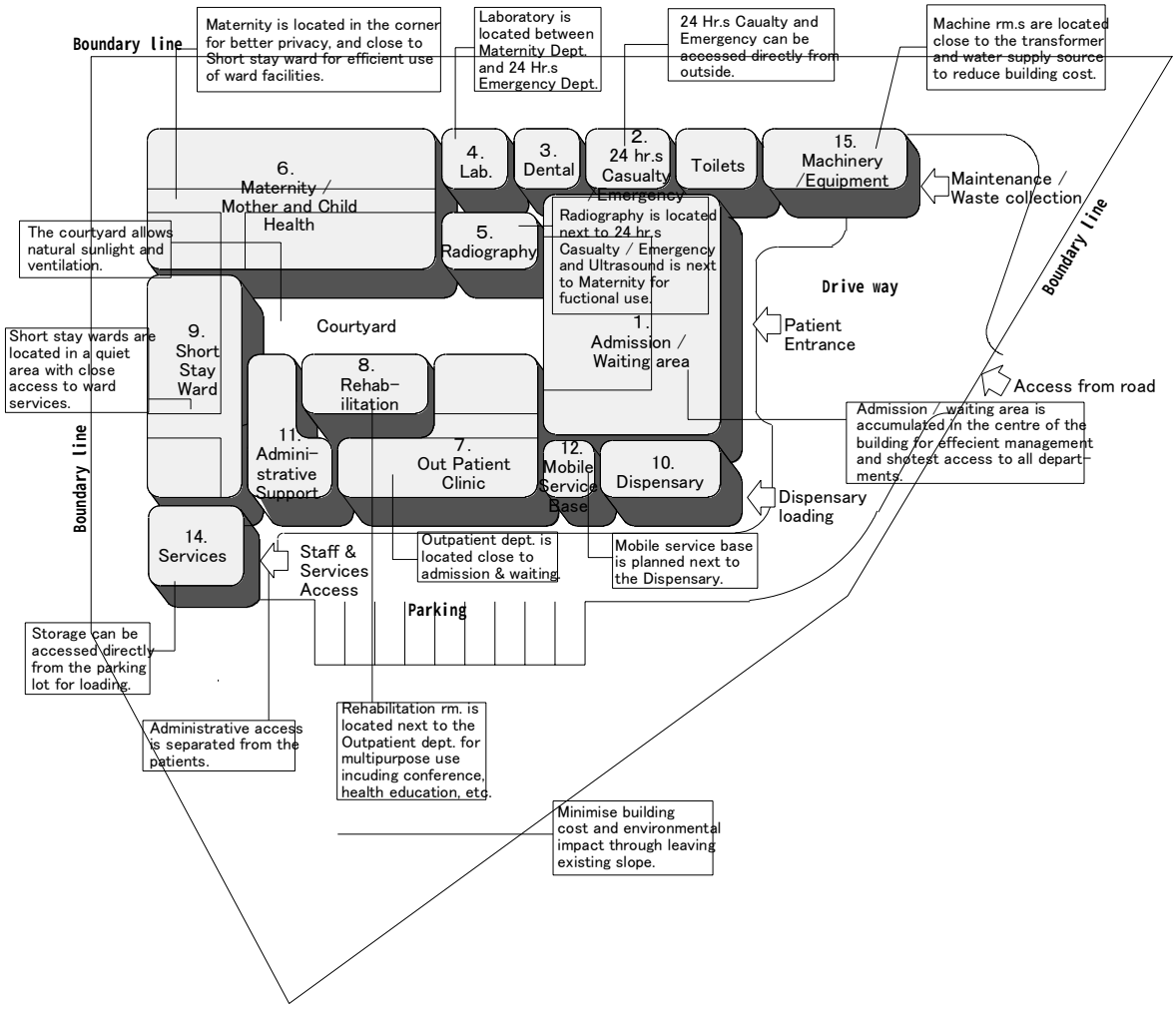


Figure 2-4 The Basic Concept of Facility Planning Diagram

The New CHC will not be fully equipped with the following service facilities, which can be provided by the referral hospital or outsourcing in consideration of the operating cost and the personnel.

- Cleaning equipment: As linen cleaning service will be provided by the referral hospital, the New CHC should include a temporary storage room for dirty linen and a pre-washing room.
-Steriliser: As sterilisation service will be provided by the referral hospital, a small room for temporarily storage for medical instruments should be included in the New CHC.
-Medical waste disposal: Medical waste will be disposed of by a waste disposal service after collected and transported to the referral hospital.
-Meals: As the New CHC will accommodate only short stay wards and located close to the town, inpatients' meals can be outsourced. A small kitchenette, instead of a full-scale kitchen, should be located adjacent to the wards.
-Mortuary: Mortuary services can be outsourced from private companies in this area.

3) Room Layout Planning

From the above assessment, necessary number of rooms and the floor area of each room, are as shown below.

Table 2-9 Required Number of Rooms of Each Department

Department	Room name	Planned Area (㎡)	Planned Facility	
			Standard area	Remarks / Planned Layout
Admission / Waiting	Reception	17.8	33.6	Includes Emergency control panel and switchboard
	Office	33.3	41.8	Telephone connected to switchboard to be located in the Office / Reception.
	MDF・PBX room	5.1		
	Stationary Store /Safe	5.1	14.1	For office equipment, stationary, and Safe.
	Records room	15.6	15.7	With records shelves
	Toilets (Female)	18.8	18.9	Closet: 4, Basin: 4, Baby change counter
	Toilets (Male)	18.4	18.9	Closet: 2, Urinal: 2, Basin: 2, Baby change counter
	Toilets (Disabled)	3.5	3.6	Closet: 1, Basin: 1, Hand rail
	Toilets (Staff/urine collection)	7.5	5.9	Closet: 2, Basin: 3, Pass box
24 Hr.s Casualty / Emergency	Resuscitation / Rehydration	34.5	36.2	Divided into 4 areas: Resuscitation, Rehydration, Treatment and Dressing
	Equipment Store-1	10.4	9.5～17	Common use for all departments. Store for consumable medical parts, common equipment, etc.
Dentistry	Dental Treatment	14.5	12.2	With Dental chair.
	Dental Store	6.3	9.75	Used for both equipment store and working area. Includes worktop with sink.
	Dental Records	5.3	12.2	Used for dentist's office and store for dental records with shelves.
Laboratory	Laboratory	15.5	27.0	With worktop and dirty sink for disposal of urine samples.

Department	Room name	Planned Area (㎡)	Planned Facility	
			Standard area	Remarks / Planned Layout
Radiology	Ultrasound	13.8	14.4	
	X-ray	19.3	19.3	
	Dark room	8.3	16.6	
	Film store / view	6.9		
Maternity / Mother and Child Health	Consultation (Mother & Child room)	13.8	14.0	Consultation for Mother & Child Health, pregnancy, and babies.
	Crisis Centre	18.4	14.0	Consultation / treatment for woman's crisis cases. The space is large compared to other consultation rooms for its multi-purpose use.
	Premature Baby	4.3	9.4	Room for 2 incubators.
	Duty room	13.0	14.4	Room for reception and nurse's office /resting room / change room.
	Anti Natal Ward	31.5	29.0	Ward with 4 beds.
	Delivery room-1	15.7	16.0	2 beds are planned due to the standard. Approx. 1 delivery per day is expected.
	Delivery room-2	16.0	16.0	
	Preparation room	12.9	—	Includes toilet and shower.
	Post Natal Ward	31.7	29.0	Ward with 4 beds.
	Baby Resuscitation / Rehydration	12.4	13.2	
	Clean Utility	10.5	14.4	Store for clean utility.
	Dirty Utility	9.50	14.4	Used as both dirty utility store and sluice.
Out Patient Clinic	Duty room	10.7	14.4	
	Consultation-1 (M.D.)	18.1	14.0	Common use of general and tuberculosis consultation. Total of 7 consultation rooms are planned within the facility for common use including consultation for Maternity and Crisis centre.
	Consultation-2 (Nurse.)	14.0	14.0	
	Consultation-3 (Nurse.)	14.0	14.0	
	Consultation-4 (Nurse.)	14.0	14.0	
	Consultation-5 (Nurse.)	14.0	14.0	
	Equipment Store-2	5.9	3.3	Store for equipment and linen.
	Routine Treatment	35.5	34.8	3 booths with worktop and sink.
	Sluice	6.2	13.5	
Rehabilitation	Rehabilitation / Health Education / Meeting room	36.8	44.6	Multi purpose use including Rehabilitation, Health Education, Meeting room, for efficient use of the facility.
	Store	6.2	7.2	For furniture, rehabilitation equipment and others.
Short Stay Ward (48 Hr.s)	Ward (Male)	31.7	29.0	
	Ward (Female)	31.7	29.0	
	Patients ablution (Male)	13.2	13.5	Common use with Maternity Wardst.
	Patients ablution (Female)	13.2	13.5	
	Kitchenette	8.5	9.6	Include the use of milk kitchen for new born babies.
	Clean Linen Store	6.1	10.8	Common use with Maternity wards.
Dispensary	Reception	12.4	27.1	The standard includes a large ward supply area which is not necessary in this case.
	Dispensary Store	26.5	48.2	The standard includes storage space for jurisdictional clinics which is not necessary in this case.
Administrative Support	Chief Administrator	14.2	14.0	Office for the chief administrator.
	Medical Superintendent	20.2	14.0 × 2	Office for 2 to 3 medical superintendents.
	Staff room	20.2	60.0	With a kitchenette and lockers.
Mobile Service	Mobile Team	15.0	15.0	Office / resting room for 3 people.
Maintenance	Maintenance workshop/Store	11.6	-	

Department	Room name	Planned Area (㎡)	Planned Facility	
			Standard area	Remarks / Planned Layout
Services	CSSD Store	9.7	28.4	Store for used medical instruments to be sent to the CSSD in the referral hospital.
	Dirty Linen Store	11.4	10.4	Store for used Linen to be sent to the Laundry in the referral hospital. Includes linen shelves.
	Washing room	11.5	10.4	For pre-washing of linen, etc.
	Bulk Store, Loading space	15.3	54.0	Total area of store is 42.9 ㎡ when the above store and maintenance are added.
	Garbage, Medical Waste Store	21.1	(effective dimension) 6X2.5m	Medical waste and general garbage are stored in separate rooms.
Machinery / Equipment	Electrical sub station	7.3	-	Floor area is calculated according to the layout of machinery equipment.
	Medical gas room	11.6	-	
Others	Corridor. Waiting areas	494.7	-	No. of seats for waiting are planned for approx. 30% of total outpatient population.
Total floor area		1.441.1	The Standard layout of CSIR is approx. 2,840 ㎡	

On the basis of the number of outpatients record of the existing Nseleni Clinic, the number of outpatients who will visit the New CHC during ordinary consultation hours on weekdays is estimated at approx. 360. According to statistic data for last year, average consultation time per outpatient is approx. 10 minutes. Each consultation room's daily capacity is therefore approx. 54 (on the assumption that average daily consultation hours are 9 hours). Then a total of 7 consultation rooms (360÷ 54 = 6.7) are required. In consideration of the effective use of the facilities, the consultation rooms can be utilized as a crisis centre or counseling rooms.

4) Section Plan

In the cross-sectional plan, consideration should be given to natural ventilation, natural lighting, and protection against direct sunshine and rainwater into the building. As for the New CHC, the eaves will be at a moderate height and projected out with a certain depth to avoid direct sunlight onto the window. In order to minimize the effect of heat gain on the roofs, the roof should be well insulated and the attic should be well ventilated.

(4) Structural Plan

1) Foundation

According to the geological survey conducted in April 2001, the geology of the Project site has been found that geological property is diversified among some points and depth. As a whole, the geologic strata of the Project site consist of sandy soil from the earth's surface up to a depth of approx. 0.5 meters, and a soft clay sandy soil below the dept of approx. 0.5 meters up to approx. 3 meters deep. A solid layer with an N value of about 50 was appeared at the depth of about 5 meters. Since the planned building will be a single-story building, it is appropriate to adopt pad footing at the depth of about 1.8 meters as

the supporting layer. The bearing capacity of the layer is expected to be over 7.3kN/m2.

2) Superstructure

In South Africa, a typical superstructure of low-rise building is brick masonry wall. In the area around the Project site, the most common superstructure is cavity brick masonry wall for effective waterproofing and heat insulation in particular. The roof trusses are usually fixed to concrete lintels above the brick walls, or fixed directly onto the tops of brick walls. As for this Project, concrete girders and columns are designed to be constructed prior to the brick masonry works. The roof trusses can then be installed onto the concrete girders prior to brick masonry work. This method enables to start the roofing work without waiting for completion of the brick masonry works, and to continue the brick works and the interior finishing work during rain seasons, which ensures control of the construction schedule. Furthermore, it will be possible to prevent the damaging or staining of the face bricks walls caused by concrete casting.

3) Roof Structure

In consideration of construction cost and erosion, the structure of the roof frame that support the roofing materials should be wooden truss, which is widely used in the construction of public medical facilities in South Africa.

4) Structural Design Load

The value of structural live load is to be determined as follows in accordance with "SABS 0160-1989 The general procedures and loadings to be adopted in the design of buildings."

Table 2-10 Live loads for Structural Design

Rooms	Live Load（kN/㎡）	Intensive Load
Consultation, Treatment, Office	2.5	9.0kN per 0.75m × 0.75m
X-ray, Rehabilitation room	2.0	5.0kN per 0.1m × 0.1m
Ward	1.5	1.5kN per 0.1m × 0.1m
Store	5.0	5.0kN per 0.1m × 0.1m
Toilet, Kitchenette	3.0	5.0kN per 0.1m × 0.1m
Entrance hall, Corridor	3.0	3.0kN per 0.1m × 0.1m

5) Reinforced Concrete

The value of strength of concrete is to be determined in accordance with "SABS 0100-1:1992 The structural use of concrete Part 1: Design." The details of the standard are identical with those of "BS 8110: Structural use of concrete Part 1: Code of practice for design and construction." Thus this standard is sufficient to be applied to this Project.

With respect to reinforcing bars, in South Africa, high-tension steel with a tensile strength of 450Mpa is used widely for main reinforcement and soft steel with a tensile strength of 250Mpa is used widely for other reinforcing bars. Thus the strength and quality of the locally manufactured steel is sufficient to be used as construction material.

(5) Electrical Facility Plan

1) Power Substation

A main distribution board that branches off of each main line feeder is to be installed in the electric substation. Public power supply and voltage stability to this area is reported as relatively liable and public transformer will be equipped with a voltage regulator. Therefore, voltage regulators system will not be required to the building.

2) Main Feeder

Distribution panel boards and power controls panels are to be installed where necessary, and connected the main line feeder. In principle, the main line feeder system should consist of cable trays and cables installed above ceiling.

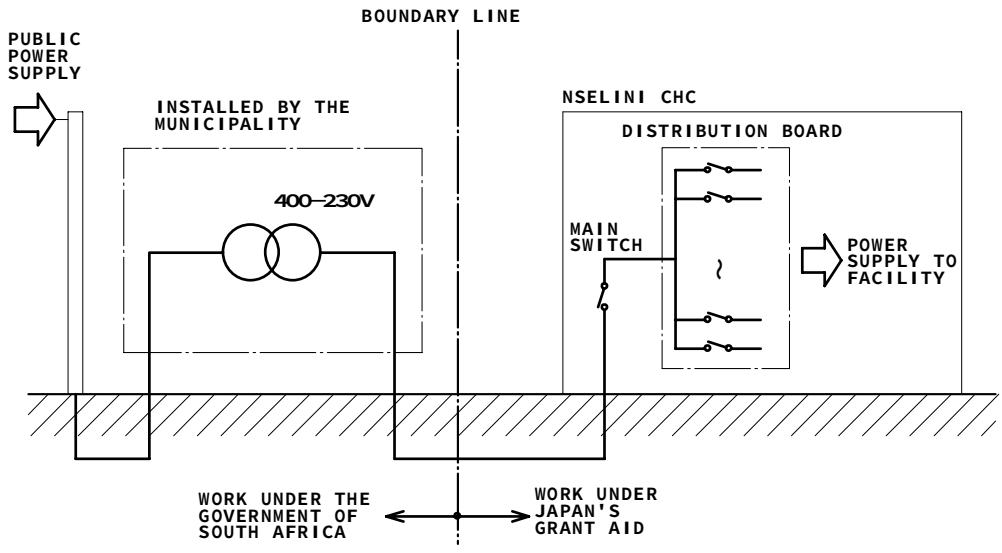


Figure 2-5 Electrical System Diagram

3) Lighting Fixtures / Socket outlets

Lighting system should be mainly designed with fluorescent lamps for durability and operation costs. In the consultation room and other medical rooms, ceiling lamps for medical use are also to be installed. The target intensity of illumination for each of the main rooms is as shown below.

Table 2-11 Target Illumination

Rooms	Illumination (lux)
Consultation, Treatment, Delivery, Dispensary	500～300
Ward, Office, X-ray	350～250
Entrance Hall, Waiting, Dispensary Store, Washing	250～100
Corridor, Machinery, General Store	150～100

Wall sockets shall comply with SABS. In principle, power skirting will be installed for maintenance and future room re-arrangement.

4) Telephone System

A MDF and a PBX (approx. 8 central office lines and 48 extensions) to form an extension network within the building should be installed in the MDF room. A specific telephone for switchboard operation will be installed in the reception office, and a multi-function telephone will be installed in the administration office. Conventional telephones should be installed in other rooms.

5) Public-Address System

The public-address system with an amplifier should be installed in the waiting area and microphones to page patients should be installed in the reception and the pharmacy.

6) Nurse Call System

The nurse call buttons shall be installed in the bedrooms, and display units shall be installed in the nurse stations.

7) Lightning Arresting System

A lightning arresting system in compliance with the local regulation shall be installed. Installation of

arrester will be considered to protect the equipment against lightning.

8) Automatic Fire Alarm System

A fire alarm system in compliance with the local regulation shall be installed. 24 hours operating receiver should be installed in the administrative office.

9) Security System

Empty cabling will be installed for future connection to the sensor that transmits to a private security service in case of emergency. These sensors will be installed in each room, and a display unit will be installed in the administrative office.

(6) Air Conditioning / Ventilation System

1) Air Conditioning System

In consideration of maintenance, operation and reduction of the running cost, split-type air conditioning unit is to be installed. Air conditioned rooms are as shown below. The indoor units will be mainly ceiling-mounted or wall-mounted units. he condenser units will be installed outside around the building and fixed by anchor bolts. The coolant plumbing will be connected to the outdoor unit above the ceilings.

Table 2-12 Air-conditioned Room

Rooms with Air-conditioning unit
Dispensary, Dispensary Store, Consultation, Treatment, Dental, Dental stre, Laboratory, X-ray, Ultrasound, Premature Baby, Baby Resuscitation / Rehydration, Crisis Centre, Consultation / Mother and Child Health, Delivery, Ward

2) Ventilation System

The ventilation system of the building will be based on natural airflow. Ventilation fans should be installed at rooms which require exhaust odor / heat / dust, and maintain a certain level of clean air. Rooms with mechanical air exhaustion only will be provided with ventilation louvers or under-cuts on

doors for natural air supply.

Ceiling fan shall be installed at the waiting room and exhaust fan shall be fixed on a wellhole at the entrance lobby to let out the heat air.

(7) Plumbing System Plan

1) Water Supply System

A service pipe should be connected to the municipal water main line laid along the road in front of the south-western side of the Project site (Ubhejane Street). Municipal water supply should be connected directly to two main water supply systems, the common water supply system and the fire extinguishing water supply system.

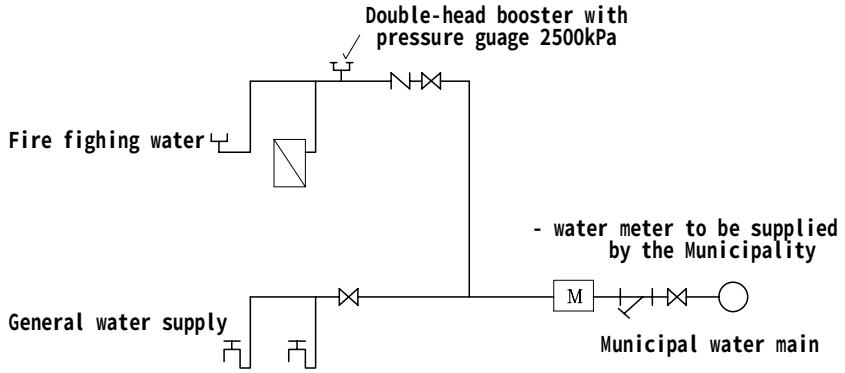


Figure 2-6 Water Supply System Diagram

Daily water consumption is estimated as follows.

Table 2-13 Calculation of Daily Water Supply

Number of people: Staff members: approx. 50 (110 L/day･person) Visitors: approx. 400 (10 L/day･person) Daily water supply = 50 x 110 +400 x 10 = 9,500 L/day (10m3/day)

2) Hot Water Supply System

Hot water should be supplied with electric geysers where necessary.

3) Waste and Vent System

Sewage and wastewater should be discharged into the public sewer pit in front of the eastern side of the Project site. Rainwater within the site should be collected and discharged into the existing storm water lines.

4) Medical Gas Equipment

Centralised medical gas supply equipment, oxygen, suction air, should be supplied to the following rooms.

Table 2-14 Medical Gas Equipment

Type of Equipment	Rooms
Oxygen	Resuscitation / Rehydration, Delivery, Ward
Suction	Resuscitation / Rehydration, Delivery, Ward, Dental treatment

5) Sanitary Fixtures

Western-style stools, urinals, washbowls and sinks will be installed. Taps for hot water supply will be planned as mixer type taps. The four-bed wards (for prenatal and postnatal women) are provided with baby bathing equipment. Sinks for urine glass washing should be installed in the dirty utility rooms.

6) Fire Fighting System

Fire fighting utilities in compliance with the National Building Regulations should be installed. Fire extinguishers, fire alarms, indoor fire hydrants, and hose reels are required for the New CHC. One fire extinguisher should be installed for each 200 m2 area. The feed water outlets for the indoor fire hydrants and the hose reels should cover a radius of 30 meters. Two hose reels will be installed outdoors.

Feed water for fire fighting should be supplied from the public water pipe laid along the front road via a double-head booster. The local regulation requires that the double-head booster should be provided with a pressure gauge capable of measuring up to 2500kPa.

(8) Materials/ of Construction Methods

Methods of construction and building materials will be decided through examination of the surrounding climatic conditions, performance, construction period, construction cost, quantity of supply, and the maintenance and management cost.

1) Exterior Finishing Materials

The following table shows the plan of main exterior finishing materials and its rationale of selection.

Table 2-15 Exterior Finishes

Part	Finish	Remarks
Roof	Colour-coated Aluminum Roof Sheeting	Most resistant for water and chloride erosion among the local roof material. Due to Its lightweight characteristics, structural cost can be reduced.
Exterior Wall	Face Brick	Highly durable and free of maintenance. Since re-painting or repair work for cracks are not necessary, maintenance cost can be reduced.
Windows	Aluminum Sash	Reliable compared to steel sash, in terms of corrosion and water resistance.

2) Interior Finishing Materials

The following table shows main interior finishing materials and its rationale for selection.

Table 2-16 Interior Finishes

Room	Floor	Wall	Ceiling	Remarks
Consultation, Treatment	Seamless vinyl sheeting	Paint on plaster screed	Mineral acoustic tiles	Hygienic and durable.
X-ray	Seamless vinyl sheeting	Anti-radiation paint on barium plaster	Anti-radiation paint on board	Specified as radiation proof room.
Laboratory, Sluice, Dispensary Store	Ceramic floor tiles	Washable paint on plaster screed	Paint on water resistant board	Chemical proof and easily cleaned.
Sluice, Toilet, Shower	Ceramic floor tiles	Ceramic wall tiles	Paint on water resistant board	Water resistant and easily cleaned.

2-2-3 Basic Design Drawing

(1) Equipment Plan

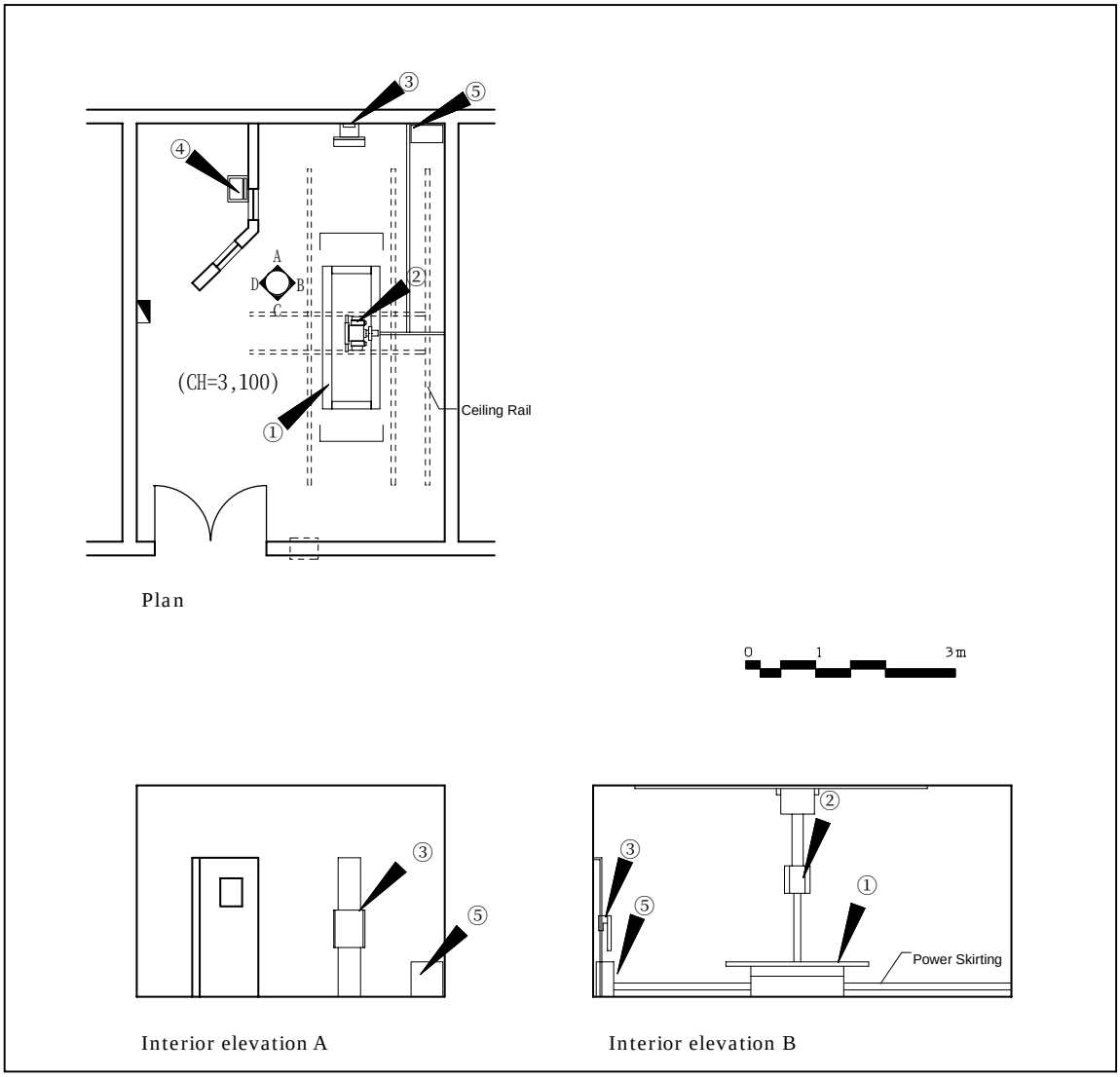
Equipment, which requires installation work, are as follows.

X-ray unit, Dental chair unit, Operating light (ceiling type), examination lamp (wall-mount type).

Equipment Installation Plan for existing facilities are shown in page 37 ~40

(2) Construction Plan

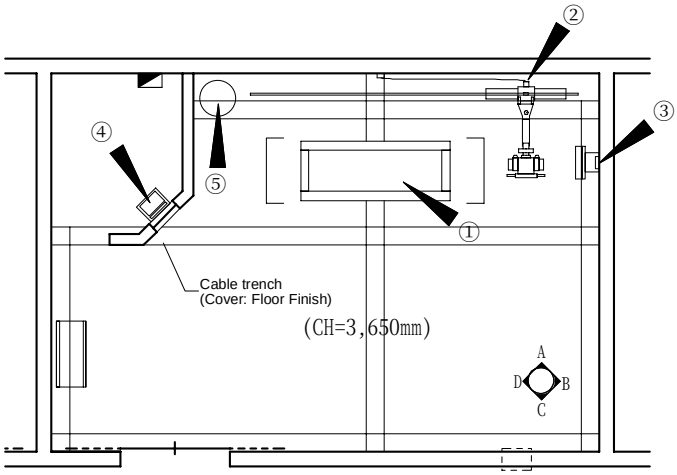
Equipment Installation Plan 1
Eshowe District Hospital



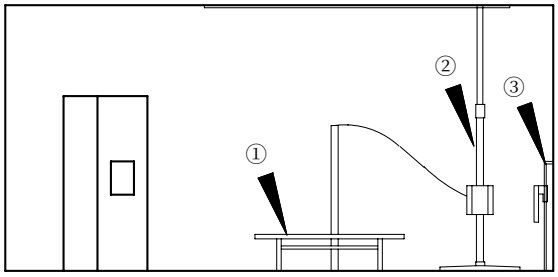
X-ray Room

① Bucky Table
② X-ray Tube Stand
③ Bucky Stand
④ X-ray Controller
⑤ X-ray Generator

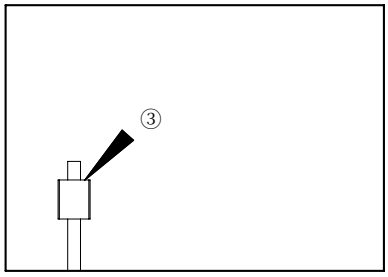
Equipment Installation Plan 2
Empangeni Regional Hospital



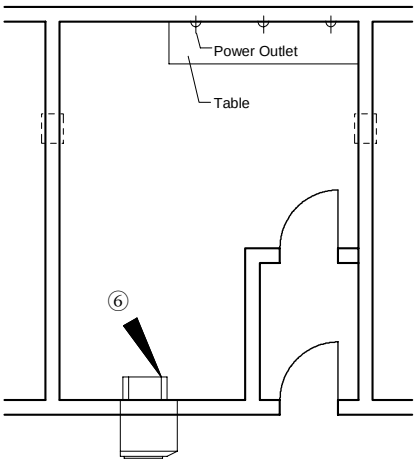
X-ray Room Plan



Interior elevation A



Interior elevation B



Dark Room Plan

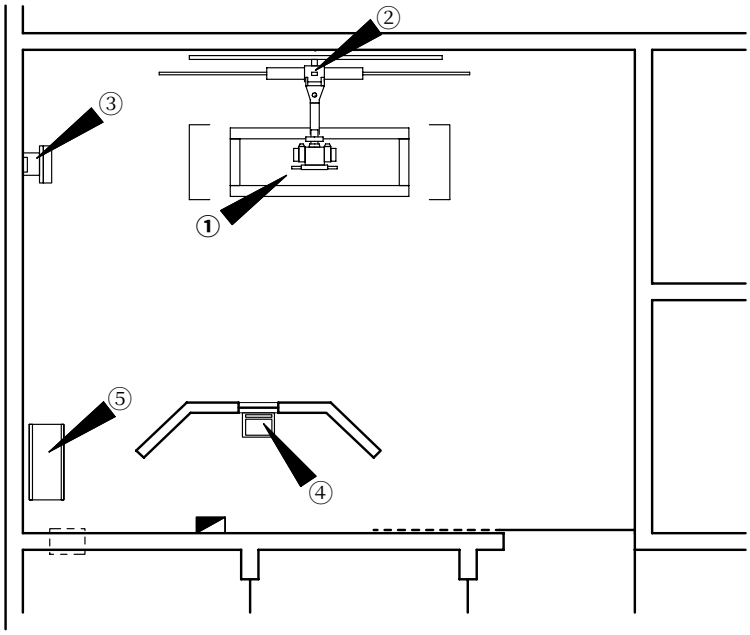
X-ray Room

① Bucky Table
② X-ray Tube Stand
③ Bucky Stand
④ X-ray Controller
⑤ X-ray Generator

Dark Room

⑥ Automatic Film Processor

Equipment Installation Plan 3
St. Mary's Kwamagwaza District Hospital

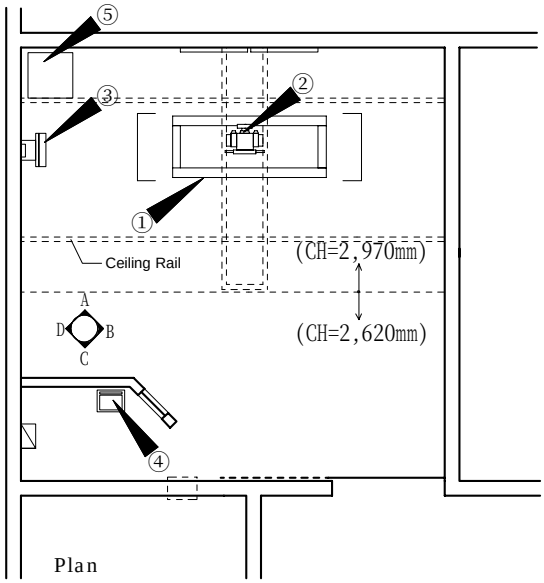


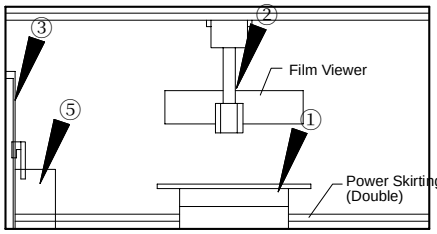
X-ray room

① Bucky table
② X-ray tube stand
③ Bucky stand
④ X-ray controller
⑤ X-ray generator

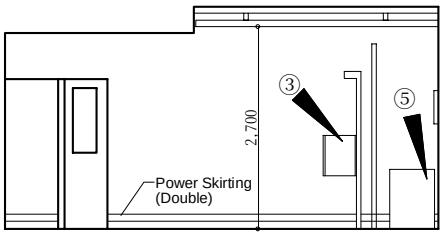
Equipment Installation Plan 4

Nkandla District Hospital





Interior elevation A



Interior elevation B

X-ray Room

① Bucky Table

② X-ray Tube Stand

③ Bucky Stand

④ X-ray Controller

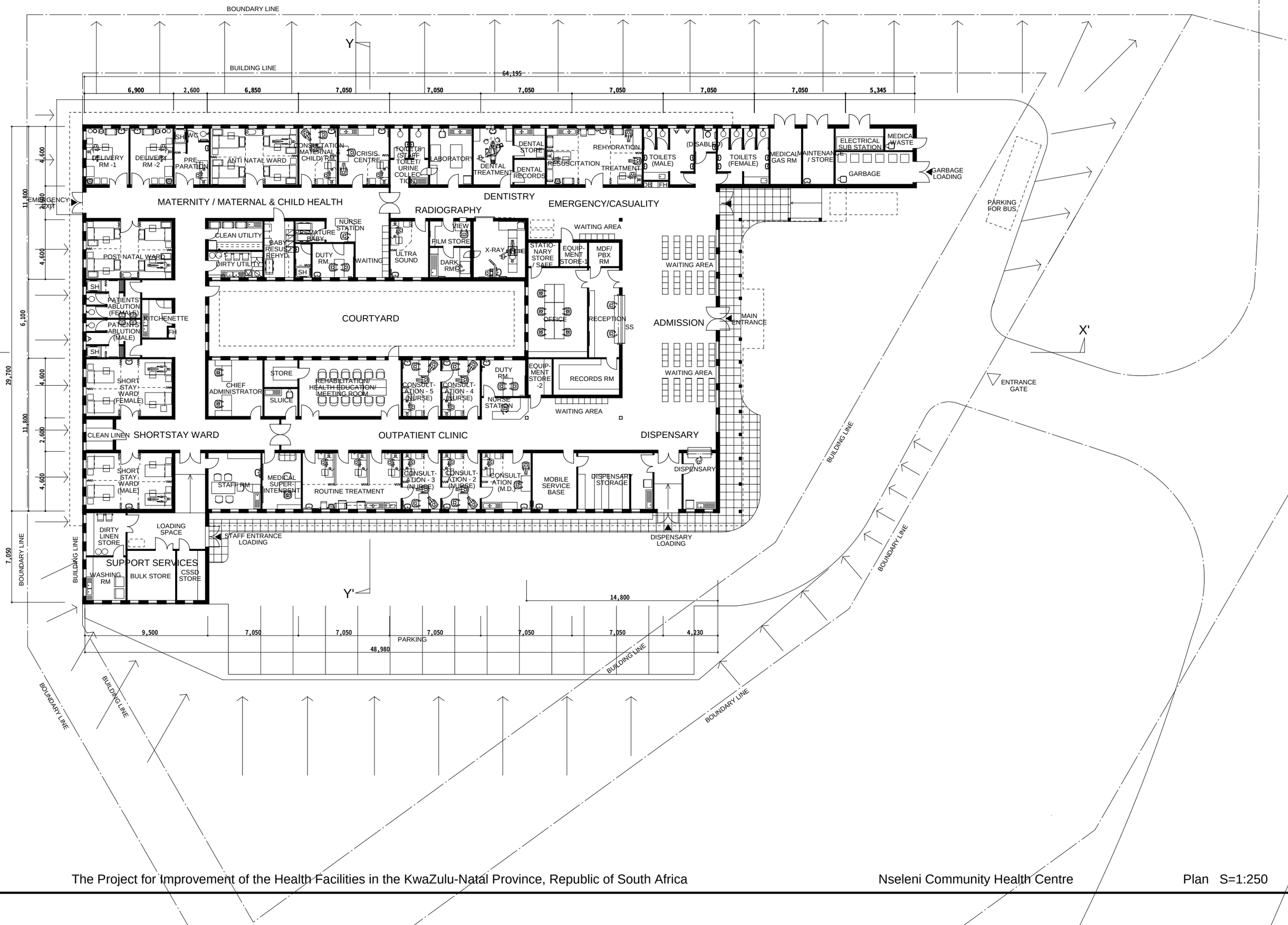
⑤ X-ray Generator

637
638
639
640
641
642
643
644
BOUNDARY LINE
EXISTING MANHOLE
GL+1
GL+2
GL+3
GL±0
CATCH BASIN
BUILDING LINE
ELECTRICAL SUB STATION
(GL+0.3M)
GARBAGE LOADING
(PARKING FOR BUS)
GL-1
EMERGENCY EXIT
SLOPE
GL-2
BOUNDARY LINE
BUILDING LINE
COURTYARD
(GL± 0M)
ENTRANCE GATE
(GL± 0M)
GL-3
SLOPE
STAFF ENTRANCE LOADING
DISPENSARY LOADING
GL-4
SLOPE
PARKING
(GL-0.8M)
SLOPE
SLOPE
GL-5
BUILDING LINE
BOUNDARY LINE
BUILDING LINE
BOUNDARY LINE
GL-6
GL-7
GL-8
GL-9
EXISTING MANHOLE
EXISTING LIGHT POLE
EXISTING GARDEN
EXISTING LIGHT POLE
EXISTING SIGN POST
ENTRANCE GATE
BUILDING LINE
BOUNDARY LINE
SLOPE
45m
44m
GL+3M
43m
GL+2M
42m
GL+1M
41m
GL±0
40m
GL-1
39m
GL-2
38m
GL-3
37m
GL-4
36m
GL-5
35m
GL-6
34m
ROAD
N

The Project for Improvement of the Health Facilities in the KwaZulu-Natal Province, Republic of South Africa

Nseleni Community Health Centre

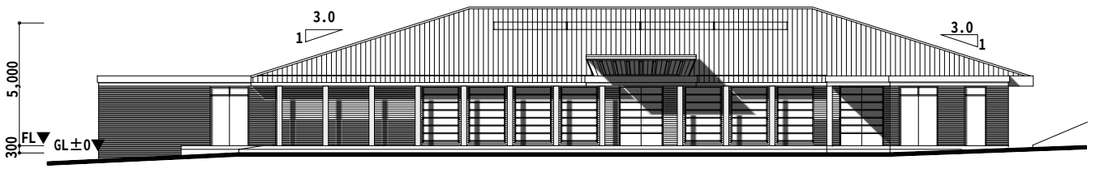
Site Plan S=1:500



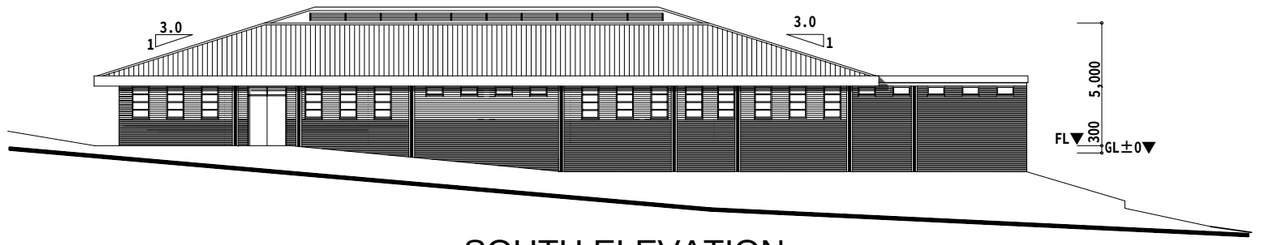
The Project for Improvement of the Health Facilities in the KwaZulu-Natal Province, Republic of South Africa

Nseleni Community Health Centre

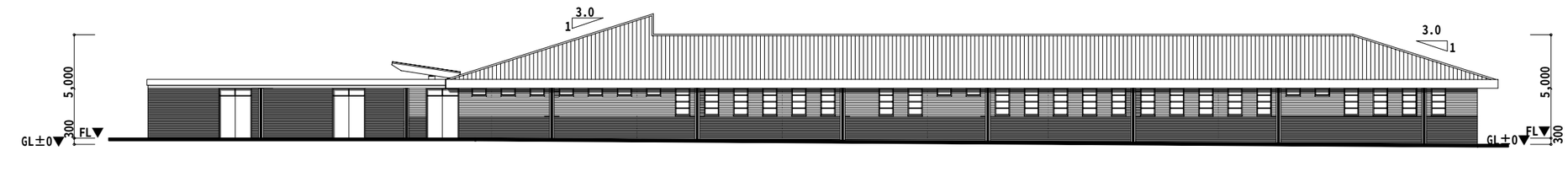
Plan S=1:250



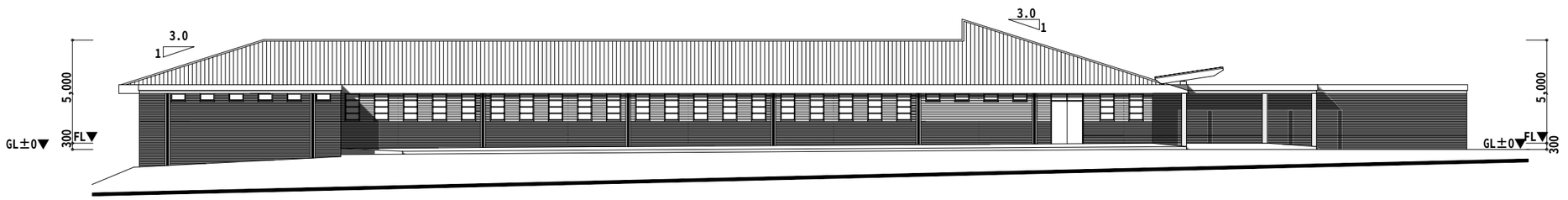
NORTH ELEVATION



SOUTH ELEVATION

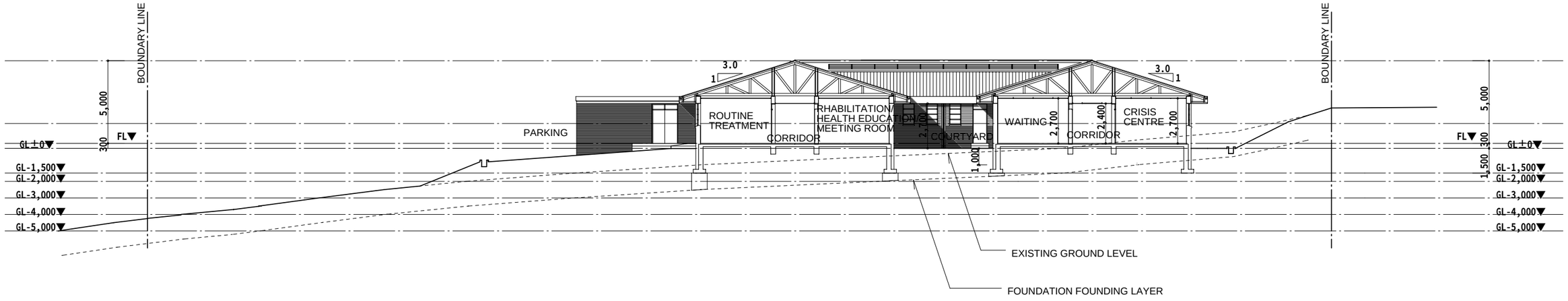


WEST ELEVATION

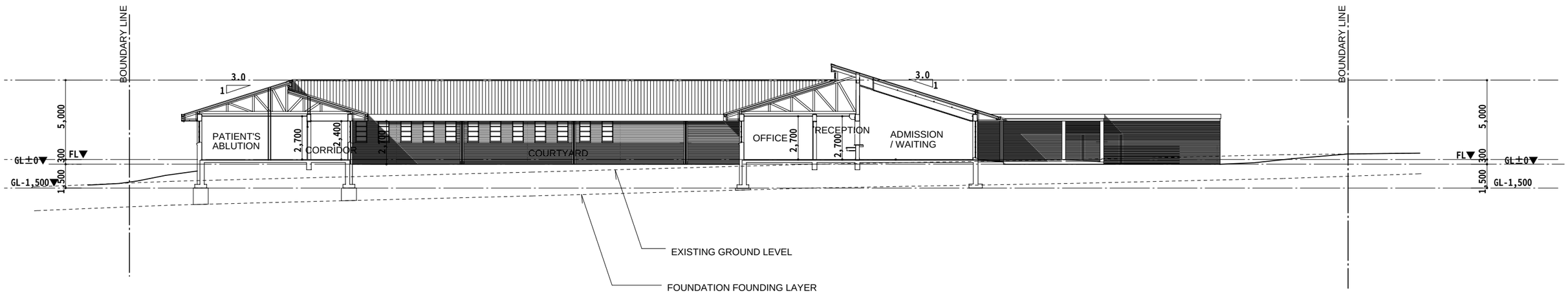


EAST ELEVATION

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



Y-Y' SECTION



X-X' SECTION

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

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

The Requested Japanese Assistance contains construction work and procurement and installation of equipment and shall be executed in accordance with the framework of Japan's grant aid scheme.

The Requested Japanese Assistance will be implemented after the signing of Exchange of Notes by the two Governments. This procedure will be followed by conclusion of the consultant agreement and preparation of detail design documents. Upon completion of detail design documents, tendering of construction contractor (hereinafter referred to as "the Contractor") and equipment supply contractor (hereinafter referred to as "the Supplier) will be held. The Contractor and Supplier selected through the tenders shall then execute both construction work and equipment supply and installation work.

During the detail design stage the consultant and the persons concerned in South Africa will study construction schedule of the Project and have discussion to ensure smooth implementation of works undertaken by the both Governments. The scope of works undertaken by South Africa shall be completed prior to procurement of equipment and construction of the New CHC.

(1) Implementing Organisation

This Project is implemented under the jurisdiction of the NDOH. KZN Department of Health and DC28 are the implementing organisations. Management of the New CHC and maintenance of supplied equipment are the responsibility of DC28.

(2) Consultant

Immediately after the signing of Exchange of Notes between both governments, the Government of Republic of South Africa will conclude a consultant agreement with a selected Japanese consultant in accordance with the framework of grant aid extended by the Government of Japan. The consultant will carry out the following services in compliance with the provisions of the consultant agreement.

1) Detail Design: Preparation of the detail design documents (including specifications and other technical documents)

2) Assistance of Tendering: Assistance of tendering to select the Contractor and the Supplier , and concluding the contract.

3) Supervision: Supervision of construction work and equipment work including installation and instruction for operation and maintenance.

In Detail Design stage, the consultant will prepare the tender documents including detailed specifications and drawings of construction and equipment work based on the Basic Design, and tender instructions and condition of the contract.

In Tendering stage, the consultant will provide the tendering services, e.g. public notice of tender, receipt of applications, pre-qualification, distribution of tender documents, tender opening, evaluation of the tender results. Furthermore, the consultant will assist on concluding the contract between the Government of Republic of South Africa and the Contractor and the Supplier, as well as report to the Japanese Government.

In Supervision stage, the consultant will ensure that construction work and equipment work will be carried out with justice in accordance with the contract documents as well as instructions, advice and coordination, for implementation of the Project. The Supervision service includes the followings:

-Instruction, advice and coordination to the Contractor and Supplier

The consultant will examine the construction schedule, construction plan, the building materials procurement plan and the equipment procurement / installation plan, and shall give the instruction, advice and coordination to the Contractor and Supplier.

-Examination and approval of working drawings on construction work

The consultant will examine, instruct and approve the shop drawings and other relevant documents submitted by the contractor.

-Confirmation and approval of building materials and equipment

The consultant will confirm and approve the building materials and equipment proposed by the Contractor and Supplier in compliance with the contract documents.

-Factory inspection

The consultant shall inspect the building materials and equipment at the manufacturers' factories to ensure the quality and performance.

-Reporting progress of work

The consultant shall grasp the actual conditions of the construction site and progress, and report them to both governments of South Africa and Japan.

-Completion inspection and commissioning test

Upon completion of construction and procurement and installation work, the consultant will conduct a final inspection and a commissioning test of the completed facilities and installed equipment to ensure that all the works are completed in compliance with the contract documents, and will submit the completion certificate to the Government of South Africa.

-Training in operation of the equipment

Some equipment will require expertise on operation and maintenance. Therefore, the persons concerned to operation of the facilities will be required to receive on-site training in proper equipment operation during the installation / adjustment / test-run period. The consultant shall give instruction and advice concerning the training programme.

(3) Contractor and Supplier

The Contractor will carry out construction work and the Supplier will procure, supply and install medical equipment in accordance with the contract documents and instruct on operation and maintenance for the equipment. The Supplier will also ensure aftercare services to procure spare parts and consumable parts for the major equipment within the guarantee period from the local suppliers, as well as technical assistance.

2-2-4-2 Implementation Condition

(1) Procurement of Equipment

1) Schedule Management

The facility and the New CHC under operation are the object of equipment supply. Since installation of equipment to the existing facility, inspection, training, etc. can bar the activity of the facility, the consultant shall examine the procurement schedule through mutual cooperation with the South African side.

2) Technician

It is very important to master the right operation method of equipment and the method of maintenance management so that the supplied equipment may always operate normally and may be effectively used after installation. In the Project, sending of a manufacturer or the engineer of a local agency is needed for installation and adjustment work of equipment, operation, and maintenance management instruction.

(2) Building Work

1) Condition of the Local Construction Industry

There are in principle no major differences in terms of construction practices between South Africa and Japan. However, since the scope of local contractors' operations and responsibilities differ widely from those of Japanese contractors', careful attention should be paid to the local method of determining the construction period and so on. In South Africa, the range of consultants' services in construction project is broad, including preparation of working drawings and reinforcement-bar schedule, as well as a heavy responsibility for warranty against defects. If a building is not constructed strictly with the design drawings, the architect in charge must rectify such defect at their own expense, and the contractor will not be held responsible for such defect. Therefore, in South Africa, architects are insured for architectural design insurance according to the size of the project.

It should be noted that in South Africa the amount of gross profit included in the unit cost of construction is by far lower in Japan due to the difference in terms of scope of work and responsibility.

2) Building Permit Procedure

In South Africa, there are regulations on facility planning and construction. Upon the completion of the detail design, the application form and the drawings must be submitted to the local authorities to obtain the building permit prior to execution of construction work. Concerning the building permit, the implementing agency of the South African side must disburse or exempt charges to the competent authorities. Furthermore, Building materials and machinery equipment should also comply with the relevant industrial standards and regulations in South Africa.

2-2-4-3 Scope of Works

(1) Equipment Procurement and Installation

1) Work under Japan's Grant Aid

- Procurement, transportation, loading of the equipment to the Project site
- Installation and test operation of the equipment
- Explanation, operation and maintenance training for the equipment

2) Work under the Government of South Africa

- Relocation, removal of existing equipment where equipment will be installed
- Provide space for temporary storage within the Project site
- Provide access way for transportation of the equipment
- Provide water supply (with bulb), sewage (with end cap), electrical supply (with power outlet, breaker), medical gas supply, reinforcement of foundation, and so on, which is necessary prior to the equipment installation

(2) Construction Work

1) Work under Japan's Grant Aid

- Facility construction
  - Construction of the buildings described in the Basic Design Study report
  - Electrical, mechanical and sanitary installations
  - Water circulation, electric cabling and drainage work within the premises
  - Installation, removal of temporary fence and temporary building such as warehouse for construction
  - Payments for electricity, water and telephone used for construction

- Other relevant work
  - Inland transportation of materials and equipment to the Project site

2) Work under the Government of South Africa

- Site and exterior works
  - Securing the site for the Project
  - Removing existing structures, trees and any other obstacles for the construction work from the Project site
  - Construction of boundary fence and other necessary exterior structures
  - Landscaping work such as planting and gardening
- Infrastructure
  - Low voltage electricity supply to the site
  - Installation of telephone lines with enough capacity up to the Main Distribution Frame in the building
  - Extension of water supply and storm water line up to the boundary line of the Project site
  - Extension of public sewage line up to the boundary line of the Project site
- Preparatory work
  - Provision of sites for temporary construction site office, workshops and material storage places
  - Connection of temporary supply line of electricity, telephone, water and drainage

2-2-4-4 Consultant Supervision

(1) Supervision Policy on Procurement and Construction

In accordance with the Japan's Grand Aid, the consultant will organize the Project working team to ensure smooth implementation of the Project based on the policy of the basic design. The supervision policy on procurement and construction are as stated below.

1) To keep close communication with the persons in charge of the Project of the both government to ensure completion of construction of the New CHC and procurement of equipment without delay.
2) To give proper advice and instruction promptly to the Supplier and the Contractor in justice
3) To give proper advice and instruction promptly concerning installation of equipment and operation of equipment after handover.
4) To confirm completion of equipment installation and construction of the New CHC in compliance with conditions of the contract, and attend handover of equipment and the New CHC, and conclude

the services with approval of South Africa side.

(2) Supervision Plan on Procurement and Construction

Judging from the scale of the Project, it is advisable that, in carrying out the aforementioned tasks, the consultant should dispatch one engineer to South Africa throughout the term of works. The consultant shall also dispatch necessary consultants/engineers to the site at relevant occasions for inspection, instruction and coordination, and at the same time assign necessary engineers in Japan to establish a communication and backup system. The consultant shall report the progress of the works, payment procedures, completion of the construction of the facilities and installation of the equipment, and any other relevant matters to the competent agencies of the Japanese Government.

2-2-4-5 Quality Control Plan

(1) Construction Work

Construction supervision under this Project is to be conducted in compliance with the following criteria in order to achieve the designated quality of construction work. These criteria are based on South Africa's or Japan's relevant standards in principle.

Table 2-17 Criteria for Quality Control

	Typical criteria for quality control			Remarks
	Items	**Target value**	**Testing method**	
Earth work	Inclination Acuracy of floorlevel Height of foundation Height of leveling concrete	Within accepted range +0～-5cm +0～-3cm ±1cm	Slant guage, observation Leveling, observation As above As above	The consultant will instruct the Contractor to submit the Summmary of construction techniques which include types of inspection, target value, contents of inspection, method of testing, curing, construction, and check prior to construction.
Reinforcing bar work	Minimum concrete covering thickness	Sides not in contact with the earth 30m/m Sides in contact with the earth: Foundation 60m/m Others 40m/m	Observation, measurement	As above
	Processing precision	Tolerable size: Stirrup / hoop ±5m/m Others ±10m/m		
	Tensile strength	3 pieces taken from 1 lot at site (1lot= 20 tons for each diameter)	Tested at factory at the presence of consultant	
Concrete work (freshly mixed concrete)	Compressive strength	Planned strength over 210kg/cm^2	3 samples x 3 types for every batch as well as every 150 m^3 (tested at site at the presence of consultant)	As above
	Slump level	15cm±2.5cm	Once for every batch as well as every 150 m^3 (tested at site at the presence of consultant)	
	Chloride level	Under 0.3kg/m^3	As above	
Masonry work	Compressive strength Other materials (cement, re-bars)	40～70kg/cm^2	Tested at manufacture at the presence of consultant Observation	As above
Plaster work Paint work Roof waterproof -ing work Doors / windows	Material, storage construction, compound, finishing thickness, curing, precision			As above
Plumbing work	Water supply pipe Sewage pipe	Air pressure test Water filling test	Tested at the presence of consultant	As above
Electrical work	Electrical cabling	Insulation resistance test Performance test	As above	As above

2-2-4-6 Procurement Plan

(1) Procurement of Equipment

1) Procurement of Equipment

The procured equipment shall be Japanese or South African products. Third-country products shall be selected after approval of the both governments. They must meet the following conditions.

- A product made by a manufacturer which has a distributor or a branch in South Africa.
- A product which is easy to maintain and which has an established system for maintenance.

- A product that can be procured within the period designated by the Exchange of Notes.

Followings equipment may be procured from a third country.

Table 2-18 Third-Country Product List

No.	Description	No.	Description
6	Blood gas monitor – cassette type	27	Nutrition pump
7	Capnograph	5	Blood gas analyzer
8	Cardiotocograph	20	Glucose meter
13	Defibrillator with cardiac pacing	24	Infant incubator

2) Method of Transportation

- To avoid robbery or loss during transportation, the equipment is basically to be loaded in a container.
- The equipment procured in Japan are to be transported by sea from Japan to Durban port in South Africa. They are to be sorted out according to its destinations and transported by vehicle from Durban port to the each site.
- The locally or third-country procured equipment is to be sorted at Durban port according to the destination and to be transported by vehicle to the each site.
- A mobile car is to be delivered to Durban and driven to the site.
- The equipment for clinics are to be transported to the hospital that belong to the same district of the clinic.

(2) Building Work

All of the major building materials are produced and available in South Africa. Some of the primary parts of industrial products, such as generators, are imported, but it is possible to procure those products in local market through local distributors. All the imported materials and equipment are landed in Durban, the largest international trade port and located a little over one hour's car ride from the Project site. The distance between the Project site and Durban is short enough for distributors in Durban to come to the Project site to provide maintenance service. Therefore, no problem will be expected regarding the procurement of repair parts and maintenance of equipment after completion of the Project.

The following table indicates the procurement source of materials / equipment for building, electrical, plumbing and mechanical work.

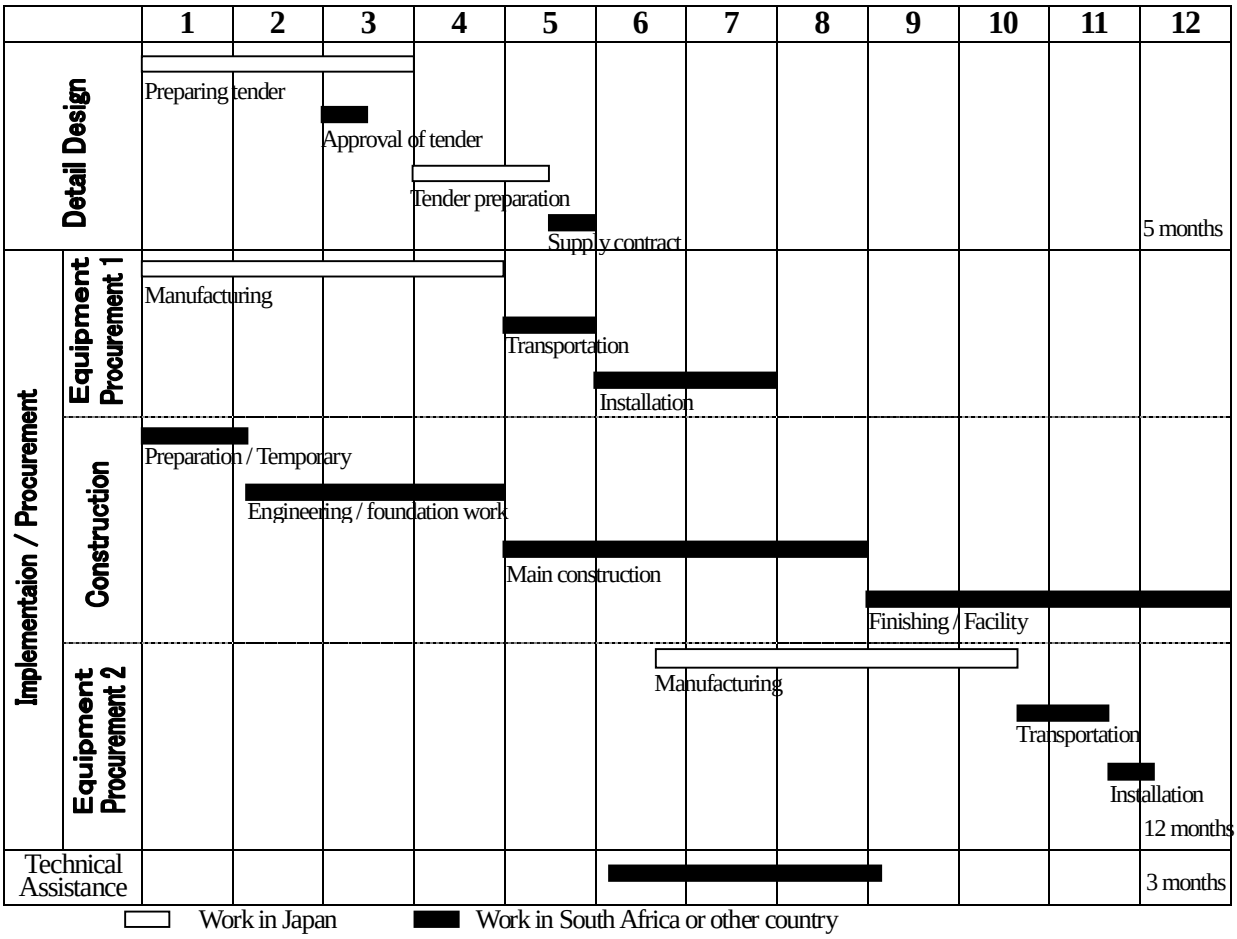
Table 2-19 Procurement Plan of Building Materials

Material / Equipment		Country	Area	Remarks
Building	Cement	South Africa	All areas	Produced locally
	Sand / Gravel	South Africa	All areas	Produced locally
	Re-bar	South Africa	All areas	Produced locally
	Form	South Africa	All areas	Produced locally
	Aluminium windows	South Africa	Durban	Produced locally
	Steel doors	South Africa	Durban	Produced locally
	Hardware	South Africa	Johannesburg, Durban	Produced locally and imported (procured in local market)
	Face brick	South Africa	Johannesburg, Durban	Produced locally
	Floor tiles	South Africa	Johannesburg, Durban	Produced locally
	Paint	South Africa	Durban	Produced locally
Electrical	Distribution panel	South Africa	Johannesburg	Produced locally, imported parts assembled locally
	Lighting fixture	South Africa	Johannesburg, Durban	Produced locally, imported parts assembled locally
	Electric cable cover (PVC pipe)	South Africa	Johannesburg, Durban	Produced locally
	Electric wire, cable	South Africa	Johannesburg, Durban	Produced locally
Mechanical	Air-conditioning unit	South Africa	Johannesburg, Durban	Produced locally, imported parts assembled locally
	Ventilation fan	South Africa	Johannesburg, Durban	Produced locally
Sanitary	Sanitary fittings	South Africa	Johannesburg, Durban	Produced locally and imported (procured in local market)
	PVC pipe	South Africa	Johannesburg, Durban	Produced locally

2-2-4-7 Implementation Schedule

Upon the signing of Exchange of Notes designating the implementation of the Project, the following work shall be executed as shown in Table.2-20.

Table 2-20 Implementation Schedule



(1) Detail Design

After conclusion of consultant agreement with the KZN Ministry of Health, the consultant shall start to prepare a detail design, equipment specifications and tender documents in accordance with the Basic Design Study Report. In the meantime the consultant shall obtain approval for those documents from the South African side.

(2) Tender

The Supplier and Contractor shall be selected through tender. Tendering stage shall start from a public announcement, pre-qualification, explanation and distribution of tender documents, questions and answers, tendering, tender evaluation and conclusion of supply contract. Meanwhile, the South African side shall take any necessary measures to obtain land permission, construction permission or working visa, etc. prior to the construction. The consultant shall assist these procedures.

(3) Construction Work

Judging from the contents and level of construction technique, the construction period, including installation of equipment, will be 12 months if construction material is procured without hindrance.

2-3 Obligations of Recipient Country

2-3-1 Measures to be Taken by the Government of South Africa

(1) To secure land necessary for the Project and to get approval of building plan;

Ingonyama Trust owns property of the Project site for the New CHC and Mhlathuze Municipality has the right to use the land. Ownership of the land is under process to transfer to KZN Department of Health, the implementing agency of the Project. This procedure transferring of the ownership of land and approval of building plan must be completed before implementation of the Project.

(2) To clear and remove any existing structure, rubbish, trees and any other obstacles from the site to implement the construction work;

(3) To undertake incidental outdoor works, such as gardening, fencing, exterior lighting, and other incidental facilities in and around the Project site, if necessary;

(4) To provide facilities for distribution of electricity, water supply, telephone trunk line and drainage and other incidental facilities to the boundary of the site;

(5) To provide sites for temporary office, workshop and warehouse for construction work and to provide temporary connection line of electricity, telephone, water supply and drainage;

(6) To ensure necessary arrangement of installation of equipment (e.g. removal of existing equipment, electricity supply, water supply and drainage);

(7)To ensure proper operation and maintenance of the facilities and the equipment of the Project;

To secure the necessary personnel to ensure that the facilities constructed and equipment procured under the Japan's Grant Aid be maintained and used properly and effectively for the Project and to secure budget for implementation of the Project other than those covered by the Japan’s Grand Aid.

(8) To bear commissions, namely advising commissions of an Authorisation to Pay (A/P) and payment commissions, to a Japanese bank for the banking services based upon the Banking Arrangement (B/A);

(9)To ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation in South Africa;

(10) To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in South Africa with respect to the supply of the products and services under the verified contracts;

(11) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into South Africa and stay therein for the performance of their work;

(12) To provide necessary permissions, licenses, and other authorisation for implementing the Project, if necessary; and

(13) To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project.

2-3-2 Project Costs Borne by South Africa

The Project cost borne by South Africa is estimated to be ZAR 2,755,000.

(1) Removal of the existing equipment (employment of worker, electrician, plumber) ZAR 29,000

Equipment to be removed	Q'ty	Hospital
Operation light	6	Ngwelezana (6)
X-ray unit, general	4	Empangeni (1) Eshowe (1) Nkandla (1) St. Mary's Kwamagwaza (1)

(2) Electricity, water supply, sewage, telephone for the New CHC ZAR 222,000

(3) Construction for access road to the New CHC ZAR 24,000

(4) Construction a boundary wall and gate for the New CHC ZAR 31,200

(5) Furniture and other supplies for the New CHC ZAR 601,800

(6) Custom and VAT ZAR 1,847,000

Custom : Exempt

VAT : The cost of equipment procured in South Africa + the cost of construction X 14%

= ZAR 1,847,000

2-4 Project Operation Plan

(1) Operation Plan

1) Existing Facility

The Project sites for the equipment procurement, excluding the New CHC, are currently operating existing facilities. There are about 20 staffs stationed at DHO and the office sends technicians and nurses to health facilities. Since shortage of doctor in each medical facilities is remarkable, the equipment plan in this Project is designed by taking the present number of staff into consideration on the basis of renewal of currently possessed equipment, hence there is no problem on the equipment management.

2) New CHC

The staffing for the New CHC estimated on the basis of the records of other CHCs of the similar scale in the KZN Province are as stated below. 20 staff, including 13 nurses will be transferred from the existing Nseleni Clinic and the other staff from Ngwelezana regional hospital. Since Ngwelezane hospital has a total of 1,367 staff members, including 924 medical staff, there will be no problem regarding staff transfer to the New CHC from the hospital. Since the population is very dense around the Project site area and the unemployment rate is very high, it is also considered unproblematic to recruit assistant staff to take charge of cleaning and maintenance for the New CHC

Table 2-21 Staff Establishment of The New CHC

Position	No. of Staff	Remarks
Doctor	1	
Nurse	20	24 hrs basis, approx. 16 Professional / Senior nurse and 4 Nurse assistant
Dentist / Oral health	1	Oral hygienist or dental therapist could be assigned as a fulltime staff in stead of Dentist
Pharmacy	1	
Radiologist	1	
Administrative Staff	12	Approx. 1 Chief Officer, 2 Senior Admin. Clerks, 4 Admin. Clerks and 5 support clerks
Guardsmen	5	24 hrs basis
Assistant Staff	10	Approx. 5 cleaners, 1 Ground man, 1 Driver, 2 Store keepers / General Assistants, 1 Maintenance Staff
Total	51	

(2) Equipment Maintenance and Management Plan

Maintenance and management of the equipment is carried out by CMTD of Provincial Department of Health, DHO and private contractor. A branch office is set up at Ngwelezana regional hospital and one engineer each are stationed, and one more engineer is due to be sent in October, 2001. DHO posts engineers at Empangeni regional hospital and Eshowe district hospital, and they maintain large-size installation equipment such as a sterilisaer, operating light and laundry equipment. Maintenance contract with private contractors is made by instruction of radiology department and central laboratory department of NDOH for a x-ray unit and laboratory equipment which require urgent and advanced repair. Since not all of the contents of repair are recorded in each medical facility, it is difficult to grasp overall situation of the equipment. It calls for centralisation of management system for equipment management.

It is possible to receive support of engineers from DC28, DHO about maintenance management of facilities. And since private service companies are also available if needed, there is no necessity for arrangement of an expert at the medical facilities. Only a daily maintenance person for glass exchange, for example, is enough.

(3) Operation and Maintenance Costs

1) Medical equipment

Table 2-22 shows a rough estimate of consumables / spare parts and maintenance contract necessary for the procured equipment for 1 year. “Appendices 10” shows a breakdown of consumables / spare parts item by item. Most of the equipment are classified as renewal of the existing equipment and maintenance contract for them will be necessary.

Table 2-22 Operation and Maintenance Costs by Facility (ZAR)

	Total	NG	EM	CB	EK	ES	MB	NK	SM	CC	DHO	CHC
Maintenance contract	1,919,576	625,531	202,177	126,234	137,032	277,269	147,830	251,297	115,436	0	0	36,770
Spare parts, consumables	7,438,944	901,091	795,337	405,891	428,858	722,657	422,888	608,158	645,163	2,132,921	21,313	354,666
Total	9,358,520	1,526,622	997,513	532,125	565,890	999,926	570,718	859,455	760,599	2,132,921	21,313	391,436

Source : Questionnaire

KZN province’s political system has been decentralised and operation budget for health sector of DC28 is allocated according to their need and activities by the representative of DHO and 2 regional hospitals.

Operation and maintenance costs for the Project is given the highest priority.

2) Operation and Maintenance Cost of The New CHC

Table2-23 indicates annual operation and maintenance costs of the New CHC calculated from the 2001 annual budget of the same scale of a facility in KZN province.

Table 2-23 Operation and Maintenance Costs of The New CHC（category of KZN DOH）

	Cost (ZAR)	Contents
Personnel-expenses	3,166,000	basic salary, bonus, housing allowance, qualification allowance, medical insurance, pension, retirement benefit, newly employment cost for qualified person, etc.
Operational expenses	69,000	Transportation expenses, mail expense, vehicles relation expenses, telephone and facsimile cost, payment of tax, etc
Goods, general service expense	1,500,000	Medicine, vaccine cost, bandage for surgery and dentistries, accessories for surgery and dentistries, cleaning service, the article for office work, stationery, maintenance material and an article, electrical appliances, a linen article, facility, medical gas cylinder
Equipments expense	1,000,000	General goods, such as furniture and a bulletin board, a maintenance tool, accessories medical equipments
Special technical service expense	400,000	Transfusion, garbage collection, hospital foods, facility repair, crime prevention system contract, planting care, water service cost, electric cost, etc.
Total	6,135,000	

The operation and maintenance costs of the New CHC occupy 1.31% of the total 2001 operation budget of public health facilities, ZAR 466,627,000 in DC28. Increased portion of the operation budget of the existing Nseleni clinic is ZAR 3,346,000, which is 0.71% of the above budget. Since the New CHC, calculated from the results of an existing facility, expects 8% of the total number of outpatients in all the public health facilities of DC28, the above budget of the New CHC shall be efficient and appropriate.

2-5 Technical Assistance by Consultant

To improve the primary health environment of DC28, KZN Department of Health requested the consultant services for the technical assistance on management of the procured equipment and on health education as one of the components of the Project.

(1) Background

KZN Department of Health has requested a Technical Assistance to improve the foundation of primary health services through guidance on health education activities and introduction on an equipment management system.

1) Present Situation of Health Education Activities

In DC28 there is much infectious disease, such as HIV, cholera, tuberculosis, diabetes, hypertension, and malnutrition. Among them, infectious disease and malnutrition can be reduced if residents take a suitable prevention measure, and strengthening of primary health care is a matter of primary importance. Although the health education activities such as distribution of pamphlet on the basis of primary health care have been performed at school or by mobile car under the leadership of the Local Health Department, residents do not show interest to the contents of activity and sufficient effect has not been acquired. So, the motivation over health education activities has been lost also at the staff side.

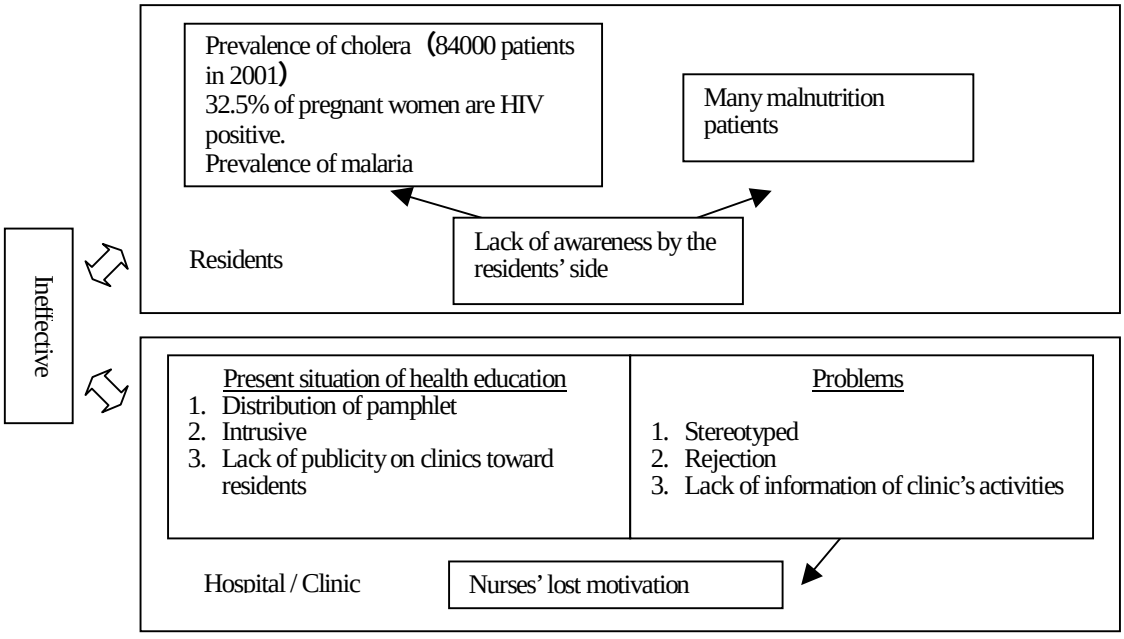


Figure 2-7 Present Situation of Local Health Education Activities

Even though the participants in the workshop held during the Basic Design are aware of the importance of health education and of necessity of improving the present activities, they did not know how to get the people aware of it. So when the study team introduced an example of health education activity using information apparatus such as personal computer, software, digital camera, health staff of DC28 showed an interest and asked for instruction of the activity.

The contents of the activity and required equipment are as follows.

Health education and promotion (improved)	Required equipment
1. Get into the people 2. Edit a community-based story so that they feel familiar with the activity of the clinic and do not be too intrusive	1. Vehicle 2. Presentation apparatus (digital camera, PC, monitor, projector, audio apparatus, etc.)

2) Equipment Management

CMTD Technical Department of DHO and private companies are involved in maintenance of medical equipment of each facility of DC28. But all the history of repairing in each facility are not recorded in a ledger, the record of Local Health Department is owned by a maintenance staff dispatched by the same Department, and CMTD keeps its record by themselves.

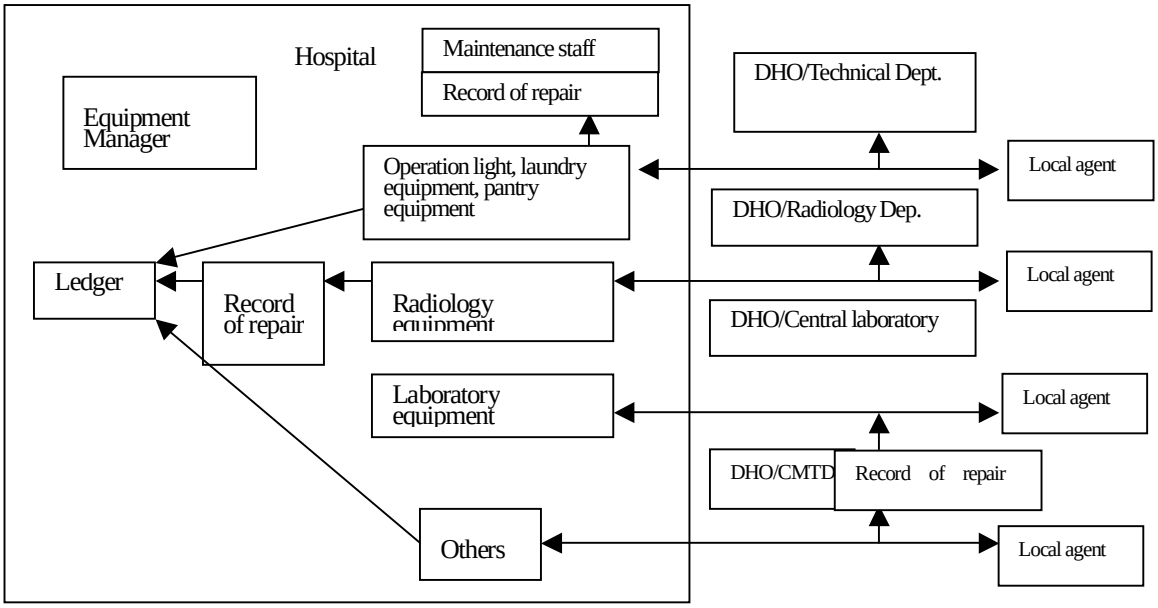


Figure 2-8 Present Situation of Equipment Management

As mentioned above, the equipment manager is in charge of equipment ledger but not of keeping a history of repair. Since they are all handwritten, it is impossible to compare the present data with those

of the past, calculate the cost of maintenance of procured equipment, and estimate appropriate time to replace. Database of local agent is not well established.

As they do no know the present situation of the equipment (repair history, costs, etc.), they can not examine the cost effectiveness of each equipment and judge an appropriate time to renew them. Therefore, for appropriate allocation of equipment management budget of DC28, it is important to establish an centralised equipment management system.

(2) Purpose

1) Health Education and Promotion

Activate local health services and increase the people's level of confidence and satisfaction towards health services by introducing a new health education method.

2) Management Method of Equipment

Facilitate efficient use of supplied equipment and establishment of long-term equipment renewal plan by introducing a centralised Method of Equipment Management.

(3) Outputs

1) Health Education and Promotion

Original contents of the Health Education and Promotion shall be introduced based on the actual life of the residents, rather than ordinary, standardized pamphlets or activities. A health instructor must get into the people, pick out the problems, draw a story, edit and incorporate animation or pictures into the story by personal computer for presentation. This way the contents of the presentation can be compiled depending on the audience, seasons or places. And then a school version or village version of presentation will be established. The presentation shall be performed by using projector and screen with a narration by the instructor. This self-directed activity will strengthen relationship between instructor and audience and strongly motivate the instructor towards health education.

2) Management Method of Equipment

They can standardise the equipment data that are not covered by CMTD in order to be applied to the

new system of equipment management introduced by CNTD. Thereby, they can establish an equipment renewal plan, reduce the repairing cost for equipment that need to be renewed and centralised equipment management at each level of KZN Department of Health, DHO and other health facilities shall become possible.

(4) Activities

1) Health Education and Promotion

Target : 6 Nurses (selected from 6 districts) who belong to DHO and are responsible for primary health care or engaged in local public health, environmental sanitation, school health, etc.

Activities : Practice and instruction of Health Education and Promotion using information apparatus

- assistance in selection of theme and message, drawing a story
- instruction of filming of activities by digital camera
- instruction of editorial method by PC (presentation software)
- instruction for arranging the activity site (installation of audio visual apparatus, etc.)
- instruction for communication and conversation skill

2) Management Method of Equipment

Target : DHO of DC28 / engineer of CMTD and persons in charge of equipment management at each facility

Activities : Organise data for equipment management, introduction and practice of management method of equipment

- confirmation and arrangement of the management system of equipment introduced by the CMTD
- re-examination and standardisation of the format of existing ledger repair report
- application of the standardised management method of equipment and instruction of data maintenance

(5) Inputs

Health Education and Promotion

1 Japanese staff for 3 months (0.17m/m in Japan, 2.83m/m in South Africa)

Management Method of Equipment

1 Japanese staff for 3 months (0.17m/m in Japan, 2.83m/m in South Africa)