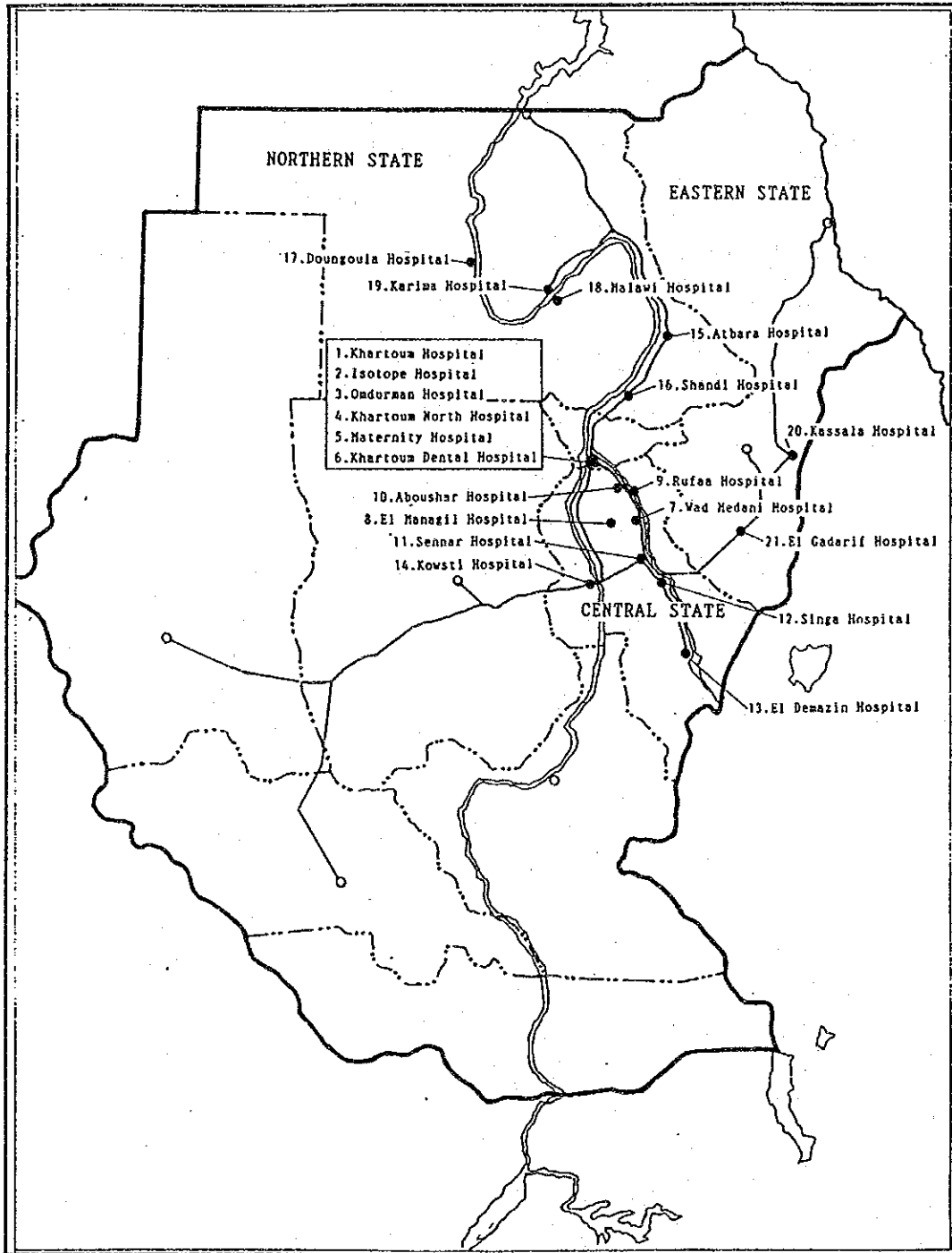


2-5 Status of Proposed Hospitals for the Project

2-5-1 Locations of Proposed Hospitals for the Project

Locations of hospitals which are proposed for the Project are shown in the map hereunder

Fig. 2-5 Locations of Proposed Hospitals for the Project



2-5-2 Status of Proposed Hospitals for the Project

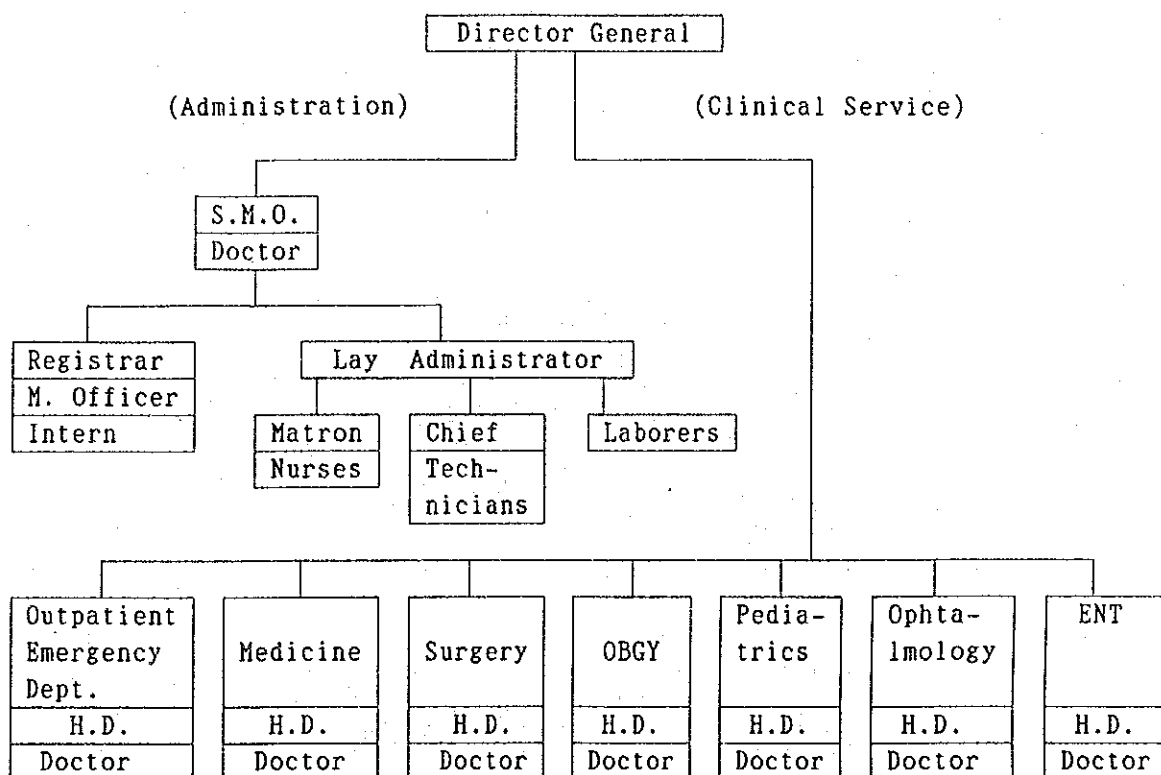
Proposed hospitals for the Project are 21 hospitals which are general hospitals and speciality hospitals located in the capital region and regional major cities which provide medical services to a large population and play an important social role. Except for three speciality hospitals, all hospitals are general hospitals and operate as such; the medical services provided and the operation and maintenance of medical equipment are all very similar. In addition, the size of hospital buildings, status of facilities, damages inflicted upon them by the flood disaster of 1988, and the circumstances surrounding damage recovery are considerably similar with each other.

(1) Hospital operation

1) Operation of the general hospitals

Although the size of general hospitals ranges from 800 beds at Khartoum Hospital to 89 beds at Marawi Hospital, the general hospital format and the medical service system are much the same for all hospitals. Hospital operation methods are also very similar with each other. A typical hospital organization chart is shown hereunder. The hospital director and medical doctors for each hospital are appointed by the Ministry of Health, and the hospital director is responsible for hospital operations. He is assisted by Senior Medical Officer for Administration and by heads of each clinical department for medical service. The hospital director reports directly to the Ministry of Health in the case of hospitals under the jurisdiction of the said Ministry, and to the state government in the case of those hospitals under its jurisdiction.

Fig. 2-6 Organization of Hospital



Source: Ministry of Health

Heads of each clinical department are responsible for medical diagnosis conducted by medical doctors in their department, and are under the supervision of the hospital director. The Senior Medical Officer is responsible for hospital administrative matters, and is under the supervision of the hospital director. Most hospitals are equipped with an internal medicine department, surgical department obstetrics and gynecology departments, a pediatrics department, an ophthalmology department, an otorhinolaryngology department, and a x-ray department; each department has its own beds for patients. Each hospital is equipped with an outpatient department and an emergency department. In general the occupancy rate for hospital beds is within the range of 70%-90%, with exceptions of 200% for Marawi Hospital and 100%-120% for Sennar Hospital. The number of outpatients differs significantly from one hospital to another, depending on hospital size and location. The number of

outpatients per medical doctor per day is 158 for Karima Hospital. The number is even higher for Shandi Hospital, Kowsti Hospital, Rufaa Hospital, and Marawi Hospital, resulting in crowding and long waiting hours for outpatients. The situation is much the same for outpatients and inpatients of speciality hospitals such as Maternity Hospital or Khartoum Dental Hospital.

(2) Hospital Building Conditions

The buildings of each hospital were originally built several decades ago and are still used without being renovated. Superannuation of buildings and deficiency of facilities are significant.

Original hospital buildings which were constructed under the administration of U.K. are of primarily single story and partially two story brick building with plaster finish surrounded by peripheral wooden corridors in a colonial architectural style.

Since hospital premises are of sufficient areas, extensions have been repeatedly made around original hospital wards in order to enlarge hospital scales. Consequently, present hospital layout is not sufficiently functional as a whole.

In the Sudan separate department wards, one for male and the other for female, are required for each department. Patients are usually carried by stretchers in outdoor because of long distance to wards and lack of corridors interconnecting hospital wards.

Hospital premises are mostly of bare ground with little vegetation to raise a cloud of dust. During sand storm season, ingress of sand into building is significant due to poor airtightness of buildings, making it extremely difficult to

clean ingress of dust and accelerating deterioration of medical equipment. Certain hospitals are providing concrete tile pavement, flower beds and vegetation in order to deal with the problem.

Number of rooms of hospitalization wards is insufficient partly due to seasonal fluctuation of number of patients. Corridors are often used as rooms and a bed is sometimes shared by two inpatients.

Rooms for inpatients in general are large rooms for more than 20 patients. Private rooms have been made available in recent years by adopting chargeable medical service system in certain hospitals.

Abundant city water supply is available which depends on the Nile River as its source of water supply. Waste water is processed by septic tanks installed in hospitals for permeation into ground through permeation valve. In certain hospitals such as Wad Medani Hospital septic tanks were damaged by the flood and remain unusable while waste water has to be carried away by tank trucks. Action is urgently required to rectify the situation.

Air conditioning is to be provided by window type air conditioners for surgical operations rooms of each hospital. Most of the air conditioners currently installed however are non-operational either due to the damage inflicted upon by the flood or due to superannuation. Air conditioners are imported ones and hospitals are prevented to purchase them due to the lack of foreign exchange. Lack of spare parts prevents repair of damaged air conditioners. Ward rooms other than surgical operation rooms are provided with ceiling fans while inpatient rooms depend on natural ventilation only.

Electric power is generated either by thermal generation or

hydraulic generation. Because cities are distanced from each other, no power transmission system network interconnecting power stations is available. Individual cities have their own power transmission systems, thus resulting instability of voltage and frequency partly due to superannuation of power distribution system. Power outage is frequent during summer months due to increased power consumption while it is less frequent during winter months. Damages inflicted upon buildings of each hospital have been mostly restored, and hospital rehabilitation programs have been implemented in many hospitals by taking the opportunity of the flood disaster including construction of new ward buildings. Salvation committee of each hospital is held responsible for the management of donations by private sector and for the implementation of the construction programme of new ward buildings. New ward buildings are of modern reinforced concrete structure with brick walls.

Marawi Hospital was designed to be a standard model hospital by the Ministry of Health. Construction has been completed and the hospital is schedule to move into new buildings in March 1992. The Ministry of Health is planning to continue to construct standard model hospitals in nation-wide scale.

(3) Status of Medical Equipment

Status of Medical equipment of 18 proposed general hospitals for the Project are much the same with each other except speciality hospitals, namely Isotope Hospital, Maternity Hospital and Khartoum Dental Hospital. Many equipment including X-ray units and operation lamps were damaged by the flood of 1988. None of those equipment has been renovated for more than 15 years due to the lack of budget for Health and Medical sector. Many equipment of those hospitals are found failed or seriously deteriorated and degrading medical service functions of hospitals. Status of major equipment is summarized as follows and outline of the proposed hospital and situation of ambulances at the proposed

hospitals are expressed in Section 2-5-3.

Major existing equipment	Status of equipment
X-ray Units	: Even small scale hospitals have at least one X-ray units which are 15 - 20 years old models. Parts required for the repair is hardly available. Most of them are either failed due to flood or severely deteriorated due to superannuation.
Operating table	: Each hospital is provided with main and auxiliary surgical operation rooms each of which is equipped with an operating table. Large scale hospitals are equipped with 3 - 4 operating tables. Except Khartoum North Hospital operating tables of which have been renovated, operating tables in general are found superannuated and severely deteriorated.
Operation lamp	: Similarly to operating tables, existing operation lamps are mostly those procured 15 - 20 years ago. Even spare bulbs are hardly available. Many operation lamps are found being used with ordinary bulbs.
Anesthetic apparatus	: Simple anesthetic apparatus using oxygen and using oxygen and fluothane gas are generally used. They are found severely superannuated.
Electrosurgical unit	: Each hospital is using the same type. A very few is operational due to superannuation.

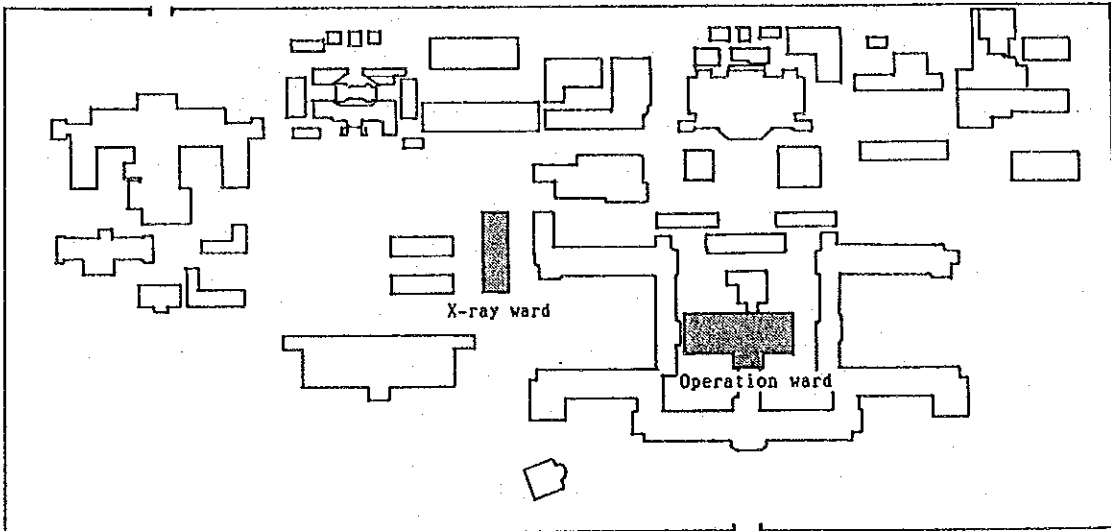
Surgical instruments : Surgical instruments for general surgery, orthopedic surgery, ophthalmic surgery, obstetric and gynecologic surgery, otorhinolaryngologic surgery are being used which have not been renovated more than 10 years. In certain cases surgical operations are hindered.

Ambulances : Two regular operational ambulances are used in Khartoum Hospital, one in Khartoum North Hospital and one in Maternity Hospital. other hospitals are using small trucks for the transport of patients.

1. Khartoum Hospital

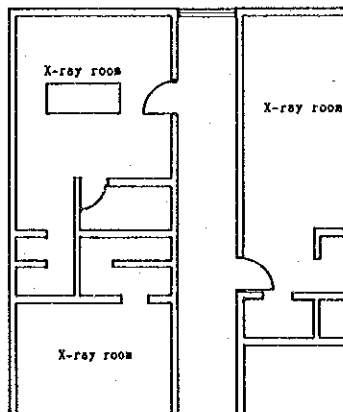
This hospital is situated at the centre of Khartoum city, and is near the Khartoum Railway Station. The front gate faces a paved 8 lane main road which connects the Khartoum Railway Station with the Air Port. The rear gate faces a 4 lane road. This hospital together with the National Health Laboratory, Shab Hospital and Isotope Hospital which used to be the parts of Khartoum Hospital has a vast area occupying five block.

Lay-out of Hospital Building

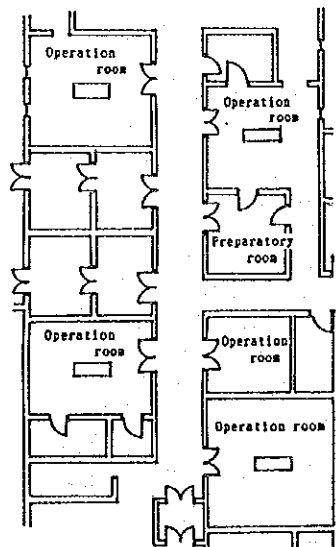


Locations of Installing Main Equipment

X-ray ward



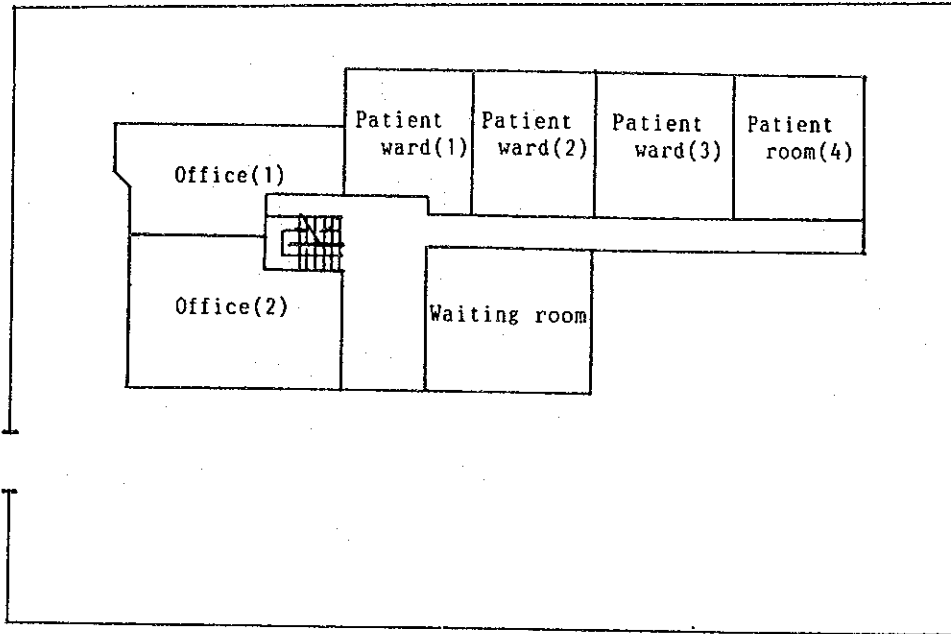
Operation ward



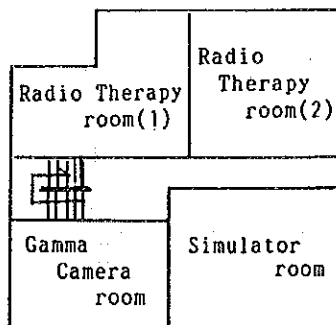
2. Isotope Hospital

This hospital is situated at the centre of Khartoum city, and is near the Khartoum Railway Station. The front entrance faces a paved 8 lane main road which connect the railway station with the Air Port. This hospital is next door to Khartoum Hospital since it used to be the Radiology department of Khartoum Hospital.

Lay-out of Hospital Building



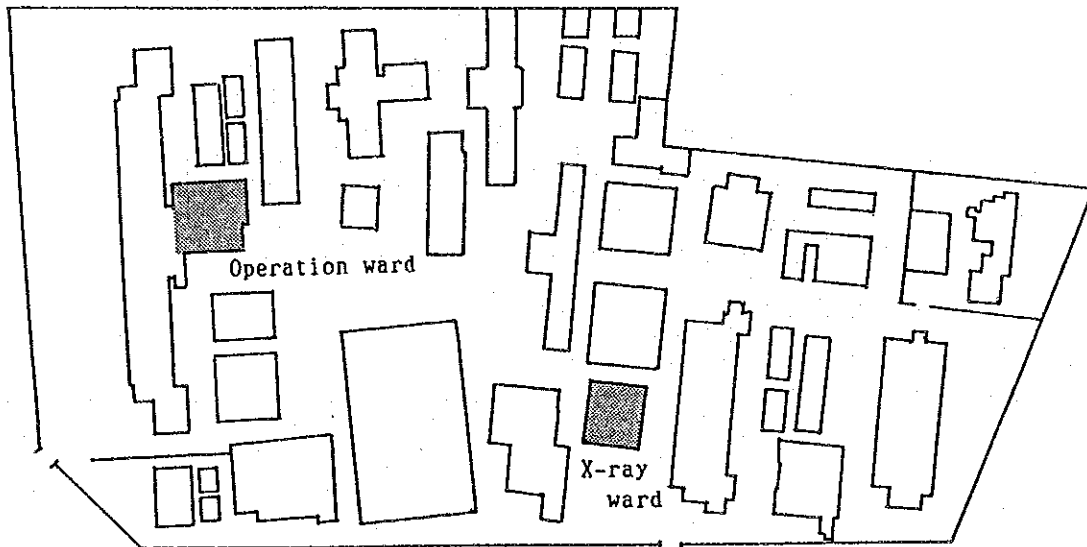
Locations of Installing Main Equipment



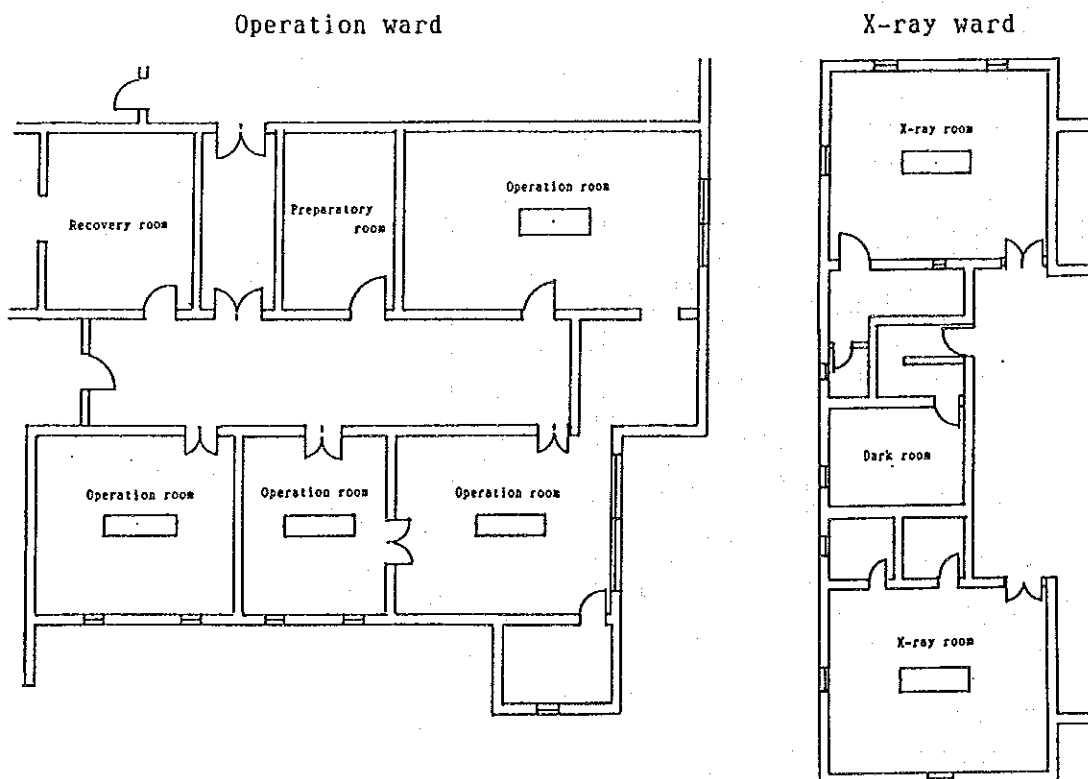
3. Omdurman Hospital

This hospital is situated at the centre of Omdurman city which extend along the northside of Nile River opposite Khartoum city and can be reached 10 minutes by car from the centre of Khartoum city. The front side of this hospital faces paved road of 20 meter width and the other three sides face unpaved roads.

Lay-out of Hospital Building



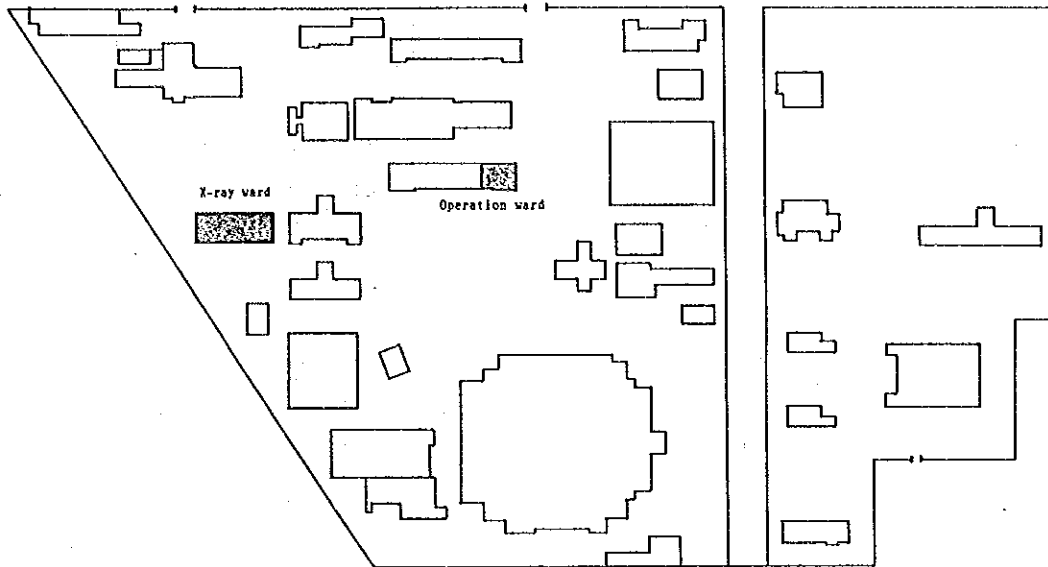
Locations of Installing Main Equipment



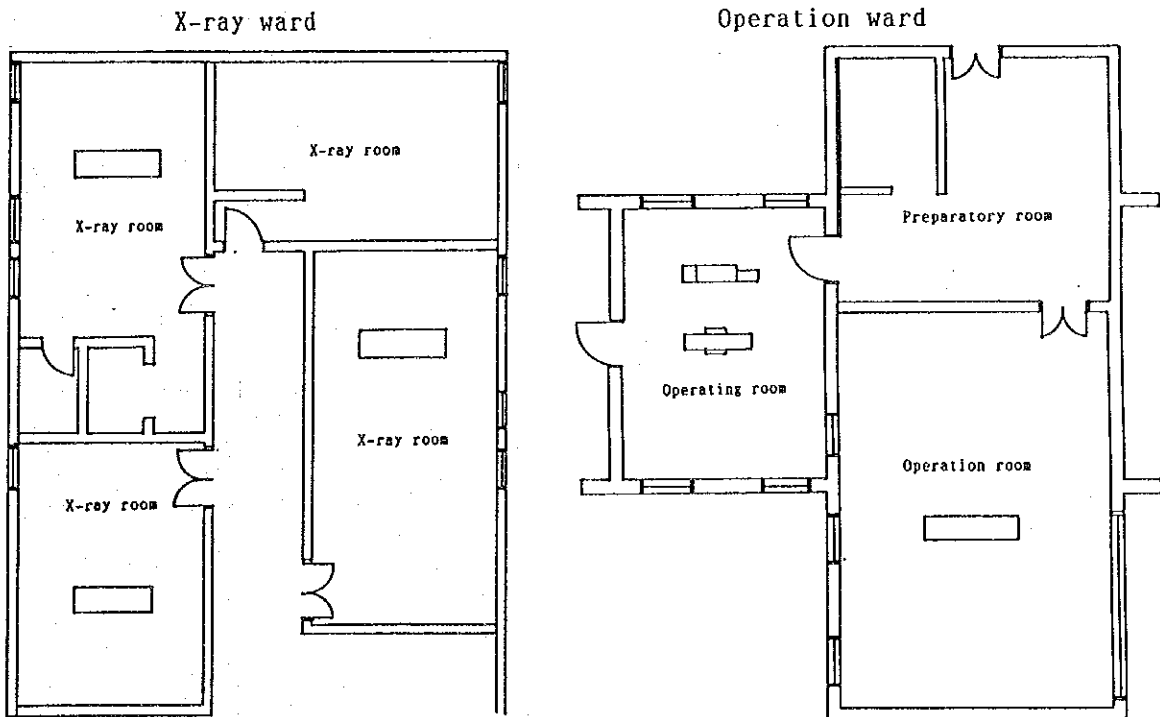
4. Khartoum North Hospital

This hospital is located in the centre of Khartoum North City which extends along the eastside of River Blue Nile opposite Khartoum city, and can be reached there in about 20 minutes by car from the centre of Khartoum city. The front and rear entrance face roads of 20m width, and the both sides face roads of 45m width, the site area is wide enough to occupy 2 blocks.

Lay-out of Hospital Building



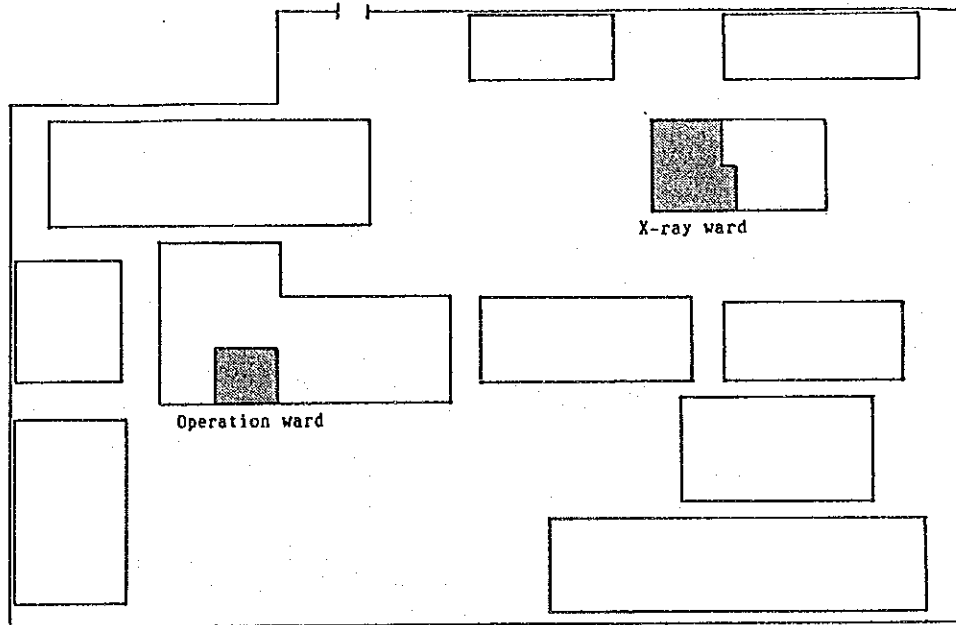
Locations of Installing Main Equipment



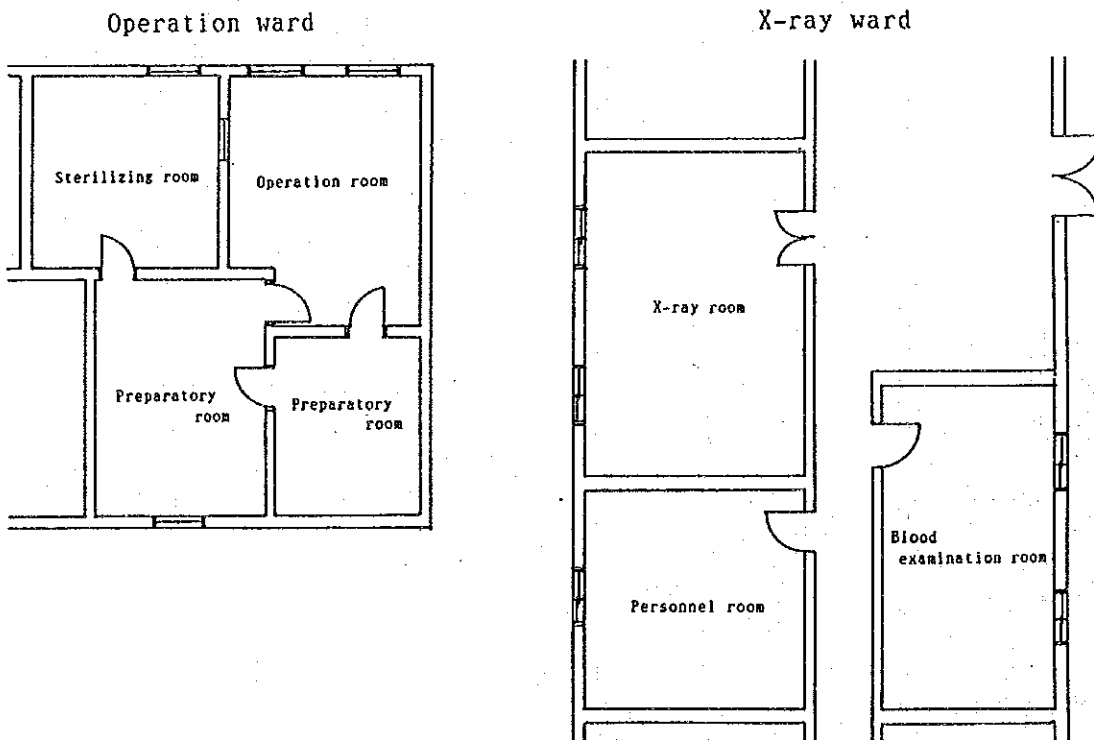
5. Maternity Hospital

This hospital is situated at the centre of Omdurman city which extend along the northside of Nile River opposite Khartoum city and can be reached 10 minutes from the core of Khartoum city. This hospital is next door to Omdurman Hospital since it used to be the gynecological and obstetric department of Omdurman Hospital. The hospital site face wide unpaved roads in three sides.

Lay-out of Hospital Building



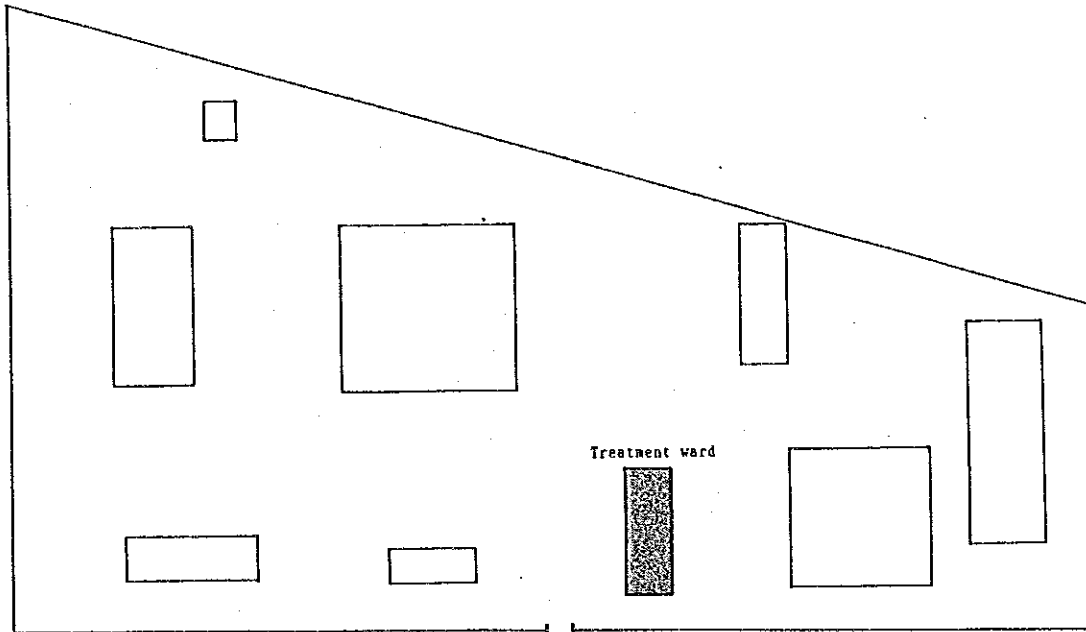
Locations of Installing Main Equipment



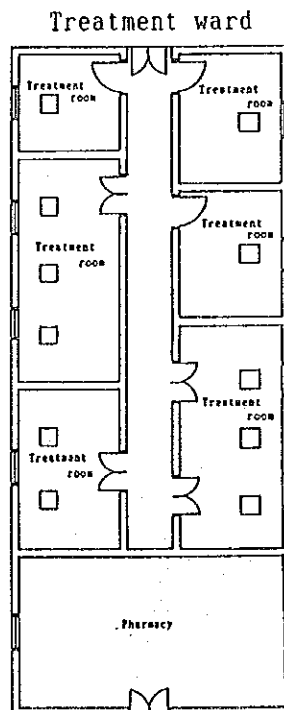
6. Khartoum Dental Hospital

This hospital is located in the centre of Khartoum city, and medical facilities such as Khartoum Hospital and Isotope Hospital are concentrated near this Khartoum Dental Hospital. This hospital is the only one of this kind in the Sudan.

Lay-out of Hospital Building



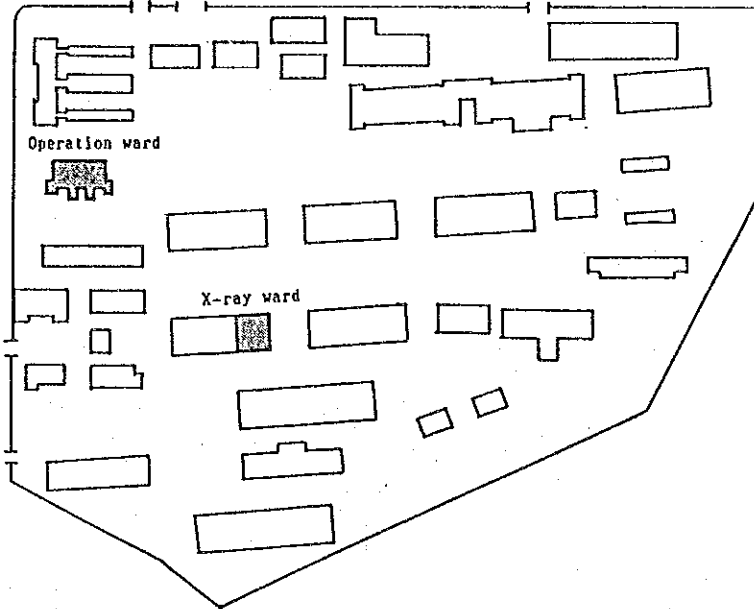
Locations of Installing Main Equipment



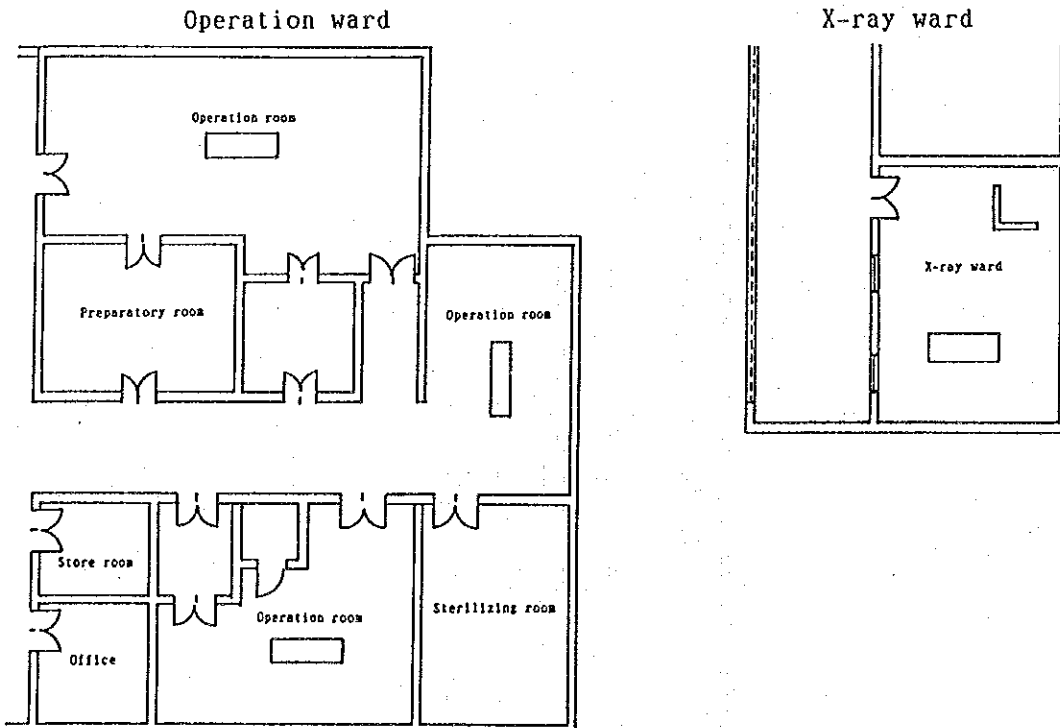
7. Wad Medani Hospital

This hospital is located at the core of Wad Medani city, capital of the Central State, which is 150km in direct distance, South east from Khartoum. The front gate faces asphalted road which go through the city zone from the trunk road. The site area of the hospital is vast enough to be 100,000m². Transportation from Khartoum is 200km southward by paved trunk road down to Port Sudan.

Lay-out of Hospital Building



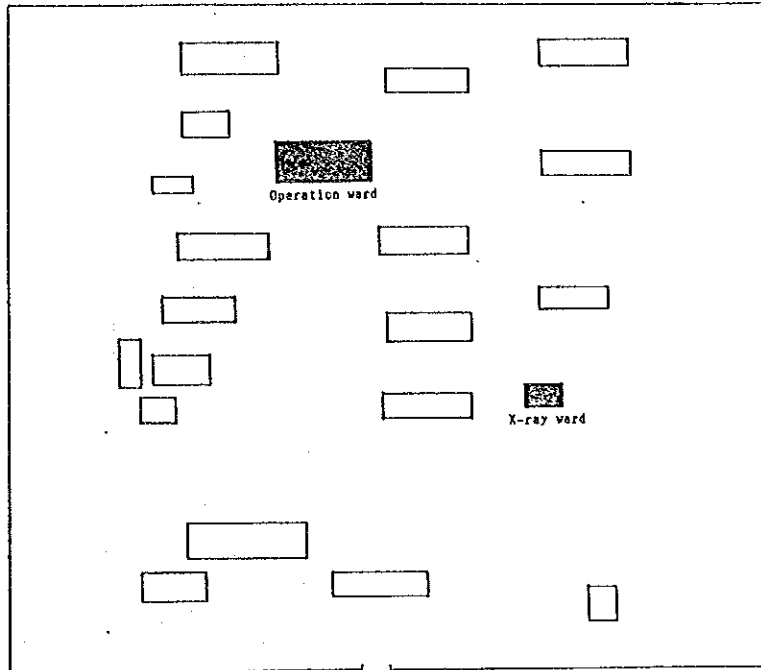
Locations of Installing Main Equipment



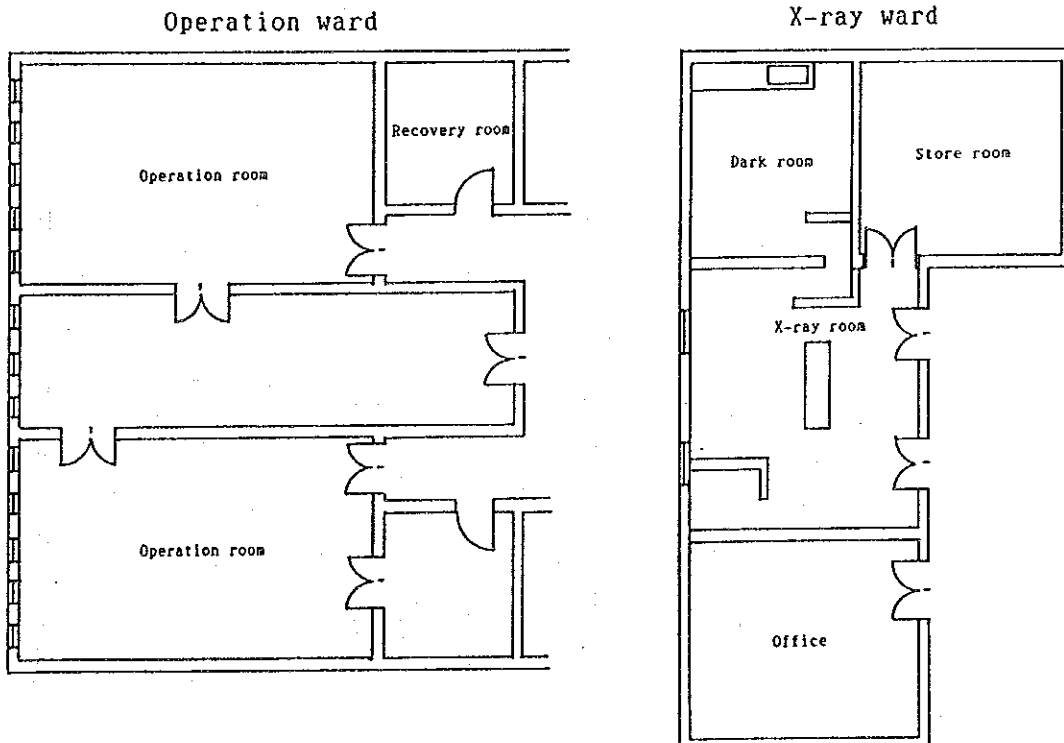
8. El Managil Hospital

This hospital is situated at the heart of El Managil city which is about 150km in direct distance south of Khartoum. The main entrance faces unpaved road of 8m width. This city can be reached from Khartoum via Wad Medani from which about 70km of unpaved road westward lead to the city.

Lay-out of Hospital Building



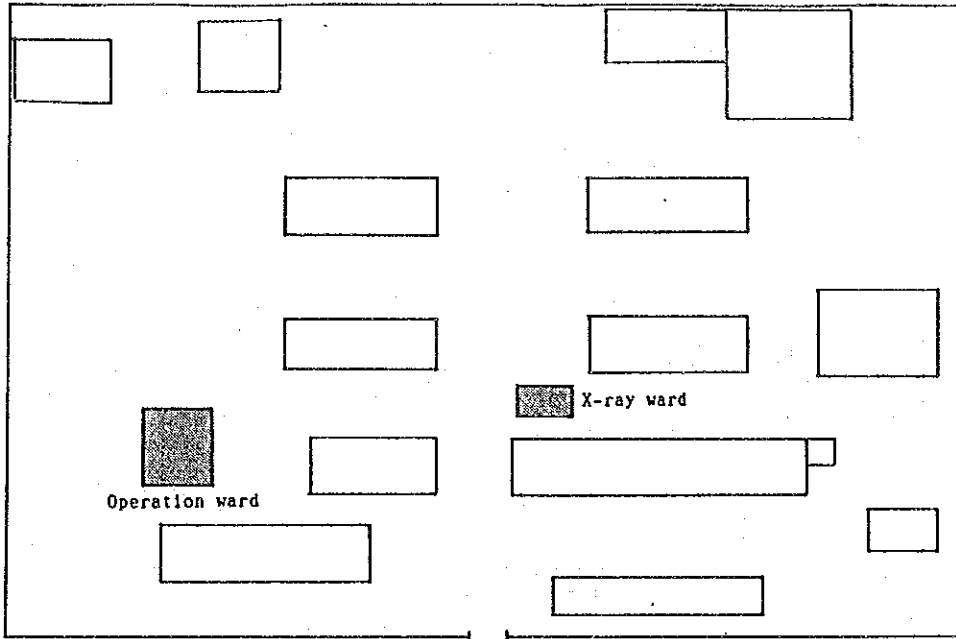
Locations of Installing Main Equipment



9. Rufaa Hospital

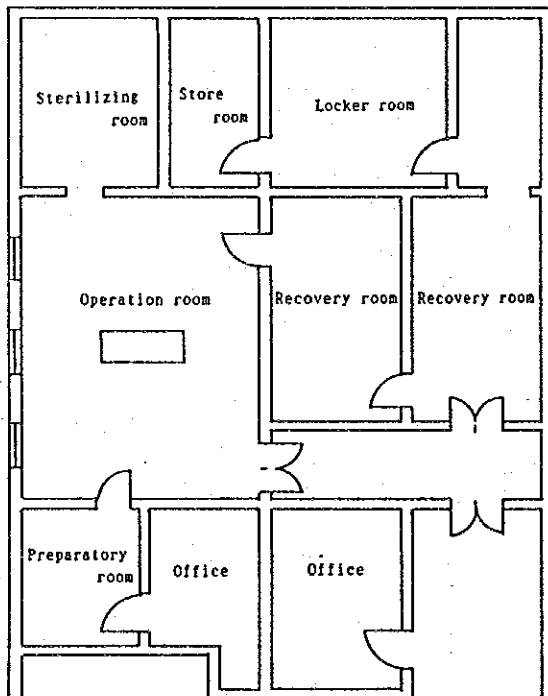
This hospital is situated at the heart of Rufaa city which is approximately 120km, in direct distance, southeast from Khartoum. Transportation can be made through trunk road about 150km southward and cross the Blue Nile by ferry.

Lay-out of Hospital Building

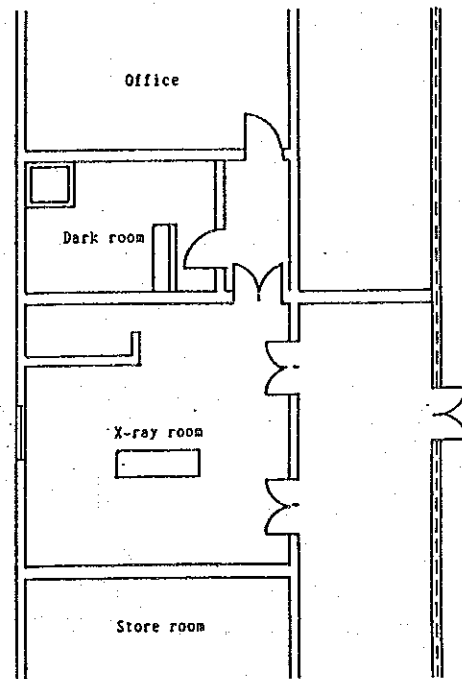


Locations of Installing Main Equipment

Operation ward



X-ray ward

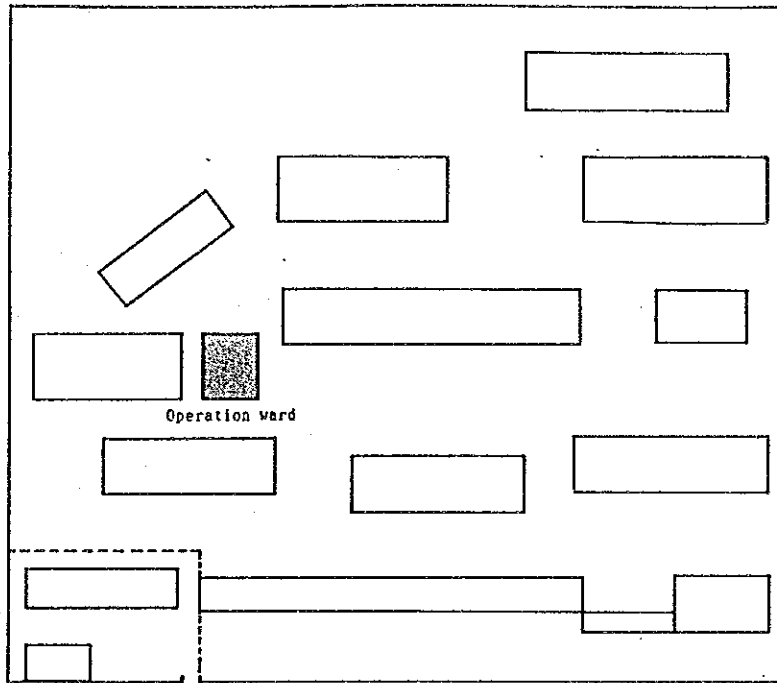


10. Aboushar Hospital

This hospital is located at the eastern part of Aboushar city which is about 100km, in direct distance, southeast of Khartoum. The front gate faces unpaved road which connect the city zone with the trunk road.

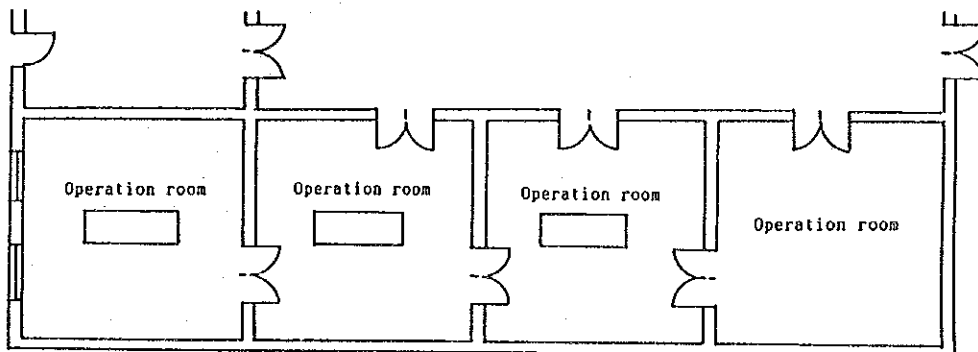
Transportation from Khartoum is to drive the paved Wad Medani highway for the distance of about 120km southward and go unpaved road for about 10 minutes by car westward.

Lay-out of Hospital Building



Locations of Installing Main Equipment

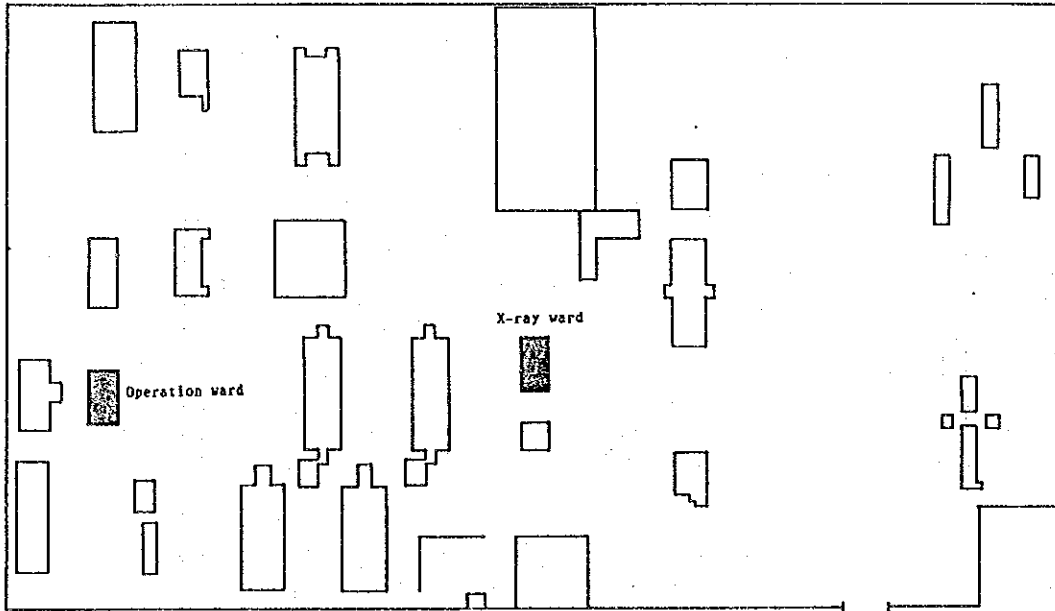
Operation ward



11. Sennar Hospital

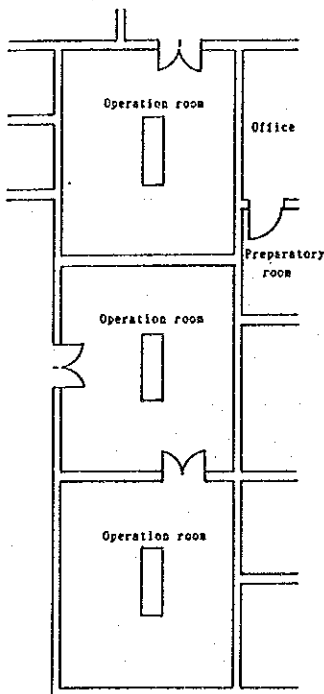
This hospital is situated at the heart of the Sennar city which is about 250km southeast from Khartoum. The front entrance faces unpaved road of 7m width. Transportation from Khartoum is to drive a paved trunk road Southward. Sennar city faces a man-made lake which was constructed for the purpose of irrigation of Gezira district which is one of the principal agriculture areas in Sudan.

Lay-out of Hospital Building

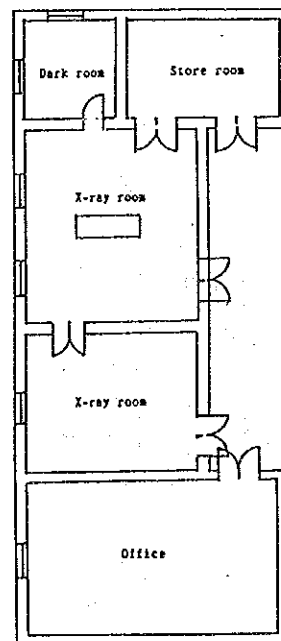


Locations of Installing Main Equipment

Operation ward



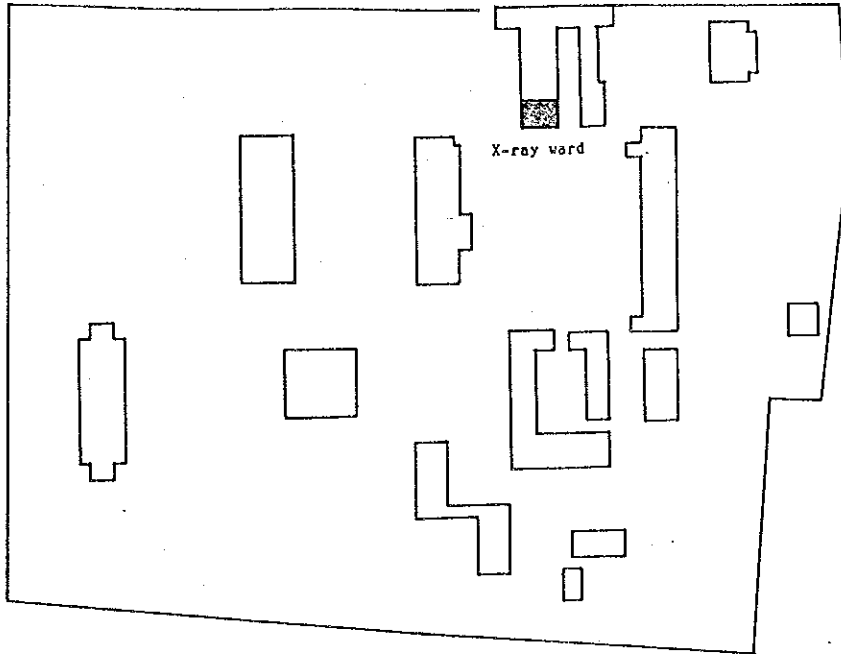
X-ray ward



12. Singa Hospital

This hospital is located at the core of Singa city which is 300km south-southeast from Khartoum. The front entrance faces a wide unpaved road. The city can be reached by going El Demazin road for 80km from Sennar.

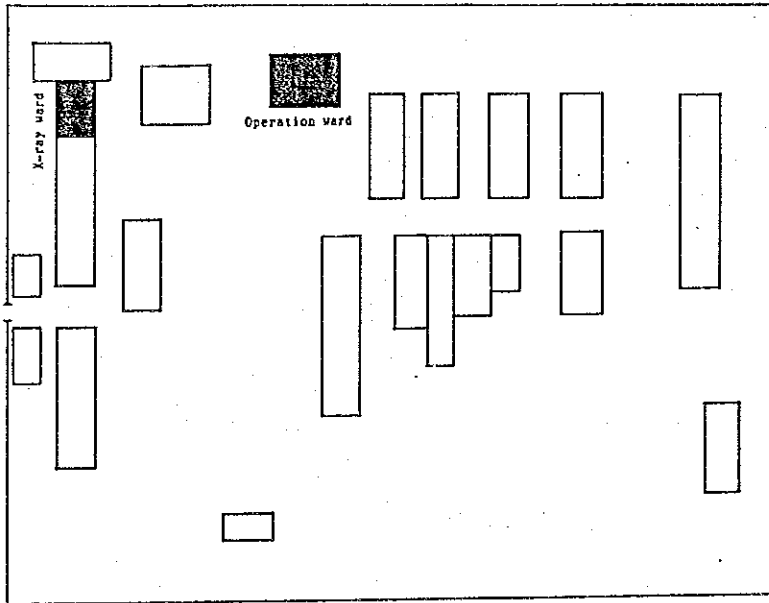
Lay-out of Hospital Building



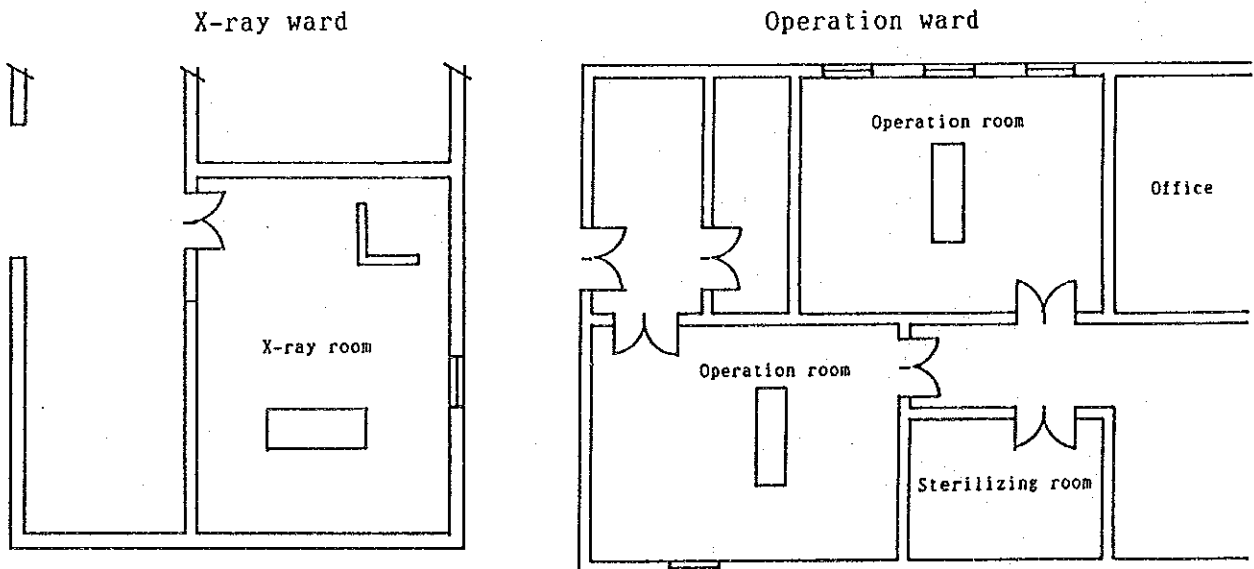
13. El Demazin Hospital

This hospital is located at the core of El Demazin city, Key city of Central State, which is 500km south-southeast from Khartoum. The main gate of the hospital faces partially paved road of 8m width. Transportation from Khartoum is that the paved trunk road is used until Singa and then unpaved road is used for 200km southward.

Lay-out of Hospital Building



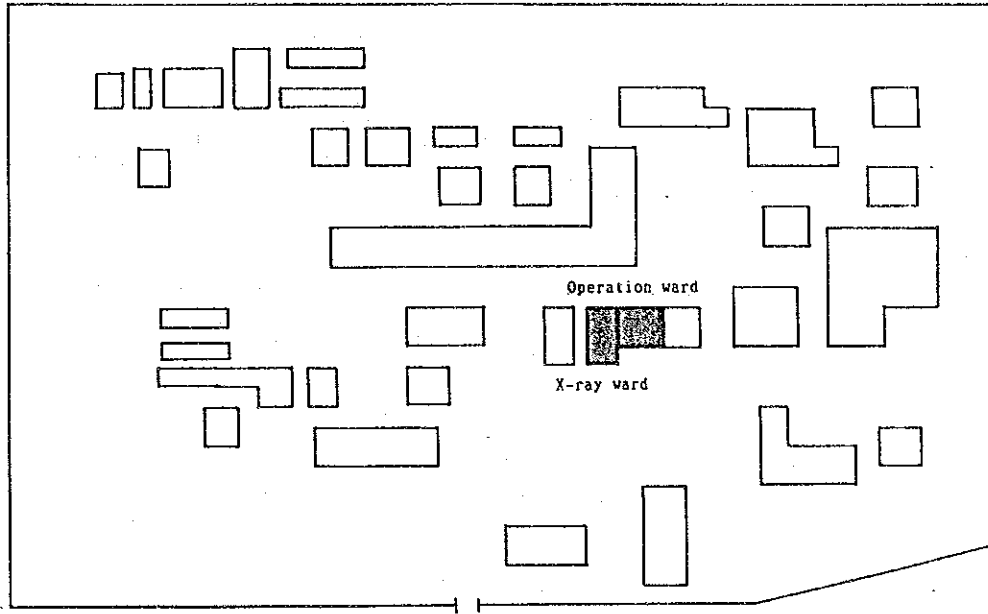
Locations of Installing Main Equipment



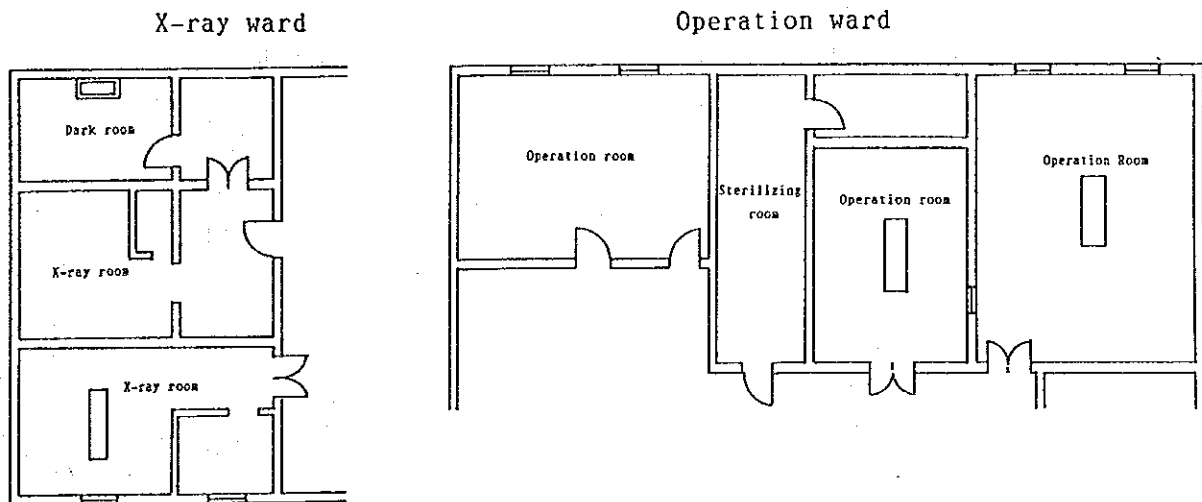
14. Kowsti Hospital

This hospital is situated at the centre of Kowsti city which is 300km south from Khartoum. The front entrance faces paved road of 100m width. Transportation from Khartoum is that newly constructed road along the White Nile is used for 350km southward.

Lay-out of Hospital Building



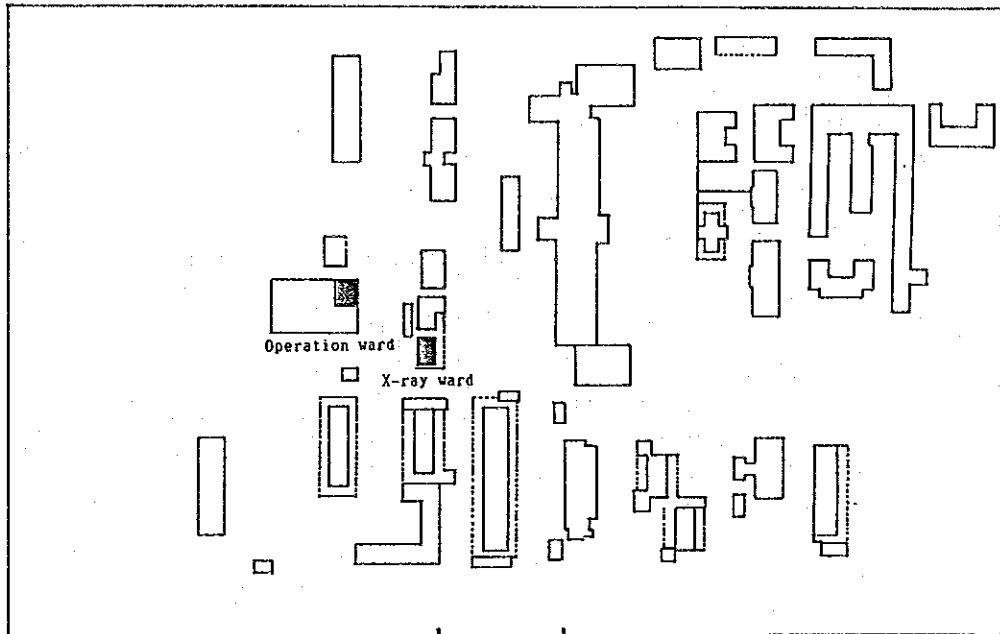
Locations of Installing Main Equipment



15. Atbara Hospital

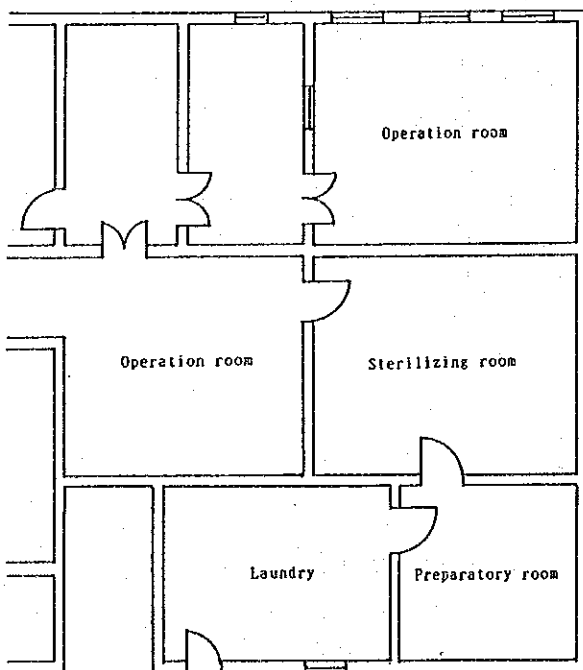
This hospital is located at the heart of Atbara city which is 300km northeast from Khartoum. The front entrance faces wide unpaved road. Transportation from Khartoum is that either unpaved road of bad condition along the River Nile is used or the railway in parallel with the road is used.

Lay-out of Hospital Building

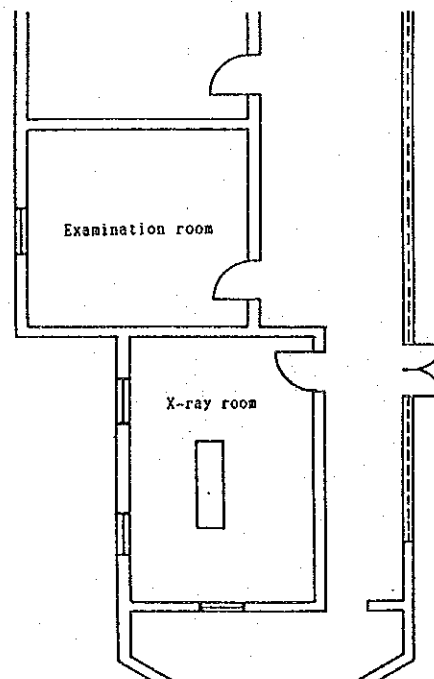


Locations of Installing Main Equipment

Operation ward



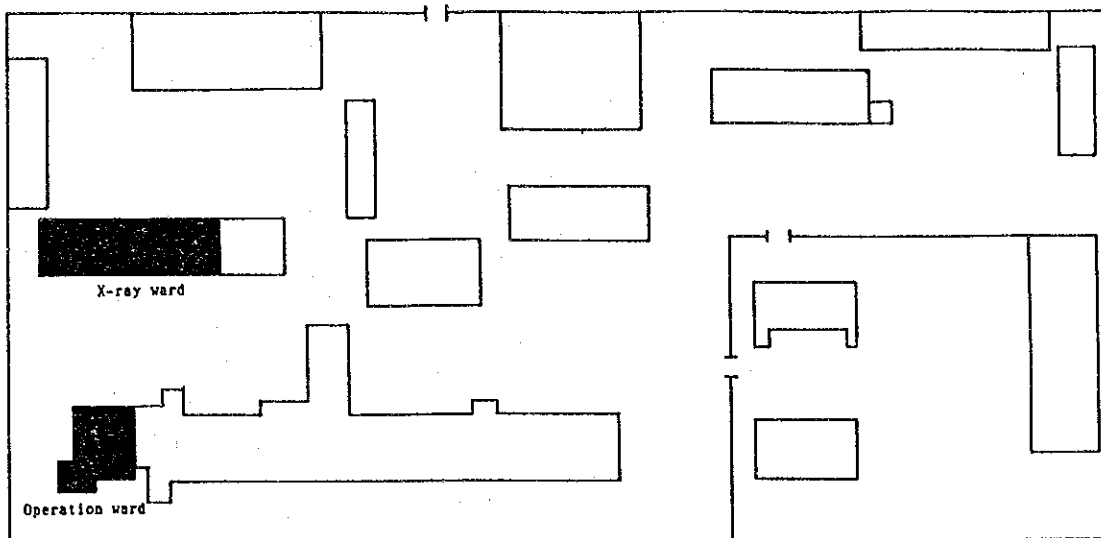
X-ray ward



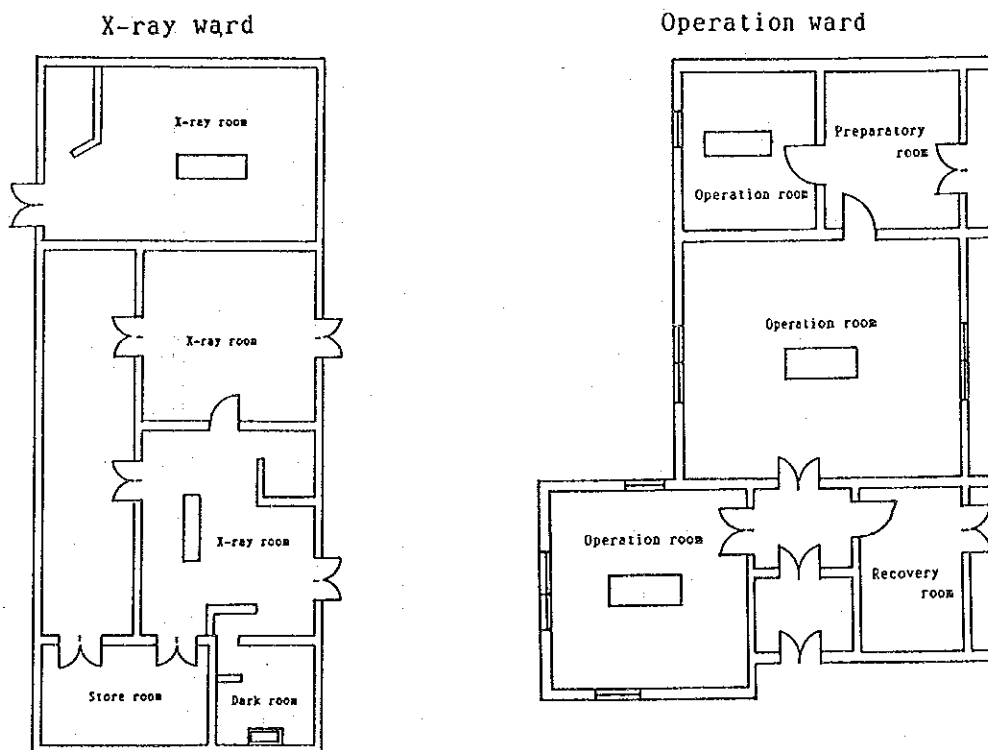
16. Shandi Hospital

This hospital is located in the centre of the Shandi city which is 200km northeast of Khartoum. The main gate faces unpaved road of 20m width. Transportation from Khartoum is that either unpaved road of inferior condition is used or the railway in parallel with the road is used.

Lay-out of Hospital Building



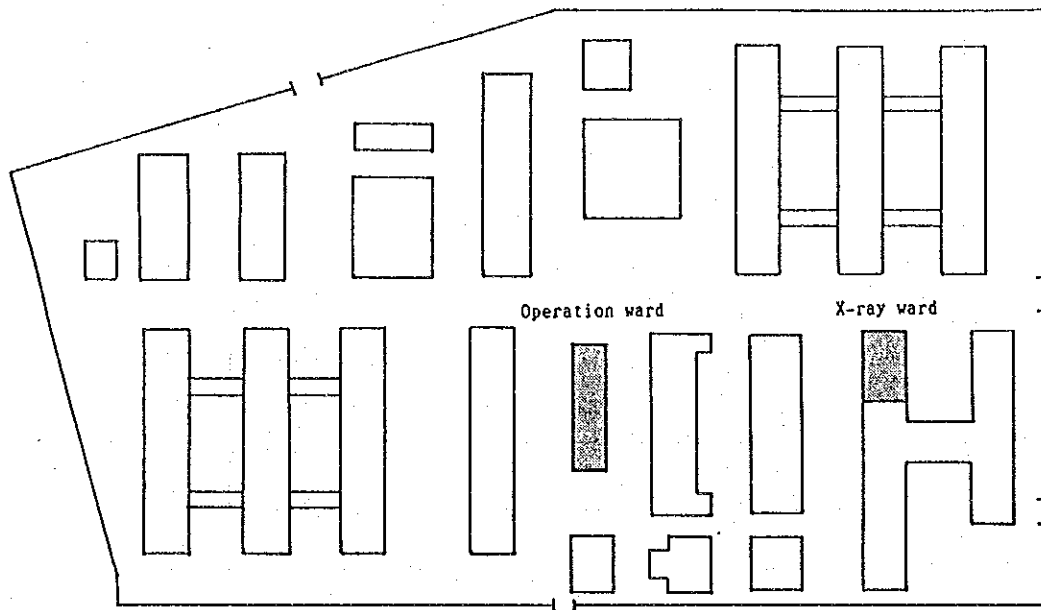
Locations of Installing Main Equipment



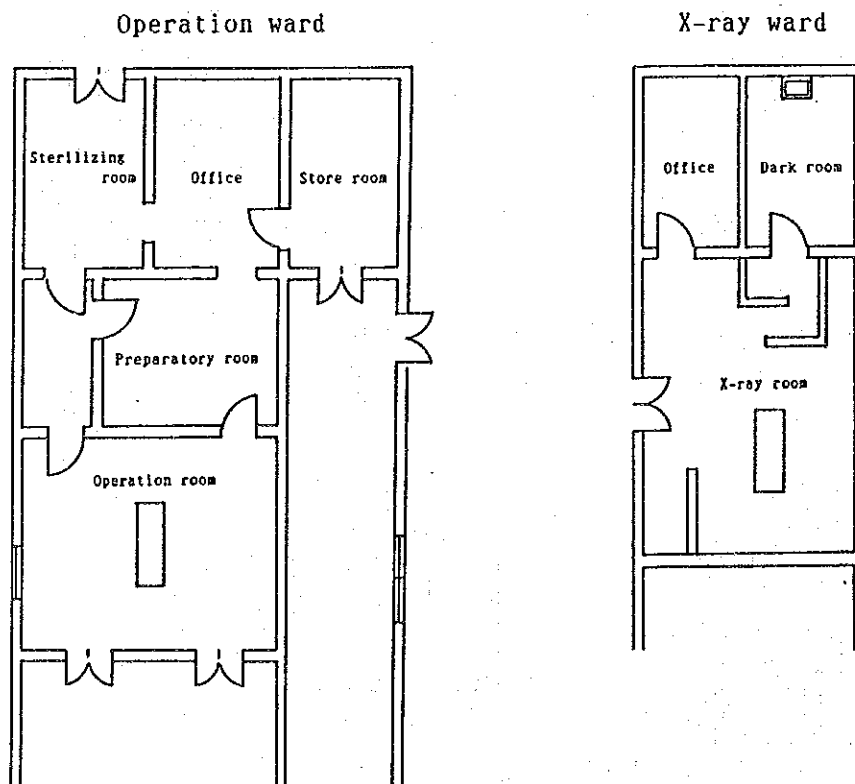
17. Doungoula Hospital

This hospital is situated at the heart of Doungoula city, Key city of Northern State, which is 450km north-northwest from Khartoum. The front entrance faces wide unpaved road. Transportation from Khartoum is that cargo truck is used going through a desert for 200km westward via Karima city.

Lay-out of Hospital Building



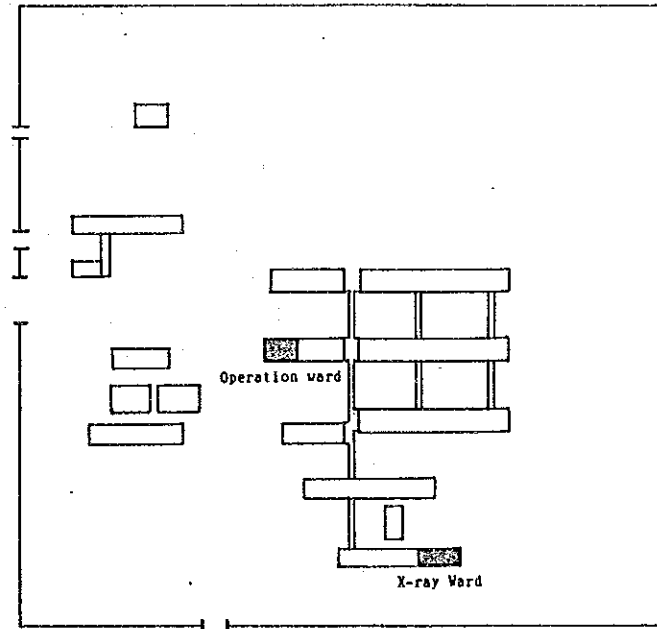
Locations of Installing Main Equipment



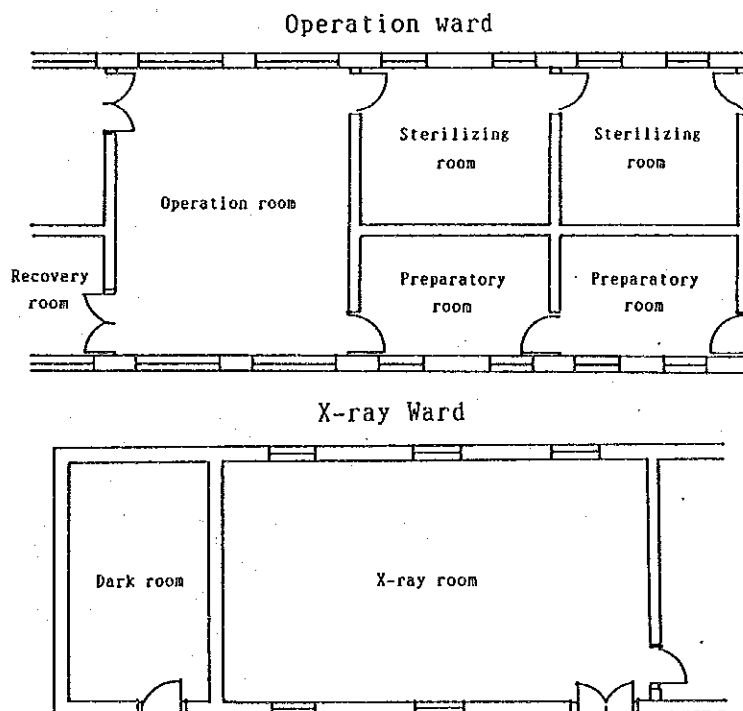
18. Marawi Hospital

Present hospital is situated at the centre of Marawi city which is about 350km north from Khartoum. The new hospital building under construction is located in the suburbs of the city. Present hospital is scheduled to move to the new building by March 1992. Transportation from Khartoum is that either road of rough condition along the Nile River is used until reaching Karima city located at the right side of the Nile or the railway in parallel with the road is used, and then ferry boat is used across the Nile.

Lay-out of New Hospital Building



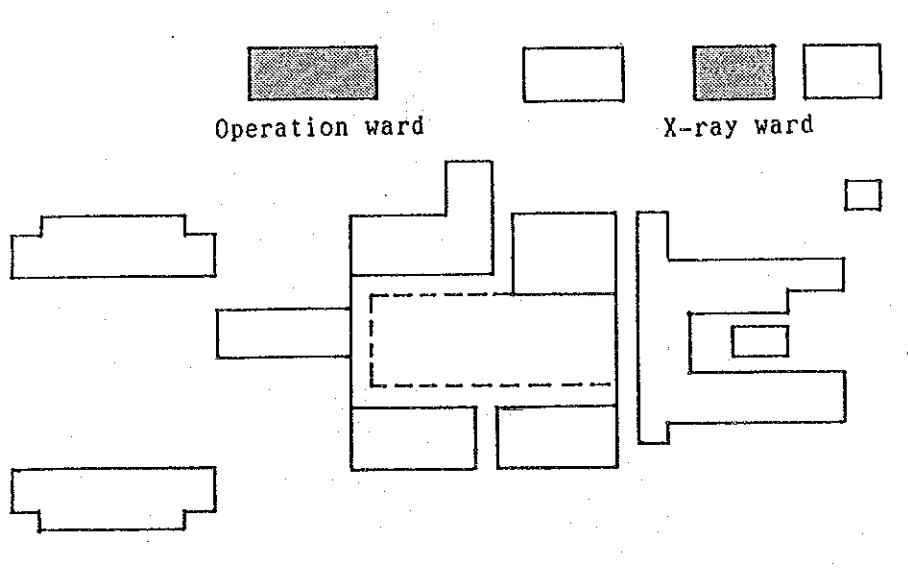
Locations of Installing Main Equipment



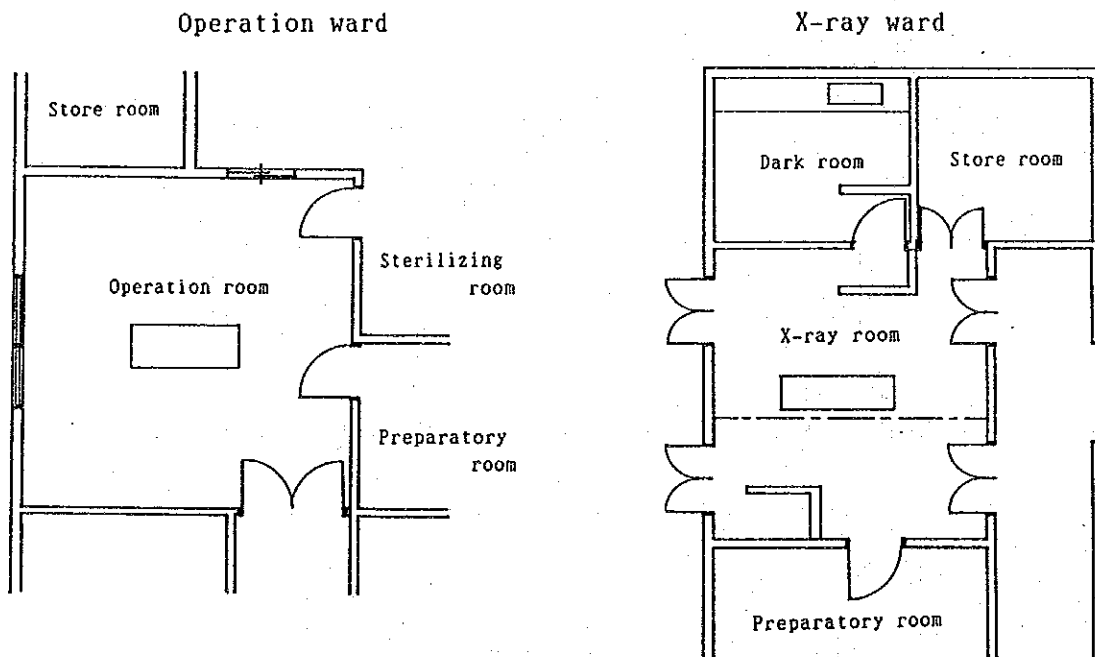
19. Karima Hospital

This hospital is situated at the centre of Karima city which is about 350km north from Khartoum. The front entrance and the sides faces unpaved roads of 20m width and of 5m width respectively. Transportation from Khartoum uses either un-paved rough road along the Nile River or railway in paralleled with the road.

Lay-out of Hospital Building



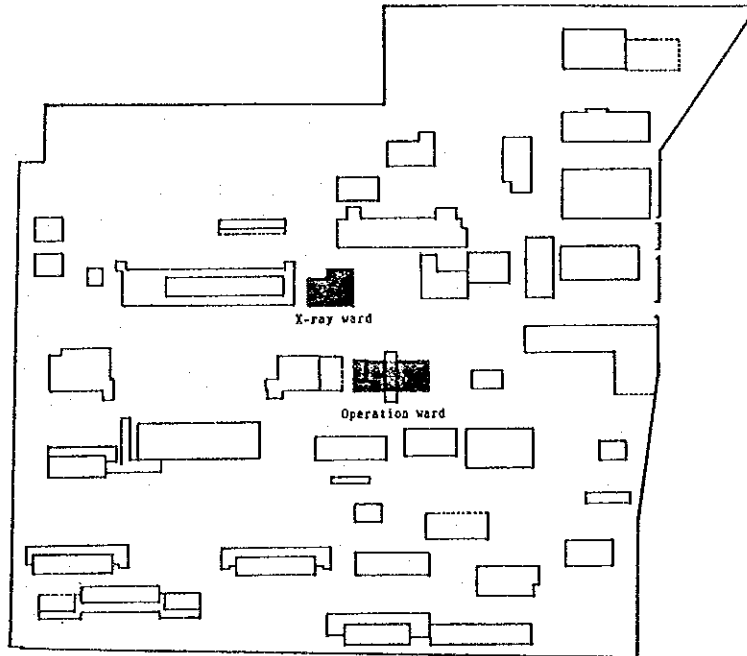
Locations of Installing Main Equipment



20. Kassala Hospital

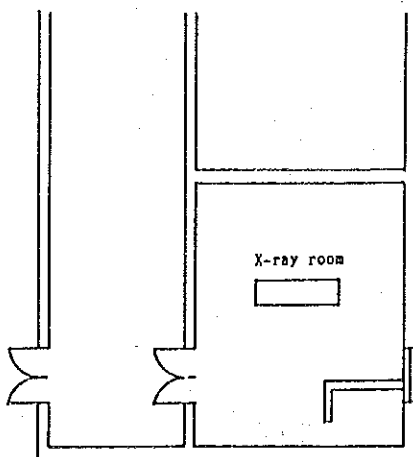
This hospital is located at eastern part of Kassala city which is about 450km east from Khartoum. The front entrance faces paved road of 10m width. Kassala city is near the boarder of Ethiopia, therefore the refugees has rapidly been increased recently. Transportation from Khartoum uses paved high way to Port Sudan going about 1,000km to reach Kassala.

Lay-out of Hospital Building

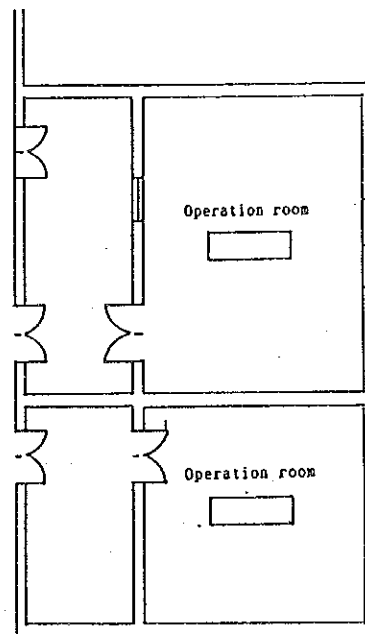


Locations of Installing Main Equipment

X-ray ward



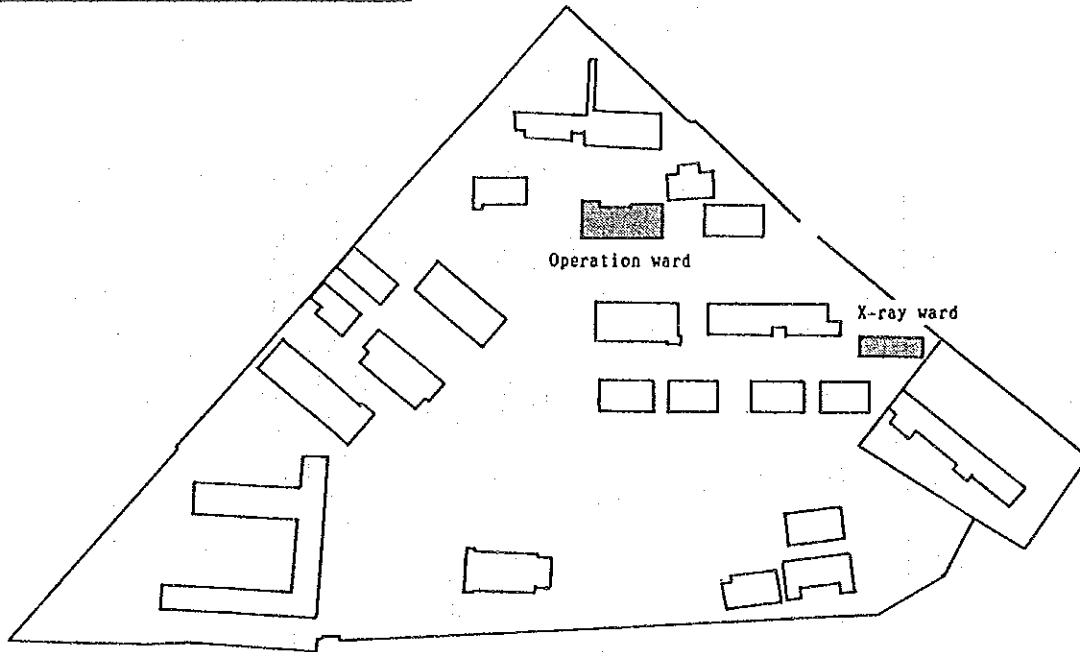
Operation ward



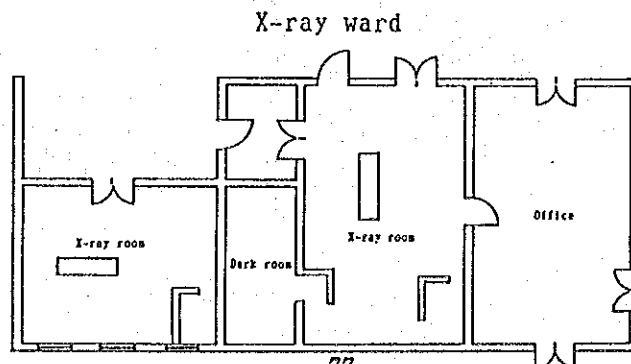
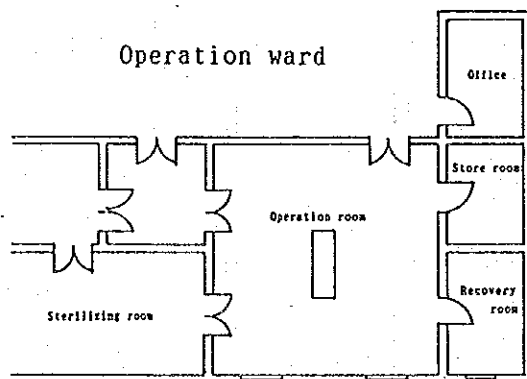
21. El Gadarif Hospital

This hospital is situated at the heart of El Gadarif city which is about 350km east-southeast from Khartoum. The hospital is connected with unpaved approach road of 4m width. This city is near the Ethiopian boarder therefore the refugees has rapidly been increased recently. Transportation from Khartoum uses paved high way to Port Sudan going about 700km to reach El Gadarif.

Lay-out of Hospital Building



Locations of Installing Main Equipment



2-5-3 Table of Outline of the Proposed Hospital of the Project (1)

Name of Hospital	Khartoum Hospital	Isotope Hospital	Khartoum Dental Hospital
Status	General Hospital and Teaching Hospital	Speciality Hospital and Teaching Hospital	Dental Speciality Hospital and Teaching Hospital
Location	Khartoum city, Khartoum State	Khartoum city, Khartoum State	Khartoum city, Khartoum State
Year of foundation	1909	1967	1971
No. of Beneficiary	25 million for Khartoum State and all country as a national referral hospital.	25 million for Khartoum State and all country only one cancer centre	25 millions for Khartoum state and all country as only one dental speciality hospital
No. of Bed	800	60	24
No. of staff Doctor, Specialist, Nurse, Paramedical	Doctor; 300, Specialist; 82, Nurse; 600, Paramedical; 100	Doctor; 15, Specialist; 5, Nurse; 50, Paramedical; 40	Doctor; 56, Specialist; 11, Nurse; 40, Paramedical; 20
No. of Outpatient	3,000/day	200/day	350/day
No. of Inpatient	112,362/year	4,800/year	1,360/year
Medical Services	Existing Department; Medicine, Surgery, Paediatrics, OBGY, Ophtalmology, Radiology Psychognosis, Urology and Outpatient Dept. with Emergency service Dept. Working as general hospital and a national referral hospital.	Provision of radiotherapy and nuclear medicine facilities. Training for medical students, radiographers and nurses.	Dental special service as only one referral center in the country. Major service for outpatient but is provided with oral surgery function for oral cancer etc.
No. of Operation	12,120/year	2,200/year	544/year
No. of x-ray films	120,000/year	2,500/year	9,000/year
Major Diseases of Inpatient	1. Malária, 2. G.E. and Diarrheal Diseases 3. Anaemia, 4. Heart Diseases, 5. Appendicitis	Males; 1. Ca. Nasopharynx 2. Lymphosarcoma Glands 3. Skin, Female; 1. Breast, 2. Cervix, 3. Ovary	1. Infections (30%), 2. Cystis (20%), 3. Tumor (30%)
Building of Hospital	Existing; 4 stories main building, operation ward, X-ray wards, Psychognosis ward, Kitchen ward, Laundry, Isolation ward. Old hospital wards, Nurse school and other hospital building with total floor; 40,000m ² . Orthopedic ward and Emergency ward under construction.	Existing; 4 stories main building with 1 story basement. Located next to Khartoum Hospital as a speciality hospital being independent from Khartoum Hospital.	Existing; Outpatient ward, Operation ward, X-ray ward, Inpatient ward, Paediatric ward. Maintenance of facilities is good.
Situation of existing building and damage by rainfall and flood	Major damage by water leakage from roof. Partly flood over floor and partly damage of walls and ceilings. All parts of building damaged now repaired.	Major damage of basement by flood and leakage of roof. All building damaged by flood now repaired.	There was small damage by rainfall and flood
Major equipment and result of damage by rain	* X-ray unit (stationary); 8 sets (5 old, not-functioning) * -do- (mobile); 4 sets (all old, not functioning) * Ultra sound scanner (functioning) * Autoclave (large); 10 sets (9 old, not functioning) * Operation table; 6 sets (3 old not functioning by rain fall) * Operation lamp 6 sets (4 old, not functioning by rain fall) * Laundry; Washing machine (3 sets old, not functioning) Many equipment being old or damaged by rainfall flood, but large number of them have been not repaired or replaced.	* Linear accelerator * Cobalt therapy; 2 sets (repaired, functioning) * Deep x-ray therapy unit; 1 set (not repaired) * Gamma Camera; 1 set (repaired but not properly functioning) * Ultra sound scanner; 1 set (functioning) * X-ray unit (mobile); 1 set (not properly functioning) All major equipment damaged by flood but most of them being repaired.	* Dental unit; 36 sets (all units have trouble with any part on the unit except patient chair) * Dental x-ray units; 2 sets (not functioning) * Operation table; 2 sets (old not functioning) * Operation lamp; 2 sets (old not properly functioning) * Electrical surgery unit; 2 sets (old, not properly functioning) Major equipment being damaged by rain fall and old and not properly functioning.

2-5-3 Table of Outline of the Proposed Hospital of the Project (2)

Name of Hospital	Khartoum North Hospital	Omdurman Hospital	Maternity Hospital
Status	General Hospital and Teaching Hospital	General Hospital and Teaching Hospital	OBGY Speciality Hospital
Location	North Khartoum city, Khartoum state	Omdurman City, Khartoum State	Omdurman City, Khartoum State
Year of foundation	1949	1918	1956
No. of Beneficiary	2.6 million for North Khartoum city	2 million for Omdurman city and Khartoum State	1.5 million for Omdurman city and Khartoum State
No. of Bed	500	650	122
No. of staff Doctor, Specialist, Nurse, Paramedical	Doctor: 102, Specialist: 24, Nurse: 301, Paramedicals: 209	Doctor: 225, Specialist: 31, Nurse: 356 Paramedical: 551	Doctor: 8, Specialist: 2, Nurse: 45, Paramedical: 6
No. of Outpatient	1,000/day	2,500/day	300/day
No. of Inpatient	18,000/year	15,811/year	7,645/year
Medical Services	Existing Department; Medicine, Surgery, Paediatrics, OBGY, Ophtalmology, and Outpatient Dept. with Emergency service Dept. Provision of MCH and EPI services.	Existing Department; Surgery, Medicine, Paediatrics, OBGY, Ophtalmology. For outpatient Dept; Dermatology, NET, and Emergency Dept. working as General hospital	Care of maternity, infant, delivery and Obstetric care as a OBGY speciality hospital.
No. of Operation	11,440/year	8,078/Year	1,117/year
No. of x-ray films	12,000/year	12,053/year	2,472/year
Major Diseases of Inpatient	1. Malaria, 2. Pneumonia, 3. Infection, 4. Typhoid, 5. Malnutrition	1. Malaria, 2. Pneumonia, 3. Infection, 4. Typhoid, 5. G. E. Diarrheal Diseases	1. Malária, 2. Eclampsia, 3. Ante-Partumorrage 4. Blood Deficiencies, 5. Heart Diseases
Building of Hospital	Existing; Main building (with female Surgery ward, Paediatrics, Administration) and Outpatient ward, Operation ward, Ophtalmology ward, Pharmacy, Dental Dept., Dermotology, Emergency Dept., and Nurse school etc. composed of more 30 buildings	Existing; Operation ward, Emergency ward, Ophtalmology, ENT ward, X-ray ward, OBGY ward, Medecine ward, Outpatient ward, Lab., Laundry, Kitchen etc. composed of more 30 buildings. Partly 4 stories. New buildings for 3 stories and 4 stories under construction.	Existing; 3 stories main building with some annex buildings. This hospital became independent from Omdurman Hospital.
Situation of existing building and damage by rain-fall and flood	Damaged by water leakage from roof. Partial damage of ceilings and walls and damage of floors and walls by an upheaval of ground.	Flood above floor ,water leakage from roof, Partly damage of ceilings, walls and floors. Electric suspension for one month. Most damaged parts being repaired except drainage.	Damaged by water leakage from the roofs. The damage has been repaired.
Major equipment and result of damage by rain	X-ray unit; 3 sets (1 set only functioning) Operation tables, Lamps and Anesthesia machines being functioning in good condition. Equipment in OBGY Operation rooms (2 rooms) being old and need replacement urgently.	* X-ray units; 3 sets old (only 1 functioning) * Operation tables; 4 sets old (all being partly not functioning) * Operation lamps; 4 sets, same as above items * Anesthesia machine; 3 sets, same as above item Most of defects by leakage or being old could not be repaired due to no supply of replacement parts.	* Operation tables; 3 sets (functioning) * Operation lamps; 3 sets (old) * Ultra sound scanner; 1 set (functioning) * Laundry machines(Washing, Drying and pressing) all functioning) * Blood bank refrigerator; 1 set (functioning) Equipment have been maintained in good condition as well as properly repaired.

2-5-3 Table of Outline of the Proposed Hospital of the Project (3)

Name of Hospital	Wad Medani Hospital	El Managil Hospital	Rufaa Hospital
Status	General Hospital, Teaching Hospital	General Hospital	General Hospital
Location	Wad Medani City, Central State	El Managil City, Central State	Rufaa City, Central State
Year of foundation	1927	1960	1954
No. of Beneficiary	2 million for Wad Medani City and Central State	1 million in and around El Managil city	1 million in and around Rufaa city
No. of Bed	800	200	196
No. of staff Doctor, Specialist, Nurse, Paramedical	Doctor; 133, Specialist; 45, Nurse; 522, Paramedical; 146	Doctor; 9, Specialist; 5, Nurse; 179, Paramedical; 20	Doctor; 11, Specialist; 5, Nurse; 60, Paramedical; 15
No. of Outpatient	1,000/day	about 350/day	600/day
No. of Inpatient	60,000/year	7,000/year	7,200/year
Medical Services	Existing Department; Medicine, Surgery, Paediatrics, OBGY, Chest, Dermatology, Psychognosis, ENT, Outpatient, Emergency as a general hospital.	Existing Department; Medicine, Surgery, OBGY, Paediatrics, Dental, Ophtalmology, Outpatient and Emergency Dept. as general hospital	Existing; Medecine, Surgery, Paediatrics, OBGY, Ophtalmology. Dental and Emergency Dept. as Outpatient services
No. of Operation	20,000/year	4,000/year	4,000/year
No. of x-ray films	24,000/year	-	6,000/year
Major Diseases of Inpatient	1. Malaria 2. Infection 3. T.B. 4. Circulatory Diseases 5. Schistosomiasis	1. Malaria, 2. T.B., 3. Typhoid, 4. Bilharziasis 5. Gastro-Diseases	1. Malaria, 2. Typhoid, 3. Bilharziasis 4. Malnutrition, 5. T.B.
Building of Hospital	Existing; Central Inpatient ward with Outpatient ward, Female medecine ward, Operation ward, Paediatrics ward, Ophtalmology ward, Emergency ward, Dental ward, New Operation ward, Blood bank ward, Nurse school etc. with more 30 buildings as a big general hospital.	Existing; Old Operation ward with Outpatient ward, Lab. ward, X-ray ward, Medicine ward, Operation ward, Outpatient ward, ENT ward, and Nurse school. New Inpatient ward under construction	Existing; Outpatient ward, Male and Female Inpatient ward, ENT ward, 2nd class Inpatient ward, Dental ward, Blood bank ward and Nurse school etc.
Situation of existing building and damage by rainfall and flood	Damaged by flood over floor for 60cm and water leakage from roofs. Partly broken for roofs, floor, walls and ceilings. All parts damaged under repairing.	Flood above floor for 40cm. Partly walls, ceilings damaged. These are under repairing	Walls and floors were damaged by water leakage from roofs. Fences around the hospital were completely fell down.
Major equipment and result of damage by rain	* X-ray unit; 1 set (old) * Operation tables; (old and partly not functioning) * Anesthesia machine; old and partly not functioning) * Autoclave (large); old, not functioning. Many equipment being so old that spare of parts are not available now.	* X-ray unit; 1 set (old, not functioning) * Operation tables; 2 sets (old, not functioning) * Operation lamp; 1 set (old, not functioning) * Anesthesia machine; 1 set (old, not functioning) * Autoclave; 2 sets (old, not functioning) Most of all equipment were flooded for 40cm height and also damaged by water leakage from ceilings. All machines are old and therefore replacement parts are not available.	* X-ray unit; 1 set (old and not properly functioning) * Operation table; 1 set (old and not properly functioning) * Operation lamp; 1 set (same as above) * Anesthesia machine; 1 set (same as above) * Dental unit; Partly not functioning Most of all equipment damaged by water leakage. Since they are so old, replacement parts are not available for repairing. No equipment yet replaced.

2-5-3 Table of Outline of the Proposed Hospital of the Project (4)

Name of Hospital	Aboushar Hospital	Sennar Hospital	Singa Hospital
Status	General Hospital	General Hospital	General Hospital
Location	Aboushar City, Central State	Sennar City, Central State	Singa City, Central State
Year of foundation	1929	1936	1956
No. of Beneficiary	500 thousand in and around Aboushar city	1 million in and around Sennar city	1 million in and around Singa city
No. of Bed	300	427	200
No. of staff Doctor, Specialist, Nurse, Paramedical	Doctor; 24, Specialist; 20, Nurse; 100 Paramedical; 15	Doctor; 33, Specialist; 11, Nurse; 261 Paramedical; 67	Doctor; 13, Specialist 4, Nurse; 155 Paramedical; 14
No. of Outpatient	617/day	1,000/day	1,000/day
No. of Inpatient	13,000/year	24,000/year	20,000/year
Medical Services	Existing Department; Medicine, Surgery, OBGY, Dental, ENT, Emergency for Outpatient Dept. as general hospital	Existing Department; Medicine, Surgery, Paediatrics, OBGY, Chest, Urology, Psychognosis, Orthopedics, Dermatology, Dental and Emergency for Outpatient Dept. as a general hospital	Existing Department; Medecine, Surgery, Paediatrics, OBGY, Chest, Dental, Ophtalmology and Emergency for Outpatient services as a general hospital
No. of Operation	2,820/year	7,840/year	2,000/year
No. of x-ray films	5,230/year	28,000/year	16,000/year
Major Diseases of Inpatient	1. Malaria, 2. Gastro Diseases, 3. Heart Diseases 4. Bilharziasis, 5. Typhoid	1. Malaria, 2. Malnutrition 3. G. E. & Diarrheal Diseases 4. Traffic Accident 5. Infection	1. Malaria, 2. G. E. & Diarrheal Diseases, 3. Hepatitis 4. Respiratory Diseases, 5. Anemia
Building of Hospital	Existing; Central administration ward with Outpatient ward, Male and Female Medecine ward ENT ward, Male and Female Outpatient ward, 1st class Inpatient ward etc.	Existing; 2 wards of Male Inpatient of 2 stories Female Inpatient ward, OBGY ward, Outpatient ward, X-ray ward, T.B. ward, 2nd Class Inpatient ward, Nurse school. Many new wards under construction.	Existing; Main administration ward, Outpatient ward, X-ray ward, Blood bank, Orthopedic ward, Pharmacy and a newly constructed Operation ward.
Situation of existing building and damage by rainfall and flood	Damaged by water leakage from roofs. The damage has been repaired except some portions.	Partly roofs and ceilings fell down by rain fall. Now all of them have been repaired.	Damaged by flood over floor for 1 m. and water leakage from roof etc. All damaged parts have been repaired.
Major equipment and result of damage by rain	* X-ray unit; old, functioning * Autoclave(large); functioning * Operation table; old, functioning * Operation table(minor); old, not functioning * Anesthesia machine; old, functioning * Many equipment damaged by water leakage but most of them have been repaired and functioning properly.	* X-ray unit; 3 sets (1 set not functioning) * Operation tables; 4 sets (all old, functioning) * Operation lamp; 2 sets (old, functioning) * Autoclave; 1 set (old, functioning) * Operation lamp(minor); not properly functioning Many equipment had damage by water leakage but most of them have been repaired by C.M.S. and with financial assistance of local residents.	* X-ray unit; 2 sets (1 only functioning) * Operating table; functioning * X-ray unit(minor); not functioning * Operation lamp(major and minor); functioning * Anesthesia machine; functioning * Autoclave; functioning Equipment were damaged by water leakage and most of them have been repaired but some equipment not repaired due to no spare parts.

2-5-3 Table of Outline of the Proposed Hospital of the Project (5)

Name of Hospital	El Damazin Hospital	Kowsti Hospital	Atbara Hospital
Status	General Hospital	General Hospital	General Hospital
Location	El Damazin City, Central State	Kowsti City, Central State	Atbara City, Northern State
Year of foundation	1962	1940	1909
No. of Beneficiary	600 thousand in and around El Damazin city	800 thousand in and around Kowsti city	600 thousand in and around Atbara city
No. of Bed	200	303	400
No. of staff Doctor, Specialist, Nurse, Paramedical	Doctor; 12, Specialist; 5, Nurse; 52, Paramedical; 6	Doctor; 12, Specialist; 7, Nurse; 58(+ 96 student nurse), Paramedical; 3	Doctor; 32, Specialist; 12, Nurse; 179 Paramedical; 64(incl. other staff)
No. of Outpatient	250/day	800/day	582/day
No. of Inpatient	20,000/year	24,233/year	11,810/year
Medical Services	Existing Department; Medecine, Surgery, Paediatrics, OBGY, Ophtalmology and Emergency Dept. for Outpatient services as a general hospital.	Existing Department; Medicine, Surgery, Paediatrics, OBGY, Ophtalmology, Chest. Male and Female Outpatient with Emergency Services as a general hospital	Existing Department; Medicine, Surgery, Paediatrics, OBGY, Chest, Ophtalmology, Dermatology, Psychogosis. General OPD and Referral OPD and Emergency Dept. as a general hospital
No. of Operation	1,970/year	2,460/year	9,600/year
No. of x-ray films	9,000/year	9,000/year	7,019/year
Major Diseases of Inpatient	1. Malaria, 2. Peneumonia 3. Typhoid 4. Injury, 5. Respiratory Diseases	1. Malaria, 2. Chest Diseases, 3. G.E. & Diarrheal Diseases 4. Asthma, 5. Typhoid	1. Malaria, 2. G.E. & Diarrheal Diseases 3. Chest Diseases, 4. Anemia, 5. Bilhaziasis
Building of Hospital	Existing; Surgery ward, Outpatient ward, Pharmacy, Lab. ward, Operation ward, Administration ward, Male and Female Medicine ward, ENT ward.	Existing; Operation and X-ray ward, Outpatient ward, Medicine ward, Blood bank, ENT ward, Pharmacy, Nurse school with 30 or more small buildings.	Existing; Male Inpatient ward, Outpatient ward, Ophtalmology ward, Dental ward, Paediatrics ward, X-ray ward, T.B. ward, Nurse school, Lab. ward and others. 1st Class and 2nd Class wards attached.
Situation of existing building and damage by rain-fall and flood	Damaged by water leakage from roofs. It has been repaired.	Main damage by water leakage from roofs. Some floors and wall were damaged by an upheaval of ground.	Floors and walls were partly damaged by water leakage from roofs. These are under repairing.
Major equipment and result of damage by rain	* X-ray unit; not properly functioning * Operation table; not functioning * Operation lamp(minor); not functioning * Autoclave(large); not functioning Equipment had big damage by water leakage and the engineers of C.M.S. have tried repairing of 4 times. But they can not repair them due to no spare parts.	* X-ray unit; 1 set (not properly functioning) * -do- (mobile); 1 set (old, not functioning) * Operation table; 2 sets (old not properly functioning) * Operation lamp; 2 sets (old not properly functioning) * Autoclave(large); 1 set (new functioning) Many equipment were damaged by water leakage. But they could not be repaired due to not spare parts.	* X-ray unit; old and not properly functioning * -do- (mobile); 2 sets (old, not functioning) * Operation tables; 2 sets (old, not properly functioning) * Operation lamp; 2 sets (not functioning) * Anesthesia machine; 2 sets (old, not properly functioning) * Autoclave(large); old, not functioning * Dental unit(new, not yet installed), but some parts being damaged Many equipment is old and no spare parts available.

2-5-3 Table of Outline of the Proposed Hospital of the Project (6)

Name of Hospital	Shandi Hospital	Doungoula Hospital	Marawi Hospital
Status	General Hospital	General Hospital	General Hospital
Location	Shandi City, Northern State	Doungoula City, Northern State	Marawi City, Northern State
Year of foundation	1917	1902	1905
No. of Beneficiary	750 thousand in and around Shandi city	200 thousand in and around Doungoula city	150 thousand in and around Marawi city
No. of Bed	400	204	89
No. of staff Doctor, Specialist, Nurse, Paramedical	Doctor; 57, Specialist; 19, Nurse; 240, Paramedical; 47	Doctor; 16, Specialist; 8, Nurse; 118, Paramedical; 35,	Doctor; 6, Specialist; 2, Nurse; 35, Paramedical; 15
No. of Outpatient	1,500/day	400/day	300/day
No. of Inpatient	-	6,175/year	2,500/year
Medical Services	Existing Department; Medicine, Surgery, Paediatrics, OBGY, ENT, Orthopedics. Dental and Emergency Dept. for Outpatient services as a general hospital	Existing Department; Medicine, Surgery, Paediatrics, OBGY, ENT, Dermatology, Psychognosis, Outpatient and Emergency as a general hospital.	Existing Department; Medicine, Surgery, Paediatrics, OBGY, Dental, Psychognosis, Emergency for Outpatient Services as a general hospital.
No. of Operation	5,000/year	1,500/year	500/year
No. of x-ray films	12,000/year	9,000/year	3,600/year
Major Diseases of Inpatient	1. Malaria 2. Pneumonia 3. Respiratory Diseases 4. G. E. & Diarrheal Diseases, 5. Malnutrition	1. Malaria, 2. Pneumonia, 3. Acute tonsillitis, 4. G. E. & Diarrheal Diseases, 5. Typhoid	1. Malaria, 2. G. E. & Diarrheal Diseases 3. Respiratory Diseases, 4. T.B., 5. Anaemia
Building of Hospital	Existing; 2 stories Medicine and Surgery ward, Dental ward, Blood bank, Outpatient ward, Lab. ward, ENT ward, Nurse school, Operation ward. Other new Inpatient ward under construction	Existing; Administration ward, Medicine, Surgery, Operation ward, OBGY ward, Paediatric ward, Blood bank. ENT ward, Ophthalmology ward, Medicine ward being under construction.	For Existing Hospital; Outpatient ward, Inpatient ward, Operation ward and others. For New Hospital; Outpatient ward, Male and Female Medicine wards, Surgery ward, OBGY ward, Paediatric ward composed of one story buildings in accordance with standard hospital plan of M.O.H. (90% completed).
Situation of existing building and damage by rainfall and flood	Damaged by flood over floor and water leakage from roofs. Floors, walls and ceilings were partly damaged. Most of these have been repaired.	Damage for building has been not heavy. All of them being repaired.	Floors, walls and ceilings were partly damaged by water leakage from roofs. Most parts damaged have been repaired. Hospital will move to new site soon.
Major equipment and result of damage by rain	* X-ray units; 5 sets (only 1 set functioning) * Operation tables; 4 sets (not properly functioning) * Operation lamps; 2 sets (functioning, but old) * Anesthesia machine; 3 sets (not functioning) * Autoclave; 2 sets not functioning Almost of all equipment damaged by water leakage are old, it is difficult to repair them due to no spare parts.	* X-ray units; 2 sets (old, 1 set only functioning) * Operation tables; 3 sets (old, 1 only functioning, other 2 not properly working) * Operation lamps; 3 sets (old, all not properly functioning) * Autoclave; 2 sets (old, 1 not functioning) Many equipment being old and not repaired due to no spare parts.	* X-ray unit; old, not properly functioning * Operation tables; 2 sets old (1 not properly functioning) * Operation lamp; minor type only available. Need replacement with standard 1ktype. * Anesthesia machine; 1 set (old, not properly functioning) * Autoclave; 1 set (old, not properly functioning) Most of equipment are old and not repaired due to no spare parts.

2-5-3 Table of Outline of the Proposed Hospital of the Project (7)

Name of Hospital	Karima Hospital	Kassala Hospital	El Gadarif Hospital
Status	General Hospital	General Hospital	General Hospital
Location	Karima City, Northern State	Kassala City, Eastern State	El Gadarif City, Eastern State
Year of foundation	1971	1924	1928
No. of Beneficiary	100 thousand in and around Karima city	1 million in and around Kassala city	1.2 million in and around El Gadarif city and seasonal workers
No. of Bed	96	400	607
No. of staff Doctor, Specialist, Nurse, Paramedical	Doctor; 6, Specialist; 3, Nurse; 64, Paramedical; 17	Doctor; 34, Specialist; 13, Nurse; 300, Paramedical; 75	Doctor; 52, Specialist; 19, Nurse; 145 Paramedical; 57
No. of Outpatient	950/day	600/day	1,500/day
No. of Inpatient	8,246/year	24,000/year	30,000/year
Medical Services	Existing Department; Medicine, Surgery, OBGY, Outpatient, Emergency as a general hospital.	Existing Department; Medicine, Surgery, Paediatrics, OBGY, Chest, Ophtalmology, ENT, Psychognosis, Outpatient, Emergency as a general hospital.	Existing Department; Medicine, Surgery, Paediatrics, OBGY, Chest, Ophtalmology, ENT, Dermatology, Psychognosis, Dental, Outpatient and Emergency as a general hospital
No. of Operation	1,000/year	6,480/year	13,560/year
No. of x-ray films	9,000/year	23,400/year	15,000/year
Major Diseases of Inpatient	1. Malaria, 2. Chest Diseases 3. G.E. & Diarrheal Diseases 4. Anemia 5. Traffic Accident	1. Malaria, 2. G.E. & Diarrheal, 3. Pneumonia 4. Balhaziasis, 5. T.B.	1. Malaria, 2. G.E. & Diarrheal Diseases 3. Pneumonia, 4. T.B. 5. Malnutrition
Building of Hospital	Existing; Outpatient ward, Operation ward, Male and Femele Medicine ward, X-ray ward, Blood bank, ENT ward, Ophtalmology ward etc.	Existing; Male & Female Inpatient ward, T.B. ward, Paediatric ward, Operation ward, X-ray ward, Administration ward, Dental ward, Ophtalmology ward, Outpatient ward, Blood bank, etc. New wards are under construction. New OBGY hospital has been opened in another place.	Existing; Male ward, Female ward, Operation ward, Dental ward, Outpatient ward, Orthopedic ward, 1st class ward, 2nd class ward etc. more than 20 buildings in total. New Inpatient ward under construction
Situation of existing building and damage by rainfall and flood	There was damage by water leakage from the roofs. Walls and ceilings were partly broken down. All of these have been repaired.	Floors were damaged by flood and water leakage from roofs. Walls, Ceilings were partly damaged. They are under repairing.	Some wards were flooded over floor for 70cm. Ceilings, walls and floors were partly damaged by water leakage from roof. These have been repaired.
Major equipment and result of damage by rain	* X-ray unit; 1 set (old, not properly functioning) * Operation table; 1 set (old, not properly functioning) * Operation lamp; 1 set (old) * Operation lamp; 1 set (old) * Anestheia equipment; 1 set (old, not function) * Autoclave; 1 set (same as above) Most of equipment are old and not repaired due to no spare parts.	* X-ray units (table type); 2 sets (1 set functioning) * X-ray unit (mobile); (old, not properly functioning) * Operation tables; 3 sets (same as above) * Operation lamps; 3 sets (same as above) * Anesthesia equipment; 3 sets (same as above) * Autoclave; 2 sets (old, not functioning) All equipment were damaged by flood and water leakage and not properly repaired due to no spare parts.	* X-ray units; 2 sets (1 set only functioning) * X-ray (mobile); not functioning * Operation tables; 2 sets (old, not properly functioning) * Operation lamps; 2 sets (same as above) * Anesthesia equipment; 2 sets (same as above) * Autoclave; 2 sets (old, 1 set not functioning) All equipment were damaged by water leakage from roofs. Many of them have not been repaired due to no spare parts.

Situations of Ambulances at the proposed Hospitals

Name of Hospital	Kartoum Hospital	Isotope Hospital	Kartoum Dental Hospital	Kartoum North Hospital	Omdurman Hospital	Maternity Hospital	Wad Medani Hospital
Presently possessed Ambulance (alternative vehicle, year of manufacture, working condition etc.)	Only three serviceable cars. Only 2 cars can be used for emergency purpose.	Ambulance not serviceable (1972 manufacture) Using rent car.	-	One ambulance	No ambulance possess 4 cars, but only one car is serviceable.	One ambulance working. Possess 4 cars but 2 cars are old and not serviceable.	No ambulance, using other type of cars, presently possess 4 cars.
Main purpose of use	Transportation of patient, doctor, medicine, blood.	Transport of patient.		Transport of patient and blood, etc.	Transport of patient, call for doctor	Transport of patient and blood, call for doctor	Transport of patient, call for doctor
Number of use per day	30 times/days	10 times/day		3-6 times/day (transport of patient)	3 times/day patient transport & call for doctor	5-8 times/day (patient only)	5 times/day for transport of patient
Number of drivers, working hours	16 drivers, 3 shifts 24 hours	4 drivers, 2 shifts 24 hours		5 drivers, 24 hours	5 drivers, 24 hours with shifts	5 drivers, 24 hours	21 drivers, 3 shifts, 24 hours
Acquisition of fuel	Budget of MOH. (Fuel ticket)	Use of ticket		Use of ticket	Use of ticket	Use of ticket and at the expense of the hospital	Use of ticket and at the hospital expense
Maintenance and repair	Depend on M.T.D. and private sector for repair.	Depend on M.T.D.		Depend on M.T.D.	Depend on M.T.D.	Depend on M.T.D. and private sector at the hospital expense.	Depend on M.T.D. and private sector at the hospital expense.

Name of Hospital	El Managil Hospital	Rufaa Hospital	Aboushar Hospital	Sennar Hospital	Singa Hospital	El Damazin Hospital	Kowsti Hospital
Presently possessed Ambulance (alternative vehicle, year of manufacture, working condition etc.)	No ambulance Depending on the cars belonging to other hospitals.	2 ambulances not serviceable because of age, depending on other type of cars.	No ambulance, using other two cars (this two cars are not in good condition.)	No ambulance, using other two cars	No ambulance, using other two cars	One ambulance (grant from Italy) is out of order, using other two cars	Used to have 2 ambulance, can not be repaired because of age, presently use a pick-up truck.
Main purpose of use	Call for doctor, transport of materials	Transport of patient, call for doctor	Transport of patient, call for doctor	Transport of patient, call for doctor	Transport of patient, call for doctor	Transport of patient, call for doctor	Transport of patient, and material
Number of use per day	Not being used for transport of patient	10 times/day	5 times/day	5-6 times/day	10 times/day (various purpose)	3-4 times/day (within town)	15 times/day (various purpose)
Number of drivers, working hours	5 drivers, 3 shifts, 24 hours	4 drivers, 3 shifts, 24 hours	5 drivers, 24 hours	5 drivers, 3 shifts, 24 hours	7 drivers, 3 shifts, 24 hours	5 drivers, 3 shifts, 24 hours	4 drivers, 3 shifts, 24 hours
Acquisition of fuel	Use of ticket and expense of the hospital	Use of ticket	Use of ticket	Use of ticket	Use of ticket and at the expense of the hospital	Use of ticket	Fuel be procured at the hospital expense
Maintenance and repair	50% for M.T.D. 50% for private sector for repair	Depend on M.T.D. and private sector at the hospital expense	Depend on M.T.D. and private sector	Depend on M.T.D. and private sector	Depend on M.T.D.	Depend on private sector at the hospital expense	20% for M.T.D. 80% for private sector

Name of Hospital	Atbara Hospital.	Shandi Hospital	Doungoula Hospital	Marawi Hospital	Karima Hospital	Kassala Hospital	El Gadarif Hospital
Presently possessed Ambulance (alternative vehicle, year of manufacture, working condition etc.)	No ambulance Use other type of cars	No ambulance Use other type of cars (2 cars)	No ambulance Use other type of car (one car)	No ambulance Use other type of cars	No ambulance Use other type of cars	No ambulance, large demand for transport of patient and doctor because of having annex, now using other type of cars.	No ambulance, using other type of cars.
Main purpose of use	Call for doctor, transport of patient	Transport of patient and materials, call for doctor	Transport of patient, call for doctor	Transport of patient and blood, call for doctor	Transport of patient, call for doctor	Transport of patient, call for doctor	Transport of patient, call for doctor
Number of use per day	7-8 times/day	20 times/day	6 times/day	3-4 times/day	3 times/day (patient) 5-6 times for other purpose	20 times/day (for various purpose)	5-7 times/day
Number of drivers, working hours	5 drivers, 3 shifts, 24 hours	5 drivers, 2 shifts, 24 hours	4 drivers, 3 shifts, 24 hours	4 drivers, 3 shifts, 24 hours	5 drivers, 24 hours	5 drivers, 24 hours	5 drivers, 24 hours
Acquisition of fuel	Use of ticket and expense of the hospital.	Meet with the expense of the hospital	Use of ticket	Use of ticket and by the donation of inhabitants	Use of ticket	Use of ticket, and at the state government expense	Use of ticket and at the hospital expense
Maintenance and repair	Depend on M.T.D., private sector in case of emergency	Depend on private sector in the city	Depend on M.T.D., partially on private sector	Depend on M.T.D., partially on private sector	20% for M.T.D. 80% for private sector	20% for M.T.D. 80% for private sector	Almost depend on private sector

Chapter 3 Details of the Project

Chapter 3 Details of the Project

3-1 Purpose of the Project

The purpose of the Project is to replace at the 21 proposed hospitals medical equipment and materials which are superannuated or were damaged by the heavy rains and the consequent flood in 1988. The objective of the Project is to improve the national health and medical services through rehabilitating the proposed hospitals and thereby to contribute to the attainment of the national health programme.

3-2 Study and Examination of the Request

3-2-1 Study of Details of the Project

(1) Appropriateness of the Project Implementation

After examining the objective, and components of the Project, as well as the levels in the proposed hospitals and the operation plan, etc., the following items are confirmed.

1) Objective of the Project

The Project is intended to renew superannuated or damaged medical equipment and materials which are to play a principal role in the Three-Year National Health Plan (1990/1991~1992/1993) and the Emergency Flood Reconstruction Programme. Medical equipment and materials planned in the Project are all fundamental, and are expected to contribute to the improvement of medical services in the proposed hospitals.

2) Study of Components and Details of the Project

The Project concerns medical equipment and materials used in basic medical examinations and treatment in general hospitals or speciality hospitals. It will contribute to the rehabilitation of fundamental medical services through the renewal of medical equipment and materials now possessed by the proposed hospitals.

3) Study of the Scope of the Project

This Project is intended to renew medical equipment and materials at 21 hospitals including general hospitals and speciality hospitals in Khartoum (National Capital region) and general hospitals in main cities.

The proposed hospital cover major parts of the Sudan including Khartoum state (6 hospitals) Central state (8 hospitals) Northern state (5 hospitals) and Eastern state (2 hospitals) with exception of the western and southern parts.

4) Study of the Implementing Agency

The Project is to be implemented by the Ministry of Health in accordance with the procedures of Japan's grant aid system. The Department of Curative Medicine of M. O.H. is in charge of this project as stated in 3-3-1 Implementing Agency and preparations for receiving the new equipment are the responsibility of the directors of the proposed hospitals.

5) Technical Levels and Operation Plan

The doctors and specialists who are working in the proposed hospitals are assigned and transferred on a national basis, in accordance with the policy of the Ministry of Health. Therefore, there is little difference in technological levels among them. The planned medical equipment and materials are renewals of those which are presently being used in the proposed hospitals. Therefore, no problems are expected due to technical difficulties in the use of the equipment by the medical personnel. Operation of the medical equipment and materials to be provided is to be conducted by the directors of the proposed hospitals, under the control of the Ministry of Health. Being selected from experienced

doctors in hospital management, these directors are appointed by the Ministry. Management is carried out with consultation of the Ministry of Health or State Department of Health.

6) Study of the Proposed Hospitals

The proposed hospitals were examined based on analysis by the Sudanese Government. The outline of each hospital is shown in Table 2-5-3 "the Outline of the Proposed Hospitals." These hospitals are included among the hospitals for which rehabilitation is considered necessary in the Emergency Flood Reconstruction Programme now being promoted by the Government of the Sudan. Based on the criteria below, the Ministry of Health has selected 21 hospitals where medical equipment and materials are necessary, and formulated the Project for Supply of Medical Equipment and Materials for the Sudan Emergency Flood Reconstruction Programme.

- a) Those hospitals whose medical equipment and materials were damaged most seriously by the heavy rains and the consequent flood.
- b) Those hospitals in the National Capital region which play an important social role.
- c) Those general hospitals which are the key hospitals providing medical services in main cities.

Name of hospitals	Reason of Selection
1. Khartoum Hospital	a . b
2. Isotope Hospital	a . b
3. Omdurman Hospital	a . b
4. Khartoum North Hospital	a . b
5. Maternity Hospital	a . b
6. Khartoum Dental Hospital	a . b
7. Wad Medani Hospital	a . c
8. El Managil Hospital	a . c
9. Rufaa Hospital	a . c
10. Aboushar Hospital	a . c
11. Sennar Hospital	a . c
12. Singa Hospital	a . c
13. El Demazin Hospital	a . c
14. Kowsti Hospital	a . c
15. Atbara Hospital	a . c
16. Shandi Hospital	a . c
17. Doungoula Hospital	a . c
18. Marawi Hospital	a . c
19. Karima Hospital	a . c
20. Kassala Hospital	a . c
21. El Gadarif Hospital	a . c

The study team has confirmed that the Project is in conformity with the above-mentioned classifications and that equipment and materials which have deteriorated due to superannuation or flood damage impede the provision of adequate medical services in these hospitals. The extent of superannuation and non-functioning of equipment and materials is almost the same in these 21 hospitals, with little difference among them. It can be considered appropriate, therefore, that medical equipment and materials be replaced in all of the 21 proposed hospitals.

3-2-2 Study and Examination of Requested Equipment and Materials

Regarding the equipment and materials requested in the Project, a detailed study was made through a field survey and analysis of the results in Japan. The study team has confirmed that all of the requested equipment and materials are useful to rehabilitate the proposed hospitals and will satisfy the purposes of the Three-Year National Health Plan (1990/1991~1992/1993) as well as the Emergency Flood

Reconstruction Programme. The team has also confirmed that these equipment and materials can be satisfactorily handled by the present personnel of the proposed hospitals with their present experience and technical levels. The team has further confirmed that the requested equipment and materials can be repaired and maintained in the Central Medical Supply, and that expenses for consumables for them will not become a heavy burden to the Government of the Sudan.

(1) Classification of the Proposed Hospitals

In studying the requested equipment and materials, the 21 proposed hospitals are classified as A, B, C, D, E, or F based on the number of beds, the number of surgical operations conducted in a year, the number of doctors and the ranking of the hospitals, as shown in the following table. The only hospital classified as A is Khartoum Hospital, the highest-ranked referral hospital in the country. General hospitals ranked next are classified as B. Hospitals become smaller in scale in the order of Classifications C, D and E. Three speciality hospitals in the National Capital region are classified as F. Study and examination are given respectively to the equipment requested for the speciality hospitals.

Table 3-1 Classification of the proposed hospitals

		No. of beds	No. of operations	No. of doctors	Positioning
A class	Khartoum hospital	800	12,120	300	Large in scale, number of doctors, and beds, central hospital for Sudan's medical service.
B class	Omdurman hospital	650	8,078	225	General referral hospitals for medical facilities and inhabi- tants in capital region and local big cities.
	Wad Menani hospital	800	20,000	133	
	El Gadarif hospital	607	13,560	52	
C class	Khartoum N. hospital	500	11,440	102	Principal general hospitals in capital region and local cities.
	Sennar hospital	427	7,840	33	
	Atbara hospital	400	960	32	
	Shandi hospital	400	5,000	57	
	Kassala hospital	400	6,480	34	
D class	El Managil hospital	200	4,000	9	General hospitals as referral centre in local medium sized towns.
	Rufaa hospital	196	4,000	11	
	Aboushar hospital	300	2,820	24	
	Singa hospital	200	2,000	13	
	El Demagin hospital	200	1,970	12	
	Kowsti hospital	303	2,460	12	
	Doungoula hospital	204	1,500	16	
E class	Marawi hospital	89	500	6	General hospitals in local towns which provide medical service for the districts.
	Karima hospital	96	1,000	6	
F class	Isotope hospital	60	2,200	15	Speciality hospitals in capital region which supplement the function of Khartoum hospital.
	K. Dental hospital	24	544	56	
	Maternity hospital	122	1,117	8	

(2) Study and Examination of Equipment Requested

According to the classifications in Table 3-1, details of the requested equipment and materials and the appropriateness of their numbers were studied. The results are shown as follows in Table 3-2. Regarding Classifications A to E, as they are all general hospitals, appropriate quantities of equipment and materials are considered based on the scales of the hospitals. Equipment and materials necessary for Classification F differ from the above, since the hospitals classified as F are speciality hospitals.

For the Isotope Hospital, a hospital specializing in cancer, X-ray equipment(mobile) and an ambulance have been requested, the provision of which is reasonable in view of the purpose of the Project.

Regarding the Maternity Hospital, as it is a speciality hospital for obstetrics and gynecology, its need for general obstetric and gynecological equipment is the same as in the hospital classified as A. Though their hospital scale is different, it is appropriate to supply them in the same quantities. The appropriate quantities for general surgical instruments, anesthetic equipment, sterilizing equipment, treatment and ward equipment, surgical equipment and X-ray equipment are considered the same as in the hospitals classified as E, from the viewpoint of hospital scale.

Regarding Khartoum Dental Hospital, as it is a speciality hospital in dentistry, emphasis is laid on the improvement of dental surgical equipment, with which it is not well equipped at present, and the minimum necessary amounts of anesthetic equipment, sterilization equipment and surgical equipment are the same as in the hospitals classified as E. In addition, installation of X-ray equipment and dental surgical instruments is given priority, in order to make

preoperative examinations possible. Dental units (consisting of a dental examination and treatment chair and instruments) are not provided under the Project, because the number of existing units is regarded as sufficient, and the Central Medical Supply is able to repair any disorders of the present units and should utilize the units in stock first. A generator and a three-phase voltage stabilizer are not provided under the Project, because they are beyond the scope of the purpose of the Project (renewal of the equipment damaged by the flood).

Study and Examination of Equipment of General Hospital (A~E class)

Table 3-2

Request no.	Name of equipment requested	Major study, standards etc.
Instrument for general operation		
1	Kilner hooks	To cope with increasing number of operations, 2 sets as minimal required quantity for operating room of E class of general hospital. 3 sets for D.C.B. class 5 sets for A class.
2	Unna hooks	Ditto
3-21	Operating scissors(19items)	Ditto
22-23	Tissue forceps (2items)	Ditto
Hemostatic forceps		
24-38	Kocher hemostatic forceps (15items)	Ditto
39-43	Mosquito forceps (5items)	4 sets as minimal required quantity for E class of general hospital. 6 sets for D.C.B. class, 10 sets for A class.
44	Green-armitage forceps	Same reason of request no.1
45	Medico pot	Ditto
46	Pen torch	Ditto
Hemostatic sutures		
47-50, 53-55	Needle holder, hegar & mathiev (7items)	Ditto
51-52	Suture needle (5items)	10 sets as minimal required quantity for E class of general hospital. 15 sets for D.C.B. class. 25 sets for A class.
Gastro-intestinal		
56-59	Retractor (4items)	Supply of 1 set each for 8 hospitals and 2 sets for A class which have many abdomen operation. No supply for hospitals which do not request the set.
Surgical Orthopedic		
60-68	Bone cutting forceps (9items)	Supply of 1 set each for hospitals which have many orthopedic operation.
69-71	Neuro surgevy forceps (3items)	2 sets as minimal required quantity for E.D.C. class. 3sets for B class, 5 sets for A class.
72-74	Plaster shear (3items)	Ditto
75-76	Bone saw (2items)	Ditto
Ophthalmic		
77	Corneal scissors curved R & L	2 sets as minimal required quantity for E.D.C. class. 3 sets for B, 5 sets for A in consideration for increasing number of operation. No supply for hospitals which do not request for the reason of absence of ophtalmologist.
78	Corneal forceps no.19	Ditto

Request no.	Name of equipment requested	Major study, standards etc.
Ophthalmic		
79	Corneal forceps no.20	Ditto, however in consideration of frequency of use, 1 set as minimal quantity for E.D.C. class. 2 sets for B class, 3 sets for A class.
80	Barraguer needle holder	Same reason of request no.77
81	De Weeker's scissors	Ditto
82	Greafe catract Knife narrow	Ditto, however, 10 sets for E.D.C. class 15 sets for B class, 25 sets for A class.
83	Spring scissors for strabismus	Same reason of request no.77
84	Strabismus hooks (muscle hooks)	Ditto
85	Intracapsular capsule forceps	Ditto
86	Iris forceps, collibri	Ditto, however, 1 set as minimal required quantity for E.D.C. class, 2 sets for B class, 3 sets for A class. No supply for hospitals which do not request the set.
87	Iris repositor, straight	Ditto
88	Eye speculum will's	Same reason of Request no.77
89	Eye speculum clerk's	Ditto
90	Keratome Knife angled	Ditto
91	Nittleship dilator	Same reason of Request no.86
92	Lacrima probes sets	Ditto
93	Vectis	Same reason of Request no.77
Anesthetic		
94	Anesthesia apparatus with ventilator	1 unit as minimal required quantity for D.E. class. In consideration of increasing number of operation, 2 units for C.B. class. 4 units for A class. No supply for hospitals which do not request the unit.
95	Laryngoscopes	Ditto, however, 2 sets as minimal required quantity for E.D.C. class. 3 sets for B class. 4 sets for A class. 2 sets for Sennar.
96	Fiber optic Laryngoscope	No supply because of difficulty of maintenance.
97	Suction Unit	1 unit for E.D.C. class. 2 units for B. class. 3 units for A. class. However, 1 unit for El Gadarif Hospital as requested.
98	Attachment for infant	Supply as the accessory for no.94
99	Bain type circuit	Ditto
100	Bedside monitor	Taken as the equipment for I.C.U., considered with request no.106
101	Automatic sphygmomanometer	Supply of 2 units, only for A class.

Request no.	Name of equipment requested	Major study, standards etc.
Anesthetic		
102	Ventilator	No Supply because taken as equipment of I.C.U.
103	Peripheal nerve stimulator	1 set each for B and C class hospitals 3 sets for A class. No supply for hospitals which do not request the set.
104	Cerberal function monitor	No supply because of low frequency of use as anesthetic equipment.
Intensive care unit		
105	Ventilator	Supply of 3 units for only A class hospitals to meet half of 6 bed of I.C.U.
106	Bed side monitor	Ditto
107	ECG monitor (3ch)	Supply of 1 unit for only A class.
108	Suction unit	Same reason as request no.105
109	Blood gas analyser	No supply as considered difficulty of supply of consumables and maintenance services.
Gynecology & Obstetric		
110-113	Rectal specula (4 items)	1 unit as minimal required quantity for E. D. class. 2 units for C.B ₂ class. 3 units for A class.
114	Vaginal specula	2 units as minimal required quantity for E.D. class. 3 units for C class. 6 units for A class.
115	Vullsellum forceps	Ditto
116	Hegar Uterine dilator	Ditto
117	Hank Uterine dilator	Ditto
118	Polypus forceps	Ditto
119-120	Obstetric forceps	Ditto
121	Double ended retractor set	Ditto
122-125	Dressing forceps	Ditto
126	Scalpels	Ditto
127	Nelson abdominal trocar set	Ditto
128	Castens a scites trocar set	Ditto
129	Doppler fetal heart	1 unit for each hospital because this is for common use.
130	Curette	Same as no.110
131	Uterine sound set	Ditto
132	Electric cautery	1 unit each as minimal quantity for A.B.C. D. class.
133	Tube, insufflateur set	Ditto
134	Doyn's retractor	Ditto
Sterilization		
135	Hot air oven	1 unit each for E.D.C. class, 2 units each for B.A. class.
136	ditto medium size	No necessity because purpose can be fulfilled with the above equipment.

Request no.	Name of equipment requested	Major study, standards etc.
Sterilization		
137	ditto large size	Same as no.136
138	Instrument sterilizer (Table type)	No necessity because the purpose can be fulfilled with the following equipment.
139	ditto (Floor type medium)	1 unit each for A.B.C.D.E. class.
140	ditto (Floor type large)	No necessity because the purpose can be fulfilled with the above equipment.
141	Suction Unit	No supply (as a sterilization equipment) because same use of no.97, However Supply as a Anesthetic.
142	Suction Unit foot type	Supply same quantity of no.97, as a back up equipment for main Suction Unit. However supply as a Anesthetic.
143	Autoclave (medium type)	No necessity because purpose can be fulfilled with the following equipment.
144	Autoclave (large type)	1 Unit as minimal required quantity for E.D.C. class. In consideration of demand, 2 Units for B.A. class.
145	Autoclave horizontal	No necessity because the purpose can be fulfilled with the a bove equipment.
146-147	Drum for sterilizer	Supply as accessory for no.144.
148	Electric sterilizer (hot plate type)	No supply because this can be covered with no.144.
149	Basin stand with basin	Same as no.136.
Treatment / wards		
150	Sputum mug	5 pieces as minimal required quantity for E.D. class, 8 for C class, 10 for B class, 15 for A class.
151	Bed Pan	Ditto
152	Urinal male	Ditto
153	Urinal female	Ditto
154	Patient ward bed	No supply because bed can be procured locally.
155	Diagnostic set	3 sets as minimal required quantity for E.D. class, 4 sets for C class, 5 sets for B class, 6 sets for A class.
156	Tunning forks	Ditto
157	Percussion hammer	Ditto
Operating theater		
158	Major operating table	2 Units each for main operating theater of C.B.class. 3 units for A class considering number of operations. exclude hospitals which do not request the unit.
159	Standard operating table	1 unit for each hospital. exclude hospital which do not request the unit.
160	Operation lamp 8 bulbs	Supply same quantity as no.158.
161	Operation lamp 5 bulb	Supply same quantity as no.159.

Request no.	Name of equipment requested	Major study, standards etc.
Operating theater		
162	Stool for operation	Supply same quantity as no.158.
163	Electrosurgical Unit	1 unit each for general hospitals. however 2 units for A class.
164	Ditto	No supply
165	Defibrillator/monitor	1 unit for C.B class. In consideration of number of operations, 2 units for A class. No supply for hospitals which do not request the unit.
166	Liver biopsy needle	1 set as minimal quantity for E.D.C.class. 2 sets for B class, 3 sets for A class.
167	Lumber puncture needle with manometer	Ditto
168	Nebulizer	Ditto
169	Instrument cabinet, small	1 unit as minimal required quantity for E. D class. 2 units for C.B class. 3 units for A class.
170	Instrument cabinet, medium	No supply because this can be covered with no.169 and no.171.
171	Instrument cabinet, large	Same reason of no.169.
172	Instrument table small	Ditto
173	Instrument table large	Ditto
174	Kidney tray	Ditto
175	Suction unit	No supply because supply of suction unit for same purpose with no.97.
Laundry		
176	Laundry for hospital 1000 beds	No supply of laundry equipment, because preference is given to medical equipment.
177	Laundry for hospital 500 beds	Ditto
E.N.T.		
178	Diagnostic instruments set	1 set as minimal required quantity for E.D.C.B class. 2 sets for A class.
179	Ear syringe	Supply quantity same as a bove.
180	Trochar and canula set	Ditto
181	E.N.T. examination unit	1 unit each for E.D.C.B.A.
182	Head mirrors	2 sets lach for E.D.C.B. class, 4 sets for A class.
183	Forehead lamps	Supply same quantity as no.178.
184	Laryngoscope - infant, child, adult	1 set as minimal required quantity for requested hospital.
185	Bronchoscope - infant, child, adult	1 set for each general hospital.
186	Esophagoscope - infant, child, adult	Ditto
187	Cold light source (for the above 3 items)	Ditto

Request no.	Name of equipment requested	Major study, standards etc.
E.N.T.		
188	Forceps set	Ditto
189	Audiometer	Supply 1 set each for Khartoum Hospital, Khartoum North Hospital and Wad Medani Hospital.
190	Tonsillectomy set	Supply same quantity as no. 181
191	Adenoidectomy set	Ditto
192	Mastoidectomy set	Ditto
193	Coagulator	Ditto
194	Transformer for the above	Add to the above coagulator
195	Suction unit (portable)	Ditto
ⓐ	Fiber optic endoscope	No supply because of difficulty of maintenance
ⓐ	Nose & paranasal sinus surgery set	No supply because of few frequency of this surgery
Vehicle		
196	Ambulance	1 ambulance as minimal required quantity for each hospital with exception of Khartoum north Hospital and Maternity hospital which are advised to use ambulance they presently possess
X-ray unit		
197	Static x-ray unit (150KV, 500mA)	1 unit as minimal required quantity for each proposed hospitals. Considering working condition of the existing units, no supply to the hospitals which do not request the unit. Supply of this unit instead of the unit with TV to Khartoum, Wad Medani, Atbara and Kassala hospitals.
198	X-ray unit with TV	No supply of the unit with TV. Preference is given to basic x-ray unit as above
199	X-ray unit, mobile type	1 unit as minimal required quantity for each proposed hospitals. however no supply to the hospitals which do not request the unit.

Study and Examination of Equipment of Speciality Hospital (F class)

Table 3-3

Request no.	Name of equipment requested	Major study, standards etc.
Isotope Hospital		
196	Ambulance	Supply of/Ambulance to meet with the tranporation of patient.
199	X-ray unit (mobile type)	Supply of 1 unit to renew the presently possessed unit.
Maternity Hospital		
1~52	Instrument of general operation	Judging that the scale of this is as same as E class of general hospital, supply the same quantity of E class.
94~102	Anesthetic	Ditto
103	Peripheal nerve stimulator	Supply of 1 unit in consideration of being speciality hospital.
110~134	Gynecology & obstetric	In consideration of demand as the speciality hospital for Gy OB supply the same quantity as A class.
135~149	Sterilization	Same as request no.1~52, however no supply of 144, 149 because of no request.
150~157	Treatment wards	Same as no.1~52.
158~175	Operating Theater	Same as above, however no supply of equipment which is not requested.
197	Static x-ray unit	Supply of 1 unit as a fundamental equipment for diagnosis of patients.
Khartoum Dental Hospital		
94~104	Anesthetic	Judging that the scale of this hospital is as same as E class of general hospital, supply the same quantity of E class.
135~149	Sterilization	Ditto
158~175	Operating Theater	Ditto, however no supply of no.166, 167, 168 and 169, because of anticipated little demand.
200	Dental unit (A-type)	No supply of the unit, Repair of the presently using unit or use of the unit in stock is advisable
201	Dental unit (B-type)	Ditto
202	Suction system	Fundamental policy of this project is to supply the equipment. As installation work is main for this system, therefore no supply of this system.
203	Stool for dentist	This comes together with no. 200. Therefore no supply.
204	Sterilizer, portable medium large	No supply here, but supply the equipment for sterilization section
205	Dental suction unit	Ditto

Request no.	Name of equipment requested	Major study, standards etc.
Dental Hospital equipment		
206	Oral x-ray unit	Supply of 1 unit of dental x-ray for dental surgery
207	Oral surgical instrument sets	Supply of dental surgical instrument set
208	Instrument for laboratory	Supply of dental laboratory equipment
209	Dental treatment instrument set	Supply of minimal required quantity of instrument set for dental hospital.
210	Others	No supply of generator, voltage, stabilizer and water pump.

3-3 Outline of the Project

3-3-1 Implementing Agency

The following Sudanese agencies and institutions are involved in the Project.

- (1) Implementing agency: Ministry of Health
- (2) Department in charge: M.O.H. Curative Medicine Dept.
- (3) Proposed hospitals: 21 general and speciality hospitals

The Ministry of Health is the implementing agency, and the Ministry's Curative Medicine Department is to take charge of the operation of the Project. After completion of the Project, the directors of the proposed hospitals are to assume responsibility, and in each hospital existing personnel are to manage and operate the provided equipment and materials. The Central Medical Supply is to be in charge of their maintenance (refer to Chapter 6).

3-3-2 Details of the Project

(1) Components of the Project

The Project plans to replace fundamental medical equipment and materials which are superannuated or were damaged by the heavy rains and the consequent flooding in 1988. The Project mainly concerns renewal of forceps, suturing needles, operating tables, operation lamps, anesthetic equipment and X-ray units. These are equipment and materials necessary for surgical operations and treatment in general hospitals. Through the Project implementation, the proposed hospitals can improve their medical services which have been impeded by damaged or superannuated equipment and materials.

(2) System for the Project Implementation

Even through the Project implementation, the kinds of medical services in the proposed hospitals will remain

unchanged. However, renewed equipment and materials are expected to improve the quality and efficiency of these services to a considerable degree. The hospital management system is to be the same as the operation and management system described in 2-5-2.

(3) Operation Plan

The Project can be implemented with the existing personnel, the operating budget of M.O.H. or the states and the operating system of each proposed hospital mentioned in 2-5-2(1). Therefore, no particular increase in budget is necessary after the Project's implementation.

3-3-3 Outline of Equipment and Materials

A detailed study was made of the requested equipment and materials, their relation to the conditions of Japan's grant aid cooperation, the scale of the Project, etc. As a result, the following equipment and materials have been selected as the most appropriate.

Equipment List

1. Instrument for general operation
 - Operating scissors
 - Hemostatic forceps
 - Hemostatic sutures
 - Gastro - in Testinal
 - Surgical orthopedic
 - Ophthalmic

2. Anesthetic
 - Anesthesia apparatus with ventilator
 - Suction unit
 - Automatic spymomanometer
 - Peripheal harve stimulator
 - Others

3. I.C.U.
 - Ventilator
 - Bedside monitor
 - ECG monitor, 3ch
 - Suction unit

4. Gynecology & Obstetric
 - Obstetric forceps
 - Doppler fetal heart detector
 - Electric cautery
 - Doyn's retractor
 - Others

5. Sterilization
 - Hot air oven
 - Instrument sterilizer
 - Autoclave
 - Others

6. Treatment / Ward
 - Diagnostic set
 - Others

- 7. Operating theatre
 - Major operating table
 - Standard operating table
 - Operation lamp
 - Electrosurgical unit
 - Defibrillator
 - Nebulizer
 - Instrument cabinet
 - Instrument table
 - Others

- 8. E.N.T.
 - Diagnostic instruments set
 - E.N.T. examination unit
 - Caryngoscope
 - Bronchoscope
 - Esophagoscope
 - Suction unit (Portable)
 - Others

- 9. Ambulance
 - Ambulance

- 10. X - ray unit
 - Static X-ray unit
 - Condenser discharge X-ray unit
(Mobile type)

- 11. Dental equipment
 - Dental X-ray unit
 - Dental surgical instruments set
 - Instrument for Laboratory
 - Instrument set
 - Others

Chapter 4 Basic Design

Chapter 4 Basic Design

4-1 Basic Design Policy

The Government of the Sudan has been making efforts to extend primary medical care through its Three-Year National Health Plan (1990/1991~1992/1993), with the Ministry of Health as the nucleus, and with the cooperation of UNICEF, WHO, etc. In the country, many people are suffering from malaria, diarrhea, respiratory diseases, eye diseases, otolaryngological diseases and oral diseases. Under these circumstances, it has long been desired that the functions of general and speciality hospitals be rehabilitated. General hospitals provide basic secondary medical services as reliable referral hospitals of primary medical institutions such as health centers, while speciality hospitals are to become the central referral hospitals of the country. The 1988 flood damaged buildings, facilities and equipment at many medical institutions, impeding their functions. The Government of the Sudan has been endeavoring to reconstruct the buildings and facilities of medical institutions damaged by the heavy rains and flooding, based on its Emergency Flood Reconstruction Programme. The Ministry of Health has planned the Project for Supply of Medical Equipment and Materials for the Sudan Emergency Flood Reconstruction Programme to renew equipment and materials damaged by the flood or which are out of order because of superannuation. However, the Project realization has been impeded by the country's financial difficulties as well as by difficulties in securing foreign currency for funding. Such being the case, the Government of the Sudan has requested grant aid cooperation of Japan for implementation of the Project. By taking into account this background, the basic design policy has been set for the Project as follows, based on analysis of the data obtained in the field survey as well as on analysis of the purpose of the Project, its operation and management plan, maintenance system and expected effects of the Project implementation.

- (1) The Project shall primarily concern renewal of equipment and

materials which have been damaged by flooding or are unrepairable because of superannuation.

- (2) The Project shall be so designed that it will become as small a burden as possible for the Government of the Sudan in terms of operating, maintenance and managing expenses.
- (3) Equipment and materials shall be limited to those which the existing personnel can operate or handle based on their experience.

4-2 Basic Design Conditions

Basic design conditions for the planned equipment and materials are described below.

(1) Demand Conditions

- ① Providing basic medical equipment and materials necessary for secondary and tertiary medical care which can support primary medical services and contribute to the Health Programme now promoted by the Government of the Sudan.
- ② Deciding the grade and amounts of equipment and materials to be provided, by taking into consideration hospital classifications, the number of beds, areas of diagnosis and treatment, service areas and the number of people to be benefited.
- ③ Providing medical equipment and materials necessary for basic medical services, by giving priority to the departments of internal medicine, surgery, pediatrics and obstetrics and gynecology.
- ④ Replacing unrepairable or superannuated equipment and materials which cannot work satisfactorily in the proposed hospitals.

- ⑤ Providing those types of equipment and materials which can be maintained and managed and whose consumables can be supplied in the Sudan.

(2) Technical Conditions

- ① Providing equipment and materials whose operation and maintenance do not require advanced techniques, i.e., basically providing equipment and materials of the same grade as those now used in the proposed hospitals, or equipment and materials which the present personnel can satisfactorily handle.

- ② Providing equipment and materials which are simple in design, solid, seldom break down and which can be maintained under the current medical equipment maintenance system of the Sudan.

- ③ Sudden voltage fluctuations may cause incorrect operation or trouble in some medical equipment and materials. In the Sudan, the electric power supply is unstable, and fluctuations of about 20% in voltage are an everyday affair. Therefore a constant voltage stabilizer is to be provided as necessary.

(3) Operational Conditions

- ① Giving guidance, in each of the proposed hospitals, to the medical technicians and the operators concerned in the operation, maintenance and inspection of equipment and materials, at the time of their installation,

- ② Giving training, in each of the proposed hospitals, to the doctors, technicians and persons responsible for the maintenance of equipment and materials, to make these persons sufficiently informed on how to operate, maintain, inspect

and manage them.

- ③ Providing three copies of English manuals for the operation, handling and maintenance of each of the equipment and materials to be provided, except for small medical articles. One of these three copies is to be kept in the proposed hospitals, one in the Central Medical Supply and one in the Ministry of Health.

4-3 Study on Selection Conditions

Based on the above-mentioned demand and technical conditions, equipment and materials are selected on the grounds of the following conditions.

- ① General operating instruments:

Providing the same types of equipment and materials as presently used in hospitals in the Sudan.

- ② Ophthalmologic operating instruments:

Providing basic ophthalmologic operating instruments which can be used in a wide range of ophthalmologic treatments in general hospitals. These instruments are regarded as renewals, and the same types of instruments as now used are to be primarily provided.

- ③ Anesthetic equipment:

Providing anesthetic equipment with attachments which can be used in general surgical operations, obstetrical and gynecological operations as well as operations for newborns and children. Providing pieces of equipment which require manual operation, like those currently installed. A cerebral function monitor is excluded because of the low frequency of its use as anesthetic equipment.

- ④ Intensive care equipment:

For the ICU room of Khartoum Hospital, included are basic equipment and materials such as a respirator, bedside monitoring equipment, electrocardiograph, and aspirator.

⑤ Obstetrical and gynecological operating instruments:

Providing basic operating instruments used for a wide range of obstetrical and gynecological operations conducted in general hospitals. Providing the same types of instruments as now used in hospitals in the Sudan.

⑥ Equipment for Sterilization

For strengthening basic sterilization function in general hospitals. Everyday sterilization is to be conducted with a large steam sterilizer, while a boiling-water sterilizer is to be used in emergencies.

⑦ Treatment/ward equipment:

Replacing superannuated pieces of nursing equipment used in wards. Providing the most basic types of equipment. Inpatient beds are to be excluded because they can be purchased with Sudanese funds.

⑧ Operating room equipment:

Replacing superannuated pieces of equipment in the proposed hospitals. Providing almost the same level of equipment as now used.

⑨ Otorhinolaryngological equipment:

Renewing basic instruments used for otorhinolaryngological treatment in general hospitals.

⑩ Radiological equipment:

Renewing general-purpose equipment widely used in diagnosis of the breast and abdominal regions as well as the limbs, and general-purpose equipment most frequently used in the radiology

department of general hospitals. An X-ray unit (mobile) to assist the general-purpose equipment is to be supplied to some of the proposed hospitals. Requested X-ray equipment with a television set for diagnostic use is to be excluded because of difficulty in maintenance. General-purpose X-ray equipment is to be provided as a renewal of the superannuated general-purpose equipment currently used.

① Ambulances:

In the Sudan, no institutions other than hospitals have ambulances. In the proposed hospitals, the frequency of responses to emergency calls have been increasing to carry patients suffering from serious diseases who cannot be treated in lower-ranked hospitals in the service area or health centers, or to rescue victims of traffic accidents at the request of the police. Many of these hospitals, not having vehicles exclusively used as ambulances, use small baggage-carrier trucks also as ambulances. As a result, it is often the case that they cannot respond to emergency calls while their vehicles are used for other purposes. Moreover, some of these small trucks are not suitable as ambulances in terms of sanitation and safety, as these trucks are not equipped with patient transportation facilities. It is appropriate, therefore, that one ambulance be provided to each of the proposed hospitals which do not possess ambulances, as a measure to solve the above-mentioned problem and facilitate medical services for outpatients as well as emergency patients. To Khartoum Hospital, which responds to as many as 30 calls a day with two ambulances, another ambulance is to be provided, which is considered reasonable. The outpatient and emergency divisions are well equipped in each of these hospitals, and have a sufficient number of drivers and sufficient fuel supplies. Vehicle maintenance can be carried out by utilizing repair shops of the Mechanical Transportation Dept. and private repair shops. After ambulances are provided to the hospitals, it is expected that each hospital will respond to five or six calls

a day on the average. It should be appropriate to plan to increase the number of ambulance in the future taking into consideration of actual demand for the ambulance and management capability of hospitals.

⑫ Equipment for the dental hospital:

Khartoum Dental Hospital, the only hospital specializing in dentistry in the National Capital region, is to be provided with dental X-ray equipment, operating instruments and dental surgical instruments, for the purpose of restoring operation functions which have been impeded by superannuated equipment. Regarding the request for dental units, repairs of the currently-used units are to be done first, or units in stock are to be used. New dental units, therefore, are not provided under the Project. A motor generator, voltage stabilizer, an aspirating system and a water pump are not to be provided, because these pieces of equipment are beyond the scope of purpose of the Project. An ambulance is not to be provided, either, because it is not urgently necessary in the dental hospital.

⑬ Laundry Equipment:

Laundry equipment are excluded from this Project for the reasons mentioned below. First, it is considered that priority should be given to medical equipment rather than to laundry equipment. Secondly, it is more reasonable to include improving the laundry section in the project of repairing hospital buildings and facilities which is under progress at 4 hospitals since installation of laundry equipment involves much construction work for the provision of a steam supply and drainage, etc.

4-4 Equipment Supply Plan

4-4-1 The Hospitals in this Project

The hospitals in this Project are confirmed though the study of the proposed hospitals described in section 3-2-1 7) and are listed as follows:

Name of Hospital	Location
1) Khartoum Hospital	Khartoum City, Khartoum State
2) Isotope Hospital	- ditto - , - ditto -
3) Omdurman Hospital	Omdurman City, - ditto -
4) Khartoum North Hospital	Khartoum City, - ditto -
5) Maternity Hospital	Omdurman City, - ditto -
6) Khartoum Dental Hospital	Khartoum City, - ditto -
7) Wad Medani Hospital	Wad Medani City, Central State
8) El Managil Hospital	El Managil City, - ditto -
9) Rufaa Hospital	Rufaa City, - ditto -
10) Aboushar Hospital	Aboushar City, - ditto -
11) Sennar Hospital	Sennar City, - ditto -
12) Singa Hospital	Singa City, - ditto -
13) El Demazin Hospital	El Demazin City, - ditto -
14) Kowsti Hospital	Kowsti City, - ditto -
15) Atbara Hospital	Atbara City, Northern State
16) Shandi Hospital	Shandi City, - ditto -
17) Doungoula Hospital	Doungoula City, - ditto -
18) Marawi Hospital	Marawi City, - ditto -
19) Karima Hospital	Karima City, - ditto -
20) Kassala Hospital	Kassala City, - ditto -
21) El Gadarif Hospital	El Gadarif, - ditto -

4-4-2 Kinds, Specifications and Quantity of Equipment

Kinds of equipment and materials selected as appropriate for the Project based on the above-mentioned basic design policy and basic design conditions amount to 111 items. The names and quantities of equipment are mentioned in the Table of Equipment to be Supplied for the Project on the next page. Major of equipment and their specifications are described in the following Table of Major Equipment and their Specifications.

Equipment to be supplied for the Project

<u>Item No.</u>	<u>Name of equipment</u>	<u>Quantity</u>
<u>1. Instruments for general operation</u>		
<u>1-1 Operating scissors</u>		
1.	Kilner hooks	56
2.	Unna hooks	56
3.	Operating scissors (1 set 19 items)	56
4.	Tissue forceps (1 set 2 items)	56
<u>1-2 Hemostatic forceps</u>		
1.	Kocher hemostatic forceps (1 set 15 items)	56
2.	Mosquito forceps (1 set 5 items)	112
3.	Green-armitage forceps	56
4.	Medicospot	56
5.	Pen torch	56
<u>1-3 Hemostatic sutures</u>		
1.	Needle holder, hegar & mathieu (1 set 7 items)	56
2.	Suture needle (1 set 5 items)	280
<u>1-4 Gastro-intestinal</u>		
1.	Retractor (1 set 4 items)	10
<u>1-5 Surgical orthopedic</u>		
1.	Bone cutting forceps (1 set 9 items)	16
2.	Neuro surgery forceps (1 set 3 items)	40
3.	Plaster shear (1 set 3 items)	40
4.	Bone saw (1 set 2 items)	40
<u>1-6 Ophthalmic</u>		
1.	Corneal scissors curved R & L	36
2.	Corneal forceps no.19	36
3.	Corneal forceps no.20	20
4.	Barraquer needle holder	36
5.	De weeker's scissors	36
6.	Greafe catract knife narrow	180
7.	Spring scissors for strabismus	36
8.	Strabismus hooks (muscle hooks)	36

Item No.	Name of equipment	Quantity
9.	Intracapsular capsule forceps	36
10.	Iris forceps, colibri	20
11.	Iris repositor, straight	20
12.	Eye speculum will's	36
13.	Eye speculum clerk's	36
14.	Keratome knife angled	36
15.	Nittleship dilator	20
16.	Lacrimal probes sets	20
17.	Vectis	36
<u>2. Anesthetic</u>		
2-1	Anesthesia apparatus with ventilator	20
2-2	Laryngoscopes	47
2-3	Suction unit	18
2-4	Suction unit, foot type	18
2-5	Automatic sphygmomanometer	2
2-6	Peripheal nerve stimulator	9
<u>3. I.C.U.</u>		
3-1	Ventilator	3
3-2	Bedside monitor	3
3-3	ECG monitor, 3ch	1
3-4	Suction unit	3
<u>4. Gynecology & Obstetric</u>		
4-1	Rectal specula (1 set 4 items)	31
4-2	Vaginal specula	57
4-3	Vullsellum forceps	57
4-4	Hegar uterine dilator	57
4-5	Hank uterine dilator	57
4-6	Polypus forceps	57
4-7	Obstetric forceps (1 set 2 items)	57
4-8	Double ended retractor set	57
4-9	Dressing forceps (1 set 4 items)	57
4-10	Scalples	57
4-11	Nelson abdominal trocar set	57
4-12	Castens ascites trocar set	57
4-13	Doppler fetal heart detector	19
4-14	Curette	31

Item No.	Name of equipment	Quantity
4-15	Uterine sound set	31
4-16	Electric cautery	19
4-17	Tube, insufflateur set	19
4-18	Doyn's retractor	19
<u>5. Sterilization</u>		
5-1	Hot air oven	24
5-2	Instrument sterilizer	20
5-3	Autoclave	20
5-4	Basin stand with basin	17
<u>6. Treatment / Ward</u>		
6-1	Sputum mug	135
6-2	Bed pan	135
6-3	Urinal male	135
6-4	Urinal female	135
6-5	Diagnostic set	71
6-6	Tunning forks	71
6-7	Percussion hammer	71
<u>7. Operating theater</u>		
7-1	Major operating table	15
7-2	Standard operating table	13
7-3	Operation lamp, 8 bulbs	15
7-4	Operation lamp, 5 bulbs	13
7-5	Stool for operation	15
7-6	Electrosurgical unit	21
7-7	Defibrillator / monitor	8
7-8	Liver biopsy needles	23
7-9	Lumbar puncture needle with manometer	23
7-10	Nebulizer	23
7-11	Instrument cabinet, small	29
7-12	Instrument cabinet, large	30
7-13	Instrument table, small	30
7-14	Instrument table, large	30
7-15	Kidney tray	30

<u>Item No.</u>	<u>Name of equipment</u>	<u>Quantity</u>
<u>8. E.N.T.</u>		
8-1	Diagnostic instruments set	19
8-2	Ear syringe	19
8-3	Trochar and canula set	19
8-4	E.N.T examination unit	18
8-5	Head mirrors	38
8-6	Forehead lamps	19
8-7	Laryngoscope - infant, child, adult	18
8-8	Bronchoscope - infant, child, adult	18
8-9	Esophagoscope - infant, child, adult	18
8-10	Cold light source	18
8-11	Forceps set (for 8-7, 8-8, 8-9)	18
8-12	Audiometer	3
8-13	Tonsillectomy set	18
8-14	Adenoidectomy set	18
8-15	Mastoidectomy set	18
8-16	Coagulator	18
8-17	Suction unit, Portable	18
<u>9. Ambulance</u>		
9-1	Ambulance	18
<u>10. X - ray unit</u>		
10-1	Static X - ray unit	14
10-2	Condenser discharge X - ray unit (Mobile type)	9
<u>11. Dental hospital equipment</u>		
11-1	Dental X - ray unit	1
11-2	Oral surgical instruments set	1
11-3	Instruments for laboratory	1
11-4	Dental treatment instruments set	1

Table of Major Equipment and Their Specifications

Table of major equipment include the equipment in large quantities and of high unit prices among "Equipment to be supplied for the Project".

Name of equipment	Main specifications
<p>1. Instrument for general operation</p> <p>Operating scissors</p> <p>Hemostatic forceps</p> <p>Hemostatic sutures</p> <p>Gastro-intestinal</p> <p>Surgical orthopedic</p> <p>Ophthalmic</p>	<p>More than SUS 403</p> <p>Ditto</p> <p>Ditto</p> <p>Ditto</p> <p>Ditto</p> <p>Ditto</p>
<p>2. Anesthetic</p> <p>Anesthesia apparatus with ventilator</p> <p>Suction unit</p>	<p>Cross circuit type, fluothane, with ventilator.</p> <p>diaphragm type, suction bottle 500cc.</p>
<p>3. I.C.U.</p> <p>Ventilator</p> <p>Bedside monitor</p> <p>ECG monitor 3ch</p>	<p>electric, volume fixed type.</p> <p>ECG. Pulse wave monitor with recorder.</p> <p>Portable, recoder, with table caster.</p>
<p>4. Gynecology & Obstetric</p> <p>Obstetric forceps</p> <p>Vulsellum forceps</p> <p>Polipus forceps</p> <p>Doppler fetal heart detector</p>	<p>more than SUS-403</p> <p>Ditto</p> <p>Ditto</p> <p>Both AC and battery, Ultra sound frequency 2.5MHz (approx.)</p>
<p>5. Sterilization</p> <p>Hot air oven (medium size)</p> <p>Instrument sterilizer (medium floor type)</p> <p>Autoclave</p>	<p>Portable type, adjustable 50°C~13°C</p> <p>Hot plate type, size approx.</p> <p>500 x 300 x 250mm stainless steel made.</p> <p>built-in steam generator. Cylinder inner size : approx. 500 x 500 x 900mm, with water softener and drum.</p>
<p>6. Treatment / Ward</p> <p>Diagnostic set</p>	<p>Ophthalmoscope, pharyngoscope, laryngoscope, tongue depressor.</p>

Name of equipment	Main specifications
<p>7. Operating theater</p> <p>Major operating table</p> <p>Standard operating table</p> <p>Operation lamp 8 bulbs</p> <p>Operation lamp 5 bulbs</p> <p>Electrosurgical unit</p> <p>Defibrillator / monitor</p>	<p>Pedal manipulation system, hydraulic type with attachments for general surgery and orthopedic.</p> <p>Pedal manipulation system, hydraulic type, for general surgery.</p> <p>Ceiling type, built-in balancer type.</p> <p>Ceiling type, built-in balancer type.</p> <p>Operation 200W, coagulation 150W, dipole 15W, solid state type.</p> <p>for both AC and DC. Out put more than 300 jule.</p>
<p>8. E.N.T.</p> <p>Diagnostic instruments set</p> <p>E.N.T. examination unit</p> <p>Coagulator</p>	<p>Consists of E.N.T. diagnostic instruments set. boxtype, with automatic suction spray, suction bottle and examination lamp.</p> <p>transistor oscillation, Out put 75W (approx.)</p> <p>Frequency : 300KHz (approx.) bipolar system.</p>
<p>9. Ambulance</p> <p>Ambulance</p>	<p>four wheel drive, diesel, emergency stretcher, bench for staff, with emergency set.</p>
<p>10. X-ray unit</p> <p>Static X-ray unit</p> <p>Condenser discharge X-ray unit (mobile type)</p>	<p>150KV/500mA, bucky table, with standing position bucky.</p> <p>Condenser type.</p>
<p>11. Dental equipment</p> <p>Dental X-ray unit</p> <p>Oral surgical instruments set</p> <p>Instruments for laboratory</p> <p>Dental treatment instrument set</p>	<p>more than 85KV/8mA, all wave rectifier, cephalometric and panorama type.</p> <p>Consists of fundamental instruments for dental surgery. more than SUS-403</p> <p>Consists of flask, flask press, lathe, lathe cover, model trimmer, micro motor for laboratory etc.</p> <p>Consists of plier, crown scissor, wire nipper, tooth extract forceps, elevator etc.</p>

4-4-3 Distribution of Equipment

Equipment is distributed to the proposed hospitals as per attached table.

Name of hospital	Name of hospital												Total					
	A	F	B	C	F	F	B	D	D	C	D	C		D	E	E	C	B
Name of equipment	Grade																	
	1. Instruments for general operation																	
	1-1 Operating scissors																	
	1. Kilner hooks																	
	2. Bunn hooks																	
	3. Operating scissors (19 items)																	
	4. Tissue forceps (2 items)																	
	1-2 Hemostatic forceps																	
	1. Kocher hemostatic forceps (15 items)																	
	2. Mosquito forceps (5 items)																	
	3. Green-armtage forceps																	
	4. Medicospot																	
	5. Pen torch																	
	1-3 Hemostatic sutures (7)																	
	1. Needle holder, begar & mathieu items																	
2. Suture needle (5 items)																		
1-4 Gastro-intestinal																		
1. Retractor (4 items)																		
1-5 Surgical orthopedic																		
1. Bone cutting forceps (9 items)																		
2. Neuro surgery forceps (3 items)																		
3. Plaster shear (3 items)																		
4. Bone saw (2 items)																		
1-6 Ophthalmic																		
1. Corneal scissors curved R & L																		
2. Corneal forceps no.19																		
3. Corneal forceps no.20																		
4. Barraquer needle holder																		

Name of equipment	Name of hospital												Total					
	A	F	B	C	F	F	F	D	D	D	D	D		E	E	C	B	
5. De wecker's scissors	5	-	3	2	-	-	2	2	2	2	2	2	2	2	2	2	3	36
6. Greife retract knife narrow	25	-	15	10	-	-	10	10	10	10	10	10	10	10	10	10	15	180
7. Spring scissors for strabismus	5	-	3	2	-	-	2	2	2	2	2	2	2	2	2	2	3	36
8. Strabismus hooks (muscle hooks)	5	-	3	2	-	-	2	2	2	2	2	2	2	2	2	2	3	36
9. Intraocular capsule forceps	5	-	3	2	-	-	2	2	2	2	2	2	2	2	2	2	3	36
10. Iris forceps. colibri	3	-	2	1	-	-	1	1	1	1	1	1	1	1	1	1	2	20
11. Iris retractor. straight	3	-	2	1	-	-	1	1	1	1	1	1	1	1	1	1	2	20
12. Eye speculum will's	5	-	3	2	-	-	2	2	2	2	2	2	2	2	2	2	3	36
13. Eye speculum clerk's	5	-	3	2	-	-	2	2	2	2	2	2	2	2	2	2	3	36
14. Keratome knife angled	5	-	3	2	-	-	2	2	2	2	2	2	2	2	2	2	3	36
15. Nittleship dilator	3	-	2	1	-	-	1	1	1	1	1	1	1	1	1	1	2	20
16. Lacrimal probes sets	3	-	2	1	-	-	1	1	1	1	1	1	1	1	1	1	2	20
17. Vectis	5	-	3	2	-	-	2	2	2	2	2	2	2	2	2	2	3	36
2. Anaesthetic																		
2-1 Anaesthesia apparatus with ventilator	4	-	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	20
2-2 Laryngoscopes	4	-	3	3	2	2	3	2	2	2	2	2	2	2	2	2	3	47
2-3 Suction unit	3	-	2	2	1	1	2	2	2	2	2	2	2	2	2	2	3	47
2-4 Suction unit. foot type	3	-	2	2	1	1	2	2	2	2	2	2	2	2	2	2	3	47
2-5 Automatic sphygmomanometer	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
2-6 Periphaea nerve stimulator	3	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9
3. I.C.U.																		
3-1 Ventilator	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
3-2 Bedside monitor	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
3-3 ECG monitor. 3ch	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
3-4 Suction unit	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
4. Gynecology & Obstetric																		
4-1 Rectal specula (4 items)	3	-	2	2	3	-	2	1	1	2	1	1	1	1	2	1	2	31

Name of hospital	Grade																Total				
	A	F	B	C	F	F	B	D	D	D	D	C	C	D	E	E		B	C	B	
Name of equipment																					
4-2 Vaginal specula	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-3 Ynllellium forceps	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-4 Hegar uterine dilator	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-5 Hank uterine dilator	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-6 Polypus forceps	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-7 Obstetric forceps	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-8 Double ended retractor set	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-9 Dressing forceps	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-10 Scalpels	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-11 Nelson abdominal trocar set	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-12 Costens ascites trocar set	6	-	4	3	6	-	4	2	2	2	2	3	2	2	2	2	2	3	3	4	57
4-13 Doppler fetal heart detector	1	-	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
4-14 Curette	3	-	2	2	3	-	2	1	1	1	1	2	1	1	1	1	1	1	1	1	19
4-15 Uterine sound set	3	-	2	2	3	-	2	1	1	1	1	2	1	1	1	1	1	1	1	1	19
4-16 Electric cautery	1	-	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
4-17 Tube, insufflator set	1	-	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
4-18 Doyn's retractor	1	-	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
5. Sterilization																					
5-1 Hot air oven	2	-	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	24
5-2 Instrument sterilizer	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
5-3 Autoclave	2	-	2	1	-	1	2	1	-	-	-	1	1	1	1	1	1	1	1	2	20
5-4 Basin stand with basin	1	-	1	1	-	1	1	1	-	-	-	1	1	1	1	1	1	1	1	1	17
6. Treatment / Ward																					
6-1 Sputum mug	15	-	10	8	5	-	10	5	5	5	5	8	5	5	5	5	5	8	8	10	135
6-2 Bed pan	15	-	10	8	5	-	10	5	5	5	5	8	5	5	5	5	5	8	8	10	135
6-3 Urinal male	15	-	10	8	5	-	10	5	5	5	5	8	5	5	5	5	5	8	8	10	135
6-4 Urinal female	15	-	10	8	5	-	10	5	5	5	5	8	5	5	5	5	5	8	8	10	135

Name of equipment	Name of hospital															Total		
	A	F	B	C	F	F	F	D	D	D	C	C	D	E	E		C	B
6-5 Diagnostic set	6	-	5	4	3	-	5	3	3	3	4	3	3	3	3	4	5	71
6-6 Tuning forks	6	-	5	4	3	-	5	3	3	3	4	3	3	3	3	4	5	71
6-7 Percussion hammer	6	-	5	4	3	-	5	3	3	3	4	3	3	3	3	4	5	71
7. Operating theater																		
7-1 Major operating table	3	-	2	2	-	-	2	-	-	-	-	-	-	-	-	2	2	15
7-2 Standard operating table	-	-	-	-	1	1	-	1	1	1	1	1	1	1	1	1	1	13
7-3 Operation lamp. 8 bulbs	3	-	2	2	-	-	2	-	-	-	2	-	-	-	2	2	15	
7-4 Operation lamp. 5 bulbs	3	-	-	2	-	-	-	1	1	1	1	1	1	1	1	1	13	
7-5 Stool for operation	3	-	2	2	-	-	2	-	-	-	2	-	-	-	2	2	15	
7-6 Electrosurgical unit	2	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21	
7-7 Defibrillator / monitor	2	-	1	1	-	-	1	-	-	-	-	-	-	-	-	1	8	
7-8 Liver biopsy needles	3	-	2	1	-	-	2	1	1	1	1	1	1	1	1	1	23	
7-9 Lumbar puncture needle / manometer	3	-	2	1	-	-	2	1	1	1	1	1	1	1	1	1	23	
7-10 Nebulizer	3	-	2	1	-	-	2	1	1	1	1	1	1	1	1	1	23	
7-11 Instrument cabinet. small	3	-	2	2	1	-	2	1	1	1	2	1	1	1	1	2	29	
7-12 Instrument cabinet. large	3	-	2	2	1	-	2	1	1	1	2	1	1	1	1	2	30	
7-13 Instrument table. small	3	-	2	2	1	1	2	1	1	1	2	1	1	1	1	2	30	
7-14 Instrument table. large	3	-	2	2	1	1	2	1	1	1	2	1	1	1	1	2	30	
7-15 Kidney tray	3	-	2	2	1	1	2	1	1	1	2	1	1	1	1	2	30	
8. E.N.T.																		
8-1 Diagnostic instruments set	2	-	1	1	-	-	1	1	1	1	1	1	1	1	1	1	1	19
8-2 Ear syringe	2	-	1	1	-	-	1	1	1	1	1	1	1	1	1	1	1	19
8-3 Trochar and canula set	2	-	1	1	-	-	1	1	1	1	1	1	1	1	1	1	1	19
8-4 E.N.T examination unit	1	-	1	1	-	-	1	1	1	1	1	1	1	1	1	1	1	18
8-5 Head mirrors	4	-	2	2	-	-	2	2	2	2	2	2	2	2	2	2	2	38
8-6 Forehead lamps	2	-	1	1	-	-	1	1	1	1	1	1	1	1	1	1	1	19
8-7 Laryngoscope - infant. child. adult	1	-	1	1	-	-	1	1	1	1	1	1	1	1	1	1	1	18

Name of hospital	Grade																	Total					
	A	F	B	C	F	F	K. Dental Hospital	Wad Medani Hospital	EI Managil Hospital	Rutaa Hospital	Aboushar Hospital	Sennar Hospital	Singa Hospital	EI Demazin Hospital	Kowli Hospital	Atbara Hospital	Shandi Hospital		Doungoula Hospital	Marawi Hospital	Karima Hospital	Kassala Hospital	EI Gadarif Hospital
8-8 Bronchoscope - infant, child, adult	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
8-9 Esophagoscope - infant, child, adult	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
8-10 Cold light source	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
8-11 Forceps set (for 8.7, 8.8, 8-9)	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
8-12 Audiometer	1			1																			3
8-13 Tonsillectomy set	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
8-14 Adenoidectomy set	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
8-15 Mastoidectomy set	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
8-16 Coagulator	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
8-17 Suction unit, Portable	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
9. Ambulance																							
9-1 Ambulance	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
10. X - ray unit																							
10-1 Static X - ray unit	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
10-2 Condenser discharge X - ray unit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9
11. Dental equipment																							
11-1 Dental X - ray unit																							
11-2 Oral surgical instruments set																							
11-3 Instruments for laboratory																							
11-4 Instruments set																							

Chapter 5 Implementation Plan

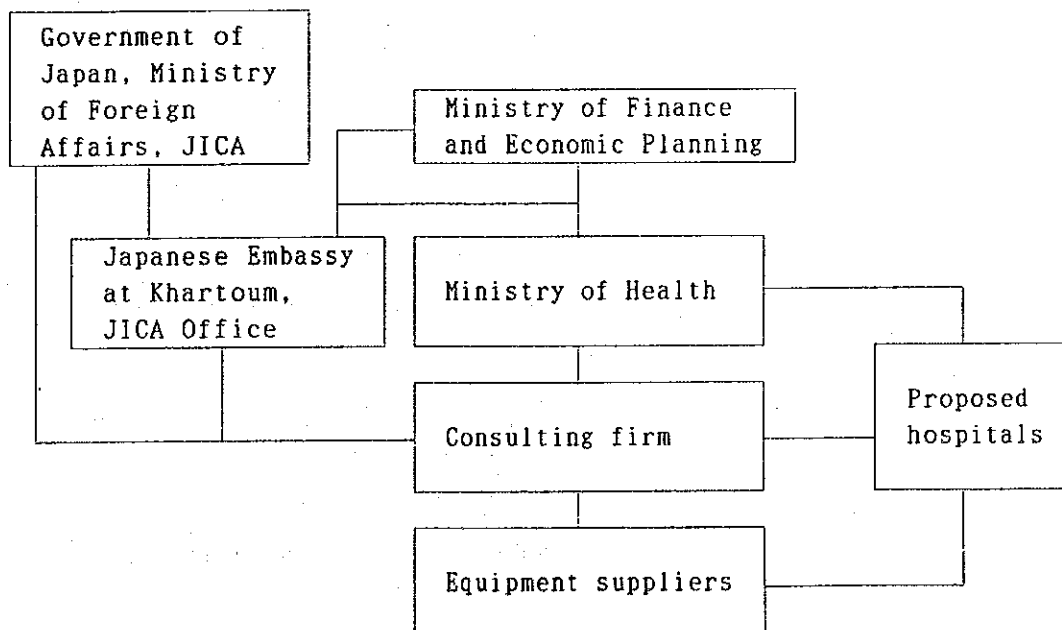
Chapter 5 Implementation Plan

5-1 Implementation Policy

(1) Implementation System

If the Project is implemented with grant aid cooperation of the Government of Japan, the implementing agency is to be the Ministry of Health and a Japanese consulting firm will act as agent, giving technical assistance, while Japanese companies will take charge of supplying equipment and materials, in accordance with the grant aid cooperation system of the Government of Japan.

The Ministry of Health of the Sudan is to be in charge of the Project implementation, while the Ministry of Finance And Economic Planning, the agency receiving the grant aid cooperation of the Government of Japan, is to take charge of the overall coordination of the Project. Curative Medicine Dept., M.O.H. is to be in charge of operation of the Project Preparation of places to locate the equipment and materials to be provided is to be done by the directors of the proposed hospitals.



(2) Consulting firm

The outline of the design and supervision to be carried out by the consulting firm regarding the provision of medical equipment and materials under the Project is described below.

① Detailed design

Preparation of detailed design, specifications, bidding conditions, etc.

② Assistance in bidding and contract conclusion

Assistance regarding matters prior to bidding, bidding and contract conclusion

③ Supervision

Supervision of the provision of medical equipment and materials

As the Exchange of Notes is signed by both governments regarding grant aid cooperation of the Government of Japan for the Project implementation, the consulting firm nominated by the Government of Japan is to conclude a consulting contract as soon as possible with the Government of the Sudan. After this consulting contract is verified by the Government of Japan, the firm is to become the formal consultant.

(3) Selection of Supplier

Companies to supply equipment and materials for the Project implementation are to be decided in accordance with the procedure of open tendering mentioned below.

Open tendering procedure: public announcement of tendering, participation in tendering, tendering document delivery, prequalification of tenderers, tendering, tendering evaluation, decision of successful tenderer.

The successful tenderer is to conclude a contract on the supply of medical equipment and materials as soon as possible with the Government of the Sudan. After this contract is verified by the Government of Japan, the successful tenderer is to become the formal supplier of the medical equipment and materials requested in the Project.

5-2 Range of Undertakings

Undertakings of the respective governments are outlined below.

(1) Undertakings of Japan

Undertakings of the Government of Japan include the supply of medical equipment and materials for the 21 proposed hospitals, installation and personnel training.

- 1) Equipment and materials to be supplied are indicated in 4-4-2 while the proposed hospitals are indicated in 4-4-1 above.
- 2) Expenses for marine transportation and all expenses for inland transportation.
- 3) Expenses for installation of equipment and materials.
- 4) Expenses for trial runs and guidance in the operation, inspection and maintenance of all equipment and materials in the hospitals.

(2) Undertakings of the Government of the Sudan

Undertakings of the Government of the Sudan are outlined below.

- 1) Preparation of facilities and space for installation of equipment and materials to be supplied.
- 2) Provision of utilities such as electricity, gas, water, drainage, etc., which are required for the installation of

the equipment.

- 3) Provision of storage facilities so that the equipment can be safely stored until the installation work is undertaken.
- 4) Assurance of smooth proceeding of unloading and customs clearance of the equipment in the Sudan as well as prompt inland transportation to the site.
- 5) Exemption from taxes and duties for the equipment to be supplied under the Japanese grant aid programme as well as exemption from income taxes and duties on personal items to be brought into the Sudan in the case of Japanese nationals providing services under the Project.
- 6) Bearing of charges for the Banking Arrangement (B/A) and Authorization to Pay (A/P).
- 7) Provision of licenses, approval and other authorizations required for the execution of the Project.
- 8) Bearing of the costs other than those covered by the grant aid which are required for the supply of equipment under the Project.
- 9) Bearing of the costs for proper and effective operation and maintenance of the equipment to be supplied under the Project.
- 10) Costs for the tax exemption procedures and for registering vehicles, etc.

5-3 Execution Plan

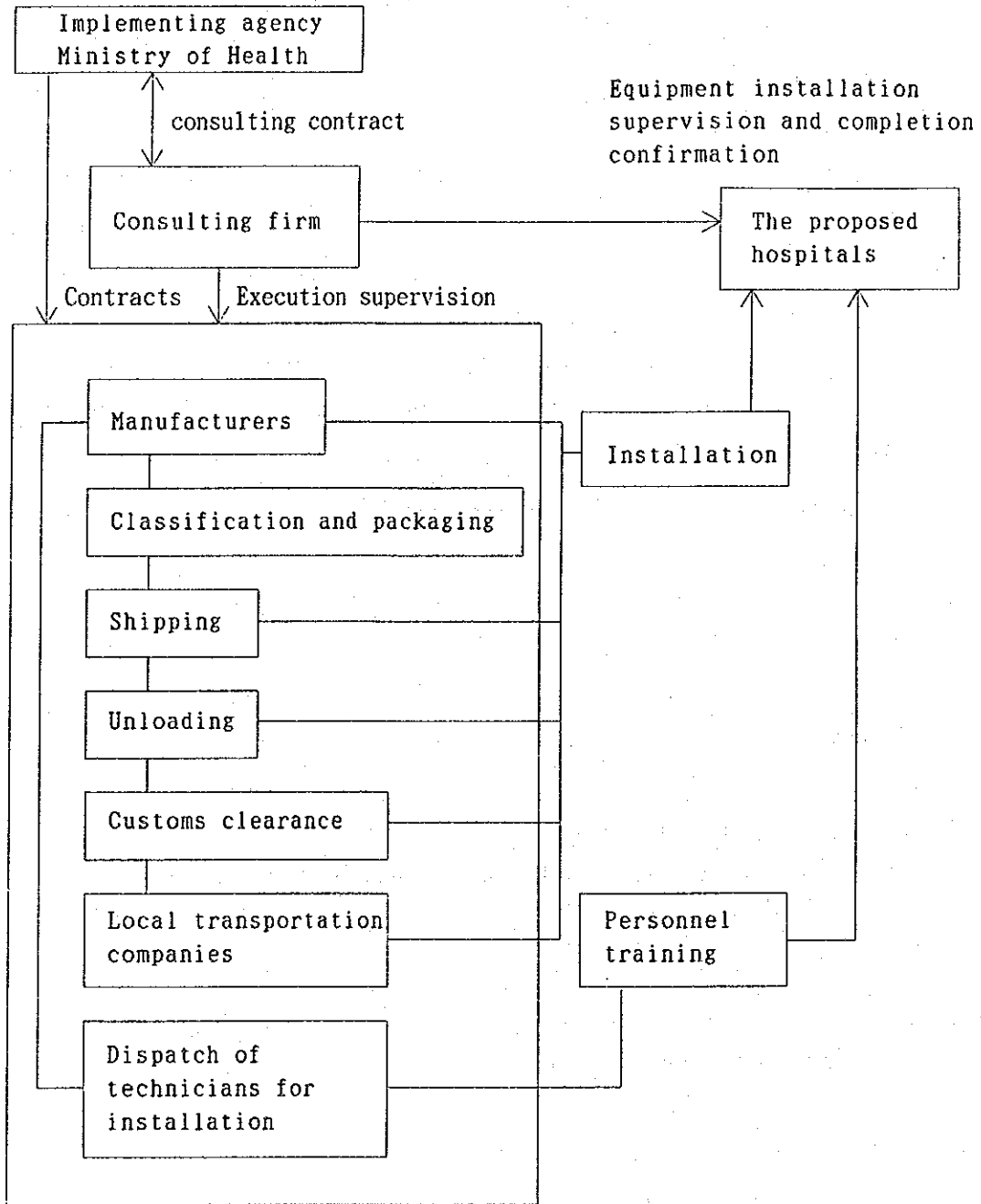
The Project shall be implemented under the following work plan.

- (1) To undertake sufficient consultations among the pertinent

authorities of both the Governments of the Sudan and Japan as well as the Consultant and the Contractor at the various stages of the conclusion of E/N, tendering, selection of the contractor, manufacturing schedule of the equipment, inspection at the time of shipment as well as delivery and the payment of the grant money so that the Project shall be implemented smoothly. These consultations include all necessary formalities.

- (2) In view of the fact that the proposed facilities are hospitals, it is difficult to suspend their routine work for the delivery and installation of the equipment. In order to avoid such a difficult situation, close consultations among personnel concerned on the work schedule, etc., should be undertaken beforehand at the stage of the detailed design.
- (3) As for the equipment to be procured in Japan, careful quality control and inspections on the equipment at the times of production and shipment thereof shall be undertaken beforehand in Japan.
- (4) Regarding equipment and materials which require installation work, the suppliers shall send Japanese technicians to give guidance in their installation.
- (5) In the delivery of equipment and materials, the Consultant shall conduct inspections.
- (6) In order to make the personnel of the proposed hospitals fully informed of how to operate and maintain the equipment and materials to be supplied, installation work and trial runs shall be conducted in the proposed hospitals, and guidance shall be given to the persons who are to take charge of the equipment and materials, regarding their use and daily maintenance.

The following flow chart shows the executing system.



5-4 Equipment Procurement Plan

Equipment and materials requested in the Project shall be procured in accordance with the following policy.

(1) Medical Equipment Procurement Plan

Medical equipment and materials now used in the Sudan were made in West and East European countries, Turkey and China. However, the Sudan has no agents in charge of repairs of these products. Since maintenance of equipment and materials is very important in the Sudan, products of those manufacturers who can provide maintenance services through their agents or service stations in neighboring countries should also be included among those to be procured under the Project. In supplying medical equipment and materials, coverings are necessary to protect them from dust and rain. Auto-transformers are to be provided to prevent precision electric equipment from breaking down. A sufficient supply of spare parts is also necessary for the equipment and materials.

(2) Vehicle Procurement Plan

In the Sudan, vehicles of Japanese make account for a high percentage of total vehicles. Some car makers have their agents in the country to sell parts and conduct repairs. It is most suitable therefore to procure products for which local service stations can provide after service.

5-5 Execution Process Plan

Execution of the Project has been planned on the assumption that the agencies concerned will carry out documentation matters as well as matters concerning equipment installation without delay, in accordance with Japan's grant aid cooperation system.

As to the execution work schedule, about nine months is planned from the Supply Contract to the completion of the Project once the Exchange of Notes between both governments is concluded. Breakdown of the period is as follows.

- About 3.0 months for equipment and material manufacturing after the conclusion of supply contracts.
- About 3.0 months for customs clearance, marine and inland transportation.
- About 3.0 months for installation, orientation and inspection by the consultant.

The execution work schedule is shown on the following page.

THE PROJECT FOR SUPPLY OF MEDICAL EQUIPMENT &
MATERIALS FOR SUDAN EMERGENCY FLOOD RECONSTRUCTION PROGRAMME

Table 5 - 1 Executing Works Schedule

Unit : Month

	1	2	3	4	5	6	7	8	9	10	11
Detailed Design	■										
		□									
			■								
				■	■						
											(Total 4.0 months)
Execution & Procurement											
			■	■	■						
						■	■	■			
											(Total 9.0 months)

Table 5 - 2 OVERALL WORK PROGRAMME

Month	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Verification		Approval		Contract Agreement		Acceptance		PROJECT IMPLEMENTATION						
JAPANESE GOVERNMENT	Verification	E/N													
SUDANESE GOVERNMENT		Consultancy Agreement													
CONSULTANT		Detailed Design	Preparation of Tender Documents	Public Notice	Public Notice	Supervision	Supervision	Supervision	Supervision	Supervision	Supervision	Supervision	Supervision	Supervision	Supervision
CONTRACTOR					Tendering	Contract	Contract	Contract	Contract	Contract	Contract	Contract	Contract	Contract	Contract
						Sea Transportation	Sea Transportation	Sea Transportation	Sea Transportation	Sea Transportation	Sea Transportation	Sea Transportation	Sea Transportation	Sea Transportation	Sea Transportation
						Manufacture & Procurement of Equipment	Manufacture & Procurement of Equipment	Manufacture & Procurement of Equipment	Manufacture & Procurement of Equipment	Manufacture & Procurement of Equipment	Manufacture & Procurement of Equipment	Manufacture & Procurement of Equipment	Manufacture & Procurement of Equipment	Manufacture & Procurement of Equipment	Manufacture & Procurement of Equipment
						Inland Transportation	Inland Transportation	Inland Transportation	Inland Transportation	Inland Transportation	Inland Transportation	Inland Transportation	Inland Transportation	Inland Transportation	Inland Transportation
						Installation	Installation	Installation	Installation	Installation	Installation	Installation	Installation	Installation	Installation
						Training	Training	Training	Training	Training	Training	Training	Training	Training	Training
						Shipment	Shipment	Shipment	Shipment	Shipment	Shipment	Shipment	Shipment	Shipment	Shipment

5-6 Estimated Project Cost to be defrayed by the Sudanese Side

Project cost to be defrayed by the Sudanese side, there is no particular cost involved in this project as the equipment is to be provided to the existing hospitals and there is no engineering work to be covered by the Sudanese side for installing the equipment except for securing the space for installation. Furthermore, conditions of the existing facilities such as the water supply and drainage system, power supply capacity and structural strength are considered good enough to install and operate the equipment to be provided. The Sudanese side, however, is required to bear the costs which are listed in 5-2 as the scope of responsibilities of the Sudanese side in connection with the grant aid programme of the Japanese Government such as charges for the Banking Arrangement (B/A) and Authorization to Pay (A/P), cost for the tax exemption procedures and for registering vehicles, etc.

Chapter 6 Maintenance and
Administration Plan

Chapter 6 Maintenance and Administration Plan

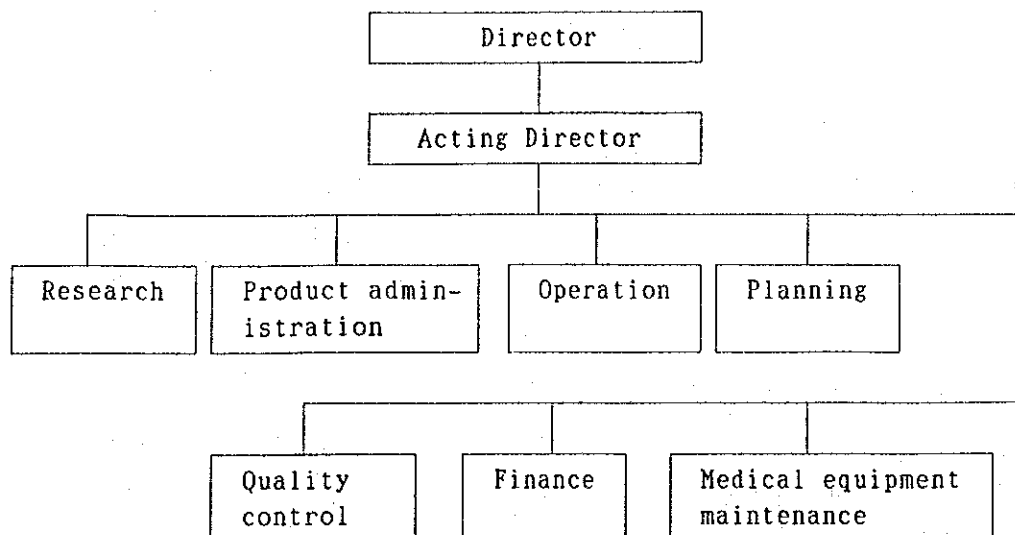
Regarding public sector hospitals, the director of each hospital is in charge of its operation and management. National hospitals are under the direct control of the Ministry of Health while local hospitals are administrated by the Department of Health of each state government.

6-1 Maintenance and administration organization (system)

At each hospital, daily maintenance and administration of medical equipment is carried out by the staff member of each section who is in charge of equipment. If repair is needed, it is reported to the director or administrative chief of the hospital. As there is no particular section in each hospital that is exclusively engaged in equipment maintenance, the request for repair is forwarded to C.M.S. through the Ministry of Health or Department of Health of each state. Upon receipt of such a request, C.M.S. makes its decision regarding repair of the equipment in consideration of the status and current conditions of the hospital. The repair work provided by C.M.S. is carried out at its own expense and is not defrayed by the hospital. Furthermore, maintenance of motor vehicles including ambulances is carried out by the M.T.D. (Mechanical Transport Department) which belongs to the Ministry of Transport and Communications.

(1) Outline of C.M.S.

C.M.S. is a public institution supervised by the Ministry of Health and operated with a direct budgetary allocation from the central government. Having a staff of 140 personnel, the head office and warehouse are located in Khartoum and a branch office in Port Sudan. It exclusively carries out the supply of medicines and the maintenance of medical equipment used in health and medical facilities in the public sector. The organization of C.M.S. is outlined below.



Major services of C.M.S. include a) procurement of medicines and medical equipment, b) supply of medicines, materials and equipment to each facility and c) maintenance of medical equipment. Medicines and other consumables are procured basically through bidding by domestic and overseas suppliers based on the procurement plan formulated in cooperation with the Ministry of Health. Medicines, medical equipment and materials are supplied by reviewing requests from each facility and considering the status and performance of the concerned facility. As it has a limited number of vehicles, C.M.S. mainly depends on private transporters for distribution. The shortage of staff is overcome by hiring workers on a temporary basis.

The breakdown of the C.M.S. budget for 1990 is roughly outlined as follows: a) S£6 million for personnel expenses, b) S£130 million for the purchase and administration of medical supplies, and c) S£5 million for the repair of medical equipment.

(2) Outline of Medical Equipment Maintenance Department of C.M.S.

At C.M.S., the Medical Equipment Maintenance Department implements the repair and inspection of equipment. At present it has a staff of 16 engineers and they will be joined by 8 engineers of the Ministry of Health who are currently engaged in

the repair work of x-ray equipment in Khartoum, the Isotope and other hospitals. Its duties consist of two types of services: periodical repairs through visiting hospitals and other medical facilities on a regular basis using special vehicles for repair work and on-call services provided in response to specific requests from hospitals, etc. Small devices are delivered to the department and sent back after they are fixed. All the expenses including those for repair work and engineers' on-site services are covered by the C.M.S. budget for repair expenses.

(3) Maintenance and administration of vehicles

M.T.D. (Mechanical Transportation Department) of the Ministry of Transport and Communications is in charge of the maintenance of the vehicles, including ambulances, used by the hospitals, along with other motor vehicles used by public sector institutions. The budget for maintenance of vehicles belonging to the Ministry of Health is deposited with M.T.D. and is used to cover the maintenance expenses for concerned vehicles. M.T.D. has its headquarters and main operational office at Khartoum North and about 30 workshops in major local cities except for the southern region. It is responsible for the maintenance of all the vehicles belonging to the public offices and facilities. The vehicles to be provided to the hospitals under the present project will be repaired at the headquarters or nearest M.T.D. workshops. The following table shows the workshops with their staff numbers which are assigned to the repair work of the vehicles of each concerned hospital.

Hospitals	Location of M.T.D. workshops	No. of staff
6 hospitals in		
Khartoum State	M.T.D. Headquarters	about 2,000
Wad Medani	Wad Medani	60(incl. 6 eng'rs)
El Managil	Soba	6
Rufaa	Hasahisa	15
Aboushar	Aboushar	6
Sennar	Sennar	20
Singa	Shinga	6
El Demazin	El Demazin	20
Kowsti	Kowsti	10
Atbara	Atbara	50(incl. 3 eng'rs)
Shandi	Shandi	20(incl. 2 eng'rs)
Doungoula	Doungoula	20(incl. 3 eng'rs)
Marawi	Marawi	6
Karima	Karima	6
Kassala	Kassala	20(incl. 3 eng'rs)
El Gadarif	El Gadarif	50(incl. 3 eng'rs)

Upon receipt of the request for vehicle repair from hospitals and other facilities, each local workshop sends a voucher called Form 15 to the headquarters for procuring necessary parts. In response, the headquarters prepare the requested parts. Staff of local workshops usually travel to the headquarters by car to receive the parts. If there is some technical difficulty preventing local workshops from carrying out the repairs, the vehicle is either delivered to the headquarters or engineers of the headquarters are sent to the local workshop for the repair work. While there is no special treatment given to ambulances, each public vehicle is equipped with an administrative notebook called the "Log House" and by presenting this notebook its repair and inspection are covered by the budget depository system of the Ministry of Health mentioned above. In addition, hospital vehicles are given fuel tickets as official vehicles

and fuel is provided up to a certain quantity with these tickets.

Although each hospital is supposed to submit a request for repairs of its vehicles to M.T.D. as mentioned above, there are considerable cases of emergencies where the repair work is implemented at local private workshops. Expenses for these repairs are covered by the income of each hospital obtained from paid treatment.

M.T.D. headquarters and private workshops stock the necessary quantity of repair parts procured from agencies of the respective auto makers in Sudan. Under such a maintenance and administration system, the repair and maintenance services for the ambulances supplied to local hospitals are ensured.

6-2 Maintenance and Administration Expenses

The maintenance and administration expenses expected for the equipment procured under the Project are as shown below. Most of the equipment, however, will either be substitutes for superannuated equipment now under use or complement the equipment which has recently broken down and proved unreparable. Therefore, the Project does not require any increased or additional appropriations of the budget for maintenance and administration expenses.

(1) Electric power fees

Public sector hospitals in Sudan do not have an independent budget for each hospital. Furthermore, supervisors of these hospitals, the state governments or the Ministry of Health, control the budget for expenses on a lump basis, resulting in scarce documentation of the expenses at each hospital. The electric power fees have been calculated by estimating the conditions of each concerned hospital based on the data of the following hospitals obtained through the survey conducted at this time. The power fee thus obtained is S£ 3.76/KW.

Table 6 - 1 Electric Consumption at the Proposed Hospitals

Hospitals	Elec. Consumption (KW)	Elec. Tariff (Sudan pound)
Khartoum North Hospital	167,000	566,100
Omdurman Hospital	118,000	400,000
Maternity Hospital	16,300	60,000
El Demazin Hospital	28,800	168,000
Shandi Hospital	29,200	60,000
Kowsti Hospital	36,000	76,300
Doungoula Hospital	21,900	240,000
Marawi Hospital	7,300	24,000

Source : hearing at the hospitals

Regarding those items of equipment procured under the Project which consume particularly large quantities of power, the required expenses are calculated as follows with the assumption of the average rate of power consumption in normal use and tariffs currently adopted in Sudan. The electricity cost of S£ 3.76 per kilowatt, obtained from analysis of the above table of the expenses for electric power consumption at the concerned hospitals, multiplied by 181,230 kilowatts, the annual power consumption of the high-power-consuming equipment in the table below, results in S£ 681,424.

Table 6 - 2 Equipment with Large Electric Consumption and Consumption Amount

Equipment	No. of Unit	Elec. Consumption (KW)	Hours of Use/day	Working days/month	Total KW/Year	Remarks
Anesthesia apparatus with ventilator	20	1.0	2.0	25	12,000	4 times/day
Ventilator	3	1.0	3.0	10	1,080	3 patients/day, 3 hours each
Bed side monitor	3	1.0	18.0	10	6,480	Ditto
Blood gas analyzer	1	0.8	1.0	25	240	1-2 times/day
Hot air oven (small)	20	1.0	2.0	25	12,000	3 times/day
Instrument sterilizer	20	1.5	2.0	25	18,000	3 times/day
Autoclave (large)	18	5.0	2.0	25	54,000	5 times/day
Operation lamp, 8 bulb	15	1.0	6.0	25	27,000	5 times/day
Operation lamp, 5 bulb	14	0.8	6.0	25	20,160	15 times/day
E. N. T. examination table	9	0.6	5.0	25	8,100	50 times/day
X-ray unit	13	25.0	0.20	25	19,500	30 films/day
X-ray unit with TV	1	30.0	0.20	25	1,800	20 times/day
Mobile type x-ray unit	9	1.0	0.10	25	270	20 times/day
Dental x-ray unit	1	10.0	0.20	25	600	30 films/day
Total KW					181,230	

(2) Water supply and drainage

There is no item of equipment procured under the Project that involves a particularly large quantity of water supply and discharge. As the expenses for water supply and drainage at the concerned hospitals are defrayed by the state government or the Ministry of Health, no data are available in this respect.

(3) Medical equipment gases

The volume of consumption and cost for medical equipment gases are calculated as follows based on the assumption that each anesthesia machine is used for 2 hours a day and 25 days a month.

1) Oxygen gas

2L./min. x 120 min. = 240L./day

240L. x 25 days x 12 months = 72,000L./year

72,000L. x 20 units = 1,440,000L.

1,440,000L. ÷ 1,500L.(per cylinder) = 960 cylinders

Per cylinder filling cost: S£ 150

960 cylinders x S£ 150 = S£ 144,000 (¥633,600)

2) Fluothane (N2O)

4L./min. x 120 min. = 480L./day

480L. x 25 days/month x 12 months = 144,000L./year

144,000L. ÷ 4,050L. (7.5kgs. volume at 25°C) = 36 cylinders

Per cylinder filling cost: S£ 4,000

36 cylinders x S£ 4,000 = S£ 144,000

Total: S£ 288,000 (¥1,267,299)

(3) Consumables required for the medical equipment

1) X-ray equipment

a. X-ray films: assumed that 30 pcs. of 10" x 8" film are consumed per unit on average.

30pcs./day x 300 days/year x 18 units = 162,000pcs./year

162,000pcs. x S£ 22 = S£ 2,564,000 (¥15,681,600)

b. Film development expenses: developing agent: S£ 146/2 gallons

Fixing agent: S£ 97/ 1kg.

Average quantity of use: about S£ 7/pc.

162,000pcs. x S£ 7 = S£ 1,134,000

Total: S£ 4,698,000 (¥20,671,200)

(4) Fuel for ambulances

As diesel oil is widely used and its official price is one-fifth of that of gasoline, diesel ambulances will be procured. Regarding the fuel cost, up to 4 gallons are rationed each month at S £ 20 per gallon (3.8L.). For emergency purposes.

additional rations are available if applications are submitted. Therefore the fuel cost has been calculated based on this price.

It is assumed that each ambulance is mobilized 8 times a day on average, runs an average of 15km each time and the distance covered per gallon is about 30km. Based on these assumptions, the fuel cost is calculated as follows.

1 unit: 15km/mobilization x 8 times/day x 30 days/month x 12 months /year = 43,200km

18 units x 43,200km/year ÷ 30km (per gallon distance)=25,920 gallons/year

25,920 gallons x S£ 20 = S£ 518,400 (¥2,280,960)

As a result of these calculations, the total cost of maintenance for the major equipment procured under the Project is as shown below. The Project, however, mainly involves equipment items which will substitute for those which are superannuated or not operable. Most of the expenses calculated here are therefore already covered by the budget of the Sudanese Government.

a. Electric power	S£ 187,320	
b. Medical gas	288,000	
c. X-ray related (films,etc.)	4,698,000	
d. Fuel for ambulances	518,400	
Total	S£ 5,691,720	(apprx. ¥25,043,000)

Chapter 7 Project Evaluation

Chapter 7 Project Evaluation

7-1 Project Effect

(1) Direct effect

Through implementation of the Project covering 21 hospitals in the capital region and regional key cities, those items of medical equipment which were damaged by torrential rainfalls and floods or which had already been superannuated will be renewed. This will help to restore each hospital's ability to provide medical services as a secondary and tertiary medical institution and enhance the condition for providing improved medical services responsive to the demand of local residents. The hospitals involved in the Project can be classified into three categories depending on their roles. The following table summarizes the present circumstances, measures taken under this project and expected results for each category.

Category & name of hospital	Current circumstances and problems	Measures taken under the Project	Expected results and improvements
<p>1. Nationwide referral hospital</p> <p>Khartoum Hospital</p>	<p>The medical services given to the patients referred by the hospitals in the capital region and all over the nation have deteriorated due to the hospital's equipment by the torrential rainfalls and floods as well as superannuation.</p> <p>-Operating instruments in major surgical departments are extremely superannuated.</p> <p>-Functions of anesthesia equipment have deteriorated</p> <p>-Equipment for operating room are superannuated.</p> <p>-Function of sterilizing equipment are lost or reduced, which occasionally disturbs surgical operations.</p>	<p>Renewal of the equipment whose functions were ruined or reduced by the floods and superannuation.</p> <p>-Renewal of operating instruments in major surgical departments</p> <p>-Renewal of anesthesia equipment.</p> <p>-Renewal of equipment for operating room.</p> <p>-Renewal of sterilizing equipment.</p>	<p>Restore functions of general medical services as a nationwide referral hospital.</p> <p>-Operating functions will be recovered.</p> <p>-Credibility of anesthesia functions will be recovered.</p> <p>-Operating room functions will be recovered.</p> <p>-Sterilizing department will recover its function and will no longer disturb operation. In hospital infection will also be decreased.</p>

Category & name of hospital	Current circumstances and problems	Measures taken under the Project	Expected results and improvements
	<p>-Functions of x-ray equipment have deteriorated.</p> <p>-ICU functions are disabled.</p> <p>Ambulance service is not properly functioned due to short of Ambulances</p>	<p>-Partial renewal of x-ray equipment.</p> <p>-Improve the ICU equipment.</p> <p>-Supply one ambulance</p>	<p>-X-ray diagnostic functions will be recovered.</p> <p>-ICU functions will be recovered.</p> <p>-Ambulance service will be improved</p>
2. General hospitals			
<p>Omdurman Hospital Khartoum North Hospital Wad Medani Hospital El Managil Hospital Rufaa Hospital Aboushar Hospital Sennar Hospital Singa Hospital El Demazin Hospital Kowsti Hospital Atbara Hospital Shandi Hospital Doungoula Hospital Marawi Hospital</p>	<p>Medical services fo local residents were reduced due to torrential rainfalls and floods as well as superannuation.</p> <p>-Operating instruments in major surgical departments are extremely superannuated.</p> <p>-Functions of anesthesia equipment have deteriorated.</p> <p>-Operating room equipment is superannuated.</p> <p>-Functions of sterilizing equipment are lost</p>	<p>Renewal of equipment suffering malfunctions due to the floods or superannuations.</p> <p>-Renewal of operating instruments in major surgical departments.</p> <p>-Renewal of anesthesia equipment.</p> <p>-Renewal of operating room equipment.</p> <p>-Renewal of sterilizing equipment.</p>	<p>Restore functions for providing medical services to local residents and those referred by lower-level medical facilities</p> <p>-Operating functions will be recovered.</p> <p>-Credibility of anesthesia functions will be recovered.</p> <p>-Operating functions will be recovered.</p> <p>-Sterilizing department will recover its</p>

Category & name of hospital	Current circumstances and problems	Measures taken under the Project	Expected results and improvements
Karima Hospital Kassala Hospital El Gadarif Hospital	or reduced, which occasionally disturbs surgical operations. -Functions of x-ray equipment have deteriorated. -Ambulance service is not properly function	-Partial renewal of x-ray equipment. -Supply an ambulance to all general hospitals except Khartoum North Hospital.	capacity and no longer disturb operations. It will also help to decrease in hospital malfunction -X-ray diagnostic function will be recover. Ambulance service will be improved
3. Specialized hospitals			
Isotope Hospital	Functions of equipment have deteriorated due to the damage caused by the torrential rainfalls and floods, and the medical services provided as the nation's only hospital specializing in cancers have been hampered.	-Renewal of the mobile-type x-ray unit which has malfunctioned due to flooding and other causes. -Supply an ambulance	-X-ray diagnoses will be improved. -Efficiency in patient transfers between hospitals will be enhanced.
Maternity Hospital	Medical services as a hospital specializing in obstetrics and gynecology have deteriorated due to the damages caused by the torrential rainfalls and floods.	Renewal of operating instruments in obstetrics and gynecology	Efficiency and quality of operations will be improved.

Category & name of hospital	Current circumstances and problems	Measures taken under the Project	Expected results and improvements
	<p>-Functions of anesthesia equipment have deteriorated.</p> <p>-Operating room equipment is superannuated.</p> <p>-Functions of sterilizing equipment are lost or reduced, which occasionally disturbs surgical operations.</p> <p>-Functions of x-ray equipment have deteriorated.</p>	<p>-Renewal of anesthesia equipment</p> <p>-Renewal of operating room equipment.</p> <p>-Renewal of sterilizing equipment.</p> <p>-Partial renewal of x-ray equipment.</p>	<p>-Credibility of anesthesia functions will be recovered.</p> <p>-Operating functions will be recovered.</p> <p>-Sterilizing department will recover its capacity and no longer disturb operations.</p> <p>Prevention of in-hospital infection will also be improved.</p> <p>-Functions of x-ray diagnostics will be recovered.</p>
Khartoum Dental Hospital	<p>Function of oral surgery has been reduced due to malfunctioning or superannuation of equipment.</p> <p>-Functions of oral surgery are not available.</p>	<p>Renewal of equipment with malfunctioning resulting from the floods or superannuation.</p> <p>-Renewal of operating room equipment and anesthesia equipment.</p>	<p>Functions of medical service of the speciality hospital will be recovered by restoring the operation room and x-ray unit.</p> <p>-Functions of oral surgery will be recovered which will make it possible to perform surgery on oral cancers, etc. at this hospital.</p>

Category & name of hospital	Current circumstances and problems	Measures taken under the Project	Expected results and improvements
	<p>-Operating functions have deteriorated due to superannuation of the equipment for operations.</p> <p>-X-ray diagnosis is not available in the hospital due to malfunctioning of the x-ray equipment.</p>	<p>-Renewal of equipment for oral surgery.</p> <p>-Renewal of dental x-ray cevices.</p>	<p>-Functions of oral surgical operations will be recovered.</p> <p>-Functions of dental x-ray diagnosis will be recovered.</p>

(2) Indirect effects

Direct objectives of the Project are to renew equipment in the 21 proposed hospitals suffering from breakdowns or malfunction due to the flood and heavy rains and superannuation and thus to recover medical services at each hospital. Through achievement of these objectives, it is expected that the availability of medical services at each proposed hospital will be recovered, the secondary medical services in the capital region and regional core cities will be restored and the system of secondary medical services for about 15 million residents will be reconstructed.

7-2 Propriety of the Project

The Sudanese Government aims at improving primary and secondary medical services through its "Three Years National Health Programme 1990-93" The damage, however, of the buildings and equipment in health and medical facilities caused by the torrential rainfalls and floods in 1988 was tremendous and restoration still remains the biggest issue in this sector. The Ministry of Health has formulated the Project for Supply of Medical Equipment and Materials for Sudan Emergency Flood Reconstruction Programme based on the Emergency Flood Reconstruction Programme, presented by a joint survey group of

international organizations after the torrential rainfalls and floods, and the following surveys independently carried out by the Ministry. Although the improvement of medical equipment was an urgent issue, it did not progress smoothly because of problems such as the difficulty in foreign currency acquisition. The Project aims at renewing medical equipment which has been damaged by the torrential rainfalls and floods or become superannuated. It will also contribute to the promotion of the Emergency Flood Reconstruction Programme. Moreover, through renewal of equipment at each proposed hospital, the medical services of each hospital will be recovered, which will lead to the enhancement of the secondary and tertiary medical services for local residents. As the Project focuses on the renewal of equipment which is extremely superannuated or has deteriorated, it does not require any additional budget appropriation for maintenance and administration or for operation after procurement. Furthermore, it does not require special training for the personnel as the equipment selected is of the same level as the existing equipment. The repair work for the equipment to be procured will be implemented by the Medical Equipment Maintenance Department of C.M.S. which is subordinate to the Ministry of Health, and maintenance of ambulances will be carried out by the Mechanical Transportation Department of the Ministry of Transportation and Communication.

Judging from the background, content, effect and maintenance and administration setups for the Project indicated above, implementation of the Project is definitely appropriate and justifiable.

Chapter 8 Conclusion and Recommendations

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8-1 Conclusion

As previously reviewed, the Project is expected to produce considerable effects and make a substantial contribution to the enhancement of the health and medical standards in Sudan through improved medical services at each proposed hospital. Accordingly, implementing this project with grant aid of the Japanese Government is regarded as highly appropriate. Furthermore, the Project is designed on the assumption that it will not require an increase in current personnel or operating expenses. As the selected items of equipment are mostly of the same level as the existing ones, they can be easily handled with the knowledge and experience of the existing personnel.

8-2 Recommendations

For further enhancing the Projects impact, efforts in the following matters on the part of the Sudanese Government are recommended.

- 1) Improve the visiting repair services at hospitals, etc., provided by the Medical Equipment Maintenance Department of C.M.S.
- 2) Improve the C.M.S. budget for purchasing repair parts and simplify the procedures for purchases.
- 3) Personnel in charge of the maintenance of the equipment is required to perform daily inspection and maintenance of the equipment supplied and to put a dust cover on equipment to protect them from any damage caused by dust or rain water leakage. They are also requested to keep the hospitals clean.
- 4) The Ministry of Health is recommended to establish a master plan for nationwide improvement of hospitals and other health and medical facilities. It is further recommended to standardize

hospitals and other health and medical facilities at each level and provide guidelines for expanding buildings as well as improvement thereof. It is also desired to increase efficiency in the health and medical services by standardizing hospital services and medical equipment programmes.

Nation-wide emergency medical system should be firmly established beforehand in case that increase in the number of ambulances is introduced in the future.