DEPARTMENT OF HEALTH AND FAMILY WELFARE
STATE GOVERNMENT OF ORISSA, INDIA

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT OF SARDAR VALLAVBHAI PATEL POST GRADUATE INSTITUTE OF PAEDIATRICS, ORISSA STATE
IN
INDIA

DECEMBER 2004

JAPAN INTERNATIONAL COOPERATION AGENCY

CONSORTIUM OF
YOKOGAWA ARCHITECTS & ENGINEERS, INC. AND
DAIICHI HEALTH CARE FACILITIES INC.

PREFACE

In response to a request from the Government of India, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Sardar Vallavbhai Patel Post Graduate Institute of Paediatrics, Orissa State, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to India a study team from April 22 to May 21, 2004 and July 4 to 12, 2004.

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

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

I wish to express my sincere appreciation to the officials concerned of the Government of India for their close cooperation extended to the team.

December 2004

Seiji Kojima
Vice President
Japan International Cooperation Agency

December 2004

LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Improvement of Sardar Vallavbhai Patel Post Graduate Institute of Paediatrics, Orissa State, in India.

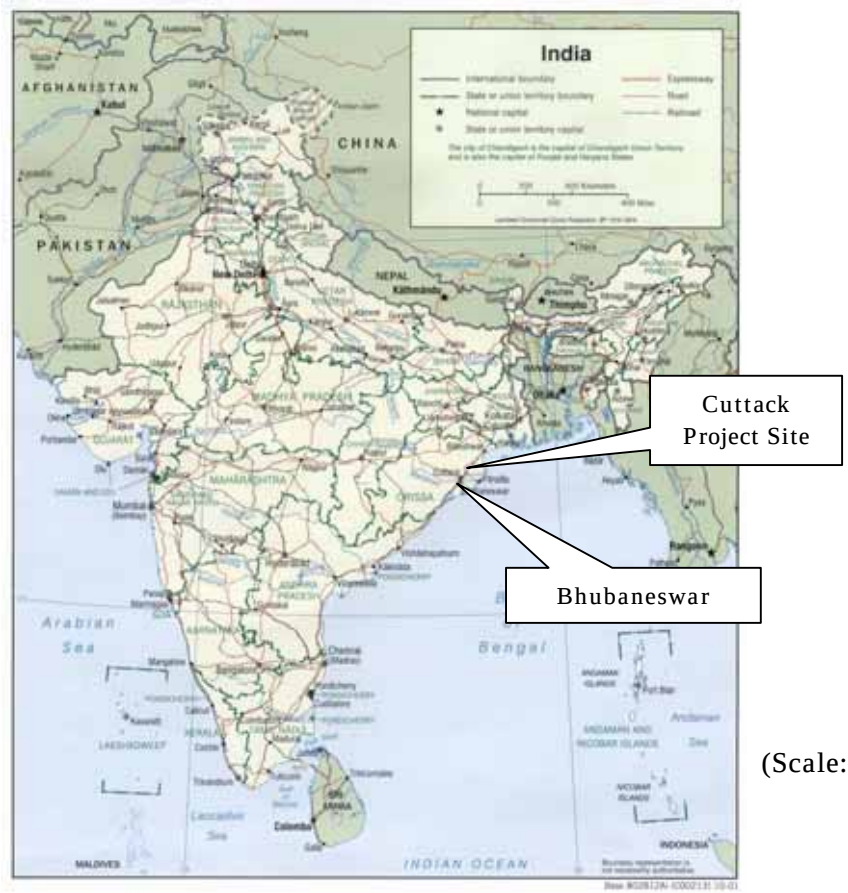
This study was conducted by the consortium of Yokogawa Architects & Engineers, Inc. and Daiichi Health Care Facility Consultants Inc., under a contract to JICA, during the period from April to December 2004. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of India and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,

Keiichi Ide
Project manager
Basic design study team on the Project for Improvement of Sardar Vallavbhai Patel Post Graduate Institute of Paediatrics, Orissa State
Consortium of
Yokogawa Architects & Engineers, Inc. and
Daiichi Health Care Facilities Inc.

LOCATION MAP



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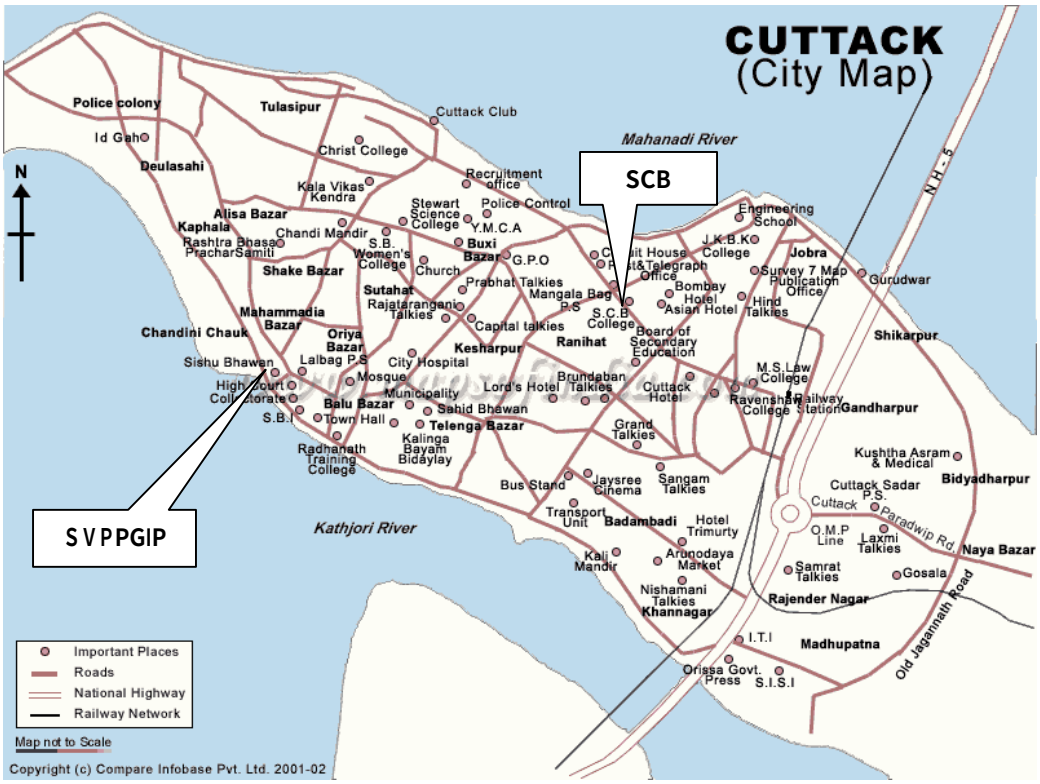

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PERSPECTIVE

CONSTRUCTION SITE (Toward TANK from OPD WARD)

CONSTRUCTION SITE (Toward SURGICAL WARD from behind OPD WARD)

SVP PGIP -1

OLD MEDICAL WARD (WEST SIDE: MAIN ENTRANCE)

OLD MEDICAL WARD
(UNDER REPAIRS)

OLD MEDICAL WARD
(ICU UNDER REPAIRS)

SUPERINTENDENT'S OFFICE
(NORTH SIDE)

SUPERINTENDENT'S OFFICE
(SEMINAR ROOM)

SUPERINTENDENT'S OFFICE
(WAITING AREA)

SVP PGIP -2

SURGICAL WARD (SOUTH VIEW)

SURGICAL WARD
(CORRIDOR AND OPERATION THEATRE)

SURGICAL WARD
(CORRIDOR, PATIENT'S FAMILY RESTING SPACE)

SURGICAL WARD
(OPERATION THEATRE)

SURGICAL WARD
(PATIENTS ROOM, FAMILY ATTENDANT)

SURGICAL WARD
(PATIENTS ROOM, FAMILY RESTING)

NEW MEDICAL WARD (NORTH VIEW)
(BEHIND: ORISSA HIGH COURT)

NEW MEDICAL WARD (EAST VIEW)
(1ST FLOOR CONSTRUCTION SUSPENDED)

NEW MEDICAL WARD
(NEW BORN ROOM)

NEW MEDICAL WARD
(NEW BORN ROOM)

OPD WARD (SOUTH SIDE: MAIN ENTRANCE)

OPD WARD (COURTYARD)

OPD WARD
(CONSULTATION ROOM)

OPD WARD
(X-RAY ROOM)

INFECTIOUS DISEASE WARD
(SOUTH VIEW)

INFECTIOUS DISEASE WARD
(NURSE STATION)

INFECTIOUS DISEASE WARD
(PATIENTS ROOM)

INFECTIOUS DISEASE WARD
(BEDS IN THE CORRIDOR)

SVP-PGIP OUTSIDE VIEW

ENTRANCE GATE

FAMILY ATTENDANTS SHED (UNUSED)

ELECTRIC CORPORATION'S SUBSTATION

WATER TANK TOWER

TANK

AMBULANCE CAR

SCB MEDICAL COLLEGE

OPERATION THEATRE

OPERATION THEATRE

LABORATORY

CT SCAN ROOM

PATIENTS ROOM -1

PATIENTS ROOM-2

LIST OF TABLES AND FIGURES

ABBREVIATIONS

Abbreviation	Original Name
AIDS	Acquired Immunodeficiency Syndrome
AMC	Annual Maintenance Contract
BHN	Basic Human Needs
CESCO	Central Electricity Supply Corporation
CHC	Community Health Center
CRS	Catholic Relief Service
CSSD	Central Supply and Sterilization Department
CT	Computerized Tomographic X-Ray Unit
DANIDA	Danish International Development Assistance
DEA	Department of Economic Affairs, Ministry of Finance
DfID	Department for International Development
EU	European Union
ELISA	Enzyme-Linked Immunosorbent Assay
E/N	Exchange of Notes
ENT	Ear, Nose, and Throat
GDP	Gross Domestic Products
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
HIV	Human Immunodeficiency Virus
ICMR	Indian Council of Medical Research
ICU	Intensive Care Unit
IMR	Infant Mortality Rate
IPD	Integrated Population Development
IRA	Infecciones Respiratorias Aguadas
JALMA	Japan Leprosy Mission for Asia
JICA	Japan International Cooperation Agency

MD	Minutes of Discussions
MDF	Main Distribution Frame
NBC	National Building Code of India 1983
NGO	Non-Governmental Organization
NICU	Neonatal Intensive Care Unit
OHSPD	Orissa Health Sector Development Project
OPD	Out-Patient Department
OT	Operation Theatre
PGSD	Post Graduate Student Doctor
PHC	Primary Health Center
PHD	Public Health Department
PICU	Pediatric Intensive Care Unit
SC	Sub Center
SCB	Sriram Chandra Bhanja Medical College
SIDA	Swedish International Development Cooperation Agency
SVP PGIP	Sardar Vallavbhai Patel Post-Graduate Institute of Paediatrics
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Fund
USAID	The United States Agency for International Development
WHO	World Health Organization

SUMMARY

SUMMARY

Certain health indexes of India, such as that for the mortality rate of under fives (93), average life expectation at birth (64), vaccination coverage rate (64) and total fertility rate (3.1) are equivalent to those of the neighbouring countries like Bangladesh (77, 60, 83, 3.6), Nepal (91, 59, 72, 4.6) and Pakistan (109, 60, 56, 5.2), except that the infant mortality rate (hereinafter, the IMR) of India is the worst (India 67, Bangladesh 51, Nepal 66, Pakistan 84). If compared to Sri Lanka (19, 72, 99, 2.1, IMR 17), where the health indexes are generally high among south Asian countries, all the health indexes of India are considerably lower: especially those relevant to paediatric health; for example the mortality rate of under fives and IMR are several times worse.

The health standard in Orissa State (104, 62, --, 3.3, IMR 90) is worse than the Indian national average, especially IMR is the worst in the entire country. While all health standards need improvement in Orissa, paediatric health care shall be given priority.

In order to emerge from this backward trend, the Government of India reviewed former health policies and issued the National Health Policy-2002, aiming to decrease the death rate by infectious diseases, IMR, and maternal mortality rate (MMR), to improve the availability of public healthcare facilities, and to increase the budgetary allocation to health sectors, so that the people of India can benefit from appropriate health standards. The Central and state governments endeavour to apply the National Health Policy-2002 into practical health programmes and strategies, and the Central Government provides support and guidance to the state governments or various organizations concerned.

In the spirit of the National Health Policy-2002, the Department of Health and Family Welfare of the State Government of Orissa issued the Orissa Vision 2010 in February 2003, detailing a reduction in IMR and the mortality rate from Malaria, improvement in the availability of public healthcare facilities, and the establishment of a proper maintenance system for the public health infrastructures as the main thrusts.

Sardar Vallavbhai Patel Post Graduate Institute of Paediatrics (hereinafter, the Institute) is a top referral hospital in Orissa, which also serves as a postgraduate paediatrical medical institution. However, the Institute does not possess sufficient facilities or medical equipment to accomplish the required functions.

Under these circumstances, the Department of Health requested Grant Aid from the Government of Japan through the Central Government of India in the form of medical equipment supplies in October 1996. Subsequently, in February 2002, the Department of Health reviewed the circumstances and submitted a revised request for Grant Aid for the purpose of improving the Institute, including the construction of new facilities (hereinafter, the

Project).

The Government of Japan entrusted the study to evaluate the viability of the Project to the Japan International Cooperation Agency (JICA), and JICA sent a preparatory study team in July 2003. This study revealed that the problems of the Institute concerning medical services were attributable to impaired facilities as well as insufficient medical equipment.

Hence, the Government of Japan decided to implement a basic design study for the Project and sent a study team from April 18 to May 17, 2004. The Government of India presented a reconstruction programme for the entire hospital facilities with a total floor areas exceeding 11,000 m^2, including the supply of medical equipment. During the repetitive discussions, the two parties identified the most urgently required facilities and equipment for improving the capability of the Institute. Following another mission from July 4 to 12, 2004, analysis of the results of the studies and the explanatory study mission sent from October 12 to 22, 2004, both parties share the view that construction of a new hospital building, partial repairs of existing buildings and renovation of medical equipment are indispensable and urgently required for the improvement of the Institute.

The Institute is unable to provide efficient medical services due to the dispersion of the central diagnostic functions, the fact that the Newborn Ward and ICU beds are in different buildings, old equipment in need of replacement, and a shortage of basic medical equipment. Moreover, ICU (NICU, PICU) beds and medical equipment necessary for the top referral hospital are also inadequate. Although the Institute does indeed provide practical training for postgraduate students at the medical service venue, the reality is not as satisfactory as expected, due to insufficient facilities and equipment.

This Project aims to improve the medical services of the Institute through the construction of a new hospital building in which the principal hospital functions are integrated, ensuring the provision of necessary equipment, transferring technology to establish an effective management and maintenance system of equipment, and thus achieving a better educational environment for the postgraduate students. (Among the project components, Japanese grant aid will be provided to construct the New Hospital Building, procure the medical equipment, and implement the operation training and maintenance guidance (the soft component).)

Major components of the New Hospital Building are as follows (Remodelling of existing buildings will be borne by the Indian side):

Components of the New Hospital Building

Building	Rooms and Facilities	Structure, floor areas
OPD/Lab	OPD consultation room/Treatment room, Casualty consultation room, Laboratory, X-ray room, ICU rooms (21 beds), Newborn room (30 beds), Doctors rooms, Corridor	RC, two stories 1,655.0 ㎡
OT/Ward	OT room, CSSD, Surgical ward (20 beds), Medical ward (45 beds), Playroom, Doctors rooms	RC, two stories 1,491.0 ㎡
Annex Building	Toilets for OPD patients/families, Fire pump room, Waste treatment room	RC, single story 110.4 ㎡
	Total number of beds 116 beds	Total floor areas 3,256.4 ㎡

The following table shows the major medical equipment to be provided for each department.

Major Equipment to be Provided

Departments & Facilities	No. of Beds	Location	Major Equipment and Instruments (Quantity)
NICU	9 beds	New Hospital Bldg.	Suction Unit (9), Infusion Pump (9), Phototherapy Unit (7), Syringe Pump (6), Monitor (9), Ventilator (3), etc.
PICU	12 beds	New Hospital Bldg.	Suction Unit (12), Infusion Pump (12), Low Pressure Continuous Suction Unit (1), Syringe Pump (7). ICU bed (9), Ventilator (2)
Newborn	30 beds	New Hospital Bldg.	Suction Unit (15), Pulse Oximeter (5), Apnea Monitor (6), Perplex Heat Shield (21), Phototherapy Unit (9), Radiant Heat Warmer (9), etc.
Image Diagnosis		New Hospital Bldg.	General X-ray Machine (1), Portable X-ray Machine (1), Ultrasonic Diagnostic Machine w/ additional neonatal probe (1), etc.
Laboratory		New Hospital Bldg.	Blood Gas Analyser (1), Chemistry Auto Analyser (1), Micro Centrifuge (1), Blood Cell Counter (1), etc.
OT		New Hospital Bldg.	Anaesthesia Apparatus (1), Major Operation Instrument Set (3), Mayo Instrument Table (1), Fiberoptic Endoscope (Broncho) (1), Defibrillator (1), etc.
CSSD		New Hospital Bldg.	High-pressure Steam Sterilizer (1), Water Softener (1), Washing Machine w/ Dryer (2), Loading Trolley (2), etc.
OPD		New Hospital Bldg.	Suction Unit (2), Infant Treatment Table (2), Ambubag (2), Stretcher (2), Examination Table (5), etc.
Casualty		New Hospital Bldg.	Infant Incubator, portable type (1), Mobile Resuscitation Unit (1), ECG, portable type (1), Emergency Cart (1), etc.
Medical Ward-1	45 beds	New Hospital Bldg.	Bed (45), Refrigerator (2), IV-Stand (23), Ambubag (2), Stretcher (2), etc.
Medical Ward-2	34 beds	Present Surgical Ward	Suction Unit (2), Refrigerator (1), IV-Stand (8), Ambubag (2), etc.
Surgery	20 beds	New Hospital Bldg.	Bed (20), IV-Stand (10), Bedside Monitor (1), Ambubag (2) Wheel Chair (1), Stretcher (1), etc.
ID	50 beds	ID Ward	Suction Unit (1), Refrigerator (2), IV-Stand (12), etc.
Incidental Facilities			Microwave for biomedical waste management (1), Waste shredder (1), Work table, sink and other medical furniture

The total project cost is estimated to be 842 million yen (Japan 835 million yen; India 7.5 million yen). The working design will take 4.5 months, and the construction work including procurement of the equipment will take approximately 12.0 months.

The Institute will be in charge of operation and maintenance of the facilities and equipment following the handover of the Project. The current number of 200 beds will remain unchanged after the Project; however, the facilities and capability of the ICU and Newborn Ward will be significantly expanded. To deal with such improvements, one nursing sister for the NICU and NB, 16 nurses, and 16 nurse aides will have to be newly employed.

As a state hospital of Orissa, the Institute is operated in accordance with the budget from the State Government, which covers basic expenditures such as salary components (for sanctioned employees). The State Government has confirmed the budget increase after the completion of the Project in order to cater for the expected increase of energy costs for the New Hospital Building.

The Institute established the User's Society system in July 1998 to introduce the User's Charge system, and the incomes received have been used for the purchase of medical consumables, the maintenance / reinforcement of equipment, the employment of nurses on a contract basis, etc. to improve the quality of its medical services. When the Project is completed, key facilities will be integrated in the New Hospital Building, which will enhance the efficiency of medical services. Upgrading of the NB Ward and ICU (NICU and PICU), and renewal of the equipment in the Imaging and Laboratory Departments will be also realised. With the introduction of new equipment with better performance, the balance of incomes and expenditures of the User's Charge is expected to present a certain surplus, in spite of some increases in expenditure such as the employment of workers on the contract, costs for the annual maintenance contract of medical equipment, and purchase of consumables, etc. There seems no problem with respect to the management of the Institute after the Project with the budget from the State Government and the incomes from the User's Charge system.

When the Project is implemented, approximately 20 million people (2003 estimate) in 13 districts including Cuttack in Orissa to be served by the Institute will receive benefits. In addition, through technology transfer by the graduate doctors of the Institute who will be dispersed to various hospitals and medical centres in Orissa, the entire population of Orissa State, a total of over 35 million people, (2003 estimate) will benefit indirectly from the Project. The following effects are expected following the Project implementation.

Project Effects and Range of Improvement

Situation and Problems	Measures Taken through the Project (Contents of the Project)	Project Effects and Range of Improvement
1. The Institute is incapable of providing satisfactory medical services because of hospital buildings scattered around the campus (dispersion of core hospital functions and inter-related functions), use of inappropriate buildings (use of buildings originally designed for other purposes, or obsolete buildings), insufficient building space (rapid increase in demand), as well as old equipment or that in insufficient supply. Post-graduate level education through practical training in medical services is not realised as expected.	• A new hospital building will be constructed, which will accommodate the outpatient department, central diagnosis department, operation section, ICU, newborn ward, a part of the medical ward and the doctors' rooms. Equipment necessary for these departments will be installed.	• With the completion of the new hospital building, core hospital functions will be combined in one location. With sufficient building space and medical equipment, the Institute will be capable of providing satisfactory medical services and a post-graduate level of education.
2. Operation and maintenance system is not established for the equipment.	• A training program to establish the equipment operation and maintenance system (soft component program) will be carried out.	• The equipment operation and maintenance system will be established. With this preventive maintenance system, the incidence of equipment failures or that left unused will decrease.

A comprehensive examination of the Project, as cited below, reveals that its implementation through Grant Aid provided by the Government of Japan, is judged fully appropriate and justifiable.

(1) The Project is expected to contribute to achieving the medium / long-term objectives of the health policies of the Central and State Governments.

(2) The enhancement of the Institute through the implementation of this Project will benefit local inhabitants as well as the entire Orissa population, encompassing over 35 million people.

(3) The free ICU beds to be provided for in the Project will expand the opportunity for underprivileged families to receive advanced medical care.

(4) Upon completion of the Project, the facilities and equipment can be operated and maintained with the Institute's own funds, personnel and engineering, rather than requiring excessively specialized technology and skills. The Institute utilises the incomes from the User's Charge system for upgrading medical services, for the annual maintenance contracts of the medical equipment, and the employment of workers on a contractual basis. They are expected to facilitate the implementation of the Project.

(5) A microwave and a shredder which will be adopted during the Project for the treatment of medical waste will satisfy local environment conservation criteria.

(6) The construction site, located inside the hospital campus, is on flat ground and does not require expensive costs for land preparation work. The remodelling of existing hospital buildings will also be facile. Maintenance costs for the improved medical equipment will remain within the range deemed affordable based on the income from the User's Charge. There do not appear to be any difficulties that may obstruct the implementation of the Project made possible through Grant Aid from the Government of Japan.

The following issues are recommended to the Indian side in order to accomplish the Project successfully, to make the beset use of the facilities and equipment, and to render the effects of the Project sustainable.

(1) Daily Cleaning and Maintenance

Daily cleaning and checks are vital for proper maintenance, which will maintain a good condition and extend the lifespan of the New Hospital Building. For this purpose, the superintendent as well as all the Institute staff shall recognise the necessity of proper maintenance and cleaning. Specifically, manuals for cleaning and daily inspections need to be prepared.

(2) Equipment Maintenance

To realise optimal effects of the soft component work programme for the establishment of the maintenance system, the Institute is recommended to employ an equipment engineer / technician under the deputy superintendent prior to the soft component work.

(3) Budget for Renewal of Equipment

From about the year 2014 onwards, namely seven years after the completion and handover of the Project, it will be necessary to renew the medical equipment. To secure the cost

thereof, the present User's Charges should be revised by attaching more importance to the depreciation costs. However, it is anticipated that high charge setting is impossible because the Institute is public. Therefore, the Department of Health of the State Government needs to prepare a budget to compensate for the insufficiency.

(4) Administration of Free Beds in ICU

The existing 6 ICU beds in the Institute are all chargeable. Since the Project is to be implemented under the Grant Aid scheme, initial investment in ICU is unnecessary. Therefore, upon completion, 4 free NICU beds and 5 free PICU beds will be lined up. Basically, this is accepted favourably from a compassionate perspective towards underprivileged people. For the successful operation of free ICU beds, the Department of Health should extend support to the Institute, and also, the regulations for the free bed availability should be stated clearly in the bylaws of the User's Society and be observed severely.

(5) Reinforcement of Referral System

Following the Project, the number of beds will increase to 21 ICU beds (12 PICU beds and 9 NICU beds) while the NB ward will have 30 beds, which will help improve its function as a tertiary level hospital.

However, in the year 2003-04, the patients referred to the Institute from lower level hospitals and medical centres shared only 11% of the total outpatients. Though it is impossible to reject non-referral patients from the vicinity areas of the Institute, it is necessary to strengthen the referral system by accepting more referral patients so that the Institute may function more efficiently as the top referral hospital for paediatrics in Orissa.

(6) Enhancement of Training in the Institute

Upon completion of the Project, the number of beds will remain at 200 beds, as at present. However, with the improvement of the ICU and NB wards, nurses and nurse aides will be newly employed in these sections. These sections are operating in the existing ICU/NB Ward, and in this Project, the service in these sections will be further improved, meaning the nurses and nurse aides who are to be increased shall undertake training in the existing ICU/NB Ward for two or three months before the handover of the Project.

(7) Coalition with SCB Medical College

As things stand, for special clinics like dentistry, ophthalmology, ENT and orthopaedics, specialists are sent from the relevant sections of SCB Medical College. Hereafter, in order to strengthen the medical treatment services of the Institute as a tertiary level hospital,

coordination with SCB Medical College is necessary. Fortunately, the existing OPD Building will have vacant space once the image diagnosis department and OPD rooms are relocated to the New Hospital Building. It is possible to strengthen the special surgery by using the vacant space.

(8) Cooperation with Other Donors

In the fields of health and medical service of Orissa, World Bank and EU, UNICEF, DfID, DANIDA and many other international donor agencies and donor countries are engaging in supportive activities. Currently, such supportive activities concentrate mainly on the policy programme support of the Department of Health and as the facility construction and equipment supply for primary and secondary hospitals. Establishing coordination between these supportive activities and this Project will help to achieve further improvement in the standard of the state paediatric care.

CONTENTS

[ANNEX]

CHAPTER 1 BACKGROUND OF THE PROJECT

CHAPTER 1 BACKGROUND OF THE PROJECT

The Department of Health and Family Welfare of the State Government of Orissa (hereinafter, the Department of Health) developed the "Orissa Vision 2010" in February 2003. In recognition of the poor paediatric health conditions in the state, the Department of Health has emphasised a "reduction in the infant mortality rate (IMR)" as one of its main targets and is striving for improvement in this area.

Sardar Vallavbhai Patel Post Graduate Institute of Paediatrics (hereinafter, the Institute) is a top referral hospital in Orissa, which also serves as a postgraduate paediatrical medical institution. However, the Institute does not possess sufficient facilities or medical equipment to accomplish the required functions. (The current circumstances of the Institute are detailed in Chapter 3.)

Under these circumstances, the Department of Health requested Grant Aid from the Government of Japan through the Central Government of India in the form of medical equipment supplies in October 1996. Subsequently, in February 2002, the Department of Health reviewed the circumstances and submitted a revised request for Grant Aid for the purpose of improving the Institute, including the construction of new facilities (hereinafter, the Project).

The Government of Japan entrusted the study to evaluate the viability of the Project to the Japan International Cooperation Agency (JICA). JICA then sent a preparatory study team in July 2003, to confirm whether the contents of the request were suitable for Japan's Grant Aid Program or not. This study revealed that the problems of the Institute concerning medical services were attributable to impaired facilities as well as insufficient medical equipment.

Hence, the Government of Japan decided to implement a basic design study for the Project and sent a study team from April 18 to May 17, 2004. Although the original request had been only for the supply of equipment, the Government of India agreed to the suggestion from the Japanese side, that the facility construction should also be considered for the Project, and presented an informal request for a reconstruction programme for the entire hospital facilities with a total floor areas exceeding 11,000 m^2, at the beginning of the field surveys. The study team then conducted field surveys of the Institute and other similar medical institutions and discussed with the Indian side, in order to identify the most urgently required facilities and equipment for improving the capability of the Institute. The results of these discussions were recorded in the Minutes of Discussions (MD) as an official request from the Indian side for the facility construction and the modified equipment lists.

Following the results of the first study, JICA sent another mission from July 4 to 12, 2004 for an additional study. The study team presented an interim report examining the first field

surveys, pursued further discussions with the Indian side and collected more data and information.

Upon returning to Japan, the study team analyzed the results of the studies and drafted a final report. The explanatory study mission was sent to India from October 12 to 22, 2004.

Through the two field surveys, domestic examination and explanatory studies, both parties share the view that construction of a new hospital building, partial repairs of existing buildings and renovation of medical equipment are indispensable and urgently required for the improvement of the Institute.

CHAPTER 2 CONTENTS OF THE PROJECT

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2-1 Basic Concepts of the Project

2-1-1 Superior and Project Objectives

(1) Current Conditions of the Institute and Orissa State

As mentioned in the foregoing chapter, the Department of Health has emphasised the reduction of Infant Mortality Rate (IMR) among other objectives of Orissa Vision 2010, and intends to improve the facilities and medical equipment of the Institute to ensure their accomplishment.

The Institute was established in the 1960s by transferring the 200-year-old Governor house and additionally constructing an outpatient department building. With the New Medical and Infectious Disease Wards being constructed later in the 1980s, the Institute now manages 200 beds; of which 130 are medical, 20 surgical and 50 for infectious disease cases. In the past, however, the facilities were improved on an ad hoc basis simply as required. Important hospital functions were also scattered around multiple buildings, inhibiting efficient management of the Institute. The Institute started to provide for critically ill patients in July 2003, by installing six ICU beds in the paediatric medical ward, and equipping a medical gas piping system (oxygen, vacuum). In 2001 the Institute established the Newborn Department with 24 beds (18 beds in the New Medical Ward and 6 in the Old Medical Ward), to provide medical services for neonatal patients with severe but non-critical diseases, to be cared for in the NICU. However, the Institute does not possess sufficient medical equipment like ventilators, bedside monitors or infant warmers, nor an adequate number of baby cods. Much of the medical equipment is obsolete and in need of replacement, such as the X-ray machine, which has deteriorated considerably, such that it is now incapable of taking clear pictures. The Institute is a top referral hospital in Orissa, which also serves as a postgraduate paediatrical medical institution, however, the current circumstances of the facilities and equipment are incapable of accomplishing the required functions of the Institute.

(2) Superior Objectives

Through the implementation of this Project, medical services of the Institute as the referral hospital will be improved, following which practical training in this improved medical environment, which also allow the education for postgraduate students to be upgraded. Upon graduation, they will be appointed to various medical institutions in Orissa, and will transfer their advanced skills and expertise to other matters there; thus contributing to paediatrical improvement throughout the Orissa State.

(3) Project Objectives

As mentioned above, the Institute is unable to provide efficient medical services due to the dispersion of the central diagnostic functions, the fact that the Newborn Ward and ICU beds are in different buildings, old equipment in need of replacement, and a shortage of basic medical equipment. Moreover, ICU (NICU, PICU) beds and medical equipment necessary for the top referral hospital are also inadequate. Although the Institute does indeed provide practical training for postgraduate students at the medical service venue, the reality is not as satisfactory as expected, due to insufficient facilities and equipment.

This Project aims to improve the medical services of the Institute through the construction of a new hospital building in which the principal hospital functions are integrated, ensuring the provision of necessary equipment, and thus achieving a better educational environment for the postgraduate students.

2-1-2 Basic Concepts of the Project

(1) Concept of Facility Renovation

1) Facility Problems in the Institute and Roles of the Project

The present facility problems in the Institute and respective causes are summarized as follows:

Problem	Appearance	Cause
a) Flooding	Half the campus is sometimes flooded underfloor in the rainy season.	Topographical conditions and a lack of a proper sewer
b) Scattered Buildings	Major hospital functions or interactive functions are scattered around the campus, preventing proper and efficient hospital operation.	Lack of a proper building layout plan at the time of construction
c) Improper Building Function	Lack of a hygienically proper room layout and obstructive human traffic lines in the operation theatre; Shortage of natural lighting and ventilation; and Obstructive human traffic lines in the old medical word	Decrepit and non-purpose built state of building
d) Insufficient Floor Space	Shortage of OPD, emergency clinic, ICU, and Newborn beds	Delay in renovating facilities to meet increased demand
e) Dirty Buildings	Garbage and medical waste abandoned all over the campus, mould and stain left on the wall without being cleaned off	Lack of consideration for proper use and maintenance

Among the above, a) shall be solved by the Municipal Corporation as part of its political commitments for urban development. The Institute intended to procure a portable

drainage pump as a tentative solution, and has requested that this be included in the equipment supply. (This matter is examined in 2-2-3 (3) Review of the Equipment Request.) Meanwhile, problems b), c), and d) can be solved through the facility renovation, while e) can also temporarily be solved through building renovation. However, in order to resolve the root cause of this problem, awareness of both hospital users and staff alike concerning the proper use and maintenance of the building must be improved. Consequently, it was decided that the facility renovation under the Project would target problems b), c), and d) in particular from the aforementioned.

2) Principles to Formulate the Project

Since the problems enumerated in b), c), and d) are applicable for all the existing buildings, effectively resolving all the present problems in one go will require the Institute to renew all of them. This will be, however, impossible, due to limited resources and hence the formulation of the Project must take this point into full consideration. Thus, it was decided not to expand and improve on existing facilities based on foreseeable future demand but to solve the most urgent problems and improve the facilities to such an extent as to render them capable of meeting present demand.

3) Manner of Renovation

Problem	Applicable Area	Details of Problem	Manner of Renovation
b) Scattered Buildings	Central Diagnosis Dept. (OPD)	OT/CSSD in the Surgical Ward, Clinical Labs in the New Medical Ward, and Image diagnosis Dept in the OPD Bldg.	Overall Renewal
	Medical Wards	Scattered into 3 buildings apart with 400 m max. interval	Partial Renewal and Remodelling
	ICU	Interval of 200 m between the Newborn Ward and neighbouring buildings	Renewal
c) Improper Building Function	ICU	Short of natural lighting, ventilation, illumination, and air-conditioning	Renewal
	OT and CSSD	Lack of hygienically proper room layout and obstructive human traffic lines	Overall Renewal
	Old Medical Ward	Short of natural lighting, ventilation, and mixture of activity flow lines	Renewal
	Family Quarters	No space meaning family members forced to sleep on ward floor	New facility through Remodelling
	ME Workshop	No proper maintenance system and facility	New facility through Remodelling
d) Insufficient Floor Space	OPD	Shortage of screening rooms in OPD and lack of waiting room	New facility at Renewal
	Emergency Clinic	Lack of emergency clinic	New facility at Renewal
	ICU	Shortage of beds	Increase at Renewal
	Doctor's Room	Shortage of doctor's rooms	Increase at Renewal

The details of the problems and the nature of the renovation required to solve the problems enumerated in b), c), and d) are as summarised in the above table. In the Project, facility renovation will take place through the construction of a New Hospital Building and partial remodelling of some existing buildings.

4) Contents of Facility Renovation

a) Construction of the New Hospital Building

In the New Hospital Building, the facilities of the following department will be renovated: the general outpatient (paediatric medicine and surgery) and casualty department, the consultation department, the operation theatre and CSSD, surgical ward, PICU, NICU, the newborn ward, and part of the paediatric medical ward (Medical Ward-1).

The construction site for the New Hospital Building was settled at the ground located between the OPD and the Old Medical Ward buildings on the northwest side of the campus main road.

b) Remodelling of Existing Buildings

i) Old Medical Ward

Since the building was not originally built for hospitalization purpose, it is unsuitable for medical activities and such usage will thus be phased out. However, this building will continue to be used to house the administrative office rooms, the central store, and the doctor's rooms. A medical equipment maintenance workshop will also be equipped following partial remodelling of the building.

ii) Surgical Ward

The surgical ward building will be remodelled into a 34 bed medical ward together with 20 existing beds after being vacated following the transfer of the surgical department to the New Hospital Building. As a result, a medical ward block will be established in the vacated space, which currently consists of the Infectious Disease Ward, the Medical Ward-1 in the New Hospital Building, and this new medical ward in the ex-surgical ward (Medical Ward-2).

iii) New Medical Ward

Following the move of the clinical laboratories, the medical wards and the newborn ward to the New Hospital Building, the library and some doctor's rooms will remain in the building. Although the moves to remodel this building into an academic structure were suggested, to meet urgent requirements, it was finally decided that the vacant rooms would be used for patient families following slight repairs.

Inpatient care is heavily reliant on the family members, especially the mothers in the Institute, just as in many other hospitals in India. Since there is no facility for such families to take a rest, many are sleeping on the ward floors, which should be strongly discouraged based on the need for hygienic hospital operation. Consequently, urgent improvement is required in this area. In the Institute, a family building including a separate WC was constructed by a local NGO and is about to be inaugurated. However, it remains insufficient, given limited floor space of just 90 sq-m, to house the total number of family members, which sometimes exceeds 600 in the case of 200 inpatients.

The minimum floor area will be 600 m^2 in total, assuming a family occupies an area of 3 m^2, meaning the issue of the Institute improving the family quarters remains a particularly important and urgent one. Accordingly, it was decided that the vacant rooms, as aforementioned, would be used for family quarters in order to solve this problem on a wider scale as part of the Project.

iv)Outpatient Department Building

As a result of the transfer of the image diagnosis department and the medical and surgical outpatient clinics to the New Hospital Building, the public health and special outpatient clinics will remain located in the Outpatient Department building, where it is possible for the Institute to expand and improve facilities for these remaining functions. The remodelling of the building is, however, not included in the scope of the Project except for a small part because the necessity for remodelling is not yet of the same urgency. The part to be remodelled within the scope of the Project is the existing ex-toilet, which will be remodelled into a corridor connecting this building to the New Hospital Building.

v) Infectious Disease Ward

As this building was originally designed to function as a hospital ward, there is no critical problem concerning the room layout. The canopy roof and certain exterior walls had the concrete materials partly peeling off and reinforcement bars exposed at the time of the preliminary study but this was later found to have been repaired. Thus, it was judged that the renovation of this building could be put on hold for a while and that it would not therefore be included in the scope of the Project, but instead function continually as a 50 bed medical ward.

vi) Superintendent's Office

This building contains a superintendent's office room, a head administration officer's room, a lecture room, a plumbed section and a storage room. Since there are no specific problems in this building, it will continue to be used without being subject to renovation under the Project.

c) Facility Renovation

With of the above in mind, the project components are summarized as follows:

Name of Building	Subject Facilities of Renovation	Manner of Renovation
New Hospital Building	OPD & Emergency Dept, Clinical Lab. and Image diagnosis Dept. OT & CSSD, Surgical Ward, Medical Ward, Newborn Ward, NICU, PICU	New Construction
Old Medical Ward Bldg.	Administrative offices, central storage room, Maintenance Workshop, Doctor's Office	Partial remodelling
Surgical Ward Bldg.	General Medical Ward	Partial remodelling
New Medical Ward Bldg.	Family Quarters	Partial remodelling
OPD Bldg	Corridor	Partial remodelling

d) Planned Bed Numbers

i) Total Number of Beds

The total mandated number in the Institute is 200 beds, which includes 180 in the medical ward and 20 in the surgical ward respectively. Recently a slight increase has been seen in the number of babies and infants among the youngest of the inpatients. In the medical ward the average bed occupancy rate is particularly high at 90 %, although that of the surgical ward is low at 64%, and compared to an overall average of 84%. Since there is still some room overall, it was not felt necessary to increase the total number of beds. Thus, the planned total number of beds to be applied for under this Project was set to be 200; namely the same as the present mandated number.

ii) Number of ICU Beds

ICU provides critically ill patients with medical services. According to patient statistics over the past year, the number of ICU beds demand necessary and sufficient to accommodate all critically ill patients can be calculated as 12 for the PICU and 9 for the NICU respectively, which include the number required for surgical ICU patients. Thus, these numbers were set as the planned ICU bed numbers for the Project. The basis for the calculation is shown in Annex 5-1.

iii) Number of Beds in the Newborn Ward

Since newborn babies are very weak, it was decided that all newborn babies should be cared for either in the NICU or a newborn ward where there is absolute control over hygiene. The total number of beds required for newborn babies can be calculated as 39 as shown in Annex 5-2. Given the aforementioned number of NICU beds, namely 9, the number of newborn beds is calculated as 39 – 9 = 30. The planned number of newborn beds was, therefore, set to be 30 for the Project.

iv)Number of Beds in the Surgical Ward

Although the bed occupancy rate of the surgical ward is low, as mentioned above, it was decided not to reduce the present bed total in the surgical ward because the minimum number of beds for the operation of a single teaching unit is 20, and this figure was also the planned number of beds for the Project.

v) Number of Beds in the General Medical Ward

The medical beds will be scattered among the New Hospital Building, the Medical Ward-2 and the ID Ward. In the ID Ward, 50 beds will be distributed, while in the New Hospital Building, housing the ICU, general paediatric medical beds are also required for patients surviving the PICU, to be smoothly transferred and received. Consequently, 45 beds will be provided for this purpose. Based on the planned total number of beds and other bed numbers already calculated above, it is calculated that 34 beds shall be distributed within the present surgical ward.

As a result the bed distribution in the various wards of the Institute will be as follows:

Building	Ward	Number of Beds
New Hospital Building	NICU	9
	Newborn	30
	PICU	12
	Medical Ward	45
	Surgical Ward	20
Medical Ward-2 (Present Surgical Ward)	Medical Ward	34
Infectious Disease Ward	Medical Ward	50
Total		200

(2) Equipment Renovation

1) Current Problems of the Equipment and Roles of the Project

The Institute faces the following equipment-related problems:

a) Much of the equipment is aged and obsolete.

b) Not enough required equipment is available.

c) A proper operation and maintenance system has not been established.

Problems a) and b) can be attributed to a lack of sources due to the severe fiscal conditions experienced by the State Government. However, by introducing the User's Charge system three years ago, the Institute has endeavoured to use its income to procure new equipment. Nevertheless, numerous instruments remain in need of replacement or to e purchased outright.

The Institute, well aware of the necessity and benefit of c), is planning to appoint the

necessary staff to establish a rational operation and maintenance system to tend the equipment.

Under these circumstances, the Project will mainly be concerned with problems concerning shortages and the obsolescence of the equipment under the mutual cooperation of both governments.

2) Improvement Principles

The objective of the Project is not to achieve an ideal and top referral paediatric hospital in Orissa or a teaching hospital capable of fulfilling future as well as present requirements. On the other hand, the Project will concentrate on improvement to the equipment in the New Hospital Building as well as that in the existing hospital wards that will be indispensable for the improvement of the Institute medical services in the most urgent circumstances.

3) Improvement Methods

a) New Hospital Building

Equipment necessary for each department and room will be planned according to the variety and size of rooms determined through facility planning. Some of the current equipment will be transferred from the existing rooms. This relocation work will be performed by the Indian side following the handover.

b) Existing Buildings

The equipment improvement plan concerns the Medical Ward-2 (34 beds), which is renovated from the present Surgical Ward, the ID Ward (50 beds), and the lecture room in the Superintendent's Office. The current instruments will, in principle continue to be used, and those in insufficient supply to allow proper ward operation will be taken into account during equipment planning.

4) Descriptions of Improvement

a) New Hospital Building

i) OPD rooms

Medical equipment and furniture will be provided for the consultation and treatment rooms, and pharmacy. etc. The present operating table will be transferred from the existing building by the Indian side following handover of the Project.

ii) Casualty consultation room

Emergency operations will be performed in the surgical treatment rooms. The equipment necessary for first-aid treatment, recovery and post-operation observation will be provided for the casualty consultation room.

iii) Image diagnosis rooms

X-ray machines will be renewed, while mobile X-ray machines and ultrasonic instruments will be provided. They will be stored in the ICU laboratories.

iv)Laboratories

Furniture and analytical instruments will be provided for the sampling room, blood storage, and biochemical, pathology, and microbiological labs. Existing instruments to be continuously used will be transferred by the Indian side after handover.

v) OT rooms

Operation instruments will be provided to replace aged ones, or those in insufficient quantity.

vi)CSSD

Currently, instruments and utensils are sterilized after use with a small sterilizer installed in each department. Under this Project, contaminated instruments and utensils will be collected and sterilized in the CSSD. The equipment necessary for sterilization will be provided.

vii) Surgical ward

Beds, furniture and medical equipment necessary for the surgical ward that will be transferred from the existing Surgical Ward will be taken into account.

viii) Medical ward-1

Beds, furniture and medical equipment necessary for the medical ward-1 (45 beds) that will be transferred from the existing Medical Ward will be taken into account.

ix)New Born ward

Medical equipment and furniture for the New Born Ward (30 beds) that will be integrated in the New Hospital Building will be taken into account.

x) NICU

Medical equipment and furniture for the NICU (9 beds) that will be newly established in the New Hospital Building will be taken into account.

xi)PICU

Medical equipment and furniture for the PICU (12 beds) that will be integrated in the New Hospital Building will be considered.

xii) Medical waste management

Instruments necessary for the management and disposal of medical waste to satisfy the requirements of environmental standards will be provided.

b) Existing Building

i) Medical Ward-2

The Indian side will renovate the present Surgical Ward and reuse it as the Medical Ward-2 with 34 beds. The current instruments will continue to be used in principle, and those in short supply will be taken into consideration in this Project.

ii) ID Ward

Current instruments will, in principle, be continuously used, and those in short supply will be considered in this Project.

iii) Superintendent Office

Training/education equipment necessary for the lectures held in the lecture rooms in the Superintendent Office will be considered.

iv)Other existing buildings

The Old and New Medical Wards and the OPD Ward are not considered in this Project.

2-2 Basic Design of the Project Components to be Implemented under the Grant Aid Scheme of Japan

2-2-1 Basic Plan

The Project aims to improve the medical services and post graduate medical education of the Institute as mentioned above and consists of two concrete components for the renovation of the facilities and medical equipment, and a soft component which includes staff training and aims to establish a basic system for the proper maintenance of medical equipment. The Project implementation is expected to achieve a concentration of the hospital functions and fulfilment of medical equipment. Among the project components, Japanese grant aid will be provided to construct the New Hospital Building, procure the medical equipment, and implement the aforementioned soft component. The details of those components are as follows:

(1) Facility Renovation

1) Selection of Components for which Japanese Grant Aid is to be Provided

It is necessary to consider the budgetary limits and constraints of the fiscal system of Japan, as well as those of Orissa State, when selecting components for which Japanese Grant Aid will be provided.

As mentioned above, the facility renovation under the Project includes the construction of a new building and remodelling of some existing buildings. It is difficult to rely on the contribution of Orissa State Government to construct the New Hospital Building, when the financial condition is taken into consideration. It is also difficult to rely on the contribution of Japan for the timely completion of remodelling of existing buildings under the constraints of the Japanese single fiscal year system, since the work will start following completion of the New Hospital Building and the move of existing functions.

Consequently, it was judged appropriate that Japan would take responsibility for the construction of the New Hospital Building and Orissa State should take part in the remodelling. Thus, the construction of the New Hospital Building and its incidental facilities was selected as the project component for which Japanese Grant Aid was to be provided.

2) Selection of Construction Site

The total area of the campus exceeds 10 hectares, with single or two storied buildings scattered in a U-shape overall, in an environment rich in greenery. In selecting the construction site, site considerations include not only the size and shape of the land, but the locations of major existing buildings that will be in continuous use. Following examination based on this viewpoint, the flood plain neighbouring the existing OPD building to the northeast and the main campus road on the southeast was selected as the construction site for the following reasons:

a) The site faces the campus main road.
b) The site is adjacent to the Superintendent Office Building that is the most major facility of the Institute and will be in continuous use following completion of the Project.
c) Concentration of hospital functions is expected to be maximized by utilizing those of existing buildings in addition to the New Hospital Building.

3) Proposed Facilities in the New Hospital Building

Among the existing facilities the first priority is given to such facilities for which the proper provision of daily medical services has been prevented and for which urgent renovation is required. Subsequently, the second priority is given to the functionally relevant facilities of the first ones. As a result, it was decided that the following facilities would be moved to the New Hospital Building, for the following respective reasons mentioned below.

a) Outpatient and Emergency Department

i) Outpatient Clinics

There is only one screening room for two doctors in charge at a time in the medical clinic and screening and consultation takes place in the same room since there is no other room available there. There is also no waiting room for outpatients and their family members. The patient toilet has long been in disuse due to deterioration. These facilities, therefore, require urgent renovation. However, merely renovating these facilities in the New Hospital Building alone and rendering them apart from other existing outpatient facilities would be meaningless, since they are functionally very close.

Thus, all major general outpatient facilities, medical and surgical clinics, will also be moved to the New Hospital Building and necessary facilities will be provided.

ii) Emergency Clinic

There is neither an emergency department nor emergency clinic in the Institute. During the outpatient opening hours, a doctor in charge of screening outpatients also examines emergency patients in a screening or treatment room suspending the ongoing outpatient service. Consequently, it is not only difficult for doctors to properly stabilize and observe an emergency patient, but it also prevents him from providing ordinary outpatients with medical services. Thus, in parallel with renovation of the outpatient facilities, an emergency clinic will be established in the New Hospital Building to provide first aid to emergency patients, and stabilize and observe them.

b) Laboratory Department

i) Rooms for Image Diagnosis

Existing facilities of the image diagnosis department are located in the outpatient department building, rendering them convenient for outpatients but inconvenient for all inpatients. This inconvenience would be compounded if the image diagnosis department were left in the current location following the transfer of major facilities, including the outpatient department, to the New Hospital Building. The existing X-ray machine has already exceeded its standard working lifespan and requires renewal. Although renewal work, including the building work, will require more than 10 days, it will not be necessary to stop daily operation of the X-ray machine, provided another X-ray room is designed for the new machine. Thus, it was decided that the facilities of the image diagnosis department would be provided in the New Hospital Building.

ii) Clinical Laboratories

The existing clinical laboratories are located in the New Medical Ward, apart from the outpatient department, where there is considerable demand for laboratory examination and other wards are at a distance, making it inconvenient. In the Project the laboratories will be transferred to the New Hospital Building and the examination function will be concentrated in a single area for the convenience of patients and staff.

c) Operation Theatre and CSSD

i) The existing operation theatre and associated rooms are located in an old residential building, with a room layout which does not lend itself to effective hygienic space distinction. Therefore, it is inappropriate for use as an operation theatre of the educational hospital and improved quality of facilities is highly expected. Accordingly, OT rooms will be renovated in the New Hospital Building.

ii) CSSD

Services of the central sterile and supply department: CSSD are presently handled by the operation theatre: OT nurses at the cleaning room and the autoclave room next to OT. These rooms are too small with neither windows nor direct entrances. Access to the rooms shall be through the operation theatre. Since urgent renovation is required, CSSD will be renewed in the New Hospital Building.

d) Intensive Care Unit: ICU

i) The ICU was introduced to the Institute in July 2003 in the Old Medical Ward

originally built as a mansion in ancient time. For this reason, the room used for ICU is short, not only in natural lighting and ventilation, but also electric lighting and air-conditioning. The scale of the ICU is too small compared to demand and extension is required. Thus, the ICU facilities will be renovated in the New Hospital Building.

ii) Along with the move to the New Hospital Building, the ICU will be separated into the NICU and PICU units, and the number of beds which presently numbers 8 in total will be increased to 9 for the NICU and 12 for the PICU. The calculation concerning bed numbers is referred to in Annex 5-1.

e) Ward

i) Newborn Ward

As the newborn bedrooms are located in the New Medical Ward building separated from the building in which ICU is presently located, even after the move to the New Hospital Building, it will be very inconvenient to transfer surviving ICU patients to the general ward smoothly.

ii) Medical Ward-1

To ensure the safe transfer of surviving patients from the ICU to the general ward and for the purpose of proper recuperative care, more general beds in the vicinity of the ICU must be provided. Thus, along with the move of the ICU to the New Hospital Building, a total of 45 beds, for both babies and infants, will be secured in the New Hospital Building.

iii) Surgical Ward

As the surgical ward requires smooth access between the OT, it will also be moved to the New Hospital Building with OT.

4) Required Rooms

The rooms, number of rooms, and purpose of use of each department in the New Hospital Building are as follows:

Department	Room	No	Purpose of Use
OPD and Casualty Dept.	Medical Screening RM	2	Screening by Junior doctors, 2 rooms are necessary based on daily outpatient numbers
	Medical Consultation RM	1	Consultation by senior doctor, students' training.
	Medical Treatment RM	1	Injection, Measurement, other medical treatments
	Surgical Screening RM	1	Screening by Junior doctor

Department	Room	No	Purpose of Use
OPD and Casualty Dept.	Surgical Consultation RM	1	Consultation by senior doctor, students' training
	Surgical Treatment RM	1	Minor and emergency operations, Disinfection of wounds, bandaging, other surgical treatments
OPD and Casualty Dept.	Emergency RM	1	First aid, Stabilization, Observation
	Reception Desk	1	Receiving outpatients and emergency patients
	Accountant	1	Collection of medical charges
	Pharmacy	1	Dispensing legal grant drugs
Laboratories	Sampling RM	1	Receiving examinations, blood and urine sampling,
	Blood storage	1	Storing and provision of blood
	Biochemical lab	1	Biochemical analysis of samples
	Pathological lab	1	Pathological analysis of samples
	Biological lab	1	Biological analysis of samples
	Doctor's RM	3	Office / academic works, research and seminar
	X-ray machine RM	1	X-ray examination
	X-ray machine operation RM	1	X-ray machine operation
	Darkroom	1	Development of X-ray films
	Reception	1	Receiving patients for image diagnosis
	Ultrasound diagnosis RM	1	Examination with ultrasound machine
Operation Theatre & CSSD	Exchange hall	1	Hygienic isolation and changing stretchers
	Family RM	1	Waiting area for family members and explanation by staff
	Operation hall	1	Human / goods traffic
	Nurse station	1	Control of OT, observation of patients
	Recovery space	1	Stabilization of postoperative patients
	Changing RM	2	Changing, bathing, evacuation, separated male and female facilities
	Anaesthetist RM	1	Office works, waiting, resting
	Staff corridor	1	Pass of staff members
	Operation RM	1	Surgical operation
	Equipment RM	1	Storage of various equipment
	CSSD	1	Washing, assembling and sterilizing of instruments and linens for OT and other departments
	Material corridor	1	Move of soiled materials from operation RM to CSSD
ICU	NICU	1	Intensive care of neonates
	PICU	1	Intensive care of infants and children
	Satellite lab	1	Blood gas testing and other emergency tests for ICU patients
	Doctor's RM	2	Room for junior doctor on duty
	Nurse station	2	Supervision of ward, 1 each for NICU and PICU
	Anteroom cum corridor	1	Hygienic isolation, common use for NICU and PICU
	Changing RM	1	For nurses

Department	Room	No	Purpose of Use
	Dirt room	1	Treatment of dirt and cleaning patients' linens
Newborn Ward	NB bedroom	2	Medical treatment and care of newborn inpatients
	Anteroom	1	Hygienic isolation, 1 each for NICU and PICU
	Breast-feeding RM	2	For mothers and newborn patients
	Pantry	1	Boiling water, preparing milk and nutrition
	Dirt room	1	Treatment of dirt and cleaning patients' linens
	Doctor's RM	4	Office / academic works, research and seminar
Surgical Ward	Doctor's RM	2	Office / academic works, research and seminar
	12-bed room	1	Medical treatment and care of baby inpatients
	6-bed room	1	Medical treatment and care of infant inpatients
	2-bed room	1	Medical treatment and care of serious inpatients
	Nurse station	1	Supervision of ward
	Equipment RM	1	Storage of various equipment
	Pantry	1	Boiling water, preparing milk and nutrition
	Toilet	2	Male and Female, for the use of patients and family members, evacuation, bathing and washing
	Corridor	1	Traffic and securing natural ventilation
Medical Ward-1	9-bed room	1	Medical treatment and care of baby inpatients
	6-bed room	1	Medical treatment and care of infant inpatients
	Nurse station	1	Supervision of ward
	Equipment RM	1	Storage of various equipment
	Pantry	1	Boiling water, preparing milk and nutrition
	Dirt room	1	Treatment of dirt and cleaning of patients' linens
	Toilet	2	Male and Female, for the use of patients and family members, evacuation, bathing and washing
	Corridor	1	Traffic and securing natural ventilation
	Playroom	1	Children's amusement
	Doctor's RM	4	Office / academic works, research and seminar
Common Use Facilities	Entrance hall	1	Traffic, waiting, and resting of patients, attendants, and visitors
	Corridor	2	Traffic, 1 each floor
	Staircase	2	Traffic
	Lift	1	Conveyance of patients and equipment
	Storage	2	Storage of various goods
	Standby Generator RM	1	Generating emergency power and controlling power supply
	Oxygen cylinder stockyard	1	Supply of medical gas
	Compressor RM	1	Supply of medical gas
	Outpatient toilet	2	Evacuation and washing, separately provided for men and women
	Staff toilet	4	Evacuation and washing

(2) Equipment Renovation

1) Target Departments and Facilities

Although the original request proposal was only for the provision of medical equipment and furniture, a facility construction was included in the project following the preparatory study. Further to the basic design study, the facility construction will be confined to the New Hospital Building, while the equipment will be supplied to the New Hospital Building, Medical Ward-1, ID ward and superintendent office.

2) Equipment Plan in Each Building

a) New Hospital Building

Medical equipment and furniture necessary for each department and room will be planned, except for those scheduled to be moved from the existing buildings.

b) Existing Buildings

i) Medical Ward-2

In accordance with the transfer of the present surgical ward into the New Hospital Building, the Indian side will remodel the room used for the present surgical ward into the general medical ward-2 with 34 beds. In principle, the existing equipment will continue to be used in this ward, and equipment and furniture for which there are shortages and used for ward and nurse station operations, will be planned in this Project.

ii) ID Ward

This ward will be continuously used without being subject to remodelling. In principle, the existing equipment will be continuously used in this ward, and equipment and furniture for which there are shortages for ward operations will be planned.

iii) Superintendent Office

Training/education equipment necessary for the lectures held in the lecture rooms will be planned.

(3) Efficient Management and Maintenance System for Equipment

There is no section to manage all the equipment in the Institute, nor are there any engineers or technicians in charge of equipment maintenance. The Indian side intends to employ a biomedical technician directly under the superintendent when the equipment is supplied through this Project.

In cooperation with this technician as a counterpart, management/maintenance training for

equipment (soft component works) will be conducted under the scheme of Grant Aid, for the purpose of establishing the management/ maintenance system and training of the technician/s.

(4) Implementing Principles

1) Facility

This Project is to construct a New Hospital Building in the existing premises of the Institute, among other hospital buildings. It will be composed of the OPD/Lab, OT/Ward and Annex Buildings. The first two wards will be of two-story construction. Exterior works include the construction of reservoir tank, septic tank, seepage pit, sterilization tank, parking area, campus road, and soil filling around the building.

2) Equipment

As was mentioned in the section concerning Improvement Principles, the Project aims to improve the equipment in the New Hospital Building as well as that in existing buildings that will be indispensable for improving the Institute medical services for which there is most urgent necessity. Equipment for the New Hospital Building will be delivered in line with the construction schedule, and installed upon completion of the construction work. Equipment for the existing buildings will also be delivered in line with that for the New Hospital Building.

3) Work Schedule

The project implementation schedule will be formulated to take various factors into consideration, including construction conditions in India, the size of the building, the amount of equipment and local climatologic conditions. The site is situated at the lowest location of the surrounding areas, meaning that it is frequently waterlogged during the rainy season from June to October, rendering the implementation of substructure works such as excavation, filling, grading and foundation work, virtually impossible. Temperatures also often exceed over 40 degrees Celsius between March and June, which may adversely affect the performance of the workers.

In consideration of these conditions, building construction work and that associated with the supply/installation of the equipment can be completed in 12 months. Therefore, this Project will be implemented on a single fiscal year basis.

2-2-2 Facility Design

(1) Design Policies

1) Policies for Harmony with Environment

The campus of the Institute encompasses an area of around 10 ha. In the centre, a main campus road runs from northeast to southwest bound for the Old Medical Ward building. High trees grow densely along the road, from which flat land thickly covered with low trees and weeds spreads to the northwest and there is a pond in the centre. A thin forest with high trees lies beyond the pond, and composes a landscape which is very rich in greenery on the whole.

Existing buildings are scattered in the campus surrounding the vacant land in a U-shape at a distance. As the New Hospital Building is constructed in such a beautiful setting, the following are taken into consideration in order to preserve the landscape and ensure the building fits harmoniously into the environment:

a) Location of the Building

The site was selected in a location where the presence of the New Hospital Building would not harm the landscape. The building will be constructed in a location minimizing the need for trees to be felled.

b) Number of Stories

The New Hospital Building will be two-storied or less to coincide with existing buildings that are one or two-storied.

c) Shape of Roof

Despite the frequent heavy rains in the rainy season, many buildings in Cuttack city, as well as the majority of existing buildings in the campus, are flat-roofed except for the staff residences. There are few sloped roof buildings in this region. Taking environmental harmony with existing buildings into consideration, the New Hospital Building should also be flat-roofed, which is more economical.

2) Consideration for Future Extension

The scope of facility renovation to be implemented under this Project is limited. Although the Old Medical Ward and Surgical Ward buildings will be partly remodelled under this Project, no structural repair will be included. The ID Ward building, which is outside the Project scope, is considerably new but deteriorating gradually, although the exterior wall and canopy roof were recently repaired. The remaining lifespan of these buildings are, therefore, much shorter than that of the New Hospital Building, and it is inevitable that reconstruction will become necessary in the near future. Thus, the planning of the New Hospital Building is implemented to take probable future extension into consideration.

3) Policies to Meet Natural Conditions

a) Air Temperature

During summer in Orissa State, it is intensely hot, as the air temperature often exceeds the body temperature, with temperature over 42 degrees Celsius not unusual. Thus, the most important aspect of architectural design in this region is the means of preventing the outdoor heat from penetrating indoors. Effective ventilation is not always the best means of lessening the heat. People tend to focus on efficient means of preserving air which has cooled overnight. For this purpose, buildings with high ceilings and small windows have traditionally been constructed. People shut the glass windows as well as the exterior blinds, and draw the curtains to prevent heat from entering the building through the windows. As a result, the air in the room is stagnant, and sometimes even bad smells drift within the building. In many cases the lighting is insufficient and people work in dimly lit rooms.

It is required that such climatic conditions and local customs should both be taken into full consideration during the architectural design. However, as hygiene is the most important issue for the hospital building, effective natural ventilation and lighting in the hospital building remains important. Thus, in the architectural design, a building plan allowing a certain extent of natural light and ventilation to be secured is devised, and a reasonable window system allowing outside radiant heat as well as direct sunlight to be shut out is devised.

b) Humidity

Many buildings in Cuttack city are dirty with mould adhering to the exterior walls. The mortar-painted exterior walls and wall sections to which downspouts are fixed, continually wet during the rainy season, are considerably polluted in particular.

Thus, in the architectural design, countermeasures against mould are taken by selecting mildew-resistant materials or materials which, in the event of mould growth, remain inconspicuous.

c) Topography

The area between the main campus road and the pond was selected as the construction site for the New Hospital Building. The topography of the site is almost flat and its relative altitude is 98.2m to 99.2m. It is, however, frequently flooded during the rainy season. Thus, the ground floor level is designated to be as high as possible, and the areas surrounding the building are to be filled with good soil.

d) Subsoil

The subsoil of the construction site consists of sandy or clayish silt in the upper layers with more sandy or sand material in the lower layers, according to depth. Since the N-value counts 5 to 9 in the upper layer, the type of foundation will be direct with a concrete slab.

4) Policies for Social Customs

a) Care by Ward Family Attendant

In hospitals providing paediatric services in Orissa State, the complete nursing system is not as popular as in Japan. Family members, mostly mothers, attend and take care of patients for 24 hours. This system is applied, even in the ICU, whereby various problems in terms of hygienic control may arise. This system is, however, useful for hospitals in order to supplement the shortage of nurses through the use of family attendants, and for the patients' families, it brings about a decrease in the financial burdens.

Therefore, as this system is anticipated to continue for a while, the New Hospital Building will be designed on this basis.

b) Manners of Use and Maintenance of Toilet

It seems that toilet training does not extend to the whole of the Orissa State. People relieving themselves along the highway and in the green areas of campus are frequently observed. Thus, it is difficult to say that appropriate manners concerning the use and maintenance of the toilet are present in the Institute and other similar facilities, where unpleasant odours linger in the air.

During the building design, this social feature will be taken into full consideration, and the structure will be devised such as to facilitate proper maintenance will be easy and malodours will not pervade through the building to the same extent, since the toilet in the building will be situated in a spot where sufficient natural ventilation is expected.

5) Construction Situations

In India, generally speaking, prior permits are required when cutting down trees growing in public premises needs. When the application is approved, the trees are brought to auction, and upon completion of the business deal, the trees can be cut down. It usually takes about three months for this procedure. To avoid such cumbersome matters, the location of the project building will be designed to allow the maximum number of trees in the site ground to be retained.

6) Commissioning the Local Companies

a) Local consultants

Most of the architects offices and architectural consulting companies in Bhubaneswar are small companies, mainly dealing with residential design work. These companies pursue design by organizing a technical group composed of architects, structural engineers, electrical engineers, mechanical engineers and other technicians considered necessary for a project. The detailed design work for this Project will be completed in a limited period of time according to the scheme and schedule of Grant Aid. The coordination of the facility design and equipment design will have to be done in Japan. Under such circumstances, the active utilization of local consultants hardly seems practical. Thus, in this Project, the local consultant will be requested to support the structural design to make it as economical as possible.

b) Local contractors

Local contractors are small companies lacking highly advanced skills or not oriented effectively for quality control or security management. Projects of a certain scale are constructed by large general contractors in Delhi or in large cities with branch offices throughout India including Bhubaneswar.

In case the Japanese contractors are engaged in the construction projects in India, they shall establish a local company, jointly with an Indian contractor, or register a project office at the Reserve Bank of India exclusively for this Project and conclude a subcontracting contract with a registered Indian subcontractor.

7) Policies concerning Capability of the Implementation Organization for Proper Operation and Maintenance

It is difficult to say that buildings are appropriately maintained, not only in the Institute and SCB Medical College Hospital but also in Karawatisalan Hospital in Delhi that was granted by Japan and inaugurated in 2000. They are all dirty. Proper building maintenance depends on daily cleaning, inspection, and small repairs every time faults are found. It appears that insufficient maintenance is conducted in the Institute. Hospital users, family attendants are not sufficiently well mannered and staff members do not place sufficient value on the necessity of proper building maintenance. Since it is difficult to change such mindset in a short time preceding the design of the building, stain-resistant materials requiring a minimum of maintenance will be selected.

8) Policies for Setting Scale and Grade of Facilities

a) Building Scale

One of the design principles involves determining the building size such that it is neither too big nor too small for the present medical activities of the Institute. Reference is made to similar facilities in the region and those facilities granted by Japan to obtain a location of necessary and sufficient size.

b) Quality of Building

The New Hospital Building is designed to be of equivalent quality to similar facilities; the most prevalent materials available in the region will be used, reinforced concrete will be adopted for the structure, and air-conditioning will be partially provided in the operation theatre, ICU rooms and other facilities that are always sealed or isolated for medical requirements.

(2) Design Description

1) Setting of Building Scale

Following many examples of hospital architecture, the 6-meter grid system that is easy to divide by whole numbers is adopted as a standard module applicable to the building planning. Each room is designed by taking the users, activities, equipment, furniture, and so on into account. Rooms decided by department, size, and the basis of a setting scale are as follows:

Department	Room	m^2	Basis of Scale Setting
Outpatient and Casualty Dept.	Medical Screening RM	18	Space for consultation by 1 doctor + 1 patient + 1 attendant and medical furniture
	Medical Consultation RM	36	Space for consultation + Space for student to attend and observe
	Medical Treatment RM	12	1 examination bed + 1 injection table
	Surgical Treatment RM	42	Space for treatment table and minor operation + 1 recovery bed
	Reception	6	Working space for 1 clerk
	Accountant		
	Pharmacy		
	Emergency RM	36	3 observation beds + examination and treatment space
Laboratory	Sampling RM	26	Toilet for urine sampling, blood sampling table, space for patients waiting with attendants
	Blood Storage	10	Guideline of the Medical Committee of India
	Biochemical lab	36	1 lecturer+ 1 lab technician+ existing equipment
	Pathological lab	36	1 lecturer+ 1 lab technician+ existing equipment
	Biological lab	36	1 lecturer+ 1 lab technician+ existing equipment

Department	Room	m^2	Basis of Scale Setting
Laboratory	Doctor's RM	18	1 set of Desk and chair for doctor + bookshelves + 4 student chairs
	X-ray machine RM	24	1 general X-ray machine + attendant waiting space
	X-ray machine operation RM	6	Operation panel + working space + passage way
	Darkroom	6	1 Film developer + working space
	Reception	9	Reception desk + passage way
	Ultrasound diagnosis RM	9	1 examination table + ultrasound machine
Operation Theatre & CSSD	Exchange hall	12	2 stretchers + working space
	Family RM	12	4 or 5 attending family members + doctor space
	Operation hall	42	Width = 3m x room layout length
	Nurse station	12	1 module width
	Recovery space	12	2 recovery beds
	Changing RM	12	Shower booth + WC + Lockers
	Anaesthetist Rm	18	Same as the doctor's room
	Operation RM	36	Standard space for 1 operating table
	CSSD	48	Space for washing + drying + assembling and 1 autoclave
ICU	NICU	48	5 m^2 / bed
	PICU	90	7.5 m^2 / bed
	Nurse station	9	1 or 2 nurses
	Doctor's RM	9	1 doctor in charge
Newborn Ward	Newborn bedroom	108	3.6 m^2 / bed
	Nurse station	9	3 or 4 nurses
	Anteroom	9	1 wash basin, outdoor sandal stock shelves, space for disinfection of hands and feet
General Ward	12 bed bedroom	48	For baby bed 4 m^2 / bed
	9 bed bedroom	36	For baby bed 4 m^2 / bed
	6 bed bedroom	36	For infant bed 6 m^2 / bed
	2 bed bedroom	18	For infant bed 9 m^2 / bed
	Nurse station	9	1 doctor in charge + 1 or 2 nurses
	Toilet	36	WC booths + Wheel chair WC + shower booths
Common Use Facilities	Corridor	3m wide	Can be also used as small waiting area or equipment stock
	Staircase	2m wide	Legal minimum width
	Lift	18	With elevator hall
	Standby generator RM	36	Including space for power receiving panel and a fuel tank
	Outpatient toilet	36	Ordinary WC + 1 Wheel chair WC (common use)
	Staff toilet	18	Separate male and female toilets

2) Setting of Quality

Based on the aforementioned design policies and following the principles that quality equivalent to similar facilities be applied, the quality of the New Hospital Building is set up as follows:

a) Structure

The building structure shall be a reinforced concrete rigid frame structure.

b) Finish

Element		Material and Construction Method	Reason for Selection
Exterior	Structural frame	Mortar + Elastic paint	Mildew-resistant material
	Gable wall	Mortar + Elastic paint	Mildew-resistant material
	Ridge direction wall	Masonry wall with fair-faced clinker brick	Maintenance free material + artistic consideration
	Separation grill	Steel lattice oil-painted	Easy maintenance + low cost
Interior	Ceiling AC room	Insulation panel hung ceiling	Decreasing AC volume, low cost
	Ceiling no AC room	Exposed slab scratch mended + paint finish	Maximum space volume use, avoiding mortar peeling off
	Wainscot	Ceramic tile	Dirt-resistant, easy to clean
	Wall	Mortar + Emulsion paint	Low cost
	Floor	Kota-stone	Non-slip, low cost
Windows and door	Window- inside	Aluminium. sash glass casement	Maintenance free
	Window- outside	Wooden grille casement	Easy to maintain, low cost
	Window- high side	Glass louver window	Securing natural lighting and ventilation
	Room door	Wooden flash door	Popular
	Corridor shutter	Steel grille door oil painted	Easy to maintain, low cost

c) Air-conditioning

Department	Room	AC system	Reason for Selection
Outpatient and Casualty Dept	Consultation RM	Ceiling fan	Low maintenance cost
Laboratories	Clinical lab	Split type AC	Maintaining the precision of equipment and working accuracy
	Ultrasound diagnosis RM	Split type AC	Sealed room, maintaining the precision of equipment and working accuracy
	Doctor's RM	Ceiling fan	Low maintenance cost
Operation Theatre & CSSD	Operation theatre	Split type AC	Sealed room, maintaining the precision of equipment and working accuracy
	Hall	Split type AC	Sealed room, maintaining moderate temperature

Department	Room	AC system	Reason for Selection
	Recovery RM	Split type AC	Sealed room, maintaining the precision of equipment and working accuracy
	Anaesthetist RM	Ceiling fan	Low maintenance cost
	Changing RM	Indirect cooling by exhaust air	Decreasing maintenance cost
ICU	Bedroom	Split type AC	Sealed room, maintaining proper temperature
	Corridor	Ceiling fan	Low maintenance cost
Newborn ward	Bedroom	Split type AC	Sealed room, maintaining proper temperature
General ward	Bedroom	Ceiling fan	Low maintenance cost

3) Architectural Design

a) Building layout

i) Construction Site

The construction site of the New Hospital Building is the ground between the OPD building and the Superintendent Office and is on the northeast side of the campus main road. The land shape is rectangular, measuring approximately 100m x 80m of which one of the longer sides faces the main road and one of the shorter sides is adjacent to a branch road bound for the ID Ward. As the ground is within the flood plain of the neighbouring pond prone to flooding in the rainy season, it will be raised by filling with good soil to a level about 80 cm high.

ii) Location of the Main Building

As mentioned below, the New Hospital Building consists of a two-storied main building and a single-story annex building connected by a corridor. The main building consists of two 2-story building wings of a central corridor plan connected in a T-shape.

The location and direction of the main building is planned such that the wing of the building corresponding to the stem of the "T" will be parallel to the campus main road in order to allow people to approach the building from the road through the entrance that would be provided in the centre of the wing. The fact that the distance between the road and the building will be as wide as possible is also taken into account, avoiding the need for overly intensive cutting of high trees, mostly growing along the road, for the purpose of construction. The space obtained through the arrangement above will be used for car parking, and also an access slopeway to absorb any difference of height caused by the landfill implemented for

flooding control purpose.

iii) Connection to the Existing Building

Upon completion of the New Hospital Building, the special outpatient clinics, family welfare clinic, and resting room for the doctors in charge of night duty will remain in the existing outpatient building, which will remain in continuous use. Thus, the New Hospital Building will be connected by a corridor. The corridor is connected to the existing ex-outpatient toilet so that the connection work need not disturb the daily operation of the outpatient department. The location of the main building is finally adjusted to take into consideration the fact that the axis of the central corridor in the main building will coincide with that of the connection point.

iv) Consideration for Future Extension

Following the design policies, land of a certain size for the future extension of the building is secured on the northwest of the wing corresponding to the top bar of the "T", namely at the west corner of the site.

b) Architectural Design

i) Story

The New Hospital Building will be a low-rise construction, according to the aforementioned design policies. When single and two-story building are compared in terms of cost efficiency, site adaptation and usability, the two-story building seems a more advantageous option, as shown below. Thus it is proposed to make the main building a full two-story building

Items to Compare	Single Story Building		Two Story Building	
Cost Efficiency	Uneconomical Bigger areas of roof and foundation	×	Economical Smaller areas of roof and foundation	○
Adaptation to Site	Too dense for site area Roof covering area = floor area	×	Surplus land available Possible to decrease roof covering area up to half the size	○
Usability	Longer distance but horizontal move only	△	Shorter distance but vertical move	△

ii) Room Arrangement

Also following the design policies, the amount of natural lighting, drafting, and ventilation secured will be maximized. Thus, room arrangements based on zone planning where only a building reliant on full air-conditioning and electric lighting only would be unsuitable. In this case, either a side or central corridor system is applied to the room arrangement. Although the former side corridor system is

favours natural lighting and ventilation, it is also inconvenient due to longer flow lines and also uneconomical due to a larger corridor area. On the other hand the central corridor system makes it comparatively difficult to secure natural lighting and ventilation in the corridor. It is, however, possible to shorten the flow lines by arranging relevant rooms closely on both sides of the corridor, which also allows the construction cost to be reduced. Thus, it is decided to adopt the central corridor system for the design of the main building.

iii) Building Composition and Wings Arrangement

With the intention to design the main building as a two-story structure and including a central corridor plan based on the aforementioned size, it is impossible to arrange such a building in the site as includes all necessary rooms. In this case the building length exceeds that of the site. Therefore, this building must be divided into a minimum of buildings. Dividing into three, however, is to be avoided due to the following reasons: 1) it is evidently uneconomical because of an increase in total wall length; 2) there is no requirement for this based on departmental arrangements. Thus, the main building will be divided into two wings.

There are three possibilities for arranging the two wings on site; 1) to arrange them in parallel; 2) to arrange them in an L-shape; and 3) to arrange them in a T-shape. In the case of a parallel arrangement, both wings may interrupt the flow of wind for their neighbouring structure. In addition, it will be impossible to enjoy the beautiful landscape spreading from and beyond the pond from the backside wing, if both wings are arranged in parallel with the main road. On the other hand, there is no such associated problem in both cases of L and T-shape arrangements.

Except for a department corridor arranged at the bottom end of a wing, a corridor passing a department serves both as a means of internal communication within the department and also as a passageway to other departments. Therefore, for departments requiring isolation, such as that housing the operation theatre, they should be arranged at the bottom end of the wing. Although the L-shaped building has only two bottom ends, the T-shaped building has three. Thus, taking this advantage into account, it is decided to adopt the T-shaped plan building for this Project.

iv) Entrance

Prioritizing outpatient convenience, the main entrance is designed at the centre of the wing and arranged in parallel with the campus road. In front of the entrance hall, a waiting hall is installed with a corridor passing in-between. At the southwest end of the corridor after crossing another wing at right angles, a sub

entrance is provided to secure access to the existing buildings such as the Superintendent Office and the present Surgical Ward building.

v) Arrangement of Departments

On the ground floor, departments requiring convenient external access such as the Outpatient Department and the Surgical Ward are selected primarily to be arranged on the ground floor, following which the OT and CSSD requiring smooth access between the surgical ward are selected. Since the laboratory department has many outpatient users, it is also arranged on the ground floor.

The outline of the departmental arrangement is as follows: on the right of the entrance and waiting halls is the outpatient department; on the opposite side of halls, an emergency clinic and the examination department are arranged; then the wing will be connected via a corridor to another wing arranged at right angles to the other. In another wing at the left side end, where a higher degree of isolation is expected, the OT and CSSD are arranged, and the surgical ward is arranged on the right.

The first floor is the ward floor. Within the area above the OT, CSSD and surgical ward, the general medical ward and doctor's rooms are arranged, and above the examination department, further doctors' rooms and the newborn ward are arranged. The ICUs are arranged at the opposite side of the upper hall space, because they are contained in the bottom ends of the wing and are not thus exposed to passing traffic.

Outline of major departmental arrangements by floor and reasons for the arrangement on the subject floor are summarized as follows:

Department / Room	Floor	Reason for Arrangement on the Floor
Outpatient and Casualty Dept.	1	Convenience of external access
Surgical ward	1	Many injured patients find it difficult to walk
OT and CSSD	1	Related to the surgical ward
Examination Department	1	Convenience of outpatient access
PICU	2	Isolation from noise
NICU	2	Isolation from noise
Newborn Ward	2	Needs to be on the same floor as the NICU
General Medical Ward	2	Needs to be on the same floor as the PICU
Medical Doctor's Room	2	Needs to be near critical medical services

vi)Annex Building

Following the design policies specifying the creation of a structure to facilitate proper maintenance and avoid malodours as far as possible, an outpatient and

family attendant toilet is provided in the annex building. A fire pump room and a medical waste treatment room are also arranged in this building.

As for the patient and family attendant and staff toilets respectively provided in the main building, the location is selected at the end of the wing where it is easy to secure natural ventilation in order to avoid malodours entering into the building as far as possible.

c) Sectional Design

The major points of the section design based on the aforementioned design policies are summarized as follows:

i) The roof will be a flat roof.

ii) As is often seen among old buildings, it is desirable to have a floor height exceeding 4 meters as part of anti-heating measures. It is, however, decided that the floor height of the New Hospital Building would be 3.6 m, taking full account of the cost reduction upon the condition that the roof slab would be equipped with sufficient external insulation.

iii) Reducing direct sunshine is an important key aspect of heat control for the architecture of the region. Thus, it was decided to provide the building with deep eaves at roof level and continuous balconies at the first floor level on both sides of ridge direction walls. The balconies will be available for evacuation passage in case of emergency and used for situating the outdoor units of air-conditioners.

4) Structural Design

a) Type of Construction and Frames

Reinforced concrete buildings predominate in Cuttack City, since effective anti-seismic design is mandatory in India, where all parts of the country are prone to earthquake. Therefore, the New Hospital Building will be constructed of reinforced concrete with rigid frames to ensure sufficient seismic resistance, durability and maintenance. Brick walls, a common local feature, are to be adopted for project building in consideration of local construction conditions and their cost performance.

b) Foundations

The geologic survey report of the site ground shows that filled soils lie between GL-0.6 and 0.8 m depth. Below this layer lies clayish / sandy silt at a depth of between -8.5 and 11 m, followed by a silt sand layer down to -18.5 m, and clayish silt between –20 and 22 m, on a bed of sand down below. N values range from 5 to 9 down to GL-7 m depth, 9 – 18 between –7 and 10 m depth, 18 – 31 down to –22 m

depth, and 42 – 60 down to –30 m depth. In order to support the two-floor project building, the foundation bottom level is set at the GL-2 m silt layer, and direct foundations are designed. The permissible soil bearing capacity is set at 7t/m^2 taking account of the initial and consolidation settlements.

The underground water level measured in May, namely during the dry season, was reported as GL-4.3～4.65m. The structural calculation shall assume a 2 to 3 meter increase during the rainy season. The cement volume used for the underground concrete structures shall be 330 kg/m^3 or more, and the water-cement ratio shall be retained at 50% or less, since the underground water contains 361 to 412mg/l sulphate (SO_3).

c) Structural Design Standards

The National Building Code of India 1983 (NBC) Part VI Structural Design will be adopted.

◆ Load and External Force

i) Live load: The required live load in each room will comply with Table-1 in Section 1, Part VI of NBC.

Table 2-1 Live Load in Principal Rooms (in KN/m^2)

Rooms	For Frame	For Seismic Force
Patient room	2.00	0.50
Consultation room, Office	2.50	0.65
OT, X-ray room, Laboratory	3.00	1.50
Corridor, Hall, Staircase, Balcony	4.00	2.00
Machine room	5.00	2.50
Toilet	2.00	0.50
Roof	0.75	—

Source: NBC Part VI, Section 1, 1983

ii) Seismic Force: The Alpide Belt brushes the north edge of India, and the country is divided in 5 categories according to past earthquake records. Consequently, effective anti-seismic design must be considered during architectural planning. Cuttack City, where the project site is located, belongs to Zone III. The seismic force is calculated in accordance with Article 5, Section 1, Part VI of NBC.

Calculation of Base shear:

$$V = K \cdot C \cdot \alpha_h \cdot W$$

$$\alpha_h = \beta \cdot I \cdot \alpha_0$$

where K: performance factor depending upon the structural framing system and brittleness or ductility of construction (1.0)

C: a coefficient defining the structural flexibility depending

upon the fundamental time period (1.0)

α_h: design seismic coefficient (0.072)

W: total dead load + appropriate amount of live load

β: a coefficient depending upon the soil-foundation systems (1.2)

I: a coefficient depending upon the importance of the structure (1.5)

α_0: basic horizontal seismic coefficient (0.04)

The base shear (V) of the project building is calculated as follows:

$\alpha_h = 1.2 \times 1.5 \times 0.04 = 0.072$

Therefore,

$V = 1.0 \times 1.0 \times 0.072 \times W = 0.072 \cdot W$

5) Utility Design

a) Electrical Installations

i) High tension panel, Transformer, Main switchboard

Public incoming current will be channelled to the HT panel from the line on the west side of the project building via the power meter, from where it will be channelled to the MSB in the electrical room via an outdoor transformer 11kV/415· 240 V 400 kVA. A switch panel to the generator for emergency purpose will be installed by MSB.

ii) Emergency generator system

A diesel generator will be installed in the generator room, allowing the generator system to supply power in the event of a conventional power failure. The capacity is 200 kVA, namely sufficient for fire and critical medical loads. The fuel tank is capable of sustained 3 hours of operation.

iii) Main feeder system

The MSB in the electrical room will feature supply of 4 kinds of power, namely normal power and lighting, and emergency power and lighting respectively.

Power will be channelled by cables on cable ladders or trays between the electrical and compressor rooms in the OPD/Lab. Bldg. The vertical cables down to the panels on the ground floor or up to the first floor will be protected using trunking.

iv)Power panel

A power panel P-1OP supplied from the emergency power will be installed in the equipment room in the OT Ward, and feed to the OT equipment such as compressors, cold lights, air conditioners, etc.

A power panel P-1VI supplied from the normal power will be installed in the

compressor room on the ground floor of the OPD-Lab. Bldg., and feed to the air conditioners, medical equipment, compressors, etc on the ground floor. On the second floor, a power panel P-2IC supplied using the normal power will be installed in the storage room below the staircase, to feed the ICU equipment. For the roof-mounted air conditioner, a panel P-RVI will be installed on the roof.

An independent power circuit will be connected to the elevator system and a local switch box will be installed in the lift motor room. A power panel P-1FP supplied from the emergency power circuit will be installed in the fire pump room, and independent power will be fed to the fire pumps.

v) Lighting panel

A lighting panel L-1OW will be installed in the storage room below the staircase on the ground floor of the OT Ward. The power source will provide emergency lighting for the OT rooms, and normal lighting for the other rooms. On the first floor, a lighting panel L-2OW will be present in the equipment room to supply to the rooms on the first floor.

In the compressor room of the OPD-Lab. Bldg., a lighting panel L-1VI will be installed to cover the ground floor. The power source will be emergency lighting for the medical and laboratory rooms, and normal lighting for the other rooms. On the first floor, a panel L-2VI will be installed in the storage room below the staircase, and will supply emergency lighting to the ICU rooms and normal lighting to the other rooms.

A lighting panel L-1VI will supply normal lighting to the Annex Bldg. and the connection corridor.

vi)Lights

In principle, exposed type fluorescent lighting fittings will be installed. The lighting intensity will be determined referring to the local norms of intensity, but at about 60% of the JIS standard intensity. In the rooms that will be air-conditioned and equipped with a ceiling finish, concealed lights will be installed.

The lights will be switched on/off using wall switches in each room. The staircases and the rooms or corridors over two or more spans will be equipped with three-way switches.

Although exterior lamps are not considered in this project, certain lamps on the ceiling of the vestibule will be partly left on to facilitate access at night.

vii) Receptacles

In principle, the following number of single receptacles will be installed.

Medical rooms / laboratories: 3 pieces

Doctor's rooms: 2 pieces

Patient rooms:	one per two beds
Newborn rooms:	four per bed
ICU:	five per bed

viii) Telephone piping

A piping for future wiring will be installed from the Doctor's Room-1 on the first floor and the reception on the ground floor of the OPD-Lab. Bldg. to the existing OPD Ward. Telephone equipment will be installed by others.

ix) Interphone system

An interphone system will connect the doctor's rooms, OPD reception, and the nurse stations. The main equipment will be installed in the electrical room of the OT Ward, which will be connected to the existing interphone system in the Old Medical Ward that has 16 lines.

x) PA system

The PA system will be installed in the pre-examination rooms (3 rooms) and the accounting room to page outpatients in the waiting area, entrance hall and emergency rooms.

xi) Fire protection system

The following fire protection systems will be designed in compliance with the local fire code:

- Emergency lighting system
- Exit lights
- Automatic fire alarm system
- Lightning protection system

b) Mechanical Installations

i) Water supply system

A branch pipe of 50A diameter will be drawn from the existing water supply pipe of 200A diameter into an outdoor reservoir tank (2 tanks). Water will be pumped up from the reservoir tank to the elevated tank (2 tanks) on top of the lift motor room, and then distributed down to the designed consumption points.

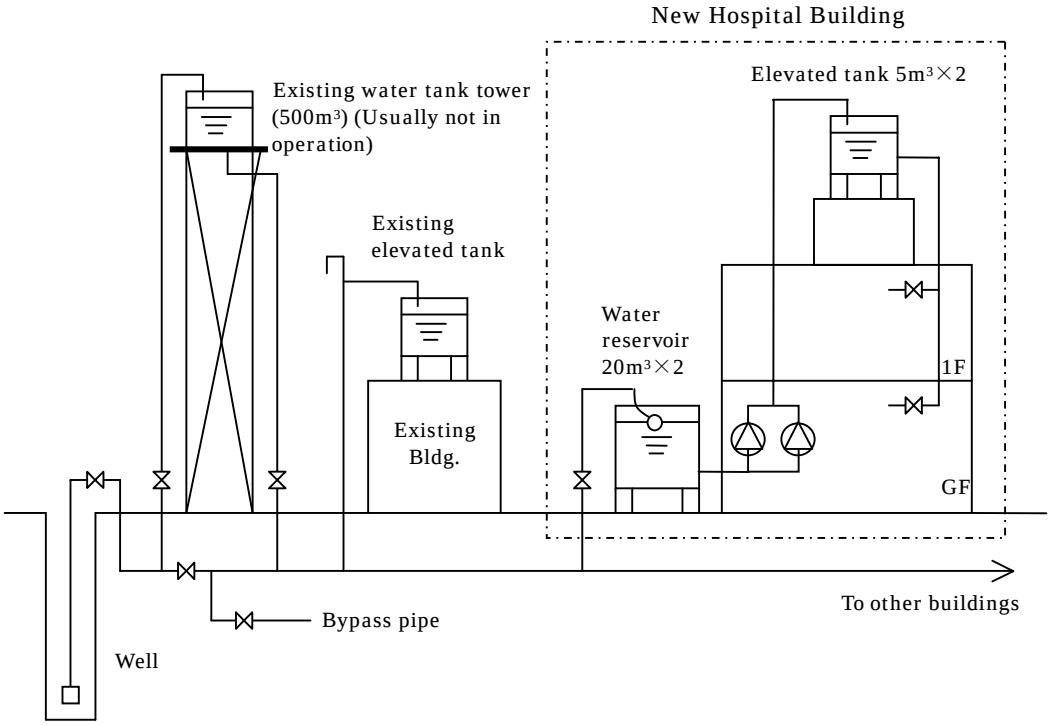


Figure 2-1 Water Supply System

ii) Sewage system

Following treatment in the septic tank (biochemical treatment), soil water will be combined with domestic sewage water and rainwater, and discharged into the Tank in the site grounds. Laboratory waste water will be sterilised and then also discharged into the Tank.

iii) LPG system

At present LPG cylinders are placed below the tables where LP gas is used. LP gas in the New Hospital Building will be used in the same manner with no built-in supply system currently being considered.

iv)Fire fighting system

Indoor fire hydrant system will be installed in compliance with the NBC.

v) Medical gas and oxygen system

A piping system for oxygen, compressed air, and vacuum suction pipes will be designed for the OT, OPD/OT, NICU, PICU and Newborn rooms.

vi)Air conditioning

Natural ventilation and cooling fans will be considered in principle. Air coolers will be installed to the minimum extent required.

A local cooling system will be adopted to facilitate maintenance. Air coolers of the floor mounted type package will be installed in the operation rooms, and ceiling or cassette type separate coolers will be installed in other rooms.

Rooms and areas to be equipped with air coolers:

GF: OT room, entrance hall, CSSD, biochemical lab, microbiological lab, pathological lab, X-ray room, X-ray machine operation room, ultrasound room, emergency room, OPD treatment room

1F: NICU, PICU, Newborn room, laboratories

Rooms to be equipped with cooling fans:

GF: Surgical ward (12 beds), (6 beds), (2 beds), pantry/formula、nurse station, surgical doctor's room, family restroom, nurses' changing room, doctors changing room, anaesthetist's room, laboratory doctor's room, reception/blood drawing, radiology doctor's room, reception, waiting area, corridor, screening room, consultation room and treatment room of the medical department, pharmacy, internal medicine screening room, internal medicine consultation room, reception, cashier, OPD screening room, OPD consultation room

1F: Medical ward (9 beds), (6 beds), pantry/formula, nurse station, doctor's room, playroom

vii) Ventilation system

Where natural ventilation is insufficient to remove heat, odour and moisture, and in rooms that are sealed highly airtight, a forced ventilation system will be applied.

Class 1 ventilation system (using air supply/exhaust fan)

GF: OT room, CSSD, biochemical lab, microbiological lab, pathological lab, X-ray room, blood storage, casualty treatment room, OPD treatment room

1F: NICU, PICU, Newborn room

Class 3 ventilation (using exhaust fan)

GF: Patient/Family toilet, WC/shower in the nurses changing room, cleaning room, darkroom, medical treatment room, OPD patient/family toilet, electrical room, emergency generator room, waste management room

1F: Inpatient/family toilet

c) Lift

It is important for the hospital architecture to secure vertical transportation measures for patient, equipment and staff and lifts are popular for this purpose. For aid projects in developing countries, however, a lift is often avoided for the purpose of reducing running costs and for the reason that repairs are difficult in the case of a breakdown. Instead, a slopeway is often substituted for a lift. In the Project,

however, it was decided to select a lift because it is more beneficial than the slopeway for the following reasons:

i) The cost of constructing a slope way, that requires a total floor area of 360 m^2 for two floors, is much higher than that of a lift installation.

ii) The New Hospital Building has only two floors, and the staircase does not represent so much of a burden for staff and attendants

iii) Thus, even in case that the elevator stopped due to power failure, breakdown, or maintenance, it would not be too big a hindrance to transport paediatric patients and equipment.

The lift will, in principle, not be freely open to the public but to staff only. The size of lift shall be sufficient to house a stretcher with staff.

6) Construction Materials Plan

In principle, materials and products predominantly used in India and easy for future maintenance will be selected. The following table shows the finishing schedule under consideration at present.

Table 2-2 Finishing Schedule

Zone			Finish				
Exterior	Roof		Ordinary: External insulation, asphalt waterproofing, Insulated brick concrete, cover t=80, gradient 1/50				
			Entrance canopy, connection corridor, etc.: Sanded asphalt waterproofing exposed, gradient 1/50				
	Exterior Wall		Ordinary: Fair faced brick				
			Gable, penthouse, etc.: Concrete, mortar base with elastic painting finish				
	Doors & Windows		Ordinary windows: Double swinging w/ wooden louvers, double swinging w/ aluminium sash, Transom: Aluminium jalousie window				
			Doors: Steel double swinging lattice door				
	Berm		Concrete with trowel finish				
	Parking Area		Asphalt paving				
Interior	Dept	Room	Floor	Baseboard	Wainscot	Wall	Ceiling
	OPD	Entrance hall	Cotastone, polished	---	Ceramic tile H=2100	Mortar w/ painting	Concrete w/ touch painting
		Waiting	As above	---	As above	As above	As above
		Consultation room	As above	---	Ceramic tile H-1200	As above	As above
		Medical treatment room	As above	---	As above	As above	As above
		Surgical treatment room	As above	---	As above	As above	Insulation ceiling board w/ aluminium frame
		Reception, Casher, Pharmacy	As above	---	As above	As above	Concrete w/ touch painting

	Dept	Room	Floor	Baseboard	Wainscot	Wall	Ceiling
		Casualty consultation room	As above	---	As above	As above	As above
	Laboratory	Biochemical lab	Cast-in-situ terrazzo	---	As above	As above	Insulation ceiling board w/ aluminium frame
		Pathology lab	As above	---	As above	As above	As above
		Microbiological lab	As above	---	As above	As above	As above
		Sampling room	Cotastone, polished	---	As above	As above	As above
		Blood storage	As above	---	As above	As above	Concrete w/ touch painting
		Cleaning	As above	---	As above	As above	As above
	Image Diagnosis	X-ray	As above	---	As above	As above	Insulation ceiling board w/ aluminium frame
		Operation room, Reception	As above	---	As above	As above	As above
		Ultrasound	As above	---	As above	As above	As above
		Dark room	As above	---	As above	As above	Concrete w/ touch painting
Interior	OT	OT room	Cast-in-situ terrazzo	terrazzo	Epoxy resin w/ painting		Silicate calcium board w/ painting
		Hall	Cotastone, polished	---	Ceramic tile, H=1200	Mortar w/ painting	Insulation ceiling board w/ aluminium frame
		Nurse station	As above	---	As above	As above	As above
		Recovery	As above	---	As above	As above	As above
		Changing	As above	---	As above	As above	Concrete w/ touch painting
		Anaesthesiologist room	As above	terrazzo	Mortar w/ painting		As above
		CSSD	Cast-in-situ terrazzo	---	Ceramic tile		Silicate calcium board w/ painting
		Family rest room	Cotastone, polished	---	Ceramic tile, H=1200	Mortar w/ painting	Concrete w/ touch painting
	ICU	NICU	As above	---	As above	As above	Insulation ceiling board w/ aluminium frame
		PICU	As above	---	As above	As above	As above
		Nurse station	As above	---	As above	As above	As above
		Anteroom	As above	---	As above	As above	Concrete w/ touch painting
	Newborn	Newborn	As above	---	As above	As above	Insulation ceiling board w/ aluminium frame
		Nurse station	As above	---	As above	As above	As above
		Anteroom	As above	---	As above	As above	Concrete w/ touch painting
	Ward	Patient room	As above	Terrazzo	Mortar w/ painting		As above
		Nurse station	As above	---	As above		As above
		Playroom	Carpet	Wood	As above		As above

	Dept	Room	Floor	Baseboard	Wainscot	Wall	Ceiling
Interior	Adminis-tration	Doctor's room (Medical, Surgical)	Cotastone, polished	Terrazzo	As above		As above
		Doctor's room (Lab, Image Diagnosis)	As above	Terrazzo	As above		As above
	Machine room, etc.	Emergency generator room	Mortar	Mortar	Glasswool acoustical board + glasswool cloth		Glasswool acoustical board + glasswool cloth
		Electrical room	As above	---	Concrete, exposed		Concrete, exposed
		Medical gas cylinder room	As above	---	As above		As above
		Compressor room	As above	Mortar	Glasswool acoustical board + glasswool cloth		Glasswool acoustical board + glasswool cloth
		Fire pump room	As above	---	Concrete, exposed		Concrete, exposed
		Waste management	As above	---	As above		As above
	Common space	Corridors	Cotastone, polished	---	Ceramic tile, H=2100	Mortar w/ painting	Concrete w/ touch painting
		Exterior corridor	Cotastone	---	---		As above
		Staircase	As above	Cotastone	Concrete w/ elastic touch painting		As above
		Storage	Cotastone, polished	Mortar	Concrete w/ painting		As above
		Medical waste management	As above	---	Ceramic tile, H=1200	Mortar w/ painting	As above
		Pantry/ Formula	As above	---	As above	As above	As above
		Patients, family toilet	Cotastone	---	Ceramic tile, H=2100	Mortar w/ painting	As above
		Staff toilet	As above	---	As above	As above	As above
		Lavatory	As above	---	As above	As above	As above
		Shower room	As above	---	As above	As above	As above
		Lift motor room	Concrete	---	Concrete exposed		Concrete exposed
		EV shaft	Waterproofing mortar	---	Structure exposed		As above

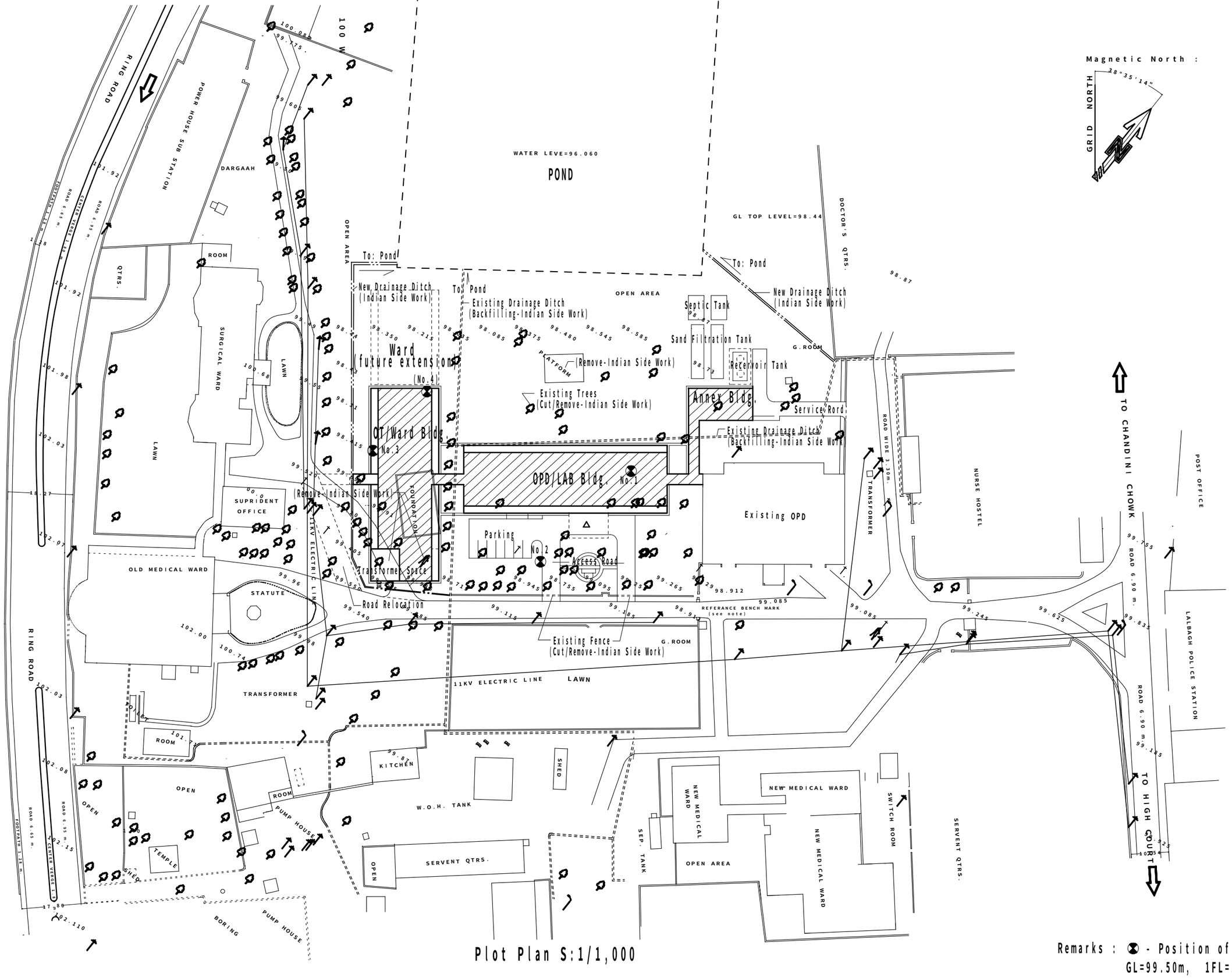
(3) Basic Design Drawings

01	PLOT PLAN	1/1000
02	GROUND FLOOR PLAN	1/300
03	FIRST FLOOR PLAN	1/300
04	PENTHOUSE FLOOR PLAN	1/300
05	ELEVATION	1/300
06	SECTION	1/100

Table 2-3 Building Components

Building	Rooms and Facilities	Structure, floor areas
OPD/Lab	OPD consultation room/Treatment room, Casualty consultation room, Laboratory, X-ray room, ICU rooms (21 beds), Newborn room (30 beds), Doctors rooms, Corridor	RC, two stories 1,655.0 ㎡
OT/Ward	OT room, CSSD, Surgical ward (20 beds), Medical ward (45 beds), Playroom, Doctors rooms	RC, two stories 1,491.0 ㎡
Annex Building	Toilets for OPD patients/families, Fire pump room, Waste treatment room	RC, single story 110.4 ㎡
	Total number of beds 116 beds	Total floor areas 3,256.4 ㎡

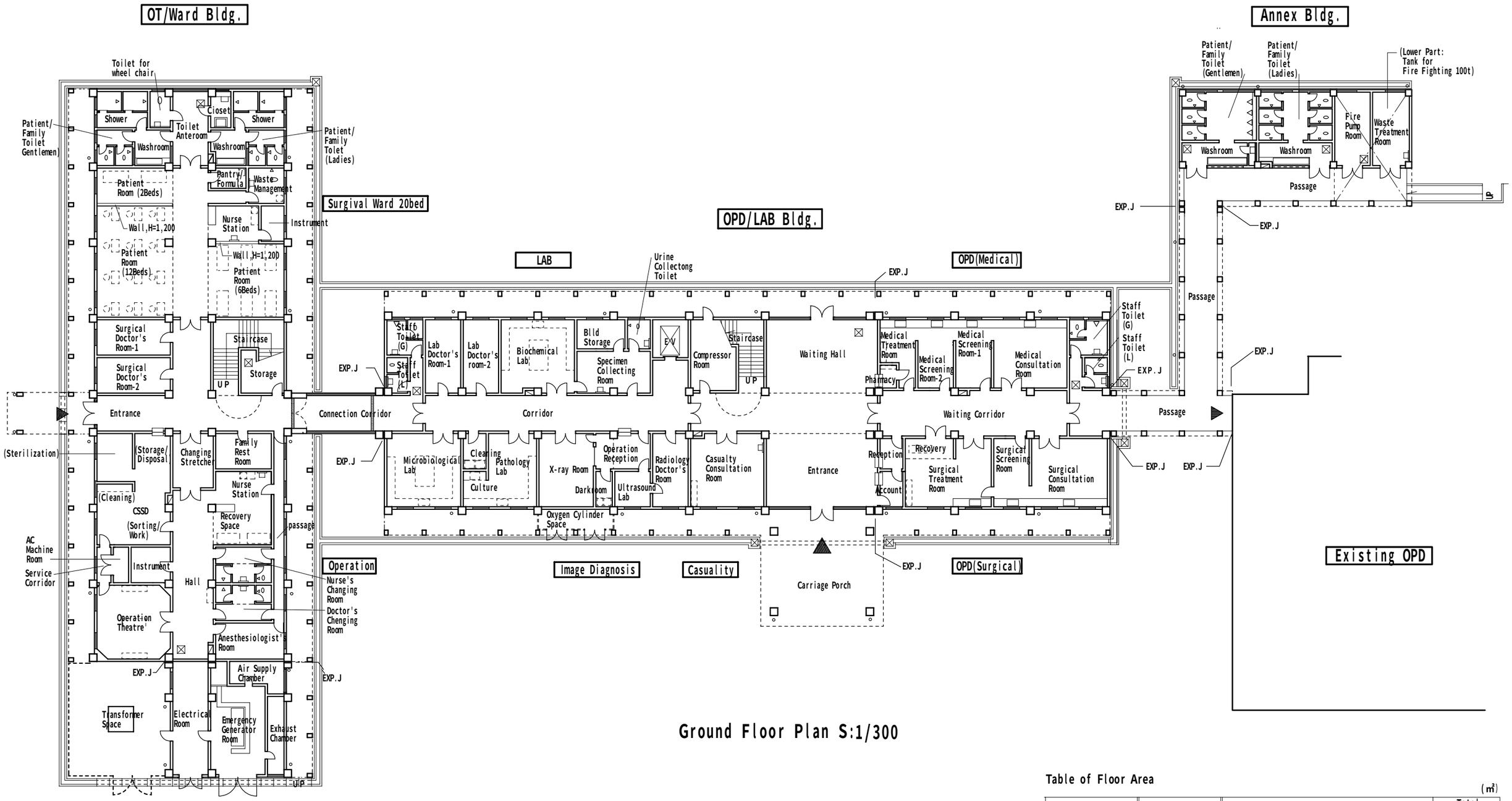
The Basic Design Drawings (01 ~ 06) are attached in the following pages.



Plot Plan S:1/1,000

Remarks : ⧗ - Position of Boring
GL=99.50m, 1FL=100.00m

The Project for Improvement of SVP Post Graduate Institute of Paediatrics, Orissa State **01 PLOT PLAN**

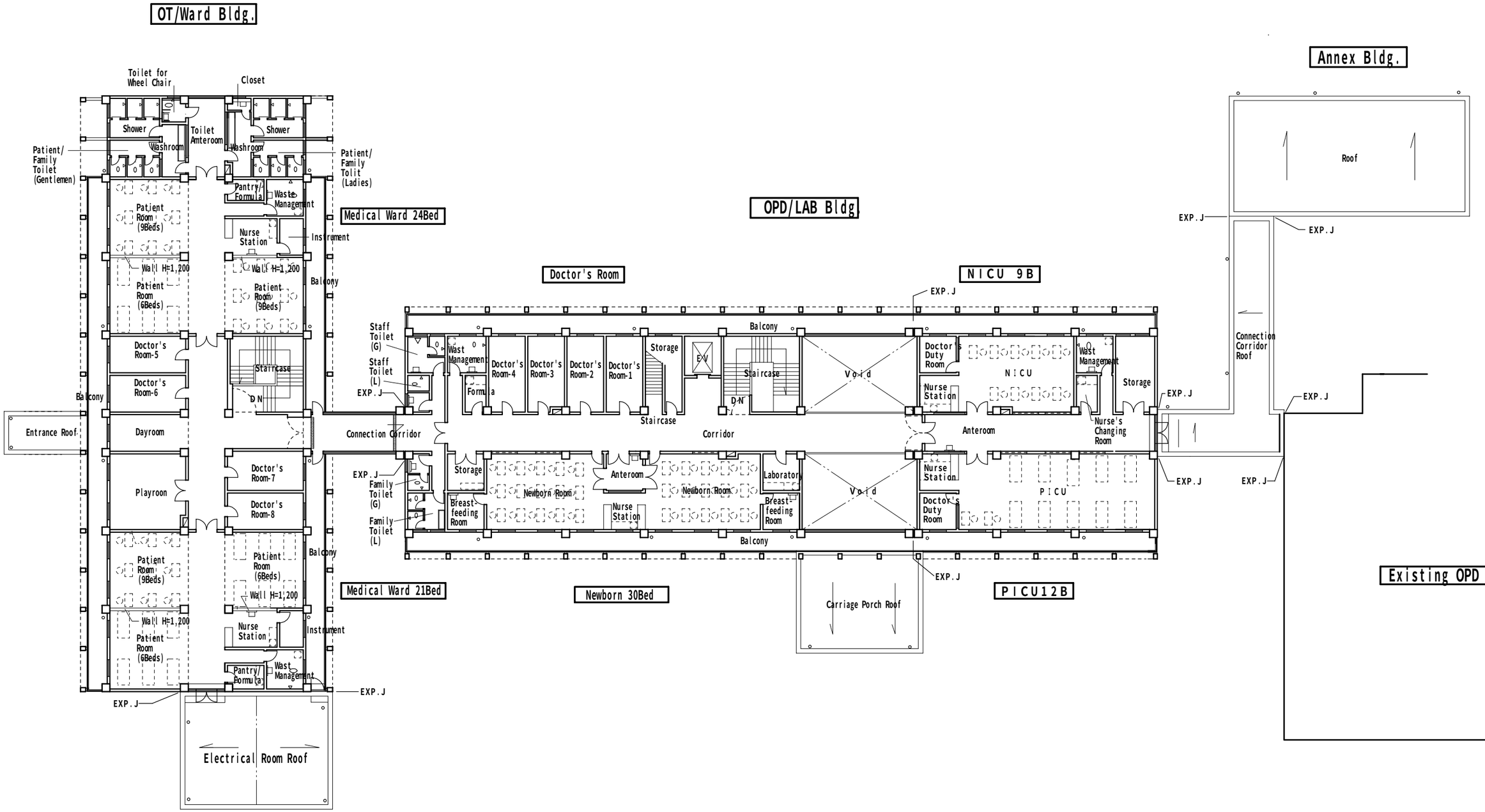


Ground Floor Plan S:1/300

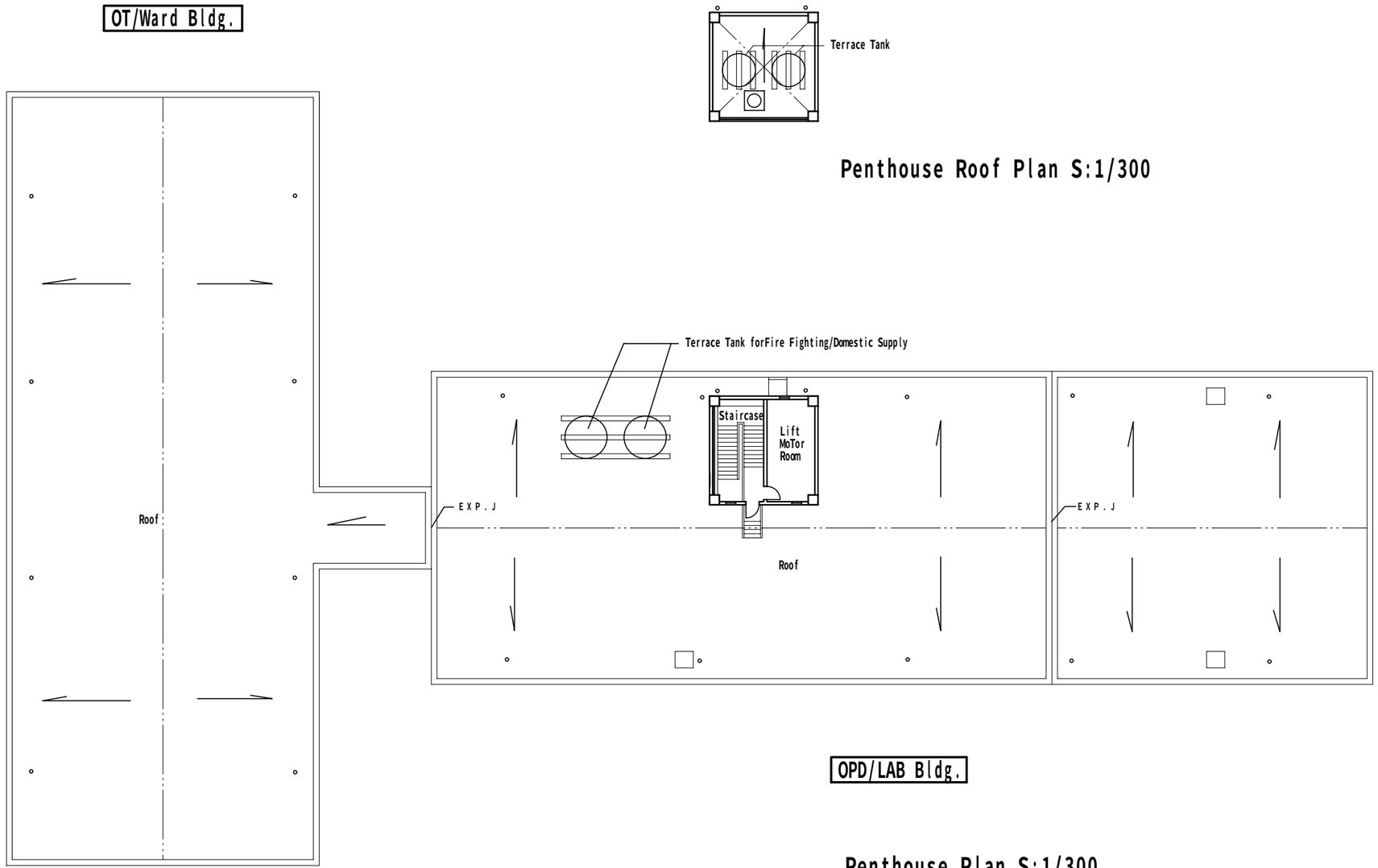
Table of Floor Area

(㎡)

Name of Bldg.	Bldg. Area	Floor Area			Total Floor Area
		Ground Floor	First Floor	Penthouse	
OPD/LAB Bldg.	1,136.2	861.0	753.0	41.0	1,655.0
OT/Wared Bldg.	991.6	786.0	705.0	0	1,491.0
Annex Bldg.	110.4	110.4	0	0	110.4
Passage	129.0	0	0	0	0
Total	2,367.2	1,757.4	1,458.0	41.0	3,256.4



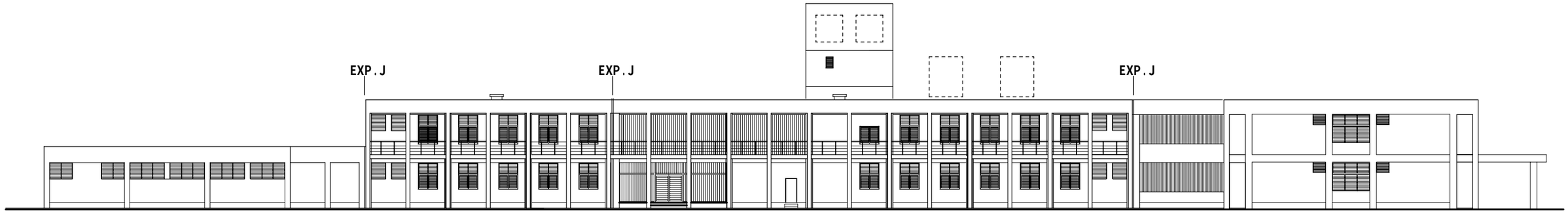
First Floor Plan



Penthouse Roof Plan S:1/300

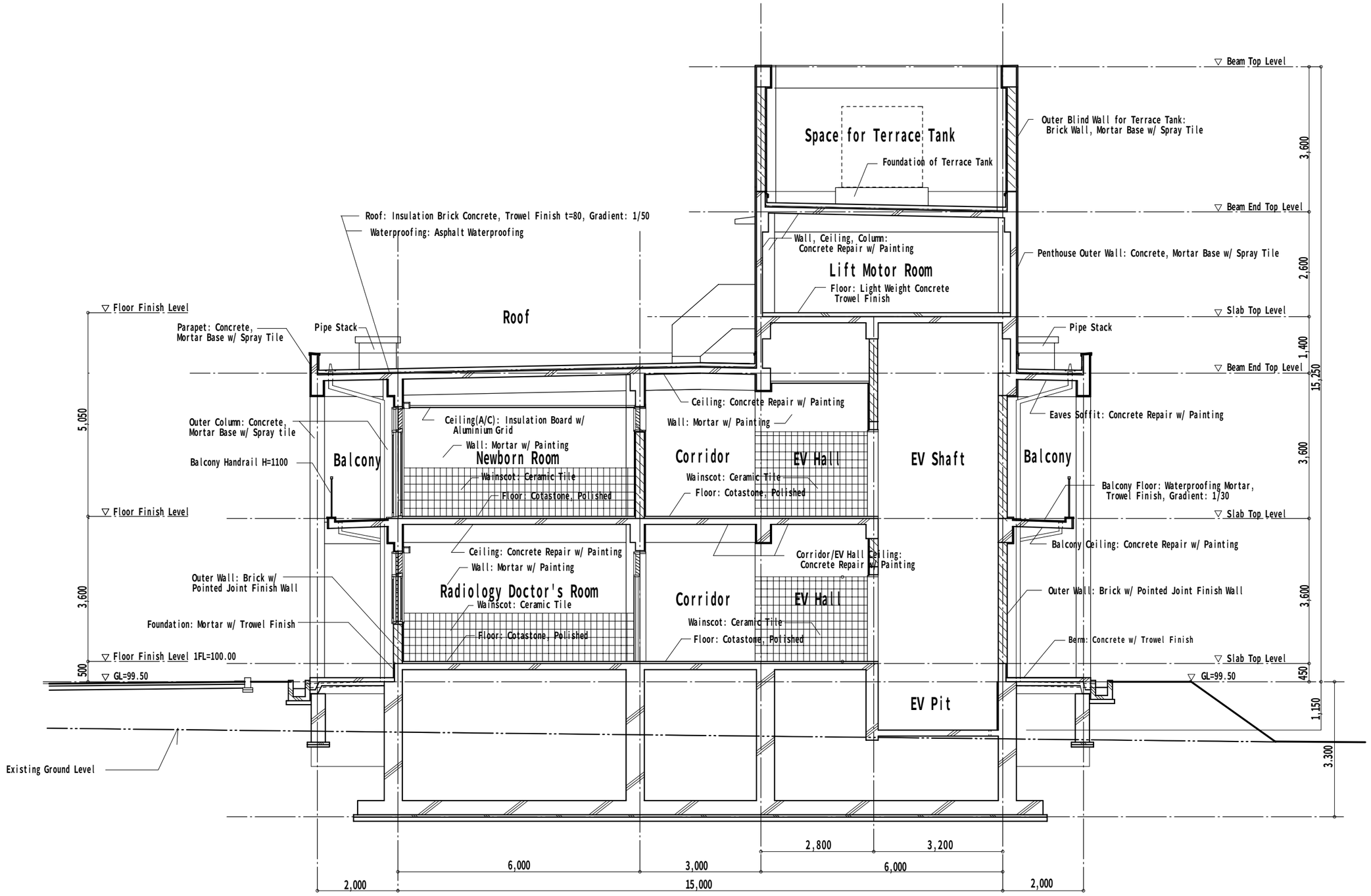
Penthouse Plan S:1/300

SOUTH ELEVATION S:1/300



WEST ELEVATION S:1/300

SOUTH ELEVATION S:1/300



SECTION S:1/100

2-2-3 Equipment Plan

(1) Requested Equipment

The following table shows the major medical equipment requested by the Indian side for each department.

Table 2-4 Major Requested Equipment

Departments	Equipment
Image Diagnosis	Automatic film processor, General X-ray machine, Portable X-ray machine, CT scanner, ECHO cardio-graphic probe for 2D ECHO
OT	Operating table, Cold light, Electrical surgical apparatus, Suction unit, Anaesthesia apparatus, Pulse Oximeter, Bedside monitor
CSSD	High pressure steam sterilizer
Laboratory	Blood gas analyser, Chemistry auto-analyser, Bilirubinometer, Micro centrifuge, Blood cell counter, Urine analyser, Coagulometer, Automatic immunological analyser, Refrigerator, Lab work table
ICU (PICU, NICU)	Bedside monitor, Infusion pump, Syringe pump, Mobile resuscitation unit, Ventilator, Radiant heat warmer, Phototherapy unit
Newborn	Apnea monitor, Neonatal monitor, Infusion pump, Syringe pump, Radiant heat warmer, Phototherapy unit, Ventilator
OPD, Casualty	Examination bed, Stretcher, X-ray film viewer, Equipment set for ambulance, Suction unit, Mobile resuscitation unit
Ward (Medical, Surgical, ID)	Bed, Stretcher, Wheel chair, Suction unit, Emergency cart, IV stand
Training/Seminar	LCD projector
Others	Microwave apparatus for biomedical waste management, Waste shredder

(2) Equipment Design Policies

1) Basic Principles

As was mentioned in the Basic Concepts, the Project aims, in principle, to improve the equipment in the New Hospital Building as well as that in the existing hospital wards; considered to be indispensable for the improvement of the Institute's medical services and of the most urgent necessity.

2) Market Conditions and/or Commercial Customs

For the procurement of equipment requiring engineering skills for maintenance, public institutions in Orissa tend to call for tenders that include the equipment price and annual maintenance costs for six years following expiry of the guarantee period. However, the operational and maintenance costs of the equipment are not included in Grant Aid, meaning the equipment planning process has to take the cost of the equipment, and the spare parts, accessories and adequate consumables required into account.

3) Commissioning to the Local Companies

The Institute concludes annual maintenance contracts with the equipment suppliers or the local agencies of the suppliers for equipment requiring annual maintenance. Likewise, in this Project, the equipment will be selected from among the local equipment suppliers or their local agencies.

4) Operation/Maintenance Capabilities of the Implementing Organization

It is virtually impossible, in practical terms, to cover all the operational and maintenance costs of the equipment based on the budgets allocated by the State Government, meaning such costs have to be covered through the User's Charges. Accordingly, based on the foreseeable revenues for these charges, the selection of equipment, for which operational and maintenance costs can be covered through the Institute revenues, is preferred.

5) Establishment of the Grade of Equipment

Regarding the equipment to be provided for the purpose of renewal, replacement or installation alongside existing equipment, that of a comparable quality to current equipment will be provided through the Project. The provision of new equipment will involve, tried and tested apparatus designed to meet the needs for which is purchased, rather than the latest high-tech equipment, which will not be considered.

6) Procurement Method

Field surveys of the Institute equipment revealed only three Japanese-made medical instruments, namely a binocular microscope, infusion pump and syringe pump. All the other instruments are products made in India or other third countries. In India, a wide range of medical equipment, from small utensils (forceps, etc.), furniture (medical beds, etc.), sterilizers, to ultrasonic diagnosis apparatus, etc. are manufactured. In addition, products made in foreign countries other than Japan are widely available on the market. Medical institutions in India select and purchase medical instruments from among domestic and imported products, taking into consideration factors such as suitability for the purpose of usage, price, the availability of after-sales-service, etc. Likewise, in this Project, the best and most suitable equipment will be selected from a wide range, including Indian and third country products.

(3) Review of the Equipment Request

The equipment request has been reviewed in line with the aforementioned principles as well as the following criteria.

i) Priority is given to the equipment that is intended to replace existing old and obsolete equipment.

ii) Priority is given to the equipment designed to supplement areas of insufficiency.

iii) The minimum required quantity of equipment will be supplied to each department and/or facility, taking the intention of the Institute to establish an equipment operation/maintenance system by through the posting of technical staff into account. The soft component programme proposed in this Project supports effective sharing of inter-departmental equipment for efficient operation.

iv) All equipment that is new to the Institute shall be carefully examined in terms of its necessity, demand, operational/maintenance capability, and so on.

The following table shows the review of the requested equipment that will not be considered for this Project, or for which the quantity needs to be reconsidered.

Table 2-5 Review of the Requested Equipment

S. No.	Equipment	Requested Q'ty	Review
1	Automatic film processor	1	*Newly introduced equipment tends to be uneconomical, due to expensive consumables including developing agents. *With a new processing room, the processing precision of the manual film processor will be improved. Excluded from the Project.
10	Electrical Surgical Apparatus	O/T-1	*Requested along with No. 83 Laparoscopic Surgery. Excluded from the project, because the laparoscopic surgery unit is excluded.
16	Suction Unit	O/T-2 Surgical Ward-2 OPD-1 Casualty-1 ID-1 New Ward-3 Old Ward-3	*The central medical piping system will be designed for each NICU and PICU bed, and one for 2 Newborn beds. A suction unit applicable to the piping system will be provided for these beds. *For other departments, electrical type units will be provided for replacement and complement.
18	Apnea Monitor	*Newborn-10	*A monitor to prevent neonates from sudden death. The Indian Neonatal Society Standard requires one for every 5 beds.
20	Blood Gas Analyser	1	*The existing analyser was installed in 2001, and will have become obsolete by 2007 when the Project is completed. Supplied to replace the existing unit.
21	Ultrasound guided biopsy kit for existing Ultrasound machine	1	*Current staff have no experience in operating this equipment. Excluded from the Project.
22	ECHO cardio-graphic probe for 2D ECHO for existing Ultrasound machine	1	*No. 59 Ultrasonic diagnostic machine is equipped with an additional Neonatal Probe.

S. No.	Equipment	Requested Q'ty	Review
24	Infant Ventilator, portable type	Casualty-1	*A portable type ventilator may be a danger to neonates and infants, and patients requiring respiratory control shall be immediately hospitalized in the ICU. *However, a ventilator is required to control the respiration of seriously ill patients while monitoring those in the emergency consultation room. One regular type ventilator for paediatric use is provided.
25	Infusion Pump	*Each ICU – 100% of Bed *Newborn- 50% of Beds *O/T-2 *2(8) for each Ward (Reducing the existing 2)	*To be supplied to all the planned ICU beds, because an infusion pump is indispensable for patients in serious condition. *To be also supplied in the new OT room, because it is indispensable for infusing the precise amount of liquid during operations. *To be provided for the wards, as a supplementary device for IV-Stands in serious shortage.
26	Neonatal Monitor	Newborn -50% of Beds	*Initially, this monitor was excluded from the Project, since critical ill patients who have died in NB Ward will be able to be treated in NICU in future, and NB will seldom treat critical patients who require temperature respiration, and pulse monitoring. *The Institute has requested 5 new pulse oximeters to replace and supplement the 3 existing pulse oximeters in NB Ward (16 beds) that were purchased in 2000. As the importance of respiratory regulation for patients in a severe condition is well recognized, this monitor will be provided in the Project.
27	Low pressure continuous suction unit	NICU-2 PICU-2	*To be required for low pressure intermittent suction in the airway and post-operation. Continuous or intermittent suction is necessary on a case by case basis. One continuous suction unit (for the piping system) and one intermittent suction unit (electric) will be considered.
28	Oxygen Analyser	NICU-2 PICU-2 Newborn-2	*To measure the oxygen density in the oxygen head boxes. One portable type will be considered for each department, according to the quantity of oxygen in the head box.
30	Oxygen Head Box	NICU-8 PICU-10 Newborn-6	*To supply oxygen-rich air to support aspiration in the event canulation or an oxygen mask is impractical. The minimum quantity will be considered.
31	Phototherapy Unit (Double surface)	*Requested again for 80% of NICU Beds. *Requested again for 30% of Newborn Beds.	*A set of upper and lower part exposure types *The requested quantity will be provided, since this equipment is indispensable for curing baby yellows frequently seen among newborns and infants, and the requested quantity is considered reasonable, based on past treatment records and the principles of the Institute.
32	Pulse Oximeter	O/T-1 Surgical Ward-1 Old Ward-2 New Ward-2 ID-2	*Equipment for patients undergoing regular respiratory control. However those who require such control will be treated in the ICU, and the current total of 10 oximeters will be sufficient provided they are operated efficiently. Excluded from the Project.
33	Radiant Heat Warmer	Re-requested for 100% of NICU and Newborn Beds PICU-3	*Body temperature control is vital for neonates and babies, and this instrument is indispensable for this purpose. *To be used also as baby cots in the NICU. *As premature deaths of babies under one year old make up 25% of the total deaths in the Institute, those patients under one year will be estimated to share 25% of PICU beds, namely equivalent to 3 PICU beds. These can also be used as baby cots.

S. No.	Equipment	Requested Qty	Review
33 (cont.)			*Newborn Total operational days of current 7 warmers: 489 days (@70 days) Total operational days of current 24 NB beds: 8,760 days Equipment operation rate: 5.6% Total operational days of 30 NB beds after the Project: 10,950 days Assuming the warmers will be used at the current operation rate, the total operation days of the warmers will be 10,950 x 5.6% = 613 days. Nine warmers will be required in total. The current 7 warmers were purchased in 2001/02. They will be over 6 years old and obsolete when the Project is completed in 2007. 9 warmers will be planned (2 new and 7 for replacement) for NB.
34	Syringe Pump	*Each ICU – 80% *Newborn -40% of Beds *2(8) for each Ward (Reducing the existing 5)	*Equipment for precise infusion of minute amounts of liquid to seriously ill patients *Indispensable in the ICU, and 13 pumps appear to be sufficient if used efficiently. (A total of 18 pumps will suffice for all 21 ICU beds, and can serve for emergency use in other departments.) *For the other departments, efficient utilization of the existing pumps and those to be provided for the ICU shall be considered.
35	Chemistry Auto Analyzer	1	*At present, a spectrophotometer procured in 1997 (for End Point Tests), a semi-auto analyser procured in 1999 (for Kinetic Tests) and a flamephotometer are used for testing and analysis purposes. This analyser will be considered as a replacement for these instruments. It will also enable effective usage of the current equipment (Semi-auto EIA).
36	Bilirubinometer	*NICU-1 *Lab.-1	*The existing equipment procured in 2002 and spectrophotometers can substitute this instrument. Excluded from the Project.
41	Mobile Resuscitation Unit	NICU-1 PICU-1 Newborn-1 O/T-2 Casualty-1 Ambulance-1	*To be used for emergency resuscitation. In the ICU and OT, other equipment for emergency resuscitation is already planned for. One each for NB and Casualty will be considered. *The unit will consist of a Dressing Cart and Intubation set.
43	Ambulance Air-conditioned, Diesel	(Equipment set for ambulance use)	*The lack of a driver has led to the existing ambulance being disused for over a year while recruitment of a replacement driver remains uncertain. The ambulance equipment set and a stretcher will effectively serve the purpose with effort on the part of the Institute. Excluded from the Project
49	Fiberoptic Endoscope for Paediatric (Broncho)	Surgery-1	*Although current staff are unfamiliar concerning the effective operation/maintenance of the requested endoscope; they are experienced in the use of a rigid-type model. A rigid-type endoscope will be considered.
50	Fiberoptic Endoscope for Paediatric (Gastroscope)	Surgery-1	*A gastroscope was initially excluded from the Project, because the current institute staff system seems barely capable of implementing proper operation and maintenance. However, the Institute cited certain doctors' experience in gastroscopic operations in nearby hospitals, and has renewed a strong request for this equipment. As the usage of gastroscope has recently grown and seems set to continue expanding, a normal type gastroscope set (for examination and treatment purposes) is provided.

S. No.	Equipment	Requested Qty	Review
55	IV Stand	(40)	*The Institute possesses few genuine IV-Stands, and uses those intended for mosquito nets instead. Proper infusion is vital for effective medical care. For NB, one for each bed except for Radiant Heat Warmers (pre-equipped with IV stands); for the Medical and Surgical Wards one for every 2 beds and other departments, one for every 4 beds.
56	Laryngoscope set	Each ICU -100% of Beds O/T-2 OPD-2 Casualty-2 Each Ward-2	*To be used for respiratory tract intubations for the purposes of resuscitation or respiratory control. Can be reused by sterilizing with hot steam. * Although 3 sets for ICU, 2 sets for ID, and one set for the other wards were initially considered, the shape and size of the blade differ in the case of neonates and infants. As the handle and blade are separately purchasable, the quantity to be provided is subject to scrutiny.
57	Oxygen cylinder with flow meter	3 for each Ward (12)	*The ICU, new OT and a part of NB will be equipped with the central medical piping system, and will not therefore need oxygen cylinders. For the other departments, the current quantity will be sufficient. Excluded from the Project.
63	Bedside multi-parameter monitor for NICU	Each ICU- 1 per Bed	*To be provided for all ICU beds, because the bedside monitor is indispensable for seriously ill patients. *One for the Surgical Ward for post-operative care. (Some patients are cared for in the Surgical Ward rather than the ICU.)
65/66	Ventilator (NICU & PICU)	Each ICU- 1 for every 2 Beds, (Reducing the existing 1) Newborn-1	*The ventilator is vital for regulating the respiration of seriously ill patients and currently, a single ventilator is used in the ICU. According to current usage, the required number was calculated as 5 including present model. Two for NICU and 3 for PICU respectively will be considered.
69	Ambubag with face mask & Oxygen Reserve (For continuous manual ventilation) are included.	Each ICU -100% of Beds O/T-2 Surgical Ward-2 Casualty-2 OPD-2 Each Ward-2	*To be used for resuscitation as well as manual ventilation purposes. Can be reused by sterilizing the mask and bag with hot steam after use. Those for neonates and infants are to be separately considered, and those for OPD shall be shifted to those for Casualty: 8 for neonates and 18 for infants respectively.
74	Urine Analyser	1	*The current manual test seems sufficient for future operation. Excluded from the Project.
75	Coagulometer	1	*Demand appears scarce. Excluded from the Project.
76	Automatic Immunological Analyser	1	*A Semi-auto EIA was procured in 2004, which can act as a substitute for the automatic immunological analyser. Excluded from the Project.
77	Fluorescent Microscope	1	*The purpose of the equipment is not clear. Excluded from the Project.
80	CT Scanner (Spiral)	1	*Based on the current revenue, the Institute cannot afford the operation/ maintenance costs of a CT scanner. *The current staff are not sufficiently familiar to implement continue proper operation / maintenance. *Demand for CT scanner is not certain. Excluded from the Project.
83	Laparoscopic Surgery unit	O/T-1	*In Japan, laparoscopic surgery is regarded as highly advanced medical care that requires the approval of the Ministry of Labour and Welfare. *The current staff are not sufficiently familiar to continue proper operation / maintenance. Excluded from the Project.

Review on the Additional Request for a Portable Pump

There is a slight depression in part of the site, with a tank in the centre. Rainwater which falls in and around the site flows in from the ground, and sewage water from the hospital buildings is discharged into this tank, which has no outflow channel. This means that when the water level rises in the rainy season, the surrounding areas are drenched. In the case of heavy downpours, floodwater reaches the surrounding roads, and the OPD Ward and the nurse dormitory are flooded up to right below the floor level. The Institute then has to request a mobile pump from Cuttack City Hall, and it usually takes weeks to discharge the floodwater.

However, such a disaster does not happen every year. During the past five years, the mobile pump was requested only twice. Therefore, despite the obvious necessity for a portable pump, the study team explained that it would not be included in the Project following evaluation of its cost performance and this was agreed by the Indian delegation.

(4) Equipment Quality

Regarding the equipment to be provided for the purpose of renewal, replacement or complement for the existing equipment, apparatus of similar quality to pre-existing equipment will be provided through the Project. The provision of new equipment will involve tried and tested apparatus designed to meet the needs for which is purchased, rather than the latest high-tech equipment, which will not be considered.

(5) Equipment Plan

1) Target Departments and Facilities

The departments and facilities for which medical equipment is intended under this Project are divided into the following categories.

Departments & Facilities	No. of Beds	Location
NICU	9 beds	New Hospital Bldg.
PICU	12 beds	New Hospital Bldg.
Newborn	30 beds	New Hospital Bldg.
Imaging		New Hospital Bldg.
Laboratory		New Hospital Bldg.
OT		New Hospital Bldg.
CSSD		New Hospital Bldg.
OPD		New Hospital Bldg.
Casualty		New Hospital Bldg.
Medical Ward-1	45 beds	New Hospital Bldg.
Medical Ward-2	34 beds	Present Surgical Ward
Surgical Ward	20 beds	New Hospital Bldg.
ID Ward	50 beds	ID Ward
Others		

2) Equipment Schedule

The following Equipment Schedule lists all the equipment to be provided in each department.

Table 2-6 Equipment Schedule

Equipment No.	Equipment Component No.	Equipment Name	Unit	Qty	Breakdown													
					NICU	PICU	Newborn	Imaging	Laboratory	OT	CSSD	OPD	Casualty	Medical Ward-1	Medical Ward-2	Surgical Ward	ID Ward	Others
2	2	General X-ray machine (300mA)	nos.	1				1										
3	3	Manual film processing tank	set	1				1										
4	4	Portable X-ray machine	nos.	1				1										
5	5-1	LCD Projector	nos.	1														1
	5-2	Computer for LCD Projector	nos.	1														1
6	6	Anaesthesia apparatus	nos.	1						1								
7	7	Automatic hand dryer	nos.	5	1	1	1			1							1	
8	8	Cold light source (Ceiling type)	nos.	1						1								
9	9	Cold light source (Stand type)	nos.	2								1						
11	11	Major operation instrument set “NID-A”	set	3						3								
12	12	Mayo instrument table	nos.	1						1								
13	13	Minor operation instrument set “NID-B”	set	3						3								
14	14	Operating table	nos.	1						1								
16	16-1	Suction unit (Applicable to medical pipe system)	nos.	37	9	12	15			1								
	16-2	Suction unit (Electric)	nos.	9								2	1	2	2	1	1	
18	18	Apnea monitor	nos.	6			6											
20	20	Blood gas analyser (with electrolyte analyser)	nos.	1					1									
23	23	Infant incubator, portable type	nos.	2			1						1					
25	25	Infusion pump	nos.	22	9	12				1								
26	26	Pulse Oximeter	nos.				5											
27	27-1	Low pressure continuous suction unit (Applicable to medical pipe system)	nos.	2	1	1												
	27-2	Low pressure continuous suction unit (Electric)	nos.	2	1	1												
28	28	Oxygen analyser	nos.	3	1	1	1											
29	29	Oxygen head box	nos.	6	2	2	2											
30	30	Perplex heat shield	nos.	21			21											
31	31-1	Phototherapy unit (for upper body)	nos.	16	7		9											
	31-2	Phototherapy unit (for lower body)	nos.	16	7		9											
33	33	Radiant heat warmer	nos.	21	9	3	9											
34	34	Syringe pump	nos.	13	6	7												
35	35	Chemistry auto analyser	nos.	1					1									
37	37	Micro centrifuge	nos.	1					1									
38	38	Refrigerator	nos.	13	1	1	2					2	1	2	1	1	2	
39	39	ICU Bed “NID-C”	nos.	9		9												
40	40-1	Patient bed (large)	nos.	26										18		8		
	40-2	Patient bed (small)	nos.	39										27		12		
41		Mobile resuscitation unit	nos.	2			1						1					
45	45-1	High pressure steam steriliser	nos.	1							1							

Equipment No.	Equipment Component No.	Equipment Name	Unit	Qty	Breakdown													
					NICU	PICU	Newborn	Imaging	Laboratory	OT	CSSD	OPD	Casualty	Medical Ward-1	Medical Ward-2	Surgical Ward	ID Ward	Others
	45-2	Water softener	nos.	1							1							
46	46	Table top steam sterilizer	nos.	1					1									
47	47	Work table for CSSD (stainless steel)	nos.	1							1							
48	48	ECG (portable) 3 channels	nos.	1									1					
49	49	Fiberoptic endoscope for paediatric use (Broncho)	set	1						1								
50	50	Gastrointestinal fiberscope	set	1						1								
52	52-1	Electronic height scale (Infant)	nos.	3								2	1					
	52-2	Electronic height scale (Paed.)	nos.	3								2	1					
53	53	Infant treatment table	nos.	3								2	1					
54	54	Instrument cabinet	nos.	9	1	1	2			2		2	1					
55	55	IV stand	nos.	77			21					2	1	23	8	10	12	
56	56-1	Laryngoscope handle (Neonate)	nos.	5	3					1			1					
	56-2	Laryngoscope handle (Paed.)	nos.	10		3				1			1	1	1	1	2	
	56-3	Laryngoscope blade (Miller type)	set	10	6					2			2					
	56-4	Laryngoscope blade (Macintosh type)	set	20		6				2			2	2	2	2	4	
58	58	Ultrasonic nebuliser	nos.	8	1	1	1						1	1	1		2	
59	59	Ultrasonic diagnostic machine with additional neonatal probe	nos.	1				1										
60	60-1	Electronic weighing scale (Infant)	nos.	3			1					2						
	60-2	Electric weighing scale (Paed.)	nos.	8								2	1	2	1		2	
61	61-1	X-ray film viewer (stand type)	nos.	6	1	1	2	1		1								
	61-2	X-ray film viewer '(table top)	nos.	12	1	1	2	1				6	1					
62	62	Bedside monitor (5 parameters)	nos.	23	9	12				1						1		
65	65	Ventilator (Paediatric)	nos.	3		3												
66	66	Ventilator (Neonatal)	nos.	2	2													
68	68	Defibrillator	nos.	2		1				1								
69	69	Ambubag with face mask & oxygen reserve	set	26	6	6						2	2	2	2	2	4	
70	70	Emergency cart	nos.	10	1	1				1			1	2	1	1	2	
71	71	Wheel chair	nos.	8								2	1	2	1	1	1	
72	72	Stretcher (with trolley)	nos.	9						3		2	1	2	1	1	1	
73	73	Blood cell counter (18 parameters)	nos.	1					1									
78	78	Microwave apparatus for biomedical waste management	nos.	1														1
79	79	Waste shredder	nos.	1														1
81	81	Protective materials against X-ray irradiation	set	1				1										
82	82	Oxygen cylinder (big)	piece	24														24
Ad-1		Oxygen flow meter (Applicable to medical pipe system)	nos.	37	9	12	15			1								
Ad-2		Washing machine with drier (for CSSD)	nos.	2							2							
Ad-3		Baby cod	nos.	21			21											
Ad-4		Examination table	nos.	5								5						

Equipment No.	Equipment Component No.	Equipment Name	Unit	Qty	Breakdown													
					NICU	PICU	Newborn	Imaging	Laboratory	OT	CSSD	OPD	Casualty	Medical Ward-1	Medical Ward-2	Surgical Ward	ID Ward	Others
Ad-5	Ad-5-1	Refrigerator	nos.	1					1									
	Ad-5-2	Deep freezer	nos.	1					1									
	Ad-5-3	Cold box	nos.	2					2									
Ad-6		Hand washing water sterilizer	nos.	1						1								
Ad-7	Ad-7-1	Examination table (doctor)	nos.	6								6						
	Ad-7-2	Chair (doctor)	nos.	6								6						
	Ad-7-3	Rotary chair (patient)	nos.	6								6						
	Ad-7-4	Desk for nurse station	nos.	7	1	1	1			1				2		1		
	Ad-7-5	Chair for nurse station	nos.	14	2	2	2			2				4		2		
	Ad-7-6	Loading Trolley	nos.	2							2							
	Ad-7-7	Sterilization drum・set	set	2							2							
	Ad-7-8	Laundry Cart	nos.	4							4							
	Ad-7-9	Medicine trolley	nos.	9	1	1	1							2	1	1	2	
	Ad-7-10	Chair (for patients' families)	nos.	116	9	12	30							45		20		
	Ad-7-11	Stainless steel sink unit (small), single sink	nos.	5				1		1				2		1		
	Ad-7-12	Stainless steel sink unit (medium), single sink	nos.	5	1		1							2		1		
	Ad-7-13	Stainless steel sink unit (medium), double sink	nos.	1					1									
	Ad-7-14	Stainless steel sink unit (large), double sink	nos.	3	1	1	1											
	Ad-7-15	Stainless steel sink/hand wash (large)	nos.	1							1							
	Ad-7-16	Stainless steel sink/hand wash (medium)	nos.	1						1								
	Ad-7-18	Work table, wall type (コ-shape) with sink	nos.	1					1									
	Ad-7-19	Work table, wall type (L-shape) with sink	nos.	1					1									
	Ad-7-20	Work table, wall type (large) with sink	nos.	1					1									
	Ad-7-21	Work table, wall type (medium) with sink	nos.	1					1									
	Ad-7-22	Lab work table (large)	nos.	2					2									
	Ad-7-23	Lab work table (medium)	nos.	1					1									

(6) Specifications of the Principal Equipment

The following table shows the specifications for principal equipment to be supplied through the Project.

No.	Equipment	Specifications	Q'ty	Purpose Validity of Equipment Grade
2	General X-ray Machine (300mA)	<Components> Generator, X-ray Tube Tube Stand, Bucky Table Bucky Stand, Consol, AVR <Specifications> Generator Output: More than 30KW KV: 40-150KV or more mA: 10-300mA or more mAs: 2mAs-500mAs or more Bucky Table Table Top: Floating type, 4 way moving Bucky Stand: Height adjustable	1	To be used in the X-ray room. To replace the current machine that is over 40 years old and obsolete.
4	Portable X-ray Machine	<Components> Portable X-ray Machine 1 <Specifications> Type: Inverter type or equivalent Output: More than 12KW KV: 50-125KV or more mA: 100mA or more mAs: 5mAs-300mAs or more Travelling Vertical: 60 to 180cm or wider Horizontal: ±45º or wider	1	To be used in ICU or patient rooms for patients who cannot be moved to the X-ray room. To replace current manual portable X-ray machines.
6	Anaesthesia Apparatus	<Components> Anaesthesia apparatus (Vaporizer) Ventilator (for anaesthesia) <Specifications> (Anaesthesia apparatus) Anaesthetic circuit: Closed type Flow meter range Oxygen 0.1 litres/min-10 litres/max or wider Nitro Oxide 0.5 litre/min - 10 litres/max or wider Air 1.0 litre/min - 10 litres/max or wider Vaporizer: Halothane Safety system: Provided (Ventilator) Ventilation mode Pressure and Volume controls Control range Tidal Volume Min. 50 ml or less Max. 1200 ml or more Breathing rate Min. 4 breaths/min or less Max. 60 breaths/min or more I.E. ratio 1:0.5 to 1:4 or more Safety system: Provided	1	To administer general anaesthesia in OT room. To replace the current machine that is over 10 years old and obsolete. The ventilator is set up for long-hour operations.

No.	Equipment	Specifications	Q'ty	Purpose Validity of Equipment Grade
14	Operating Table	<Components> Operating Table, Arm board, Shoulder support, body support etc. <Specifications> Electro-hydraulic type Height adjustment 70 to 95cm or more Trendelenburg; 25º or more Reverse trendelenburg: 25º or more Lateral tilting (left/right); 15º or more Lumbar section: 60º up, 25º down or more Leg section: 90º down or more	1	To be used in the OT room. The current table will be relocated to the OPD surgical treatment room for minor operations, etc.
20	Blood Gas Analyser	<Components> Blood gas/Electrolyte analyser <Specifications> Parameters: pH, pCO2, pO2, Na, K, Ca and Cl Calculation function: 10 parameters or more Sample volume: 200µl or less Throughput: 25 samples per hour or more Calibration: Automatic Printer: Provided	1	To check the aspiration and body fluid (electrolytes) of patients in serious conditions. To replace the current machine that has been in use since 2002. Electrolytical analysis function is added for patients with diarrhoea.
35	Chemistry Auto Analyser	<Specifications> Type: Random access type Analysis mode: End-point and Kinetic Reagent system: Open system Throughput: 120 tests/hour or more Automatic sampler: equipped Sample volume: 100µl or les Printer: Provided Parameter: Glucose (F),(PP),(PG), T. Cholesterol, Triglyceride, Total Protein, Albumin, Globulin, Direct Bilirubin, Indirect Bilirubin, Alkaline Phosphatase, SGPT (ALT), SGOT (AST), Calcium, Phosphorous, and others (26 parameters or more)	1	To replace the current semi-auto analyser that has been in use since 1999. The automatic type is considered best-placed to cater for increased demand and enable effective usage of other instruments (Semi-Auto EIA).
45	High Pressure Steam Sterilizer	<Components> High pressure steam sterilizer, Water softner <Specifications> Door type: Single Door Chamber capacity: 250 litres or more Chamber material: Stainless steel Electric boiler: Built-in Sterilizing Temperature and Time Fixed or adjustable as follows: 115ºC & 30 minutes or more 121ºC & 20 minutes or more 126ºC & 15 minutes or more Vacuum pump: -740mmHg or more Vacuum Control: Selectable Sterilization program: Cycle instrument/linen and others Printer: Provided	1	To sterilize medical equipment and utensils. To replace the current machine that is over 10 years old.

50	Gastro-intestinal fiberscope	<Components> Fiberoptic Endoscope (Gastroscope) Endoscopic Suction Pump Halogen Light Source <Specifications> Gastrointestinal fiberscope Optical system Field of view：120º or more以上 Depth of field：3-50mm or more Distal End Outer Diameter：7.9mm or more Working Length：925mm or more Endoscopic Suction Pump Pressure Range：-690mmHg or more Pump specification：Piston type Suction Jar Capacity：2,000ml or more Halogen Light Source Illumination：Lamp Halogen Bulb/Lamp	1	To diagnose upper gastrointestinal tracts. Normal type one will be considered.
59	Ultrasonic Diagnosis Machine with Additional Neonatal Probe	<Components> Main unit with monitor Probe for abdomen Probe for superficial areas Printer (B/W), Foot switch, Probe holder <Specifications> Scanning method: Electronic convex, Electronic linear Image mode: B, M, B/M, Monitor: colour, 15-inch or more Probe for abdomen: 3.5MHz, convex Probe for superficial: 6.5-7.5MHz convex	1	To be used in the ICU or patient rooms for those patients who cannot be moved to the ultrasound diagnosis room.
62	Bedside Monitor	<Components> Main unit Recorder unit Rechargeable battery, Mobile cart <Specifications> Parameters: ECG, Respiration, SPO2, NIBP, Temperature Number of trace: 5 traces or more Alarm: Provided Display: 8 inches or more Recorder unit: Provided	23	To monitor patients in critical conditions. To be used in ICU (NICU 9 beds, PICU 12 beds), OT room and surgical ward.
65	Ventilator (Paediatric)	<Components> Ventilator Heated humidifier Air compressor (if necessary) Cart or stand <Specifications> Ventilation: For adult and paediatric Ventilation control: Pressure, Flow and Volume control Mode: Volume control, pressure control, SIMV(IDV), CPAP/PEEP Tidal volume: 50 – 1300 ml or more I:E ratio: 1:9－4:1 Selectable Display：Breath rate, inspiratory time, pressure, I/E ratio, alarm indicators Alarm：Pressure, flow rate, frequency, apnea	3	To be used in PICU for patients who need respiratory control.

66	Ventilator (Neonatal)	<Components> Ventilator Heated humidifier Air compressor (if necessary) Cart or stand <Specifications> Ventilation: For neonate Ventilation control: Pressure, Flow and Volume control Mode: IMV, CPAP/PEEP, Manual Tidal volume: 5 – 300 ml or more I:E ratio: 1:9－4:1 Selectable Display：Breath rate, inspiratory time, pressure, I/E ratio, alarm indicators Alarm：Pressure, flow rate, frequency, apnea	3	To be used in NICU for patients who need respiratory control.
73	Blood Cell Counter	<Specifications> Sample: Whole blood or whole blood and diluted blood Sample volume: 50µl or less Measuring parameters: RBC, WBC, HGB, HCT, MCV, MCH, MCHC, PLT, LYM Monocyte (MXD), Granulocyte (NEUT) and more Throughput: 50 samples/hr or more Display: LCD or equivalent Printer: Provided	1	To deal with an expected increase in blood tests currently manually administered. To be a common type with 18 parameters to facilitate maintenance.
78	Microwave Apparatus for Biomedical Waste Management	<Specifications> Chamber capacity: Approx. 40 litres Microwave generator：Provided Microwave Frequency: Approx. 2,450 MHz Internal temperature: 90ºC - 120ºC or wider. Timing control：Provided Temparature sensor：Provided Recorder：Provided Safety：Provided	1	To sterilize biomedical waste. Planned in place of an incinerator, for which meeting environmental criteria would prove too costly.
79	Waste Shredder	<Components> Main unit <Specifications> Capacity: More than 20 kg/hr. Rotation of shaft: Less than 60 rpm.	1	To shred waste treated with the aforementioned microwave, then dispose of it as ordinary waste.
AD-2	Washing machine with drier (for CSSD)	<Specifications> Type：No steam operation type Washing capacity：40Kg/ load or more Operating control：Programmable	2	To wash and dry operating gowns and linens, etc. in CSSD.

2-2-4 Implementation Plan

(1) Implementation Policy

The Project consists of the construction of facilities and supply/installation of medical equipment. The work for which the Japanese side is responsible will be implemented in compliance with the Japanese Grant Aid scheme.

The construction work involves building the New Hospital Building that will be composed of the OPD/LAB, OT/Ward. and Annex buildings. Preparation of the land including

demolition and removal of obstacles like trees and old foundations and rerouting of the existing sewage ditch will be the responsibility of the Indian side. Prompt execution of this preparatory work will facilitate the prompt commencement of construction work on the New Hospital Building, which will, in turn, lead to the swift completion of the Project. In addition, it is very important to elaborate the implementation plan to guarantee security and safety during the construction work, and not to hinder the operation of the hospital in any way. Accordingly, close coordination between Japan and Indian parties must be maintained.

Once the Project is approved and the Notes are signed and exchanged between both governments (E/N) regarding the implementation, the Project will be officially implemented. After the E/N, the implementing organization of the Indian side and the Japanese consultant will conclude the consultant agreement, and the project will enter the working design stage. Following completion of the working design, tenders will be requested from Japanese construction companies for construction and Japanese medical equipment suppliers for the supply and installation of relevant apparatus. The successful contractors will be eligible to carry out their respective works according to the following principles.

1) Implementing Organization

The implementing organization for this Project is SVP Postgraduate Institute of Paediatrics, Orissa, India. The Institute will be responsible for the operation, management and maintenance of the constructed facilities and supplied equipment.

2) Consultant

When the E/N is concluded, the Japanese consultant will, conforming to the Japanese Grant Aid scheme, enter into a consultant agreement with the implementing organization on the Indian side, and will then be responsible for the following services under this agreement:

a) Working design: Preparation of the working design documents (drawings, specifications and other technical documents concerning the facilities and medical equipment to be included in the Project)

b) Assistance in the tendering and contract conclusion: Assistance in the implementing organization for the selection of a contractor for construction work as well as a supplier for supply/installation of the equipment

c) Supervision of the work: Supervising the contractors in construction work, as well as supply, installation, and orientation for operation and maintenance of the medical equipment.

d) Soft component work: Support for establishing a proper management and maintenance system for the equipment (detailed in Annex-5)

The working design involves determining the details of the architectural and equipment plans, to develop the basic design according to this Basic Design Study Report, and to compile the tender documents that will include the specifications, terms of tender, draft contracts for construction and equipment supply/installation. The estimation of construction and equipment costs is also included in the working design.

Tender assistance includes attendance to the tendering for the selection of the construction contractor and the equipment supplier by the implementation organization, the execution of the required procedures for concluding each contract, and reporting to the Japanese authorities concerned, etc.

Supervision of the work involves ensuring that the contractors have effectively carried out the construction or equipment supply/installation work in accordance with the contractual terms, and to confirm that they have properly met their contractual obligations. For the successful completion of the Project, the consultant will, from a true and fair perspective, extend advice and instructions, and coordinate the persons concerned. Specifically, the supervisory services of the Consultant include the followings:

i) Review and approval of the work program, shop drawings, equipment specifications and other documents prepared and submitted by the construction contractor and equipment supplier.

ii) Pre-shipment review and approval of the quality of construction materials and medical equipment.

iii) Confirmation of the delivery and installation of equipment for the facilities and medical equipment, and their operation manuals.

iv) Supervision of the work progress and reporting.

v) Final inspections of the facilities and medical equipment, and attendance during the handover.

In addition to the aforementioned services, the consultant shall report to the Japanese authorities concerned regarding the progress of the project, payment procedures, completion of the project and handing-over, etc.

3) Construction Contractor and Equipment Supplier

Based on the contract, the construction contractor shall construct the facilities, and the equipment supplier shall procure, supply and install the medical equipment. They shall

also provide technical guidance to the Indian side concerning the operation and maintenance of the supplied equipment. Once the equipment is handed over, the equipment supplier shall, in cooperation with the agency of the equipment manufacturers, support the continuous supply of spare parts and consumables for major equipment during the guarantee period, either free of charge or on a chargeable basis.

4) Japan International Cooperation Agency

The Grant Aid Management Department of JICA will strive for prompt progress of this Project to ensure that it will be properly implemented in compliance with the Grant Aid scheme.

5) Implementation Plan

During the working design period, the Indian implementing organization and the Japanese consultant will examine the project implementation plan. This examination includes identification of the scope of works of each party, confirmation of the commencement date and method of work, and work-related discussions by each individual party so that the work can be conducted efficiently based on the schedule specified in the Basic Design Study Report. In special, the preparation work by the Indian side, including the demolition and removal of obstacles in the site grounds, has to be carried out before the construction work of the project facilities.

(2) Implementation Conditions

1) Observations for Construction

The following matters shall be observed during the Project construction, and the work execution program shall be planned to take these observations into consideration.

a) Management of work schedule

The construction work will consist of the construction of the OPD/LAB, the OT/Ward and Annex buildings. As the existing buildings are situated in the vicinity of the construction site, a rational work schedule is needed, for purposes such as dividing work areas, connecting or switching over between existing and new infrastructure systems, etc. The medical equipment installation schedule shall also be carefully planned to conform to the facility construction schedule.

b) Safety management

The work and in-service hospital areas shall be separated using temporary fences in order to prevent the risk of accident or injury to patients and Institute staff, to avoid obstructing the operation of the Institute, and to secure safe passages for the hospital visitors. Elaborate management and coordination will be necessary among mutual

cooperation among the Institute, the consultant and the contractors.

c) Instructions on the operation of the equipment

It is essential that the user be sufficiently familiar to proper operation and maintenance of the supplied equipment so that it will contribute toward the effective medical service of the Institute. For this purpose, operation manuals explaining the methods of operation, routine inspections and repairs will be administered for the principal equipment. The possibility of sending a Japanese engineer for operational training with the equipment will also be considered.

2) Observations for Supply/Installation of Materials and Equipment

Locally available construction materials are supplied through rather small retail shops, and the market quantity is limited. In this Project, materials will be procured from other Indian states through local agencies. The proper planning and management of procurement will be necessary in line with the work progress.

3) Influence on the Current Hospital Operation

As the top paediatric referral hospital in Orissa, the Institute accepts numerous patients for outpatient and/or inpatient care on a daily basis. Under these circumstances, the equipment delivery and installation shall be carefully discussed and scheduled among the people concerned including the Institute staff in order to minimize suspension of hospital operation and/or adverse affects like noise and vibrations.

4) Climatologic Influence

It is hot and humid in Cuttack City throughout the year; and especially from March to June, the temperature frequently exceeds 40ºC. As much of the medical equipment and consumables are vulnerable to high temperature and humidity, proper protective measures will be considered during their transport and temporary storage on-site before installation.

(3) Split of Works

The Project will be implemented in the form of a collaboration between India and Japan. When the implementation of the Project by Japanese Grant Aid is approved, the two governments will share the responsibilities of works as follows:

1) Responsibilities Attributed to the Government of Japan

The Japanese side will undertake the following tasks concerning consultation of the Project, construction of the facilities and supply/installation of the equipment.

a) Consultation

i) To develop a detailed design for facilities and equipment, and to prepare the terms of the tender

ii) To assist in the selection of contractors for construction work and supply/installation of the equipment, and the conclusion of contracts with them

iii) To supervise the construction work and supply/installation, instructions/training for operation and maintenance of the medical equipment

iv) To compile the soft component program establishing the management and maintenance system for the equipment

b) Construction work and supply/installation of medical equipment

i) To construct the project facilities

ii) To purchase, transport and deliver materials and equipment for construction and medical purposes

iii) To install the equipment to be supplied and implement their adjustment through trial operations

iv) To instruct and train in the operation and maintenance of the equipment

2) Responsibilities Attributed to the Government of India

The Indian side will undertake the following tasks concerning formalities and preparatory construction work.

a) Formalities

i) Expropriation of land

ii) Exemption of domestic tax

iii) Exemption of customs duties for the materials and equipment imported from Japan or other countries

iv) Acquisition of the contract permit and other permission required for implementation of the Project

v) Application for connecting the public infrastructure systems (electricity, water supply, telephone lines, etc.)

vi) Intake of temporary electric power and water supply for the construction works

vii) Issuance of the banking arrangements and the authorization to pay

viii) Facilitation of formalities necessary for the Japanese nationals to enter/exit and stay in India for the accomplishment of their services

xi) All the costs except for those to be born by the Japanese side

b) Preparatory and construction works

i) Site preparation

ii) Renewal of the existing hospital buildings

iii) Relocation of the existing medical equipment and furniture

iv) Planting

(4) Supervisory Plan

1) Supervisory Principles

For the prompt and proper accomplishment of the services, the consultant will organize a project team to pursue the working design and supervisory work based on the basic design, in compliance with the Grant Aid scheme. The supervisory principles of the Project are as follows:

a) The consultant will maintain close communication with the authorities concerned in both countries in order to avoid delays in the progress and completion of the construction work as well as the equipment supply/installation work.

b) The consultant will maintain a fair standpoint, and will promptly extend appropriate instructions and assistance to the contractors during construction and equipment work.

c) The consultant will provide for appropriate instructions and assistance in terms of the operation and management of the medical equipment after the Project.

d) After confirming that the construction and equipment supply/installation work is completed in compliance with the contractual terms, the consultant will witness the handing over of the facilities and equipment. The services of the consultant will be completed when the work is accepted and approved by the Indian side.

2) Supervisory Plan

a) Facilities

A Japanese resident representative of the consultant (an architect) will be posted at the site to supervise the construction works, to take the diversified work items into consideration, the site being surrounded by the various existing facilities and buildings, and the importance of coordination between the Institute and the contractor. In addition, the following engineers will be sent to the site as necessary during the work period.

- Supervisory architect (entire management, schedule coordination)
- Supervisory architect (architecture: construction methods, design principles, shop drawings, material specifications)
- Supervisory engineer (structure: supporting ground, foundation work, and building framing work)

- Supervisory engineer (mechanical work: air-conditioning, plumbing systems, etc.)
- Supervisory engineer (electrical work: incoming power and transformer, emergency generator system, electric apparatus, etc.)

b) Equipment

After the equipment supplier is selected through the tender process, the consultant will supervise the procurement, transport and installation of equipment for prompt progress and completion.

The consultant will ensure that the equipment is purchased in conformance to the contract documents, and attend the pre-shipping inspection if necessary. The consultant will confirm that the transportation method, installation workmanship and operation manuals will also conform to the contract documents, and provide advice and assistance to the equipment supplier and the Institute personnel if necessary. A Japanese engineer will be sent to the site periodically during the work period to supervise delivery, installation, trial operation, adjustment and operation / maintenance instructions of the equipment.

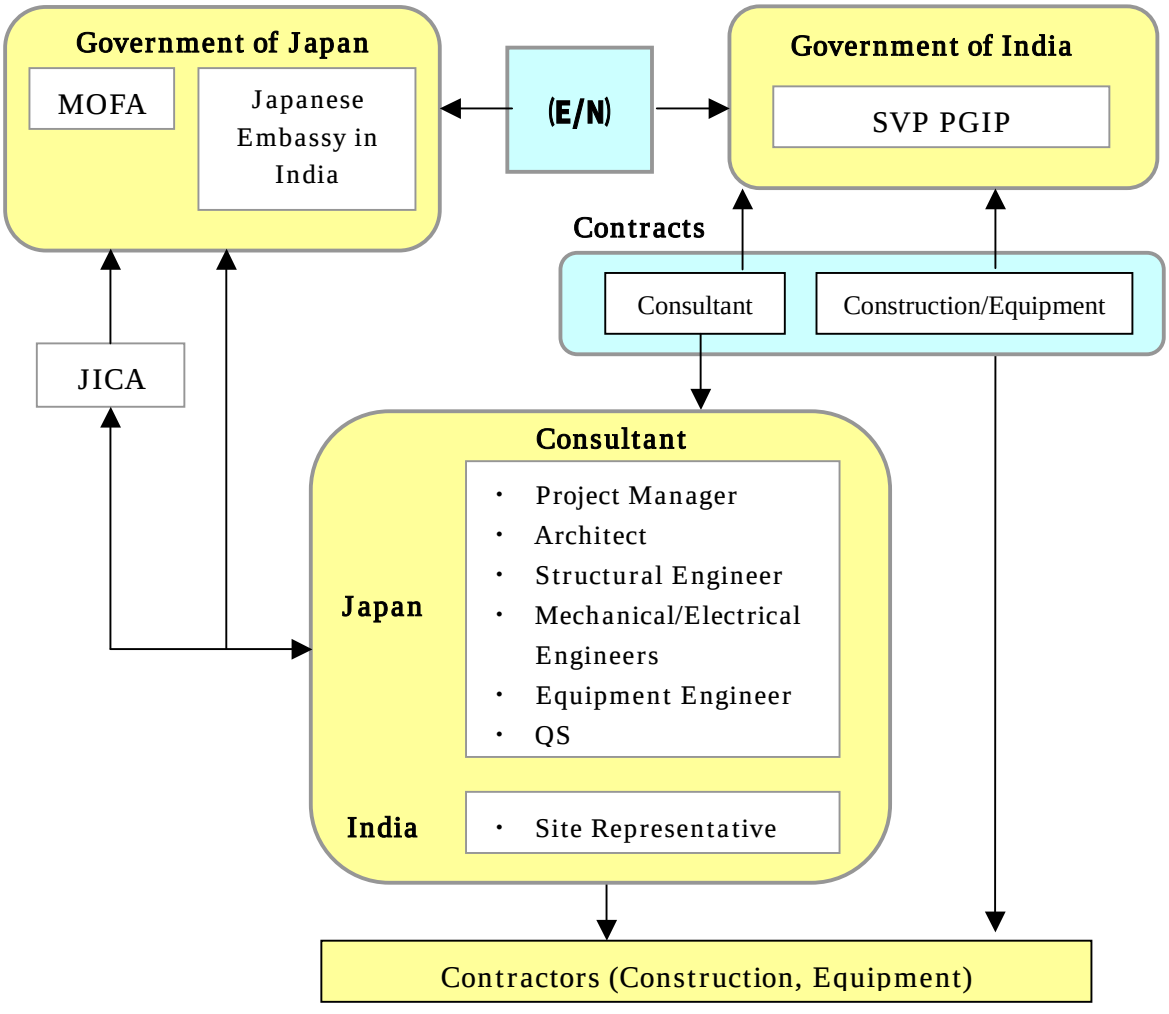


Figure 2-2 Construction Work Supervising System Diagram

(5) Quality Control

The site representative of the consultant will inspect the quality of construction materials when they are delivered to the site. The required test items for quality control will be clarified in the project specifications.

- The bearing strength of the soil will be tested on site in the presence of the structural engineer. The instruments for the plate loading test will be transported from Bhubaneswar.
- The concrete strength will be tested in the testing laboratory of the cement manufacturer or the contractor. The concrete sample shall be well protected during its transportation to Bhubaneswar.
- The tensile strength test of the reinforcing bars will be commissioned to the School of Engineering of the National University in Bhubaneswar.

(6) Procurement Plan

1) Construction Materials

Most of the construction materials are available in India, but certain materials will be purchased in Japan or a third country in consideration of product quality and reliability.

Table 2-7 Procurement of Materials and Equipment

Materials & Equipment	Local market		Procurement Plan			Remarks
	Situation	Import	India		Japan	
<Construction Materials>						
1. Aggregate (sand, crushed stone)	○		○			
2. Cement	○		○			
3. Reinforcing steel	○		○			
4. Concrete blocks	○		○			
5. Plywood, lumber	○		○			
6. Floor/wall tiles	○		○			
7. Slate	○		○			
8. Wooden doors & windows	○		○			
9. Metal doors & windows	○		○			
10. Leady metal doors & windows	○		○		○	Reliability of product and delivery schedule
11. Finishing hardware	○		○		○	Reliability of product Delivery schedule of the master key
12. Glass	○		○			
13. Lead glass	○		○		○	Reliability of product and delivery schedule
14. Paint	○		○			
15. Special paint (antistatic, etc.)	○		○		○	Reliability of product and delivery schedule
16. Work table, sink unit	○		○		○	Depending on the purpose
17. Construction machinery	○		○		○	Depending on the purpose

<Utility Appliances>						
1. PVC conduits, hardware	○		○			
2. Wires, cables	○		○		○	Special cables will be procured in Japan
3. Lights	○		○		○	Quality and price
4. Transformer	○		○			
5. Voltage controller	○		○			
6. Generator	○		○			
7. Panels	○		○		○	Special panels will be procured in Japan
8. Telephone system	○		○			
9. Low voltage current appliances	○		○		○	Quality and price
10. PVC pipes (plumbing)	○		○			
11. Copper pipes	○		○			
12. Sanitary wares	○		○			
13. Fire hydrants	○		○			
14. Reservoir tank	○		○			
15. Pumps	○		○		○	Quality and price
16. Septic tanks	○		○		○	Quality and price
17. Airconditioners	○		○			
18. Fans	○		○			

2) Equipment

In India, a wide range of medical equipment from highly advanced diagnostic imaging instruments to small utensils and medical furniture is manufactured and distributed. Imported products from Japan and other foreign countries are also available. Medical institutions select appropriate medical equipment from among domestic and imported products taking the purpose, price, and after-sales service, etc into consideration. Since the instruments to be supplied in this Project are not highly advanced ones requiring special skills, but rather general-purpose units prevalent in the country, the dealers do not foresee problems concerning the supply of consumables, installation of the equipment and maintenance/repair services.

Under these circumstances, the equipment will be procured in India or Japan in principle. Those manufactured in foreign countries will be considered, if they are superior to the domestic or Japanese products in terms of quality, price, inspection, after-sales service, etc. The equipment will be provided with one-year guarantee upon handover. Consumables and spare parts will be provided for about three-months, because past experiences show it took about three months from order to final delivery. The suppliers/ agencies shall conclude the annual maintenance contracts at the request of the Institute.

The purchase of products made in foreign countries will be examined according to the following terms, and the approval of both governments will be obtained.

i) To be products of suppliers that have agencies, branch office or liaison offices in India.
ii) To be easily maintained and/or repaired, and to be products of the suppliers that have reliable after-sales maintenance service systems.

iii)To be procured, transported and delivered within the date specified in E/N.

3) Transport and Delivery Route of Construction Materials and Machinery

Those purchased in India:

In consideration of the market volume in Orissa, most of the materials and machinery will be purchased in other states. There do not seem to be any problems in inland transportation, as the railways and national highways spread throughout the country.

Those purchased in Japan

Products loaded in Yokohama Port will be transhipped to Singapore or Malaysia and then shipped onward to Haldia Port (Kolkata) or Vishakatapatanam Port (Andhra Pradesh). The former route will take about 22 days for shipping and the latter about 28 days. The customs clearance will also take a few days. For inland transportation, it will take about two days from these two ports to the site.

4) Transport and Delivery Route of Medical Equipment

Products purchased in India:

There are several agencies of Indian and foreign medical equipment suppliers in Bhubaneswar. Most suppliers or their agencies are located in large cities like Delhi, Kolkata, Hyderabad, and Mumbai, which means most of the equipment will be transported from the other states. There do not seem to be any problems in inland transportation, as the railways and national highways spread throughout the country.

Products purchased in Japan

Products will be shipped in containers to prevent burglary and loss during transportation. Similar to the construction materials and machinery, the equipment will be loaded in Yokohama Port, transhipped to Singapore or Malaysia and then shipped onward to Haldia Port (Kolkata). It will take about 22 days for shipping, while the customs clearance will also take a few days. For the inland transportation, it will take about two days from the port to the site.

(7) Operation Training and Maintenance Guidance for Equipment (Soft Component Work)

In order to realize efficient utilisation of the supplied and existing equipment, systematic management and maintenance is indispensable. The management and maintenance training is intended to support the Institute in establishing an operation / maintenance system by employing an engineer or technician for equipment management under the deputy superintendent with the incomes from User's Charge.

The management and maintenance training will include the workshop for technology transfer in terms of equipment management; specifically the numbering system of equipment, renovation of the equipment management book, accessories and consumption inventory record, failure report format and repair request format for the equipment users, etc.

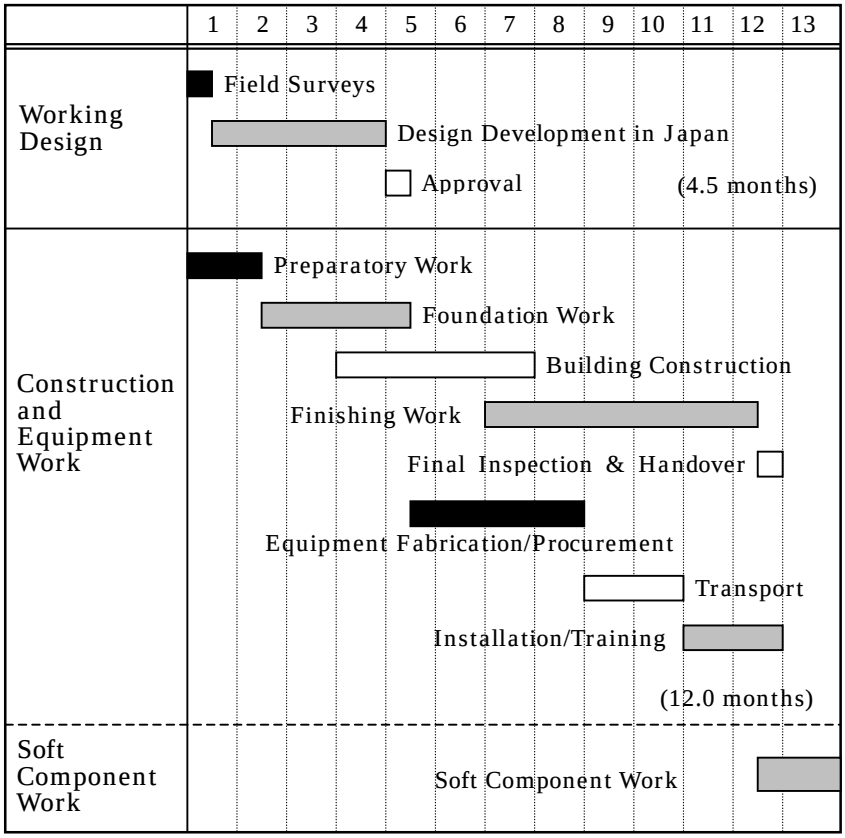
Equipment maintenance consists of routine maintenance by users, and periodical maintenance and repairs by the engineer. At present, however, equipment users only check or clean the equipment on a random basis, before or after usage. All repairs have to be commissioned to the supplier/agencies, due to the lack of technical staff in the Institute, meaning it takes time for the equipment to start working again.

The management and maintenance training program shall support the establishment of an efficient system to manage the equipment, routine and regular maintenance, and the annual maintenance contracts of the equipment. Details of the management and maintenance training for the equipment are specified in Annex 5-5 Operation Training and Maintenance Guidance for Equipment (Soft Component Programme).

(8) Implementation Schedule

The working design stage will take 4.5 months, and the construction work stage including procurement of the equipment will take approximately 12.0 months. The following diagram shows a rough project implementation schedule.

Table 2-8 Project Implementation Schedule



2-3 Obligations of the Recipient Country

The responsibilities of both countries are as mentioned in 2-2-4 (3) Split of Works. The outline of the works attributed to the Indian side is as follows:

2-3-1 Formalities

(1) Expropriation of Land

The site ground is located in the premises of SVP Post-Graduate Institute of Paediatrics, and the State Government of Orissa owns the land. The Institute will apply to the State Government for approval to use the ground as a construction site for the New Hospital Building.

(2) Exemption of Domestic Tax

The Indian side will exempt domestic taxes on the purchase of construction materials and medical equipment, and for the services to be provided for the Project. They will facilitate formalities for the transport of materials and equipment from other states to cross the state border.

(3) Exemption of Customs Duties for the Materials and Equipment

The Government of India and the State Government of Orissa will exempt the customs duties on the materials and equipment to be imported from Japan or third countries for the Project. They will also expedite the customs clearance and the procedures for domestic transportation.

(4) Permissions for Construction and Other Works

In order to implement the construction work for this Project, permission for construction has to be obtained from Cuttack City Hall. The Institute shall apply and acquire the building permit, approval for felling the trees on the site and other required permission from the Cuttack City Hall under the cooperation with the State Government prior to the commencement of construction work.

(5) Preparation of Infrastructure

1) Electric Power

Electric power for the existing buildings is distributed from the substation of an electric power company on the west of the site through the aerial cable. Electric power for the New Hospital Building will be taken from the existing cable, rendering the Indian side responsible for applying the branch wiring work.

2) Water Supply

The Institute will obtain approval to draw a branch pipe from the existing water supply piping and to channel it to the reservoir tank for the New Hospital Building.

3) Telephone

For the New Hospital Building, a single telephone line is to be installed. The intake work for the new line will be performed by a telephone company. The application for the wiring work to the outpatient reception and the doctor's room 1 in the New Hospital Building will be the responsibility of the Indian side.

(6) Temporary Electric Power and Water Supply for Construction Works

Temporary electric power and water shall be supplied to the site as necessary for the construction works.

(7) Banking Arrangement and Authorization to Pay

With the cooperation of the State Government, the Institute shall ensure prompt issuance of banking arrangements and authorization to pay as required in the consultant agreement and the contracts with contractors.

(8) Facilitation of formalities necessary for the Japanese nationals to enter/exit and stay in India for accomplishment of their services

(9) All costs except for those to be borne by the Japanese side

2-3-2 Works by the Indian Side

(1) Site Preparation

There is a toilet foundation and a well in the site grounds that have to be demolished and removed. In addition, part of a campus road traversing the site has to be relocated, while around 26 trees on site likely to become obstructive to the construction work and will have to be cut down. Two open ditches for drainage running through the site grounds will have to be rerouted to locations that will not hinder the construction work.

The site grounds are an area of grassland gently inclining about 1 meter from south to north, and sometimes covered with water during the rainy season, since the land level is lower than the campus road. In order to prevent seepage of this floodwater into the New Hospital Building, the site is to be filled up to a height of 1.0 to 1.5 meters. Although the site preparation work is usually the responsibility of the recipient country, in this Project, the filling work can be performed alongside the process of the foundation work for the New

Hospital Building. Therefore the filling work by the Indian side is not foreseen to be necessary.

(2) Remodelling of Existing Buildings

1) Old Medical Ward

The administrative, central storage and doctors' rooms will remain unchanged. As the administrative department is to be relocated from the present Surgical Ward to rooms currently used for patients, they will be cleaned and repainted during relocation. Part of this building will be remodelled as an equipment workshop, which will also be cleaned and repainted.

2) Medical Ward-2 (present Surgical Ward)

Along with the relocation of the surgical department, current OT rooms, doctors' room and office will be remodelled as Medical Ward-2. Although excessive renovation work will not be necessary, the partition will be partly rearranged and interior walls will be repainted.

3) OPD Ward

The toilet currently unused will be remodelled in order to construct a connecting passage to the New Hospital Building. The exterior wall on the west side will be demolished and the floor will be partly sloped. Mortar on the interior wall will be repaired and painted.

4) New Medical Ward

The doctor's room and library will remain as they are. Rooms currently used as clinical lab and patient rooms that will be vacant upon transfer to the New Hospital Building will be used as the patient family rest rooms. Partition walls and windows will be left as they are, but repainted on the surface.

(3) Relocation of Existing Medical Equipment and Furniture

The Indian side will be responsible for moving the equipment and furniture from the existing buildings. Compact units can be transported manually by the hospital staff, avoiding expenses like commission fees to an outside company for moving such items.

(4) Planting

The Indian side will be responsible for planting work around the New Hospital Building and the parking area at least as shown in the plot plan, following completion of the construction work by the Japanese side.

2-4 Operation and Maintenance Plan

2-4-1 Operation/Management Plan

(1) Organization

The organization responsible for the Project is the Department of Health and Family Welfare, State Government of Orissa, while the implementing organization is SVP PG Institute of Paediatrics, Orissa. Upon completion of the Project, the Institute will be responsible for operations and maintenance.

The Institute is, in terms of medical services, an independent institution, which provides tertiary medical services to patients from the surround areas in Orissa and other states as well. As for medical education, the Institute belongs to SCB Medical College, the medical department of UTKAL University, and caters for graduate students of paediatrics. This Institute also intends to become educationally independent, and the relevant procedures are currently underway.

1) Superintendent of the Institute

While the superintendent, as the representative of the Institute, takes responsibility for medical service and clinical training, the director of SCB Medical College takes responsibility for the medical education of graduate students.

2) Deputy Superintendent of the Institute

The deputy superintendent assists the superintendent in terms of the operations of the Institute, and supervises the paramedical staff.

3) Teaching Unit System

The Institute adopts a teaching unit system, which is composed of four units in the Medical Department and one in the Surgical Department. Both units include medical and surgical doctors, who serve for treatment and teaching purposes. Each unit is headed by a professor or associate professor, and composed of an assistant professor, lecturer, specialist and several postgraduate students. Each unit shall serve a specific ward and patients, and take responsibility for the medical care and treatment thereof. Nurses and paramedical staffs do not belong to the unit system but serve the wards on a common basis.

4) Administrative Officer

While the administrative staff of the Institute are employed by the Department of Health and Family Welfare of the Orissa State Government, support workers such as attendants, sweepers, cook, kitchen staff and guards are employed by the Institute. The administrative officer, under the administration of the Superintendent of the Institute, is in charge of all the administrative and support workers.

5) Family Welfare Clinic

The Family Welfare Clinic is located in the OPD Ward, and serves as a source of vaccination for infants, and pre- / postnatal checks for pregnant and parturient women, etc. Although the superintendent of the Institute supervises this clinic, administratively it belongs to the Directorate of Health Services of the Department of Health and Family Welfare, State Government, rather than the Directorate of Medical Education and Training to which the Institute belongs. Therefore, the Clinic is a substantively separate body from the Institute.

6) Special Clinic

As for dentistry, ophthalmology, ENT and orthopaedics, although outpatient care service is provided once or twice weekly, there is no provision for inpatient care. The doctors are dispatched in turns from SCB Medical College. Each section serves several hundred patients annually; equating to about two patients a day.

7) Paediatric Psychiatry

Paediatric psychiatry is provided on an outpatient basis in the OPD Ward. There is a psychotherapist in the Institute but no doctor for this specialty. The number of annual patients reaches several hundred children.

8) Post Graduate Paediatrics Courses

Postgraduate courses at the SCB Medical College last for 3 years and the total number of students enrolled in the Institute is 24; namely 8 students per year. Senior students are transferred to SCB Medical College for six months to study special subjects that are not provided for in the Institute such as cardiovascular, urology, orthopaedics, etc. During this period, there are 16 students in the Institute.

In principle, freshmen take lectures, seminars and laboratory work, while junior and senior students are additionally assigned to practical work at the NB Ward and ICU as doctors on call.

The following page shows the organization of the SVP PG Institute of Paediatrics, Orissa.

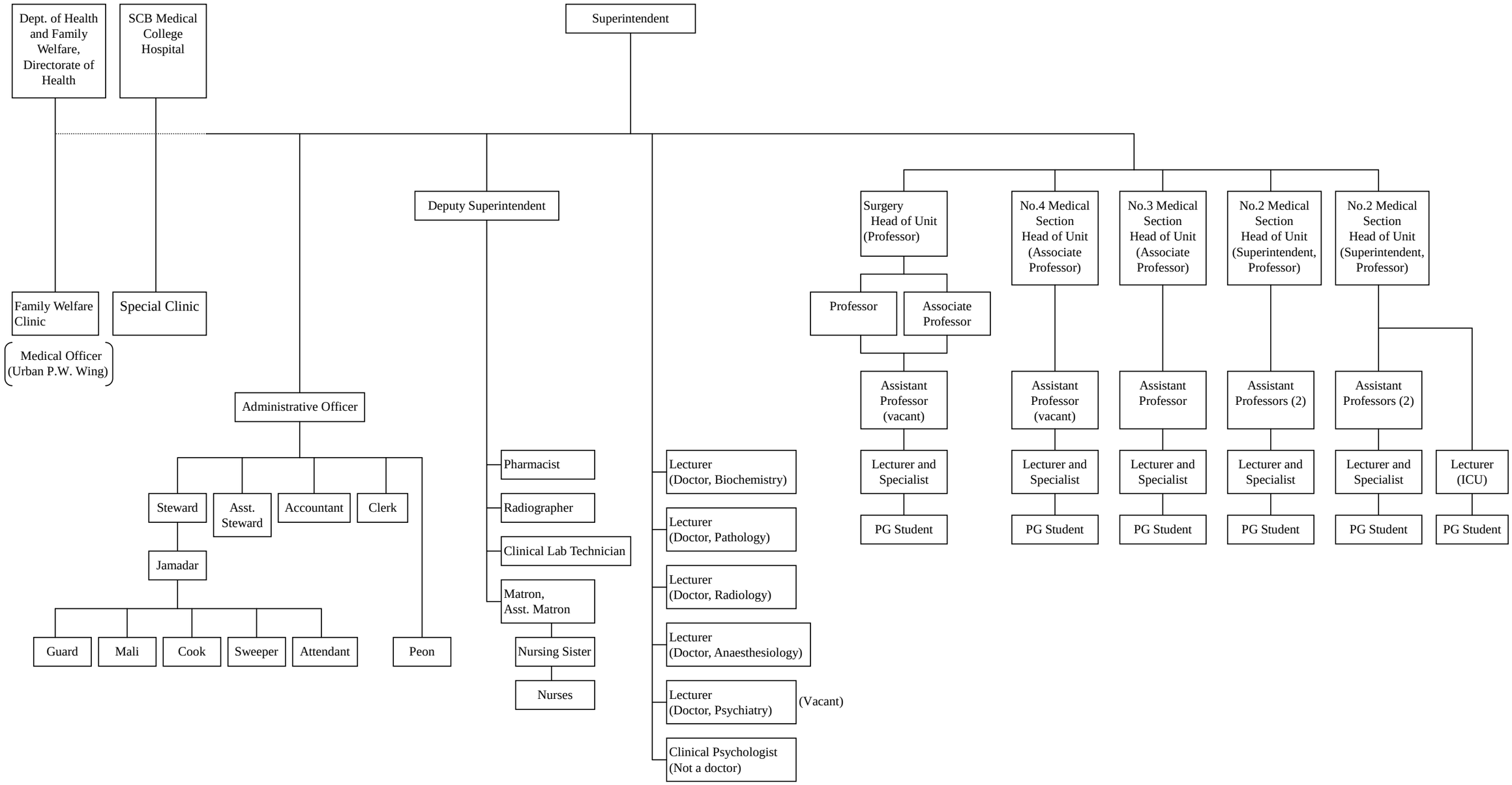


Figure 2-3 SVP Post Graduate Institute of Paediatrics, Orissa

(2) Staff Allocation

The following table shows the staff components and work shifts of the Institute as of 2004.

Table 2-9 Staff Components / Work Shift

Department, Section	Title / Position	Sanc-tioned	Actual staff	06070809101112131415161718192021222324010203040506
Medicine	Doctor, Professor		9	
	Doctor on call – 1		8	
	Doctor on call - 2			holiday
	PG student –1	24	24	lecture, lab work
	PG student – 2			lecture, lab work holiday
Reception, Treatment	Pharmacist (Outpatient)	6	6	
	Pharmacist (Central store)			
	Pharmacist (Night)			
	Pharmacist (Night)			
Surgery	Doctor, Professor	5	5	
	OT Nurse in charge	2	2	
	Anaesthetist, Doctor	1	1	
Imaging	Doctor, Professor	1	1	
	Radiographer – 1	2	2	
	Radiographer – 2			
Clinical Lab.	Doctor, Pathology	1	1	
	Doctor, Biochemistry	1	1	
	Lab technician – 1	7	7	
	Lab technician – 2			
Paediatric Psychiatry	Psychiatrist, Doctor	1	0	
	Psychotherapist / Librarian	1	1	
Ward	Matron	1	1	
	Assistant Matron	1	1	
	Nursing Sister	5	5	
	Staff Nurse – 1	34	34 + 4 (contract)	
	Staff Nurse – 2			
	Staff Nurse – 3			
Administration	Superintendent (*1)	1	1	
	Deputy Superintendent	1	1	
	Administrative Officer	1	1	
	Clerk	9	8	
	Attendant, Peon	4	4	
	Steward	1	1	
	Assistant Steward	1	1	
	Jamadar	1	1	
	Worker (*2)	104	82	
Special Clinic	Dentist		1	(*3)
	Ophthalmologist		1	(*4)
	ENT Doctor		1	(*3)
	Orthopaedist		1	(*4)
Family Welfare	Public Health Doctor		1	
	Senior Health Worker		1	
	Female Health Worker		1	
	Attendant		1	

*1: Serving concurrently as the Manager of Medical Dept., Head of No.1 and No.2 Medical Units.
*2: Workers mean attendants, sweepers, mali, guards, cooks
*3: Assigned from SCB Medical College two days a week when necessary.
*4: Assigned from SCB Medical College once a week when necessary.

For a paediatric hospital of 200 beds, the number of nurses in the Institute is rather small compared to a similar Japanese hospital where a 24-hour nursing system applies. This is mainly because, as is commonly adopted in public hospitals in India, nurse aides perform odd jobs and cleaning, while patient families, mainly mothers, stay in the hospital and attend to inpatients for 24 hours. Meanwhile, the nurses are engaged in medical activities and records under the instructions of doctors. They also supervise and instruct nurse aides and family attendants. Through these services the nurses contribute to a reduction in medical costs.

The current number of 200 beds will remain unchanged after the Project; however, the facilities and capability of the ICU and Newborn Ward will be significantly expanded. To deal with such improvements, one nursing sister for both NICU and NB, 16 nurses, and 16 nurse aides will have to be newly employed, as shown in table 2-10. The NICU doctors and PG student doctors are to be appointed from the Paediatric Medical Unit.

Table 2-10 ICU Operation System and Schedule

Special Beds	Staff	Work Shift			Total Staff	Current Staff	Additionally Employed Staff
		Morning	Afternoon	Night			
PICU (12 beds)	Doctor (Lecturer)	— 1 —	—		1	1	0
	PGSD		1	1	2	2	0
	Nurse	2	2	2	8	4	4
	Nurse Aide	2	2	2	8	0	8
NICU (9 beds)	Doctor (Lecturer)	— 1 —	—		1	0	1
	PGSD		1	1	2	0	2
	Nursing Sister	— 1 —	—		1	0	1
	Nurse	2	2	2	8	0	8
	Nurse Aide	2	2	2	8	0	8
NB (30 beds)	Doctor (Lecturer)	— 1 —	—		1	1	0
	PGSD		1	1	2	2	0
	Nurse	2	2	2	8	4	4

Additionally employed staff: Doctor (Lecturer) 1 (for NICU, newly allocated)
PGSD 2 (6 are daily assigned out of 8 or 16 PG students)
Nursing Sister 1 (for ICU/NB, newly employed)
Nurse 16 (employed on the contract, newly employed)
Nurse Aide 16 (employed on the contract, newly employed)

Although there are currently no special staff employed for the purpose of equipment maintenance, the intention is to employ a single biomedical technician after the project, who will be responsible for such medical equipment maintenance.

(3) Free ICU Beds

Currently, all the six beds in ICU are chargeable. The User's Charge Rate shows the fees for hospitalization in the ICU and for the use of each instrument. The average hospitalization / medical service fee in the ICU is 650 Rs./day. If a patient stays in the ICU for six days , which represents the average hospitalization period, the fee accounts for 3,900 Rs., which is almost equivalent to the average monthly wage of a nurse (4,000 Rs.). It is far beyond what underprivileged families can afford. The families that can afford such costs are limited. The Institute is aware that the situation, namely the ICU only being available to privileged patients, is undesirable in its role as a public hospital; however, the ICU requires air conditioning system and expensive advanced medical equipment, with considerable annual operation / maintenance costs. For administrative purpose, the Institute has to charge for ICU hospitalization.

However, there is no difference in the value of human life between the privileged and underprivileged. Critical care medicine shall be equally available to all patients in need. Fortunately, the initial capital investment for the ICU is not necessary in this Project, because the ICU facilities and equipment will be granted by the Government of Japan. If fees equivalent to those in nearby similar hospitals are charged to patients, the amount recaptured on the initial capital investment can be utilized to offer free ICU beds. As is detailed in Annex 5-1 "Validation of Free ICU Beds," there is a positive expectation concerning the feasibility of free ICU beds that will not obstruct the proper operation of ICU. Therefore, on the condition that the Indian side will establish free and discount ICU bed systems by the time of inauguration of the New Hospital Building, a sufficient number of ICU beds are planned for inclusion in the Project to respond to all demands.

2-4-2 Maintenance System

(1) Facility Maintenance

As with other public hospitals in India, the Institute seeks cooperation from the other departments of the State Government. The following departments will continuously deal with facility maintenance after the Project.

As is mentioned in the preceding pages, about 30 persons are employed as sweepers in the Institute. They will continuously work on the cleaning of the New Hospital Building in addition to the existing buildings.

Dept. of Urban Development (Directorate of Public Health)	Operation/maintenance of plumbing system of the Institute
Dept. of Public Works (Directorate of Public Works) (Directorate of General Electrics)	Maintenance of buildings of the Institute Operation/maintenance of electric system of the Institute

(2) Equipment Maintenance

The Institute concludes annual maintenance contracts with the manufacturers/agencies in the case of certain principal equipment. Two central store workers maintain the equipment management book and maintenance/repair records under the deputy superintendent, while the nurses of the departments where the equipment is installed carry out routine maintenance. There is no department/section that is exclusively responsible for equipment maintenance or technicians/engineers with expert skills.

The Institute, well aware of current inadequacies, intends to establish a maintenance system to deal with significantly improved medical equipment. One engineer or technician who will be newly employed using the income from the User's Charge, will be responsible for the maintenance of medical equipment, under the direct administration of the deputy superintendent. For all instruments requiring special skills for maintenance and/or repairs, AMC will be concluded with the manufacturers and/or agencies to ensure regular maintenance.

As the Institute has presented petitions for supports toward the establishment of the maintenance system of medical equipment, training in the operation and maintenance of the equipment is to be incorporated into this Project.

2-4-3 Financial Plan

(1) Operation of the Institute

In principle, the Institute is operated in accordance with the budget from the State Government of Orissa, and the costs required for the improvements of medical services are reliant on the User's Charge. The budget from the State Government covers basic expenditures such as salary components (for sanctioned employees), as well as the costs for diets, telephone charges, travel expenses, electricity, medicine, road and revenue taxes, reimbursement, equipment, motor vehicles, bedding and clothing linen, water, and other contingencies.

Meanwhile, since July 1997, all the secondary and tertiary medical institutions, including district hospitals in Orissa and three medical college hospitals and SVP PG Institute of Paediatrics, have been allowed to charge patients diagnostic-care fees as the User's Charge,

and to utilize the incomes for the purpose of improving hospital capabilities and the overall quality of medical services.

The Institute established the User's Society system in July 1998 to introduce the User's Charge system, and the incomes received have been used for the purchase of medical consumables, the maintenance/reinforcement of equipment, the employment of nurses on a contract basis, etc. to improve the quality of its medical services.

The current standard care / consultation fees are 2 Rs. for outpatients, 5 to 200 Rs. for laboratory tests, 200 Rs./day for the ICU, 25 to 200 Rs./day for the use of instruments (Annex 5-3 User's Charge Rates).

(2) Review on the User's Charge System

Current hospital charges (as of the year 2004) and those to be levied in future after the Project are compared in table 2-11. As shown in the table, current hospital charges seem to stay much the same following the Project. Any increase will probably be due to expanded use of equipment, taking advantage of the equipment renovation made possible through the Project. Still, the equipment charges are rather low compared to those in private hospitals. On the other hand, the Project will benefit the medical environment of the underprivileged and other patients through improvement in medical services and the establishment of free ICU beds.

Table 2-11 Comparison of Hospital Charges

Departments	Items	Current Charges (2004)	Charges after the Project
OPD	Care/ consultation	Patients pay 2 Rs. at the OPD reception and receive a medical card (pink color). Those who hold the poverty line card are exempted from fees and receive a different medical card (white color).	Unchanged
Laboratory	Inspection	Outpatients: According to the doctor's consultation in OPD, patients pay the inspection fee at the LAB reception, and have the required specimens taken. With the test result, the patients retake the doctor's consultation, which is free of charge this time. The poverty line card holders are exempted from these fees. Inpatients: According to the doctor's diagnosis at the time of routine ward rounds, inpatients undergo lab tests similar to outpatients. The test results are presented during the next rounds. The poverty line card holders are exempted from the fees.	Unchanged Unchanged

Departments	Items	Current Charges (2004)	Charges after the Project
Laboratory	Image diagnosis	Outpatients: According to the doctor's consultation in OPD, patients pay the inspection fee at the Image Diagnosis reception, and have required specimens taken. With the test result, the patients retake the doctor's consultation, which is free of charge this time. The poverty line card holders are exempted from the fees. Inpatients: According to the doctor's diagnosis at the time of routine ward rounds, inpatients undergo an image diagnosis similar to outpatients. The test results are presented during the next rounds. The poverty line card holders are exempted from the fees.	Unchanged Unchanged
Ward	Medical Ward	No hospitalization fee is required. The Institute serves only bread and milk for lunch. Patients take care of other meals themselves.	Unchanged
	Special Cabin	A special cabin charges 150 Rs/day. SCs were originally for rich patients. Hospital meals are the same as in the medical ward.	The charge of 150 Rs/day may be reconsidered, but other terms will remain unchanged.
	Newborn	The NB ward charges 50 Rs/patient. The poverty line card holders are handled free of charge. No hospital lunch is served. User's charges as shown in ANNEX 5-3 are charged to all patients for the use of equipment.	The charge may be reconsidered, but other terms will remain unchanged.
	ICU (PICU/ NICU)	ICU charges 200 Rs/day･patient without exception. No hospital lunch is served User's charges as shown in ANNEX 5-3 are charged to all patients for the use of equipment.	In this project 47% of ICU beds will be saved as free ICU beds. The poverty line card holders will be exempted from hospitalization and equipment charges. The rate of charged ICU bed may be reconsidered, but other terms will remain unchanged.
Pharmacy	Drugs	For both outpatients and inpatients (Ward, SC, ICU, NB) drugs for malaria, diarrhoea, leprosy, acute respiratory disease, dermatologic disease are supplied free of charge by the central or state government. In general, the Institute does not have drugs in stock, and the patients must purchase them at an external pharmacy. There is some financial assistance from NGO and donor agencies, but .this is strictly limited.	Without changes in government policies, the situation may not change drastically.

(3) Prospects following the Completion of the Project

The State Government of Orissa promises the allocation of sufficient budget for the management of the Institute after the Project including the increased energy costs for the New Hospital Building. The balance of incomes and expenditures of the User's Charge is expected to achieve a certain surplus. Thus, there seems no problem with respect to the management of the Institute after the Project.

1) Budget from the State Government

A budget allocation conference under the Secretary of the Department of Health and Family Welfare as a chairman and the representatives of the P & C and Finance Departments as the members, determines the budget of the Institute according to the budget capping method specified by the P & C Department. After the Project, budget allocation is expected to increase by approximately 2,000,000 Rs., equivalent to 10% of the budget for the year 2003-04, in order to cater for an increase in energy costs, especially electricity consumption. The Minister of Health and Family Welfare as well as the Secretary have confirmed this budget increase. Table 2-12 shows the balances of general revenues and expenditures over the past 5 years. The following increases in energy costs are assumed upon completion of the Project.

a) Electricity Charge

The T/R capacity for the New Hospital Building is assumed to be 400 kVA, as the proposed total floor area by the study team is approx. 3,400 ㎡. The diverting factor of the contract power and the utilization rate are assumed based on the operation of the existing buildings.

Contract power: 400 kVA x 0.8 (power factor) x 0.6 (diverting factor) = 192 kw

Consumption: 192 kw x 65% (utilization rate) x 10h/day x 30days/month

= 37,440 kwh/month.

Calculation of electricity charge

Basic charge: If 192 kw, 9,600 Rs./month

Service charge: 37,440 kwh/month x 3.2 Rs./kwh = 119,808 Rs./mon.

Rental charge per meter: 1 meter 100 Rs./month

Hence, (9,600＋119,808＋100) Rs./month x 12 months = 1,554,096 Rs./year

approximately 1,555,000 Rs./year

(Reference: annual electricity charges for the existing five buildings)

Total floor areas of 5 bldgs.: 4,891 ㎡ T/R capacity : 250 kVA

Annual electricity charges (2003 – 04) 900,000 Rs./year

b) Telephone Charges

There are two lines in existing hospital buildings, only one of which is in use. The annual total charge is 18,953 Rs. Another line is planned in the New Hospital Building as part of this Project. Accordingly, similar telephone charges need to be estimated.

approximately 20,000 Rs./year

c) Water Charges

Water charges for the Institute are calculated based on the number of faucets in the buildings. There are 90 faucets in existing buildings, and the water charge in September 2003 was 1,950 Rs./month. Thus, the charge per faucet is calculated as follows:

1,950 Rs. / 90 faucets = 21.67 Rs/faucet /month

As 153 faucets are included in the New Hospital Building, the water charge is estimated to increase by approximately 40,000 Rs. annually.

153 faucets x 21.67 Rs./faucet = 3,316 Rs./month

3,316 Rs./month x 12 months = 39,792 Rs./year

approximately 40,000 Rs./year

d) Fuel for the Emergency Generator System

A generator system for emergency use is to be installed in this Project. Based on past data, the electric power supply stops twice a month, for around five hours in total. A 200kVA generator consumes 50 litres of fuel per hour, while diesel oil costs 24 Rs./litre. Accordingly, the required fuel cost is estimated to be 50 litres/h x 5 h/month x 12 months x 24 Rs. = 72,000 Rs./year

2) User's Charge

Table 2-13 shows the revenues and expenditures relating to the User's Charge during the past 5 years. When the Project is completed, key facilities will be integrated in the New Hospital Building, which will enhance the efficiency of medical services. Upgrading of the NB Ward and ICU (NICU and PICU), and renewal of the equipment in the Imaging and Laboratory Departments will be also realised. With the introduction of new equipment with better performance, the balance sheet of the User's Charge is expected to present a surplus. Some significant income and expenditure items are calculated as follows:

Table 2-12 General Revenue and Expenditure: past 5 years (in Rs.)

	1999-2000	2000-01	2001-02	2002-03	2003-04
A. Revenue					
Budget allocation from the State Government					
1. Salary Component	13,380,000	16,607,000	17,198,000	14,056,000	17,540,000
2. Others					
(1) Purchase of equipment	305,000	100,000	510,000	600,000	600,000
(2) Contingency	200,000	200,000	160,000	160,000	144,000
(3) Medicine, diet, etc.	1,509,954	1,501,000	1,580,000	2,368,000	1,957,000
(4) New construction	---	---	---	---	---
(5) Minor repairs	60,000	---	---	---	---
Sub-total	2,074,954	1,801,000	2,250,000	3,128,000	2,701,000
Total	15,454,954	18,408,000	19,448,000	17,184,000	20,241,000
B. Expenditure					
1. Salary Component	14,258,810	14,826,289	17,840,675	16,546,744	17,638,120
2. Non Salary					
(1) Other contingency	199,999	400,000	160,000	159,940	244,000
(2) Diet	238,085	249,932	498,000	516,691	474,073
(3) Telephone	14,000	12,000	10,980	20,000	18,953
(4) Travel expenses	18,000	14,974	13,994	13,979	12,964
(5) Stipend	397,901	382,774	206,866	7,947	0
(6) Leave travel concession	7,148	11,000	0	0	0
(7) Electricity	300,000	550,000	1,000,000	900,000	900,000
(8) Medicine	164,954	171,000	149,997	150,000	150,000
(9) Road and revenue tax	15,000	37,000	13,623	11,958	11,958
(10) Reimbursement	54,989	42,992	37,992	37,956	33,995
(11) Equipment	305,000	205,000	509,940	600,000	599,989
(12) Motor vehicle	23,000	19,000	17,000	20,000	2,213
(13) Bedding and clothing linen	59,911	18,484	10,399	10,397	10,400
(14) Water charges	15,000	20,000	20,000	20,000	20,000
Sub-total	1,812,987	2,134,156	2,648,791	2,468,868	2,478,545
Total	16,071,797	16,960,445	20,489,466	19,015,612	20,116,665
Balance (A-B)	▲616,843	1,447,555	▲1,041,466	▲1,831,612	124,335

Source: Data for the past 5 years: Answers to the Questionnaire, from the State Government and SVPPGIP

a) Revenue

Incomes from the item 8. Newborn, 9. NICU, and 10. PICU are estimated in table 2-14.

b) Expenditures

i) Repair and maintenance (civil)

Systems such as elevator, air-conditioners, generators, interphones and medical air & suction equipment will require annual maintenance contracts. Their AMC costs are estimated to be as follows:

Elevator	60,000 Rs.
Air-conditioner	30,000 Rs.
Generator	30,000 Rs.
Interphone	10,000 Rs.
Medical gas piping	30,000 Rs.
	160,000 Rs.

ii) Repair and maintenance (equipment)

The repair and maintenance costs are estimated in table 2-15.

iii) Employment on the contract

Upon completion of the Project, nursing staff for the ICU and NB Wards, as well as equipment maintenance staff must be employed on a contractual basis.

(1) Nursing staff for the ICU and NB Ward

ICU nursing sister	1	6,000 Rs./mon. x 1 x 12 months =	72,000 Rs./yr.
ICU nurses	16	4,000 Rs./mon. x 16 x 12 months =	768,000 Rs./yr.
		Subtotal	840,000 Rs./yr.
(2) ICU nurse aides	16	2000 Rs./mon. x 16 x12 months =	384,000 Rs./yr.
(3) Equipment maintenance staff (biomedical engineer)			
	1	6,000 Rs./mon. x 1 x 12 months =	72,000 Rs./yr.

Therefore, the total costs for additional employment under contract will be as follows:

(1) + (2) + (3) = 840,000 + 384,000 + 72,000 = 1,296,000 Rs./yr.

Table 2-13 Revenue and Expenditure of User's Charge: past 5 years (in Rs.)

	1999-00	2000-01	2001-02	2002-03	2003-04
A. Revenue					
1 LAB (Pathology + Bio-chemistry)	297,500	356,845	452,530	946,335	1,081,005
2 Radiology	83,760	126,590	114,500	172,730	258,270
3 Ultrasound	---	---	---	41,500	70,780
4 Outdoor Ticket	---	3,354	57,903	59,697	56,517
5 Indoor Ticket	---	640	18,135	20,969	24,245
6 Special Cabin	---	---	247,100	216,000	293,050
7 O/T Charge	22,950	59,500	59,950	42,850	37,470
8 NB	---	---	28,450	22,850	49,125
9 NICU	---	---	---	---	---
10 PICU	---	---	---	---	319,895
11 Ambulance	90	7,657	9,315	7,525	1,420
12 Donation	---	---	101,700	---	---
13 Others	213,396	255,258	42,655	89,954	49,580
14 Refund	---	---	▲32,580	▲22,005	---
15 Interest (Bank)	---	---	44,585	60,434	40,380
Total	617,696	809,844	1,144,243	1,658,839	2,281,737
B. Expenditure					
1 Printing & Stationary	580	15,667	51,191	119,617	83,588
2 Repairs & Maintenance (Civil)	9,700	2,200	10,359	---	3,196
3 Repairs & Maintenance (Equipment)	54,924	78,418	75,531	115,559	102,018
4 Fuel (Ambulance)	0	6,828	33,253	23,283	2,450
5 Consumable & Reagents	20,700	90,046	95,388	468,127	819,412
6 Medicine	0	0	23,347	---	0
7 Waste Management	0	0	---	8,000	4,000
8 Depreciation	0	0	229,353	347,861	0
9 Miscellaneous	1,144	5,510	---	17,134	8,483
10 Purchase of Equipment	242,109	302,434	480,963	---	1,388,023
11 Purchase of Furniture	14,629	4,397	13,100	---	56,069
12 Employment on the contract	0	3,650	8,917	47,217	92,934
Total	343,786	509,150	1,021,402	1,146,798	2,560,173
Balance (A-B)	273,910	300,694	122,841	512,041	▲278,436

Source: Data for the past 5 years: Answers to the Questionnaire, from SVPPGIP

Notes: The figures in the cells of A. Revenue, 13. Others for the years 1999-99 and 2000-01 seem rather large, because there were no other categories specified in the questionnaire.

Table 2-14 Expected Income from the User's Charge (NB, NICU, PICU)

<table>
<tr><th>Departments</th><th>Preconditions</th><th>Income from Inpatients</th><th>Income from Equipment Operation</th></tr>
<tr><td>Newborn
30beds</td><td>Average hospitalization days
10.5 days
Bed occupancy rate
90%
Hospitalization fee
Rs. 50/use･bed
Equipment Plan
<table><tr><th>Equipment</th><th>Installation rate</th></tr><tr><td>Apnea monitor</td><td>20%</td></tr><tr><td>Pulse oximeter</td><td>20%</td></tr><tr><td>Radiant heat warmer</td><td>30%</td></tr><tr><td>Phototherapy unit</td><td>30%</td></tr></table>
Other equipment
To share the use..
30% of the in-patients will use Billirubinometer.</td><td>Annual income
Rs.50×30beds
×365dy×90%/10.5dy
=Rs. 46.929</td><td>Annual income
Apnea monitor
Rs.50/dy･beds×30beds×365days×90％×20％
= Rs.98,550
Pulse oximeter
Rs.50/dy･beds×30beds×365days×90％×20％
= Rs.98,550
Radiant heat warmer
Rs.50/dy･beds×30beds×365days×90％×30％
= Rs.147,825
Phototherapy unit
Rs.50/dy･beds×30beds×365days×90％×30％
= Rs.147,825
Billirubinometer
Rs.20/dy･beds×30beds×365days×90％×30％
= Rs.59,130/yr

Total Rs. 551,880</td></tr>
<tr><td>NICU
9 beds</td><td>Average hospitalization days
6.2 days
Bed occupancy rate
90%
Hospitalization fee
Rs. 200/day･bed

Equipment Plan
<table><tr><th>Equipment</th><th>Installation rate</th></tr><tr><td>Infusion pump</td><td>100%</td></tr><tr><td>Syringe pump</td><td>60%</td></tr><tr><td>Bedside monitor</td><td>100%</td></tr><tr><td>Ventilator</td><td>30%</td></tr><tr><td>Radiant heat warmer</td><td>100%</td></tr><tr><td>Phototherapy unit</td><td>80%</td></tr></table>
Other Equipment
Use of blood gas analyser will be proportional with the use of ventilator. 50% of inpatients will use billirubinometer.</td><td>Annual income

from Annex 5-4
Rs.384,210</td><td>Annual income

from Annex 5-4
Rs.591,959</td></tr>
</table>

<table>
<tr><th>Departments</th><th>Preconditions</th><th>Income from Inpatients</th><th>Income from Equipment Operation</th></tr>
<tr>
<td>PICU
12 beds</td>
<td>Average hospitalization days
5.5 days
Bed occupancy rate
90%
Hospitalization fee
Rs. 200/day･bed

Equipment Plan
<table>
<tr><th>Equipment</th><th>Installation rate</th></tr>
<tr><td>Infusion pump</td><td>100%</td></tr>
<tr><td>Syringe pump</td><td>60%</td></tr>
<tr><td>Bedside monitor</td><td>100%</td></tr>
<tr><td>Ventilator</td><td>30%</td></tr>
<tr><td>Radiant heat warmer</td><td>25%</td></tr>
</table>
Other equipment
Use of blood gas analyser will be proportional with the use of ventilator.</td>
<td>Annual Income

from Annex 5-4
Rs.464,280</td>
<td>Annual Income

from Annex 5-4
Rs. 576,868</td>
</tr>
</table>

Table 2-15 Expected AMC Costs for the Proposed Equipment

Equip No	Equipment Name	Plan Qty	AMC Cost	Estimated Cost
2	General X-Ray machine	1	AMC (*) US$69,300×3%×@45 =Rs.93,555	Rs.93,555
4	Portable X-Ray machine	1	AMC (*) US$48,312×3%×@45 =Rs.65,221	Rs.65,221
6	Anaesthesia Apparatus	1	AMC (*) ￥2,451,900×3%×@2.43 =Rs.178,744	Rs.178,744
16-1	Suctio Unit (applicable to the central piping system)	37	AMC (*) ￥51,000×2%×37 units×@2.43 =Rs.12,580	Rs.91,708
20	Blood Gas Analyzer	1	AMC (*) US$15,750×5%×@45 =Rs.35,438	Rs.35,438
25	Infusion Pump	22	AMC (*) ￥291,000×2%×22 units×@2.43 =Rs.311,137	Rs.311,137
26	Pulse Oximeter	5	AMC (*) US$900×2%×5 units×@45 =Rs.4,050	Rs.4,050
27-1	Low Pressure Continuous Suctio Unit (applicable to the central piping system)	2	AMC (*) ￥33,750×2%×2 units×@2.43 =Rs.3,281	Rs.3,281
31	Phototherapy Unit	16	AMC (*) US$1,485×2%×16 units×@45 =Rs.21384	Rs.21,384
33	Radiant Heat Warmer	21	AMC (*) US$1,080×2%×21 units×@45 =Rs.20,412	Rs.20,412
34	Shringe Pump	13	AMC (*) ￥208,500×2%×13 units×@2.43 =Rs.131,730	Rs.131,730
35	Chemistry Auto Analyzer	1	AMC (*) US$26,550×5%×@45 =Rs.59,738	Rs.59,738
45	High-pressure Steam Sterilizer	1	AMC (*) Rs.2,036,340×3% =Rs.61,090	Rs.61,090
46	Table Top Steam Sterilizer	1	AMC (*) ￥187,500×3%×@2.43 =Rs.13,669	Rs.13,669
50	Gastro Intestinal Fiberscope	1	AMC (*) ￥2,007,000×3%×@2.43 =Rs.146,310	Rs.146,310
58	Ultrasonic Nebulizer	8	AMC (*) ￥175,000×3%×8 units×@2.43 =Rs.102,060	Rs.102,060
59	Ultrasonic diagnostic machine with additional neonatal probe	1	AMC (*) ￥4,665,000×3%×@2.43 =Rs.340,079	Rs.340,079
62	Bedside multi-parameter monitor	23	AMC (*) US$6,219×2%×23 units×@45 =Rs.128,733	Rs.128,733

Equip No	Equipment Name	Plan Qty	AMC Cost	Estimated Cost
65/66	Ventilator	6	AMC (*) US$27,180×3%×6 units×@45 =Rs.220,158	Rs.220,158
73	Automatic Blood Cell Counter	1	AMC (*) US$22,950×5%×@45 =Rs.51,638	Rs.51,638
74	Microwave apparatus for biomedical waste management	1	AMC (*) US$38,574×3%×@45 =Rs.52,075	Rs.52,075
75	Waste Shredder	1	AMC (*) US$16,650×3%×@45 =Rs.22,478	Rs.22,478
			Total	Rs.2,154,686
			(rounded)	Rs.2,154,000

(*) Regular inspection and maintenance is conducted once in each quarter of a year.

Table 2-16 Expected Annual Costs of Consumables and Reagents

No.	Item	Terms of Estimation	Estimated Cost
1	X-Ray Films	Though the diagnosis is not assumed to increase drastically, in cosideration of the current number of staff and their components, 15% increase is assumed with the adoption of portable X-ray mashine. 7,169 cases (2003 recod)×115%×@Rs.30 =Rs.247,330	Rs.247,330
2	Reagents and Consumables	As a result of purchase of new testing instruments, the number of tests are expected to increase by 10%. The assumed testing cost in 2003 is Rs.9/case. 39,887cases (2003 record)×110%×@Rs.9 =Rs.394,881	Rs.394,881
3	Oxygen	Oxygen charge in 2003-04 was 113,531 Rs. After the Project completion, ICU beds will increase from 6 to 21, and the Newborn beds will increase from 24 to 30. Oxygen consumption is assumed to increase accordingly. Oxygen consumption in other departments is assumed not to change. (21+30) / (6+24)=1.7 Accordingly, oxygen consumption is assumed to increase by 70%. Rs.113,531×70%=Rs.79,471	Rs.79,471
		Total	Rs.721,682
		(rounded)	Rs.721,000

2-5 Project Cost Estimation

The total project cost is estimated to be 842 million yen. The detailed costs to be borne by the both countries according to the split of works are estimated based on the calculation conditions as specified in (3) below. This cost estimate is provisional and subject to further scrutiny by the Government of Japan for approval of the Grant.

(1) Costs to be borne by the Government of Japan

Items		Cost Estimate (in million yen)		
Facility	New Hospital Bldg.	570.2	588.4	728.0
	Exterior Work	18.2		
Equipment			139.6	
Working Design, Supervision of Construction and Equipment Installation				102.6
Operation Training & Maintenance Guidance for Equipment				4.1
Total				834.7

(2) Costs to be born by the Government of India

Items		Cost Estimate (thousand Rs)	
Site Preparation	Removing obstacles	291	2,022
	Cutting trees	142	
	Rerouting the sewage ditches	1,589	
Remodelling of the Existing Buildings	Old Medical Ward	162	696
	Medical Ward-2 (current surgical ward)	307	
	OPD Ward	51	
	New Medical Ward	176	
Planting			355
Total			3,073

(Equivalent to 7.5 million yen)

(3) Calculation Conditions

1) Time of Estimation : as of July 2004

2) Conversion Rate : US$1.00 = 109.50 yen

: Rs1.0 = 2.43 yen

3) Construction Period : as shown in the implementation schedule.

4) Other Conditions

Project implementation intended to be in compliance with the Grant Aid scheme of the Government of Japan.

CHAPTER 3 PROJECT EVALUATION AND RECOMMENDATIONS

CHAPTER 3 PROJECT EVALUATION AND RECOMMENDATIONS

3-1 PROJECT EFFECTS

The Institute serves as the top referral hospital of paediatrics in Orissa, and also serves as a post-graduate medical institution. When the Project is implemented, approximately 20 million people (2003 estimate) in 13 districts including Cuttack in Orissa to be served by the Institute, will receive benefits. In addition, through technology transfer by the graduate doctors of the Institute who will be dispersed to various hospitals and medical centres in Orissa, the entire population of Orissa State, a total of over 35 million people (2003 estimate) will benefit indirectly from the Project.

In summary, the following effects are expected following the Project implementation.

Table 3-1 Project Effects and Range of Improvement

Situation and Problems	Measures Taken through the Project (Contents of the Project)	Project Effects and Range of Improvement
1. The Institute is incapable of providing satisfactory medical services because of hospital buildings scattered around the campus (dispersion of core hospital functions and inter-related functions), use of inappropriate buildings (use of buildings originally designed for other purposes, or obsolete buildings), insufficient building space (rapid increase in demand), as well as old equipment or that in insufficient supply. Post-graduate level education through practical training in medical services is not realised as expected.	• A new hospital building will be constructed, which will accommodate the outpatient department, central diagnosis department, operational section, ICU, newborn ward, a part of the medical ward and doctors' rooms. Equipment necessary for these departments will be installed.	• With the completion of the new hospital building, core hospital functions will be combined in one location. With sufficient building space and medical equipment, the Institute will be capable of providing satisfactory medical services and a post-graduate level of education.
2. Operation and maintenance system is not established for the equipment.	• A training program to establish the equipment operation and maintenance system (soft component program) will be carried out.	• The equipment operation and maintenance system will be established. With this preventive maintenance system, the incidence of equipment failures or that left unused will decrease.

The aforementioned project effects and range of improvement are based on research concerning the number of patients in the Institute over the past five years, as shown in the following table. As the Institute records statistical data annually, the number of patients following the completion of the Project, which can be taken as the criteria of the project effects and improvement, will be available through analysis of these data

Table 3－2 Number of Patients in SVPPGIP (past 5 years)

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
A. Outpatients					
Medicine	37,985	40,814	37,833	26,449	24,166
Surgery	4,599	4,253	2,463	3,576	4,729
Casualty	5,048	6,234	4,117	4,976	5,423
Neurology	871	745	485	322	409
Dentistry	725	566	381	441	201
ENT	3,349	2,789	2,509	2,404	365
Orthopaedics	145	283	251	48	135
FW	9,525	6,327	12,595	19,358	21,940
(Total)	(62,247)	(62,011)	(58,634)	(57,574)	(57,187)
Neonates (under than one month old)	2,037	1,985	2,226	2,211	2,269
Under one year old	14,377	13,765	12,805	13,415	13,673
Under 5 years old	26,331	25,189	15,586	24,836	24,018
5 years or older	19,509	21,063	18,017	17,112	17,227
(Total)	(62,247)	(62,011)	(58,634)	(57,574)	(57,187)
B. Inpatients					
Medicine	5,183	5,287	5,654	5,404	5,959
Surgery	749	720	633	622	606
ID	1,132	1,347	1,167	1,315	1,480
(Total)	(7,064)	(7,354)	(7,454)	(7,641)	(8,045)
Avg. hospital stay (days)					
Medicine	10.50	11.00	10.80	11.20	10.50
Surgery	8.20	7.80	7.50	6.00	5.00
ID	6.00	5.20	5.00	8.00	8.00
(Average)	(8.24)	(8.00)	(7.76)	(8.40)	(7.83)
Neonates	895	916	861	975	1,418
Dead (%)	270(30.2)	272(29.7)	251(29.2)	321(32.9)	344(24.3)
Under one year old	2,192	2,008	1,838	2,204	2,449
Dead (%)	161(7.3)	154(7.7)	161(8.8)	189(8.6)	188(7.7)
Under 5 years old	2,217	2,466	2,672	2,384	2,514
Dead (%)	138(6.2)	135(5.5)	142(5.3)	125(5.2)	107(4.3)
5 years or older	1,760	1,964	1,983	2,078	1,664
Dead (%)	41(2.3)	56(2.8)	72(3.6)	70(3.4)	85(5.1)
(Total inpatients)	(7,064)	(7,354)	(7,454)	(7,641)	(8,045)
(Total dead patients)	(610)	(617)	(626)	(705)	(724)
ICU patients	--	--	--	--	216
Dead (%)	--	--	--	--	152(70.4)
C. Referred Patients					
Referred from others	3,565	3,221	3,819	3,776	3,895
Referred to others	45	38	82	76	40

Source: Replies received from the Institute to the study team's questionnaire

Note: Data concerning the ICU are available only for the period between July 2003 and March 2004. The number includes neonates and children.

3-2 RECOMMENDATIONS

The following issues are recommended to the Indian side in order to accomplish the Project successfully, to make the best use of the facilities and equipment, and to render the effects of the Project sustainable.

(1) Removal of Obstacles

The site ground is located in the premises of SVP Post-Graduate Institute of Paediatrics, and there appear to be no problems for the Institute to apply to the State Government of Orissa and acquire permission to use the land for constructing the New Hospital Building. There are several obstacles in the site ground such as, a toilet foundation, a borehole, around 26 trees and bushes, and a boring machine once brought in to dig a borehole but left neglected. Two open drainage ditches run across the site ground, requiring rerouting elsewhere so as not to hinder the construction of the New Hospital Building. The Indian side is responsible for demolishing and removing these obstacles from the site ground prior to the commencement of construction works.

The concerns are, in the State Government of Orissa, that the Department of Health and Family Welfare has to request the demolition and removal work from the Department of Public Works, and it may take an unexpectedly long period. As the budget allocation for these works is also the responsibility of the Department of Public Works, the Institute will have to start applying for these works before the E/N, with the assistance of the Department of Health.

(2) Acquisition of Permission for Construction and Other Works

The building permits to construct the New Hospital Building has to be obtained from Cuttack City Hall. During the field surveys in India, the study team discussed the acquisition of building permits with the Cuttack Development Authority, and confirmed that there would be no problems as regards the current Project. With previous grant aid projects in India, the according of permission sometimes took an unexpectedly long period, which then delayed the commencement of work. In this Project, the Institute shall start close negotiations with the Cuttack Development Authority promptly following E/N to avoid any such delays.

Trees growing in the site ground will have to be felled and excavated before the application for the building permits. Cutting the trees requires procedures meaning that following permission granted by the regional forest officer, the Department of Public Works auctions off these trees. When the trees are sold, they can be cut and excavated. Negotiations shall commence initially with the officers and agencies concerned, for the prompt commencement of construction work.

(3) Authorization to Pay and Banking Arrangements

This Project is the first grant aid project in Orissa State. Neither the Institute nor the Department of Health has experience concerning the formalities of the Authorization to Pay and Banking Arrangements. In past projects, the Bank of India was engaged in transactions. The person in charge in the Institute shall contact the Bank of India before E/N, and clarify the nature of the Banking Arrangements and Authorization to Pay, what to do, and the service charges necessary, etc. Moreover, information concerning the service charges shall be obtained at the earliest opportunity in order to include the amount in the budget for next year.

(4) Daily Cleaning and Maintenance

The existing hospital buildings are considerably dirty, both inside and out. Although the Institute employs many janitors, daily maintenance such as cleaning, inspections and minor repairs of the hospital facilities cannot be deemed sufficient. Consequently, even the New Medical Ward, which is 17 years old, has noticeably deteriorated. Daily cleaning and checks are vital for proper maintenance, which will maintain a good condition and extend the lifespan of the New Hospital Building. For this purpose, the superintendent as well as all the Institute staff shall recognise the necessity of proper maintenance and cleaning. Specifically, manuals for cleaning and daily inspections need to be prepared. As JICA provides mass training programs concerning proper hospital operation and management as part of the technical cooperation scheme, participation in such training programmes is recommended for the executive staff of the Institute.

(5) Equipment Maintenance

The Institute establishes an Annual Maintenance Contract with supplies / agencies for major medical equipment, however, for other equipment, two central store workers maintain an equipment book and repair records only. Lab technicians and nurses from the user departments take care of daily maintenance. To realise optimal effects of the soft component work programme for the establishment of the maintenance system, the Institute is recommended to employ an equipment engineer / technician under the deputy superintendent prior to the soft component work.

(6) Budget for Renewal of Equipment

The present User's Charge rate settings are based on the annual maintenance costs, and the descriptive costs are considered insignificant. In addition, there seems to be tacit acknowledgement that, since the Institute is a public hospital, the State Government

should bear the cost for equipment renewal in order to improve the habitants' health.

However, from about the year 2014 onwards, namely seven years after the completion and handover of the Project, it will be necessary to renew the medical equipment. To secure the cost thereof, the present Users' Charge should be revised by attaching more importance to the depreciation costs. However, it is anticipated that high charge setting is impossible because the Institute is public. Therefore, the Department of Health of the State Government needs to prepare a budget to compensate for the insufficiency.

(7) Administration of Free Beds in ICU

The existing 6 ICU beds in the Institute are all chargeable. Since the Project is to be implemented under the Grant Aid scheme, initial investment in ICU is unnecessary. Therefore, upon completion, 4 free NICU beds and 5 free PICU beds will be lined up. Basically, this is accepted favourably from a compassionate perspective towards underprivileged people. For the purpose of effective operation of free ICU beds, the Department of Health should extend support to the Institute, and also, the regulations for the free bed availability should be stated clearly in the bylaws of the User's Society and be observed severely.

(8) Reinforcement of Referral System

The medical service system of Orissa is divided into three levels as are in other states in India. In this system, patients initially access primary level hospitals such as the sub centres, primary health centres or community health centres. The next stage involves accessing secondary level hospitals such as regional, district or city hospitals, and patients, according to their needs, are referred to tertiary level hospitals such as university or specialty hospitals.

The Institute is the top referral hospital for paediatrics in Orissa. As of 2004, when the basic design study for the Project was done, 6 ICU beds and 24 NB beds were already completed and critical neonatal and infant patients were being treated there. Following the Project, the number of beds will further increase to 21 ICU beds (12 PICU beds and 9 NICU beds) while the NB ward will have 30 beds, which will help improve its function as a tertiary level hospital.

However, in the year 2003-04, the patients referred to the Institute from lower level hospitals and medical centres shared only 11% of the total outpatients. Though it is impossible to reject non-referral patients from the vicinity areas of the Institute, it is necessary to strengthen the referral system by accepting more referral patients so that the Institute may function more efficiently as the top referral hospital for paediatrics in

Orissa.

(9) Enhancement of Training in the Institute

Upon completion of the Project, the number of beds will remain at 200 beds, as at present. However, with the improvement of the ICU and NB Wards, nurses and nurse aides will be newly employed in these sections. These sections are operating in the existing ICU/NB Ward, and in this Project, the service in these sections will be further improved, meaning the nurses and nurse aides who are to be increased shall undertake training in the existing ICU/NB Ward for two or three months before the handing-over of the Project. In addition, when full-operations commence following the handover, the training of medical staff shall be enhanced to further improve the standard of medical services.

(10) Coalition with SCB Medical College

As things stand, for special clinics like dentistry, ophthalmology, ENT and orthopaedics, specialists are sent from the relevant sections of SCB Medical College. Hereafter, in order to strengthen the medical treatment services of the Institute as a tertiary level hospital, coordination with SCB Medical College is necessary. Fortunately, the existing surgical ward will have vacant space once the image diagnosis department and OPD rooms are relocated to the New Hospital Building. It is possible to strengthen the special surgery by using the vacant space.

(11) Cooperation with Other Donors

In the fields of health and medical service of Orissa, World Bank and EU, UNICEF, DfID, DANIDA and other many international donor agencies and donor countries are engaging in supportive activities. Currently, of such supportive activities concentrate mainly on the policy programme support of the Department of Health and as the facility construction and equipment supply for primary and secondary hospitals. Establishing coordination between these supportive activities and this Project will help to achieve further improvement in the standard of state paediatric care.