Federal Ministry of Health / Nigeria Centre for Disease Control
Federal Republic of Nigeria

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR STRENGTHENING THE CAPACITY OF NETWORK LABORATORIES OF THE NIGERIA CENTRE FOR DISEASE CONTROL
IN
THE FEDERAL REPUBLIC OF NIGERIA

NOVEMBER 2019

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

ORIENTAL CONSULTANTS GLOBAL CO., LTD.
FUJITA PLANNING CO., LTD.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the “Preparatory survey for the Project for Strengthening the Capacity of Network Laboratories of the Nigeria Centre for Disease Control in the Federal Republic of Nigeria”, and entrusted the survey to the consortium consists of Oriental Consultants Global Company Limited and Fujita Planning Company Limited.

The survey team held a series of discussions with the officials concerned of the Government of Nigeria, and conducted field investigations.

As a result of further studies in Japan, 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.

Finally, I wish to express my sincere appreciation to the officials concerned of the Federal Rebublic of Nigeria for their close cooperation extended to the survey team.

November, 2019

Jun SAKUMA
Director General,
Human Development Department
Japan International Cooperation Agency

Summary

Summary

1. Background of the Project

Nigeria has a significant risk of infectious diseases such as Lassa fever, which originated from the country. In fact, in recent years, there have been reported outbreaks of the Ebola Virus Diseases with 20 cases in 2014, outbreaks of the five infectious diseases (e.g., Lassa fever, CSM, Yellow fever, Cholera, and Monkeypox). However, a lack of sufficient laboratory equipment and infrastructure in those public health laboratories poses a rapid and accurate detection of infectious disease outbreaks. Hence, the Government of Nigeria requested the Government of Japan to provide grant aid which includes procurement and installation of a laboratory facility and laboratory equipment in order to further develop the network laboratories that serve as regional hubs and to strengthen their testing and diagnostic capacity.

Based on the request, the Japan International Cooperation Agency (JICA) conducted a preparatory survey. Its result confirmed that the Project, which aims to strengthen the infectious disease surveillance system and its control, will contribute to the early detection of infectious disease outbreaks and the prevention of the spread of infectious diseases in Nigeria by providing equipment and facilities to the eight laboratories under the Nigeria Centre for Disease Control (NCDC) laboratory network. Moreover, the Project will address the prioritized issues in infectious disease controls in the Nigerian public health policies such as in the National Action Plan on Health Security (NAPHS), National Health Policy 2016, the Nigeria Medical Laboratory Services Policy and the Nigeria Medical Laboratory Strategic Plan 2015-2019 (e.g., improving infectious disease surveillance, prevention, and emergency response and providing laboratory equipment to strengthen epidemiological investigation capacity).

The Project aims to contribute to the early detection and prevention of outbreak of infectious diseases in Nigeria, as well as to strengthening the control of infectious diseases and surveillance capacity through the improvement of facilities and equipment for the eight network laboratories led by NCDC. The request from the Nigerian side is shown in Table-1.

Table-1 Contents of request

	Contents of request in the preliminary hearing survey
I. Building construction	Construction of a new building and facility for public health including BSL-2 laboratories for CPHL in Lagos
II. Equipment procurement	CPHL: provision of necessary Laboratory equipment for BSL-2 laboratories Other seven network laboratories: Laboratory equipment (Biosafety cabinet, Dry oven, CO_2 incubator, -30℃ and -80℃ freezer, Centrifuge, DNA sequencer, etc.
III. Soft Component Program	Training in operation & maintenance of BSL-2 facility and equipment

2. Contents of the Project

The Preparatory Survey team was dispatched to Nigeria from January 7 2019 to February 1 2019, in order to implement field survey and to discuss the Project with NCDC and the Federal Ministry of Health

(FMOH). During the Survey, the Nigerian side reconfirmed the requested equipment for the eight network laboratories as indicated in Table-2.

Table-2 Requested equipment list for the eight Network Laboratories

Equipment	Equipment for CPHL and other seven NCDC Network laboratories: Vertical autoclave vertical, biosafety cabinet, blood culture, centrifuge (high and low speed types, and small size), CO_2 incubator, -30℃ and -80℃ freezer, dry thermo unit, incubator, laboratory refrigerator, magnetic stirrer, microscope (binocular, fluoroscopy, inverted), microwave oven, pH meter, platform scale, precision electronic balance, spectrophotometer, vortex mixer, water bath, work bench, ELISA set, hot plate, domestic refrigerator, electrophoresis, gel imager, PCR workstation, real time PCR (qPCR), thermal cycler, UV transilluminator, dry oven, water distiller

Japanese and Nigerian sides agreed that the required equipment would be evaluated based on the criteria for the selection to prepare the equipment plan.

After returning to Japan, the Survey team continued to study and analyze results of filed survey to make an outline design and compile the draft final report. Then, the Survey team was dispatched to Abuja from May 26th, 2019 to June 6th, 2019, in order to explain the outline design in accordance with the draft final report to the Government of Nigeria.

Subsequently, through discussions of the draft final report, project components and items of both new facility and equipment were confirmed to finalize the outline design compiling this final report. Components of the Project are summarized in Table-3 and Table-4, while the soft-component program was confirmed to render the training for operation and maintenance of the air conditioning ventilation system, infectious wastewater treatment and some specialized equipment (biosafety cabinet, incubators, etc.).

Table-3 Summary of Project Components (Building)

Component	Contents
I. The new building and facility of CPHL (1) Public Health Laboratory (Basement, 2 Stories)	< Infection Control Area > 1) Laboratory Area: Bacteriology laboratory for Culture & DNA extraction*, Bacteriology laboratory for DNA amplification*, Master Mix Room of Bacteriology, Media Room of Bacteriology, Virology laboratory for DNA extraction*, Virology laboratory for DNA amplification*, Master Mix Room of Virus, Parasitology laboratory, Preparation Hall-2, Bio Bank for Bacteriology, Bio Bank for Virology *Each room has two anterooms. 2) Service Area: Sample Reception, Sample Room, Service Corridor, Preparation Hall-1, Reagent Room, Corridor, Washing Room, Hazardous Water Storage, Storage, Pipe Shaft (PS), Electrical Pipe Shaft (EPS) 3) Others: Training laboratory including 2-Anterooms, storage & preparation Hall < General Management Area > 4) Administrative Area: Entrance Hall, Office, Monitoring Room, Staff Room-1, Male & Female toilet, Corridor, Staircase

Component	Contents
	Lecture Room, Director Room, Assistant Director Room, Conference Room-1, Conference Room-2, Male & Female toilet, Corridor, Staircase, Storage
(2) Utility facility	・Air conditioning ventilation system (General air conditioning facility, BSL-2 laboratory air conditioning facility) ・Electrical facility (Transformer, Main feeder system, Emergency power supply system, Lightning/ Receptacle outlet system, Lighting protection) ・Communication facility (Telephone, LAN) ・Alarm facility (Access control, CCTV, Intercom, Fire alarm) ・Plumbing facility (Water supply, Sanitation, Drainage (Domestic waste water treatment, Infectious wastewater treatment) ・Incinerator facility ・Fire extinguisher facility (Fire hydrant, Fire extinguisher)
(3) Supplementary facility	parking lot, road in site & parking pavement, sidewalk, septic tank, incinerator, waste pit, oil tank space, electrical transformer space, guardhouse
Total 3,006m^2	

Source: prepared by the Survey team

Table-4 Summary of Project Components (Equipment)

Equipment	Major specification	Q'ty
Autoclave, vertical	Type：Vertical type autoclave Chamber size： ϕ 365 - 425 x 625 - 780 mm Temperature：115 - 130℃ or wider External dimensions： W450 -670x D620-670 x H1,000-1,180mm	19
Biosafety cabinet	Type：Class II, TypeA2 Effective working area dimensions：W1,250-1,350 x D590-640 x H590-650 mm External dimensions：W1,300-1,600 x D720-800 x H1,850-2,000 mm	18
Blood culture	Type：Table top type ID/AST automat system Capacity of sample : 40 bottles or morel	3
Centrifuge, high speed	Type：Floor standing type or bench top with stand Revolving speed：15,000 rpm or more Refrigeration function：Equipped Applicable sample tube： 1.5, 2ml and microplate	7
CO_2 Incubator	Type：Heater jacket or water jacket type Capacity：160L or more Temperature control range：Room temp. + 8 - 45°C or wider CO_2 control range： 1 - 19.9% or wider	2
Deep freezer -80℃ A	Type：Upright type Temperature range：-70 °C - -80°C or lower Capacity：330L or more	9
Electrophoresis set A	Power supply unit：1 set Gel electrophoresis bath part：2 set Gel casting set：1 set	3

Equipment	Major specification	Q'ty
ELISA set	Microplate reader Applicable plate：96 well microplate or more Measuring range：0 - 3.0 OD or more Measuring wavelength：400 - 750nm or wider Filter：3 or more Light source：Halogen or tungsten lamp Microplate washer Applicable plate：96 well microplate or more Pump：Equipped	5
Gel imager	Camera：CCD, CMOS or better quality Sample size：11 x 14 cm or more Light source：UV and blue light or more Operation and analysing unit：Equipped Image capture and analysis software：Equipped	4
Incubator	Type：Air jacket and natural convection Temperature range：Room temp. + 5 - 60°C or wider Temperature uniformity：±1.0℃ or less Internal capacity：150L or more	20
Microscope, Fluoroscopy	Type : Fluoroscopy microscope with camera system Eye piece : x10 Objective lens : x4, x10, x20, x40, x100 oil Light source : LED Technique : Bright, dark and fluorescent Excite filter : 3 type or more	2
Microscope, Inverted	Type : Inverted microscope Eye piece : x10 Objective lens : x4 or 5, x10, x20, x40 Light source : LED Technique : Bright, dark and phase contrast	1
PCR work station	Type：Installed on Laboratory table Working space：W600-720 x D520-580 x H560-780 mm HEPA filter：Equipped UV lamp：Equipped	7
Real-time PCR	Block type：96 wells 0.2ml block PCR reaction volume：3 - 30μL or wider Temperature range：30 - 98℃ or wider Temperature accuracy：±0.25℃ or less Heating speed：4ºC/sec. or more Cooling speed：2ºC/sec. or more Light source：LED Number of exciting and detection：4 or more	7
Spectrophotometer	pectrophotometry method：Double beam Measuring range：200 - 1,100 nm or wider Spectro band width：2nm or less	3
Thermocycler	Applicable block： 0.2ml tube or more Temperature setting range：5 - 99℃ or wider Temperature stability：±0.3℃ or less Block ramp rate：Max. 3.0℃ Sample ramp rate：Max. 2.3℃ Main control panel：Touch panel	3

Equipment	Major specification	Q'ty
UV transilluminator	Application：Observation of DNA and RNA Filter size：190 x 190 mm or more Wavelength：300 nm or higher	3
Water distiller	Type : Table top type Production capacity : 1.5 L/hr. or more Material : Stainless steel or hard glass Water softener : Equipped Equipped distilled water tank capacity: 10L or more	6
Work bench A	Type：Centre table Table size： W3,600 x D1,500mm x H800 mm Drawer : Equipped Shelf: Equipped Plug socket : Equipped Laboratory Chair : 4 sets	2
Work bench B	Type：Centre table with sink Table size：W3,000 x D1,500 x H800 mm Overall sink size : W1,500 x D600 x H800 mm Drawer : Equipped Plug socket : Equipped Laboratory chair : 4 sets	3
Work set for biosafety cabinet maintenance	Composition： Air velocity meter with mist pipe, aerosol photometer with prob, container for formaldehyde and ammonia, exhaust fan with flexible duct, hot plate, PAO generator, safety cabinet fumigation set, sampling kit for formaldehyde density	1

Source: prepared by the Survey team

3. Implementation Schedule and Initial Cost Estimate of the Project

Duration of the detailed design and tender preparation is 3 months after the signing of agreement for consulting services. Thereafter, process for tendering and contract for the building construction and equipment procurement takes 3.5 months. The period of construction and procurement is 20.5 months after the signing of contract.

The initial cost for the Project to be born by the Nigerian side is estimated NGN$ 76,692,750.

4. Project Evaluation

4-1. Relevance

(1) Relevance of Benefit and Target of the Project

It is expected that infectious disease controls will be strengthened by the improvement of these regional public health laboratories to contribute to the target and neighboring states of the Project. The Project will contribute to the early detection of infectious disease outbreaks and the prevention of its spread in Nigeria by providing equipment and facilities to the eight laboratories supervised by NCDC.

NCDC plays a major role in the research/diagnosis of infectious disease controls and performs laboratory tests and diagnoses of the pathogens of the eight prioritized diseases (Viral hemorrhagic fever, Yellow fever, Cholera, Meningitis, Measles, Influenza, AMR, Monkeypox) among the 41 diseases in the Integrated Disease Surveillance and Response (IDSR) designated by WHO. The six major laboratories including NRL and CPHL, two standard virus laboratories and 38 laboratories under the laboratory network (as of February 2019) have established a surveillance system of infectious diseases. As for influenza, the sentinel surveillance system has been established with four supporting institutions and tests are regularlry conducted in the laboratories. The goals of NCDC are to provide a diagnosis of these eight infectious diseases in all the network laboratories and strengthen surveillance and response capabilities. By improving NCDC's functions by such actions as the construction of BSL-2 laboratories, the Project is expected to further enhance the capacity to tackle infectious diseases and contribute to the early detection of infectious disease outbreaks and the prevention of their escalation.

(2) Consistency with Nigeria's Health Policy

Nigeria prioritizes infectious disease controls and makes efforts to improve laboratory functions as described in the "National Vision 20:2020", the "National Action Plan on Health Security 2018-2022", the "Nigeria Medical Laboratory Services Policy" and the "Nigeria Medical Laboratory Strategic Plan 2015-2019". NCDC is responsible for surveillance, prevention and emergency response of infectious diseases. In particular, the improvement of network laboratories is expected to enhance the capacities of surveillance and laboratory testing. The Project is defined as the embodiment of these priority issues.

(3) Consistency with Japan's Aid Policy

The implementation of the Project will have great significance in contributing to Universal Health Coverarge (UHC) in Africa, particularly because Nigeria is one of the target countries of JICA's program for Partnership for Building Resilience against Public Health Emergencies through Advanced Research and Education (PREPARE).

The Project is considered to be consistent with the "Country Development Cooperation Policy for Nigeria" issued in September 2017 , which sets "improvement inclusive and robust establishment of health and medical system" as one of the important fields of the basic policy for Japanese ODA, and with the "Basic Policy for Peace and Health", "G7 Ise-Shima Leader's Declaration" etc. in which Japan has manifested supports for the strengthening of countermeasures to infectious diseases leading to international threats. With the cooperation policy to especially support the improvement of local health services and strengthen laboratories and the NCDC, the Project is expected to enhance the capacity to deal with infectious diseases through the development of health infrastructure. Moreover, it will also contribute to the "improvement of preparedness for public health emergencies", a pillar for promotion of UHC stated in a pledge made in TICAD VI.

It is also greatly significant in terms of contribution to Goal 3 of the Sustainable Development Goals (SDGs), enhanced international support of the capacity to deal with infectious diseases after the 2014-

2016 Ebola outbreak in West Africa and strengthening of the performance of WHO International Health Regulations (IHR) through the improvement of laboratory/diagnosis techniques and enhancement of the research capability.

4-2. Effectiveness

The output expected by carrying out the Project and outcome expected by carrying out the whole project plan are described as follows. Quantitative and qualitative indicators are suggested assuming that the standard year of indicators is 2019 and target year is 2025, three years after 2022 when the construction of the building facility and procurement of equipment are expected to be completed.

(1) Quantitative Effects

The number of network laboratories (out of eight) that diagnose the major six pathogens is suggested as the quantitative indicator, and standard and target values are set as shown in Table-5.

Table-5 Indicator of quantitative effects (output by carrying out the Project)

Indicator Name	Indicator Value		Target Value (FY2025)
	Disease	Standard Value (2019)	[Three years after the project is completed]*3
The number of the registered laboratories(*1) out of eight laboratories of the Project that enable to conduct the determined diagnosis(*2) of pathogens classified as the prioritized infectious diseases	(a) Antimicrobial Resistance	3 (NHA, UITH, UCH)	5 (NHA, UITH, UCH, UNTH, CPHL)
	(b) Yellow Fever	0	4 (Serological test: CPHL, UNTH) (PCR: CPHL, ISTH, LUTH)
	(c) Cholera	1 (CPHL)	4 (CPHL, UHI, UNTH, UITH)
	(d) Meningitis	1 (CPHL)	2 (CPHL,UITH)
	(e) Influenza	0	1 (CPHL)
	(f) Lassa fever	2 (LUTH, ISTH)	5 (LUTH, ISTH, CPHL, Two other laboratories (to be selected))

*1: Registered laboratory is the laboratory that NCDC and/or FMoH deem capable to conduct the determined diagnosis for the prioritized infectious diseases.

*2: Determined diagnosis is to examine in compliance with IDSR and judge whether infected or not. Accuracy and fastness of the determined diagnosis enable an initial response to be taken at the earlier stage of outbreaks.

*3: The Project will not enable eight laboratories to attend the examination for all prioritized infectious diseases since the necessary equipment and examination differed in accordance with pathogens of virus, bacteria.

(2) Qualitative Effects

1) Improvement of importance of eight network laboratories as a regional public health laboratory in each state by improving quality and effectiveness of tests and diagnosis

The Project is expected to improve the environment of BSL-2 facility systems in the monitoring of interior/exterior access, air conditioning/ventilation, water supply and drainage sanitation, infectious wastewater treatment. Furthermore, the Project upgrades the zoning and layout in the area of CPHL in terms of i) the intercommunications and enlacement of rooms, ii) the traffic line and workflow, iii) the distribution of equipment, and iv) the work space, which set the BSL-2 laboratories closely interfaced with its auxiliary rooms such as the preparation hall, the biobank, and also set the virology, bacteriology and parasitology laboratory including PCR rooms mechanically and physically isolated under the concept of biosafety and biosecurity. In the other seven network laboratories, equipment required for BSL-2-equivalent laboratories will be updated and added. Through these supports, it is expected that safe, efficient and accurate testing and diagnosis will be ensured and the eight network laboratories will take on more importance as a base for public health measures in each state.

2) Prevention of public health crisis in Nigeria by strengthening the infectious disease response and surveillance system

The Project is expected to contribute to the following outcomes by upgrading the facility and equipment suitable for the BSL-2 laboratories at the eight network laboratories: i) to strengthen the surveillance system and then ii) to increase the number of laboratory testing, iii) to enhance the specimen transport and the test quality assurance, iv) to enhance the infectious disease response in the target states (e.g., rapid containment of outbreaks), and v) to render the safety and security against infectious diseases to the population in the target and neighboring states.

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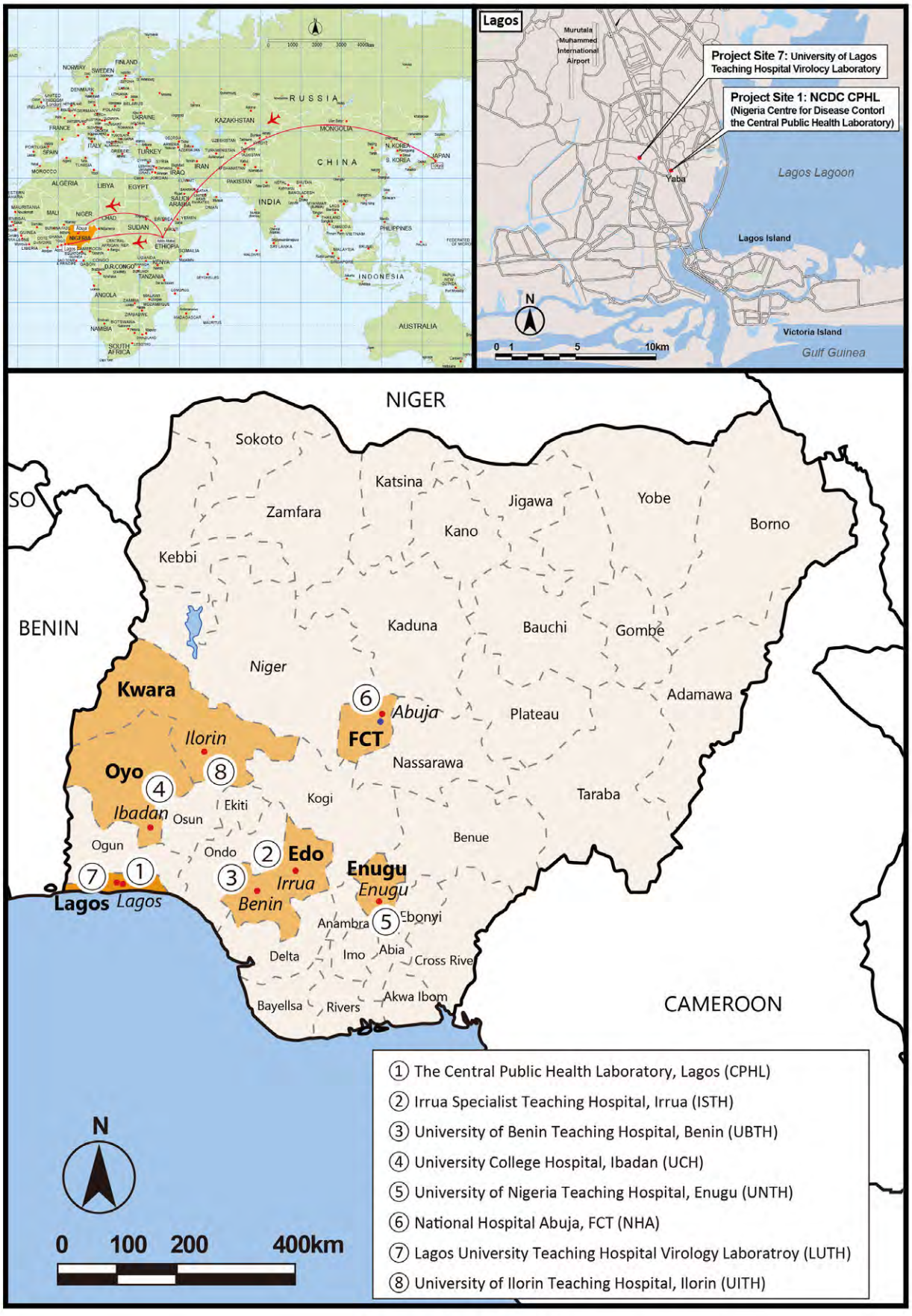

Location Map

PERSPECTIVE

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ABBREVIATIONS

Abbreviations	English or French
1F	First Floor
4WD	Four-wheel Drive
A/P	Authorization To Pay
A/C	Air Conditioning
ABS	Acrylonitrile Butadiene Styrene
AC	Alternating Current
ACDC	Africa Center For Disease Control And Prevention
AEFI	Adverse Events Following Immunization
AFENET	Africa Field Epidemiology Network
AIDS	Acquired Immunodeficiency Syndrome
AMR	Antimicrobial Resistance
APHL	Association of Public Health Laboratory
ARI	Acute Respiratory Infection
ASHRAE	American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc.
ASTM	American Society For Testing And Materials
AVR	Automatic Voltage Regulator
Aw	tropical wintertrocken
B/A	Banking Arrangement
BME	Bio Medical Engineer
BNITM	Bernhard Nocht Institute for Tropical Medicine, Germany
BS	British Standard
BSC	Bio-Safety Cabinet
BSL	Bio Safety Level
CAT6	Category 6 Cable
CCD	Charge-coupled Device Image Sensor
CCTV	Closed-circuit Television
CD4	Cd4 Antigen
CHAZVY	Centre for Human and Zoonotic Virology
CHEW	Community Health Extension Worker
CHO	Community Health Officer
CIP	Carriage and Insurance Paid To
CISS	Comprehensive Import Supervision Scheme
CIT	Corporate Income Tax
CLSI	Clinical And Laboratory Standards Institute
CMD	Chief Medical Director
CMOS	Complementary MOS
CO2	Carbon Dioxide
CPHL	Central Public Health Laboratory
CSM	Cerebral Spinal Meningitis
DAC	Development Assistance Committee
DG	Director General
DNA	Deoxyribonucleic Acid

Abbreviations	English or French
DSNO(s)	Disease Surveillance Notification Officer(s)
E/N	Exchange Of Notes
ECOWAS	Economic Community Of West African States
EKEDC	Eko Electricity Distribution Company
ELISA	Enzyme-Linked Immuno Sorbent Assay
EPI	Expanded Program on Immunization
EPS	Electrical Pipe Shaft
EUCAST	The European Committee on Antimicrobial Susceptibility Testing
ETLS	ECOWAS Trade Liberalization Scheme Duty
FCT	Federal Capital Territory
FETP	Field Epidemiology Training Programme
FHI360	Family Health International
FL	Floor Level
FMoE	Federa Ministry of Education
FMoH	Federal Ministry Of Health
FMPWH	Federal Mnistry of Power, Works and Housing
FOB	Free on Board
FRP	Fibre-reinforced Plastic
G/A	Grant Agreement
GDP	Gross Domestic Product
GF	Ground Floor
GHSA	Global Health Security Agenda
GL	Ground Level
GNI	Gross National Income
GPS	Global Positioning System
HEPA	High Efficiency Particle Air Filter
HIV	Human Immunodeficiency Virus
HP	Home Page
HR	Human Resource
IDSR	Integrated Disease Surveillance And Response
IgM	Immunoglobulin M
IHBN	
IHR	International Health Regulation
ILFRC	Institute of Lassa Fever Research Centre
IMF	International Monetary Fund
INRB	Institut National De Recherche Biomédicale
IP	Internet Protocol
IPP	Independent Power Plant
ISTH	Irrua Specialist Teaching Hospital
JASS	Japanese Architectural Standard Specification
JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standards
JPY	Japanese Yen
KEMRI	Kenya Medical Research Institute
KVA	Kilo Volt Ampere

Abbreviations	English or French
KWh	Kilowatt per Hour
LAN	Local Area Network
LED	Light-Emitting Diode
LGAs	Local Government Areas
LIMS	Laboratory Information Management System
LUTH	Lagos University Teaching Hospital
LWC	Lagos State Water Company
Mbps	Megabits Per Second
MEND	Movement for the Emancipation of the Niger Delta
MNS	Mental Neurological & Substance Abuse
MOPOL	Nigerian Mobile Police
MTN	（Mobile Operator)
N 値	N-Value
NAPHS	National Action Plan on Health Security
NBCN	National Building Code Of Nigeria
NCDC	Nigeria Centre For Disease Control
NDA	Niger Delta Avenger
NFELTP	Nigeria Field Epidemiology And Laboratory Training Program
NGN	Nigeria Naira
NGO	Non-Government Organization
NHA	National Hospital Abuja
NHMIS	National Health Management Information System
NIMR	Nigerian Institute of Medical Research
NMIMR	Noguchi Memorial Institute For Medical Research
NMLStP	Nigeria Medical Laboratory Strategic Plan
NPHCDA	National Primary Health Care Development Agency
NPO	Nonprofit Organization
NRL	National Reference Laboratory
OJT	On-the-Job Training
OPC	Odua People's Congress
PAO	Polyalphalefin
PCR	Polymerase Chain Reaction
pH	Potential Hydrogen
PHC	Primary Health Care
PHCs	Primary Health Centres
PhD	Doctor Of Philosophy
PHE	Public Health England
PIT	Personal Income Tax
PREPARE	Partnership For Building Resilience Against Public Health Emergencies Through Advanced Research And Education
PS	Pipe Shaft
RC	Reinforced Concrete
RCC	Regional Collaborating Center
RCDC	Regional Center For Surveillance And Disease Control
RDT	Rapid Diagnostic Test

Abbreviations	English or French
REDISSE	Regional Disease Surveillance Systems Enhancement
RRT	Rapid Response Team
RT-PCR	Reverse Transcription Polymerase Chain Reaction
SDGs	Sustainable Development Goals
SIM	Subscriber identity module
SLIPTA	Stepwise Laboratory Improvement Process Towards Accreditation
SLMTA	Strengthening Laboratory Management Toward Accreditation
SONCAP	Standard Organisation of Nigeria Conformity Assessment Programme
SOP	Standard Operating Procedures
SPD	Surge Protective Device
STIs	Sexually Transmitted Infection
TB	Tuberculosis
TICAD	Tokyo International Conference On African Development
TN-C	Earthing System
TRANEX	Trans-Nationwide Express Plc
UBTH	University of Benin Teaching Hospital
UCH	University College Hospital Ibadan
UHC	Universal Health Coverage
UITH	University of Ilorin Teaching Hospital
UNICEF	United Nations Children's Fund
UNTH	University of Nigeria Teaching Hospital Enugu
UNZA	University Of Zambia
UPS	Uninterruptible Power-Supply System
USAID	United States Agency for International Development
USCDC	Centers For Disease Control, USA
USD	United States Dollar
UV	Ultra Violet
VAT	Value Added Tax
VHF(s)	Viral Hemorrhagic Fever(s)
VP	Vinyl Chloride Enamel Paint
WAHO	West Africa Health Organization
WB	World Bank
WHO	World Health Organization

Chapter 1 Background of the Project

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1-1 Background and Overview of the Grant Aid

Nigeria has a significant risk of infectious diseases such as Lassa fever, which originated from the country. In fact, in recent years, there have been reported outbreaks of the Ebola Virus Diseases with 20 cases in 2014, outbreaks of the five infectious diseases (e.g., Lassa fever, CSM, Yellow fever, Cholera, and Monkey pox). Moreover, it becomes a critical threat in the global community as there are imported cases of Monkey pox reported from the UK in 2018, Singapore and Israel in 2019. Therefore, in 2011, the Government of Nigeria established the Nigeria Centre for Disease Control (NCDC) to strengthen infectious disease surveillance, prevention, and emergency response and established a network of public health laboratories led by the NCDC. However, a lack of sufficient laboratory equipment and infrastructure in those public health laboratories poses a rapid and accurate detection of infectious disease outbreaks. Hence, the Government of Nigeria requested the Government of Japan to provide grant aid which includes procurement and installation of a laboratory facility and laboratory equipment in order to further develop the network laboratories that serve as regional hubs and to strengthen their testing and diagnostic capacity.

Based on the request, the Japan International Cooperation Agency conducted a preparatory survey. A result of the survey confirmed that the Project will contribute to the early detection of infectious disease outbreaks and the prevention of the spread of infectious diseases in Nigeria by providing equipment and facilities to the eight laboratories under the NCDC laboratory network. The Project will address the prioritized issues in infectious disease controls in the policies mentioned above (e.g., improving infectious disease surveillance, prevention, and emergency response and providing laboratory equipment to strengthen epidemiological investigation capacity). Therefore, the Project is consistent with the Nigerian public health policies such as the National Action Plan on Health Security (NAPHS), National Health Policy 2016, the Nigeria Medical Laboratory Services Policy and the Nigeria Medical Laboratory Strategic Plan 2015-2019 according to the survey result.

1-2 Actual Conditions of the Project Site

1-2-1 Natural Conditions

(1) Temperature /humidity

Lagos has a savanna climate (Aw). The mean monthly temperature is approximately 27.0 ℃. The mean monthly minimum temperatures are 23.2 ℃ in January, and the maximum temperature is 35.5 ℃ in March. The annual relative average humidity is about 84%.

(2) Rainfall

In Lagos, the dry season begins in November and lasts until April and the rainy season starts in May and lasts until July with heavy rainfalls, from August to October with relatively light falls.

(3) Sunshine

The Project site is located at six degrees North Latitude where the sun elevation is high. The duration of daylight is about 250 to 280 hours/month in the dry season from October to March, and 150 hours/month in the rainy season from July to September. The duration of daylight is about 2,500 hours/year, which is larger than the world average (2,200 hours/year).

(4) Wind direction / wind speed

From the end of the dry season at the end of October to March, Harmattan, a dusty trade wind from the Sahara Desert blows and gives off fine dust (0.5-10 micrometres).

1-2-2 Field Surveys for Natural Conditions

The following five surveys were conducted to determine the scope and the scale of cooperation for the Project and develop an outline design plan, a construction plan and estimates of project costs. Purposes, methods and the summary results of the surveys and are described below.

(1) Topographic Survey

The proposed construction site for the new building is located on the south side of the existing CPHL building and adjacent to other facilities on all boundaries. The ground is flat with an elevation difference of less than 30cm and free from unnecessary obstructions. Although the elevation difference is not considered as an obstacle for the construction, the study team surveyed the foundations and other visible structural elements of the existing buildings within the site. The purpose of the topographic examination was to analyse the traffic paths and functional relationships between the existing and new facilities and plan plumbing, demolition of existing buildings including other structures, and temporary construction, and to confirm the appropriateness for the construction. The study team surveyed the entire site, the arrangement of facilities and structures, elevation differences, and the location and topography of the planned construction site. The measurements was taken using a new benchmark. The results showed no irregular conditions from the building and facility plan, and confirmed that it might not cause any alterations in developing the outline design and construction planning. The detailed results of the survey and the plan are shown in Appendix 7 (Topographic Survey: Topographical Plan).

(2) Geological condition/Stratum Survey

The purpose of a geotechnical and soil bearing survey was to perform structural analysis, including the analysis of the scale, structural system and construction method of the new building. A drilling survey was used at the proposed site. After drilling boreholes to a depth of 20m, a standard penetration test was performed to retrieve soil samples and measure the N-value and groundwater level, and a laboratory soil test was carried out. The survey results showed that the groundwater table is 2.4 to 3.0m below the ground surface. A load-bearing stratum of sandy clay with an N-value of 20 to 25 was located about 3m below the ground surface. Based on the N-value measurements and the geotechnical test results, the study

team suggests that spread footings should be used to provide sufficient bearing capacity to support the designed building load (two-story building load). The detailed results of the survey are shown in Appendix 7 (Geotechnical/Soil Survey: Borehole Logs).

(3) Survey on underground obstacles / buried objects

Some of the JICA grant aid projects completed in Africa experienced construction delays and cost overruns due to unexpected underground debris and installations. Therefore, the study team conducted an underground/buried object survey, planning to reflect the results of the survey in the scope of work to be performed by the Nigerian side and the construction schedule. The team manually drilled and visually inspected observation pits with a length of 2 m, a width of 3 m and a depth of 3 m) at the construction site within the premises of CPHL. The survey found no underground debris, obstacles, or installations. These observation pits were drilled carefully not to damage underground pipes and cables and later filled up to restore the site to its original condition.

(4) Survey on plumbing / water quality

The water quality and supply capacity of water sources were assessed to develop a building plan for the new CPHL facility and laboratory equipment plans for the network laboratories, and their appropriateness and feasibility were examined. The study team examined the existing drainage system and developed layout and equipment plans for the new CPHL facility based on the arrangement of drainage pipes and pits.

The results of the water source survey at the network laboratories showed that two of the eight laboratories were supplied with water from water supply systems, two from municipal waterworks and four from wells. Meanwhile, the results of the water quality testing by a public laboratory showed that these water sources were safe to use and meet the WHO standards. The detailed results of the survey are shown in Appendix 7 (Plumbing/Water Quality Survey: Water Quality Data).

(5) Power supply survey

The power systems (e.g. frequency of power outages and voltage fluctuations) and power supply facilities (e.g. power generation sources and supply capacities) of the network laboratories were examined and voltage fluctuations In the commercial power system that provides electricity to CPHL was measured.

The results of the survey showed that seven of the eight laboratories were supplied with electricity from commercial power systems and the other one (LUTH) generates power for its own use. One of the seven laboratories connected to commercial grid (ISTH) suffers from frequent power outages and has an independent power generator for hospital use. The detailed results of the survey are sown in Appendix 7 (Power Supply Survey).

1-3 Environmental and Social Considerations

The Project is classified as category C in the JICA Guidelines for Environmental and Social Considerations promulgated in April 2010. It is due to that the Project does not include the environmentally influential sectors, characteristics and susceptible regions listed in the guideline, and is considered to have minimal undesired effects on the environment and society. The Environmental review will be omitted after the category classification, while the required environment-related permit application shall be processed according to the country's environmental laws and regulations, and the environmental and social considerations system as an item to be borne by Nigeria.

The NCDC suggested that the procedure for the environmental and social considerations will not be required for the new BSL-2 laboratory of CPHL to be constructed in the Project because it will be built within the site where the current CPHL facilities situate. To support this suggestion, the NCDC submitted the NCDC/HQ/GCOR/V.1/228: "Waiver of Environmental Impact Assessment for Remodelling of NCDC Central Public Health Laboratory (CPHL) Lagos", dated on July 30 2019, to JICA Nigeria Office as evidence.

1-4 Safety Measures for the Study Team Members Dispatched to the Network Laboratories

1-4-1 Basic security information

(1) General summary of security information

Nigeria has relatively high personal security risks, such as violent crimes (e.g. kidnapping, murders, carjacking and robberies), a social disorder due to political disturbances, strikes, religious and ethnic conflicts, traffic accidents and terrorist attacks. These risks characterize the security situation of the country. In particular, Nigeria is the home country to many international and regional terrorist groups, such as the Islamic extremist group Boko Haram, the Movement for Emancipation of Niger Delta (MEND), the Niger Delta Avengers (NDA) and the Oodua People's Congress (OPC) (based on the categorization by the Public Security Intelligence Agency of Japan).

On the other hand, the planned project sites (the capital city of Abuja and the states of Lagos, Oyo, Kwara, Enugu and Edo) are safer than other areas of the country* though the security level varies from site to site. In these areas, personal safety will be guaranteed by taking the appropriate security measures, such as those specified in the JICA Safety Measures in Nigeria (revised on 24th May 2019).

* According to the Japanese Ministry of Foreign Affairs, the project sites are rated at a level 2 warning as of September 1, 2019, while other areas are rated at a level 2, 3, or 4 warning.

(2) Security risks in Edo, Enugu and Lagos States

The Edo, Enugu and Lagos States are considered to have higher security risks than the other Project sites, given their geographical location close to the Nigeria Delta region, home to the NDA, (their geographic proximity to hazards) and their high robbery and kidnapping rates.

1-4-2 Security and Safety situations at the network laboratories

(1) Irrua Specialist Teaching Hospital (ISTH) in Edo State

- Among the project sites, Edo state is geographically closest to the Delta region where NDA's home base is.
- It is recognized that the security situation of Edo state, especially Benin city is worst over the country, where the threat of violent crime by armed bandit and kidnapping party is clear and characterized Benin City, although a threat of terrorism is relatively low in comparison with the area where Bokoharam and NDA are active, such as Delta state and the north-east region of the country.
- In October 2017, Nigerian residents of Edo state did protest demonstrations in Abuja, calling for the improvement of the security situation in Edo state and resignation of Police Commissioner of Edo state.
- On 26th August 2019, the Chief Medical Director (CMD) of ISTH was kidnapped at Ramat Park in Benin City while he was heading for Benin Airport to Abuja on a business trip. In the incident, two of three body-guarding police officers were shot and killed. The CMD was freed on 4th September 2019.
- In general, in the site and facilities of ISTH, the first, second and third lines of defense are vulnerable, except for the third line of defense for the virus laboratory.
- It will take two hours or more to travel from the hotel in Benin City to the ISTH for installation of equipment. so time length on road is long. It may cause higher risk of traffic accidents and inclination to limit options to hedge patterning or routinizing of activities by changing commuting time, for shortening time length of activities at laboratory in case of late departure from the hotel and early departure from the laboratory. For instance, the following measures should be taken to avoid the patterning the more changing commuting time each day. The departure time from the hotel to the Project site should be set differently day to day.
- Considering the security situation of the area, we are in the circumstances that our attention should be paid to the trends of local illegal armed groups, etc.

(2) University of Benin Teaching Hospital (UBTH) in Edo State

- The security situations of UBTH is generally similar to that of the ISTH described in (1).
- It deems difficult for the contractors to secure an evacuation route from the microbiology laboratory of UBTH where the equipment is installed by the Project.
- The second and third lines of defense for the bacteria laboratory in UBTH are vulnerable. The security situation of Benin City suggests that attention should be paid to the movements of local illegal armed groups.

(3) University of College Hospital Ibadan (UCH) in Ibadan, Oyo State

- The UHC is located at the edge of an urban area of Ibadan city or outskirts of the city. The security situation on UHC needs to be paid attention to general crimes such as theft, robbery (Smash and Grab, etc.) especially during commuting, even if feasibility of terrorist attack is low in general.
- Regarding the site and facilities of UCH, although the first line of defense has been well established, the second and third lines of defense are vulnerable, which will make it easy for ill-intentioned people to approach Japanese project team members.

(4) University of Nigeria Teaching Hospital Enugu (UNTH) in Enugu State

- It is estimated that a risk of organized kidnapping is relatively high due to its geographical proximity to Delta region, where is hometown of the NDA.
- The security situation of the surrounding wilderness dotted with villages (with few violent crimes typical in urban areas) indicates that general crimes by local bad boys group are unlikely to occur in this area. On the other hand, the first line of defense is very fragile. In fact, it does not work at all.
- Due to the extensive property, vehicles are an important evacuation tool. However, they may not be very an appropriate tool when evacuation is actually required because the parking lot for rental cars is far from the laboratory area (approx. 300m away from the buildings).
- Attention should be paid to the movements of organized illegal armed groups.

(5) National Hospital Abuja (NHA) in the Federal Capital Territory of Abuja

- The NHA is located at the center of the city of Abuja, which is best guarded and considered to be relatively safe. After the frequent bomb attacks by terrorist against United Nations office, police HQ, and shopping mall in the centre of the city in 2011, the security posture of the city was strengthened. On April 2017, there was the incident that terrorist combatants was arrested for plotting the attack to US and UK embassy, however, because it is close to major terrorist targets, such as the US Embassy (approx. 1.5km away), other embassies, and United Nations facilities (approx. 350m away; attacked by terrorist bombers in the past), the NHA may be affected by explosions and the like when terrorists attack one of these facilities. Apart from terrorist attacks, the NHA is considered relatively safe.
- Preparation of a safe room in the laboratory facility will be easily obtained. In addition, it will be easy to establish multiple travelling routes between the accommodations and the Project site. For the risk of personal attack, it is considered as relatively low since there are many similar laboratories around the hospital and it makes it difficult for attackers to identify the locations of the Project team members. On the other hand, the laboratory can be accessed by many and unspecified persons, and therefore, project team members may fall victim to pickpocketing, theft, and other crimes.

(6) Lagos University of Teaching Hospital (LUTH) in Lagos

- At Lagos city, it occurs kidnapping for ransom money frequently and recent years UK citizen, Lebanese, Italian, Saudi Arabian UAE citizen and Chinese were kidnapped as far as being recognized officially.
- Regarding the site and facilities of LUTH, the lines of defense for the biological laboratory are vulnerable. It is essential to develop emergency measures in case that someone breaks through the first line of defense without being noticed.
- Because the BSL-2 viral and bacterial infection and biological laboratories are located in different buildings, it will be difficult to establish collaborative relationships when they operate separately.
- The lines of defense are strong enough to protect the hospital. However, in light of the security situation of Lagos and the behavioral patterns of Japanese people (who tend to follow the same routine all the time), it is considered necessary to take measures against kidnapping.

(7) University of Ilorin Teaching Hospital (UITH) in Kwara State

- The UITH is located in the suburbs of Ilorin (approximately 14 km away from the city center). As the university is surrounded by the deserted rural area, concerning general crimes by local gang group, it is safer in comparison with that of inner city.
- Safety depends on the security situation of the surrounding area, meaning the site in itself is vulnerable.
- The lines of defense of UITH are vulnerable. At present, imminent and significant threat is not identified, but security situation of the site is fallings. Organized group, for instance terrorists group consists of three or four members s can penetrate to site perimeter, get to the car parking area next to the laboratory, intrude the laboratory and complete killing person inside the laboratory in short time if terrorists have a will to attack and intelligence on site and activities of Japanese, judging from its easiness to access from main gate to laboratory area, its proximity from parking area to laboratory, etc.

(8) Central Public Health Laboratory (CPHL) in Lagos

- It is generally similar to the security situation as the LUTH described in (6).
- Regarding the significance of CPHL in itself, it mainly focuses on public health laboratory testing and hospital clinical laboratory testing and is expected to play the central role in this Project.
- CPHL is located close to a Christian church, a busy shopping complex, and a bus terminal.
- If someone breaks through the first line of defense to attack or kidnap people working at the facility during the daytime, it will be difficult to take countermeasures because the second and third lines of defense are vulnerable.

- The existing security system is vulnerable, especially at night. Although Japanese project team members are supposed to work during the daytime, the risk of theft of construction materials and other goods cannot be ignored.
- Project team members are relatively likely to fall victim to smash and grab robbery if they stop their car on a street busy with vehicles and pedestrians while commuting to CPHL.

Chapter 2 Contents of the Project

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

2-1-1 Objectives of the Project

In spite of its largest economic scale in Africa, Nigeria has suffered from a high risk of infectious disease outbreaks such as an outbreak of Ebola Virus Disease in 2014, Yellow fever in 2017 and Lassa fever in every year, which the first case occurred in the country.

The Nigeria Centre for Disease Control (NCDC) was established in 2011 in purpose to improve the capabilities on surveillance, prevention, emergency control as well as diagnosis and research of infectious diseases, and to undertake critical roles as a reference laboratory of the 38 NCDC network laboratories (as of February 2019) in Nigeria. It is essential in the vast extent of Nigeria that the network laboratories expected to be the regional centres are enhanced to play an important role in providing the rapid and accurate diagnosis necessary for the public health laboratories network. However, a lack of sufficient equipment and adequate laboratory facility causes a delay in the detection of infectious diseases, outbreaks. In fact, the detection of outbreaks of Ebola Fever Virus Disease was not conducted in a timely manner in 2014.

Under these circumstances, the Government of Nigeria has prioritised the investment in the improvement of the health sector in the National Development Plan "Economic Recovery and Growth Plan 2017-2020", and highlighted prevention and control of infectious diseases as one of key issues in "National Health Policy 2016". Furthermore, the Nigerian government has considered the improvement of network laboratories as well as the strengthening supply system of consumable as key tasks in "National Action Plan on Health Security 2018-2022" established in 2018 to address the laboratory capacity enhancement according to "Nigeria Medical Laboratory Services Policy".

"The Project for Strengthening the Capacity of Network Laboratories of the Nigeria Centre for Disease Control (hereinafter referred as the Project)" aims at strengthening the preparedness and control of infectious diseases in the country by the enhancement of the laboratory facility and equipment, and the capacity building of human resource. The objective of the Project is to detect outbreaks quickly and contain the spread of infectious diseases by constructing and procuring the necessary facility and equipment to the eight NCDC network laboratories, which the NCDC leads as a top public health referral centre. Therefore, the Project is considered as one of the prioritized projects in Nigeria under the national action plan and polices mentioned above. The JICA also intends strengthening the laboratory network both within and outside of Nigeria by establishing Biosafety Level (BSL)-3 laboratories through "the Project for Strengthening the Diagnostic Capacity of the NCDC". In addition, Nigeria has been appointed as the Regional Surveillance Centre Disease Control of the Economic Community of West Africa States (ECOWAS). Therefore, JICA provides the Technical Assistance for enhancing the diagnostic and the research capacities of the NCDC in the prevention and control of infectious diseases as a model institute in the sub-region.

2-1-2 Basic Concept of the Project

The Project is to improve the facility infrastructure and equipment to the eight network laboratories of 38 network laboratories. The Project includes 1) a construction of a new building and facility for CPHL with BSL-2 laboratories in the compound of the FMoH in Yaba, Lagos State, 2) equipment procurement for the eight network laboratories, and 3) the technical assistance in the start-up, operation and maintenance called "Soft Component Program" as shown in Table 2-1.

As the executing agency, FMoH and NCDC ensure conducting the operation and maintenance of the new building and equipment, which will enhance the infectious disease controls both in Nigeria and in West Africa. In addition, both executing agencies, FMoH and NCDC are to take initiatives in planning the laboratory diagnosis, training programme, and the adequate allocation of human resource, and the estimated necessary budget for those activities and the human resource is to secure.

The Project will provide the Soft Component Program to strengthen the capacity for operation and maintenance of new building and equipment. The JICA will also implement a technical cooperation project, "Project for Strengthening Detection of and Response to Public Health Threats in Nigeria", in 2019 for improvement of the NCDC's managerial capacity of the biosafety & biosecurity of the network laboratories.

Table 2-1 Cooperating components

Component	Contents
I. The new building and facility of CPHL (1) Public Health Laboratory (Basement, 2 Stories)	< Infection Control Area > 1) Laboratory Area: Bacteriology laboratory for Culture & DNA extraction*, Bacteriology laboratory for DNA amplification*, Master Mix Room of Bacteriology, Media Room of Bacteriology, Virology laboratory for DNA extraction*, Virology laboratory for DNA amplification*, Master Mix Room of Virus, Parasitology laboratory, Preparation Hall-2, Bio Bank for Bacteriology, Bio Bank for Virology *Each room has two anterooms. 2) Service Area: Sample Reception, Sample Room, Service Corridor, Preparation Hall-1, Reagent Room, Corridor, Washing Room, Hazardous Water Storage, Storage, Pipe Shaft (PS), Electrical Pipe Shaft (EPS) 3) Others: Training laboratory including 2-Anterooms, storage & preparation Hall < General Management Area > 4) Administrative Area: Entrance Hall, Office, Monitoring Room, Staff Room-1, Male & Female toilet, Corridor, Staircase Lecture Room, Director Room, Assistant Director Room, Conference Room-1, Conference Room-2, Male & Female toilet, Corridor, Staircase, Storage

Component	Contents
(2) Utility facility	・Air conditioning ventilation system (General air conditioning facility, BSL-2 laboratory air conditioning facility) ・Electrical facility (Transformer, Main feeder system, Emergency power supply system, Lightning/ Receptacle outlet system, Lighting protection) ・Communication facility (Telephone, LAN) ・Alarm facility (Access control, CCTV, Intercom, Fire alarm) ・Plumbing facility (Water supply, Sanitation, Drainage (Domestic waste water treatment, Infectious wastewater treatment) ・Incinerator facility ・Fire extinguisher facility (Fire hydrant, Fire extinguisher)
(3) Supplementary facility	Parking lot, Road in site & Parking pavement, Sidewalk, Septic tank, Incinerator, Waste pit, Oil tank space, Electrical transformer space, Guardhouse
Total 3,006m^2	
II. Equipment procurement Laboratory Equipment for CPHL	Vertical autoclave, biosafety cabinet, centrifuges with high and low speed types, and small size type, CO_2 incubator, -30℃ and -80℃ freezers, dry thermo unit, incubator, laboratory refrigerator, magnetic stirrer, binocular microscope fluoroscopy, microwave oven, pH meter, platform scale, precision electronic balance, spectrophotometer, vortex mixer, water bath, work bench, ELISA set (microplate reader & washer), hot plate, domestic refrigerator, electrophoresis, gel imager, PCR workstation, Real-time PCR, thermal cycler, UV trans illuminator, dry oven, water distiller, etc.
Laboratory Equipment for other 7 target Network Laboratories	vertical autoclave, biosafety cabinet, blood culture, centrifuges with high and low speed types, and small size, -30℃ and -80℃ freezers dry thermo unit, incubator, laboratory refrigerator, binocular microscope, fluoroscopy, inverted microscope, microwave oven, pH meter, platform scale, precision electronic balance, spectrophotometer, vortex mixer, water bath, work bench, ELISA set (microplate reader, washer), domestic refrigerator, PCR workstation, Real-time PCR, dry oven, water distiller, etc.
III. Soft component	Training in the operation & maintenance of ; • Air conditioning ventilation system in BSL-2 laboratory • Infectious laboratory waste materials and wastewater treatment (heat sterilization wastewater treatment system and waste incineration system) • Specified laboratory equipment (e.g., biosafety cabinet, incubator, etc.)

Sources: JICA Study Team

2-2 Outline Design of the Project

2-2-1 Design Policy

2-2-1-1 Study of the Requested Contents

The Project aims to contribute to the early detection and prevention of outbreak of infectious diseases in Nigeria, as well as to strengthening the control of infectious diseases and surveillance capacity through improvement of facilities and equipment for the eight network laboratories led by NCDC. Table 2-2 shows a request from the Nigerian side.

Table 2-2 Contents of request

	Contents of request in the preliminary hearing survey
I. Building construction	Construction of a new building and facility for public health including BSL-2 laboratories for CPHL in Lagos
II. Equipment procurement	CPHL: provision of necessary laboratory equipment for BSL-2 laboratories Other seven network laboratories: laboratory equipment (biosafety cabinet, dry oven, CO_2 incubator, -30℃ and -80℃ freezer, centrifuge, DNA sequencer, etc.
III. Soft Component Program	Training in operation & maintenance of BSL-2 facility and equipment.

Based on the results of the field survey conducted in January 2019, the contents of request regarding the new building and facility for CPHL have been confirmed as below. The details are described in Attachment 7 (List of rooms planned) and Appendix-2 Technical Notes (T/N).

- The new BSL-2 laboratories consist of laboratories for Virology, Bacteriology, Parasitology and Molecular biology.
- Training laboratories, lecture room, biobanks and monitoring room are also considered to include into the layout plan adjacent to laboratories.
- The incineration system for infectious waste, the water treatment system for infectious wastewater and the Emergency power generator (diesel) are considered for the new BSL-2 laboratory.

Regarding the equipment, the following equipment for the eight network laboratories has also been confirmed during the field survey in January 2019.

Table 2-3 Requested equipment list for the eight Network Laboratories

Equipment	Equipment for CPHL and other seven NCDC Network laboratories: vertical autoclave, biosafety cabinet, blood culture, centrifuges with high and low speed types, and small size, CO_2 incubator, -30℃ and -80℃ freezer, dry thermo unit, incubator, laboratory refrigerator, magnetic stirrer, (binocular microscope, fluoroscopy, inverted microscope, microwave oven, pH meter, platform scale, precision electronic balance, spectrophotometer, vortex mixer, water bath, work bench, ELISA set, hot plate, domestic refrigerator, electrophoresis, gel imager, PCR workstation, Real-time PCR (qPCR), thermal cycler, UV trans illuminator, dry oven, water distiller

The Japanese and Nigerian sides agreed that the required equipment would be evaluated based on the criteria for the selection to prepare the equipment plan.

2-2-1-2 Basic Policy of Building, Facility and Equipment Plan

(1) Basic Policy of Building and Facility Plan

1) Layout and Traffic Lines

- Four main areas of the new CPHL facility will be laid out at the construction area of approximate 4,700 m^2, which locates inside the compound of the FMoH, taking into account the connectivity with the existing CPHL facility.

- Septic tanks will be laid out on the east boundary of the compound to conduct the soak and absorption of the treated sewage as well as the treated infectious medical wastes.
- The traffic line for the pedestrians and vehicles to approach the new CPHL facility will be led via the existing entrance gate and access road of the compound, having the new control gate as well as the parking lots adjacent to the new CPHL facility.

2) Main Structure/Capacity

- The structure of the new CPHL facility will be designed with the reinforced concrete framing (column and girder) for the partial 2-story and basement floor, which has a structural module of 6.5m x 6.5m and 9.0m x 8.0m. The spread foundation system is applied. 3-floor levels including the basement will be considered for the BSL-2 management area to locate machine rooms both for the infectious medical waste treatment system at the basement and for the air-conditioning and ventilation system specified for requirements of the biosafety at the second floor.
- The scale and floor area of the new CPHL facility is determined based on the designed number of staffing capable for the proper practices and operation, the utilisation plan of facilities and deployment plan of the staff provided by NCDC/CPHL. An appropriate working area will be designed in accordance with the particulars of each specific laboratories and rooms.

3) Rooms/ Zoning /Floor Planning

- The zoning will be strictly planned for preventing the infection or the contamination inside the facility by establishing the general management area and the infection control areas such as, the BSL-2 management area. The air-conditioning and ventilation system, sewage and infectious medical waste treatment system will be physically and completely isolated in accordance with the zoning above-determined.
- "Shower-out" concept will be applied for the man-traffic line in the BSL-2 management area. Infectious solid waste will be biologically decontaminated by a high-pressure steam sterilization of autoclaves inside BSL-2 laboratories before taking the waste out of the management area for the disposal.
- The BSL-2 laboratory will be constructed at the ground floor and will be comprised of the eight main rooms such as i) four individual rooms of the bacteriology laboratory, ii) three rooms of the virology laboratory and iii) a room of the parasitology laboratory. Both laboratories of the bacteriology and the virology will have a PCR room for DNA extraction, amplification as well as master-mix of reagents. The training laboratories will locate on the first floor.

4) Utilities

- The control measures against environmental pollution of neighbouring facilities will be taken into consideration in designing the air-conditioning and ventilation system, sewage and an infectious

medical waste system specified for the BSL-2 laboratory. The systems will be physically and completely isolated and assured for the containment of the biological contaminations.

- The access control system for the BSL-2 laboratories, the monitoring and surveillance system will be strictly considered for the new building in terms of the biosecurity and the prevention of disaster.

5) Soft Component

- The training program called "Soft-Component Program" is planned to strengthen the capacity of NCDC/CPHL and other network laboratories in operation and maintenance of systems for the air-conditioning and ventilation, infectious medical waste and waste disposals, as well as for major diagnostic equipment for the BSL-2 laboratories.

(2) Basic Policy of Equipment Plan

- Laboratory selection criteria for the procurement of laboratory equipment are as follows:
  - There is enough space and rooms where equipment to be installed.
  - The laboratory is capable for the operation at a level equivalent to the BSL-2.
  - Electric capacity, plumbing and ventilation are in good condition (or to be improved in the future).
- Selection criteria for laboratory equipment for the seven network laboratories are as follows:
  - There is increased needs in updating equipment due to deterioration.
  - There are personnel to utilize the equipment.
  - Operation and maintenance are feasible in terms of budget.
  - In case the equipment is not currently used, it has been confirmed that NCDC will conduct operation training.
- Selection criteria for equipment for CPHL are as follows:
  - Equipment should accord with the design of the rooms required for the facilities.
  - Equipment is necessary to achieve the aiming role of CPHL
  - NCDC can assure sufficient human resources to be allocated appropriately and ensure operation and maintenance for the equipment.
- Selection criteria for equipment for all the laboratories are as follows:
  - Automatic Voltage Regulator (AVR) should be attached to the equipment connected to a power supply circuit without AVR so that equipment can be protected from operational issues caused by voltage fluctuations.
  - As a basic rule, the frequent power loss will be responded to with generators to be installed in the facilities. UPS will be attached to the devices that may have operational issues even from short-lasting power loss.

- Because water quality (currently under analysis) may be poor (foul hard water), a pre-filter and a water softener should be attached to distillers.
- Concerning equipment procurement, NCDC will procure consumables and replacement parts after the equipment is installed.
- Other consumables include many reagents as well as articles that the facilities have rarely procured. Therefore, consumables will be delivered together with equipment in the quantity that will last for six months to ease procurement work.
- Maintenance will be performed by the Biomedical Engineers (BME) deployed in each facility and through a maintenance agreement with an agent when necessary.

2-2-1-3 Basic Policy for Setting Scale and Floor Area of the Facility

(1) Design Policy for CPHL's Function of Diagnostics

The scale and components of the new CPHL facility will be determined in order to obtain the safe, prompt and accurate practices and operation in term of the biosafety in conducting separation of bacteria, viruses from samples, culturing, gene extraction, etc. Future plans to anticipate the enhancement of management of high-risk pathogen such as Lassa fever will also be considered into the building and facility plan.

It is necessary that the concrete plans of the diagnosis and research of NCDC will be discussed yet with the donors (e.g., World Bank, USCDC and WHO) in order for NCDC to determine the target pathogens, the content and number of research programs, content of diagnosis and examination, number of samples etc. Based on the current situation, the building and facility plan will be developed for treating eight prioritized diseases such as viral haemorrhagic fever, yellow fever, cholera, meningitis, measles, influenza, antimicrobial resistance (AMR) and monkeypox out of 41 target diseases of Integrated Disease Surveillance and Response (IDSR) and will determine the required scale, components and floor area.

The laboratory is planned to meet international standards for the prevention of infection, diagnostic and research, with referring the WHO Biosecurity Guidance of Laboratory Facility (2006), the Safety Management Regulations (Revised 3rd edition) of National Institute of Infectious Diseases Japan.

(2) Parking

Four parking lots will be considered for visitors, director and deputy director.

(3) Necessary rooms and Number of planned personnel

Based on the information provided by NCDC of the staff deployment and use of the new CPHL facility, necessary rooms and numbers of planned personnel will be considered as indicated in Table 2-4.

Table 2-4 Necessary rooms and number of planned personnel

Public Health Laboratory	Room name	Number of staff [person]	Capacity of rooms [person]
① Laboratory Area:	Bacteriology laboratory (Culture & DNA extraction)	2-3	―
	Bacteriology laboratory (DNA amplification)	2-3	―
	Virology laboratory (DNA extraction)	2-3	―
	Virology laboratory (DNA amplification)	2-3	―
	Parasitology laboratory	2-3	―
	Training laboratory	―	15-20
② Service Area	Washing room	2-3	―
	Sample Reception	―	―
③ Administrative Area	Office, Monitoring room	2-3	―
	Staff room	―	10

2-2-1-4 Basic Policy for Natural Conditions

(1) Temperature /humidity

Lagos has a savannah climate (Aw). The mean monthly temperature is approximately 27.0 ℃. The mean monthly minimum temperatures are 23.2 ℃ in January, and the maximum temperature is 35.5 ℃ in March. The annual relative average humidity is about 84%.

Basically, the cooling system will be considered for the air conditioning system for the rooms located in BSL-2 and the general management area, while the heating system will not be needed.

Table 2-5 Temperature data in Lagos (2018)

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Avrg. Temperature (f)	27.7	28.5	30.2	28.8	27.9	27.0	26.0	25.7	26.0	27.0	28.2	28.6
Avrg. low temperature (°C)	23.2	24.8	26.7	25.3	24.6	24.0	23.7	23.3	23.5	23.7	24.5	24.1
Avrg. high temperature (°C)	33.9	33.6	35.5	32.8	31.9	30.8	29.2	29.1	29.3	31.6	32.5	34.9

Source: OGIMET

(2) Rainfall

In Lagos, the dry season starts in November and lasts until April and the rainy season starts in May and lasts until July with heavy rainfalls, from August to October with relatively light falls. Because there is a large difference in rainfall during the rainy season and the dry season, it is essential for the design to consider changes in groundwater level, the rainfall intensity on the roof surface, preventing rainwater inflow into the building and the septic tanks, soak and absorption of rainwater, the basement planning and the like.

Table 2-6 Rainfall data in Lagos (2018)

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Rainfall (mm)	0	52	0	28	158	116	88	85.7	116	130	101	11
Rainy day (day)	0	5	0	3	5	7	6	8	9	8	3	1

Source: OGIMET

The rubber-modified asphalt material is considered for the waterproofing membrane at the flat roofing of the new CPHL facility.

(3) Sunshine

The project site is located at six degrees North Latitude where the sun elevation is high. The monthly duration of daylight is about 250 to 280 hours/month in the dry season from October to March, and 150 hours/month in the rainy season from July to September. T, the annual duration of daylight is about 2,500 hours/year, which is larger than the world average (2,200 hours/year). It is essential for the design to consider the solar radiation shielding and heat countermeasures by using the heat-absorbing glass for the perimeter windows.

(4) Wind direction / wind speed

From the end of the dry season at the end of October to March, a trade wind containing dried sand from the desert, which so-called Harmattan, blows and gives off fine dust (0.5-10 micrometres). It is essential for the design to consider rainwater inflow into the building and the openings and influences to air supply and exhaust for the laboratory (including exhaust after filter treatment). The wind-resistant design will be conducted based on the wind pressure referred to the Japanese standards and the local meteorological data in Lagos.

(5) Earthquakes

Although there are few earthquake records in Nigeria, the standard story shear coefficient, which is the design value showing the vibration behaviours of the structure frame and the seismic performance, will be applied for the design with 50% of the value (C 0 = 0.1) regulated in the Building Standards Act of Japan by considering the safety of the new building.

2-2-1-5 Basic Policy for Social Conditions

It is essential for the design to consider workers' work efficiency decreases during Ramadan period (about 5/5 to 6/4 of 2019, about 4/23 to 5/3 of 2020) as the inoperable day.

The price variation coefficient has been set to 1.199 by the following calculation formula applying the monthly variation of price index to consider the price escalation assumed from the start date of the cost estimation (February 2019) to the planned date of the bidding (August 2020).

- Variation coefficient：
  13.489%÷12×10 (2019) ＋ 12.983%÷12×8 (2020) ＝ 19.903% → 1.199

2-2-1-6 Basic Policies for Situation of Construction Works and Equipment Procurement, and Authorizations, etc.

Regarding construction circumstances, more than middle-story buildings and construction sites under construction were confirmed, and several local contractors with a certain level of construction skills were confirmed during the survey in Lagos. However, their skills are not considered high enough for the construction work in the Project, which requires higher technical accuracy. Therefore, in the Project, the implementation of quality control will be considered under the technical guidance of the Japanese contractor.

Regarding the circumstances of procurement of equipment, in Nigeria, the existence of several agencies for biomedical laboratory equipment have been confirmed. European, American and Japanese manufacturers are also included, who employ technicians and provide not only selling but also services for installing, operating guidance and maintenance. As for Japanese manufacturers, seven companies have been confirmed for a biomedical laboratory equipment agency. It is essential in the procurement of planned equipment to consider utilizing these agencies to secure suitable and easier maintenance and management.

Nigeria has applied the Nigeria Building Standards Law and relevant laws and regulations based on the British Standard (BS) for the building and facility design. The building permission system has also been developed, and regulatory compliance systems are being established through checking of the design content by the supervising agency, inspection during construction/inspection after construction.

Evaluation procedures are also carried out in accordance with these laws and standards in the building permit application process of the new CPHL facility. It is considered for the design not only based on Japan's Building Standards Law, Japan Architectural Institute Building Structural Standards, but also referred and adapted to Nigerian standards. It is also referred to the biosafety guidelines edited by WHO as well as US Centers for Disease Control and Prevention (USCDC) for laboratory facilities.

2-2-1-7 Basic Policies for CPHL's Capacity of Operation and Maintenance

It is essential to design the new CPHL facility with optimum contents and specification/quality of the building facilities and equipment, considering the improvement of diagnosis functions necessary for NCDC, and fit to the management and use plan of the new CPHL facility as well as the operation and maintenance capability.

- In addition to analysing information and data on budget planning, organization planning and staffing allocation provided by NCDC, the scale (floor area calculation) of necessary rooms is set based on the appropriate number of personnel expected for BSL-2 laboratories in particular.
- It is also essential for the design to consider that the electrical and mechanical installation of the new CPHL facility shall satisfy necessary functions and minimize operation and maintenance.

- The NCDC has two personnel of engineers in maintenance, and is planning to increase the number of engineers, and organizes workshops. However, NCDC's expertise is limited in this field. Therefore the Soft Component Program will support the NCDC in improving operation and maintenance skills of the facilities with BSL-2 laboratories and equipment.
- For the other seven network laboratories, BMEs who belong to those hospitals are in charge of the maintenance of the equipment. The Soft Component Program described above will also support the seven laboratories in improving skills of BMEs.

2-2-1-8 Basic Policy for Grading of Building, Facility and Equipment

Considering the priority of the operation and maintenance, the building and facility shall be constructed with the materials and equipment that does not deteriorate over the years. With some exception for some special laboratories, facility of low cost, robust and simple building should be considered. However, necessary specification and quality shall be adequately considered to maintain a regional and international evaluation of NCDC/CPHL.

The laboratory will be designed in line with the biosafety guidelines established by WHO and USCDC and meet the international standard with infection prevention measures and diagnosis/research environments. Additionally, the plan will be considered for international laboratory certificate submitted by NCDC in future. Furthermore, add consideration to facility contents in anticipation of future enhancement of management with high-risk pathogen such as Lassa fever.

For the procurement of laboratory equipment, it is essential to select the equipment of necessary level for the bacteriology and virology of the BSL-2 laboratory. Although considering the selection of basic equipment, high-grade equipment is also subject to be selected as necessary, and specifications shall be conforming to this technical level.

2-2-1-9 Basic Policies of Construction Methods / Procurement Procedures, and Construction Period

(1) Implementation Period

1) Construction of Building and Facility

The rainy season in Nigeria is from May to October. As for the construction schedule of the Project, it is assumed that earth work and foundation work will be carried out during the rainy season. It is essential to consider the necessary construction period in advance and reflect it in the construction plan. Furthermore, it is also essential to reflect sufficient days into the construction schedule by considering i) particular traffic and security conditions in Lagos and ii) the trial operation, adjustment and tests related to the air conditioning and ventilation system in the BSL-2 laboratory, as well as iii) the comprehensive trial operation covering the BSL-2 management areas after the installation of the equipment.

2) Procurement of Equipment

Bidding:

Equipment will be procured in bidding for a single lot. Bidding for a single lot will be more appropriate than several lots because of the effectiveness in cost and labour. Moreover, a contracting with a single contractor will make it easier for the Project to operate in terms of the safety measures.

Installation:

Installation will take place in two terms. In the first term, the following equipment will be installed: i) items for CPHL that do not need adjustment for the facility or other equipment, analytical instruments, and ii) equipment for the seven network laboratories. In the second term, the remaining items for CPHL will be will be installed in new CPHL laboratory rooms. In the first term, the equipment will be installed in the existing CPHL laboratory rooms, and delivery will be completed after installation, trial operation and initial training. These items will be used for technical cooperation project which may commence from 2019, as well as CPHL's activities before the completion of the new laboratory building. When the construction of the new CPHL facility is completed, CPHL will relocate the equipment installed in the first term. Equipment for network laboratories will be delivered after the contractors install equipment, perform test operation and provide initial training in each region. The installation should be conducted safely so that appropriate safety measures will be taken in installation work.

(2) Construction Planning

Construction works will be conducted inside the compound of the FMoH/CPHL. The area of the existing buildings is fenced and furnished with the temporary entrance/passage to secure the safety of facilities users and visitors since its existing buildings will be used during the construction period. The works will begin with earthworks and then continue thereafter foundation works, concrete works on the basement floor, concrete works on upper floors, mechanical & electrical installation and exterior works. The trial operation, testing and adjustments of building and facility, systems is conducted prior to completing the inspection to end construction works and hand over the new CPHL facility.

The temporary construction area (e.g., temporary office, construction vehicle parking lot, material yard, etc.) during the construction period is indicated in Figure 2-1, which has been confirmed and agreed with NCDC/CPHL during the preparatory survey.

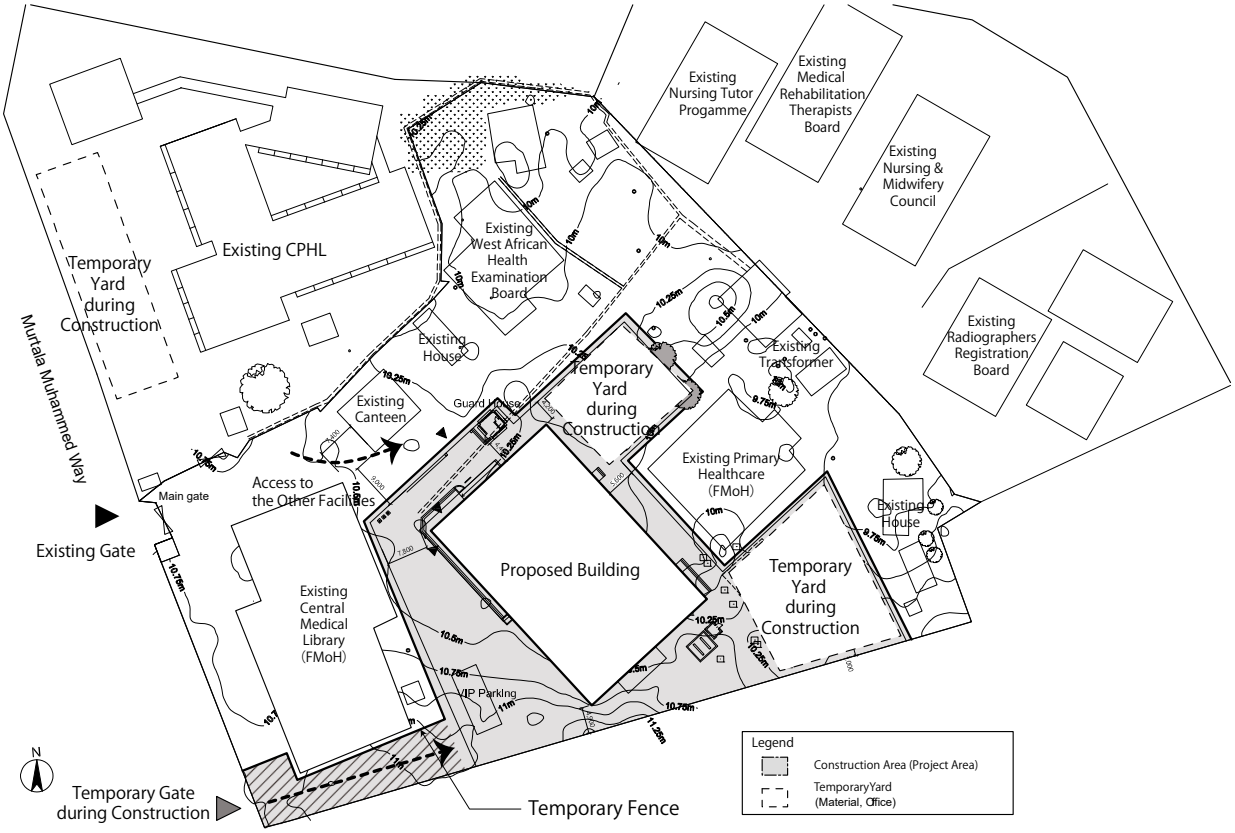


Figure 2-1 Temporary work area

(3) Labour

It is considered in the Project that Japanese contractor will undertake comprehensive construction management, quality control, and technical guidance (technology transfer) to local subcontractors and workers as the skills of the local workers vary. The Japanese contractor will monitor and assure the quality of construction works, which should be equivalent to the practices taken in Japan.

(4) Construction Materials and Equipment

In Lagos, the main building materials (e.g., portland cement, aggregates, reinforcements, ready-mix concrete) can be purchased locally. However, most of the reinforcement materials, fittings and finishing materials are imported from overseas, it is possible to purchase the materials through distributors in Abuja and Lagos. It is necessary to ensure homogeneity and quality control. Overall, it was confirmed that the main building materials for the construction work were available locally. Besides the products produced in Nigeria, building materials from Europe, South Africa, China etc. are also widely distributed in the local market and are readily available, so that a construction plan can be formulated considering these materials as much as possible. Furthermore, it will be considered a procurement from Japan with regard to the materials and equipment specified for the BSL2 laboratory in order to satisfy the required performance such as hardware, finishing, fittings and the air conditioning system and wastewater treatment system etc.,

For equipment, in addition to the standard procurement method (Japan or locally made) in grant aid, it will be considered a procurement of third-country goods which the local agencies can provide services of maintenance.

In principles, the furniture is to be procured locally. However, as it is likely that its price becomes relatively high in Africa by the importation with suffering the certain limitation of available quantity, the purchase in Japan will be taken into consideration in developing the procurement plan.

(5) Procurement of Materials and Equipment

The cargo of construction materials and equipment from a third country or Japan will be transported by sea to the Lagos Port in south western Nigeria (approx. 42 to 45 days). Then, after through the customs clearance procedure (1 to 2 months), the cargo will be conveyed by the land transportation to Yaba in Lagos city where the Project site is located. The distance from the Lagos Port to the Project site is about 12 km of the land transportation, which takes about 1 to 2 days due to the poor transportation and unpaved roads.

In the Nigerian customs clearance system, preliminary registration procedures for the Conformity Assessment Program (SONCAP), as well as a set of shipping documents are required. The insurance coverage by C. & F. is also common, in which case the Nigerian side will be required to undertake the part of the insuring procedure.

(6) Tax Exemption

It is understood that Import tax (Import Tax), Value Added Tax (VAT: 5%), Income Tax (CIT), Personal Income Tax (PIT) including withholding tax shall be exempted for the Project.

The tax exemption is a fundamental rule for the Japanese grant aid projects. Detailed information of the tax exemption for the Project, such as the relevant taxation, the governmental agencies in charge, necessary procedures and documentation, will be clarified by the field survey referring to the collected information of the precedent grant aid project for NCDC. Results of the field survey will be stated in the minutes of discussion in order for the Nigerian side to assure his undertaking of the tax exemption as a part of obligations for the implementation of the Project.

2-2-2 Basic Plan (Building and Facility Plan/Equipment Plan)

2-2-2-1 Site Layout Plan

(1) Site Conditions

Prior to the field survey, three proposed sites were considered as indicated in Figure 2-2. The proposed sites ① and ②, which locate outside of the property of FMoH, were deemed inappropriate for the site by NCDC because of difficulty to obtain agreements with the relevant landowners. The proposed site ③, which is located inside the property of FMoH, was confirmed as the candidate construction site or the new CPHL facility even though a direct connectivity of the traffic lines with the existing CPHL facility is unavailable.

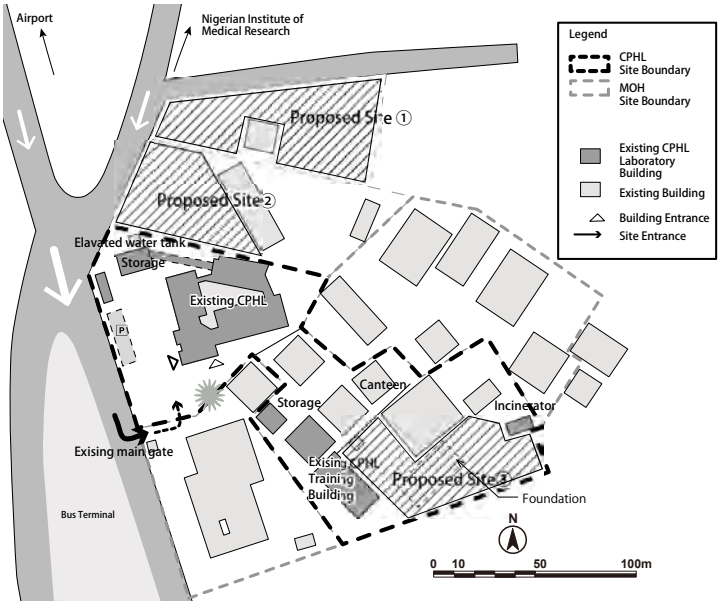


Figure 2-2 Proposed construction sites

The Study team agreed with NCDC/CPHL as described in the minutes of discussion that the Project area would comprise the proposed site ③ and those additional areas available by dismantling and removing some existing structures adjacently to the construction site locates as indicated in Figure 2-3.

- East side: Existing building related to FMoH
- West side: Existing library of FMoH
- Southside: Site boundary
- North side: Access road of the property (Width 6.0 m)

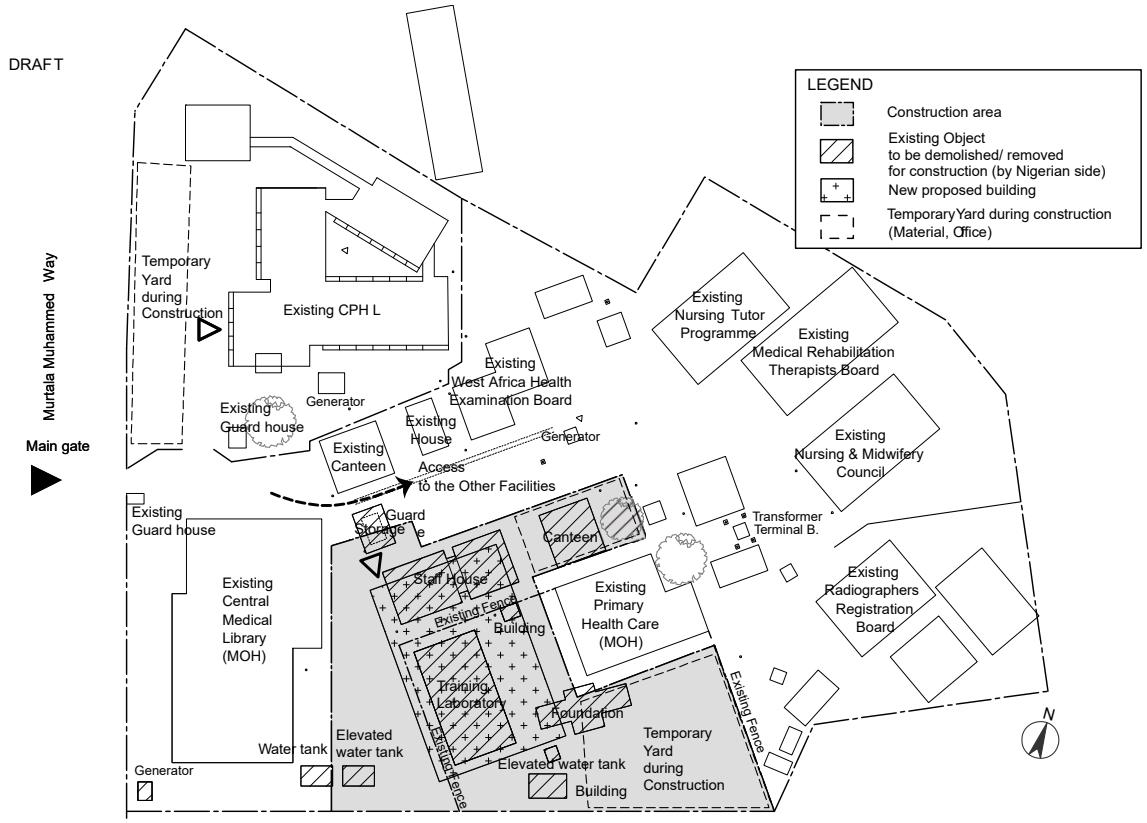


Figure 2-3 Project area and existing building

(2) Layout and Zoning Plan

The Study team confirmed with NCDC/CPHL that the planning in zoning, traffic lines and layout would be developed the following four main areas of the new CPHL facility. It is essential for the planning, in terms of the biosafety and security, to secure particularly the containment of the biological contaminations and control infection as well as access inside those areas in conformity with the structure and facility planning.

- Laboratory area (BSL-2 laboratory 3 rooms, Bio-bank etc.)
- Service area (Washing room, Service corridor etc.)
- Administrative area (Entrance hall, Monitoring room, Lecture room etc.)
- Mechanical & Electrical (M&E) machine area

The zoning and flow line plan is indicated in Figure 2-4. It is planned that the service area shall be operated and considered as part of the BSL-2 management area. Based on the concept of the biosecurity, three safety control lines are considered such as the first-line setting out at the boundary fence, the second line at the exterior wall of the new CPHL facility and the third security control line at the BSL-2 management area as.

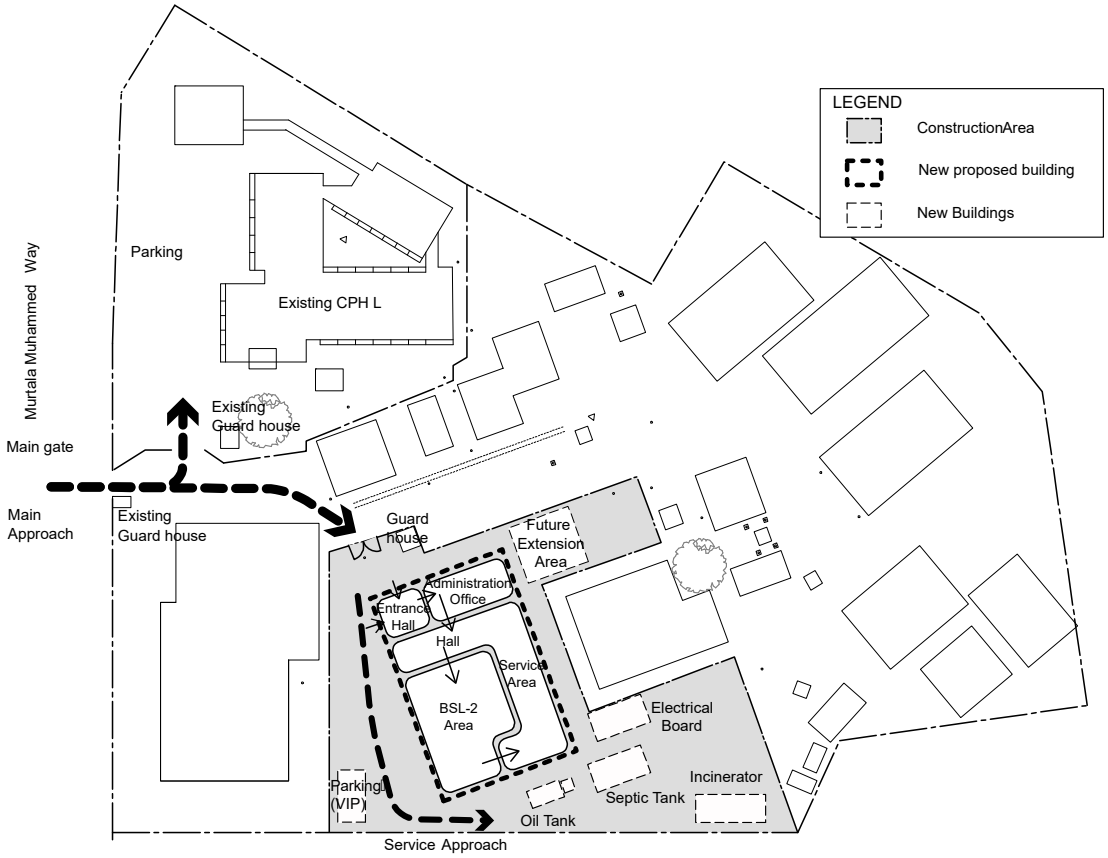


Figure 2-4 Placement and zoning plan and flow line plan

2-2-2-2 Architectural Plan

(1) Basic Components

Principal rooms in the four main areas of the new CPHL facility are listed as follows.

① Laboratory area (BSL-2 management area)

- Preparation hall-2
- Anteroom
- BSL-2 laboratory 8 rooms
- Bio-bank 2 rooms
- Training laboratory, anteroom, Training preparation hall

② Service area
(BSL-2 management area)

- Preparation hall-1
- Sample reception, Sample storage
- Reagent room, Storage, Corridor
- Service corridor-1

(General management area)

- Service corridor-2, Washing room, Hazardous waste storage, Storage

③ Administrative area

- Office (including Monitoring room)
- Staff room 2 rooms
- Lecture room,
- Director, Deputy director's office
- Conference room

④ Mechanical & Electrical machine area

- Machine room (basement floor)
- Mechanical and Electrical room

(2) Contents of Facility Components

The facility components of this Project are as shown in Table 2-7.

Table 2-7 Contents of facility components

Stair	Rooms
Basement	machine room, reservoir room, pit for plumbing
Ground floor	bacteriology laboratory (culture & DNA extraction, amplification), virology laboratory (DNA extraction, amplification), parasitology, media room (bacteriology & virus), master mix room (bacteriology), preparation hall-1&2, bio bank (bacteriology & virus), sample reception, sample room, service corridor, reagent room, washing room, hazardous water storage, storage entrance hall, corridor, office, monitoring room, staff room-1, toilet (male & female), staircase electrical room-1
First floor	training laboratory, training preparation hall lecture room, director room, assistant director room, conference room-1&2, staff room-2, toilet (male & female), staircase, storage mechanical room, electrical room-2
Penthouse	water tank space, storage
Supplementary Facility	parking lot, road in site & parking pavement, sidewalk, septic tank, incinerator, waste pit, oil tank space, electrical transformer space, guardhouse

(3) Floor Planning

The design policy of the floor planning is indicated as follows.

- It is planned in terms of the biosecurity that the bullet-proof glass will be furnished at the openings on the outer periphery of wall, and that the security control system will be furnished with the surveillance cameras and biometric access control (electric locks).
- It is planned in terms of the prevention of biological contamination and infection that the machine rooms specialized for the air conditioning and ventilation system will be considered at the upper level of the BSL-2 laboratory, and that another machine rooms specialized for the sewage and

infectious medical waste treatment system will be considered at the lower level of the BSL-2 laboratory.

- Floor planning and the layout of rooms will be developed in accordance with the traffic lines of "men and goods" examined at each level of the infection control areas.

(4) Planning of Rooms of the New CPHL Facility

1) Laboratory Area

The layout of the laboratory area will comprise the eight laboratory rooms on the first floor and the training laboratory room on the second floor. This area will be categorised as the BSL-2 Management Area. The specification of openings in the infection control area is a key issue to secure effective control of air pressure and airflow. Access doors and windows, which locate along/inside the boundary line dividing the infection control area from the general control area, will be specified for an efficient airtightness in order to maintain properly the airflow and pressure inside the laboratory area.

The preparation halls and anterooms setting out along the traffic lines to laboratories will secure assure those airflow control as well as access control in the laboratory area.

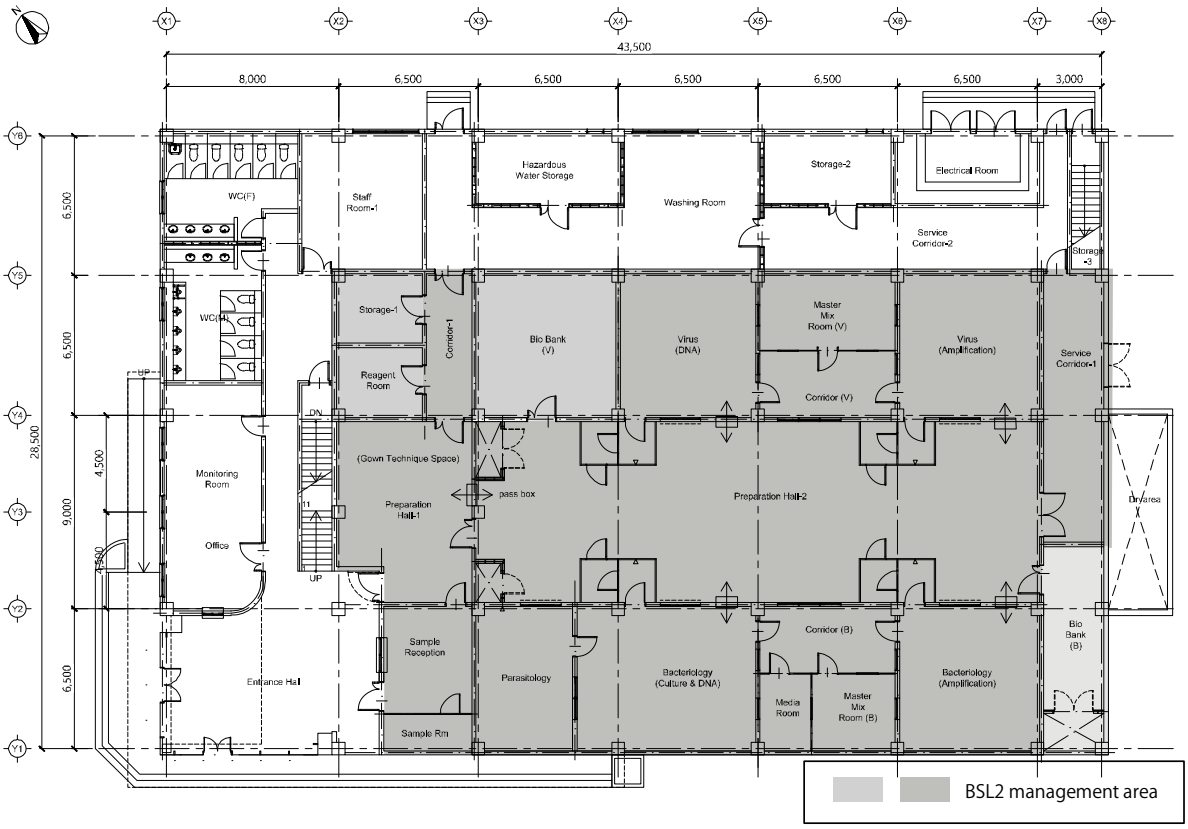


Figure 2-5 Plan of BSL-2 management area at ground floor

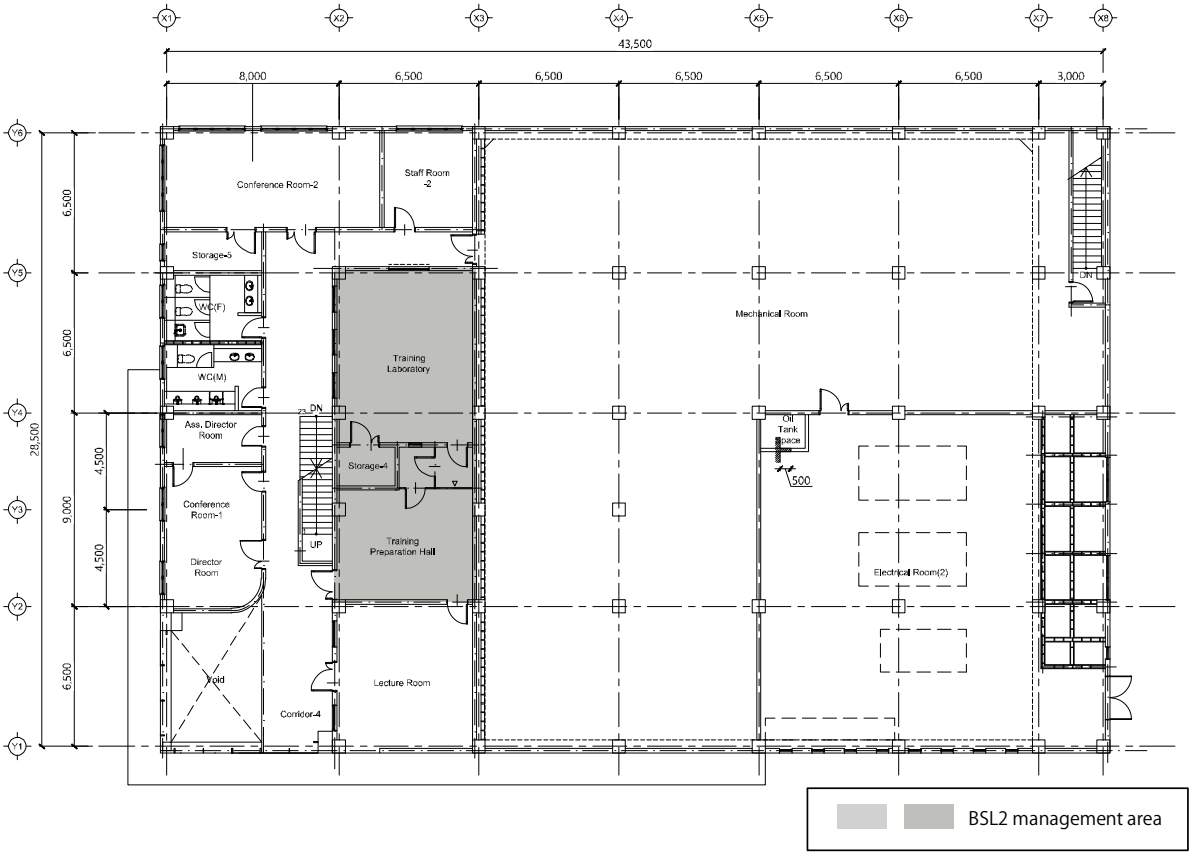


Figure 2-6 Plan of BSL-2 management area at first floor

a. BSL-2 laboratories

BSL-2 laboratories comprise the following eight rooms;

- Three virology laboratory rooms: DNA extraction room, master-mix room, DNA amplification room
- Four bacteriology laboratory rooms: Culture and DNA extraction room, medium culture room, master-mix room, DNA amplification room
- One parasitology laboratory

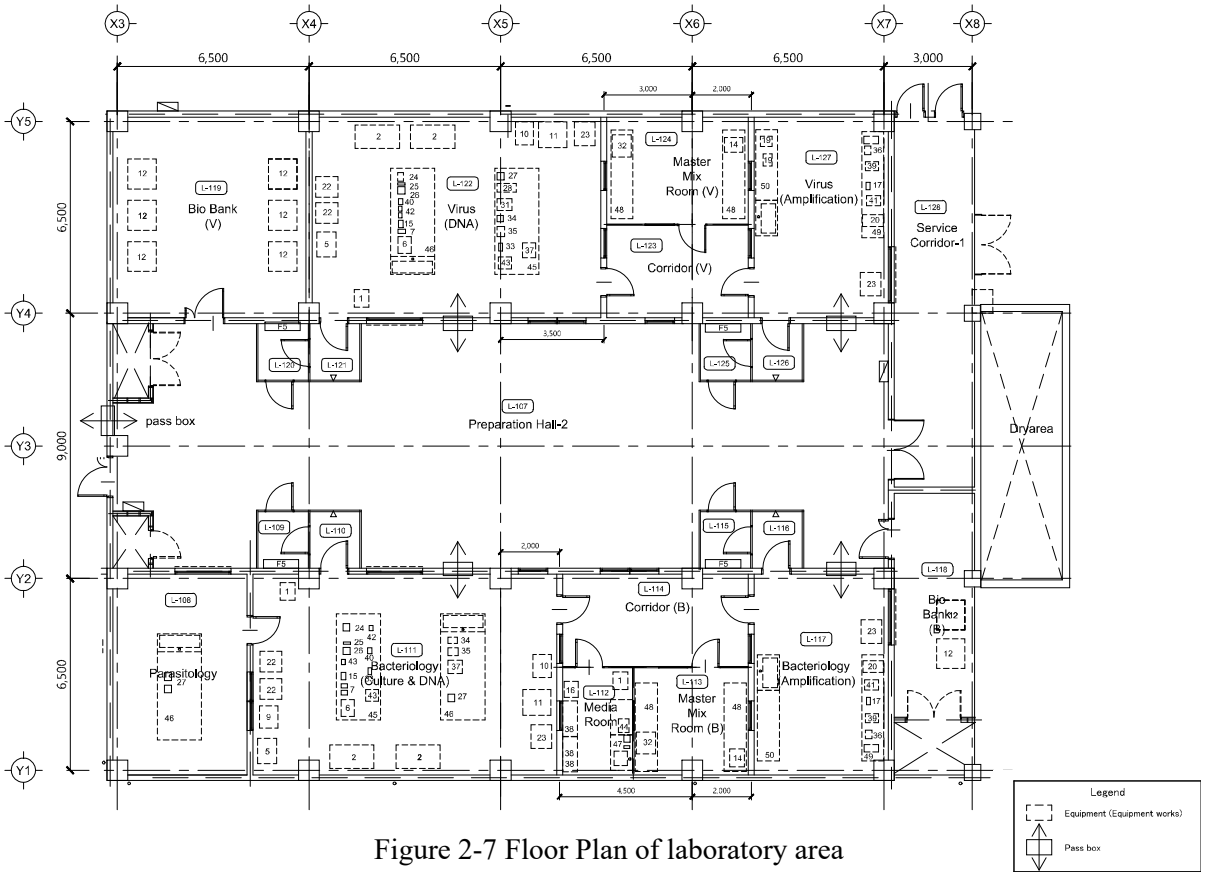


Figure 2-7 Floor Plan of laboratory area

The capacity of each room of the BSL-2 laboratory will be considered for 2 to 3 laboratory staff,

The specification of the laboratory facility will be firmly determined by the Laboratory Biosafety Manual, third edition WHO. As the utmost importance in the planning for the laboratory, the containment of the biological contaminations in the infection control areas will be strictly secured by the following technical considerations i.e. i) establishment of the traffic lines for “men and goods” in the area, ii) the barometric pressure and the airflow control, iii) introduction of the laboratory equipment required for the specific biosafety levels such as safety cabinets and autoclaves, iv) introduction of the advanced system for air conditioning and ventilation comprises higher order controlling system and medium efficiency air filters units.

The standard module of BSL-2 laboratory is planned to suffice for installation of the island laboratory table giving suitable work space of 1.2m to 1.3m around as well as the large size equipment such as the safety cabinet etc. along the interior wall line. See-through windows shall be furnished on the partition walls dividing each room of the laboratory in order for staff working inside to observe each other in visual and to secure the countermeasure against the accidents, the biological emergency and the like.

Wall, ceiling and floor slab in the infection control areas will be basically planned with the reinforced concrete structure except those partition walls furnished at the anterooms. Interior finishing for the wall and ceiling in the area will be specified with chemical resistance paints, while the floor finishing will be specified with chemical resistance floor sheet.

Samples will be conveyed by the appointed staff from the sample reception located at the service area directly to the laboratory staff of BSL-2 laboratories through the pass box furnished at the hall-1. Flow of gown technic and the personal protective equipment (PPE) is indicated in Figure 2-8.

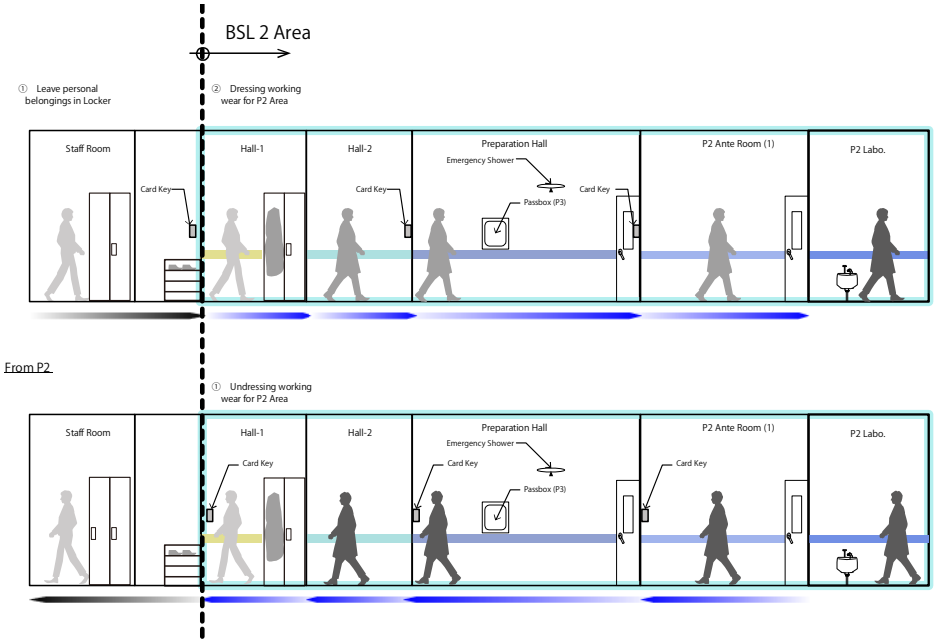


Figure 2-8 Flow of Gown Technic and PPE On/off in BSL-2 Area

b. Anteroom

The entrance and the exit for each room of the laboratory shall be through the adjacent anterooms of which differential pressure and airflow are mechanically controlled and regulated. The hand wash basin shall be furnished at the entrance of the anterooms. Two doors furnished in each anteroom are operated with automatic closing and interlocking system to avoid two doors opened at the same time. The partition walls will be specified with the metal siding panel of efficient air tightness. An Emergency shower will be equipped at the anteroom and used also according to “shower-out” concept when necessary. The access will be controlled with the card key system.

c. Preparation hall-2

The false ceiling will be installed in the area with a height of 2.8 m.

d. Bio-bank

Bio-bank is considered both space for non-infectious cell and infection cell. The required room is not planed as the engineered freezing storage but the installation of freezers.

e. Training laboratory

Two training laboratories will be considered for conducting both the virology and bacteriology training to the external trainee.

2) Service Area

a. Preparation hall-1 (BSL-2 management area)

The access control to the infection control area will commence from this room which is considered space with lockers for wearing the laboratory coat and PPE as well.

b. Sample reception room and storage (BSL-2 management area)

Reception and registration of samples will be controlled by the appointed staff through the intercom system which is equipped at the entrance hall adjacent to the sample reception room.

c. Reagent room and storage (BSL-2 management area)

Necessary reagents for diagnosis will be stored.

d. Service corridor-1 (BSL-2 management area)

Infectious waste materials (decontaminated) from laboratories will be conveyed and disposed to outdoor through this corridor.

e. Service corridor-2 / Washing room / Hazardous waste storage

Washing room is located connecting to Service corridor-2 and furnished a shelf and ultrapure water system. Hazardous waste storage is considered to store no-treatable materials such as organic solvent and the like.

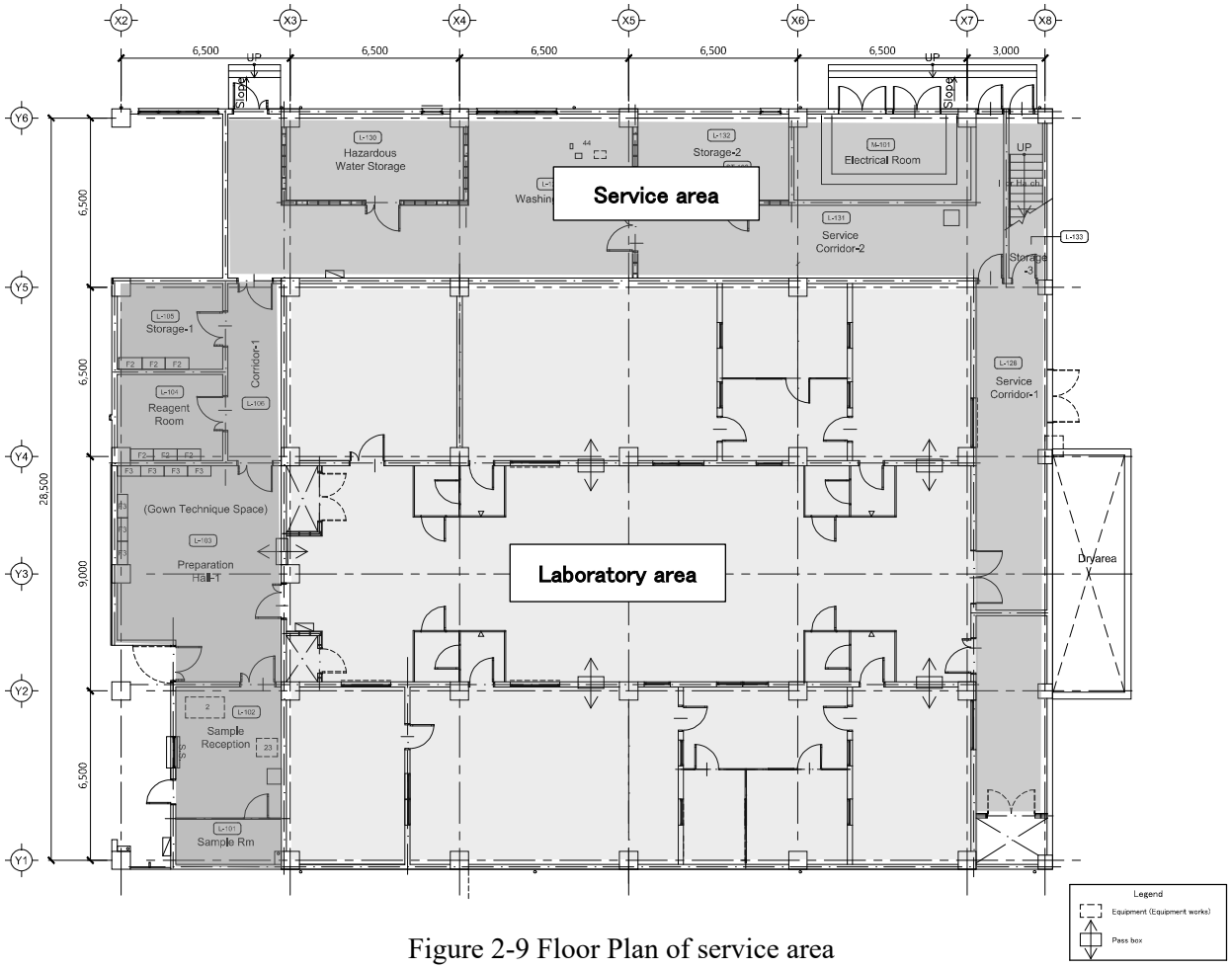


Figure 2-9 Floor Plan of service area

3) Administrative Area

a. Office and Monitoring room

Administrative and security management of the new CPHL facility will be carried out through this room to secure biosafety and biosecurity including monitoring and surveillance of laboratories. The number of the administrative staff assumes 2 to 3 people. In order to properly take care of visitors, it is planned to set up an administrative office facing the entrance hall, with a reception desk on the hall side. In addition, CCTV monitoring system shall be installed in the entrance hall for security.

b. Staff rooms (including conference room-2)

Staff room-1 is planned as an office space and a rest space for laboratory staff with outside facing windows, and the capacity is planned 10 people. Staff room-2 is planned as an office space for outside visitors, invited participants of donor agencies and/or collaborators. A meeting space is considered at the conference room-2 as with. It is planned to use the conference room of existing CPHL facility for large scale conference and meetings.

c. Lecture room

Trainee will have classroom lectures in this room other than practical trainings at the training laboratory, and the capacity is planned 15 to 20 people.

d. Director/ Deputy director's room (including conference room-1)

Work and meeting spaces are provided for the director and deputy director, and the capacity is planned 2 people each.

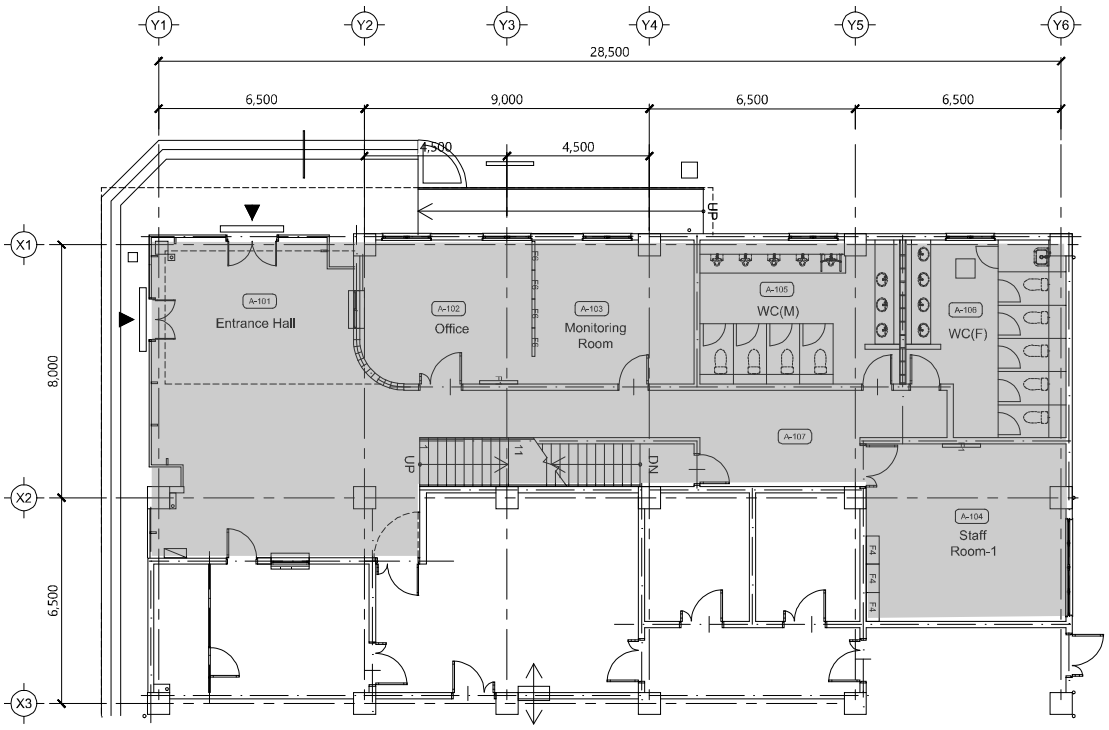


Figure 2-10 Plan in administrative area

4) Mechanical and Electrical Machine Area

a. Machine rooms at the basement floor

Infectious medical waste treatment system is installed at the basement floor below the BSL-2 laboratory with furnishing holding tanks and sterilization unit. Since the city water tank is located at the basement, the traffic lines for each system are clearly separated for avoiding risk as much as possible. Perimeter double wall is considered to prevent a leakage of underground water.

b. Mechanical and Electrical rooms at the first floor

The air conditioning and ventilation system and the emergency power generator are mainly installed and located on the floor directly above the BSL-2 laboratory. The air conditioning and ventilation machine room of the BSL-2 management area is clearly separated from the one of the general control area.

5) Table of Floor Area

The area of each room in CPHL new building is shown in Table 2-8.

Table 2-8 Table of Floor area of CPHL New Building

Area	Management	Room name		Floor Area [m^2]	Total [m^2]
Laboratory Area	BSL2 Management	Bacteriology Laboratory (Culture & DNA extraction) (including 2-Anterooms)		80.68	624.80
		Bacteriology Laboratory (DNA amplification) (including 2-Anterooms)		40.43	
		Master Mix Room & Media Room(Bacteriology		45.51	
		Virology laboratory (DNA extraction) (including 2-Anterooms)		77.18	
		Virology laboratory (DNA amplification) (including 2-Anterooms)		40.43	
		Master Mix Room(Virus)		35.00	
		Parasitology laboratory		33.25	
		Preparation Hall-2		190.16	
		Bio Bank(Bacteriology)		22.82	
		Bio Bank(Virus)		47.25	
		Pipe Shaft (PS), Electrical Pipe Shaft (EPS)		12.09	
Service area	BSL2 Management	Sample Reception & Sample Room		29.75	164.20
		Service Corridor -1		37.29	
		Preparation Hall-1		51.65	
		Reagent Room, Storage & Corridor		45.51	
	General Management	Washing Room		77.88	174.77
		Hazardous Water Storage & Storage		49.76	
		Service Corridor -2		47.13	
Administrative area	General Management	GF	Entrance Hall & Corridor	112.96	283.90
			Office & Monitoring Room	50.58	
			Staff Room -1	37.70	
			Toilet(Male)	31.31	
			Toilet(Female)	30.88	
			Staircase	20.47	
Laboratory area	BSL2 Management	1F	Training laboratory (including 2-Anterooms & Storage)	64.95	95.55
			Training Preparation Hall	30.60	
Administrative area	General Management	1F	Lecture Room	45.34	306.65
			Director Room & Conference Room-1	32.05	
			Assistant Director Room	11.40	
			Staff Room -2	20.19	
			Conference Room -2	48.69	
			Storage	9.50	
			Toilet(Male)	15.44	
			Toilet(Female)	15.44	
			Corridor	79.28	
			Staircase	29.32	
		PH,BF	Storage	50.54	120.62
			Staircase	70.08	
Machine area		Electrical Room 1 (GF)		24.50	1,186.58
		Mechanical Room 1 (BF)		322.88	
		Mechanical Room 2,Electrical Room 2 (1F)		839.20	
		Total			2,957.07 →appx. 2,960 ㎡

(5) Sectional Planning

In planning the section plan, it is considered the following points, including the special conditions of the public health laboratory and the climate in this region.

- Mechanical air conditioning will be provided.
- The floor level and exterior drainage plan will be carefully designed to consider the potential damage caused by the rains as well as the floods in the future.
- The flat roof will be employed for the main building considering advantages in loading and unloading of equipment and maintenance, while the pitched roof is designed for the entrance hall. It is essential for the design to secure an enough slope to flash the rainfalls. The attic ventilation will be considered to reduce heat loads and to improve cooling effects of the new CPHL facility.
- Eaves will be installed to block intense daylights and severe rain blowing in the rainy season.
- The standard floor height at the ground floor will be of 4.0m and at the first floor will be of 3.8m, while the ceiling height is of 2.8m which allows an easy arrangement and distribution of piping etc.
- The standard floor and ceiling height in the infection control areas will be of 4.0m with the direct slab finished which allows the expose piping and ducting of the air conditioning and ventilation system as well as the safety cabinet. The standard floor height of the machine rooms located the first floor will be of 5.0m having sufficient space for the installation and maintenance.

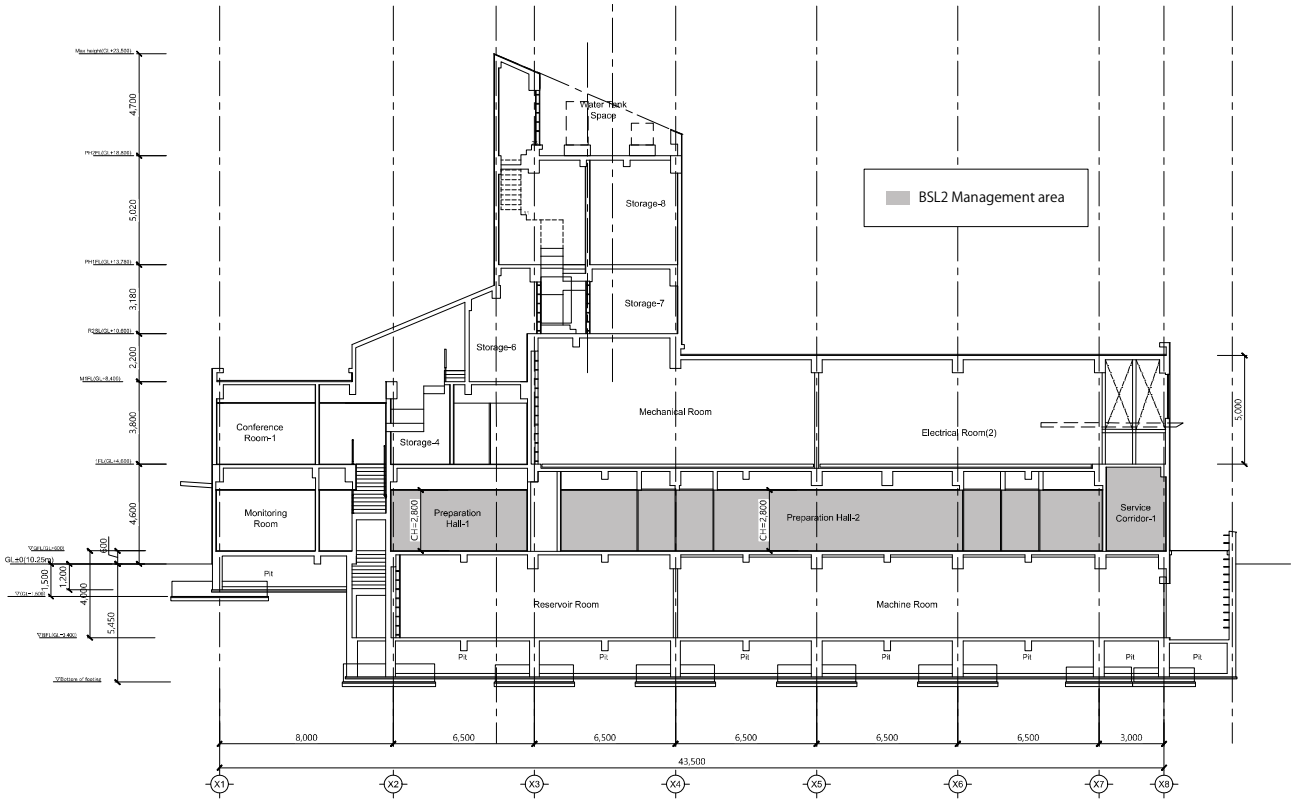


Figure 2-11 Sectional plan

2-2-2-3 Structural Plan

(1) Basic Policy of Structural Plan

The basic policy of structural plan are as follows;

- to accurately obtain the geological condition of the Project site, the groundwater level, the bearing stratum, and then to plan a safe and reasonable foundation and the basement floor
- to consider deflection, vibration and the like during the long-term loading, and then to select a safe and reasonable structure type for the proper use of the building;
- to secure the safe and sufficient structural capacity for the short-term loading such as the intensive seasonal winds etc.;
- to develop a simple and sustainable structure plan which allows the construction to be compatible with materials and practices locally procured.

(2) Method and Materials

Construction method is reinforced concrete ramen structure which is mainly based on general and economical on-site. The wall is based on reinforced concrete. The flat roof is planned with a reinforced concrete roof.

(3) Design Policy

- Long term allowance bearing capacity is 300 kN/m^2
- A thickness of 150 mm of crushed stone shall be laid under the floor slab.
- The foundation type shall be a spread footing.
- The aseismic design criteria are indicated in 2-1-5 (5).
- The wind-resistant design shall be conducted with 30 m/sec of the standard wind pressure.
- The design load of roof, office and laboratory shall be the following value according to Japanese standards.

Table 2-9 Design load

Design load for the floor and beam	
Roof	900 N/m^2
Office	2,900 N/m^2
Laboratory	2,300 N/m^2

(4) Materials

Consideration is given to the following material:

Table 2-10 Structural materials

Concrete	From footing to ground floor	24 N/mm^2
	From ground floor to first floor	24 N/mm^2
	From first floor to roof	24 N/mm^2
Reinforcement	Round steel bar	φ6 φ9
	Deformed steel bar SD295	D10~D14
	Deformed steel bar SD345	D16~D25

2-2-2-4 Utility Plan

(1) Plumbing System

1) Water Supply System

a. Water source

It is confirmed that NCDC/NRL currently uses wells as a water source located in the Project site. In addition, the city water network has been laid up to 70m from the site, and confirmed with the Lagos State Water Company that it is also possible to supply water to the site using the city water network. Based on the results of the field survey and water quality test, the amount and the water quality of the city water have been confirmed as sufficient and appropriate for use.

- Main water pipe diameter of city water 150mmφ
- Water pressure 0.1MPa
- Planned water pipe diameter of installation 50mmφ

b. Assumption of daily water consumption

No. of users	Staff	20 persons	100 litres/person·day
	Visitors	40 persons	20 litres/person·day
	Total	70 persons	2,200 litres/day

Based on these conditions, daily water demand will be assumed 8m^3/ day as follows.

Staff & visitors	4,900 litres/ day
Shower room	3,000 litres/ day
Laboratory	450 litres/ day
Total	8,350 litres/ day→ 8 m^3/ day

c. Water supply system and capacity of major equipment

It is planned that the gravity type water supply system will be employed, and that the elevated tank will be located at required height for the supply with the designed pressure. The water receiver tank stores a required amount of water to be pressurized by the water pump. The receiver tank will be of FRP (fibre reinforced plastic) material having 2 separate vessels, and will be located on the basement floor with the capacity equivalent to the water consumption for 1 day.

- Water receiver (size: W2.0m×D4.0m×H1.5.0m)
  Capacity $8m^3$/day × 100% = $8m^3$
- Elevated tank (size: W1.0m×D2.0m×H1.5.0m)
  Capacity $8m^3$/day × 1/4 = $2m^3$

d. Prevention of cross contamination

The backflow prevention valve will be installed in the water supply system to the BSL-2 laboratory in order to prevent reverse flow due to negative pressure inside the piping.

2) Drainage (Domestic wastewater and infectious wastewater)

The drainage system of the new CPHL facility will be completely separated into two different circuits, and then the wastewater is singly discharged as follows: a circuit for the domestic wastewater generated from the general management area (e.g., sewage and miscellaneous wastewater), and the other circuit for infectious medical waste generated from the BSL-2 management areas.

The domestic wastewater is treated in the new septic tank which permeates the treated water in the penetration tank underground, while the infectious medical waste from the BSL-2 management area collecting the wastewater from lab-sinks, hand wash basins and emergency showers will be sterilized by the infectious medical waste treatment system per circuits and percolated underground.

The infectious medical waste treatment system will employ the high-temperature steam sterilizer with reservoir tanks for batch, which will be located in the machine room of the biosafety containment on the basement floor.

Rainwater collected at the roof and the paved surface in the compound will be discharged to existing rainwater infiltration basins or the public drainage (open ditch) located along the access road on the north boundary same as the existing buildings do.

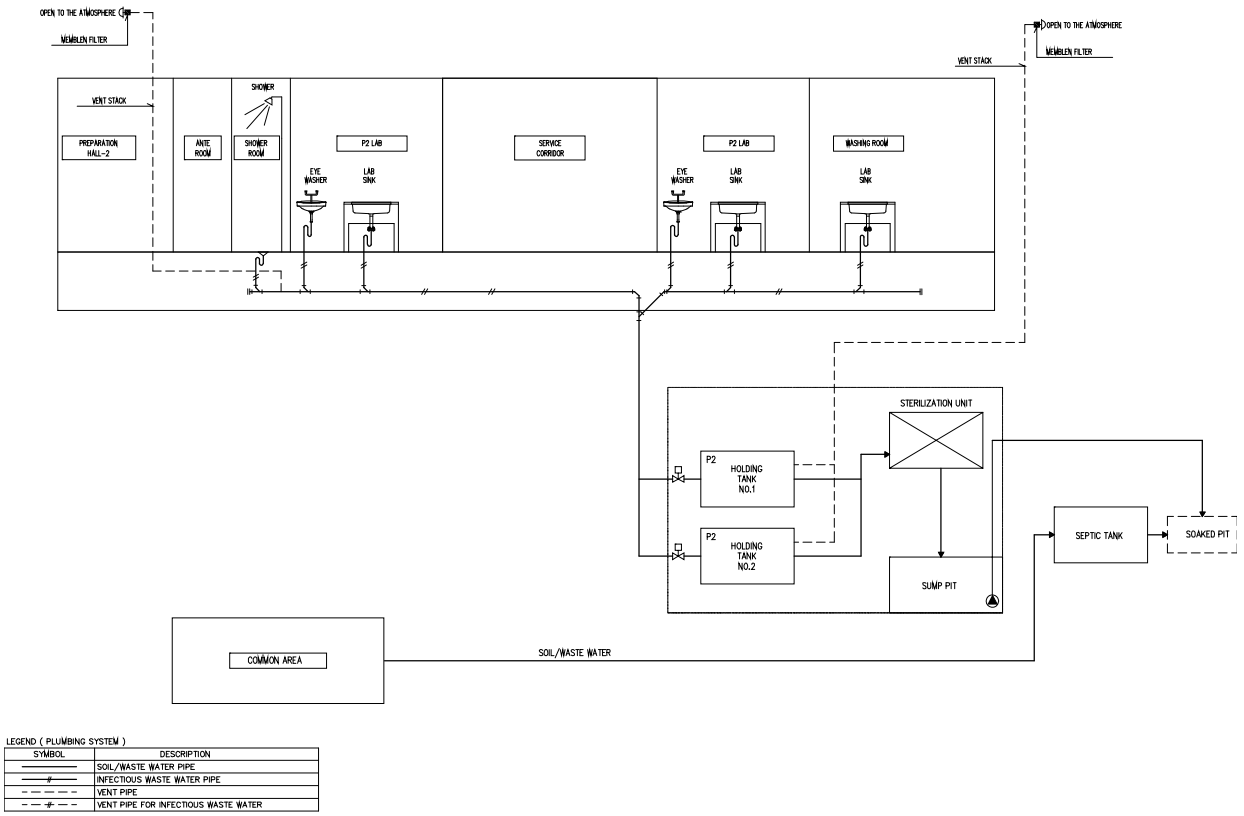


Figure 2-12 Infectious wastewater flow scheme for laboratory

3) Sanitary Equipment

Considering toilets provided in the existing CPHL facility are all western-style fixtures, western-style plumbing fixtures will be selected for the Project. Toilets for disabled persons will be installed according to needs based on the personnel deployment plan as the building will not open to the public, and equipment is planed according to the local building standards.

4) Fire Extinguisher

Indoor fire hydrants and fire extinguishers will be considered effective for initial firefighting based on the use and magnitude of building in conformity with local regulations and standards. Fire extinguishers will be reserved particularly inside and outside the BSL-2 laboratory.

(2) Ventilation and Air Conditioning System

1) Air Conditioning System

The Project area is located in the city of Lagos, where is situated 6.5° north of the equator at altitude of 41m. The climate is savannah and divided into rainy season (April - July) and dry season (November - March).

According to the ASHRAE (American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc.) guideline, which covers all design conditions for major cities in all countries, air conditioning design specifications are as follows.

- Outdoor Design Condition:

  Dry Bulb Temp. : 33.0 °C, Wet Bulb Temp. : 28.0°C, Daily Temp. Difference: 7.0°C

  (Source: ASHRAE Weather data: at Lagos)

In consideration of these climatic conditions and the room application in the new CPHL facility, the certain air conditioning system is planned in all rooms which are undesirable environment conditions such as hot, humid and dusty, or necessary to maintain as a suitable indoor environment in order to work efficiency.

2) Ventilation System

In order to climate odours, heat and moisture, the rooms will be provide with mechanical ventilation system.

In reference to the above ASHRAE Standards and Japanese ministry of Land, Infrastructure and Transport design standards, applicable ventilation design conditions for this Project are considered in Table 2-11.

Table 2-11 Design conditions for ventilation system

Room name	Type of ventilation	Capacity of ventilation	Remarks
Room with general air conditioning	Supply air fan	25m^3/person·day	For fresh air intake
Storage	Exhaust air fan only	5 times/hour	
WC	Exhaust air fan only	10 times/hour	For odours elimination
Water reservoir	Exhaust air fan only	3 times/hour	
Electrical room	Exhaust air fan only	10 times/hour	For removal of heated air
Emergency generator room	Supply/ exhaust dual air fan	25~30 times/hour	Combustion air supply and removal of heated air

3) Air conditioning and Ventilation system in the BSL-2 laboratory

It is planned that the system will be complied with the following international standards and Japanese standards, which enables NCDC to obtain the international certification of laboratory facilities when needed.

- WHO: Laboratory Biosafety manual, third edition
- CDC: Biosafety in Microbiological and Biomedical Laboratories
- National Institute of Infectious Diseases: Provisions for safety management of pathogens, etc.

Although the biosafety requirements are not strict as the BSL-3 laboratory (designed for the negative pressure management, room airflow control, ensuring indoor cleanliness, exhaust system with HEPA

(High Efficiency Particle Air Filter) filtration etc.), it is planned as a laboratory with medium-low risk of infection (corresponding to WHO risk groups 2) that the BSL-2 laboratory shall be equipped with the air conditioning and ventilation system which conforms to the certain grade of containment.

It is planned that these air conditioning and ventilating equipment shall be installed in the 2nd floor machine room right above the laboratory in consideration of workability and maintenance. In order to manage the system, the operation control monitoring board shall be installed at the monitoring room in the general management area which enables the operation status of each device, airflow and pressure in the laboratory, etc. to be comprehensively monitored and controlled.

HVAC system flow schematic for the BSL-2 laboratory is as shown below.

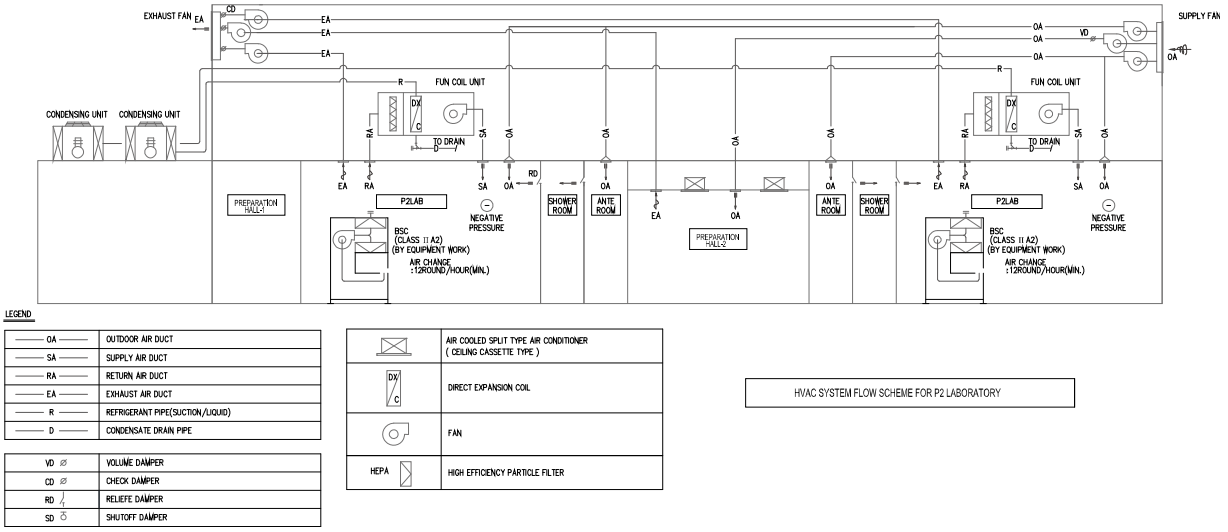


Figure 2-13 HVAC system flow schematic for BSL-2 laboratory

(3) Electrical System

1) Substation System

The existing CPHL facility currently receives intermediate voltage of 11.0 KV from EKO Electricity Distribution Company (EKEDC), which is reduced to the low voltage through the step-down transformer installed outdoors and distributed to buildings exist inside the property of FMoH other than CPHL. Regarding power distribution to the new CPHL facility, based on results of consultation with the EKEDC, it is planned that the 11 KV distribution line shall be used by connecting with the existing aerial power line to Nigerian Institute of Medical Research (NIMR) locates 500m away from the construction site or by newly installing the underground distribution line from the existing substation locates 700m away from the site. NCDC/CPHL is in progress to obtain the cost estimate from EKEDC for the connection with those incoming power lines.

- Input power : 11KV 3-phase 3-wires, 50Hz

a. Expected power load capacity

Expected power load capacity of transformer shall be the calculated total of Table 2-12.

Table 2-12 Expected power load capacity

Load capacity	Load density (VA/m^2)	Floor area (m^2)	Load capacity (KVA)	Remarks
Lighting & Outlet	30	3,000	90.0	
HVAC system and equipment in BSL-2 laboratory	30KVA/room (laboratories) 400VA/m^2 (other)	8 rooms 519.98	240 519.98 x 0.4 Sub-total: 448	
Air conditioning system in administration area	100VA/m^2	245.95	25	General air conditioning
Sanitary equipment	-	-	30	
Total			593	

Total expected power load capacity is 593KVA and maximum power demand will be determined as follows, with an assumed demand rate of 50%:

- 593KVA × 0.5 ＝ 296.5KVA → 300KW

2) Emergency Generator System

In the new CPHL facility, system and equipment such as a safety cabinet, an incubator, a freezer (-30℃, -80℃), a medicine refrigerator, incubators etc., where the outage of power supply shall cause a critical accidents in terms of the operation of diagnosis as well as the containment of biological contaminations. For air conditioning and ventilation system in the BSL-2 laboratory where the strict operation under the BSL 2 management is required, an uninterrupted operation is indispensable even in case of the power outage. It is planned under these requirements that emergency generator shall be newly established.

It is planned that the generator with an affordable fuel storage shall have a minimum capacity necessary for uninterrupted power supply during the power outage, and that the estimated total capacity shall be 80% or more of the maximum demand electric power (300 KW) considering 1 week of the duration of outage and 8 hours of the operation time per day based on results of the field survey. 2 units of the medium capacity generators are considered for the total loads and demand, while 1 unit of the small capacity is considered for the night time loads and demand.

- System Low noise air cooled type, indoor use package unit
- Capacity(M-size) 3-phase 4-wires 380V 50Hz 125KVA x 2 units(fuel consumption: 20litre/hour)
- Capacity(S-size) 3-phase 4-wires 380V 50Hz 37KVA x 1 unit (fuel consumption: 7litre/hour)
- Fuel tank 4,000 L Diesel
- Operating hours/week M-size: 8 hours x 7days = 56 hours
- S-size: 24 hours x 7days = 168 hours

It is planned that an uninterruptible power supply (UPS) shall be procured in the equipment package for diagnosis and experimental equipment which are sensitive to power fluctuations.

3) Power Supply Trunk Line System

From the Power Distribution Board in Substation boards, 3-phase, 4-wires 400/230V 50Hz power will be distributed to each demand points in consideration of the division of load and grouping of facilities. Trunk line capacity will be set to meet the installed capacity to be connected under the appropriate voltage drop and allowable current rate. The cable and wiring system will basically be a cable rack system in the shafts and others will be a conduit piping. The electrical power shall be supplied from a low voltage panel through an automatic voltage regulator (AVR) equipped on the trunk line in order to prevent those critical malfunctions of the air conditioning and ventilation system i.e. air balance failures which may be incidentally caused by voltage fluctuations and the like.

The distribution method is as follows.

Trunk line:	3φ4W 230V/400V
Single phase load:	1φ2W 230V
Power load:	3φ3W400V

4) Lighting System

Each room and corridor will be provided with straight tube type Light Emitting Diode (LED) lighting in consideration of maintenance and running costs. Illuminance criteria (standard illumination level) is planned as follows based on the required average illuminance by international standards and Japanese Industrial Standard (JIS), as well as the Nigerian domestic standards.

Table 2-13 Planned illuminance

Office, Monitoring room, Staff room	350 lux
BSL-2 laboratory	500 lux
Corridor, Staircase	150 lux
WC, Storage	100 lux
Machine room, Electrical room	150 lux

Lighting will be controlled in each of the rooms and lighting circuitry is planned to enable lighting control in every section of the room. A low voltage power supply system for lighting and outlets is planned to distribute single phase, 2-wires, and 230 V. Evacuation routes such as BSL-2 laboratories whose access is controlled, and stairs are planned with emergency exit sign and an emergency lighting.

5) Telephone System

There are several private communication carriers in Lagos that currently provide services for mobile phones and data communication, among which there are limited companies offering services combining telephone and data communication. Since there is no carrier provides a high-speed broadband network

service using optical fibre, it is planned that the microwave wireless system with voice channel will be connected by installing a dish antenna likely to the internet connection.

It is planned that the new CPHL facility will have incoming lines and the telephone extension, and that IP phone PBX (with UPS) and telephone set will be furnished in various rooms. The telephone sets for outside calls will be furnished for offices in the general management area, while the intercommunication will be considered for rooms in the infection control area to communicate with the monitoring room by the intercom system of which a hands-free talk will be available.

6) Local Area Network

Considering the needs for close communication and collaboration with laboratories and research institutes domestic and overseas, it is planned that the local area network (LAN) will be established for the new CPHL facility by using the data communication services provided by the microwave wireless system same as the telephone line services.

- LAN standards: Carrier transmission speed 6 to 10Mbps (installation of router)
- Wiring(CAT6) or wireless
- Data transmission speed: 1000Mbps,100Mbps

7) Access Control System

In order to strictly control the restricted access to the BSL-2 management areas, it is planned that the access control system shall be installed to manage the authorized person for access and to record “entry and exit” of the area and the BSL-2 laboratory. The card reader and ten-key authentication will be adopted for the system, of which the control panel will be installed in the monitor room in the general control area.

8) Remote Monitoring System

Surveillance cameras will be installed in each Laboratories and Preparation hall and Sterilization room in BSL-2 laboratory areas, and remote monitoring display is planned in Monitoring room.

9) Emergency Call System

Emergency buttons will be installed in each Laboratories and Preparation hall and Sterilization room in BSL-2 laboratory areas, and the emergency call display is planned in Monitoring room.

10) Fire Alarm System

A Fire alarm system will be installed in the Service area and administrative area. In the BSL-2 laboratory area with strictly access control, is planned an automatic fire alarm system with smoke and heat detectors to enable fire deduction at an early stage. A fire receiver will be installed in monitoring room. Although access control and interlock control will be performed.

11) Lightning Protection System

It is planned to consider the lightning protection facilities in order for the new CPHL facility to avoid damages caused by lightning. Protective devices and the system will be properly installed to maintain a stable power supply, and to prevent computers, telephone sets and PBX and laboratory equipment from lightning strikes regardless indirectly or directly, which may cause critical malfunctions of the electronic equipment by abnormal currents/voltages induced through power lines, telephone lines etc.

(4) Waste Management

The new CPHL facility will comprise the incineration system for CPHL in addition to the infectious medical waste treatment system to conduct a proper sorting and disposal of infectious waste materials including infectious medical waste, bloods and urines. At the same time, liquid waste (organic solvent), solid waste (garbage) storages and incineration ash pits, of which the needs shall be concretely examined according to the waste management plan formulated by NCDC/CPHL.

2-2-2-5 Building Material Plan

(1) Basic Policy

The building material plan shall be formulated based on the climatic conditions, the location of the site, the local construction situation, construction period, construction cost and maintenance/operation costs. The following shall be matters of the Basic Policy:

- Based on the particularity of building and facility, some of construction materials, devices and equipment specified for the infection control areas will be procured in Japan. However, conventional materials to be locally procured shall be selected for the general control areas to aim for reducing construction costs and shortening the construction period.
- The maintenance and operation costs shall be reduced by considering adaptation to the local climate, resistance against climate and the selection of materials that are easy to maintain and obtain locally.
- The procurement from the third countries and/or Japan shall be determined by examining advantages and availability upon maintenance based on the building and facility as well as the equipment planning.
- Selection and determination of the building materials shall be based on the studies on local procurement or application of local construction method.

(2) Selection of Construction Materials

1) Structural Materials

The main frames which are reinforced concrete for mainframes of column, beam and slab, and concrete walls will be adopted for this Project. The flat roof will be reinforced concrete roof slabs.

2) Exterior Finishing Materials

a. Exterior Wall

Polyurethane paint on mortar base will be used as the finishing materials for exterior walls, columns and beams.

b. Roofs

The flat roof will be specified with the rubber asphalt coating waterproofing which expects a high workability and elasticity without heating and additive solvent. The waterproofing surface will be covered by the protective concrete (40 to 50mm of thickness) to avoid the deterioration caused by ultraviolet radiations.

c. Windows and Doors

For external openings, such as windows and doors, aluminium sashes, steel doors and stainless steel doors will be used. Considering the purpose of the new CPHL facility, the shatter-proof film shall be specified for windows of openings facing the exterior to strengthen the security against burglary, biological crimes and terrorism and the like.

d. Eaves

Eaves will be installed for the entrance lobby to block intense daylights and severe rain blowing in the rainy season. Eaves will be specified with the reinforced concrete coated by the rubber asphalt waterproofing.

3) Interior Finishing Materials

a. Floors

Polyvinyl floor sheet will be specified for the rooms in the general management area, while chemical resistant polyvinyl floor sheet is specified for the infection control areas. Ceramic tiles will be specified for the toiles according to availability from local procurement.

b. Walls

Polyurethane paint on mortar base will be used as the finishing materials for interior walls. Also, polyurethane paint on mortar base will be used in the laboratory.

c. Ceilings

Double board lining will be specified (plaster board + rock wool sound absorbing board etc.) for the rooms in the general management area, while no board lining is specified for the infection control areas where the concrete ceiling slab will be exposed and finished with the urethane paint on the repaired surface.

4) Main Proposed Materials

The criteria for building materials have been analysed and studied. Based on the analysis, the main proposed materials are as follows:

Table 2-14 Main proposed materials

Structure		Reinforced concrete				
Floor height		1F: 4,000 mm, 2F: 5,000 mm (3,800 mm in partial)				
Exterior finish	Roof	Flat roof: Concrete Steel Trowel t40-50 w/Mesh D6 @150, Rubber Asphalt Waterproofing Membrane Slope roof: Water Proof Acrylic Silicon Paint				
	Exterior wall	Mortar trowel with polyurethane paint				
	Windows	Aluminium, Stainless steel, Coloured Heat Absorbing Laminated Glass t12.0 (w/Scattering prevention film)				
	Doors	Aluminium Steel, Steel				
Interior finish	Room name	Main entrance	BSL-2 laboratory	Staff room	WC	Corridor
	Floor	Mortar steel trowel, PVC floor sheet	Mortar steel trowel, PVCS floor Sheet (chemical resistance)	Mortar steel trowel, PVC floor sheet	Mortar Steel Trowel, Porcelain Tile 300sq	Mortar steel trowel, PVC floor sheet
	Wall	Glass wall Laminated Glass	Mortar steel trowel with Polyurethane paint	Mortar steel trowel with Polyurethane paint	Mortar steel trowel, Porcelain Tile 300sq	Mortar steel trowel with Polyurethane paint
	Ceiling	PB t9.5 + RWB t9.0	Patching mortar, polyurethane paint	PB t9.5 + RWB t9.0	CMB t5.0+t5.0 with NAD paint	PB t9.5 + RWB t9.0
Ceiling height		2,800~6,900	3,600	2,800	2,800	2,800

PB: plaster board, RWB: rock wool sound absorbing board, CMB: fibre reinforced cement board (non-asbestos)

2-2-2-6 Equipment Plan

In accordance with the following criteria, the equipment plan was examined for the target network laboratories such as CPHL and seven other laboratories based on the contents of request submitted by the Nigerian side and confirmed during the field survey.

The name and the reference code of seven laboratories are indicated in the Table 2-15.

Table 2-15 Seven Network Laboratories and facility code

No.	Target network laboratory	Code
1	Irrua Specialist Teaching Hospital	ISTH
2	University of Benin Teaching Hospital	UBTH
3	University College Hospital Ibadan	UCH
4	University of Nigeria Teaching Hospital Enugu	UNTH
5	National Hospital Abuja	NHA
6	University of Lagos Teaching Hospital	LUTH
7	University of IIorin Teaching Hospital	UITH

(1) Equipment Plan for seven network Laboratories other than CPHL

The target laboratories in the seven hospitals are shown in the Table 2-16. In the preparatory survey, based on equipment requested by NCDC, information necessary for the selection of target facilities has been examined, such as laboratory items and maintenance status. The results are shown in Table 2-17. The equipment will be installed in facilities where the necessary infrastructure has been established or has been confirmed to be established on its own. In particular, FMoH needs to have strong leadership to secure budget because improving facilities and infrastructures such as supply of electricity and water are required as prerequisites.

As there are both bacteriology and virology laboratories under the same microbiology departments in five facilities except for LUTH and UCH, PCRs and some equipment are shared for the diagnosis of both bacteria and virus.

Table 2-16 Target Laboratories and Matters to be Improvement

No.	Hospital	Laboratory Type supported by the Project	Microbiology Laboratory	Status for the Establishment of Bacteriology Laboratory	Status for the Establishment of Virology Laboratory	Infrastructure Improvement (Improvement to be done by the Nigerian side)
1	ISTH	Bacteria, Virus	Established in each section	✓	✓	To establish three PCR rooms
2	UBTH	Bacteria, Virus	Established as microbiology laboratory	✓	×	To establish two PCR rooms
3	UCH	Bacteria	Established in each section	✓	✓	To establish three PCR rooms

No.	Hospital	Laboratory Type	Microbiology Laboratory	Status for the Establishment of Bacteriology Laboratory	Status for the Establishment of Virology Laboratory	Infrastructure Improvement (Improvement to be done by the Nigerian side)
4	UNTH	Bacteria, Virus	Established as microbiology laboratory	✓	×	To establish three PCR rooms To improve facilities for water and electricity supply
5	NHA	Bacteria	Established as microbiology laboratory	✓	×	-
6	LUTH	Virus	Established in each section	×	✓	-
7	UITH	Bacteria, Virus	Established as microbiology laboratory	✓	×	To establish three PCR rooms To improve facilities for water and electricity supply

Table 2-17 Considerations for the Procurement of Equipment

No.	Facility	Bacteria tests in bacteriology/microbiology Laboratory	Virus tests
1	ISTH	・ Currently PCR tests are not performed. Establishment of three PCR rooms (for DNA extraction, premix and amplification) and deployment of trained technicians will be necessary.	・ Virus tests are excluded from the scope of the Project since the equipment has been provided and operated properly with support from another donor.
2	UBTH	・ A premix room and an amplification room should be established for the equipment to be installed and operated through the support of the Project.	・ Virus tests are performed in the bacteriology laboratory. ・ HIV tests are performed with a fully automatic PCR device. However, this device cannot be used for the functions of a network laboratory.
3	UCHI	・ As PCR tests are not performed at present, a PCR laboratory needs to be established. Creation of three PCR rooms and deployment of trained technicians will be necessary.	・ Virus tests are excluded from the scope of the Project since virus tests are performed by another organization (college) that is not in the scope of the support.
4	UNTH	・ Infrastructure improvement (supply of electricity and water) will be required for the provision of the support. ・ Unused equipment (RT-PCR equipment) needs to be operated.	・ Virus tests are performed in the bacteria test department.
5	NHA	・ As PCR equipment is properly operated, there is no need for support for the introduction of such equipment. ・ Aging bacterial culture equipment should be replaced. There are no items for improvement for the laboratory.	・ There is no independent virus test department and virus tests are performed in the bacterial test department. It is excluded from the support of the Project since the sound performance of equipment has been confirmed.

No.	Facility	Bacteria tests in bacteriology/microbiology Laboratory	Virus tests
6	LUTH	・ Bacteria tests are excluded from the scope of the Project. ・ (Ref) To perform PCR tests in the future, it is believed that establishment of a PCR laboratory with three test rooms and deployment of trained technicians will be necessary.	・ Properly operated ・ Replacement of aging equipment and addition are necessary. There are no items for improvement for the laboratory facilities.
7	UITH	・ Backup power supply during working hours will be necessary. ・ Unused equipment (RT-PCR equipment) need to be operated. ・ As there is no laboratory appropriate for PCR operation, creation of three PCR rooms and deployment of trained technicians will be necessary.	・ Virus tests will be performed in the bacteria test department.

Based on the descriptions above mentioned, the equipment plan was considered for each of seven laboratories as indicated in Table 2-18.

Table 2-18 Equipment List for the Seven Network Laboratories

No.	Equipment	Total	ISTH	UBTH	UCH	UNTH	NHA	LUTH	UITH
1	Autoclave, vertical	15	2	2	3	3	2	-	3
2	Biosafety cabinet	11	1	-	2	3	1	1	3
3	Blood culture	3	1	-	1	-	1	-	-
4	Burner, electric	2	2	-	-	-	-	-	-
5	Centrifuge, high speed	4	-	1	1	1	-	-	1
6	Centrifuge, low speed	6	-	1	2	1	1	-	1
7	Centrifuge, micro	3	-	-	1	1	-	-	1
8	Chair・Table	-	-	-	-	-	-	-	-
9	CO_2 Incubator	-	-	-	-	-	-	-	-
10	Deep freezer -30℃	3	1	-	-	1	-	-	1
11	Deep freezer -80℃ A	7	1	1	-	-	-	4	1
12	Deep freezer -80℃ B	-	-	-	-	-	-	-	-
13	Display	-	-	-	-	-	-	-	-
14	Domestic refrigerator	4	-	1	1	1	-	-	1
15	Dry thermo unit	3	-	-	1	1	-	-	1
16	Drying oven	2	1	-	-	1	-	-	-
17	Electrophoresis set A	-	-	-	-	-	-	-	-
18	Electrophoresis set B	1	-	-	-	-	-	1	-
19	ELISA set	3	-	1	-	1	-	-	1
20	Gel imager	1	-	-	-	-	-	1	-
21	Hot plate	-	-	-	-	-	-	-	-
22	Incubator	14	2	4	2	2	2	-	2
23	Laboratory refrigerator	13	1	2	3	3	1	-	3
24	Magnetic stirrer	-	-	-	-	-	-	-	-
25	Micropipette set, single	7	1	1	1	1	1	1	1

No.	Equipment	Total	ISTH	UBTH	UCH	UNTH	NHA	LUTH	UITH
26	Micropipette set, Multi	7	1	1	1	1	1	1	1
27	Microscope, Binocular	18	5	5	2	3	1	-	2
28	Microscope, Fluoroscopy	1	-	-	-	-	-	1	-
29	Microscope, Inverted	1	-	-	-	-	-	1	-
30	Microscope, Teaching	-	-	-	-	-	-	-	-
31	Microwave oven	1	-	-	-	-	1	-	-
32	PCR work station	4	-	1	1	1	-	-	1
33	pH meter	1	-	-	-	-	1	-	-
34	Platform scale	2	-	-	-	1	-	-	1
35	Precision electronics balance	1	-	-	-	1		-	-
36	Real-time PCR	4	-	1	1	1	-	-	1
37	Spectrophotometer	-	-	-	-	-	-	-	-
38	Stainless shelf	-	-	-	-	-	-	-	-
39	Thermocycler	-	-	-	-	-	-	-	-
40	Timer	-	-	-	-	-	-	-	-
41	UV trans illuminator	-	-	-	-	-	-	-	-
42	Vortex mixer	3	-	-	1	1	-	-	1
43	Water bath	1	-	-	-	1	-	-	-
44	Water distiller	4	1	-	1	1	-	-	1
45	Work bench A	-	-	-	-	-	-	-	-
46	Work bench B	-	-	-	-	-	-	-	-
47	Work bench C	-	-	-	-	-	-	-	-
48	Work bench D	-	-	-	-	-	-	-	-
49	Work bench E	-	-	-	-	-	-	-	-
50	Work bench F	-	-	-	-	-	-	-	-
51	Work bench G	-	-	-	-	-	-	-	-
52	Work bench H	2	-	2	-	-	-	-	-
53	Work bench I	14	-	5	3	3	-	-	3
54	Work set for BSC maintenance	-							
55	AVR 0.5kw	46	8	10	6	8	3	4	7
56	AVR 1.0kw	31	2	5	6	6	2	4	6

(2) Equipment Plan for CPHL

Based on the requested equipment, the Study team have made a list of equipment to be provided for CPHL laboratories as shown in Table 2-19. This is consistent with the layout plan of each laboratory according to the building design and satisfies the criteria described above.

In CPHL, the existing equipment has substantially been organized and arranged due to facility renovation conducted in 2018 and many of the existing equipment items are not included in the list of requested equipment. However, as it is confirmed that NCDC will conduct training on the operation of these items and secure budget, the Study team has drawn up the equipment list as below.

Table 2-19 Equipment List for CPHL

No.	Equipment	Q'ty
Reception, sample receiving		
1	Laboratory refrigerator	1
2	Biosafety cabinet	1
Parasitology		
1	Microscope, Binocular	2
2	Work bench B	1
Bacteriology		
Sample separation/incubation/extraction room		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	Centrifuge, micro	2
6	CO2 Incubator	1
7	Deep freezer -30℃	1
8	Deep freezer -80℃ A	1
9	Dry thermo unit	1
10	Incubator	2
11	Laboratory refrigerator	1
12	Magnetic stirrer	1
13	Micropipette set, single	1
14	Micropipette set, Multi	1
15	Microscope, Binocular	1
16	pH meter	1
17	Platform scale	1
18	Precision electronics balance	1
19	Spectrophotometer	1
20	Timer	1
21	Vortex mixer	2
22	Water bath	1
23	Work bench A	1
24	Work bench B	1
Medium preparation room		
1	Autoclave, vertical	1
2	Drying oven	1
3	Stainless shelf	2
4	Water distiller	1
5	Work bench C	1
Master Mix Room (B)		
1	Domestic refrigerator	1
2	Micropipette set, single	1
3	Micropipette set, Multi	1
4	PCR work station	1
5	Work bench D	2

No.	Equipment	Q'ty
Amplicification		
1	Electrophoresis set A	1
2	Gel imager	1
3	Laboratory refrigerator	1
4	Micropipette set, single	1
5	Micropipette set, Multi	1
6	RT PCR	1
7	Thermocycler	1
8	UV transilluminator	1
9	Work bench E	1
10	Work bench F	1
Virology		
Sample separation/extraction room		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	Centrifuge, micro	1
6	Deep freezer -30℃	1
7	Deep freezer -80℃ A	1
8	Dry thermo unit	1
9	Incubator	2
10	Laboratory refrigerator	1
11	Magnetic stirrer	1
12	Micropipette set, single	1
13	Micropipette set, Multi	1
14	Microscope, Binocular	1
15	Microscope, Fluoroscopy	1
16	Microwave oven	1
17	pH meter	1
18	Platform scale	1
19	Precision electronics balance	1
20	Spectrophotometer	1
21	Timer	1
22	Vortex mixer	2
23	Water bath	1
24	Work bench A	1
25	Work bench B	1
Master Mix Room (V)		
1	Domestic refrigerator	1
2	Micropipette set, single	1
3	Micropipette set, Multi	1
4	PCR work station	1
5	Work bench D	2

No.	Equipment	Q'ty
Amplification		
1	Electrophoresis set A	1
2	ELISA set	1
3	Gel imager	1
4	Micropipette set, single	1
5	Micropipette set, Multi	1
6	Laboratory refrigerator	1
7	RT PCR	1
8	Thermocycler	1
9	UV transilluminator	1
10	Work bench E	1
11	Work bench F	1
Bio Bank (V)		
1	Deep freezer -80℃ B	6
Bio Bank (B)		
1	Deep freezer -80℃ B	2
Washing Room		
1	Water distiller	1
Training Laboratory		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	Centrifuge, micro	1
6	CO2 Incubator	1
7	Deep freezer -30℃	1
8	Dry thermo unit	1
9	Electrophoresis set A	1

No.	Equipment	Q'ty
10	ELISA set	1
11	Gel imager	1
12	Hot plate	1
13	Incubator	2
14	Laboratory refrigerator	1
15	Magnetic stirrer	1
16	Micropipette set, single	1
17	Micropipette set, Multi	1
18	Microscope, Binocular	2
19	Microscope, Teaching	1
20	Microwave oven	1
21	PCR work station	1
22	ph meter	1
23	Platform scale	1
24	Precision electronics balance	1
25	RT PCR	1
26	Spectrophotometer	1
27	Thermocycler	1
28	Timer	2
29	UV transilluminator	1
30	Vortex mixer	2
31	Water bath	1
32	Work bench G	2
33	Work set for Biosafety cabinetmaintenance	1
Lecture Room		
1	Chair with writing board	20
2	Display	2

(3) Equipment Major Specification

Major specification of planned equipment is shown in Table 2-20.

Table 2-20 Major specification of planned equipment

Code No.	Equipment	Main Specifications
1	Autoclave, vertical	Type：Vertical type autoclave Chamber size：φ365 - 425 x 625 - 780 mm Temperature：115 - 130℃ or wider External dimensions： W450 -670x D620-670 x H1,000-1,180mm
2	Biosafety cabinet	Type：Class II, TypeA2 Effective working area dimensions：W1,250-1,350 x D590-640 x H590-650 mm External dimensions：W1,300-1,600 x D720-800 x H1,850-2,000 mm
3	Blood culture	Type：Table top type ID/AST automat system Capacity of sample : 40 bottles or morel

Code No.	Equipment	Main Specifications
4	Burner, electric	Type：Table top, electric type Application：Sterilization of platinum loop
5	Centrifuge, high speed	Type：Floor standing type or bench top with stand Revolving speed：15,000 rpm or more Refrigeration function：Equipped Applicable sample tube： 1.5, 2ml and microplate
6	Centrifuge, low speed	Type：Table top centrifuge Revolving speed：0 - 4,400 rpm or wider Applicable sample tube：15ml and 50ml
7	Centrifuge, micro	Type：Small centrifuge Revolving speed：10,000 rpm or more Sample capacity：1.5/2 ml x 6 pcs. or more
8	Chair・Table	For lecture and meeting.
9	CO_2 Incubator	Type：Heater jacket or water jacket type Capacity：160L or more Temperature control range：Room temp. + 8 - 45°C or wider CO_2 control range： 1 - 19.9% or wider
10	Deep freezer -30℃	Type：Upright type Temperature range：-20 - -28℃ or wider Internal capacity：480L or more
11	Deep freezer -80℃ A	Type：Upright type Temperature range：-70 °C - -80°C or lower Capacity：330L or more
12	Deep freezer -80℃ B	Type：Upright type Temperature range：-70 °C - -80°C or lower Capacity：507L or more
13	Display	Size: 49 inch or more Wall mount type
14	Domestic refrigerator	Type：Double door domestic type Refrigeration room capacity：120L or more Freezing room capacity：43L or more
15	Dry thermo unit	Temperature control range：+ 5 - 95℃ or wider Temperature uniformity：±0.2℃ or less Temp. heating and indication：Digital Block size：1.5ml and 2.0 ml Capacity：20 pcs. or more (both blocks)
16	Drying oven	Type：Natural convection type Temperature uniformity：±10℃ or less Capacity：150L or more
17	Electrophoresis set A	Power supply unit：1 set Gel electrophoresis bath part：2 set Gel casting set：1 set
18	Electrophoresis set B	Power supply unit：1 set Gel electrophoresis bath part：4 set Gel casting set：1 set

Code No.	Equipment	Main Specifications
19	ELISA set	Microplate reader Applicable plate：96 well microplate or more Measuring range：0 - 3.0 OD or more Measuring wavelength：400 - 750nm or wider Filter：3 or more Light source：Halogen or tungsten lamp Microplate washer Applicable plate：96 well microplate or more Pump：Equipped
20	Gel imager	Camera：CCD, CMOS or better quality Sample size：11 x 14 cm or more Light source：UV and blue light or more Operation and analysing unit：Equipped Image capture and analysis software：Equipped
21	Hot plate	Heating plate size：W260 x D230mm or more Operation temperature range：50 - 250°C or wider
22	Incubator	Type：Air jacket and natural convection Temperature range：Room temp. + 5 - 60°C or wider Temperature uniformity：±1.0℃ or less Internal capacity：150L or more
23	Laboratory refrigerator	Temperature range：+2 - +14℃ or wider Light shielding mechanism：Equipped Internal capacity：486 L or more
24	Magnetic stirrer	Type：Electromagnetic type Stirrer volume：50 - 3,000ml or wider Revolving speed：100 - 1,200 rpm or wider
25	Micropipette set, single	Type：Manual dispensing Volume adjustment：Digital, adjustable Dispense volume： A : 0.5 - 10 µL or wider (Accuracy：±2.0 % or less) B : 10 - 100 µL or wider (Accuracy：±2.0 % or less) C : 100 - 1000 µL or wider (Accuracy：±2.0 % or less)
26	Micropipette set, Multi	Type：8ch, dispensing Volume adjustment：Digital, adjustable Dispense volume： A : 0.5 - 10 µL or wider (Accuracy：±8.0 % or less) B : 10 - 100 µL or wider (Accuracy：±4.0 % or less)
27	Microscope, Binocular	Type : Binocular microscope Eye piece : x10 Objective lens : x4, x10, x40, x100 oil Light source : LED Technique : Bright and dark
28	Microscope, Fluoroscopy	Type : Fluoroscopy microscope with camera system Eye piece : x10 Objective lens : x4, x10, x20, x40, x100 oil Light source : LED Technique : Bright, dark and fluorescent Excite filter : 3 type or more

Code No.	Equipment	Main Specifications
29	Microscope, Inverted	Type : Inverted microscope Eye piece : x10 Objective lens : x4 or 5, x10, x20, x40 Light source : LED Technique : Bright, dark and phase contrast
30	Microscope, Teaching	Type : Binocular microscope, teaching type Eye piece : x10 Objective lens : x4, x10, x40, x100 oil Light source : LED Technique : Bright and dark
31	Microwave oven	Type : Domestic type microwave oven Capacity : 16L or more Max. output : 600w or more Turn table : Equipped
32	PCR work station	Type：Installed on laboratory table Working space：W600-720 x D520-580 x H560-780 mm HEPA filter：Equipped UV lamp：Equipped
33	pH meter	Type：Desktop type Electrode type：Glass electrode Measuring parameters：0.00- 14.00 pH or wider pH repeatability：±0.02pH or less Electrode stand：Equipped
34	Platform scale	Type : Platform type, electronics Weighing : 3,200 g or more Accuracy : 0.01g or less
35	Precision electronics balance	Type : Precision type, electronics Weighing : 200 g or more Accuracy : 0.1mg or less Air shield : Equipped
36	Real-time PCR	Block type：96 wells 0.2ml block PCR reaction volume：3 - 30μL or wider Temperature range：30 - 98℃ or wider Temperature accuracy：±0.25℃ or less Heating speed：4ºC/sec. or more Cooling speed：2ºC/sec. or more Light source：LED Number of exciting and detection：4 or more
37	Spectrophotometer	spectrophotometry method：Double beam Measuring range：200 - 1,100 nm or wider Spectro band width：2nm or less
38	Stainless shelf	External dimensions：W1,100 - 1300 x D440 - 470 x H1,700 - 1,900 mm Number of shelves：5 columns or more, adjustable Material：Stainless steel

Code No.	Equipment	Main Specifications
39	Thermocycler	Applicable block： 0.2ml tube or more Temperature setting range：5 - 99℃ or wider Temperature stability：±0.3℃ or less Block ramp rate：Max. 3.0℃ Sample ramp rate：Max. 2.3℃ Main control panel：Touch panel
40	Timer	Channel：2 or more Maximum setting time：99 hrs.59 min. or more
41	UV trans illuminator	Application：Observation of DNA and RNA Filter size：190 x 190 mm or more Wavelength：300 nm or higher
42	Vortex mixer	Head：For agitation of sample tube Rotation speed：2,500rpm or wider
43	Water bath	Temperature range：Room temp. +5 - 60℃ or wider Bath capacity：27L or more Temperature indicator：Digital
44	Water distiller	Type : Table top type Production capacity : 1.5 L/hr. or more Material : Stainless steel or hard glass Water softener : Equipped Equipped distilled water tank capacity: 10L or more
45	Work bench A	Type：Centre table Table size： W3,600 x D1,500mm x H800 mm Drawer : Equipped Shelf: Equipped Plug socket : Equipped Laboratory Chair : 4 sets
46	Work bench B	Type：Centre table with sink Table size：W3,000 x D1,500 x H800 mm Overall sink size : W1,500 x D600 x H800 mm Drawer : Equipped Plug socket : Equipped Laboratory chair : 4 sets
47	Work bench C	Type：Side table with sink Table size：W1,200 x D750 x H800 mm Overall sink size : W1,200 x D750 x H800 mm Drawer : Equipped Plug socket : Equipped Laboratory chair : 4 sets
48	Work bench D	Type：Side table Table size：W3,000 x D750 x H800 mm Drawer : Equipped Plug socket : Equipped Laboratory chair : 4 sets
49	Work bench E	Type：Side table Table size：W3,600 x D750 x H800 mm Drawer : Equipped Plug socket : Equipped Laboratory chair : 4 sets

Code No.	Equipment	Main Specifications
50	Work bench F	Type：Side table with sink Table size：W2,400 x D750 x H800 mm Overall sink size : W1,200 x D750 x H800 mm Drawer : Equipped Plug socket : Equipped Laboratory chair : 4 sets
51	Work bench G	Type：Centre table with sink Table size：W3,600 x D1,500 x H800 mm Overall sink size : W1,500 x D600 x H800 mm Drawer : Equipped Plug socket : Equipped Laboratory chair : 4 sets
52	Work bench H	Centre table type with sink Size : W3,600 x D1,200 x H800 mm+ W1,200 x D600 x H800 mm + Sink W1,200 x D600 x H800 mm Shelf: Equipped Drawer : Equipped Plug socket : Equipped Laboratory chair : 6 sets
53	Work bench I	Type：Side table Table size：W1,800 x D750 x H800 mm Drawer : Equipped Plug socket : Equipped Laboratory chair : 2 sets
54	Work set for biosafety cabinet maintenance	Composition： Air velocity meter with mist pipe, aerosol photometer with probe, container for formaldehyde and ammonia, exhaust fan with flexible duct, hot plate, PAO generator, safety cabinet fumigation set, sampling kit for formaldehyde density
55	AVR 0.5kw	Capacity：0.5kw or more Output voltage：AC230V±3%
56	AVR 1.0kw	Capacity：1.0kw or more Output voltage：AC230V±3%

(4) Maintenance system

Maintenance at the target network laboratories is planned to be performed by internal engineers. For the items that require high-level skills or inspection certificates, agents and third-party organizations will be used. The needs of the Soft Component Program will be examined to provide the training of the equipment maintenance for these engineers.

(5) Agents for research equipment

It is confirmed that there are more than 10 agents for the laboratory equipment in Nigeria, including many general agents of European and American manufacturers. All these agents have engineers and conduct not only sales but also installation, operation training and maintenance. For Japanese manufacturers, seven laboratory equipment agents have been confirmed. For the procurement of planned equipment, these agents will be used so that maintenance functions will be secured easily.

(6) Measures against voltage fluctuations and power loss

1) Measures against voltage fluctuations

Investigation on voltage fluctuations is currently under way, but the measurement of August 2017 at CPHL was +2.0% and -5.4%. The power distribution situation has got worse (about 5 hours a day) and the fluctuation is likely to exceed the common allowable range of ±10%. The situation of the network laboratories is the same. Therefore, automatic voltage regulators (AVRs) will be attached to some equipment that is likely to be affected by voltage fluctuations. For CPHL, if it is decided through future discussion to install AVR in the facilities, the AVR for the facilities will be used instead of installing AVR to each device.

2) Measures against power loss

As a measure against power loss, generators that will be installed or have already been installed will be used. However, uninterruptible power supply (UPS) that features AVR functions will be attached to the equipment that may be affected even by short-time power loss lasting until the start-up of backup generators (biosafety cabinets, PCR devices, ELISA devices, etc.).

(7) Water quality measures

Water quality is currently under investigation. Although it is believed that water is not very polluted, but water hardness is expected to be high. Assuming that the water quality is poor, we will consider attaching filters and softeners to distillers.

(8) Quantity of consumables to procure

Consumables can be procured from agents in Nigeria. Therefore, considering the time required for import, consumables will be included in quantity required for six months.

(9) Installation plan

For the operations of this plan, consultants and installation contractors will have to perform activities in network laboratories after taking the safety measures planned separately. The most important activities include the following.

- The installation contractor develops a Security Management Plan based on the SOP developed by the Japanese Security Clerk consultant.
- The Japanese Security Clerk consultant reviews and verifies the safety plan created by the installation contractor, then makes correction and guidance as needed.
- The installation contractor assigns the Security Coordination Officer during the installation process. The officer will be also responsible for ⅰ) Coordination with safety personnel (including guards) at each facility during installation, ⅱ) Coordination with armed guards on the move, ⅲ) Security management in accordance with the Security Management Plan prepared by the contractor. Prior to

installation work, safety lesson classes for Japanese engineers will be held, including confirmation of actions in the event of an emergency.

- A local security manager is additionally assigned as an advisor to analyse the security situation around the laboratory as well as to ensure safety when moving and staying during the laboratory installation at UNTH, ISTH, UBTH or LUTH located in Enugu State, Edo State and Lagos State.
- Japanese engineers are guarded by armed police officers while traveling between cities in Nigeria (including travel to Lagos city and outside Ring Road 2, Abuja) or from Abuja Airport, working on site, and depending on the situation, while staying in the accommodations.
- Specify transportation means between cities (by aircraft in principle, by 4WD car if there is no air service).
- Secure a backup vehicle for emergency for intercity travel by car.
- Travel must be done during the day (6 am to 6 pm). In ISTH (Irrua, Edo State), where are no suitable accommodation facilities from the viewpoint of safety, installation work must be performed in consideration of travel time.
- Own and use various safety devices (i.e., alarm, portable GPS).

(10) Deadline for the introduction of equipment to Network laboratories other than CPHL

Equipment will be delivered in two parts as follows.

1) The first term of installation to CPHL and the other 7 network laboratories

The equipment to be installed to CPHL at the first term shall comprise of the one that can simply be placed (e.g., pipettes, vertical autoclaves, centrifugal machines, etc.) or the one needs to be adjusted and interfaced with other equipment. The equipment will be installed to the existing laboratory. After the completion of the Project, they will be relocated to the new CPHL facility with supports from the technical cooperation project under the responsibility of CPHL. The delivery of equipment to the other seven network laboratories is also scheduled for the same period of the first term of installation to CPHL.

2) The second term of installation to CPHL

The following equipment is scheduled to install according to the construction schedule:

i) equipment that needs to be assembled during construction of the new CPHL facility

ii) equipment that requires connection (signals, alarms) to the facility (i.e., freezers, incubators, laboratory tables, and biosafety cabinets)

iii) equipment that could not be delivered at the first term of installation due to limited space in the existing laboratory

2-2-3 Outline Design Drawing

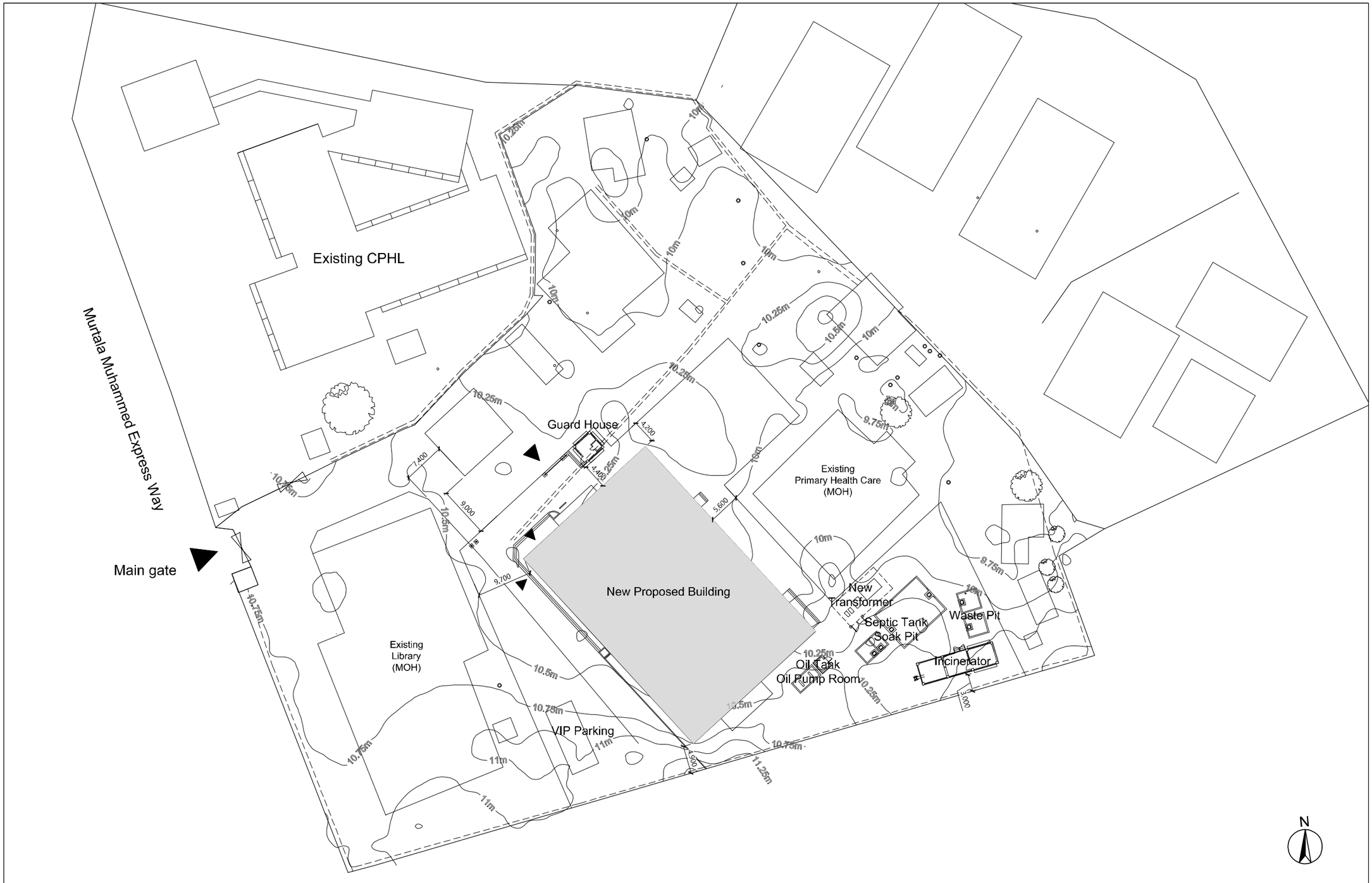


Figure 2-14 Site layout plan

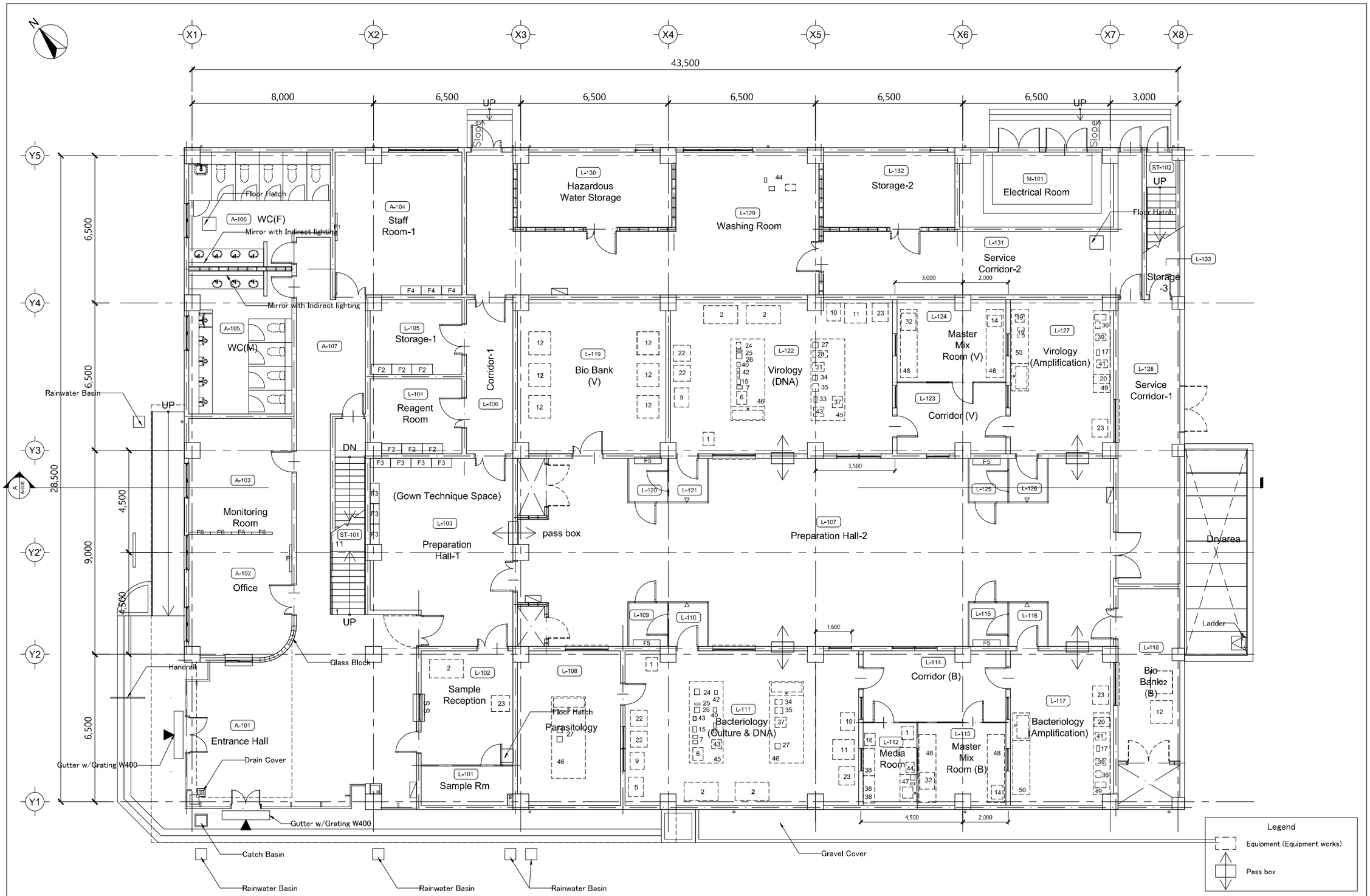


Figure 2-15 Ground floor plan

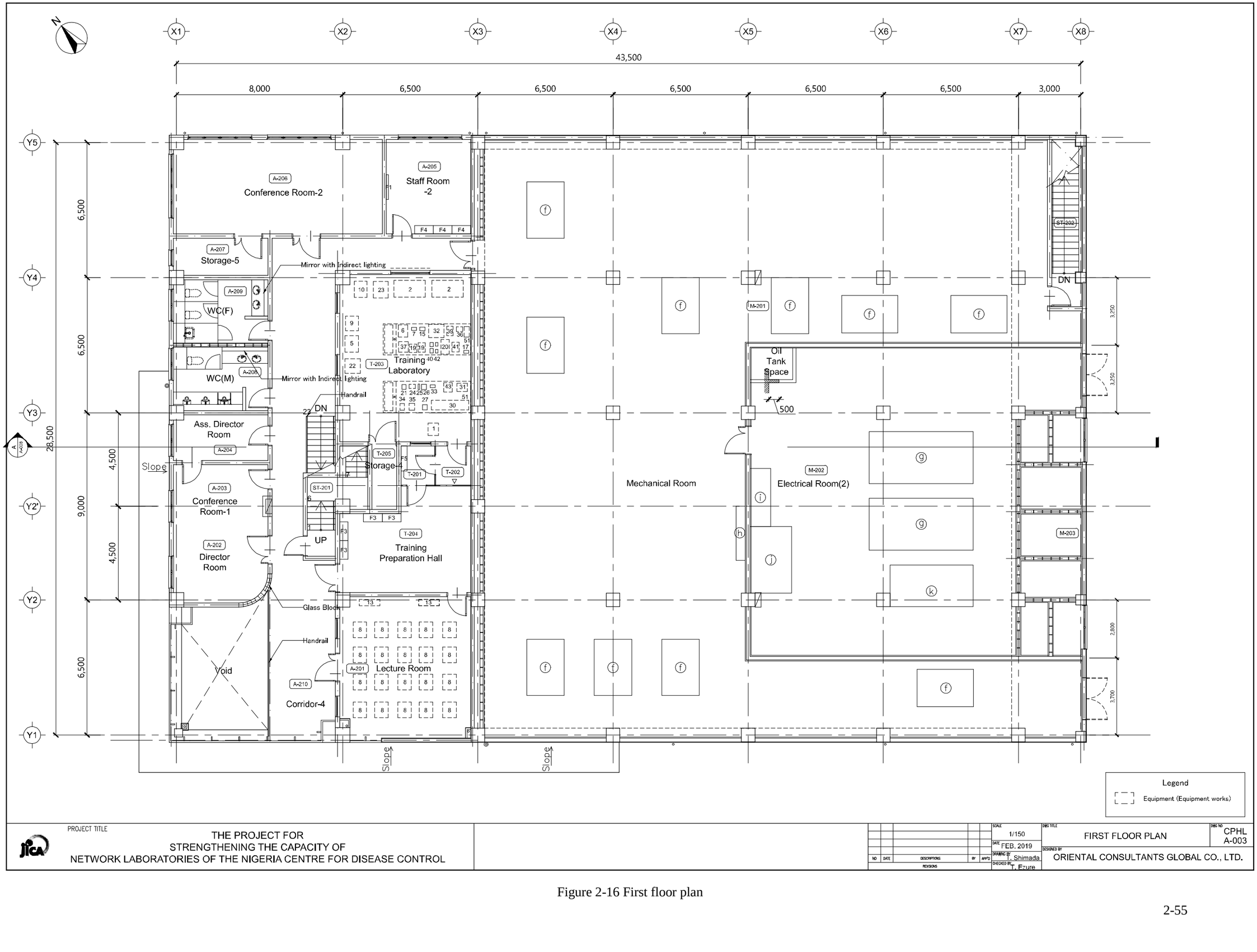


Figure 2-16 First floor plan

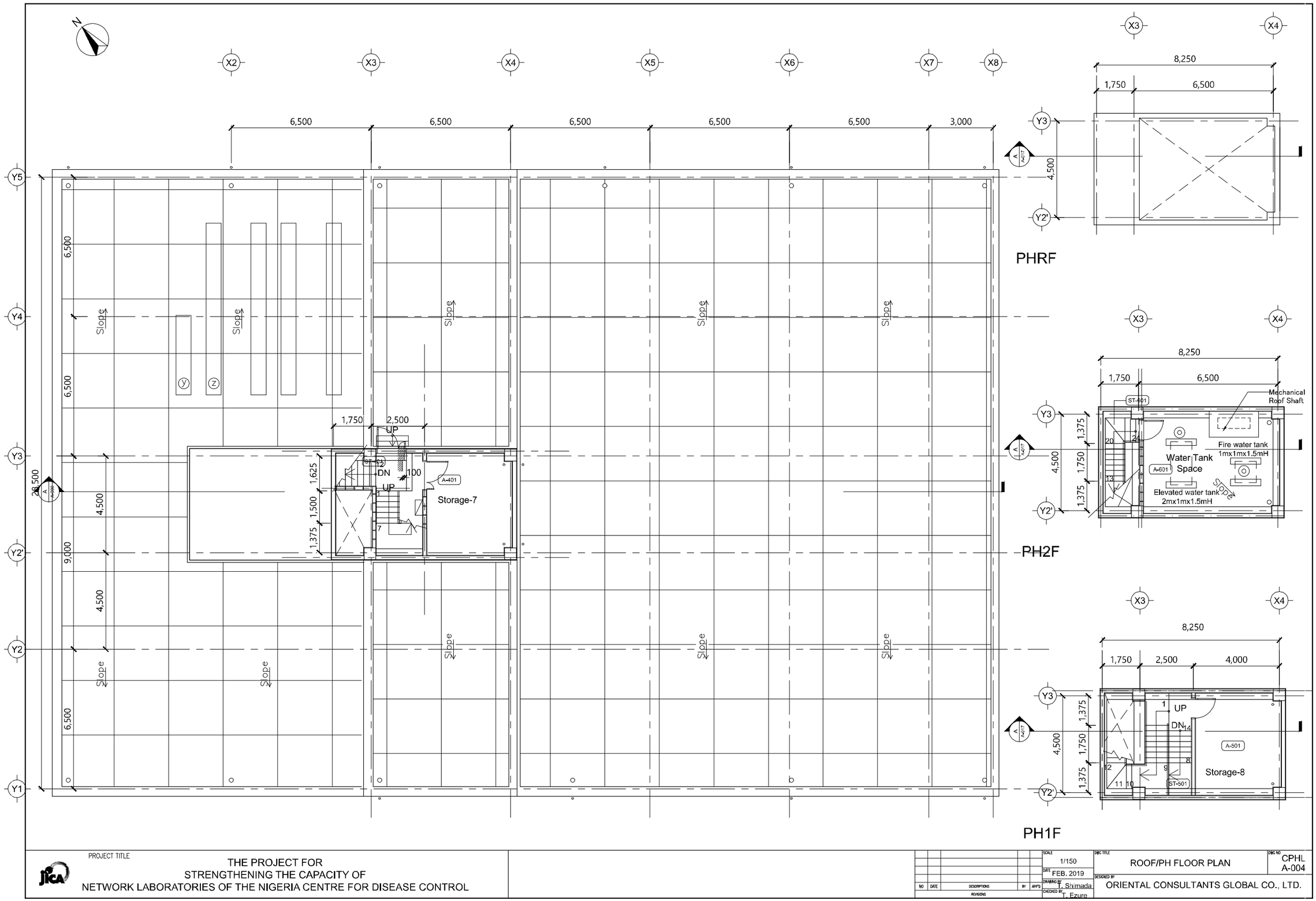
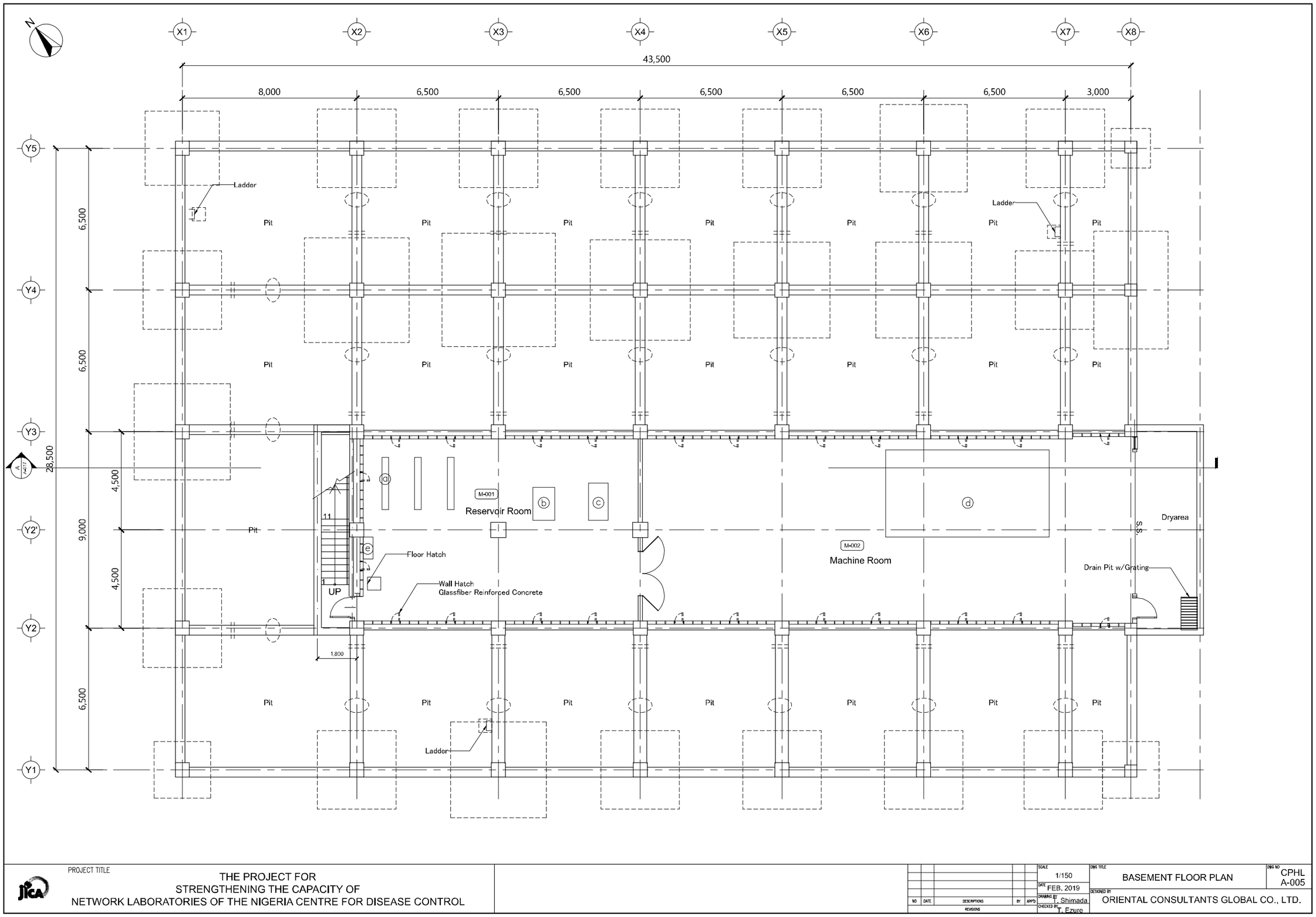


Figure 2-17 Roof floor plan



PROJECT TITLE

THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NETWORK LABORATORIES OF THE NIGERIA CENTRE FOR DISEASE CONTROL

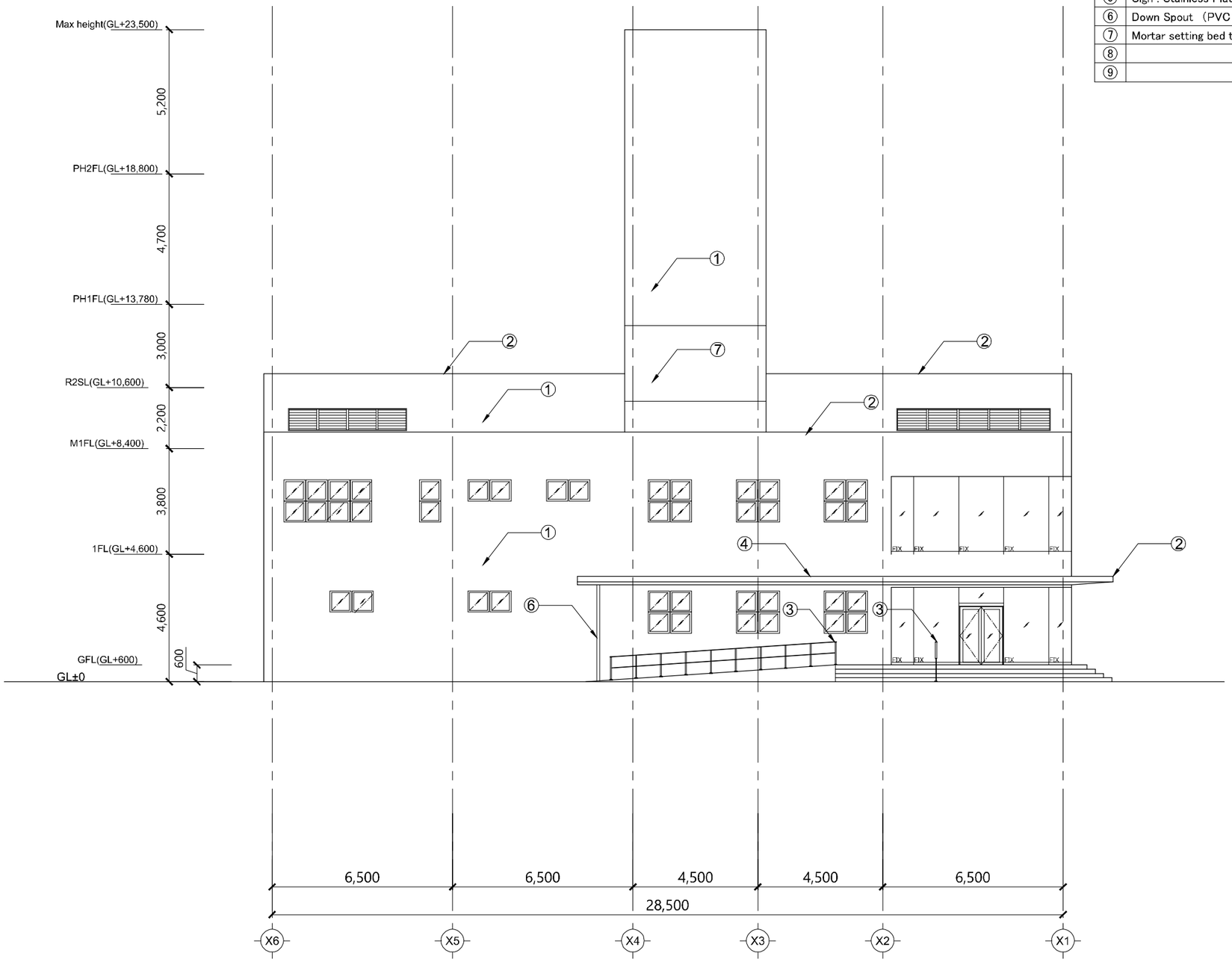
NO	DATE	DESCRIPTIONS	BY	APP'D
		REVISIONS		

SCALE 1/150
DATE FEB. 2019
DRAWING BY T. Shimada
CHECKED BY T. Ezure

DWG TITLE: BASEMENT FLOOR PLAN
DWG NO: CPHL A-005
DESIGNED BY: ORIENTAL CONSULTANTS GLOBAL CO., LTD.

Figure 2-18 Basement floor plan

No.	Material / Finish
①	Mortar setting bed t25, w/ UE Paint
②	Readymade Aluminium Coping
③	Handrail : Steel FB w/SOP
④	Eaves : Concrete w/Rubber Asphalt Resin Membrane Water Proofing
⑤	Sign : Stainless Plate, Silk Screen
⑥	Down Spout (PVC 100φ)
⑦	Mortar setting bed t25, w/ UE Paint + UE Paint for Roof
⑧	
⑨	



PROJECT TITLE

THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NETWORK LABORATORIES OF THE NIGERIA CENTRE FOR DISEASE CONTROL

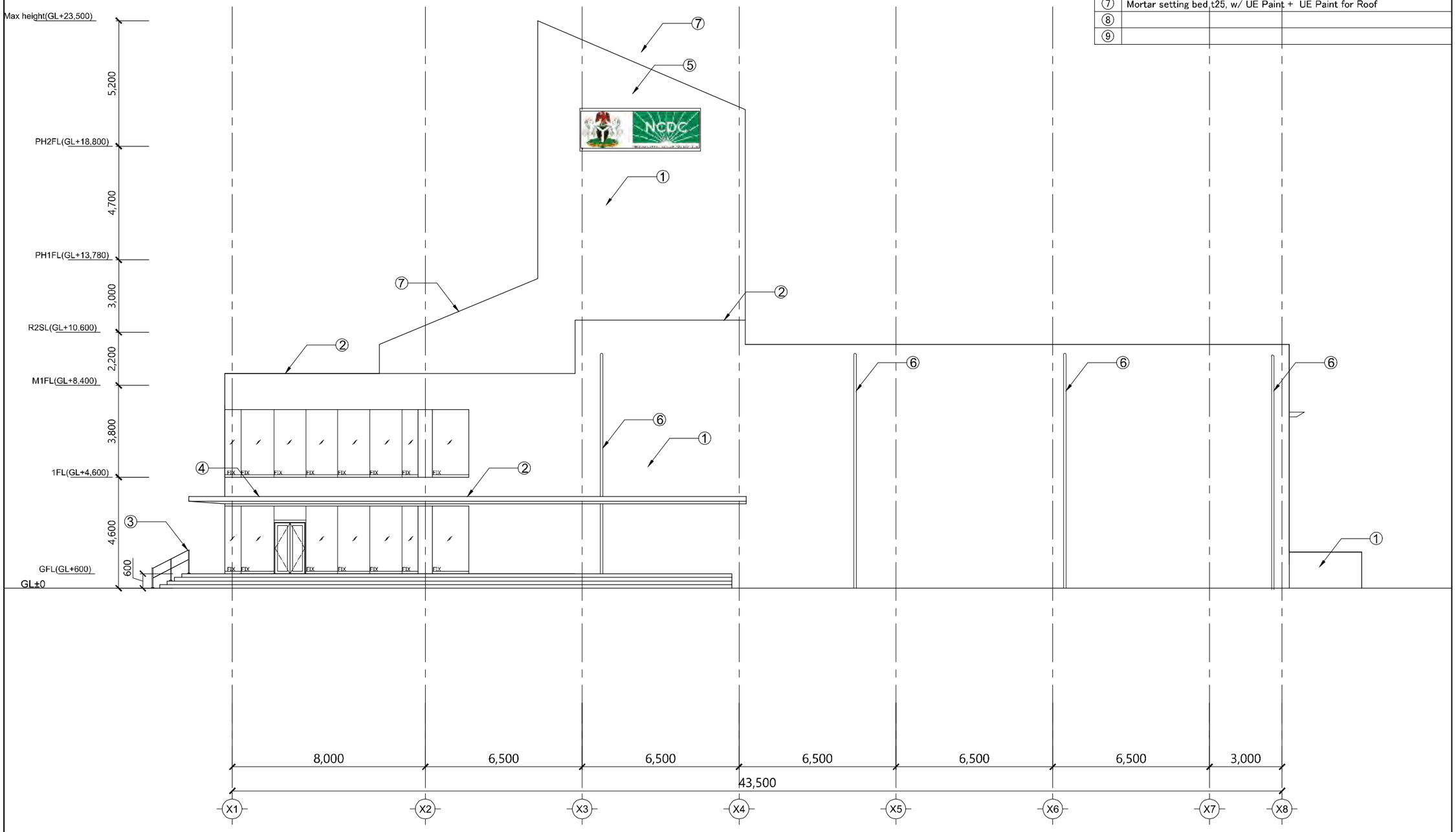
NO	DATE	DESCRIPTIONS	BY	APP'D
		REVISIONS		

SCALE 1/150
DATE FEB. 2019
DRAWING BY A. Shimada
CHECKED BY T. Ezure

DWG TITLE: NORTH ELEVATION
DWG NO: CPHL A-006
DESIGNED BY: ORIENTAL CONSULTANTS GLOBAL CO., LTD.

Figure 2-19 Elevation (1)

No.	Material / Finish
①	Mortar setting bed t25, w/ UE Paint
②	Readymade Aluminium Coping
③	Handrail : Steel FB w/SOP
④	Eaves : Concrete w/Rubber Asphalt Resin Membrane Water Proofing
⑤	Sign : Stainless Plate, Silk Screen
⑥	Down Spout （PVC 100φ）
⑦	Mortar setting bed t25, w/ UE Paint + UE Paint for Roof
⑧	
⑨	



PROJECT TITLE

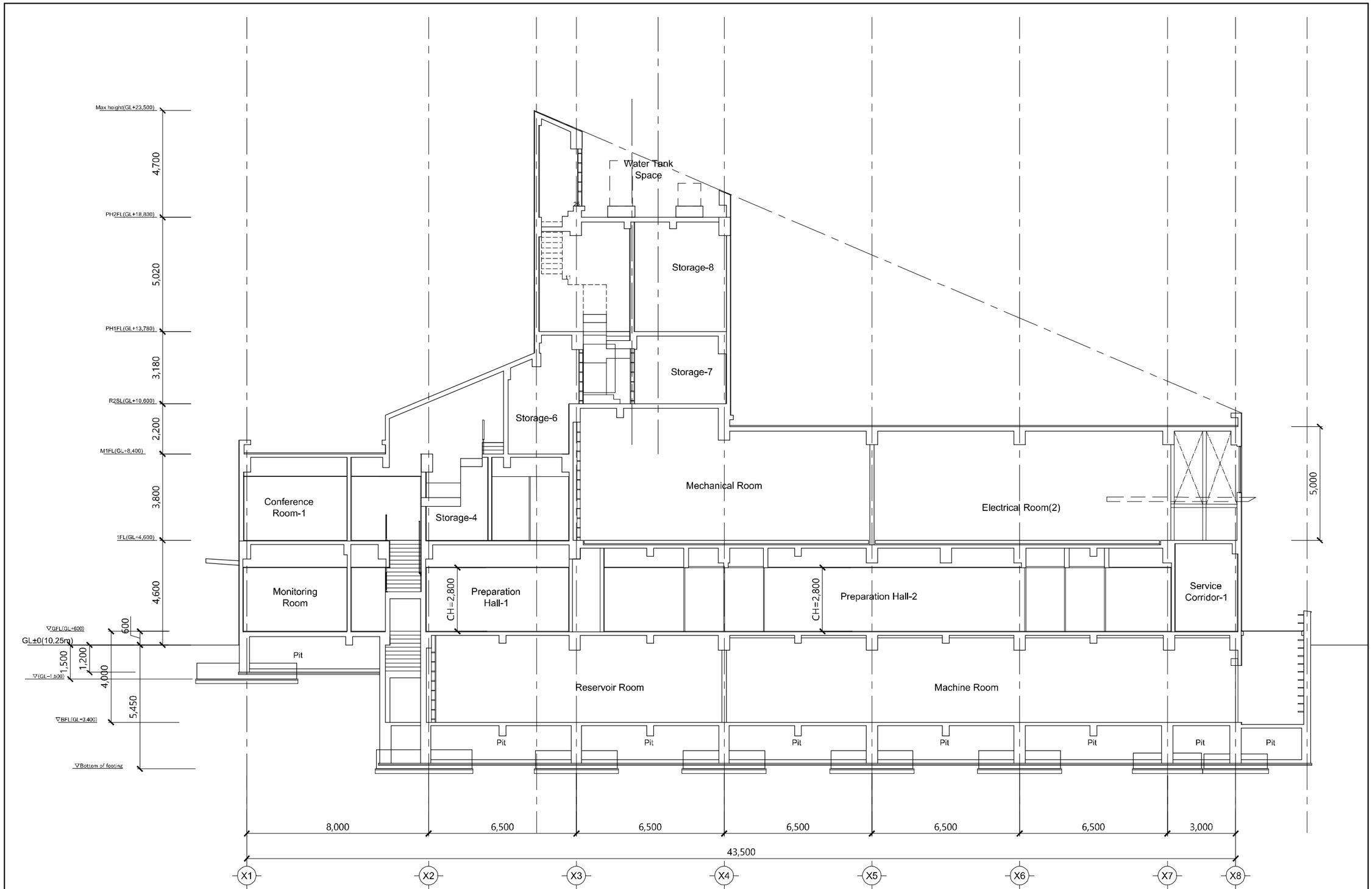
THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NETWORK LABORATORIES OF THE NIGERIA CENTRE FOR DISEASE CONTROL

NO	DATE	DESCRIPTIONS	BY	APP'D
		REVISIONS		

SCALE 1/150
DATE FEB. 2019
DRAWING BY T. Shimada
CHECKED BY T. Ezure

DWG TITLE: WEST ELEVATION
DWG NO: CPHL A-007
DESIGNED BY: ORIENTAL CONSULTANTS GLOBAL CO., LTD.

Figure 2-20 Elevation (2)



PROJECT TITLE

THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NETWORK LABORATORIES OF THE NIGERIA CENTRE FOR DISEASE CONTROL

NO	DATE	DESCRIPTIONS	BY	APP'D
		REVISIONS		

SCALE 1/150
DATE FEB. 2019
DRAWING BY T. Shimada
CHECKED BY T. Ezure

DWG TITLE SECTION
DWG NO CPHL A-008
DESIGNED BY ORIENTAL CONSULTANTS GLOBAL CO., LTD.

Figure 2-21 Section

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) General

1) The Exchange of Notes (E/N) for the Grant Aid Project shall be concluded between the Government of Japan and the Government of Nigeria after the cabinet meeting and decision by the Government of Japan.

2) With the signing of E/N, Grant Agreement (G/A) shall be entered into between JICA and the recipient country. On the basis of the G/A, JICA will make payments to the recipient country as the Project progresses.

3) The signing of E/N and G/A will mark Japan's official commitment to provide the aid in question and its practical implementation.

4) Following conclusion of G/A, consultants of Japanese nationality and the government of Nigeria will conclude an execution design and supervision contract, and immediately start detailed design work.

(2) Detailed Design Stage

1) For the Detailed Design, full details of facilities and equipment in the Outline Design should be carefully confirmed and discussed with the implementing agency.

2) The consultant shall discuss the technical issues through meetings with the relevant authorities in Japan and Nigeria during the detailed design stage.

3) It is believed that the design period will require approximately 3 months.

(3) Tender

1) Tendering will follow the JICA tendering guidelines.

2) There are three possible methods for the tender, (a) a Japanese construction company for facility construction and equipment, (b) a stand-alone method dividing facilities and equipment or (c) a consortium between Japanese construction companies and trading companies that combines facility construction, the evaluation is carried out after a careful verification of the particularities of the Project. Option-(b) will be deemed advantageous and adequate to ensure a competitiveness of the tender based on contents, scale of the Project.

3) The party executing the tender will be the implementing agency, but it is necessary for consultants to cooperate sufficiently while taking instructions from JICA.

(4) Construction

1) According to the result of the Preparatory Survey in Nigeria, local building materials which are acceptable in quality and supply should be used for the Project as much as possible, for ensuring and maintaining quality are the most important items to be noted.

2) For the planning of labour supply, the quality level of skilled and semi-skilled workers in local contractors will be taken into consideration. It is important that a Japanese contractor, as the prime contractor, supervise and manage the local contractor and his labourer to maintain the quality assurance required for the Project.

(5) Implementation Organization (Project Implementation Agent)

The organization responsible for the Project is the Ministry of Budget and National Planning and the implementation organizations are the Federal Ministry of Health (FMoH) and NCDC. The following diagram shows the relationship between the implementation organization, the Japanese consultant and contractor.

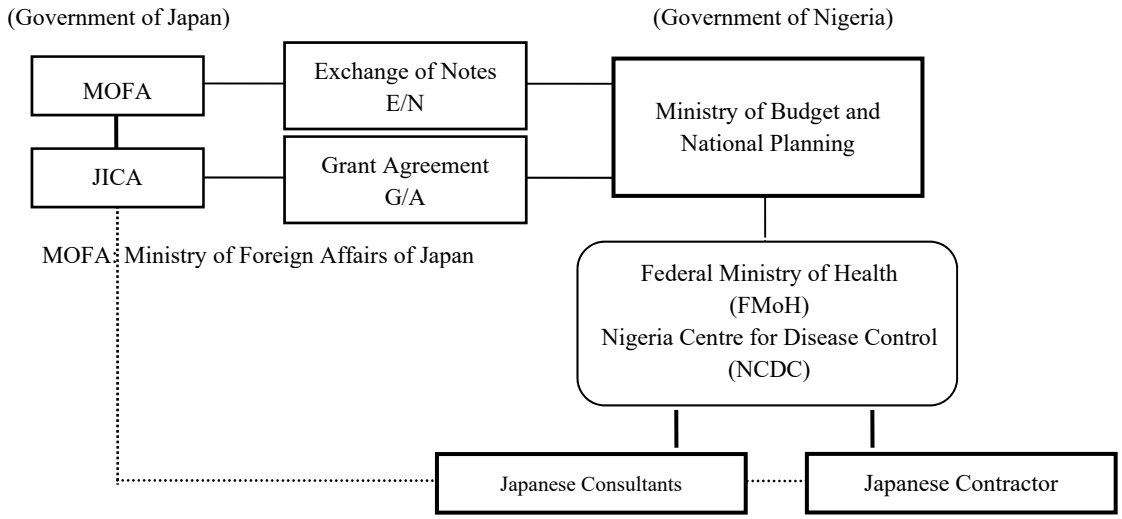


Figure 2-22 Implementation Organization

2-2-4-2 Implementation Conditions

I. The rainy season in Lagos is from May to October, especially during the three months May, September and October, rainfall concentrates. It is necessary to formulate a construction plan with sufficient consideration during the rainy season.

II. The standards and laws concerning construction are based on Nigerian standards (NBCN: National Building Code of Nigeria) and Japanese standards, and in some cases BS, ASTM, etc. standards shall be applied after considering the local situation.

III. Detailed coordination and adjustment shall be key and necessary for the contractors to schedule construction works, installation of laboratory equipment.

IV. Since the construction works is implemented inside the compound administrated not only by CPHL also FMoH, the following consideration shall be taken for the surrounding environment.

a) Construction methods that minimize the negative impacts on the existing CPHL facility shall be adopted. The construction plan shall be formulated to prevent construction pollutions such as noise, accidents etc. during the construction period.

b) It is the key to take care of proper measure for the safety & hygiene of the site and the traffic control of construction vehicles as well as pedestrians, and for preventing existing roads and surrounding area from damages.

c) The safety plan shall be formulated for the proper storage of construction materials, machinery and equipment, the placement of temporary buildings etc. to prevent CPHL from interruptions in operating the existing CPHL facility.

V. Value added tax (VAT), customs duty and other taxes collected in Nigeria shall be subject to the tax exemption. It is understood that Import tax (Import Tax), Value Added Tax (VAT: 5%), Income Tax (CIT), Personal Income Tax (PIT) including withholding tax shall be exempted for the Project.

Based on results of the field survey, parts of the Import Tax such as CISS (Comprehensive Import Supervision Scheme), ETLS (ECOWAS Trade Liberalization Scheme Duty) may not be subjects for the tax exemption, which shall imply that NCDC shall bear those Tax as a part of responsibilities of the Nigerian side as stipulated in E/N and G/A.

2-2-4-3 Scope of Works/ Division of Procurement and Installation

The responsibilities between the Japanese side and the Nigerian side for the implementation of Japan's Grant Aid Project are shown in Table 2-21.

Table 2-21 Division of works between the Japanese Government and the recipient country for Grant Aid Project

Japanese side	Nigerian side
(1) Demolition works ・ Demolition at the area administrated by CPHL: Existing buildings (Training lab., Elevated tank, Staff house, Cafeteria, Storage), Fence, Existing concrete floor and foundation ・ Relocation at the area administrated by CPHL: Electrical poles, Tree and Plantation ・ Demolition at the area administrated by FMoH: Elevated tank, Reservoir tank ・ Relocation at the area administrated by FMoH: Power generator room and Generator	(1) Site preparation a) Governmental coordination and arrangement for demolition of existing buildings undertaken by Japanese side (NCDC) b) The temporary electricity supply and water for construction works (NCDC) (2) Basic works a) Water supply Installation and preparation of the water supply pipe from the city water system to the connection point at the boundary of the site (NCDC) b) Electrical power installation works Installation and preparation of the electrical power supply from the commercial power network to the

(2) Building works Structure works, finishing works, parking etc. (3) Electrical works Wiring work from the arrival panel in the electrical room (including the arrival panel), lightning protection equipment, lighting / socket, communication equipment (4) Plumbing works a) Water supply works Water equipment works b) Drainage works Penetration in site and drain outside the premises c) Water treatment facility d) Water reservoir e) Fire hydrant etc. (5) External works in Project site Driveway (6) Equipment works a) Equipment procurement b) Maritime and domestic transport in Nigeria c) Delivery and installation of equipment d) Trial test and explanation of the instructions for use (7) Compliance with the environmental management plan stipulated by Nigeria (8) Technical guidance on special facility and equipment for P2 and P3 Laboratory (9) Basic technical assistance for maintenance of facility, utility and equipment(including initial operation training) (10) Maintenance contract for the specified equipment (2 years)	connection point at the boundary of the site (NCDC) c) Telephone and network works Installation and preparation of the telephone and telecommunication line from the city network to the connection point at the boundary of the site (NCDC) (3) Other formalities Formalities for land ownership, Formalities for changing land use, Formalities for applying for a building permit, formalities relating to social and environmental considerations, formalities for requesting the connection of facilities, formalities and exemption from customs clearance of materials and equipment for the construction of installations, etc.(NCDC) (4) Budget required for the maintenance, management and operation of new facilities (NCDC) (5) Exemption from customs duties, internal taxes, and other charges for Japanese and third-country nationals involved in the work (NCDC) (6) Facilities and privileges of Japanese technicians during their entry and leave of Nigeria (NCDC) (7) All works other than those supported by the Japanese side including general furniture not procured by the Project (NCDC)
	(1) Payment to the B/A (Banking Arrangement) and A/P (Authorization to Pay) (2) Tax exemption of equipment import (3) Participation in the explanation of the instructions for use of the equipment (4) Assignment of maintenance staff and participation in technical supervision (5) Issuance of certificate of completion after acceptance of equipment (6) Provision of the armed guard police officer for Japanese nationals (7) Assignment of participants for the soft component program with per diem, allowance and travel expenses

2-2-4-4 Consultant Supervision

(1) Basic Policy

It is planned that a resident supervisor specialized in construction shall be dispatched to supervise the entire construction in order to thoroughly carry out the quality control on site upon construction works undertaken by the contractor. In addition, specialized supervisors shall perform the spot supervision at the important timing according to the progress of various construction (framework construction, building construction, etc.), and the Project manager shall undertake the on-site supervision and/or inspections at the specified milestones i.e. the commencement of works, at the completion of concrete works, at the final completion of works.

Table 2-22 Plan of personnel necessary for supervision

Name of supervisor (expertise)	Period (Nigeria)
<Building and Facility>	
Resident construction supervising engineer	20.5 months
Non-resident supervised engineer	
・Project manager/construction supervised engineer 1 (architecture)	1.50 months
・Construction supervised engineer 2 (architecture)	0.80 months
・Construction supervised engineer 3 (structure)	0.50 months
・Construction supervised engineer 4 (electric/machine)	1.00 months
・Construction supervised engineer 5 (HVAC)	1.50 months
・Japanese security clerk	0.54 months
Name of supervisor (specialty)	Period (Nigeria)
<Equipment>	
Inspection engineer 1 (confirmation, acceptance /delivery)	1.00 months
Inspection engineer 2 (confirmation, acceptance /delivery)	1.03 months
Japanese Security clerk	
Resident supervised engineer 1 (Group A)	1.17 months
Resident supervised engineer 2 (Group B)	1.23 months
Inspection engineer 3 (examination/verification of shop drawings)	6.26 months
Inspection engineer 4 (inspections with witness)	0.30 months
Resident supervised engineer 3	
Resident supervised engineer 3 (1st lot of delivery: warranty inspection)	
Supply supervised engineer 1 (2nd lot of delivery: warranty inspection)	0.33 months
Supply supervised engineer 1 (1st lot of delivery: 1st year maintenance contract)	0.43 months
Supply supervised engineer 1 (2nd lot of delivery:1st year maintenance contract)	1.39 months
Supply supervised engineer 1 (1st lot of delivery: 2nd year maintenance contract)	
Supply supervised engineer 1 (2nd lot of delivery:2nd year maintenance contract)	0.30 months

(2) Contents of Consultants Assignment

The resident supervisor for construction works shall be mainly in charge of i) inspection, confirmation, coordination on site of the progress both for construction works and for equipment procurement and installation, ii) review and approval of construction documents such as relevant construction plans, construction drawings and the like. Headquarters in Tokyo shall be responsible for i) monitoring and supporting the on-site supervision, ii) reporting the progress of construction works to JICA headquarters, iii) attending the factory/product inspection, pre-shipment inspection etc. in Japan.

Full-time Equipment Procurement Supervising Engineer will witness carrying-in, unpacking, installation, procurement, trial operation, initial and subsequent operation training, supervise installation and check inspection reports, all concerning the equipment procured by a trading company. Procurement

Supervising Engineer will also conduct a final check in the acceptance inspection on site and obtain an approval letter from the recipient. Inspection Engineers 1 and 3 will check production drawings of the equipment submitted by the procurement company and will be in charge of inspection before expiration of manufacturer's warranty to be conducted within a year after delivery. Inspection Engineer 1 will also check at each facility whether the conditions described in the special notes for the acceptance of equipment in facilities, shown in Table 2-20, are satisfied. Inspection Engineers 2 and 4 will witness product (plant) inspections and supervise equipment verification inspection before shipping.

(3) Issuance of Certificates

The certificates on export of construction materials and equipment, the payment for construction, practical completion and final completion, etc., are issued.

(4) Submission of Reports, etc.

Checking and approving monthly progress reports, completion documents and photos of works from the contractor and submitting to the Government of Nigeria and JICA. After completion, the completion report shall be prepared and submitted to JICA in accordance with the Grant Aid guidelines.

(5) Others

Monitoring and expediting the schedule of works to achieve smooth operation of related works executed by the Government of Nigeria, shall be done as necessary.

2-2-4-5 Quality Control Plan

(1) Basic policy

The Detailed Design drawings shall be developed based on the studies analysed from actual circumstances in Nigeria, maintenance cost, use of local materials and local construction methods. The specification should comply with the Nigeria construction standards, Japanese Regulations such as Japanese Architectural Standard Specification (JASS), National Building Code of Nigeria (NBCN), BS and ASTM to ensure the quality of buildings, utilities and equipment.

The construction plan, implementation schedule and shop-drawings which are to be submitted by the contractor during the construction period shall be examined and approved by the consultant.

(2) Quality Examination (Building Construction)

The Japanese Consultant shall examine the implementation plan submitted by the Contractor prior to the commencement of each stage of the works, and approve it if the construction materials and the execution methods conform to the Specification. The Consultant should inspect necessary portions of work based on the implementation plan and Specifications. The key supervision items will be determined on the basis of the implementation plan, and inspections will be carried out properly.

In this Project many materials can be purchased locally, besides the manufacturers' warranty on the products unannounced quality assurance inspections shall be carried out to assure the quality.

1) Earthwork

The work plans and schedule shall be developed based on the open cut method for excavating the basement floor and foundation, considering the groundwater level and rainy season. It is the key to pay attention to the disposal of the excavated soil and the quality of the borrow materials.

2) Reinforcing Bar Work

The Mill-Sheet and so on, showing re-bar content submitted by the Contractor should be confirmed by the Consultant. Also bar quality and strength should be inspected to match yield strength in the specification.

3) Concrete Work

It is planned to use the ready mixed concrete which is available in Lagos city. The main items for the supervision works (items to be inspected, method of inspection) are as follows:

a. Items to be inspected for concrete material

Material	Item to be inspected	Method of inspection
Cement	Hydration Heat	Dissolution Heat
Sand/ Gravel/ Crushed Stone	Grading	Sieve analysis
	Absolute dry specific gravity	Specific gravity & ratio of water absorption
	Alkali aggregate reaction	Alkali aggregate reaction test
Water	Organic impurities	Quality test of water

b. Items to be inspected for the mixing test

Item to be inspected	Method of inspection
Estimate test for structural concrete	Compression test machine
Slump	Slump cone
Concrete humidity	Hygrometer
Air content	Manometer
Chloride volume	Measuring instrument for salt

c. Items to be inspected for the concrete placing

Item to be inspected	Method of inspection
Time from mixing to completion of concrete placing	Check time of completion of concrete placing (one hr. or less)
Slump	Slump cone
Concrete humidity	Hygrometer
Air content	Manometer
Chloride volume	Measuring instrument for salt

d. Items to be inspected in the progress schedule

Item to be inspected	Method of inspection
Estimate test for structural concrete	Compression test machine
Accuracy for the openings of door & windows	Measurement
Accuracy for horizontal level of concrete slab	Spirit level & measurement
Status of Finishing	Visual inspection

(3) Quality Inspection of Equipment

During the equipment procurement and installation supervision, most appropriate work plan shall be established with Nigerian side and the supplier through coordination of work schedule, work contents and placement plan etc. After establishing procurement equipment, smooth progress of the overall operation will be implemented through close coordination with the construction plan. Respect points about procurement and supervision are as follows.

1) After concluding equipment procurement contract, the Consultants shall promptly confirm with the content of procurement equipment, allocation plan, country of manufacture, supplier, the utility to building and facility consultant, Nigerian side facility personnel and the supplier.
2) Under the supervision of the Consultant, the equipment procurement contractor conducts inspection for custom-made equipment at the manufacturer's factory and pre-shipment inspection prior to the export packaging.
3) For the equipment shipping from Japan, consign to third-party institution and conduct pre-shipment equipment verification inspection under the supervision of the Consultant.
4) On the installation work of the equipment procurement contractor, a person in charge of supervision from consultant will be dispatched for witness the work on site and make necessary coordinate with facility side based on the arrangement plan.
5) In the final delivery inspection, confirm the number of contracted equipment, any discrepancy, required specification and function, implementation of operation training etc. and carry out delivery work.

2-2-4-6 Procurement Plan of materials and equipment

The main building materials and equipment needed for the construction work are available and can be supplied in Nigeria. However, since a large part of the structures and finishing materials will be import materials from neighbouring countries available through distributors in Lagos, it will be necessary to ensure homogeneity and the quality.

For concrete, ready-mix concrete available from power plants in the city of Lagos will be used.

Locally manufactured products such as tiles as interior and exterior coating materials, paint, aluminium products, lighting fixtures for installation work, switches, ceiling fans, electrical wires, cables, conduit

material, plumbing fixtures, pumps, water tank, distribution board, including imported products, are widely available in the market, but it will be necessary to ensure the homogeneity and quality of the products.

Roofing waterproof materials, aluminium coping, windows, doors, finishing materials (polyvinyl chloride (PVC) floor sheet and steel panel), pass box, plaque, air conditioning units, variable air volume unit, air distribution vents, automatic control devices, water treatment system infectious, pumps, emergency shower enclosure, materials of a portion of pipelines such as steel pipes coated with PVC and stainless steel pipes, necessary for installation work, are planned to supply in Japan.

Also, most of the equipment will be procured from Japan or Nigeria. However, there is a possibility that competitive and fair bidding will not be established by procuring the equipment limited to Japanese product. Therefore, the procurement from third countries will be considered for cases below.

1) Equipment which is not manufactured, or whose manufacturer is limited in Japan: blood culture, centrifuge with high speed, deep freezer -80℃ A and B, gel imager, ELISA set, fluoroscopy, inverted microscope, Real-time-PCR, Spectrophotometer, thermocycler etc.
2) Equipment which is generally procured locally in Nigeria (i.e., domestic refrigerator and microwave)

The procurement countries of major items are shown in Table 2-23 and Table 2-24.

Table 2-23 Procurement country of major construction materials

Name of material	Procurement country			Remarks
	Local	Japan	Third country	
[Materials]				
Portland Cement	○			
Sand	○			
Gravel	○			
Re-bar	○			
Form	○			
Concrete Blocks	○			
Timber	○			
Metal Fittings	○	○		
Steel Panel		○		For laboratory
Aluminium fittings	○	○		Airtight fittings for Laboratory
Glass	○	○		Airtight fittings for Laboratory
Paint	○			
Waterproof material		○		
Distribution Panel	○			
Wire, Cable	○			
Wiring Devices (Switch, Outlets)	○			
Conduit Pipe	○			
Lighting Fixtures	○			
Air Conditioning Units (Split Type)		○		
Ventilating Fans		○		

Name of material	Procurement country			Remarks
	Local	Japan	Third country	
Water reserving tank		○		
Sanitary Fixtures	○	○		
Pipe (uPVC, SGP)	○	○		Stainless pipes are supplied in Japan
Valve	○	○		Valves and metal fittings for infectious wastewater are supplied in Japan
Well water treatment equipment		○		
Supply fan unit		○		
Emergency shower unit		○		
Chemical faucet		○		
Generator	○			
Construction Machinery	○			
Furniture	○			

Table 2-24 Procurement country of major equipment

Equipment	Origin of the Country			Note
	Nigeria	Japan	The Others	
Biosafety cabinet		○		
Blood culture		○	○	*1
Centrifuge, high speed		○	○	*1
Deep freezer -80℃		○	○	*1
ELISA set		○	○	*1
Gel imager		○	○	*1
Microscope, fluoroscopy, inverted		○	○	*1
Real-time PCR		○	○	*1
Spectrophotometer		○	○	*1
Thermocycler		○	○	*1
Work bench		○		
Work set for biosafety cabinet maintenance		○		

*1: To secure fair and proper competitive tendering

2-2-5 Security Management Plan

2-2-5-1 Policy for Security Management

Regarding security posture of this project sites existing on Abuja Federal Administrative district, Lagos state, Oyo state, Kwara state, Enugu state and Edo state, it is necessary to take measures in hard and soft aspects as security situation in general, for vulnerable defence line of each site, lacking of standard operational procedure (SOP) of the emergency etc. at present time. Because of this, we will take security measures reflected by outcome of this site survey, recognizing the way of thinking described in the “JICA security/safety measures guidance (March 2019) as a basic idea, on the premise to observe “JICA security/safety measures (Nigeria, May 2019)”.

2-2-5-2 Outline of security measures

(1) Common items

1) Arrangement and employment of security personnel for ensuring safety

① Japanese Security Clerk

- The clerk is expected to be Japanese who has experiences of military/police with enough knowledge and skills for security measures, especially being familiar with information analysis, counter-terrorism tactics, etc.
- Japanese Security Clerk shall visits the Project sites four times and modify security posture including revision of the SOPs, provision of advice and guidance based on collected information and analysis.

② Security coordination officers (two personnel named “A” and “B”)

- Contractor shall arrange and employ security coordination officers who are assumed Japanese during activities on seven sites except for CPHL
- During activities, security coordination officers shall coordinate with security personnel belonging to the site (including private security guard) and Armed Guard Police Officer (see below③) especially for moving on road on security of activities (※1), and do administration in line with security plan prepared by contractor, and so on. (※2)

※1 Coordinate based on “List of coordination items with Armed Guard Police Officer, etc. (Standard)”

※2 Before activities on site, execute a safety lesson class where teaches the way of security management on security management plan, action management in emergency etc.

③ Armed Guard Police Officer

- Assumption is the Nigerian Mobile Police (MOPL). In line with “JICA security/safety measures(Nigeria, May 2019), Japanese shall go with Armed Guard Police Officers in movement inter-city in Nigeria(including movement to Lagos and outside 2nd ring road in Abuja city),in movement from Abuja airport, in the site, and at staying accommodations, depending on the situation.
- The number of Armed Guard Police Officer shall be equal or above that of vehicle for above two is requisite at every activities.
- All cost of employing the Armed Guard Police Officers shall be borne by the Nigeria side.

④ Nigerian Security Manager (Security Manager)

- Considering security situation of Edo state, Enugu state and Lagos, One Nigerian Security Manager shall be employed at each activity group in these area

- Nigerian Security Manager shall accompany with the group ,coordinate and advise with/to Armed Guard Police Officer arranges with contractor, give some advice/guidance based on situation and situation analysis

(2) Accommodation for the Japanese Project members

- The principle of selecting an accommodation for Japanese project members is to stay at accommodation designated by JICA Nigeria Office.
- Depending on the situation, to stay under direct protection of Armed Guard Police Officer at the accommodation

1) Communication equipment

① Mobile Communication

- The Contractor, the Supplier and the Consultant will have and carry mobile phones with several SIM carriers in activities group as usual.
- Japanese engineers shall carry satellite mobile phone (with vehicle mounted antenna) and appropriate the cost on Japanese Project items in the survey for Detailed Design and construction supervision,

② Other devices

- Japanese engineers shall carry GPS and Alarm device(Loud speaker)and appropriate the cost on Japanese Project items in the survey for Detailed Design and construction supervision,

2) Other considerations

- Endeavour to secure activities etc. such as concealment of activities, avoiding routinizing, etc.
- Just before activities on sites, security coordination officer shall hold security lesson class for the purpose of enhancing crisis management capability of each person and team, sharing knowledge, etc.

(3) Items for activities on each facility and each site

1) Items of common measures for each facility

- Preceding “security personnel” shall establish the posture which enables to detect threat in advance, warn and share the threat information and quick action for coping with threat at each facility. Particularly, shall make sure to ensure evacuation route (or/and ensure safe room), communication tool such as alarm device and to inform related personnel.
- In activities on Edo state, Enugu state and Lagos where Nigerian Security Manager (Security Manager) will be employed, everyday threat analysis, etc. shall be conducted before activities and be reflected to if necessary.

2) Measures taken at respective facilities

- All activities are to be conducted based on SOPs developed for respective facilities. An example of part of SOP is shown in Diagram 3-22 “Rough Sketch of standards of Evacuation Route, positioning of armed police, etc. (Conceptual Diagram for evacuation route, etc.)” The SOP for respective facilities will be only shared among the related for the safety reason.

(4) Security management for movement

1) Common items

- On the premise to observe “JICA security/safety measures (Nigeria, 24th May. 2019)”, a 4WD vehicle with smoked glass shall be used for the travel and appropriate the cost estimate from the reliable rent-car company which has/have history of dealing with JICA Nigeria office.
- On Movement in region/local area except Lagos and Abuja, make sure to have the number of vehicle which can accommodate all passengers and drivers of convoy except for one driver at minimum, preparing for one vehicle’s disability of drive.

2) Inter-city movement

- At minimum, to share the route, points, the way to communicate for confirming rest points and leading car before departure.
- Each person shall carry one litter drinking water.
- On inter-city movement, make sure to carry and load GPS, satellite mobile phone (with vehicle mounted antenna) and blood stanching set and try to grasp the position of convoy using GSP.
- Inter-city movement below shall be by air.

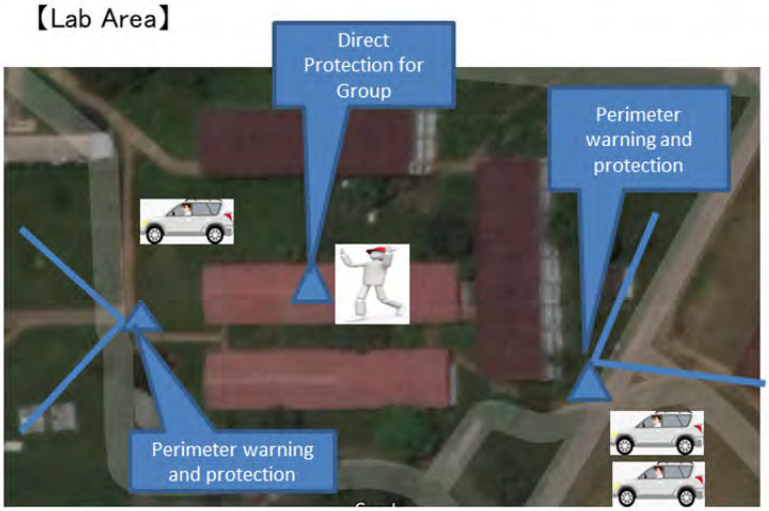
Inter-city	Means
Lagos and Abuja～Ilorin (Kwara state)	by Air
Lagos and Abuja～Benin (Edo state)	by Air
Lagos and Abuja～Enugu state	by Air

SOP Rough Sketch（Conceptual Diagram※）

Rough Sketch of standards of Evacuation Route, positioning of armed police, etc.

※ Here the conceptual diagram is shown using a facility outside Nigeria for concealing SOP.

【Lab Area】



【Standard level of guards number ,equipment, etc.】

- Group members to be protected × 5
- Vehicle × 3
- Armed policeman × 3

【Legend】

Vehicle:

Group members:

Armed policemen:

Evac. route:

Assembly point:

Direction of warning:

2-2-5-3 Initial handling training and operational training

Initial handling training and operational training will be conducted by the engineer dispatched by the supplier at the time of installation of all planned equipment. The training will include initial handling guidance, special notes on daily check-up, trouble shooting, and regularly operated maintenance check-up. In order to maintain installed equipment, the contents of daily check-up of pre- and post-operation will be trained appropriately.

2-2-5-4 Soft Component (Technical Assistance) Plan

Although NCDC organize the in-house maintenance unit by appointing one electric engineer, maintenance and inspection have been conducted limitedly by using external resources for those conventional system and equipment such as emergency power supply facilities, low voltage distribution lines, pumps, etc. Since particular construction materials and equipment specialized will be introduced to the new CPHL facility, it becomes essential for NCDC to obtain specialized technical knowledge and experiences required for proper operation and maintenance of the BSL2 Laboratory.

Soft component program shall be effective to support NCDC in gaining a basic knowledge and skills necessary for operation and maintenance with regard to the air conditioning and ventilation system, the infectious medical waste treatment system, the infectious waste disposal system and the laboratory equipment specialized for the BSL2 laboratory, which require advanced maintenance in particular.

Table 2-25 Purposes and Activities of Soft Components

Purpose	Output item		Activity item
	Area	Output	
I. Specific equipment of BSL2 laboratories can be operated and maintained properly.	(1) Air-conditioning and ventilation equipment are operated and maintained properly.	・ Items and contents of operation, check-up and maintenance to be described in “Technical Instruction Book” are organized. - System summary, overview of airflow control and differential pressure control, devices, etc. ・ “Technical Instruction Book”, “Checklist”, “Ledger” and “Form” are created for operation and maintenance personnel to use for daily work and training plans are developed on the basis of these documents. ・ Technical Instruction Book and training plans are explained.	・ For system summary, airflow control, differential pressure control, operation and maintenance inspections of equipment, etc., “Technical Instruction Book” (guide for the contents and implementation methods of inspections to be conducted by operation and maintenance personnel), “Checklist” (list of inspection items and procedures to be conducted by operation and maintenance personnel for each device), “Form” (records of contents and results of inspections and repairs for each inspection item) and “Ledger” (records and history of inspection and repairs for each device) are developed.
		・ Using Technical Instruction Book, lectures and practical training are conducted concerning:	Maintenance personnel: ・ have taken technical training in the forms of lectures and practical training and understand the contents;

		- overview and plan (including budgeting) of equipment systems, operations and maintenance, and - concrete operations and maintenance work (items, procedures and methods) ・ For airflow and differential pressure control, lectures and practical training (using actual machinery) are conducted after contents of trial operation and adjustment work to be conducted by Japanese contractors (target devices, purposes, work items, adjustment values and other data) are recorded and documented and a standard operating procedure is developed.	・ understand the overview and plan (including budgeting) concerning equipment systems, operations and maintenance; ・ understand practical operations and maintenance work (items, procedures and methods); and ・ Understand their contents in terms of actuary machinery.
	(2) Infectious medical waste treatment equipment is operated and maintained properly.	・ Items and contents of operation, check-up and maintenance to be described in "Technical Instruction Book" are organized. - Overview and plan (including budgeting) of heat sterilization apparatuses. ・ "Technical Instruction Book", "Checklist", "Ledger" and "Form" are created for operation and maintenance personnel to use for daily work and training plans are developed on the basis of these documents. ・ Technical Instruction Book and training plans are explained.	・ For heat sterilization wastewater treatment equipment and batch tanks, "Technical Instruction Book" (guide for the contents and implementation methods of inspections to be conducted by operation and maintenance personnel), "Checklist" (list of inspection items and procedures to be conducted by operation and maintenance personnel), "Form" (records of contents and results of inspections and repairs for each inspection item) and "Ledger" (records and history of inspection and repairs) are developed.
		・ Using "Technical Instruction Book", etc., lectures and practical training are conducted concerning: - overview and plan (including budgeting) of operation and maintenance of heat sterilization wastewater treatment equipment, and - Concrete operations and maintenance work (items, procedures and methods). ・ For high pressure steam control of heat sterilization wastewater treatment equipment, lectures and practical training (using actual machinery) are conducted after contents of trial operation and adjustment work to be conducted by Japanese	Maintenance personnel: ・ have taken technical training in the forms of lectures and practical training and understand the contents; ・ understand operation and maintenance plans (including budgeting); and ・ Understand practical operations and maintenance work (items, procedures and methods).

		contractors (target devices, purposes, work items, adjustment values and other data) are recorded and documented and a standard operating procedure is developed.	
	(3) Infectious waste disposal equipment is operated and maintained properly.	· Items and contents of operation, check-up and maintenance to be described in the "Technical Instruction Book" are organized. - Overview and plan (including budgeting) concerning incinerators · "Technical Instruction Book", "Checklist", "Ledger" and "Form" are created for operation and maintenance personnel to use for daily work and training plans are developed on the basis of these documents. · Technical Instruction Book and training plans are explained.	· For incinerators, "Technical Instruction Book" (guide for contents and implementation methods of inspections to be conducted by operation and maintenance personnel), "Checklist" (list of inspection items and procedures to be conducted by operation and maintenance personnel), "Form" (records of contents and results of inspections and repairs for each inspection item) and "Ledger" (records and history of inspection and repairs) are developed.
		· Using "Technical Instruction Book", etc., lectures and practical training are conducted concerning: - overview and plan (including budgeting) of operations and maintenance of incinerators, and - concrete operations and maintenance work (items, procedures and methods)	Maintenance personnel: · have taken technical training in the forms of lectures and practical training and understand the contents; · understand operation and maintenance plans (including budgeting); and · Understand practical operations and maintenance work (items, procedures and methods).
II. Specific equipment of network laboratories can be operated and maintained properly.	(4) Specific equipment is operated and maintained properly.	· Items and contents of operation, check-up and maintenance to be described in "Technical Instruction Book" are organized for each specific equipment item. · "Technical Instruction Book", "Checklist", "Form" and "Ledger" are created for equipment users and maintenance personnel to use for daily work and training plans are developed on the basis of these documents. · Technical Instruction Book and training plans are explained.	· For BSCs (biosafety cabinets), incubators, freezers, etc. "Technical Instruction Book" (for equipment users and maintenance personnel to understand actions and operating procedures), "Checklist" (for equipment users and maintenance personnel to perform daily and periodic inspections), "Form" (for equipment users and maintenance personnel to request other departments or external parties to do work) and "Ledger" (for equipment users and maintenance personnel to record and analyse equipment operation and maintenance) are developed.
		· Using "Technical Instruction Book", etc., lectures and practical training are conducted concerning: - overview and plan (including	Maintenance personnel: · have taken technical training in the forms of lectures and practical training and understand the contents; · understand system summary and

		budgeting) of operations and maintenance of specific equipment, and - Concrete operations and maintenance work (items, procedures and methods). ・ For formalin fumigation and filter scanning, lectures and practical training (using actual machinery) are conducted after contents of trial operations and adjustment work to be conducted by Japanese contractors (target devices, purposes, work items, adjustment values and other data) are recorded and documented and a standard operating procedure is developed.	operation and maintenance plans (including budgeting); and ・ Understand practical operations and maintenance work (items, procedures and methods).
		・ Equipment items that require a maintenance agreement are identified. (Expected items: PCR, thermocycler, ELISA, blood culture apparatus, etc.) ・ "Manuals" necessary for the conclusion of maintenance contracts are developed for the identified equipment items. ・ Procedures associated with the execution of maintenance contracts are carried out. ・ Cooperation with diagnosis guidance of the technical cooperation project is promoted.	・ Guidance is provided for the conclusion of maintenance contracts for PCR (Polymerase Chain Reaction), thermocycler (CPHL only), ELISA (Enzyme-Linked Immuno Sorbent Assay), blood culture apparatus, etc. "Manuals" necessary for the conclusion of maintenance contracts are developed.

The following three experts shall be dispatched for implementing the proposed activities of soft component.

1) An Engineer for the air conditioning and ventilation system
2) An Engineer for the special laboratory equipment
3) An engineer for the infectious medical waste treatment / waste disposal system

2-2-5-5 Maintenance Contract for Equipment

NCDC or FMOH shall conclude the maintenance contract for several equipment items shown in the table below for two years after expiration of one-year manufacturer's warranty.

Table 2-26 Maintenance Contract for Equipment

No.	Target Equipment	Condition
1	Biosafety cabinet	・ Periodic preventive maintenance/service once a year including formalin fumigation, HEPA filter change, and system maintenance ・ Off-site support through phone calls and emails
2	Blood culture	・ Off-site support through phone calls and emails up to twice a year
3	ELISA set	・ Periodic preventive maintenance/service once a year ・ Off-site support through phone calls and emails
4	Real-time PCR	
5	Thermal cycler	

The consultant shall be responsible for supervising the implementation status of the maintenance agreement. It is expected that recommendations will be made on the matters necessary to conclude a continuous maintenance agreement.

2-2-5-6 Implementation Schedule

The tentative implementation schedule for the Project is expected as shown in Figure 2-23.

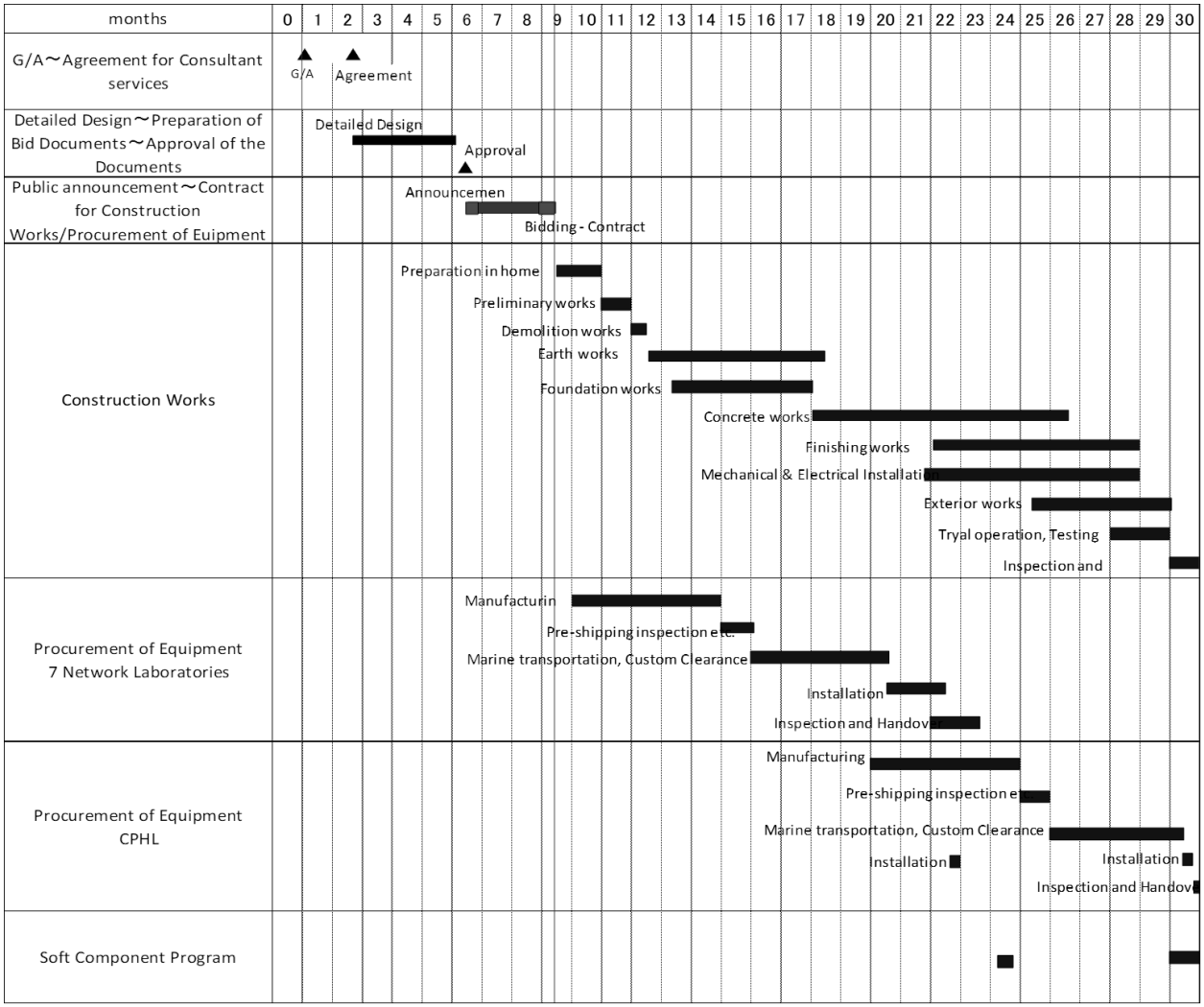


Figure 2-23 Tentative General Project Schedule

2-3 Obligations of Recipient Country

2-3-1 Responsibilities of Recipient Country

When the Project is implemented, the Nigerian side will carry out the following scope of works during the Preparatory Survey the Japanese side and the Nigerian side agreed that the Nigerian side agree to execute their scope of works.

2-3-1-1 Tax Exemption

The Nigerian side shall secure a quick tax exemption of materials, equipment purchased for the Project under the grant aid as well as facilitation of customs clearance and domestic inland transport.

Based on the verified contract, the Nigerian side shall undertake tax exemption on customs duties, domestic taxes with regard to materials and services to be procured in Nigeria, and other fiscal surcharge imposed to Japanese nationals who reside in Nigeria to engage in the Project. The tax exemption for the Project shall be smoothly processed in reference to the procedures are taken for the precedent grant aid project for NCDC. In case of not being granted the exemption, the Nigerian side shall bear the required taxation in accordance with recorded of the minutes of discussion.

2-3-1-2 Giving Facilities

Based on the verified contract, assistance with entry and safety stay will be provided in Nigeria to the Japanese nationals who will be involved in this Project.

2-3-1-3 Social and Environmental Considerations

Based on the JICA Environmental and Social Consideration Guidelines (April 2010), the Nigerian side shall undertake the appropriate environmental and social considerations during Project implementation and after Project completion, and conduct necessary procedures for environmental impact assessment to acquire relevant licenses and approvals. During the field survey, NCDC suggested that the procedure for the environmental and social considerations will not be required for the new BSL-2 laboratory of CPHL to be constructed by the Project because it will be built at the site where similar facilities have already been built. To back up this suggestion, NCDC also submitted the NCDC/HQ/GCOR/V.1/228: “Waiver of Environmental Impact Assessment for Remodelling of NCDC Central Public Health Laboratory CPHL Lagos”, dated on July 30, 2019, to JICA Nigeria Office as evidence.

2-3-2 Works borne by the Recipient Country

The scope of works borne by the Nigerian side is shown in Table 2-21. The major items are noted as follows:

2-3-2-1 Before Implementation of the Project

1) Clearing the Site, such as demolition of existing buildings (training lab., elevated tank, staff house, cafeteria, storage), fence, existing concrete floor and foundation, Elevated tank, Reservoir tank, and relocation of power generator room, generator, electrical poles, tree and plantation etc. shall be completed before the construction starts.

2) Temporary electric power for construction work and temporary water supply pipes shall be secured.

3) Mandated procedures related to the renewal/modification of land ownership of the Project site and the change of land use of the same shall be completed and approved when required incidentally.

4) Mandated procedures related to the building permit shall be completed and related license and approval shall be acquired by submitting the documents/drawings of application prepared by the Japanese side and checked by the qualified Nigerian engineers. The relevant license and approval upon the existing CPHL facility shall be also obtained when required incidentally.

5) Mandated procedures related to the environmental impact assessment shall be completed and related license and approval shall be obtained. The relevant license and approval upon the existing CPHL facility shall be also obtained when required incidentally.

6) Utility services such as water supply, electric power, communication etc. necessary for implementation of the Project shall be provided to the Project site.

7) During the stages of detailed design and tender assistance, necessary supports in documentation including issuance of an invitation shall be provided for Japanese nationals of the Consultant to obtain the required visa when visiting Nigeria. In addition, necessary security measures shall be provided to Japanese nationals of the Consultant, i.e. deployment of the armed escort guards when moving from/to the airport in Abuja in compliance with JICA's safety and security guidelines. Necessary expenses such as a per diem, allowance of the guards shall be borne by the Nigerian side.

2-3-2-2 During Implementation of the Project

1) Permits and licenses, etc., necessary for the implementation of the Project shall be issued without delay.

2) Necessary environmental monitoring activities etc. shall be carried out according to the contents of environment-related license and approval.

3) General furniture, curtains and carpets, etc. for the new CPHL facility shall be purchased and furnished if necessary.

4) Access control and security check for existing buildings in the Project site shall be undertaken.

5) During the stages of construction and procurement of equipment, necessary supports in documentation, including issuance of an invitation, shall be provided for Japanese nationals, the 3rd

country nationals of the Consultant, the Contractors to obtain the required visa when visiting and/or staying in Nigeria. In addition, necessary security measures shall be provided to Japanese nationals of the Consultant, the Contractors, i.e. deployment of the armed escort guards when moving from/to the airport in Abuja as well as during activities for the installation of equipment for seven network laboratories other than CPHL. Necessary expenses such as accommodation, per diem and allowance of the guards shall be borne by the Nigerian side.

6) Prior to/during the stage of "Soft Component Program", the trainee shall be selected and appointed to participate in the training programs. Necessary expense such as accommodation, per diem and allowance of the trainee shall be borne by the Nigerian side.

2-3-2-3 After Implementation of the Project

1) Necessary environmental monitoring activities etc. shall be carried out according to the contents of environment-related license and approval.
2) Implementation organization for the operation and maintenance of the facility and equipment shall be secured.
3) Budget for operation and maintenance of the new CPHL facility and equipment shall be allocated.

In order to carry out the Project smoothly for the portions by the Nigerian side, sufficient explanation of the contents, schedule, etc., should be given.

The budget for the portions by the Nigerian side should be prepared with a budget of FMoH as well as NCDC. In order to facilitate the finish of construction in accordance with the schedule, the Nigerian side must complete their scope of works on schedule and coordinate their works with the Japanese side, in order to meet the final completion date. The Preparatory Survey Team has also explained this importance. It is necessary for the Japanese side to monitor the progress in regard to this matter

2-4 Project Operation Plan

2-4-1 Operation Policy

(1) Organization of FMoH, NCDC and Network Laboratories

Figure 2-24 shows an organogram of FMoH.

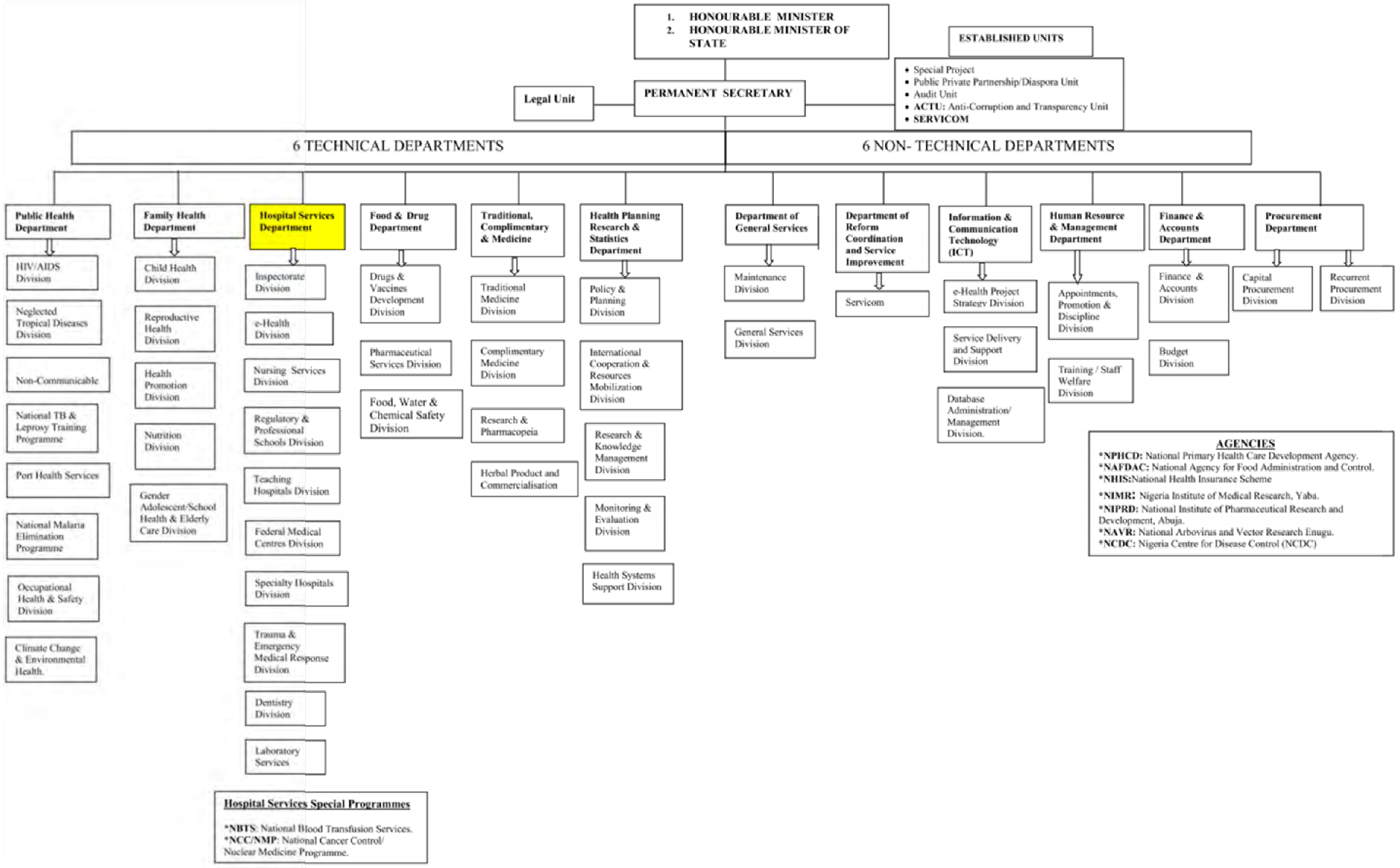


Figure 2-24 FMoH Organogram

Figure 2-25 shows a relationship diagram among FMoH, NCDC, CPHL and seven target network laboratories. NCDC is responsible for directly managing CPHL, whereas FMoH is in charge of the operation and maintenance of the seven network laboratories except for the consumable supplies which shall be administrated by NCDC.

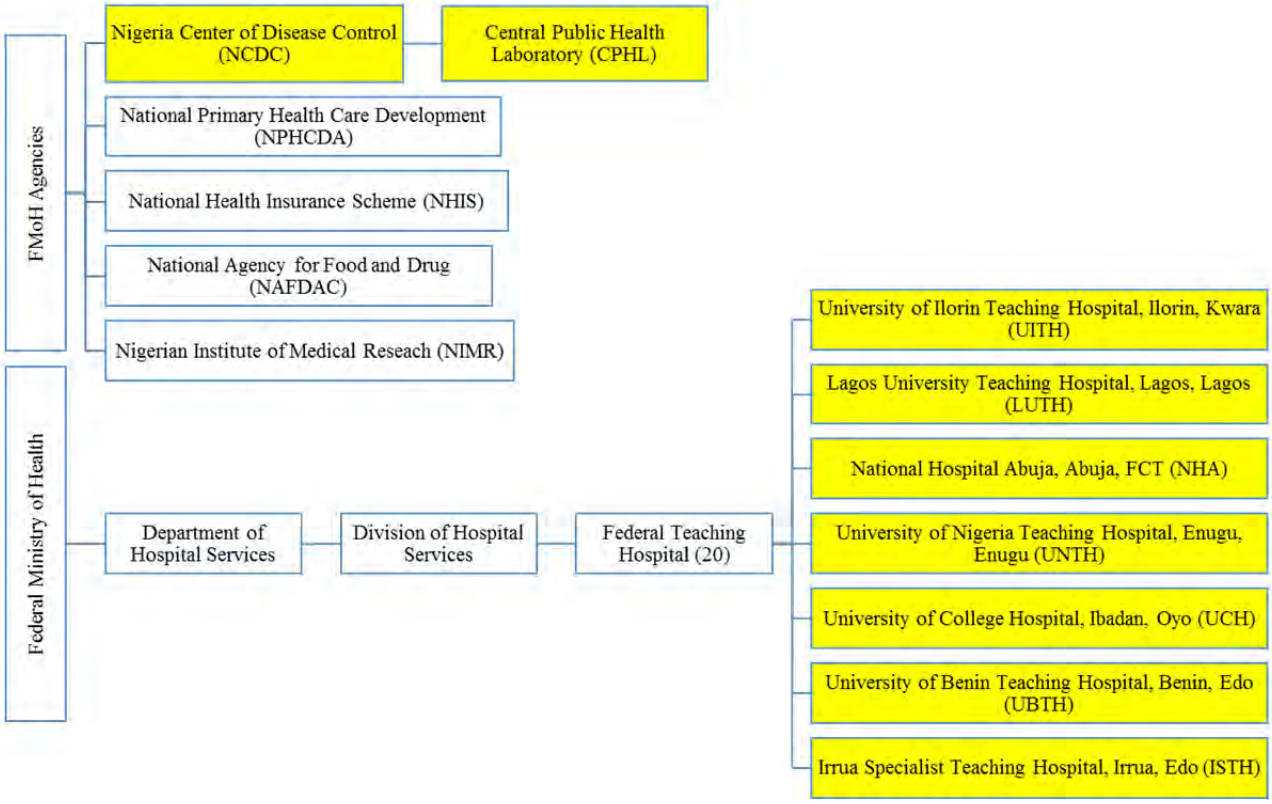


Figure 2-25 Diagram among NCDC, CPHL and Other target network laboratories

(2) Organization, Budget and Financial Resources of NCDC/CPHL

1) Organization and Staff Plan

The main implementing agency of the Project is NCDC and FMoH. Figure 2-26 and Figure 2-27 show an organogram of NCDC, CPHL respectively.

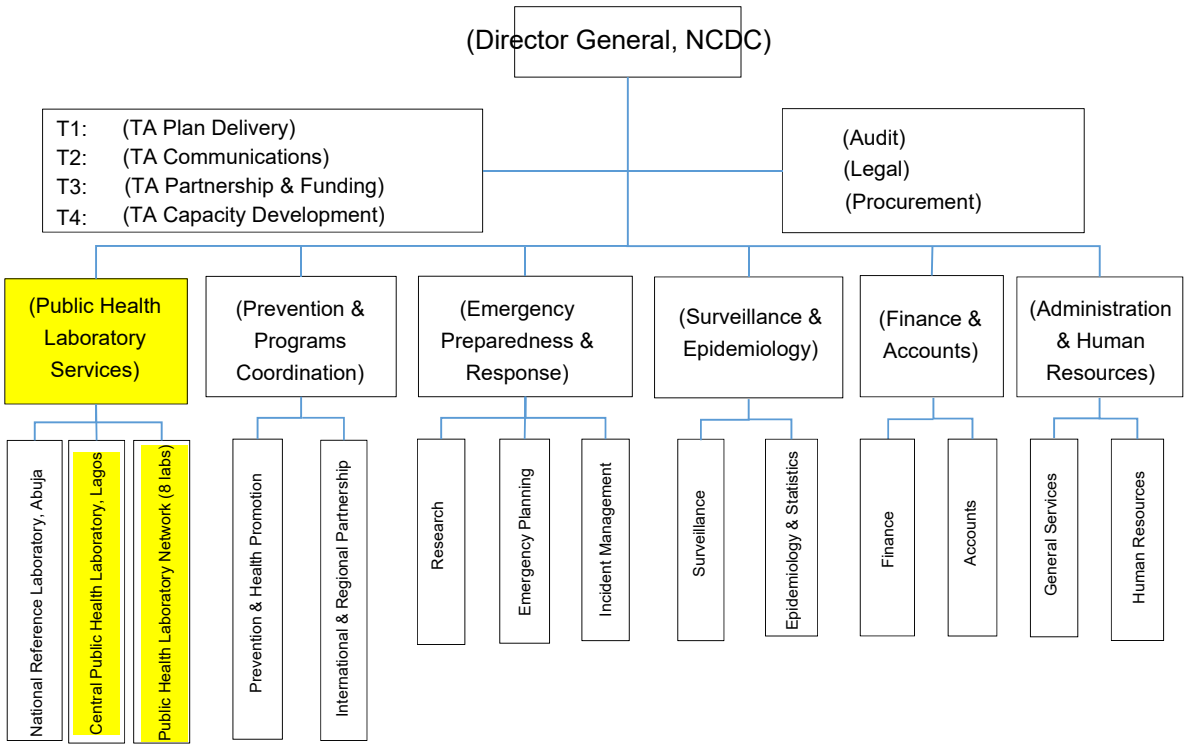


Figure 2-26 NCDC organization

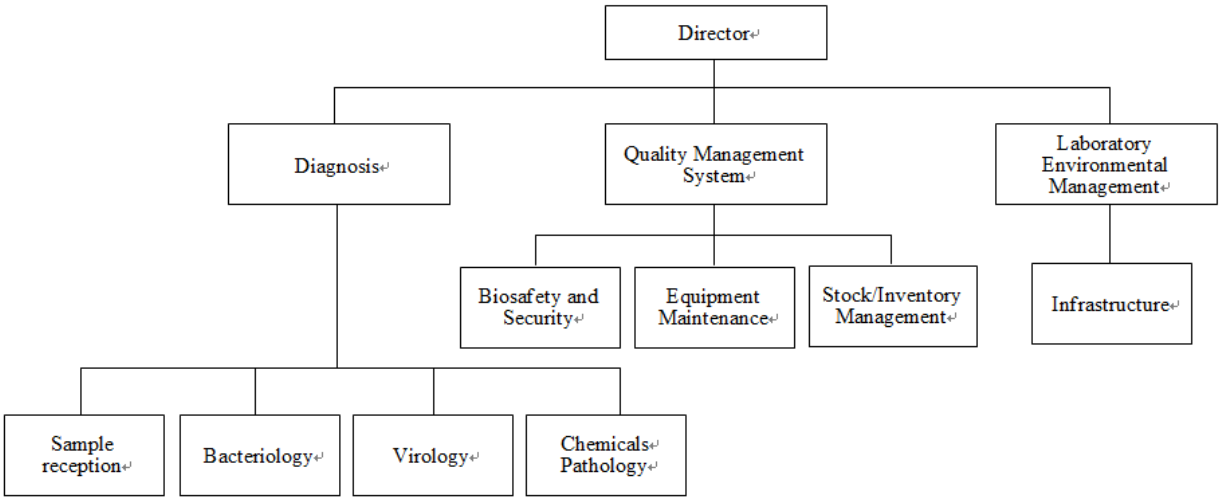


Figure 2-27 CPHL Organogram

NCDC consists of six departments such as Public Health Laboratory Services, Prevention & Programs Coordination, Emergency Preparedness & Response, Surveillance & Epidemiology, Finance & Accounts, and Administration & Human Resources, and is led by the Director-General. In addition, administrative divisions (Governance Units) and external technical assistance are organized. Table 2-27 shows the staffing of each department. As of 2019, 210 people including CPHL are engaged in NCDC. A considerable number of staff has been increased since 2017 when the field survey of the precedent grant aid project for NCDC conducted.

Table 2-27 Staffing of each department of NCDC

No.	Department	NCDC and NRL (Abuja)		CPHL (Lagos)	
		2019	2017	2019	2017
1	Director-General	1	1	0	0
2	Finance and Account	17	7	0	0
3	Administration and HR	23	22	0	0
4	Audit	3	2	0	0
5	Legal	1	1	0	0
6	Procurement	4	5	0	0
7	Public Health Laboratory	34	13	27	33
8	Prevention & Programs Coordination	28	2	0	0
9	Emergency Preparedness & Response	31	7	0	0
10	Surveillance & Epidemiology	41	10	0	0
11	DG Office	included in 3	6	0	0
	Total	183	76	27	33

Sources: JICA Study Team edited on the answer of questionnaire by NCDC, NCDC NOMINAL ROLL (2017)

Table 2-28 shows the number of staff of the department of Public Health Laboratory Services (including NRL and CPHL) in NCDC. Currently, CPHL has 27 staff (8 laboratory scientists, 4 laboratory technicians, 15 other professionals) who carry out viral tests by ELISA method as well as culture, identification and chemical sensitivity test of bacteriological examination.

Table 2-28 Number of personnel in the Public Health Laboratory Services in 2019

Department	NRL/Abuja	CPHL/Lagos
Public Health Laboratory Services	34	27

Sources: JICA Study Team edited on the answer of questionnaire by NCDC

The new BSL-2 laboratory and facilities will be operated and managed by existing staff and personnel of new employees of the NCDC. As agreed in the technical note, it is required personnel in charge who operate and maintain equipment/facilities. Moreover, the NCDC is considering that an establishment of a new internal committee or a department to supervise biosafety for laboratories including BSL-3, which will require additional personnel.

2) Budget and Financial Resources

Table 2-29 shows the previous budget records of NCDC between 2015 and 2018, and operating budget in 2019, 2020. In the NMLStP for 2015-2019, the FMoH has committed to securing sufficient and continued budget for laboratory testing services, earmarked for equipment upgrades and maintenance. In light of the 2014 Ebola virus epidemic in West Africa, the Nigerian government prioritises the preparedness for their public health crisis response and strengthening emergency response capacity. Nigeria also conducted an IHR Joint External Evaluation, formulated the NAPHS, and clearly defined a plan for the necessary budget.

In 2017, NCDC began full operation of the NRL in Asokoro, Abuja. The NRL serves as the national reference laboratory, where has a centralised function such as laboratory confirmation and examination/diagnostics. After the NCDC's independence in terms of budget from FMoH in November 2018, NCDC has started operating autonomously through the acquisition of their own income via testing and diagnostic services, and also by working in cooperation with other research institutions, and through the technical and financial support provided by other donors and international aid agencies. Furthermore, when the NCDC Act was passed, current Nigerian President Buhari committed to the continuing contribution of government budget necessary for running NCDC. He also commented on the possibility of supplementary budget measures financed by the Basic Health Care Provision Fund (BHCPF) through WB support.[1] Since it has been very recent since these measures have been put in place, future budget measures and the relationship between the newly independent NCDC and the FMoH have not yet been clear, but in 2018, 5% of the BHCPF budget was set aside as an emergency response budget, with 2.5% of that allocated as specific budget for NCDC emergency response. The Nigerian government contributions to NCDC in 2018 increased 9.6 times that of 2017.

The total estimated cost of equipment maintenance for the eight laboratories envisioned through the implementation of the Project is 293.8 million NGN (108.2 million JPY, not including VAT) per year (Table 3-32). Of that, the NCDC will cover 249.09 million NGN/year (91.76 million JPY) in total which is consisted of 233.76 million NGN/year for the new CPHL facilities and equipment (equivalent to 86.11 million JPY), and 15.33 million NGN/year for consumables for the equipment of the seven network laboratories (equivalent to 5.65 million JPY). The total estimated cost is equivalent to 12% of the total budget performance of the NCDC in 2018 shown in Table 2-10. However, newly planned assistance includes support from WB's Regional Disease Surveillance Systems Enhancement (REDISSE) (approx. 9.6 billion JPY, 2018-2022), which focuses on strengthening laboratories, as well as from Public Health England (PHE) (approx. 2.2 billion JPY, memorandum signed in October 2018). With this assistance, NCDC can decide the content of their activities and allocate the necessary budget. Additionally, an increase in NCDC joint researchers is expected, as are contributions by other donors for testing and research costs. With this, the maintenance and management of CPHL facilities and equipment, as well as the supply of equipment consumables to the other seven network laboratories is thus considered as possible.

Table 2-29 Budget for operation and maintenance of NCDC (Year 2015 - 2020)

(Currency: upper/NGN, lower/JPY)

	2015	2016	2017	2018	2019	2020
1) Governmental Fund	227,083,598 83,659,868	252,281,264 92,942,940	1,581,335,551 582,579,830	1,955,178,842 720,307,437	1,492,528,098 549,862,277	2,110,710,553 777,606,875
① Personnel	0 0	0 0	12,457,939 4,589,629	315,801,230 116,344,331	412,753,833 152,062,640	-
② Indirect	3,083,598 1,136,028	3,774,264 1,390,477	3,774,265 1,390,477	3,774,265 1,390,477	3,774,265 1,390,477	-

[1] Project cost: US$ 20.00 million. Period: 2018–2021.
https://projects.worldbank.org/en/projects-operations/project-detail/P163969?lang=en

	2015	2016	2017	2018	2019	2020
③ Capital Budget	224,000,000 82,523,840	248,507,000 91,552,464	1,565,103,347 576,599,724	1,635,603,347 602,572,629	1,076,000,000 396,409,160	-
Project Budget within 1)	224,000,000 82,523,840	248,507,000 91,552,464	475,103,347 175,032,824	616,103,347 226,978,634	901,000,000 331,937,410	
2) Donor	219,528,060 80,876,333	108,239,500 39,876,514	70,526,870 25,982,804	36,588,000 13,479,385	-	-
1) +2) Total	446,611,65816 4,536,200	360,520,764 132,819,454	1,651,862,421 608,562,634	1,991,766,842 733,786,822	-	-

Sources: JICA Study Team edited on the answer of questionnaire by NCDC and BUDGET OFFICE OF THE FEDERATION (https://www.budgetoffice.gov.ng/) exchange rate：1.00 NGN=0.36841JPY

Operation and maintenance expenses for facilities and equipment of CPHL and seven networks laboratories supported by the Project are estimated about 308,519,307 NGN/year.

(3) Organization, Budget and Financial Resources of seven network Laboratories

1) Organization

Figure 2-24 shows an organization chart of the FMoH. The relevant department of FMoH to the Project is the Department of Hospital Services as the seven network laboratories except for the CPHL belong to the department of FMoH. The Department is responsible for facility management of teaching hospitals and laboratories, and implementation of activities related to clinical departments such as nursing, dentistry, and tumours and disease-specific services. Table 2-30 shows a number of staff of the seven network laboratories.

Table 2-30 Number of staff of seven network laboratories

Facility	Microbiologist & others	Laboratory scientist	Laboratory technician	Laboratory assistant	Data officer	Office assistant
① ISTH, ILFRC *	0	23	0	0	0	0
① ISTH, Microbiology	0	30	0	0	0	0
② UBTH, Molecular Virology	0	3	1	0	2	0
② UBTH, Bacteriology	0	18	0	0	0	0
③ UCH, Clinical Microbiology	0	7	0	0	0	0
④ UNTH, Microbiology	0	48	0	0	0	0
⑤ NHA, Medical Microbiology & Parasitology	0	13	0	0	0	0
⑥ LUTH, CHZVY*	3	3	0	1	1	1
⑥ LUTH, Medical Microbiology & Parasitology	5	13	0	1	1	5
⑦ UITH, Microbiology	11	17	0	10	0	0

Sources: JICA Study Team edited on the answer of questionnaire by NCDC

2) Budget and Financial Resources

Table 2-31 shows the financial status of FMoH, which contributes to the budget of each teaching hospitals. The FMoH operating budget has increased approximately 45% in the five years from 2015 to2019, and with this fiscal size, continued budgetary measures for each teaching hospital can be expected. By using funds secured under the name "projects (special budget for the maintenance)" from future budget plans while keeping maintenance costs at an appropriate amount at each educational hospital, maintenance costs for the equipment to be prepared for the seven network laboratories by the Project can be secured and said equipment can be maintained.

Table 2-31 Budget for operation and maintenance of FMoH (2015-2019)

(Currency: upper/NGN, lower/JPY)

	2015	2016	2017	2018	2019
1) Ordinary Budget	214,940,000,000 79,186,045,400	237,080,000,000 87,342,642,800	221,410,000,000 81,569,658,100	252,840,000,000 93,148,784,400	311,245,805,391 114,666,067,164
2) Capital Budget	22,680,000,000 8,355,538,800	28,650,000,000 10,554,946,500	55,610,000,000 20,487,280,100	71,110,000,000 26,197,635,100	61,457,193,899 22,641,444,804
Total	237,620,000,000 87,541,584,200	265,730,000,000 97,897,589,300	277,020,000,000 102,056,938,200	323,950,000,000 119,346,419,500	372,702,999,290 137,307,511,968

Source: FMoH and yourbudgit.com Web site Exchange rate: 1.0NGN = 0.36841JPY

The overall budgets and maintenance costs between 2015 and 2019 for the teaching hospitals to which the seven network laboratories belong are shown from Table 2-32 to Table 2-38. For the Project, funds for consumables including reagents are allocated from the NCDC's maintenance budget. Therefore, the maintenance budget that each network laboratory must secure from FMoH is for the maintenance costs of the equipment itself, including periodic inspections and repairs. The average annual maintenance costs for the seven network laboratories are estimated at 60.05 million NGN per year (22.1 million JPY). After subtracting the reagent costs provided for by the NCDC, the estimated necessary budget is approximately 44.72 million NGN/year (16.47 million JPY). The budget for each network laboratory is approximately 6.38 million NGN/year (2.35 million JPY).

Table 2-32 ISTH's Budget Records in 2015-2018 and Budget in 2019

(Currency: upper/NGN, lower/JPY)

ISTH	2015	2016	2017	2018	2019
1) Personnel	3,721,341,262 1,370,979,334	3,479,454,079 1,281,865,677	4,562,738,711 1,680,958,569	4,992,627,262 1,839,333,810	6,455,393,606 2,378,231,558
2) Overhead	45,835,225 16,886,155	43,056,338 15,862,385	40,209,154 14,813,454	45,209,154 16,655,504	45,209,154 16,655,504
3) Capital Budget	72,602,384 26,747,444	38,600,037 14,220,640	241,600,037 89,007,870	572,400,056 210,877,905	217,000,000 79,944,970
Total Allocation	3,839,778,871 1,414,612,934	3,561,110,454 1,311,948,702	4,844,547,902 1,784,779,893	5,610,236,472 2,066,867,219	6,717,602,760 2,474,832,033
Maintenance within Total	5,127,819 1,889,140	4,816,930 1,774,605	1,000,000 368,410	1,000,000 368,410	1,000,000 368,410

Table 2-33 UBTH's Past Records in 2015-2018 and Budget in 2019

(Currency: upper/NGN, lower/JPY)

UBTH	2015	2016	2017	2018	2019
1) Personnel	6,251,849,481 2,303,243,867	5,845,479,264 2,153,533,016	6,801,106,287 2,505,595,567	8,042,968,027 2,963,109,851	8,812,195,218 3,246,500,840
2) Overhead	64,265,922 23,676,208	65,909,399 24,281,682	54,204,869 19,969,616	54,204,869 19,969,616	54,204,869 19,969,616
3) Capital Budget	72,602,384 26,747,444	105,151,196 38,738,752	82,151,196 30,265,322	597,247,790 220,032,058	460,000,000 169,468,600
Total allocation	3,839,778,871 1,414,612,934	6,016,539,859 2,216,553,449	6,937,462,352 2,555,830,505	8,694,420,686 3,203,111,525	9,326,400,087 3,435,939,056
Maintenance within Total	4,227,713 1,557,532	13,214,416 4,868,323	0 0	0 0	0 0

Table 2-34 UCH's Budget Records in 2015-2018 and Budget in 2019

(Currency: upper/NGN, lower/JPY)

UCH	2015	2016	2017	2018	2019
1) Personnel	9,450,138,082 3,481,525,371	8,835,879,106 3,255,226,221	10,889,320,870 4,011,734,702	10,347,864,425 3,812,256,733	14,582,330,951 5,372,276,546
2) Overhead	71,866,511 26,474,341	99,715,497 36,736,186	84,701,272 31,204,796	104,701,272 38,572,996	104,701,272 38,572,996
3) Capital Budget	71,585,829 26,373,935	116,200,000 42,809,242	126,200,000 46,493,342	468,400,000 172,563,244	830,000,000 305,780,300
Total allocation	9,593,590,422 3,534,374,647	9,051,794,603 3,334,771,650	11,100,222,142 4,089,432,839	10,920,965,697 4,023,392,972	15,517,032,223 5,716,629,841
Maintenance within Total	2,875,515 1,059,368	3,932,187 1,448,657	0 0	0 0	0 0

Table 2-35 UNTH's Budget Records in 2015-2018 and Budget in 2019

(Currency: upper/NGN, lower/JPY)

UNTH	2015	2016	2017	2018	2019
1) Personnel	9,005,608,026 3,317,756,053	8,420,243,504 3,102,101,909	8,972,534,299 3,305,571,361	9,451,588,665 3,482,059,780	12,520,698,700 4,612,750,608
2) Overhead	79,722,716 29,370,646	78,289,108 28,842,490	67,203,564 24,758,465	67,203,564 24,758,465	67,203,564 24,758,465
3) Capital Budget	95,021,895 35,007,016	122,268,108 45,044,794	227,268,108 83,727,844	436,802,162 160,922,285	260,000,000 95,786,600
Total allocation	9,180,352,637 3,382,133,715	8,620,800,720 3,175,989,193	9,267,005,971 3,414,057,670	9,955,594,391 3,667,740,530	12,847,902,264 4,733,295,673
Maintenance within Total	15,383,456 5,667,419	15,106,824 5,565,505	8,950,000 3,297,270	9,330,319 3,437,383	9,330,319 3,437,383

Table 2-36 NHA's Budget Records in 2015-2018 and Budget in 2019

(Currency: upper/NGN, lower/JPY)

NHA	2015	2016	2017	2018	2019
1) Personnel	7,046,050,020 2,595,835,288	6,588,056,768 2,427,105,99	7,304,119,414 2,690,910,633	6,049,756,412 2,228,790,760	7,613,091,776 2,804,739,141
2) Overhead	285,884,505 105,322,710	158,518,253 58,399,710	156,444,165 57,635,595	156,444,164 57,635,594	45,999,976 16,946,851
3) Capital Budget	200,870,620 74,002,745	177,606,467 65,431,999	217,606,467 80,168,399	895,212,934 329,805,397	180,000,000 66,313,800
Total allocation	7,532,805,145 2,775,160,743	6,924,181,488 2,550,937,702	7,678,170,046 2,828,714,627	7,101,413,510 2,616,231,751	7,839,091,752 2,887,999,792
Maintenance within Total	3,602,976 1,327,372	3,242,678 1,194,635	3,242,678 1,194,635	3,242,678 1,194,635	3,242,678 1,194,635

Table 2-37 LUTH's Budget Records in 2015-2018 and Budget in 2019

(Currency: upper/NGN, lower/JPY)

LUTH	2015	2016	2017	2018	2019
1) Personnel	6,291,394,597 2,317,812,683	5,882,453,947 2,167,154,859	6,863,390,227 2,528,541,594	4,867,820,549 1,793,353,768	7,155,460,640 2,636,143,254
2) Overhead	84,556,930 31,151,619	97,430,437 35,894,347	78,301,959 28,847,225	100,301,959 36,952,245	100,301,959 36,952,245
3) Capital Budget	60,999,540 22,472,841	130,399,724 48,040,562	322,700,000 118,885,907	1,042,700,000 384,141,107	270,000,000 99,470,700
Total allocation	6,436,951,067 2,371,437,143	6,110,284,108 2,251,089,768	7,264,392,186 2,676,274,725	6,010,822,508 2,214,447,120	7,525,762,599 2,772,566,199
Maintenance within Total	24,747,853 9,117,357	23,247,447 8,564,592	0 0	20,000,000 7,368,200	18,000,000 6,631,380

Table 2-38 UITH's Budget Records in 2015-2018 and Budget in 2019

(Currency: upper/NGN, lower/JPY)

UITH	2015	2016	2017	2018	2019
1) Personnel	6,474,394,744 2,385,231,768	6,053,559,085 2,230,191,703	6,734,474,553 2,481,047,770	7,297,484,936 2,688,466,425	8,542,008,146 3,146,961,221
2) Overhead	57,603,017 21,221,527	58,071,265 21,394,035	57,885,938 21,325,758	54,885,939 20,220,529	54,885,939 20,220,529
3) Capital Budget	63,598,881 23,430,464	94,576,827 34,843,049	67,576,827 24,895,979	281,730,481 103,792,327	260,000,000 95,786,600
Total allocation	6,595,596,642 2,429,883,759	6,206,207,177 2,286,428,786	6,859,937,318 2,527,269,507	7,634,101,356 2,812,479,281	8,856,894,085 3,262,968,350
Maintenance within Total	35,063,952 12,917,911	35,348,982 13,022,918	36,037,757 13,276,670	3,145,434 1,158,809	3,145,434 1,158,809

Source: BUDGET OFFICE OF THE FEDERATION, Website (https://www.budgetoffice.gov.ng/)

Exchange rate: 1.0NGN = 0.36841JPY

The revenue and expenditure of LUTH between 2016 and 2018 is shown in Table 3-29. In 2017-2018, approximately 100 million NGN/year (36.8 million JPY) was allocated for laboratory operating costs.

The costs of the equipment and maintenance planned for provision by the Project accounts for 6.3% of the laboratory operating costs. In addition to laboratory operation, the aforementioned budget measures in the name of "projects (special budget for the maintenance)" are also possible, if necessary. Therefore, an adequate budget allotment can be expected, and equipment maintenance is also deemed possible. In regard to the financial status of the other six laboratories, the necessary procedures were conducted to request information disclosure at FMoH, but this information was not made available during the period of the preparatory survey period. Looking at the budget trends of the past five years, as shown in Tables 2-12 to 2-18, there are some laboratories such as ISTH, UBTH and UCH, for which it may be difficult to secure maintenance costs in a short period of time, based on the current size of the budgets. On the other hand, in addition to ordinary budget for each teaching hospital, the funds for many expenses for equipment procurement and facilities/equipment repairs every year are secured in the name of "projects." Therefore, for the time being, it seems possible to ensure a budget by securing funds for Project maintenance expenses through this method. For example, a budget of 25 million NGN (9.2 million JPY) was planned for FY 2018 (continuing in 2019) for the "supply of surgical, laboratory and sundry medical equipment to Irrua Specialist Hospital." It explains that each hospital can secure maintenance budget using the project. Moreover, from among the teaching hospitals to which the seven network laboratories belong, hospitals providing medical services are expected to have income from user fees (medical treatment, testing, diagnostic services). Also, since the 2019 budgets at the teaching hospitals to which these laboratories belong are larger than the LUTH budget, it will also be possible to allot laboratory operating costs equivalent to or more than that of LUTH. Based on the use of budget in the name of "projects," maintenance is also deemed possible.

Table 2-39 Financial Status of LUTH (2016–2018)

(Currency: upper/NGN, lower/JPY)

	Financial Status		
	2016	2017	2018
1. Government Fund	5,800,000,000	6,400,000,000	6,400,000,000
	2,136,778,000	2,357,824,000	2,357,824,000
2. from Foreign Donors	-	-	-
	-	-	-
3. from Technical Partners	-	-	-
	-	-	-
4. Clinical Services Fees	245,000,000	247,000,000	224,000,000
	90,260,450	90,997,270	82,523,840
5. Laboratory Services Fees	117,000,000	189,000,000	188,000,000
	43,103,970	69,629,490	69,261,080
6. Other Income	29,000,000	32,000,000	37,000,000
	19,6833,890	11,789,120	13,631,170
Total	6,190,000,000	6,830,000,000	6,850,000,000
	2,280,457,900	2,516,240,300	2,523,608,500
1. Staff Salaries & Welfare	5,700,000,000	6,300,000,000	6,300,000,000
	2,099,937,000	2,320,983,000	2,320,983,000

	Financial Status		
	2016	2017	2018
2. Operation Costs	-	-	-
	-	-	-
(1) Office Requisites	18,000,000	21,000,000	24,000,000
	6,631,380	7,736,610	8,841,840
(2) Running Costs	75,000,000	102,000,000	116,000,000
(Laboratory)	27,630,750	37,577,820	42,735,000
(3) Running Costs	101,000,000	132,000,000	140,000,000
(Other)	377,209,410	48,630,120	51,577,400
(4) Maintenance Costs	15,000,000	21,000,000	24,000,000
(Building)	5,526,150	7,736,610	8,841,840
(5) Maintenance Costs	17,000,000	17,000,000	18,000,000
(Equipment)	6,262,970	6,262,970	6,631,380
4. Renovation/Major Repair work	-	-	-
	-	-	-
5. Other Expenditures	261,000,000	263,000,000	210,000,000
	96,155,010	96,891,830	77,366,100
Total	6,190,000,000	6,380,000,000	6,830,000,000
	2,280,457,900	2,350,455,800	2,516,240,300

Source：LUTH answer to the Questionnaire prepared by the study team Exchange rate: 1.00 NGN=0.36841JPY

2-4-2 Operation and Maintenance of the Building and Facility, Equipment

2-4-2-1 Building and Facility

Maintenance and management of building and facility, equipment of CPHL is currently carried out mainly by one electric engineer assigned, while utilizing external resources. Since facility equipment and system requiring special skills are not installed in existing CPHL facility, maintenance and inspection have been conducted on demands limitedly for emergency power supply facilities, low voltage distribution lines, pumps, etc.

Since particular construction materials and equipment specialized for the BSL-2 laboratory will be introduced to the new CPHL facility, specialized technical knowledge and experiences shall be required for operation and maintenance. Therefore, it will be essential that, in addition to engineers in charge of laboratory equipment, a comprehensive facility maintenance team shall be established in the maintenance department consisting of technical experts on construction, air conditioning, electricity, water supply and sanitation, and that shall conduct a daily operation and inspection, a periodic inspection which enable to adequately respond to preventive maintenance for the infection control in the BSL-2 management areas. With regard to the air conditioning and ventilation system in the laboratory, the infectious medical waste treatment system, and the infectious waste disposal system, which require advanced maintenance in particular, soft component program shall support NCDC to learn basic knowledge and skills necessary for operation and maintenance.

2-4-2-2 Equipment

CPHL does not have any maintenance contracts for the existing equipment. In the future, maintenance of the equipment will be performed on a periodic basis by Biomedical Engineers (BMEs) who belong to NCDC, and this activity already started at the end of 2018. Deployment of BMEs in CPHL is also planned for the new facilities to be constructed under this plan. In this plan, the laboratories will be encouraged to use this system and to enter into maintenance contracts with a local agent for equipment items for which maintenance agreement with a manufacturer is recommended.

The seven network laboratories that are in the scope of this plan belong to teaching hospitals under FMoH. Therefore, their equipment is maintained by the BMEs who belong to the hospitals. There are no maintenance contracts for the existing equipment, and manufacturers are requested to perform maintenance when necessary. In this plan, the laboratories will be encouraged to use this system and to enter into maintenance contracts with a local agent for equipment items for which maintenance agreement with a manufacturer is recommended.

At the request of NCDC, maintenance contracts for some equipment items will be included in the Project.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

2-5-1-1 Costs to be borne by Nigerian side

Items	Cost estimation (NGN: Naira)	Remarks
1. Cost for site preparation	19,266,750	
1) Water supply main distribution line CPHL: UNTH:	 451,000 2,400,000	Lago state water co.
2) Electrical power supply main distribution line CPHL: UNTH: UITH:	 5,415,750 5,000,000 5,000,000	Cost estimate by EKEDC pending
4) Telecommunication line CPHL	500,000	MTN
5) Data communication line CPHL	500,000	MTN
6) Land use change/Land ownership renewal	0	Free
2. Building permit	9,025,000	
3. Social and Environmental Impact Assessment	1,832,000	
4. General furniture	3,610,000	meeting table, desk & chair, curtain
5. Banking arrangement fee	7,220,000	

Items	Cost estimation (NGN: Naira)	Remarks
6. Tax exemption (reimbursement)	14,901,000	
1) CISS (Comprehensive Import Supervision Scheme duty)	9,934,000	FOB x 1%
2) ETLS (ECOWAS Trade Liberalization Scheme duty)	4,967,000	CIP x 0.5%
7. Armed escort guards (security measures)	20,838,000	
Total (1+2+3+4+5+6+7) Rate: 1NGN=0.36841yen	76,692,750	28,254 (thousand JPY)

2-5-1-2 Condition of Cost Estimation

1) Date of estimation: February, 2019
2) Exchange rate: Average three-month rate from first November, 2018 to 3first January, 2019
   1Naira = 0.36841 Japanese yen
   1US$ = 112.67 Japanese yen
3) Construction Period: 20.5 months (including 2 months domestic preparation period)
4) Other: The Project shall be implemented in compliance with Japanese Grant Aid Scheme.

2-5-2 Operation and Maintenance Cost

2-5-2-1 Required Cost for New CPHL Facilities

The running cost (expenses for power and fuel) for the new CPHL facility is calculated as follows:

(1) Electricity Cost

Assumption

Maximum demand	340	kw
Load factor	0.30	

Tariff of electricity charge (Abuja Electricity Distribution Company (AEDC) and EKO Electricity Distribution Company (EKEDC) 33KV Office category)

Demand charge	1970	NGN/kw
Unit charge	100	NGN/kwh

Monthly electricity cost

Demand charge	340kw×1970 NGN/kw	=	669,800 NGN/month
Unit charge	340kw×720h/month×0.3×100 NGN/kwh	=	7,344,000 NGN/month
Total			8,013,800 NGN/month

Annual electricity cost

8,013,800 NGN/month	×	12	month	=	96,165,600 NGN/year

(2) Telephone Cost

Microwave network system (1 line, 10mbps)	Included in internet access cots
Unit charge (Domestic)	10units×180min/month×12 NGN/min=21,600 NGN/month
Unit charge (International)	10units×100min/month×39 NGN/min=39,000 NGN/month
Monthly telephone cost	60,600 NGN/month
Annual telephone cost	60,600 NGN/month × 12 month= 727,200 NGN/month

(3) Data Communication Cost

Internet access cost (1 line of optical line, 10mbps)	520,833 NGN/month
Annual data communication cost	520,833 NGN/month× 12 month×1 line= 6,249,996 NGN/month

Source: Quotation of "Globacom Ltd"; telecommunication carrier in Nigeria

(4) Water Supply and Sewage Cost (Sewage cost is not applicable)

Maximum volume of water consumption per day

Maximum volume of water consumption per day	8 m^3/day

Tariff of water charge (Tariff of FCT water board)

Unit charge	200 NGN/m^3

Annual water supply and sewage cost

8m^3/day ×	360	day/year ×	0.7	×	200	NGN/m^3	=	403,200 NGN/year

(5) Fuel Cost

Conditions stand-by generator	Output 125KVA x 2 units 3-phases 4wire 380V 50HZ (Diesel)	
	Fuel consumption	20.0 litres/hour
Assuming consumption	Monthly operation hours (5hours /day)	240 hours/month
Unit price of diesel fuel		267 NGN/litre

Annual fuel cost	20.0 litres/hour×240 hours/month×12month ×267 NGN/litre= 30,758,400 NGN/year	
Conditions stand-by generator	Output 37KVA x 1 unit 3-phases 4wire 380V 50HZ (Diesel)	
	Fuel consumption	7.0 litres/hour
Assuming consumption	Monthly operation hours (5hours /day)	720 hours/month
Unit price of diesel fuel		267 NGN/litre
Annual fuel cost	7.0 litres/hour×720 hours/month×12month ×267 NGN/litre= 16,148,160 NGN/year	

(6) CO_2 Gas Cost

Replacement frequency	For CO_2 incubator	10times/unit/month
Consumption of CO_2 gas	Capacity 167liters×10% ×10times =	167 litres/unit/month
Annual consumption of CO_2 gas	167liters/unit/month×5unit×12month =	10,020 L/year
Conversion of cylinder(30kg/unit)	10,020 litres/year ÷ 15,272 litres/unit =0.66unit	1.0unit/year
Unit price of CO_2 gas		270 USD/unit
Annual CO_2 gas	1.0 unit/year×270 USD/unit=	270 USD/year

Exchange rate:1.0 USD = 305.83 NGN → 82,574 NGN/year

(7) Maintenance Cost for Septic Tank

New septic tank		
Septic tank for the new building	(Capacity 14.4 m^3/day)	1unit
Number of changes		1time/year
Cost		105,000 NGN/time
Maintenance cost	105,000 NGN/time × 1unit =	105,000 NGN/year
Total		105,000 NGN/year

(8) Maintenance Cost for Facility

	Monthly repair cost (USD)				Annual repair cost (USD)
	Spare parts	Consumables	Inspection	Total	
Lighting fixtures	100	300	50	450	5,400
Standard air conditioning equipment	200	300	60	560	6,720
Sanitary equipment	150	200	608	510	6,120
Repair of interior and exterior	20 USD/m^2/year×2,960m^2 =				59,200
Total					54,240 USD/year

Exchange rate:1.0 USD = 305.83 NGN → 15,976,599 NGN/year

(9) Replacement Cost for Filter

Frequency and unit price of replacement

Medium efficient filter	For BSL-2 laboratory 1 time/year	360 USD/pcs

Annual cost of replacement

Medium efficient filter	360 USD/pcs× 10 pcs×1time/year =	3,600 USD/year
Total		3,600 USD/year

Exchange rate:1.0 USD = 305.83 NGN → 1,100,988NGN/year

(10) Maintenance Cost for Infectious Wastewater Treatment System

Filter, trim, etc.	300,000yen×1time/year =	300,000 yen/year
Annual cost		300,000yen/year

Exchange rate:1.0 NGN = 0.36841 Japanese yen→ 814,310 NGN/year

(11) Maintenance Cost for Infectious Wastewater Treatment System

Specification	Capacity 22 KG/hour 88KG/batch(Fuel oil-A or Kerosene)	
Assuming consumption	Combustion main burner + auxiliary burner	15.2 ℓ/hour
Assuming running time	Constant running per 1 batch	4hours/batch/day
Unit price of fuel		1.12 USD/ℓ
Annual fuel cost	15.2 ℓ/hour×4hours/day×30day×12months ×1.12 USD／ℓ=	24,514 USD/year

Exchange rate:1.0 USD = 305.83 NGN → 7,497,116 NGN/year

2-5-2-2 Required Cost for new Equipment

The annual running cost for equipment is calculated as follows:

Table 2-40 Estimation Annual Running Cost for equipment CPHL

No.	Equipment	Operation and maintenance cost	Quantity	Total (Japanese Yen)
2	Biosafety cabinet (CPHL)	Periodical maintenance and certificate (without HEPA filter) 822,000 Air supply HEPA filter：93,000 Exhaust HEPA filter：72,000 Fluorescent lamp：3,100×2pcs. =6,200 LED lamp：6,000×2pcs. =12,000	7	7,036,400
17	Electrophoresis A	Gel set 80,000 (for 800 gel)	3	240,000
19	ELISA set	Preventive maintenance 17,000 Reagent set 1,040,000	2	2,114,000

No.	Equipment	Operation and maintenance cost	Quantity	Total (Japanese Yen)
27	Microscope, binocular	Oil：10,640	6	63,840
28	Microscope, Fluorescent	C-LHGFI HG LAMP：105,280 Oil：39,200	1	144,480
30	Microscope, teaching	Oil：10,640	1	10,640
32	PCR work station	HEPA filter 17,000 Fluorescent lamp：3,100×2pcs.=6,200 LED lamp：6,000×2pcs.=12,000	3	105,600
33	pH meter	Reagent etc. 16,400	3	49,200
36	Real-time PCR	Preventive maintenance 77,000 Reagent kit for 2,400 samples (10 samples / day) 1,080,000	3	3,471,000
39	Thermal cycler	Preventive maintenance 44,000 Reagent kit for 2,400 samples (10 samples / day) 2,850,000	3	8,682,000
Total				21,917,160 /year

Exchange rate：1.0 NGN = 0.36841 → 59,491,219 NGN/year

Table 2-41 Estimation Annual Running Cost for equipment (seven network laboratories)

No.	Equipment	Operation and maintenance cost	Quantity	Total (JPY)
2	Biosafety cabinet (NHA, LUTH)	Periodical maintenance and certificate (without HEPA filter) 822,000 Air supply HEPA filter：93,000 Exhaust HEPA filter：72,000 Fluorescent lamp：3,100×2pcs. =6,200 LED lamp：6,000×2pcs. =12,000	2	2,010,400
2	Biosafety cabinet (ISTH, UBTH, UCH, UNTH, UITH)	Periodical maintenance and certificate (without HEPA filter) 905,000 Air supply HEPA filter：93,000 Exhaust HEPA filter：72,000 Fluorescent lamp：3,100×2pcs. =6,200 LED lamp：6,000×2pcs. =12,000	9	9,793,800
3	Blood culture	Periodical Maintenance 320,000 Reagent：280,800	3	1,802,400
18	Electrophoresis B	Gel set 160,000 (for 1600 gel)	1	160,000
19	ELISA set	Preventive maintenance 17,000 Reagent set 1,040,000	3	3,171,000
27	Microscope, binocular	Oil：10,640	18	191,520
28	Microscope, Fluorescent	C-LHGFI HG LAMP：105,280 Oil：39,200	1	144,480
29	Microscope, inverted	Mercury lamp：48,000 Oil：19,000	1	67,000

No.	Equipment	Operation and maintenance cost	Quantity	Total (JPY)
32	PCR work station	HEPA filter 17,000 Fluorescent lamp：3,100×2pcs.=6,200 LED lamp：6,000×2pcs.=12,000	4	140,800
33	pH meter	Reagent etc. 16,400	1	16,400
36	Real-time PCR	Preventive maintenance 77,000 Reagent kit for 2,400 samples (10 samples / day) 1,080,000	4	4,628,000
Total				22,125,800 /year

Exchange rate：1.0 NGN = 0.36841 → 60,057,545 NGN/year

2-5-2-3 Estimated Annual Cost for Operation and Maintenance

The annual cost for operation and maintenance of the building and equipment of the Project is calculated as 293 million NGN which are indicated in Table 2-42, whereas the same of eight network laboratories is 119 million NGN.

Table 2-42 Annual cost for operation and maintenance

Items		Annual cost (NGN)	VAT (5%)	Total (NGN)
(1) Cost of facility maintenance		174,279,147	8,713,957	182,993,104
1	Electricity cost	96,165,600	4,808,280	100,973,880
2	Telephone cost	727,200	36,360	763,560
3	Data communication cost	4,500,000	225,000	4,725,000
4	Water supply and sewage cost	403,200	20,160	423,360
5	Fuel cost for generator	46,906,560	2,345,328	49,251,888
6	Cost of CO_2 gas	82,574	4,129	86,703
Sub-total -1 (Annual cost of utilities)		148,785,134	7,439,257	156,224,391
7	Maintenance cost for septic tank	105,000	5,250	110,250
8	Maintenance cost for facility	15,976,599	798,830	16,775,429
9	Replacement cost for HEPA Filter	1,100,988	55,049	1,156,037
10	Maintenance cost for infectious medical waste treatment system	814,310	40,716	855,026
11	Maintenance cost for incinerator	7,497,116	374,856	7,871,972
Sub-total-2(Annual cost for maintenance of facilities)		25,494,013	1,274,701	26,768,714
(2) Annual cost of Equipment for CPHL		59,491,219	2,974,561	62,465,780
(3) Annual cost of Equipment for seven network laboratories		60,057,545	3,002,873	63,060,422
Total (1)+(2)+(3)		293,827,911	14,691,395	308,519,306

Chapter 3 Project Evaluation

Chapter 3 Project Evaluation

3-1 Preconditions

It is important that NCDC and FMoH jointly and severally assume responsibility and conduct the Project smoothly as the executing agency for the Project since the official demarcation and responsibility between the two executing agencies are not clearly determined yet due to the autonomy recently given to NCDC from FMoH.

It is important that the Nigerian side will certainly conduct those responsibilities as described in "2-3 Obligations of Recipient Country" in the appropriate timeline before and/or during the construction of the Project. Especially, NCDC shall properly process together with FMoH the permit for the demolition of existing buildings in accordance with the official procedures, and complete before the date agreed in the minute of meeting.

3-2 Necessary Inputs by Recipient Country

Through the implementation of the Project, BSL-2 laboratory and facilities will be constructed and laboratory equipment will be procured for eight public health laboratories that are part of the network laboratories controlled by NCDC. The Nigerian side should provide inputs and deal with the following items in order to make effective use of the inputs from the Japanese side, to strengthen NCDC's system for the response to and surveillance on infectious diseases, and to detect early and prevent expansion of outbreak of infectious diseases in Nigeria.

(1) Staff Deployment for the Construction of BSL-2 Laboratory Facilities and Procurement of Associated Equipment

It is necessary to plan the detailed staff deployment including the concurrent position holding/re-deployment of existing staff, as well as the eligibility requirements, number and deployment of new staff, to ensure reliable staff deployment, since it will basically be the existing staff who will operate the eight network laboratories except for newly recruiting staff in CPHL. CPHL's BSL-2 laboratory facility will be operated by existing staff at NRL and CPHL as well as staff newly deployed at CPHL, and approximately twenty laboratory staff and maintenance engineers (facility and equipment) are expected to be deployed for full-scale operation. Equipment to be procured for the other seven network laboratories than CPHL will be operated by existing staff at teaching hospitals controlled by FMoH that these laboratories belong to.

(2) Securing of Budget for Operation and Maintenance of Building and Facility, Equipment

FMoH and NCDC should secure budgets for managing the operation and maintenance of the planned facilities and equipment. FMoH's operation budget comes from the Nigerian government and NCDC's operation budget consists of contributions from the Nigerian government, other donors/joint research

institutions and the internal profits of NCDC. Favorable budgetary actions will still be required after the completion of the Project in 2022, even though it was confirmed that the budget could accommodate the management of the operation and maintenance of the planned facilities and equipment based on the past budget performance of NCDC and FMoH in 2015-2018, and NCDC' budget plan in 2019 and 2020.

(3) Management of Operation and Maintenance of Building and Facility, Equipment

The management of the operation and maintenance of the new facility and equipment requires special skills and experience.

CPHL is managed by NCDC, and the other seven network laboratories are supervised by the Department of Hospital Service of FMoH. It has been clarified during the preparatory survey as the detailed allocation of roles including operation, maintenance and budgetary actions that NCDC will be responsible for operation and maintenance of CPHL as well as supply of consumables such as reagents for the seven network laboratories, whereas operation and maintenance of those seven laboratories are under FMoH's responsibility. However, due to NCDC's autonomy recently given and remaining the demarcation unclear between NCDC and FMoH as mentioned earlier, the efficient cooperation between two responsible organizations will be required in operation and maintenance management structure during the implementation and after the completion of the Project.

Concerning the new CPHL facility with BSL-2 laboratories, NCDC should add new engineers specializing in architecture, air conditioning, electricity and water supply and drainage sanitation to the current maintenance team of NRL and CPHL. They will play a critical role in the appropriate operation/handling and inspection of air conditioning and ventilation systems, wastewater treatment systems and medical wastes as well as periodic inspections and preventive maintenance in the infectious control areas.

The maintenance of equipment for the eight network laboratories will be performed through the combined use of the maintenance team of each laboratory and external vendors. General equipment requires daily inspection following the operational manual to maintain good condition. For special equipment installed in the laboratories (e.g., biosafety cabinets (BSCs), blood culture systems, ELISA sets, real-time PCRs and thermal cyclers) additional two-year maintenance contracts are expected after the expiration of the warranty period for the planned equipment.

After the expiration of the maintenance contract period, the equipment must be checked daily by the skilled internal maintenance team, and be checked periodically by specialist vendors such as engineers from a local agency. It is required to conclude an annual maintenance contract with such specialist vendors as required and ensure safe and efficient operation of the equipment.

(4) Enhancement of Biosafety and Biosecurity for New Installation of Laboratory

Strengthening NCDC/CPHL's capacities in biosafety and biosecurity is a key to utilize the new CPHL facility and equipment safely and appropriately and prevent contaminations. With the construction of

BSL-2 laboratories, it is necessary to update guidelines concerning the operation of existing laboratories conducted by NCDC/CPHL and establish an appropriate BSL-2 management system. In addition, from the viewpoint of the management of high-risk pathogens, necessary countermeasures against crimes/disasters and environmental pollution around the laboratory must be taken into considerations.

3-3 Important Assumptions

Expected important assumptions are as follows to materialize and sustain the effect of the Project.

(1) Promotion of Development Plan in Health Sector

The framework of the Project is established following the policy and request from a high-level plan, and the positive and continuous promotion of actions in the field of infectious diseases by the Nigerian side are important in order to achieve the goal of the plan.

The health sector, including infectious disease controls, is positioned as one of the top priority areas in "Economic Recovery and Growth Plan 2017-2020". In December 2018, "National Action Plan on Health Security 2018-2022" was announced.

Concerning government agencies such as NCDC and FMoH established the action plan mentioned above together with the Federal Ministry of Agriculture and Rural Development and the Federal Ministry of Environment. The plan was developed based on the following major pillars: digitalizing surveillance in the LGAs, establishing a network of public health and veterinary laboratories, gaining the human resource for the detections of infectious diseases and improving responses against public health threats and emergency situations,.

The "Nigeria Medical Laboratory Services Policy" and the current "Nigeria Medical Laboratory Strategic Plan 2015-2019" also address the improvement of laboratory functions and regard enhancement of NCDC's capabilities for infectious disease surveillance, prevention, emergency response and investigation and the development of NRL and network laboratories as priority issues. Among the issues, there is high expectation for laboratory data maintenance, storage of specimens/samples, and improvement of bacteriological examinations and strengthening of the laboratory network.

(2) Continuous Support from Donors Including JICA, Other International Organizations and Joint Researches

As NCDC mainly obtains support from WHO, US CDC and PHE, it will be important that NCDC continue to obtain funding from these organizations and seek new partners while closely working with the three JICA projects including the Project. Especially, for the enhancement of developing public health laboratory network, it is expected that support will be continuously provided to strengthen diagnostic testing capacity of each laboratory, to strengthen biosafety biosecurity and to enhance the system of external quality assessment.

In Nigeria, outbreaks of emerging infectious diseases are often reported such as Lassa fever and Ebola virus disease in 2014. The FMoH has very high expectations for JICA's support for the construction of laboratories that will provide the foundation for early detection and containment of these serious infectious diseases. Japan has provided comprehensive support, including the "Project for Strengthening the Diagnostic Capacity of Nigeria Centre for Disease Control" (grant aid) for the construction of BSL-3 facilities in the NRL. The provision of equipment by the Project is expected to generate synergetic effect with the technical assistance, "Project for Strengthening Detection of and Response to Public Health", which will start in 2019.

(3) Organization of the implementation structure for Adequate Management and Operation of the Laboratory Network

The Project is expected to assist in enhancing the diagnostic capacity for infectious diseases and surveillance function at the state level by improving the laboratory infrastructure. However, the following systems should be established to ensure the proper management and operation of the laboratory network.

- Establish a hierarchy in the network with NRL and CPHL as top referrals and strengthen the program management capacity of NRL and CPHL.
    - Establish a quality management system including Laboratory accreditation system, external quality assessment, internal quality control and quality improvement activities, and continue monitoring periodically.
    - Develop procurement and supply system for reagents, consumables, etc. so that each network Laboratory can provide uninterrupted test services.
    - Establish a Laboratory information management system for interactive collection of information such as the number of tests performed for each Laboratory tests, positive rate and inventory information about reagents, commodities, etc.
    - Establish a human resources development/training program based on the quality management system and develop a plan for implementation.
- Establish a referral system in the catchment area of each network laboratory. Health systems' delay in diagnosing infectious disease (Figure 3-1) will be improved if the decentralized testing system is further segmented from the zone level to the state level. For this, a transportation system should be established for patients or test specimens in the respective catchment area.
- Introducing more advanced Laboratory methods, reduce the tune around time on the Laboratory test (reduce diagnosis delay in the Laboratory, see Figure 3-1) and improve the quality of the Laboratory test. Specifically, promote the dissemination of the test method using a nucleic acid amplification method (conventional PCR: cPCR), and real-time PCR (quantitative PCR: qPCR) is newly introduced. Compared to the cPCR method, the qPCR method has advantages such as easy operation and quick results, low risk of contamination, and accurate quantification.

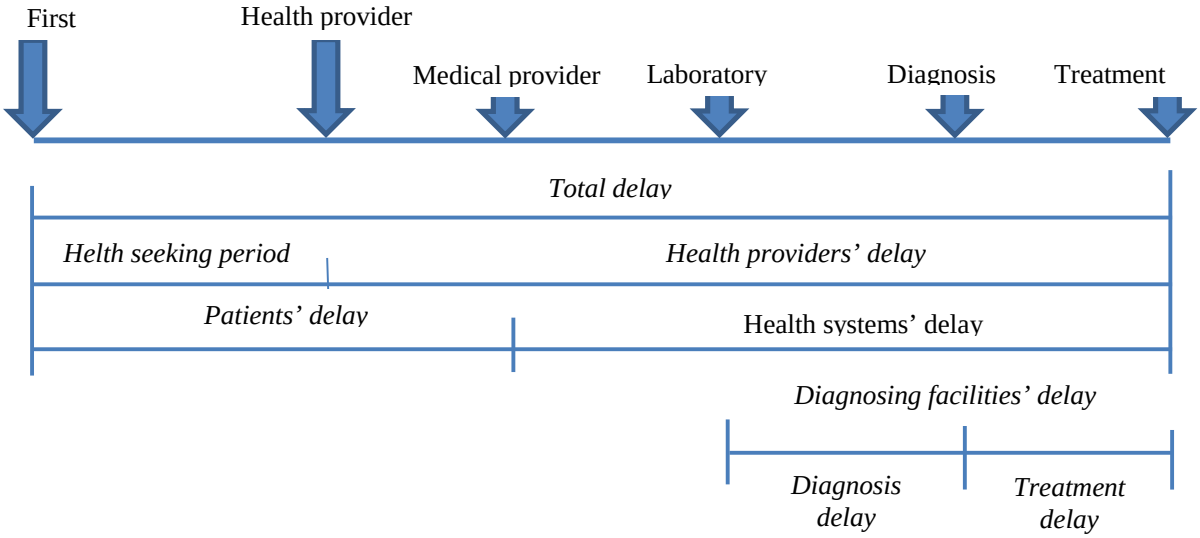


Figure 3-1 The relation of the different delay periods such as patients' health seeking and health providers

3-4 Project Evaluation

3-4-1 Relevance

The expected effect of the Project and its worthiness are as follows.

(1) Relevance of Benefit and Target of the Project

It is expected that infectious disease measures will be strengthened by the improvement of these central laboratories in the region to contribute to the target and neighboring states of the Project. The Project will contribute to the early detection of infectious disease outbreaks and the prevention of their escalation in Nigeria by providing equipment and facilities to eight laboratories controlled by NCDC to strengthen the infectious disease control and surveillance system.

NCDC plays a major role in the research/diagnosis related in infectious disease controls and performs tests and diagnoses of the pathogens of the eight prioritized diseases (Viral hemorrhagic fever, Yellow fever, Cholera, Meningitis, Measles, Influenza, AMR, Monkey pox) among the 41 diseases in the Integrated Disease Surveillance and Response (IDSR) designated by WHO. The six major laboratories including NRL and CPHL, two standard virus laboratories and 30 laboratories under the laboratory network (as of February 2019) have established a surveillance system of infectious diseases. As for influenza, the sentinel surveillance system has been formed with four supporting institutions and tests are continuously conducted in existing laboratory facilities. The goals of NCDC are to provide a diagnosis of these eight infectious diseases in all the network laboratories and strengthen surveillance and response capabilities. By improving NCDC's functions by such actions as the construction of BSL-2 laboratories, the Project is expected to further enhance the capability to tackle infectious diseases and contribute to the early detection of infectious disease outbreaks and the prevention of their escalation.

(2) Consistency with Nigeria's Health Policy

NCDC is expected to play a major role in surveillance, prevention and emergency response regarding infectious diseases. In particular, the improvement of network laboratories is expected to enhance the surveillance capability and epidemiology testing and diagnostic capability. The Project is defined as the embodiment of these priority issues. As described in the "National Vision 20:2020", the "National Action Plan on Health Security 2018-2022", the "Nigeria Medical Laboratory Services Policy" and the "Nigeria Medical Laboratory Strategic Plan 2015-2019," Nigeria prioritizes infectious disease controls and makes efforts to improve laboratory functions.

(3) Consistency with Japan's Aid Policy

The implementation of the Project will have great significance in contributing to UHC in Africa, particularly because Nigeria is one of the target countries of JICA's program for Partnership for Building Resilience against Public Health Emergencies through Advanced Research and Education (PREPARE).

The Project is considered to be consistent with the "Country Development Cooperation Policy for Nigeria" issued in September 2017[1], which sets "improvement inclusive and robust establishment of health and medical system" as one of the important fields of the basic policy for Japanese ODA, and with the "Basic Policy for Peace and Health", "G7 Ise-Shima Leader's Declaration" etc. in which Japan has manifested supports for the strengthening of countermeasures to infectious diseases leading to international threats. With the cooperation policy to especially support the improvement of local health services and strengthen laboratories and the NCDC, the Project is expected to enhance the capacity to deal with infectious diseases through the development of health infrastructure. Moreover, it will also contribute to the "improvement of preparedness for public health emergencies", a pillar for promotion of UHC stated in a pledge made in TICAD VI.

It is also greatly significant in terms of contribution to Goal 3 of the Sustainable Development Goals (SDGs), international support to the enhancement of the capability to deal with infectious diseases in post Ebola and strengthening of the performance of WHO International Health Regulations (IHR) through the improvement of laboratory/diagnosis techniques and enhancement of the research capability.

3-4-2 Effectiveness

The output expected by carrying out the Project and outcome expected by carrying out the whole project plan are described as follows. Quantitative and qualitative indicators are suggested assuming that the standard year of indicators is 2019 and target year is 2025, three years after 2022 when the construction of the building facility and procurement of equipment are expected to be completed.

[1] Country Development Cooperation Policy for Nigeria issued in September 2017
https://www.ng.emb-japan.go.jp/files/000503124.pdf

(1) Quantitative Effects

The number of network laboratories (out of eight) that diagnose the major six pathogens is suggested as the quantitative indicator, and standard and target values are set as shown in Table 3-1.

Table 3-1 Quantitative Indicators (The Project Output)

Indicator	Disease	Baseline Data in FY2019	Target Value in FY2025 [Three years after the project is completed]*3
The number of the registered laboratories(*1) out of eight laboratories of the Project that conducts a confirmative diagnosis(*2) of pathogens classified as the prioritized infectious diseases	(a) Antimicrobial Resistance	3 (NHA, UITH, UCH)	5 (NHA, UITH, UCH, UNTH, CPHL)
	(b) Yellow Fever	0	4 (Serological test: CPHL, UNTH) (PCR: CPHL, ISTH, LUTH)
	(c) Cholera	1 (CPHL)	4 (CPHL, UHI, UNTH, UITH)
	(d) Meningitis	1 (CPHL)	2 (CPHL, UITH)
	(e) Influenza	0	1 (CPHL)
	(f) Lassa fever	2 (LUTH, ISTH)	5 (LUTH, ISTH, CPHL, Two other laboratories (to be selected))

*1: Registered laboratory is the laboratory that NCDC and/or FMoH deem capable to conduct the determined diagnosis for the prioritized infectious diseases.

*2: Confirmative diagnosis is to examine in compliance with IDSR and judge whether infected or not. Accuracy and fastness of the determined diagnosis enable an initial response to be taken at the earlier stage of outbreaks.

*3: The Project will not enable eight laboratories to attend the examination for all prioritized infectious diseases since the necessary equipment and examination differed in accordance with pathogens of virus , bacteria.

(2) Qualitative Effects

1) Improvement of importance of eight network laboratories as a regional public health laboratory in each state by improving quality and effectiveness of tests and diagnosis

The Project is expected to improve the environment of BSL-2 facility systems in the monitoring of interior/exterior access, air conditioning/ventilation, water supply and drainage sanitation, infectious wastewater treatment. Furthermore, the Project upgrades the zoning and layout in the area of CPHL in terms of i) the intercommunications and enlacement of rooms, ii) the traffic line and workflow, iii) the distribution of equipment, and iv) the work space, which set the BSL-2 laboratories closely interfaced with its auxiliary rooms such as the preparation hall, the biobank, and also set the virology, bacteriology and parasitology laboratory including PCR rooms mechanically and physically isolated under the concept of biosafety and biosecurity. In the other seven network laboratories, equipment required for BSL-2-equivalent laboratories will be updated and added. Through these supports, it is expected that safe, efficient and accurate testing and diagnosis will be ensured and the eight network laboratories will take on more importance as a base for public health measures in each state.

2) Prevention of public health crisis in Nigeria by strengthening the infectious disease response and surveillance system

The Project is expected to contribute to the following outcomes by upgrading the facility and equipment suitable for the BSL-2 laboratories at the eight network laboratories: i) to strengthen the surveillance system and then ii) to increase the number of laboratory testing, iii) to enhance the specimen transport and the test quality assurance, iv) to enhance the infectious disease response in the target states (e.g., rapid containment of outbreaks), and v) to render the safety and security against infectious diseases to the population in the target and neighboring states.

Appendices

Appendix-1 Member List of the Survey Team

Field Survey (From January 7th, 2019 to February 1st, 2019)

Name	Function	Affiliation
Dr. Mitsuo ISONO	Leader	Senior Adviser, JICA
Ms. Rei KANSAKU	Adviser /Infection Control	Senior Adviser, JICA
Ms. Maki MASUTANI	Project Coordinator	Health Team 2, Health Group 1,JICA
Ms. Kyoko FUJISAWA	Project Coordinator	Health Team 2, Health Group 1,JICA
Mr. Teruyasu EZURE	Chief Consultant /Architectural Planning /Environmental Condition	Oriental Consultants Global Co., Ltd.
Mr. Takatsugu SHIMADA	Architectural Planning/Natural Conditions Survey 1	Oriental Consultants Global Co., Ltd.
Ms. Naoko MIYATAKE	Architectural Planning/Natural Conditions Survey 2	Oriental Consultants Global Co., Ltd.
Mr. Masahiko SUZUKI	Facility Design	Oriental Consultants Global Co., Ltd. (SPC)
Mr. Haruhisa ISHIKAWA	Construction Planning /Cost Estimation (Facilities)	Oriental Consultants Global Co., Ltd.
Mr. Akio KANEKO	Equipment Procurement Planning	Fujita Planning Co., Ltd. (AHMN)
Mr. Yosuke KONNO	Equipment Procurement Planning /Cost Estimation (Equipment)	Fujita Planning Co., Ltd
Mr. Takashi MIURA	Laboratory Planning	Oriental Consultants Global Co., Ltd. (Japan Anti-Tuberculosis Association)
Mr. Takeshi KUDO	Security Planning	Oriental Consultants Global Co., Ltd.

Explanation for Draft Final Report (From May 26th, 2019 to June 6th 2019)

Name	Function	Affiliation
Dr. Mitsuo ISONO	Leader	Senior Adviser, JICA
Ms. Kyoko FUJISAWA	Project Coordinator	Health Team 2, Health Group 1,JICA
Mr. Teruyasu EZURE	Chief Consultant /Architectural Planning /Environmental Condition	Oriental Consultants Global Co., Ltd.
Mr. Takatsugu SHIMADA	Architectural Planning/Natural Conditions Survey 1	Oriental Consultants Global Co., Ltd.
Mr. Akio KANEKO	Equipment Procurement Planning	Fujita Planning Co., Ltd. (AHMN)

Appendix-2 Survey Schedule

Field Survey (From January 7th, 2019 to February 1st, 2019)

	DATE		JICA	Architectural Planning/Natural Conditions Survey 1	Architectural Planning/Natural Conditions Survey 2	Facility Design	Construction Planning/ Cost Estimation (Facilities)	Equipment Procurement Planning	Equipment Procurement Planning / Cost Estimation (Equipment)	Laboratory Planning	Security Planning
				EEJIRE/TERUYASU	SHIMADA/TAKATSUGU	MIYATAKE/NAOKO	SUZUKI/MASAHIKO	ISHIKAWA/HARUHISA	KANEKO/AKIO	KONNO/YOSUKE	MIURA/TAKASHI	KUDO/TAKESHI
1	7-Jan-19	Mon		TOKYO→ADDIS ABABA				TOKYO→ADDIS ABABA			TOKYO→ADDIS ABABA	
2	8-Jan-19	Tue		→ABUJA				→ABUJA			→ABUJA	
3	9-Jan-19	Wed		Briefing to JICA Office w/FMoH・NCDC, Explanation, Discussion on Inception Reports				Survey on Construction Planning/Cost Estimate（ABUJA） Preparation for Natural Conditions Survey	w/ Chief Consultant		w/ Chief Consultant	
4	10-Jan-19	Thu		Survey on Site Condition ③National Hospital Abuja NCDC-NRL				Survey on Construction Planning/Cost Estimate（ABUJA） Preparation for Natural Conditions Survey	w/ Chief Consultant		Survey on Site Condition ③National Hospital Abuja NCDC-NRL	
5	11-Jan-19	Fri		ABUJA→LAGOS CPHL, Explanation, Discussion on Inception Reoprts	TOKYO→ADDIS ABABA		ABUJA→LAGOS Preparation for Natural Conditions Survey	ABUJA→LAGOS CPHL, Explanation, Discussion on Inception Reoprts	TOKYO→ADDIS ABABA		ABUJA→LAGOS CPHL, Explanation, Discussion on Inception Reoprts	
6	12-Jan-19	Sat		Survey on Site Condition ①CPHL Preparation for Natural Conditions	→ LAGOS		Preparation for Natural Conditions Survey, Survey on Construction Planning/Cost Estimate（LAGOS）	w/ Chief Consultant	→ LAGOS		Survey on Site Condition ①CPHL Preparation for Survey on Medical Research Planning & Security Planning	
7	13-Jan-19	Sun		Examinations on Outline Designs (Building/ M&E/ Equipment) Consultant team Meeting、Preparation for Survey								
8	14-Jan-19	Mon		Survey on Site Condition ②University of Lagos Preparation for Natural Conditions				Survey on Site Condition ②University of Lagos			Survey on Medical Research Planning & Security Planning ②University of Lagos	
9	15-Jan-19	Tue	TOKYO→	Survey on Medical Research Planning & Security Planning LAGOS → IBADAN （land）		Survey on Construction Planning/Cost Estimate（LAGOS）			Survey on Medical Research Planning & Security Planning LAGOS → IBADAN （land）			
10	16-Jan-19	Wed	→ABUJA	IBADAN → LAGOS Survey on Outline Designs (Building/ M&E)	w/ Laboratory Planning	w/ Chief Consultant	Survey on Construction Planning/Cost Estimate（LAGOS）	w/ Laboratory Planning	w/ Chief Consultant		Survey on Medical Research Planning & Security Planning ④University College Hospital, Ibadan IBADAN → ILORIN （land）	
11	17-Jan-19	Thu	Meeting w/JICA Office Meeting w/FMoH & NCDC	Survey on Site Condition ③CPHL	Survey on Medical Research Planning & Security Planning ⑧University of Ilorin Teaching Hospital, Kwara	Survey on Site Condition③CPHL	Survey on Construction Planning/Cost Estimate（LAGOS）	Survey on Medical Research Planning & Security Planning ⑧University of Ilorin Teaching Hospital, Kwara	Survey on Site Condition③CPHL		Survey on Medical Research Planning & Security Planning ⑧University of Ilorin Teaching Hospital, Kwara ILORIN → LAGOS （air）	
12	18-Jan-19	Fri	ABUJA→LAGOS Survey on Site Condition ①CPHL、②University of Lagos	Survey on Site Condition ①CPHL、②University of Lagos Discussion w/CPHL	Survey on Outline Designs (Building/ M&E), Preparation for Natural Conditions	Survey on Medical Research Planning & Security Planning ILORIN → LAGOS （air）	Survey on Outline Designs (Building/ M&E)	Survey on Medical Research Planning & Security Planning ⑤University of Nigeria Teaching Hospital, Enugu LAGOS → ENUGU （air）	Survey on Medical Research Planning & Security Planning ILORIN → LAGOS （air）		Survey on Medical Research Planning & Security Planning ⑤University of Nigeria Teaching Hospital, Enugu LAGOS → ENUGU （air）	
13	19-Jan-19	Sat	LAGOS→ABUJA Preparation for draft M/D	Examinations on Outline Designs(Building/ M&E/ Construction/ Procurement) Consultant team Meeting				Survey on Medical Research Planning & Security Planning ENUGU → LAGOS （air）	Survey on Equipment Planning & Procurement Consultant team Meeting		Survey on Medical Research Planning & Security Planning ENUGU → LAGOS （air）	
14	20-Jan-19	Sun	Preparation for draft M/D	Examinations on Outline Designs (Building/ M&E) w/JICA	Survey on Outline Designs (Building/ M&E) Preparation for Natural Conditions	w/ Laboratory Planning	w/ Architectural Planning 1 Survey on Outline Design(M&E)	Examinations on Outline Designs(Building/ Equipment) Consultant team Meeting, Data/Docs. Organization and Analysis	w/ Laboratory Planning	Preparation for Survey of Equipment Planning	Survey on Medical Research Planning & Security Planning LAGOS → BENIN （air）	
15	21-Jan-19	Mon	Discussion w/NCDC Preparation for draft M/D	Survey on Outline Designs (Building/ M&E) & Environmental Impact Assessment	Survey on Outline Designs (Building/ M&E) Preparation for Natural Conditions	w/ Laboratory Planning	w/ Architectural Planning 1 Survey on Outline Design(M&E)	Survey on Construction Planning/Cost Estimate（LAGOS）	w/ Laboratory Planning	Preparation for Survey of Equipment Planning	Survey on Medical Research Planning & Security Planning ⑥Irrua Specialist Teaching Hospital, Edo BENIN → IRRUA → BENIN （Land）	
16	22-Jan-19	Tue	Discussion w/NCDC Preparation for draft M/D	Survey on Outline Designs (Building/ M&E) & Environmental Impact Assessment	Survey on Outline Designs (Building/ M&E) Preparation for Natural Conditions	w/ Laboratory Planning	w/ Architectural Planning 1 Survey on Outline Design(M&E)	Survey on Construction Planning/Cost Estimate（LAGOS）	w/ Laboratory Planning	Preparation for Survey of Equipment Planning	Survey on Medical Research Planning & Security Planning ⑦University of Benin Teaching Hospital, Edo BENIN	
17	23-Jan-19	Wed	Eplanationand Discussion draft M/D w/FMoH Visit to WHO, WB	LAGOS→ABUJA Consultant team Meeting Preparation for draft M/D	Examinations on Outline Designs(Building/ M&E) Consultant team Meeting	w/ Laboratory Planning	LAGOS→ABUJA Examinations on Outline Designs(Building/ M&E)	LAGOS→ABUJA Survey on Construction Planning/Cost Estimate（ABUJA）	w/ Laboratory Planning	LAGOS→ABUJA Survey on Equiment Planning/Cost Estimate（ABUJA）	Survey on Medical Research Planning & Security Planning BENIN → ABUJA （air） Consultant team Meeting	
18	24-Jan-19	Thu	Discussion of draft M/D	Preparation for Natural Conditions Examinations on Outline Designs(Building/ M&E)				ABUJA→ADDIS ABABA	w/ Chief Consultant	Survey on Equipment Procurement（ABUJA）	w/ Chief Consultant	
19	25-Jan-19	Fri	Discussion and Signing of M/D Meeting w/JICA Office Briefing to EoJ	Discussion and Signing of M/D Meeting w/JICA Office Briefing to EoJ	Preparation for Natural Conditions Examinations on Outline Designs(Building/ M&E)		→TOKYO		w/ Chief Consultant	Survey on Equipment Procurement（ABUJA）	Preliminary Report of Field Survey	
20	26-Jan-19	Sat	→TOKYO	Preparation for Natural Conditions Planning on Outline Designs				Planning on Equipment Planning & Outline Designs	LAGOS→ABUJA Survey on Equipment Procurement(ABUJA)		ABUJA→ADDIS ABABA	
21	27-Jan-19	Sun	Consultant team Meeting, Data/Docs. Organization and Analysis Planning and Preparing on Outline Designs						Consultant team Meeting, Data/Docs. Organization and Analysis Planning and Preparing on Outline Designs		→TOKYO	
22	28-Jan-19	Mon	Explanation of Outline Design, Revision of Outline Design, Preparation for Technical Note						Explanation of Outline Design, Revision of Outline Design, Preparation for Technical Note			
23	29-Jan-19	Tue	Discussions & Explanation of Outline Designs Discussions of draft Technical Notes		ABUJA→ADDIS ABABA				Discussions & Explanation of Outline Designs Discussions of draft Technical Notes			
24	30-Jan-19	Wed	Discussions of draft Technical Notes and Signing of Technical Notes Report to JICA Office, Preliminary Report of Field Survey		→TOKYO				Discussions of draft Technical Notes and Signing of Technical Notes, Report to JICA Office, Preliminary Report of Field Survey			
25	31-Jan-19	Thu	ABUJA→ADDIS ABABA						ABUJA→ADDIS ABABA			
26	1-Feb-19	Fri	→TOKYO						→TOKYO			

Explanation for Draft Final Report (From May 26th, 2019 to June 6th 2019)

	Date		JICA Team Leader	JICA Project management	Chief Consultant／Arcitecture Planning／Social and Environmental	Architectural Planning/Natural Conditions Survey 1	Equipment Planning
			Dr. Isono	Ms. Fujisawa	Mr. Ezure	Mr. Shimada	Mr. Kaneko
1	26-May	Su			NRT → ADDIS ABABA		
2	27-May	M			→ ABUJA		ACCRA → ABUJA
3	28-May	T	NRT →		Consultant team Meeting for the Preparation of M/D		
4	29-May	W	→ ABUJA	HND → ABUJA	Consultant team Meeting for the Preparation of M/D		
			Team Meeting Preparation for draft M/D				
5	30-May	Th	Meeting w/JICA Nigeria Office				
			NCDC： Discussion on the Draft M/D Team Meeting Preparation for draft M/D				
6	31-May	F	NCDC： Singning of M/D				
7	1-Jun	Sa	Team Meeting Preparation for Report		ABUJA → ADDIS ABABA		ABUJA → PARIS
8	2-Jun	Su	Preparation for Report		→ NRT		→ NRT
9	3-Jun	M	Report to JICA Office, Meeting w/EOJ MOH：Breifing & Singning of M/D				
10	4-Jun	T	Meeting w/ USCDC & USAID				
11	5-Jun	W	ABUJA →				
12	6-Jun	Th	→ HND				

Appendix-3 List of Parties Concerned in the Recipient Country

1. NCDC (Nigeria Centre for Disease Control)

- Dr. Chikwe Ihekweazu — CEO
- Mr. Anthony Ahumibe — Senior Laboratory Technical Advisor
- Ms. Nwando Mba — Dir. National Reference Laboratory
- Badaru Sikiru — Deputy Director (Lab. Network)
- Adedeji Adesayo — Director Lab. Senior
- Akinpelu Afocolor — Assist. Director(Medical Lab. Scientist)

2. NCDC CPHL(Central Public Health Laboratory)

- Mrs. Babatunde Oleyumd — Deputy Director
- Mrs. Ogbazi Josephine E — Biosafety/Biosecurity/Public Management Sectors
- Mr. Martins Olajide — Lab. Scientist
- Mr. Obahor Benjamin — Account/Maintenance
- Mr. Christophor B. Uicpe — Maintenance Officer
- Mr. Amiefiok Ekoh — Assist. Director (Medical Lab Scientist)

3. Federal Ministry of Health

- Mrs. Agba Janet C. — Assist. Director (Medical Lab Scientist)
- Mrs. Emeka Alice — Deputy Director (Medical Lab Scientist)
- Mrs. Nkechi .A. Nwoke — Director (Medical Lab Scientist)

4. National Hospital Abuja

- Dr. J. A. Momoh — CMO/CEO
- Dr. O.O.Olaomi — DCS/CMAC
- Mr. Olasamuel A. — DM
- Mr. A.A. Umar — DCMAE
- Mr. Sramo Haaspeud — DD/PRO
- Mr. Ikedo John — HOD
- Engr. Ajimaro Suamy — Asst. Chief Engineer
- Mr. Ilegogie Anthony — Deputy Director Dm
- Dr. K.C.Iregbu — HOD
- Dr. T.T.Wakama — HOD (Haematology)
- Anoke Uzoamaka R. — Asst. Director (Haematology)

5. University of Lagos, Virology

- Mr. Sunday Omilabu — VHF Lab Lead
- Abdulah Maryam — Lab. Scientist
- Oremolu Meray R. — Lab. Scientist
- Anjamary Roosarey — Lab. Scientist
- Salu Olumuyiwa — Lab. Manager

6. University of Lagos, Microbiology

- Ms. Anyameou A. Roosevelt
- Prof. O. Odnel — HOD
- Dr. Osuagwu C. S. — Consultant

7. University College Hospital, Ibadan

- Dr. Victor I. Akinmoladun — CMD
- Ms. Olaosim Iyiova I — Deputy Director(MLS)
- Ms. Fowotade Adeola — Tec HUD
- Ms. Aderooji A. T. — Departmental Secretary
- Ms. Ogunleye Veonice — Deputy Director

- Mr. Gboja Adebimpe — Infection Control Nurse
- Ms. Adiguri Oyirilola — Departmental SCC
- Mr. Odekawmi Adesin — Deputy Director(MLS)
- Mr. Olayimka, Baniji — Biomedical Engineer

8. University of Ilorin Teaching Hospital

- Prof. A.D. yusuf — Chief Medical Director
- Dr. A. O. Saica — CMAC
- Dr. Kadir Hassan Oba — Deputy D. A
- Dr. Adeniran A. S. Deputy — CMAC
- Mr. Alarape A. J. — CMLS
- Dr. Abayomi Fadeyi O. — Consultant
- Dr. Suleiman S. T. — Consultant
- Mr. Anderson O. Agoni — Biomedical Engineer

9. University of Nigeria Teaching Hospital, Enugu

- Ms. Chioma Banjamin Puja — Chief Medical Lab Scientist
- Mr. Ani Ebelechykaru — Chief Medical Lab Scientist
- Mr. Okechukmi Euphemia — Chief Medical Lab Scientist, Media Room
- Ms. Chukwuemeka Ijeoma Blessing — Chief Medical Lab Scientist
- Mr. Udeinya Frances Ihuakm — Principal Medical Lab Scientist, Bacterology
- Dr. Azubuke Constana U. — Chief Medical Lab Scientist, Virology
- Ms. Chukyubuikem Chinemu — Principal Medical Lab Scientist
- Ms. Bressing Opara — Senior Medical Lab Scientist
- Mr. Eboh Uzoma — Senior Medical Lab Scientist
- Okome Ujuinwa — Senior Medical Lab. Scientist
- Onyeso Immaclels — Senior Medical Lab. Scientist

10. Irrua Specialist Teaching Hospital

- Prof. S. DKDGBENIN — CMD
- Dr. W. DyIGNRIA — CMAC
- Mr. S. A. Momoh — Assistant
- Mr. Rev. Fehx Obhakhan — Director
- Dr. C. Affusim — DCMAC
- Dr. Ebhraim Ogbaini — Director ILFRC(Institute Lassa Fever Research Control)
- Mr. Ikponmwosa Odia — Head of Lab Manager

11. University of Benin Teaching Hospital

- Prof. D. E. Oboseki — CMD
- Prof. C. Omuemu — CMAC
- Prof. O. Adeleye — DC MAC(Research & Ethics)
- Prof. C. O.kuwkwo — DC MAC(Training & Monitoring)
- Mrs. E. Osian — Deputy Director Nursing Service
- Mr. G. Furae — S.A.to Care
- Mr. Uwaila Joshua. Esq — P.R.O
- Mr. Ndiokwere Casimir — Assistant Director
- Dr. E.O. Yusuf — Head of Department
- Mrs. Omijie Rosemary — Assistant Director
- Mr. Richrd Omoregie — Assistant Director
- Mr. Ogheifun M. Asawamy

12. Land Bureau Lagos State

- Mr. Chales Aribisala — Director(Estate)
- Mr. Bola Aliu — Director

- Tpl. Ogunlewe D.A. — As. Director
- Tpl. Ofarinde I.S. — As. Director

13. Local Contractor

- Engr. John B USWUAGBO — Lightyear, CEO
- Mr. Peter Ageva — Lightyear, Civil Engineer
- Engr. Josh Ohanenye — Lightyear, Electrical Engineer
- Mr. Bar Theodora Ikhille — Lightyear, Director/Company Secretary
- Ms. Okeowo Kemi Oluwaseyi — Lightyear, Office Assistant
- Mr. Julius Ileiju — Swift, Operations Manager
- Mr. Tunji Abisoye — Swift, Engineer
- Mr. Bayo Ogunrinde — OAT Construction, Executive Director
- Mr. Soji Adeniji — OAT Construction, Managing Director

14. Local Company

- Mr. Happy Idahor — MTN, Corporate Account Partner
- Mr. Damian Mbalu — ABJ Consolidated Nigeria LTD, Product Manager
- Ms. Kate Isa — Katchey, Chief Executive Officer
- Mr. Olumurewa Odunjo — LS Scientific, Managing Director
- Mr. Lanre Akinseye — Winteck Nigeria Limited, Marketing Executive
- Ms. Amaka Jiodo — Finlab Nigeria Limited, Sales Manager
- Mr. Nzurumike Augustine — Biosafe Equipment Calibrations Ltd., CEO
- Mr. Andrew Alefule — DCL Laboratory Products LTD, National Sales Manager
- Mr. Omolake Abolade — AXA Mansard, Branch Operations
- Mr. Olungbenga M. Olugbamila — Leadway Assurance Company Limited, Associate
- Ms. Adebola A. Tope-babalola — Industrial and General Insurance PLC, Assistant Director
- Mr. Richard A. Oyekunle — Prestige Assurance PLC, Abuja Branch Manager

15. Procurement

- Ms. Mari Masuoka — World Food Programme Nigeria, Logistics Officer
- Mr. Hisao Yamamoto — CFAO, General Manager

16. JICA Nigeria Office

- Mr. Katsutoshi Komori — Chief Representative
- Ms. Makiko Okumura — Chief Representative
- Ms. Yuriya Teragaki — Project Formulation Advisor
- Mr. Ryota Kinouchi — Project Formulation Advisor
- Mr. Kenichi Kuroda — Representative
- Mrs. Damilola Graham-Douglas — In House Consultant

Appendix-4 Minutes of Discussions Field Survey

MINUTES OF DISCUSSIONS
ON THE PREPARATORY SURVEY
ON THE PROJECT FOR STRENGTHENING THE CAPACITY OF NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES IN THE FEDERAL REPUBLIC OF NIGERIA

Based on the several preliminary discussions between the Government of the Federal Republic of Nigeria (hereinafter referred to as "Nigeria") and Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for Strengthening the Capacity of the Nigeria Centre for Disease Control Network Laboratories (hereinafter referred to as "the Project") to Nigeria, from 16th to 25th January, 2019.

The Team held a series of discussions with the officials of the Government of Nigeria and conducted a field survey. Over the course of the discussions, both sides have confirmed the main items described in the attachment. The Team will proceed to further works and prepare the Preparatory Survey Report.

Abuja, 24th January 2019

Mitsuo Isono
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Joseph Amedu, mni
Head
Department of Hospital Services
Federal Ministry of Health
The Federal Republic of Nigeria

Chikwe Ihekweazu
Director General
Nigeria Centre for Disease Control
The Federal Republic of Nigeria

Witnessed by

Elizabeth Akpana Egharevba
Director
Department of International Cooperation
Federal Ministry of Budget and National Planning
The Federal Republic of Nigeria

ATTACHMENT

1. Objective of the Project

The objective of the Project is to prevent and control the spread of infectious diseases by constructing and procuring the necessary facility and equipment in Nigeria Centre for Disease Control (hereinafter referred to as "NCDC") network laboratories located in NCDC/Central Public Health Laboratory (hereinafter referred to as "CPHL") and the Federal Ministry of Health (hereinafter referred to as "FMoH") teaching hospitals, and thereby it will contribute to strengthening the surveillance system of infectious diseases in Nigeria.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Strengthening the Capacity of the Nigeria Centre for Disease Control Network Laboratories".

3. Project Sites

Both sides confirmed that the sites of the Project for construction of the new facility with laboratories are on the ground of the CPHL in Lagos as shown in **Annex 1**. In addition, the requested equipment is to be procured and installed in the seven NCDC network laboratories in the FMOH teaching hospitals listed below. The location map of the Project sites of all the laboratories and the CPHL is shown in **Annex 2**.

(1) Irrua Specialist Teaching Hospital, Irrua, Edo State
(2) University of Benin Teaching Hospital, Benin, Edo State
(3) University College Hospital, Ibadan, Oyo State
(4) University of Nigeria Teaching Hospital, Enugu, Enugu State
(5) National Hospital Abuja, Abuja, FCT
(6) Lagos University Teaching Hospital Virology Laboratory, Idiaraba, Lagos state
(7) University of Ilorin Teaching Hospital, Ilorin, Kwara state

4. Implementing Agencies

Both sides confirmed the responsible authorities for the Project are as follows:

The FMoH and the NCDC are the implementing agencies. The implementing agencies shall coordinate with all the relevant agencies to ensure smooth implementation of the Project and ensure that the undertakings are taken by the relevant agencies properly and on time. The NCDC shall be responsible for issues related to the CPHL, while the FMoH shall be responsible for issues related to other NCDC network laboratories in the FMoH teaching hospitals. The organization

charts of the FMoH and the NCDC are shown in **Annex 3 and Annex 4.**

5. Items Requested by the Government of Nigeria

5-1. Both sides agreed that the requested facility for the CPHL including BSL-2 laboratories would serve as a referral laboratory for diagnosis of prioritized infectious diseases in the sub-region, and also confirmed the architectural design of the facility as follows:

- Four BSL-2 laboratories
- Training laboratory
- Bio-bank
- Monitoring room
- Other necessary facilities as reference laboratory

5-2. Both sides agreed that the essential equipment to operate the new facility in the CPHL and to diagnose the prioritized infectious diseases in other seven NCDC network laboratories have priorities in the Project. The major requested equipment is listed below:

- Real-time PCR cycler
- Conventional PCR thermal cycler
- Trans illuminator
- ELISA plate reader & washer
- Biosafety cabinet

5-3. The detailed lists of recommended equipment for the new facility in the CPHL and the seven NCDC network laboratories in the FMoH teaching hospitals will be submitted as a technical note by the Team through further discussions with the Nigerian side by the end of this survey.

5-4. JICA will assess the feasibility of the above-requested items through the survey and will report findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

5-5. The Government of Nigeria shall submit an official request to the Government of Japan through a diplomatic channel before the appraisal of the Project, which is scheduled in June 2019.

6. Procedure and Basic Principles of Japanese Grant Aid

6-1. The Nigerian side understands Japan's Grant Aid Scheme explained by the Team, as described in **Annex 5, Annex 6** and **Annex 7**.

6-2. For smooth implementation of the Project, the Nigerian side will take the necessary measures as described in **Annex 8.** The schedule of the Project will be elaborated and refined during the Preparatory Survey and will be agreed in the mission dispatched for the explanation of the Draft Preparatory Survey Report. As the Preparatory Survey progresses, the contents of the schedule of the Project will be updated and be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

7-1. The Team will proceed to further studies in Nigeria until January 30, 2019.

7-2. JICA will prepare a draft report for Preparatory Survey in English and dispatch a mission to Nigeria to explain its contents in June 2019.

7-3. When the contents of the draft Preparatory Survey Report are accepted and the undertakings for the Project are fully agreed by the Government of Nigeria, JICA will finalize the Preparatory Survey Report and send it to the Government of Nigeria by August 2019.

7-4. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The Nigerian side confirmed to give due environmental and social considerations during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April 2010).

8-2. The Project is categorized as "C" from the following considerations:
The Project site is not located in a sensitive area, nor has it sensitive characteristics, nor falls it into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

9. Budget allocation
The Nigerian side agreed to allocate a budget (operational and maintenance costs), take necessary actions for the provision of new furniture and human resources (health service providers and any other personnel) essential for the proper and sustainable operation and maintenance of the facility and the equipment to be provided under the Project.

10. Undertakings by the Nigerian Side

10-1. The Nigerian side agreed on the following to ensure proper and safe usage of the laboratories that will ensure its sustainability:

(1) Allocate a budget for continuous electrical power as well as routine maintenance of the facilities and equipment.

(2) Train all existing and incoming staff on accurate and up-to-date knowledge

of biosafety.

10-2. Exemption of customs duties, internal taxes and other fiscal levies
Both sides confirmed that customs duties, internal taxes and other fiscal levies, which may be imposed in Nigeria with respect to the purchase of the products and/or the services, are to be exempted.

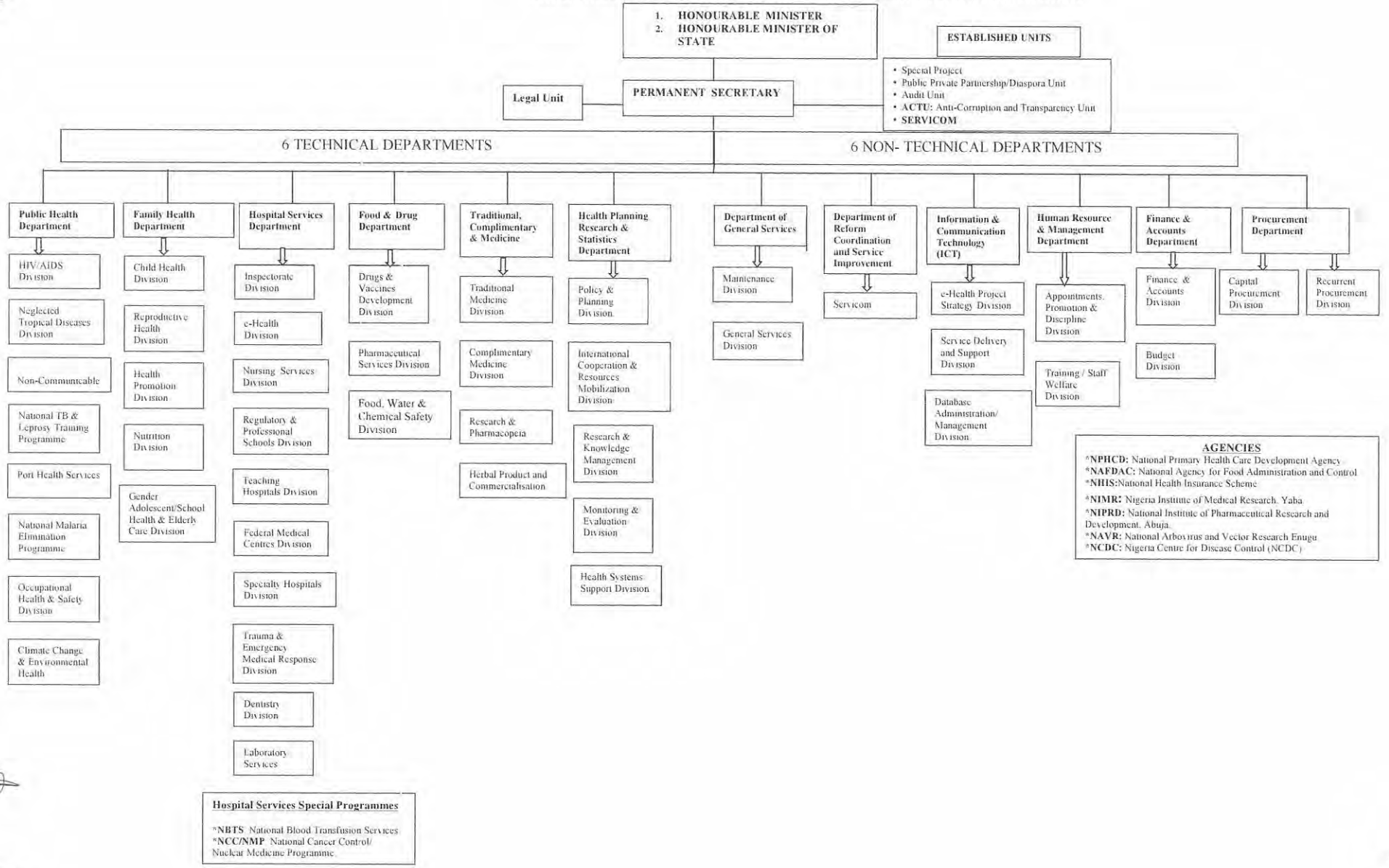
11. Technical Assistance ("Soft Component" of the Project)
Both sides agreed to explore the necessity of assistance in developing the technical skills of the CPHL and other seven laboratories in order to operate the new BSL 2 laboratories and utilize the equipment. The assistance may include 1) ensuring full and proper utilization of the new laboratories, and 2) conducting training on basic maintenance of equipment for existing and incoming staff including laboratory technicians and maintenance staff. The technical assistance shall be provided through the "Soft Component" of the Project.

Annex 1	Site map in the CPHL
Annex 2	Location Maps for target laboratories
Annex 3	Organogram of the Federal Ministry of Health, Nigeria
Annex 4	Organogram of the Nigeria Centre for Disease Control
Annex 5	Japan's Grant Aid
Annex 6	Flow Chart of Japan's Grant Aid Procedures
Annex 7	Financial Flow of Grant Aid
Annex 8	Major Undertakings to be Taken by Each Government

LEGEND
Existing Object to be demolished/ removed for construction (by Nigerian side)
New proposed building
Site Option B
Existing Central Medical Laboratory
Existing Medical Rehabilitation Therapists Board
Existing Nursing & Midwifery Council
Existing Radiographers Registration Board
Transformer Terminal B.
Existing Fence
Existing Primary Health Care (MOH)
Canteen
Foundation
Elevated water tank
Building
Existing West Africa Health Examination Board
Generator
Existing House
Access to the Other Facilities
Staff House
Existing Fence
Training Laboratory
Existing Fence
Existing CPHL
Generator
Existing Canteen
Storage
Existing Guard house
Existing Central Medical Library (MOH)
Elevated water tank
Water tank
Generator
Main gate
Murtala Muhammed Way
DRAFT
N
Site Option B Scale 1:800
JICA STUDY TEAM
The Project for Strengthening the Capacity of Nigeria Centre for Disease Control Network Laboratories

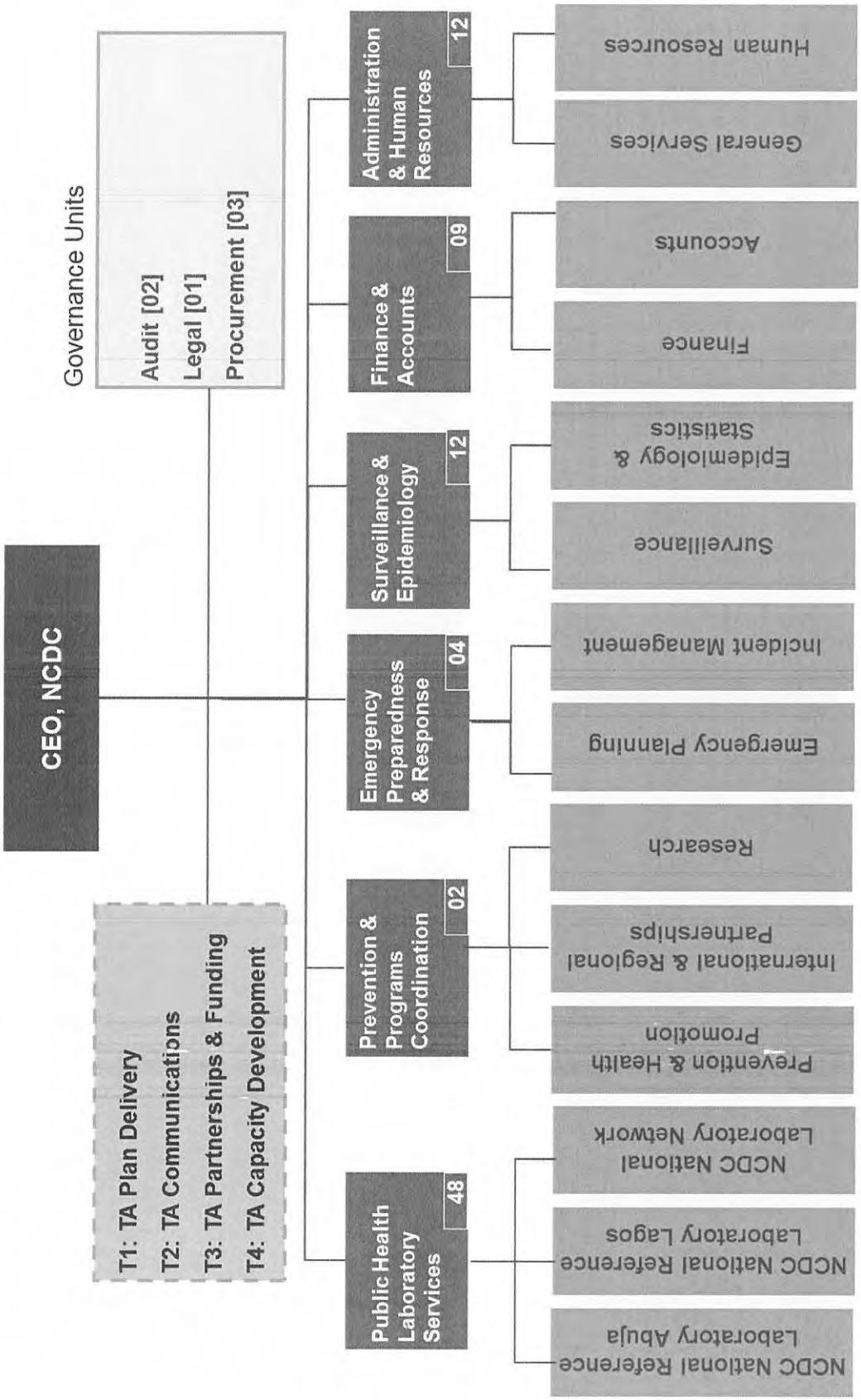

NIGER
Sokoto
Katsina
Zamfara
Jigawa
Yobe
Borno
Kano
Kebbi
BENIN
Kaduna
Bauchi
Gombe
Niger
Kwara
Adamawa
Abuja
Plateau
FCT
Ilorin
Nassarawa
Oyo
Taraba
Ekiti
Kogi
Ibadan
Osun
Benue
Ogun
Ondo
Edo
Enugu
Irrua
Enugu
Lagos
Lagos
Benin
Anambra
Ebonyi
Abia
Delta
Imo
Cross River
Akwa Ibom
Bayellsa
Rivers
CAMEROON
N
0 100 200 400km
① Irrua Specialist Teaching Hospital, Irrua (ISTH)
② University of Benin Teaching Hospital, Benin (UBTH)
③ University College Hospital, Ibadan (UCH)
④ University of Nigeria Teaching Hospital, Enugu (UNTH)
⑤ National Hospital Abuja, FCT (NHA)
⑥ Lagos University Teaching Hospital Virology Laboratroy (LUTH)
⑦ The Central Public Health Laboratory, Lagos (CPHL)
⑧ University of Ilorin Teaching Hospital, Ilorin (UITH)

ORGANIZATIONAL STRUCTURE OF THE FEDERAL MINISTRY OF HEALTH



A-4-9

Annex 3


CEO, NCDC
Governance Units
Audit [02]
Legal [01]
Procurement [03]
T1: TA Plan Delivery
T2: TA Communications
T3: TA Partnerships & Funding
T4: TA Capacity Development
Public Health Laboratory Services
48
NCDC National Reference Laboratory Abuja
NCDC National Reference Laboratory Lagos
NCDC National Laboratory Network
Prevention & Programs Coordination
02
Prevention & Health Promotion
International & Regional Partnerships
Research
Emergency Preparedness & Response
04
Emergency Planning
Incident Management
Surveillance & Epidemiology
12
Surveillance
Epidemiology & Statistics
Finance & Accounts
09
Finance
Accounts
Administration & Human Resources
12
General Services
Human Resources

JAPAN'S AID GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See **Annex 6**: Flow Chart of Japan's Grant Aid Procedures):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal

-Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

-The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")

-Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")

-Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement

-Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

-Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, benefits of the Project and institutional capacity of relevant agencies of the Recipient necessary for the implementation of the Project.
- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical,

financial, social and economic point of view.

- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

2) Banking Arrangements (B/A) (See **Annex 7**: Financial Flow of Japanese Grant (A/P Type) for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of

the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.

b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.

2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

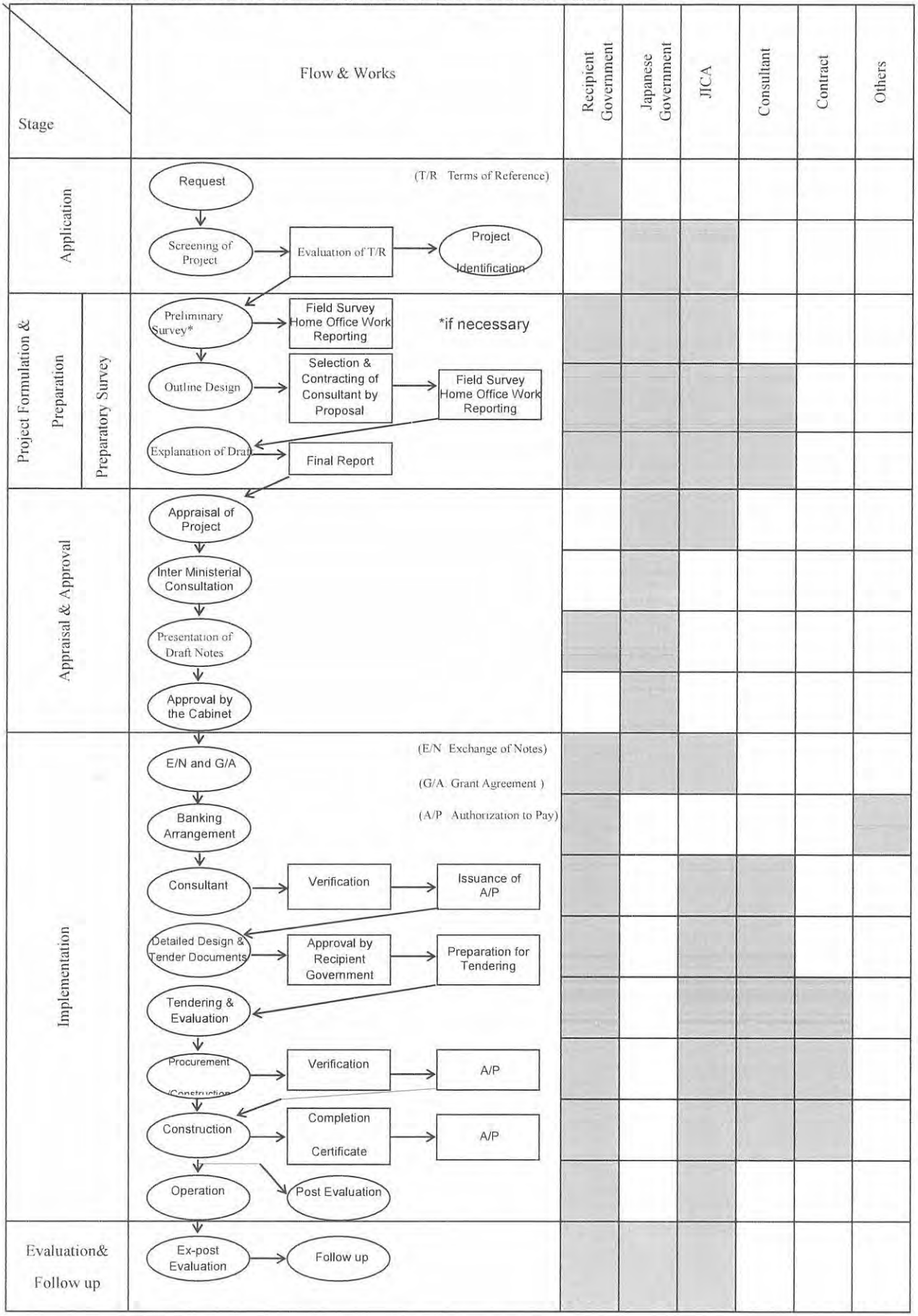
3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

Annex 6: FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



Financial Flow of Grant Aid (A/P Type)

Annex 8

Major Undertakings to be taken by both Governments of Nigeria and Japan

No	Items	Responsibility		Major Undertakings to be taken by Recipient			
		To be covered by Grant Aid	To be covered by recipient side	Deadline	In charge	Cost	Remarks
	Before Tender						
1	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A						
	1) Advising commission of A/P		•	2019/12	NCDC/FMoH	20,000 usd	
	2) Payment commission for A/P		•		NCDC/FMoH		
2	To give due environmental and social consideration in the implementation of the Project		•		NCDC/FMENV		
3	To secure the following land necessary for the implementation of the Project						
	1) Project sites for the BLS-2 laboratory and Waste water treatment system		•	2020/5	NCDC		
	2) Temporary access, stock yard for construction near the Project area		•	2020/5	NCDC		
4	To clear, level and reclaim the project site						
	1) Removal of existing buildngs and exisiting structures such as fences, concrete floor, elevated tanks, electrical poles and wiring, power generator and man holes.		•	2020/5	NCDC	50,000 usd	
	2) Removal or tranplant of existing trees		•	2020/5	NCDC	Iclud in 1)	
	3) Leveling and reclaiming the sites		•	2020/5	NCDC	Iclud in 1)	
5	To obtain the building permission		•	2020/5	NCDC	25,000usd	
6	To obtain the environmental permission		•	2020/5	NCDC	5,000usd	
7	To submit Project Monitoring Report (with the result of Detail Design)		•		NCDC		
	During the Project						
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A						
	1) Advising commission of A/P		•		NCDC/FMoH		
	2) Payment commission for A/P		•		NCDC/FMoH		
9	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products						
	1) Marine (air) transportation of the Products from Japan to the recipient country	•					
	2) Tax exemption and customs clearance of the products at the port of disembarkation		•		NCDC/FMoF		
	3) Internal transportation from the port of disembarkation to the project site	•					
10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		•		NCDC/FMHA		
11	(To exempt Japanese nationals from/to bear, without using the Grant,) customs duties, internal taxes and other fiscal levies such as VAT(Value Added Tax), Personal Income Tax, Corporate Income Tax, Remittance Tax, Economic Service Charge, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		•		NCDC/FMoF		
12	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		•		NCDC/FMoH		
13	Construct temporary access road for the construction work.		•	2020/5	NCDC/FMFCT	Incld 4-1)	

14	To construct the following facilities:						
	1) The building	●					
	2) The gates and fences in and around the site	●					
	3) The parking lot	●					
	4) The road within the site	●					
	5) The road outside the site		●		NCDC/FMoH		
15	To provide facilities for distributing electricity, water supply and drainage, and other incidental facilities necessary for the implementation of the Project outside the site						
	1) Electricity						
	a. The distribution power line to the site with electric power capacity required by the Project		●	2020/5	NCDC	15,000 usd	
	b. The drop wiring and internal wiring within the site	●					
	c. The main circuit breaker and transformer	●					
	2) Water Supply						
	a. The city water distribution main to the site with water consumption and pressure required by the Project		●	2020/5	NCDC	5,000usd	
	b. The supply system within the site (receiving and elevated tanks)	●					
	3) Drainage						
	a. The city drainage main (for storm sewer and others to the site)		●		NCDC/FMFCT		
	b. The drainage system (for toilet sewer, common waste, storm drainage, and others) within the site	●					
	4) Gas Supply						
	a. The city gas main to the site		●		n/a		
	b. The gas supply system within the site	●					
	5) Telephone System						
	a. The telephone to the main distribution frame/panel (MDF) of the building with line capacity required by the Project		●	2020/5	NCDC	5,000usd	
	b. The MDF and the extension after the frame/panel	●					
	6) Furniture and Equipment						
	a. General furniture		●		NCDC		
	b. Project equipment	●					
	After the Project						
16	To ensure that facilities and the products be maintained and used properly and effectively for the implementation of the Project		●		NCDC/FMoH		
17	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●		NCDC/FMoH		
18	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid.						
	1) Allocation of maintenance cost		●		NCDC/FMoH		
	2) Operation and maintenance organization and staff		●		NCDC/FMoH		
	3) Routine check/periodical maintenance		●		NCDC/FMoH		

(B/A: Banking Arrangement, A/P: Authorization to pay)

Minutes of Discussions
on the Preparatory Survey for the Project for
Strengthening the Capacity of Nigeria Centre for Disease Control Network
Laboratories in the Federal Republic of Nigeria
(Explanation on Draft Preparatory Survey Report)

With reference to the minutes of discussions signed among the Federal Ministry of Health (hereinafter referred to as "FMoH"), the Nigeria Centre for Disease Control (hereinafter referred to as "NCDC") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on January 24 2019, and in response to the request from the Government of the Federal Republic of Nigeria(hereinafter referred to as "Nigeria") dated May 20 2019, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Strengthening the Capacity of Nigeria Centre for Disease Control Network Laboratories in the Federal Republic of Nigeria (hereinafter referred to as "the Project").
Based on the discussions, both sides agreed on the main items described in the attached sheets.

Abuja, 1 June 2019

Mitsuo Isono
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Joseph Amedu
Head
Department of Hospital Services
Federal Ministry of Health
The Federal Republic of Nigeria

Chikwe Ihekweazu
Director General
Nigeria Centre for Disease Control
The Federal Republic of Nigeria

Witnessed by

Elizabeth Akpana Egharevba
Director

Department of International
Cooperation,
Federal Ministry of Budget and
National Planning
The Federal Republic of Nigeria

ATTACHEMENT

1 Objective of the Project

The objective of the Project is to detect outbreaks quickly and contain the spread of infectious diseases by constructing and procuring the necessary facility and equipment in the NCDC network laboratories located in the Central Public Health Laboratory (hereinafter referred to as "CPHL") and the FMoH teaching hospitals, and thereby it will contribute to strengthening the surveillance system of infectious diseases in Nigeria.

2 Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Strengthening the Capacity of Nigeria Centre for Disease Control Network Laboratories in the Federal Republic of Nigeria".

3 Project site

Both sides confirmed that the Project site for the construction of the new facility with BSL-2 laboratories is on the ground of the CPHL in Lagos as shown in **Annex 1**. In addition, the requested equipment is to be procured and installed in the seven NCDC network laboratories in the FMoH teaching hospitals listed below. The location map of the Project sites of all the laboratories and the CPHL is shown in **Annex 2**.

(1) Central Public Health Laboratory (CPHL), Lagos State (shown in **Annex 1**)
(2) Lagos University Teaching Hospital Virology Laboratory(LUTH), Idiaraba, Lagos State
(3) Irrua Specialist Teaching Hospital(ISTH), Irrua, Edo State
(4) University of Benin Teaching Hospital(UBTH), Benin, Edo State
(5) University College Hospital, Ibadan(UCHI), Oyo State
(6) University of Nigeria Teaching Hospital(UNTH), Enugu, Enugu State
(7) National Hospital Abuja, Abuja(NHA), Federal Capital Territory
(8) University of Ilorin Teaching Hospital(UITH), Ilorin, Kwara State

4 Responsible authority for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

4.1 The FMoH and the NCDC will be the executing agencies for the Project (hereinafter referred to as "the Executing Agencies"). The Executing Agencies

shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be taken care by relevant authorities properly and on time. The organization charts of the NCDC and the FMoH are shown in **Annex 3** and **Annex 4.**

4.2 The Federal Ministry of Budget and National Planning (hereinafter referred to as "FMBNP") is an agency responsible for managing the Japanese Grant Aid Project in Nigeria and as such, the Executing Agencies are managed by the FMBNP.

5 Contents of the Draft Report

After the explanation of the contents of the Draft Report by the Team, the Nigerian side agreed to its contents. The facility components, which are included in the Project, are shown in **Annex 5** and the equipment to be procured is shown in **Annex 6**.

Based on the discussion during the previous mission, both sides agreed that improvement of infrastructural conditions in the UITH and UNTH is critical in order to implement the Project. The Nigerian side confirmed that necessary electrical system shall be installed to UITH and UNTH, and necessary measures to secure water supply to UNTH shall be ensured before the Detailed Design starts, which is scheduled in April 2020.

6 Cost estimate

Both sides confirmed that the cost estimate for the Nigerian side, shown in the Draft Report explained by the Team, is provisional and will be examined further by the Government of Japan for its approval. On the other hand, JICA is assessing the cost estimate for the Japanese side including the contingency. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc. Since it is under assessment, the cost undertaken by each side may differ even after the agreement made in this Minutes of Discussions.

7 Confidentiality of the cost estimate and technical specifications

Both sides confirmed that the cost estimate and technical specifications of the Project described in the Draft Report should never be disclosed to any third parties until all the contracts under the Project are concluded.

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8 Timeline for the Project implementation

The Team explained to the Nigerian side that the expected timeline for the Project implementation is as attached in **Annex 7.**

9 Expected outcomes and indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Nigerian side will be responsible for the achievement of agreed key indicators targeted by the year 2025 and shall monitor the progress based on those indicators.

[Quantitative indicators]

Indicator	Disease	Baseline data in January 2019	Target Year 2025
The number of laboratories that diagnose pathogens which are classified as the prioritized infectious diseases*	(a) Antimicrobial Resistance	3	5
	(b) Yellow Fever	0	4
	(c) Cholera	1	4
	(d) Meningitis	1	2
	(e) Influenza	0	1
	(f) Lassa fever	4	5

*The prioritized diseases are defined as Measles, Yellow Fever, Antimicrobial Resistance, Viral Hemorrhagic Fevers (Lassa Fever, Ebola Viral Diseases, etc.), Cholera, Meningitis, Monkey Pox and Influenza by the NCDC.

[Qualitative indicators]

(1) Importance of the eight laboratories as a regional public health laboratory in each state is enhanced due to the imporovement of the quality and the efficacy in laboratory diagnostic capacities.

(2) The risk of infectious disease outbreaks on the population is mitigated through the improvement of the infectious disease surveillance system.

10 Technical assistance ("Soft Component" of the Project)

Considering the sustainable operation and maintenance of the equipment and services granted by the Project, technical assistance in the Project is planned as follows: training on the equipment maintenance of the wastewater treatment, air system, etc. The Nigerian side confirmed to deploy a necessary number of counterparts who are

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appropriate and competent in terms of its purpose of the "Soft Component" as described in the Draft Report.

11 Demolition of the existing buildings before the construction

The Nigerian side requested that the Japanese side would be the responsible for bearing the cost for the demolition of the building and the objects on the ground of the construction site due to the budget constraints. The Japanese side understood their request and agreed to include the cost on the premise that the NCDC provides the official letter for land ownership and the approval for the demolition by June 10 2019.

12 Undertakings of the Project

12.1 Both sides confirmed the undertakings of the Project as described in **Annex 8,** which will be used as an attachment of G/A.

12.2 Exemption of customs duties, internal taxes and other fiscal levies

With regard to exemption of customs duties, internal taxes and other fiscal levies including the Value Added Tax (hereinafter referred to as "VAT"), commercial tax, income tax and corporate tax, which may be imposed in Nigeria with respect to the purchase of the products and/or services, shall be exempted as stipulated in **Annex 8-(2)**. Both sides confirmed that such customs duties, internal taxes and other fiscal levies shall be clarified in the bid documents by the FMoH and the NCDC during the implementation stage of the Project.

The FMoH and the NCDC will take necessary action to ensure the exemption, through sending letters to the Federal Ministry of Finance and other relevant authorities to have order(s) in the exemption and instruct all relevant agencies and offices to follow it. Such procedure can start just after the signing of Exchange of Notes (hereinafter referred to as "E/N") and G/A utilizing list(s) of equipment and its cost estimation, instead of the actual invoice. In particular, both sides agreed that the Nigerian side would bear the cost of the Comprehensive Import Supervision Scheme (CISS) and ECOWAS Trade Liberalization Scheme Duty (ETLS) if they are not exempted.

12.3 The Nigerian side assured to take the necessary measures and coordination including allocation of the sufficient budget, which are preconditions of the Project implementation. It is further agreed that the costs are indicative at the current stage (i.e., Outline Design stage). The costs will be estimated more accurately at the Detailed Design stage.

12.4 Both sides confirmed that the Nigerian side would provide alternative space for the services carried out in the demolished facilities during the construction period according to the schedule in **Annex 7**.

12.5 The Nigerian side agreed to allocate budget (operational and maintenance costs), the adequate personnel (laboratory technicians, maintenance staff and any other personnel), and necessary goods (spare parts and consumables) for the appropriate and sustainable operation and maintenance of the facilities and the equipment under the Project based on the Draft Report.

12.6 Based on the request by the Nigerian side, the Japanese side agreed to bear the cost for a two-year maintenance contract for the equipment after routine one-year warranty by suppliers. The items of this additional warranty are shown in **Annex 6**.

12.7 Considering the request by the Nigerian side during the previous mission and the fact that the NCDC does not have any in-house or external technical expertise for the building permit, the Japanese side agreed to cover the cost for the technical design review of the building permit for smooth implementation of the Project.

13 Monitoring during the implementation

The Project will be monitored by the Executing Agencies and reported to JICA by using the form of Project Monitoring Report (PMR) attached as **Annex 9**. The timing of the submission of the PMR is described in **Annex 8.**

14 Project completion

Both sides confirmed that the Project would complete when the constructed facility and the procured equipment by the Grant is in operation. The completion of the Project will be reported to JICA promptly within six months after the completion of the Project.

15 Ex-Post Evaluation

In principle, JICA will conduct the ex-post evaluation three years after the Project completion based on the five evaluation criteria (e.g., Relevance, Effectiveness, Efficiency, Impact, and Sustainability). The result of the evaluation will be publicized. The Nigerian side is required to provide the necessary support for the data collection.

16 Security Consideration during the Project

The Team requested the Nigerian side to ask a necessary arrangement to secure the safety of personnel who will be assigned to the Project. Both sides agreed that the Nigerian side agreed to allocate the necessary budget and arrange the deployment of the Nigerian Mobile Police in accordance with the safety regulation of JICA as shown in **Annex 10.**

17 Schedule of the Survey

The Nigerian side agreed to submit their comments on the Draft Report to JICA by 30 June 2019 if any. Then, JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Nigerian side around October 2019.

18 Environmental and Social Considerations

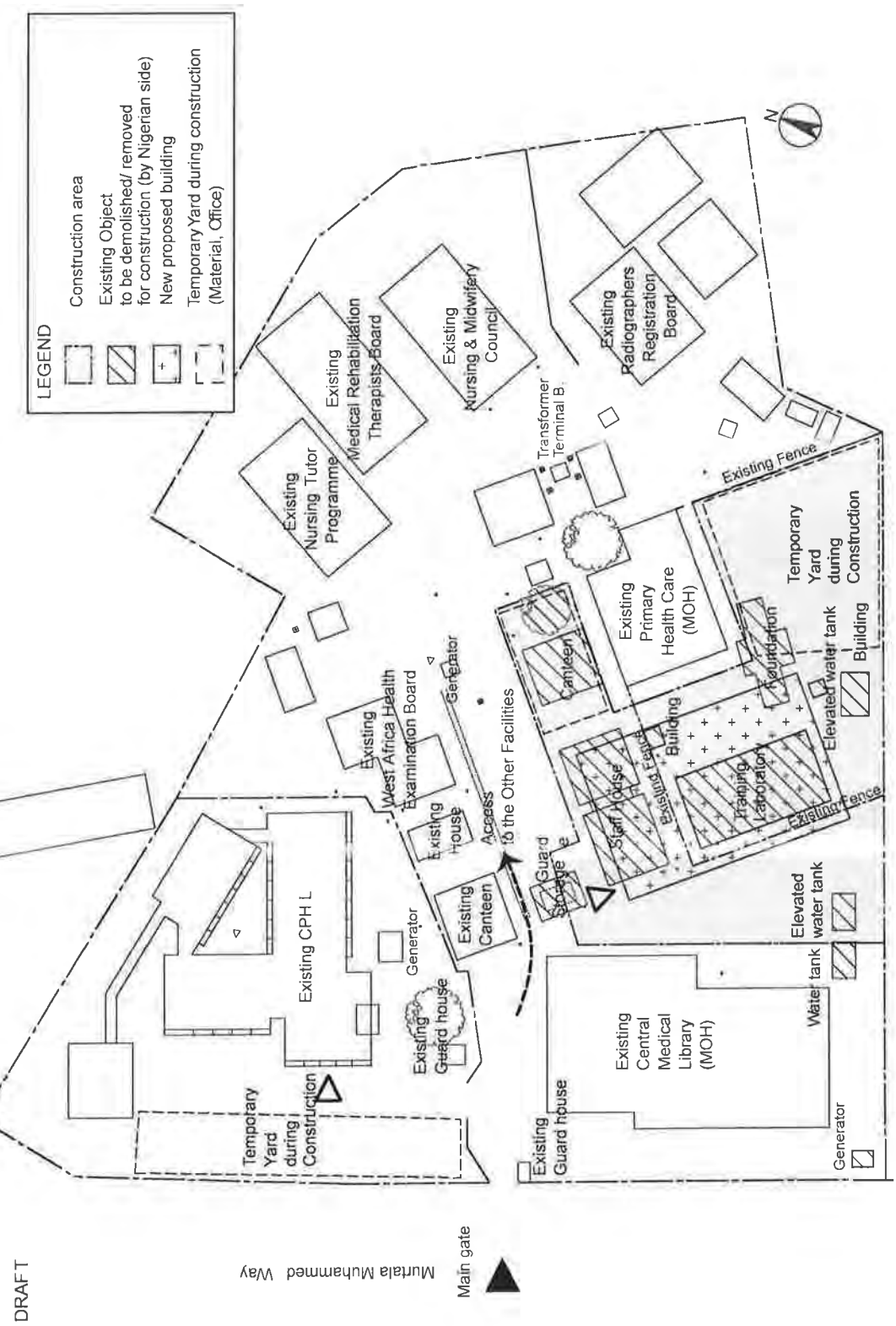
The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as C because the Project is likely to have a minimal adverse impact on the environment under the Guidelines. The Nigerian side agreed to comply with environmental regulations by the Nigerian government in addition to "the Guideline" and to take necessary procedures by November 2019.

19 Other Relevant Issues

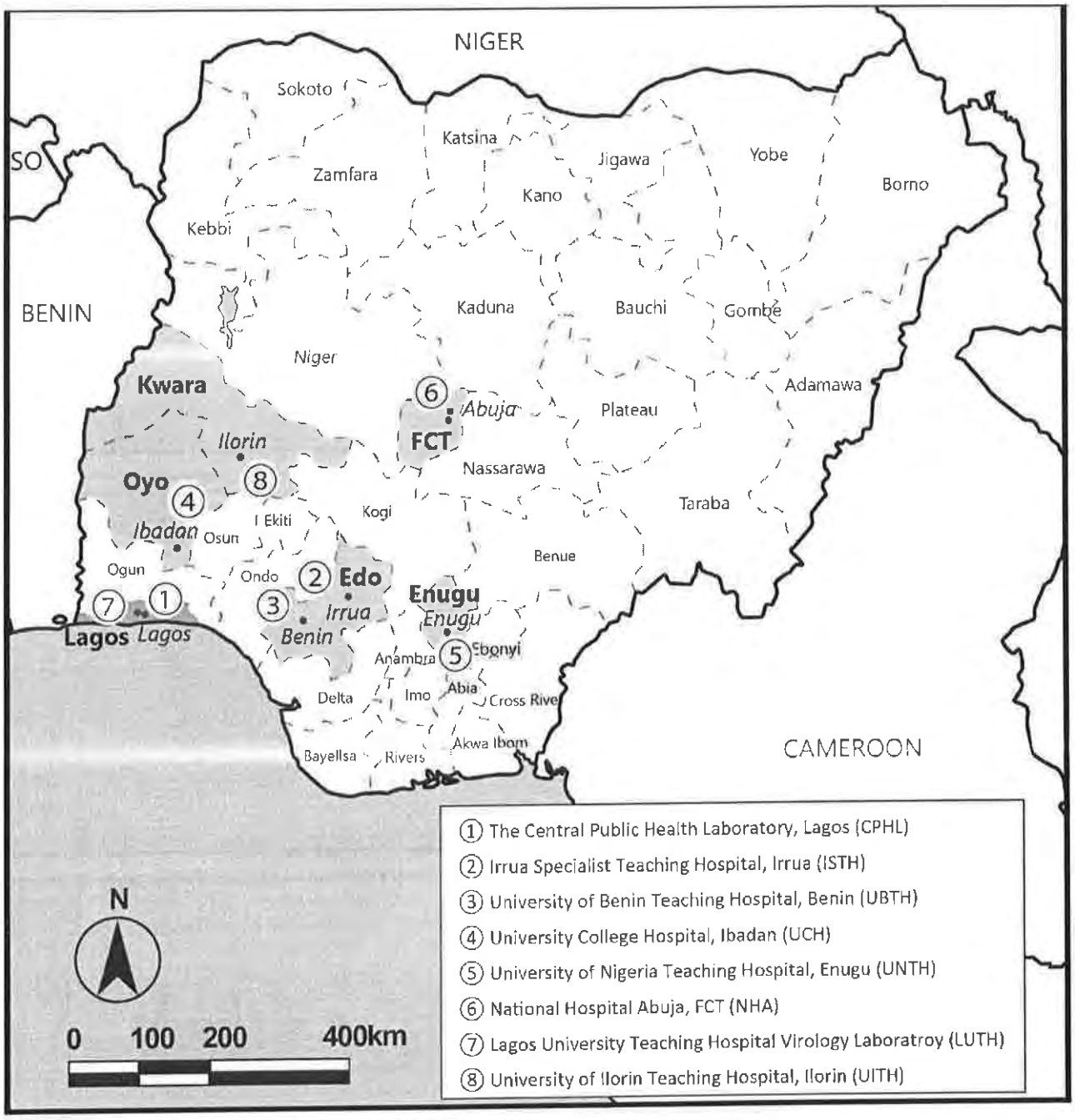
19.1 Disclosure of Information

Both sides confirmed that the Preparatory Survey Report would be disclosed to the public except the project cost after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

Project site map of the Central Public Heath Laboratoy



Location Map of the NCDC Network Laboratories supported by the Project



Annex 3

ORGANIZATIONAL STRUCTURE OF THE FEDERAL MINISTRY OF HEALTH
1 HONOURABLE MINISTER
2 HONOURABLE MINISTER OF STATE
ESTABLISHED UNITS
• Special Project
• Public Private Partnership/Diaspora Unit
• Audit Unit
• ACTU: Anti-Corruption and Transparency Unit
• SERVICOM
PERMANENT SECRETARY
Legal Unit
6 TECHNICAL DEPARTMENTS
6 NON- TECHNICAL DEPARTMENTS
Public Health Department
HIV/AIDS Division
Neglected Tropical Diseases Division
Non-Communicable
National TB & Leprosy Training Programme
Port Health Services
National Malaria Elimination Programme
Occupational Health & Safety Division
Climate Change & Environmental Health
Family Health Department
Child Health Division
Reproductive Health Division
Health Promotion Division
Nutrition Division
Gender Adolescent/School Health & Elderly Care Division
Hospital Services Department
Hippocrorate Division
eHealth Division
Nursing Services Division
Regulatory & Professional Schools Division
Teaching Hospitals Division
Federal Medical Centres Division
Specialty Hospitals Division
Trauma & Emergency Medical Response Division
Dentistry Division
Laboratory Services
Food & Drug Department
Drugs & Vaccines Development Division
Pharmaceutical Services Division
Food, Water & Chemical Safety Division
Traditional, Complimentary & Medicine
Traditional Medicine Division
Complimentary Medicine Division
Research & Pharmacopeia
Herbal Product and Commercialisation
Health Planning Research & Statistics Department
Policy & Planning Division
International Cooperation & Resources Mobilization Division
Research & Knowledge Management Division
Monitoring & Evaluation Division
Health Systems Support Division
Hospital Services Special Programmes
•NBTS: National Blood Transfusion S...vices
•NCC/NMP: National Cancer Centre/ Nuclear Medicine Programme
Department of General Services
Maintenance Division
General Services Division
Department of Reform Coordination and Service Improvement
Servicom
Information & Communicating Technology (ICT)
e-Health Project Strategy Division
Service Delivery and Support Division
Database Administration/ Management Division.
Human Resources & Management Department
Appointments Promotion & Discipline Division
Training / Staff Welfare Division
Finance & Accounts Department
Finance & Accounts Division
Budget Division
Procurement Department
Capital Procurement Division
Recurrent Procurement Division
AGENCIES
•NPHCD: National Primary Health Care Development Agency
•NAFDAC: National Agency for Food Administration and Control
•NHIS:National Health Insurance Scheme
•NIMR: Nigerian Institute of Medical Research, Yaba
•NIPRD: National Institute of Pharmaceutical Research and Development, Abuja
•NAVR: National Arbovirus and Vector Research Enugu
•NCDC: Nigerian Centre for Disease Control (NCDC)

CEO, NCDC
Governance Units
Audit [02]
Legal [01]
Procurement [03]
T1: TA Plan Delivery
T2: TA Communications
T3: TA Partnerships & Funding
T4: TA Capacity Development
Public Health Laboratory Services 48
Prevention & Programs Coordination 02
Emergency Preparedness & Response 04
Surveillance & Epidemiology 12
Finance & Accounts 09
Administration & Human Resources 12
NCDC National Reference Laboratory Abuja
NCDC National Reference Laboratory Lagos
NCDC National Laboratory Network
Prevention & Health Promotion
International & Regional Partnerships
Research
Emergency Planning
Incident Management
Surveillance
Epidemiology & Statistics
Finance
Accounts
General Services
Human Resources

Outline of the BSL-2 facility

Area	Management	Room name		Floor Area [m2]	Total [m2]
Laboratory Area	BSL2 Management	Bacteriology Laboratory (Culture & DNA extraction) (including 2-Anterooms)		80.68	624.80
		Bacteriology Laboratory (DNA amplification) (including 2-Anterooms)		40.43	
		Master Mix Room & Media Room(Bacteriology		45.51	
		Virus Laboratory (DNA extraction) (including 2-Anterooms)		77.18	
		Virus Laboratory (DNA amplification) (including 2-Anterooms)		40.43	
		Master Mix Room(Virus)		35.00	
		Parasitology Laboratory		33.25	
		Preparation Hall-2		190.16	
		Bio Bank(Bacteriology)		22.82	
		Bio Bank(Virus)		47.25	
		Pipe Shaft (PS), Electrical Pipe Shaft (EPS)		12.09	
Service area	BSL2 Management	Sample Reception & Sample Room		29.75	164.20
		Service Corridor -1		37.29	
		Preparation Hall-1		51.65	
		Reagent Room, Storage & Corridor		45.51	
	General Management	Washing Room		77.88	174.77
		Hazardous Water Storage & Storage		49.76	
		Service Corridor -2		47.13	
Administrative area	General Management	GF	Entrance Hall & Corridor	112.96	283.90
			Office & Monitoring Room	50.58	
			Staff Room -1	37.70	
			Toilet(Male)	31.31	
			Toilet(Female)	30.88	
			Staircase	20.47	
Laboratory area	BSL2 Management	1F	Training Laboratory (including 2-Anterooms & Storage)	64.95	95.55
			Training Preparation Hall	30.60	
Administrative area	General Management	1F	Lecture Room	45.34	306.65
			Director Room & Conference Room-1	32.05	
			Assistant Director Room	11.40	

Area	Management	Room name		Floor Area [m2]	Total [m2]
			Staff Room -2	20.19	
			Conference Room -2	48.69	
			Storage	9.50	
			Toilet(Male)	15.44	
			Toilet(Female)	15.44	
			Corridor	79.28	
			Staircase	29.32	
		PH,BF	Storage	50.54	120.62
			Staircase	70.08	
Machine area		Electrical Room 1 (GF)		24.50	1,186.58
		Mechanical Room 1 (BF)		322.88	
		Mechanical Room 2,Electrical Room 2 (1F)		839.20	
		Total			2,957.07 →appx. 2,960 ㎡

Equipment list

(1) Equipment list for the CPHL

No.	Equipment	Q'ty
Reception, sample receiving		
1	Laboratory refrigerator	1
2	Biosafety cabinet	1
Parasitology		
1	Microscope, Binocular	2
2	Work bench B	1
Bacteriology		
Sample separation/incubation/extraction room		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	Centrifuge, micro	2
6	CO2 Incubator	1
7	Deep freezer -30℃	1
8	Deep freezer -80℃ A	1
9	Dry thermo unit	1
10	Incubator	2
11	Laboratory refrigerator	1
12	Magnetic stirrer	1
13	Micropipette set, single	1
14	Micropipette set, Multi	1
15	Microscope, Binocular	1
16	pH meter	1
17	Platform scale	1
18	Precision electronics balance	1
19	Spectrophotometer	1
20	Timer	1
21	Vortex mixer	2
22	Water bath	1
23	Work bench A	1
24	Work bench B	1
Medium preparation room		
1	Autoclave, vertical	1
2	Drying oven	1
3	Stainless shelf	2
4	Water distiller	1
5	Work bench C	1
Master Mix Room (B)		
1	Domestic refrigerator	1
2	Micropipette set, single	1
3	Micropipette set, Multi	1
4	PCR work station	1
5	Work bench D	2

No.	Equipment	Q'ty
Amplicification		
1	Electrophoresis set A	1
2	Gel imager	1
3	Laboratory refrigerator	1
4	Micropipette set, single	1
5	Micropipette set, Multi	1
6	RT PCR	1
7	Thermocycler	1
8	UV transilluminator	1
9	Work bench E	1
10	Work bench F	1
Virology		
Sample separation/extraction room		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	Centrifuge, micro	1
6	Deep freezer -30℃	1
7	Deep freezer -80℃ A	1
8	Dry thermo unit	1
9	Incubator	2
10	Laboratory refrigerator	1
11	Magnetic stirrer	1
12	Micropipette set, single	1
13	Micropipette set, Multi	1
14	Microscope, Binocular	1
15	Microscope, Fluoroscopy	1
16	Microwave oven	1
17	pH meter	1
18	Platform scale	1
19	Precision electronics balance	1
20	Spectrophotometer	1
21	Timer	1
22	Vortex mixer	2
23	Water bath	1
24	Work bench A	1
25	Work bench B	1
Master Mix Room (V)		
1	Domestic refrigerator	1
2	Micropipette set, single	1
3	Micropipette set, Multi	1
4	PCR work station	1
5	Work bench D	2

No.	Equipment	Q'ty
Amplification		
1	Electrophoresis set A	1
2	ELISA set	1
3	Gel imager	1
4	Micropipette set, single	1
5	Micropipette set, Multi	1
6	Laboratory refrigerator	1
7	RT PCR	1
8	Thermocycler	1
9	UV transilluminator	1
10	Work bench E	1
11	Work bench F	1
Bio Bank (V)		
1	Deep freezer -80℃ B	6
Bio Bank (B)		
1	Deep freezer -80℃ B	2
Washing Room		
1	Water distiller	1
Training Laboratory		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	Centrifuge, micro	1
6	CO2 Incubator	1
7	Deep freezer -30℃	1
8	Dry thermo unit	1
9	Electrophoresis set A	1

No.	Equipment	Q'ty
10	ELISA set	1
11	Gel imager	1
12	Hot plate	1
13	Incubator	2
14	Laboratory refrigerator	1
15	Magnetic stirrer	1
16	Micropipette set, single	1
17	Micropipette set, Multi	1
18	Microscope, Binocular	2
19	Microscope, Teaching	1
20	Microwave oven	1
21	PCR work station	1
22	ph meter	1
23	Platform scale	1
24	Precision electronics balance	1
25	RT PCR	1
26	Spectrophotometer	1
27	Thermocycler	1
28	Timer	2
29	UV transilluminator	1
30	Vortex mixer	2
31	Water bath	1
32	Work bench G	2
33	Work set for Biosafety cabinetmaintenance	1
Lecture Room		
1	Chair with writing board	20
2	Display	2

(2) Equipment list for the other seven NCDC network laboratories

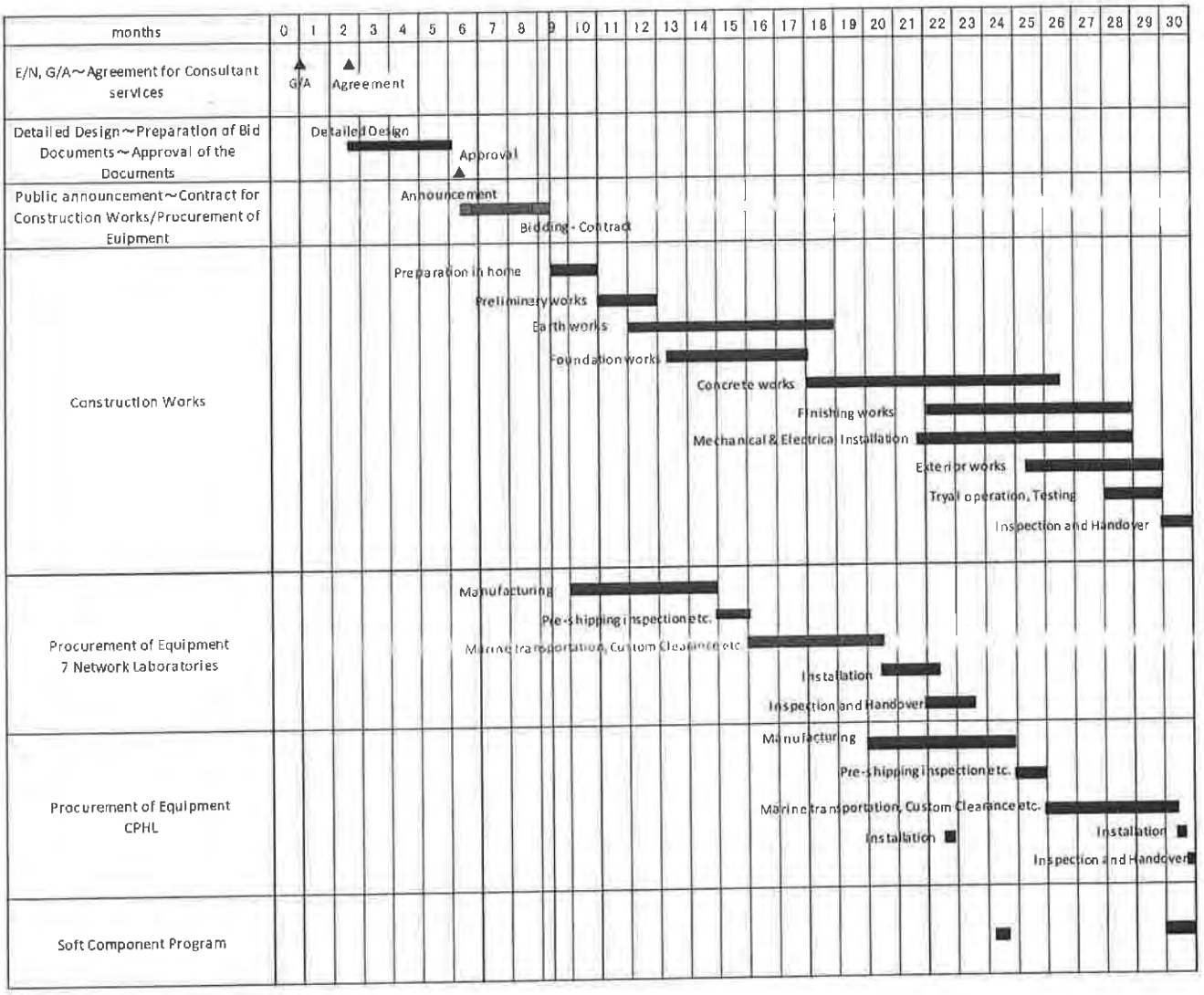
No.	Equipment	Total	ISTH	UBTH	UCHI	UNTH	NHA	LUTH	UITH
1	Autoclave, vertical	15	2	2	3	3	2	-	3
2	Biosafety cabinet	11	1	-	2	3	1	1	3
3	Blood culture	3	1	-	1	-	1	-	-
4	Burner, electric	2	2	-	-	-	-	-	-
5	Centrifuge, high speed	4	-	1	1	1	-	-	1
6	Centrifuge, low speed	6	-	1	2	1	1	-	1
7	Centrifuge, micro	3	-	-	1	1	-	-	1
8	Chair · Table	-	-	-	-	-	-	-	-
9	CO2 Incubator	-	-	-	-	-	-	-	-
10	Deep freezer -30℃	3	1	-	-	1	-	-	1
11	Deep freezer -80℃ A	7	1	1	-	-	-	4	1
12	Deep freezer -80℃ B	-	-	-	-	-	-	-	-
13	Display	-	-	-	-	-	-	-	-
14	Domestic refrigerator	4	-	1	1	1	-	-	1

No.	Equipment	Total	ISTH	UBTH	UCHI	UNTH	NHA	LUTH	UITH
15	Dry thermo unit	3	-	-	1	1	-	-	1
16	Drying oven	2	1	-	-	1	-	-	-
17	Electrophoresis set A	-	-	-	-	-	-	-	-
18	Electrophoresis set B	1	-	-	-	-	-	1	-
19	ELISA set	3	-	1	-	1	-	-	1
20	Gel imager	1	-	-	-	-	-	1	-
21	Hot plate	-	-	-	-	-	-	-	-
22	Incubator	14	2	4	2	2	2	-	2
23	Laboratory refrigerator	13	1	2	3	3	1	-	3
24	Magnetic stirrer	-	-	-	-	-	-	-	-
25	Micropipette set, single	7	1	1	1	1	1	1	1
26	Micropipette set, Multi	7	1	1	1	1	1	1	1
27	Microscope, Binocular	18	5	5	2	3	1	-	2
28	Microscope, Fluoroscopy	1	-	-	-	-	-	1	-
29	Microscope, Inverted	1	-	-	-	-	-	1	-
30	Microscope, Teaching	-	-	-	-	-	-	-	-
31	Microwave oven	1	-	-	-	-	1	-	-
32	PCR work station	4	-	1	1	1	-	-	1
33	pH meter	1	-	-	-	-	1	-	-
34	Platform scale	2	-	-	-	1	-	-	1
35	Precision electronics balance	1	-	-	-	1		-	-
36	RT PCR	4	-	1	1	1	-	-	1
37	Spectrophotometer	-	-	-	-	-	-	-	-
38	Stainless shelf	-	-	-	-	-	-	-	-
39	Thermal cycler	-	-	-	-	-	-	-	
40	Timer	-	-	-	-	-	-	-	-
41	UV transilluminator	-	-	-	-	-	-	-	-
42	Vortex mixer	3	-	-	1	1	-	-	1
43	Water bath	1	-	-	-	1	-	-	-
44	Water distiller	4	1	-	1	1	-	-	1
45	Work bench A	-	-	-	-	-	-	-	-
46	Work bench B	-	-	-	-	-	-	-	-
47	Work bench C	-	-	-	-	-	-	-	-
48	Work bench D	-	-	-	-	-	-	-	-
49	Work bench E	-	-	-	-	-	-	-	-
50	Work bench F	-	-	-	-	-	-	-	-
51	Work bench G	-	-	-	-	-	-	-	-
52	Work bench H	2	-	2	-	-	-	-	-
53	Work bench I	14	-	5	3	3	-	-	3
54	Work set for BSC maintenance	-							
55	AVR 0.5kw	46	8	10	6	8	3	4	7
56	AVR 1.0kw	31	2	5	6	6	2	4	6

(3) Equipment list for two years maintenance contract after routine one-year warranty

No.	Equipment
1	Biosafety cabinet
2	Blood culture
3	ELISA set
4	RT PCR
5	Thermal cycler

Tentative Schedule of Project Implantation



Major Undertakings to be taken by the Government of Nigeria

Specific obligations of the Government of Nigeria which will not be funded with the Grant

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost (NGN)	Ref.
1	To Open Bank Account (Banking Arrangement (B/A))	Within 1 month after the signing G/A	NCDC	-	
2	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A - Advising commission of A/P		NCDC	7,220,000	
3	To obtain the approval of land use and demolition of the existing buildings and objects	June 10 2019	NCDC	-	
4	To obtain the environmental permission	November 2019	NCDC	1,832,000	
5	To obtain the building permission	April 2020	NCDC	9,025,000	
6	To submit Project Monitoring Report (with the result of Detail Design)	Before preparation of bidding document	NCDC	-	

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost (NGN)	Ref.
1	(To exempt Japanese nationals from/to bear, without using the Grant,) - customs duties, internal taxes and other fiscal levies such as VAT(Value Added Tax), Personal Income Tax, Corporate Income Tax, Remittance Tax, Economic Service Charge, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract - CISS (Comprehensive Import Supervision Scheme duty) - ETLS (ECOWAS Trade Liberalization Scheme duty)	-	FMoH/NCDC	14,901,000	
2	Provision of the Nigerian Mobile Police (security measures)		FMoH/NCDC	20,838,000	
3	Electricity - CPHL: The distribution power line to the site with electric power capacity required by the Project - UNTH: The power supply by electrical power generator - UITH: The power supply by electrical power generator	December 2021 April 2020 (Before the Detailed Design starts)	NCDC FMoH/NCDC FMoH/NCDC	5,415,750 5,000,000 5,000,000	
4	Water Supply - CPHL: The city water distribution main to the site with water consumption and pressure required by the Project - UNTH: The water supply by water tank trucks	December 2021 April 2020	NCDC FMoH/NCDC	451,000 2,400,000/year	
5	Telecommunication System - CPHL: The telephone trunk line to the main distribution frame/panel (MDF) of the building with line capacity required by the Project	December 2021	NCDC	500,000	
6	- CPHL: Data communication trunk line with line capacity required by the Project	December 2021	NCDC	500,000	
7	Furniture and Equipment - General furniture, if any	-	NCDC	3,610,000	
	Travel expenses, per diem for the appointed trainee to participate in the Soft Component Program	October 2021	FMoH/NCDC	12,000,000	
8	1) To submit Project Monitoring Report	Every month	NCDC	-	
	2) To submit Project Monitoring Report (final)	Within one month after signing of Certificate of Completion for the works under the contract	NCDC	-	
9	To submit a report concerning completion of the Project	Within six months after completion of the Project	NCDC	-	

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost (NGN)	Ref.
1	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid. - Annual maintenance cost of utilities of building facility	-	NCDC	156,224,391	
	- Annual maintenance cost for maintenance of building facility	-	NCDC	26,768,714	
	- Annual maintenance cost of maintenance of equipment for CPHL	-	NCDC	62,465,780	
	- Annual cost of Equipment for the 7 network laboratories		FMOH	63,060,422	

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX

20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:
Executing Agency	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:
Line Ministry	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description

1-1 Project Objective

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original *(proposed in the outline design)*	Actual
1.		

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	*(at the time of signing the Grant Agreement)*	

Reasons for any changes of the schedule, and their effects on the project (if any)

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original *(at the time of outline design)* name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual *(PMR)*

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original *(at the time of outline design)*
Actual *(PMR)*

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)*

Actual *(PMR)*

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks *(at the time of outline design)*

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low Impact: High/Moderate/Low Analysis of Probability and Impact: Mitigation Measures: Action required during the implementation stage: Contingency Plan (if applicable):
2. (Description of Risk)	Probability: High/Moderate/Low Impact: High/Moderate/Low Analysis of Probability and Impact: Mitigation Measures: Action required during the implementation stage: Contingency Plan (if applicable):
3. (Description of Risk)	Probability: High/Moderate/Low Impact: High/Moderate/Low Analysis of Probability and Impact: Mitigation Measures: Action required during the implementation stage:

	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C－D	Price (Increased) F=C＋D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

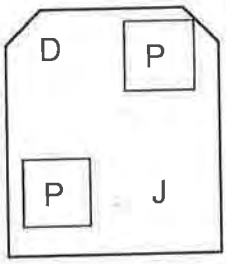
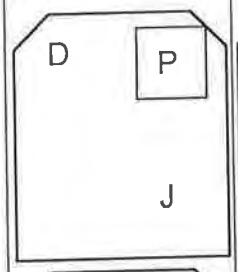
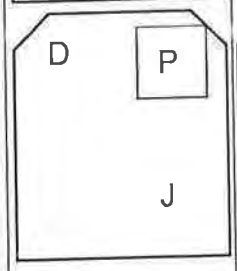
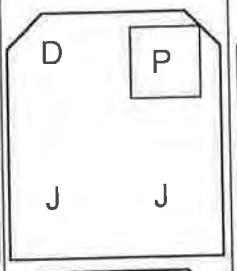
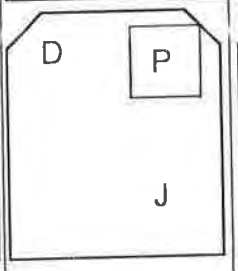
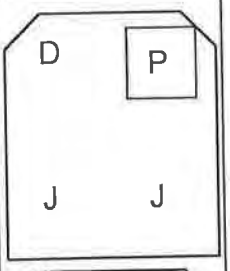
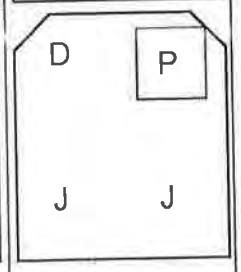
-
-
-

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Arrangement of the Nigerian Mobile Police (NMP) for Japanese supplier and Japanese consultants

The NCDC shall hire Police officers at its own expense for Japanese supplier during the construction of the new facility in the CPHL and the installment of the equipment in the eight laboratories. The number of Police officers shall be at least two for the escort from one Japanese to four Japanese suppliers. The schematic figure is shown below and the estimated costs for the

No. of Driver (D)	1	2	2	2
No. of Japanese Suppliers(**J**)	1	2	3	4
No. of police officers(**P**)	2	2	2	2
Number of car to be allocated	1	2	2	2
		 	 	 

TECHNICAL NOTES (T/N)

The Preparatory Survey on the Project for Strengthening the Capacity of the Nigeria Centre for Disease Control Network Laboratories in the Federal Republic of Nigeria

As recorded in the Minutes of Discussions (M/D) signed on January 24, 2019 between Nigeria Centre for Disease Control (NCDC) and JICA for the captioned project (hereafter referred to as "the Project"), the Consultant continued the study and this T/N was prepared and signed. M/D prevails over T/N.

1. Project Site

Project area:

(1) The Consultant explained, based on the discussion with CPHL recorded in **Attachment-14**, the Project Area inside the Compound of the Federal Ministry of Health (FMoH) in Yaba district, which would be required for the construction of the new building and facility implemented by the Project, as indicated in the **Attachment-1**, and NCDC acknowledged the explanation.

(2) The Consultant explained that the existing buildings, fences, trees/plants, the electrical lighting poles, the power generator, water tanks and the concrete foundation/floor indicated in the **Attachement-1** would be removed by NCDC before May, 2020 prior to the expected dated of the public announcement of the tender, and NCDC agreed with the explanation.

2. Utilities for the Project

Electrical power line:

(1) The Consultant explained there might be two options for the connection point with the grid power such as; i) by utilizing the existing power incoming line at 11kV, ii) by having new power incoming line on 33kV as indicated in the **Attachment-2**, and that technical details and cost estimation of those options would be accessed and informed by the Power Distribution Company in Lagos (EKEDC) to the Consultant for further examination together with NCDC, and NCDC understood the explanation.

(2) The Consultant explained the scope of works which shall be undertaken by NCDC, as indicated in the **Attachment-3**, and NCDC understood the explanation.

(3) The Consultant explained that the request letter for the estimated cost of the connections of ether options was submitted by the Consultant to the Power Distribution Company, and that the estimated cost would be considered as NCDC's undertaking for their budgetary preparation, and NCDC understood the explanation.

City water supply line:

(4) The Consultant explained that the water source for the existing CPHL building was the well water which might not be favorable in terms of the supply with stable volume and water quality, and that the city potable water (60mm with 0.1Mpa) would be recommended by newly connecting from the nearest connection point located along the main front road approximately 70m away from the Project area, as indicated in the **Attachment-2**, and NCDC understood the explanation.

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NCDC agreed that the water source for the Project would be selected based on results of water quality tests which the Consultant is carrying out.

(5) The Consultant submitted the estimated cost as NCDC's undertaking obtained from the Water Board of Lagos to NCDC for their budgetary preparation.

Telecommunication network:

(6) The Consultant explained that the incoming telecommunication network to the new building would be an independent connection in terms of the biosecurity and operation, and NCDC agreed with the explanation.

(7) The Consultant submitted the estimated cost as NCDC's undertaking obtained from the MTN and GLO to NCDC for their budgetary preparation.

3. Building and Facility Planning

General

(1) The Consultant explained the new building and facility for CPHL would be planned for the BSL-2 laboratory which would principally aim at eight prioritized infectious diseases i.e. Lassa fever/VHF, Yellow fever, Cholera, Meningitis, Measles, Monkey Pox, AMR, Influenza and NCDC confirmed the planning.

Architectural planning:

(2) The Consultant explained the site layout, the floor plan (ground floor, first floor and basement floor), the cross section and the list of rooms planned as shown in the **Attachment-4, 5, 6, 7** respectively, and NCDC agreed with the planning.

Arrangements of incoming electrical power line:

(3) The Consultant explained that i) the exiting transformer and distribution line would remain as currently installed, and that ii) the existing transformer would be fed by branching 33kv of MV power from the switchgear panel located near the connection point and provided by the Project, as shown in the **Attachment-2**, and NCDC agreed on the explanation.

Infectious waste management:

(4) The Consultant explained the handling flow for the infectious waste disposals as shown in the **Attachment-8,** and NCDC agreed on the explanation.

(5) The Consultant suggested the upgrading the incineration system to suffice for processing those waste generated from the new building and facility of the Project, and NCDC agreed on the suggestion.

4. Equipment Planning

(1) The Consultant explained the procurement and installation of laboratory equipment would be planned for the network laboratories which would principally aim at eight prioritized infectious diseases i.e. Lassa fever/VHF, Yellow fever, Cholera, Meningitis, Measles, Monkey Pox, AMR, Influenza, and NCDC confirmed the planning.

(2) The Consultant explained the equipment planning to be examined for the provision by the Project as indicated in the **Attachment-10 and 11** Equipment list and **Attachment 12** Necessary measures for equipment planning as the results of the review and discussions with NCDC on the requested equipment indicated in the **Attachment-9**, NCDC agreed with the planning and necessary measures of network laboratories.

(3) The Consultant requested that NCDC continuously employ biomedical engineers for equipment management and maintenance, NCDC acknowledged needs and the request.

(4) The Consultant requested that NCDC would make the maintenance contract(s) with the external specialized agent(s) in PCR and ELISA etc., NCDC acknowledge needs and the request.

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5. Construction Planning

(1) The Consultant explained the construction planning on temporary occupation during the construction for the following purposes as indicated in the **Attachment-13**, and NCDC understood the explanation.

1) Site temporary office, toilets, storage etc. for the Contractor at the existing parking area/the construction area

2) Stock yards and workshop of materials/equipment at the existing parking area/the construction area

3) Temporary enclosure and gates for the construction area with fencing

(2) The Consultant explained that the area belongs to FMoH along the exterior fence, where water tanks, generator room currently locate, would be utilized as a part of the temporary access during the construction, and that the tanks and generator would be expected to be removed before the commencement of construction, and NCDC understood the explanation.

(3) The Consultant explained that the access during the construction for users of those existing institutions inside the Compound would maintain through the existing utility road and gate, and NCDC understood the explanation.

(4) The Consultant requested the following considerations during the construction, and NCDC understood the explanation.

1) The Consultant shall be allowed to work at the site office from 8:00 to 17:00 on week days and Saturday.

2) The Consultant shall be allowed to work at the site office on Sunday as well as at the night shift by requesting permissions in anticipation.

3) The Contractor shall be allowed to utilize the existing well water or city water on the purpose of the construction and/or to drill new bore hole for that purpose in the Compound.

6. "Soft Component" of the Project

(1) NCDC requested, after confirming the importance of the operation and maintenance for the building facilities and equipment specialized for the BSL-2 laboratory provided by the Project, a further study on the availability of the following technical assistances, and the Consultant understood the request.

1) Training on the operation and maintenance of the air conditioning and ventilation system for the BSL-2 laboratory

2) Training on infectious waste management (including training on the operation of the high temperature heating sterilization system, incineration system)

3) Training on the operation and maintenance of the specialized technique for the BSL-2 laboratory such as the the biosafety cabinets maintenance, temperature maintenance of Incubator, etc.

4) Training on periodical maintenance procedure for laboratory equipment.

7. Other Relevant Issues

Land Ownership and Land Use of the Project area in the Compound:

(1) The Consultant explained the evidential/supporting documents of the land ownership of the Compound and/or the Project area had not been provided by CPHL during the period of survey in Lagos. The Consultant requested the submission of copies of the evidential/supporting documents of the land ownership no later than February 28, 2019, and NCDC acknowledged the request.

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(2) The Consultant explained that those evidential/supporting documents should declare the appropriate designation of land use for the laboratory/the institution, and be lawfully required to submit to the supervisory authority in due course for obtaining the building approval of the Project, and NCDC acknowledged the explanation.

Building Approval for the building facility of the Project:

(3) The Consultant explained that the building approval of the Project would be processed in compliance with the relevant federal regulations not established by the state government of Lagos because of being a construction inside of the land property of the federal government, and NCDC understood and agreed to verify the similar cases as well as relevant procedures.

(4) The Consultant explained that the building approval of the Project would be applied and obtained by NCDC's undertaking before May, 2020 prior to the expected dated of the public announcement of the tender, and that the following arrangements and documentations would be conducted by NCDC in case same manner of relevant practices in FCT are required for the Project, and NCDC acknowledged the explanation.

1) Carry out the technical review on the design documents prepared by the Consultant by contracting architects and engineers registered in ARCON (Architect Registration Council of Nigeria) and COREN (Council for the Regulation of Engineering in Nigeria)

2) Carry out the preparation of documents required for the application incorporating results of 1) by contracting a town planner qualified by FCDA

(5) Due to the fact that NCDC organizes no in-house nor outsourceable engineering expertise related to the building infrastructure, NCDC requested to reconsider the scope of undertakings between Nigerian side and Japanese side stated above in (4)-1), and to include the technical design review by the Nigerian qualified architects/engineers into the scope of Japanese side for the purpose of the smoother implementation of technical clarification and communication required on the review, and the Consultant understood the request for a further study.

(6) The Consultant explained that it would mostly take 3 months to evaluate the application and issue the approval after receiving of the complete documents of application, and NCDC acknowledged the explanation.

(7) The Consultant requested the provision of copies of the building approval of the existing CPHL building, if available, no later than the end of May, 2019, and NCDC acknowledged the request.

(8) The Consultant explained that those documents stated above in (7) together with document stated in (4) would be required to submit as a mandatory to the supervisory authority in due course for obtaining the building approval of the Project, and NCDC acknowledged the explanation.

Environmental Impact Assessment:

(9) The Consultant explained that the EIA and/or IEE (called as "EMP" in Lagos) mandated by the Federal Ministry of Environment would be conducted focusing on the land utilization of the Compound, and that it would be necessary for NCDC/CPHL to submit an official request letter for further clarification with the FMENV, and NCDC understood the explanation.

Staff Deployment/Assignment

(10) NCDC explained that two assigned staff for maintenance of the building facility, whose expertise is the electrical installation, would take care of minor maintenance and small scale repairs such as A/C, lighting fixtures, retouch painting etc., and that major maintenance and large scale renovation would be conducted by outsourcing.

(11) The Consultant requested to consider strengthening the operation and maintenance structure i) by recruitment of mechanical and electrical engineers for the new building and facility, ii) by outsourcing the specialized maintenance company such as BIOSAFE (Biosafety Equipment

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Calibration Limited, Nigeria), AFMS (Air Filter Maintenance Services, South Africa) or equipment manufacturer who is capable to provide the periodical maintenance services and calibrations, and NCDC agreed with the request.

Field Survey by Local sub-consultant:

(12) The Consultant requested to extend the approval given by CPHL after the study team's departure for the following survey to be continued by the sub-consultants, and NCDC/CPHL approved the request.

1) Topographic survey in the compound (start on January/31/2019)
2) Geological survey in the compound (start on January/31/2019)
3) Electrical power supply survey including measurement of the fluctuation of at the power receiving room in the exiting CPHL building
4) Water supply survey including sampling and measurement of water flow of the existing well

(13) The Consultant requested to obtain the work permissions from the following 7 network laboratories in order for the sub-consultant to conduct water sampling for the water quality test, and NCDC understood the request and agreed to take necessary coordination with FMoH.

① University of Lagos Teaching Hospital Virology Laboratory (Lagos)
② National Hospital Abuja (FCT)
③ University College Hospital, Ibadan (Oyo)
④ University of Nigeria Teaching Hospital (Enugu)
⑤ Irrua Specialty Teaching Hospital (Edo)
⑥ University of Benin Teaching Hospital Benin (Edo)
⑦ University of Ilorin Teaching Hospital , Ilorin (Kwara)

Questionnaires:

(14) The Consultant requested answers to the following questionnaires which have remained blank partially for answers, and NCDC acknowledged the request.

-Chapter-3: Support from other organizations
-Chapter-4a: Current Operation and Future Plan for Biomedical Research Activities for CPHL,
-Chapter-4b: Biomedical Research Activities for 8 network laboratories,
-Chapter-5: Operation and Management of NCDC
-Chapter-7: Equipment Plan for CPHL,
-Chapter-10: Operation and Maintenance Plan o CPHL and NCDC,

Additional Information:

(15) The Consultant requested the following specific information; and NCDC acknowledged the request.

- Information of donors/partners in recent alignment with NCDC after 2017
- Information or relevant documents/reports with regard to roles, functions of network laboratories as well as supports provided to network laboratories
- Information or relevant documents/reports with regard to the progress currently achieved of establishment of the laboratory network
- Budget allocation of NCDC in the purpose of establishment and strengthening of the laboratory network

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(End of Notes)

Attachment 1	Project Area
Attachment 2	Location of the electrical power connection and the city potable water connection
Attachment 3	Scope of works for the electrical power incoming and connection
Attachment 4	Block zoning layout
Attachment 5	Floor plan (ground floor, first floor)
Attachment 6	Floor plan (basement floor), Cross section
Attachment 7	List of rooms planned
Attachment 8	Infectious waste management flow
Attachment 9	Requested equipment
Attachment 10	Equipment list for CPHL
Attachment 11	Equipment list for network laboratories
Attachment 12	Necessary measures for equipment planning
Attachment 13	Construction planning for temporary occupation during the construction
Attachment 14	Records of Meeting with CPHL

Abuja, January 30, 2018

Mr. Anthony Ahumibe
Senior Laboratory Technical Adviser
Nigeria Centre for Disease Control

Mr. Teruyasu EZURE
Chief Consultant, JICA Study Team
Oriental Consultants Global Co., Ltd.

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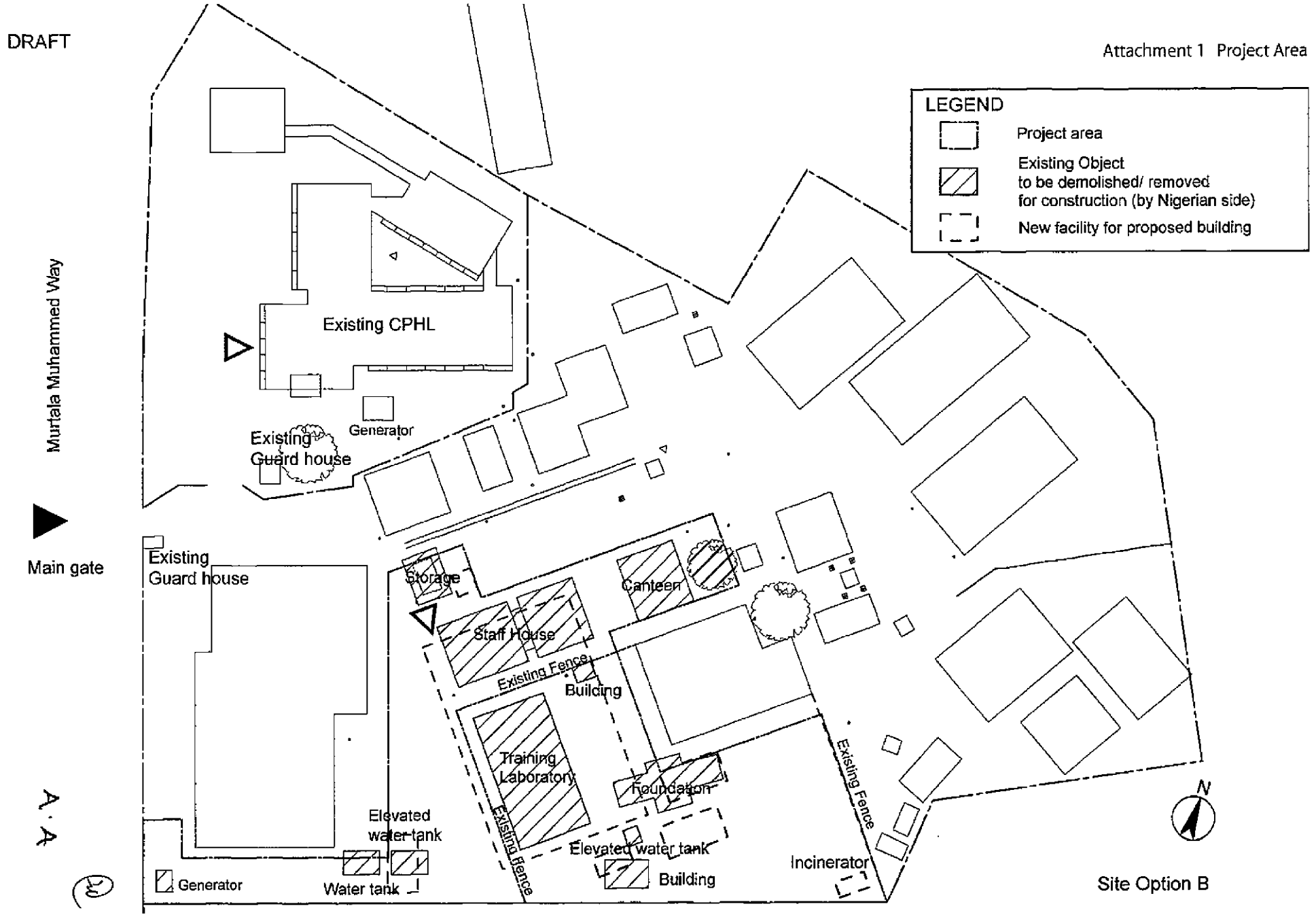
Attachment 1 Project Area



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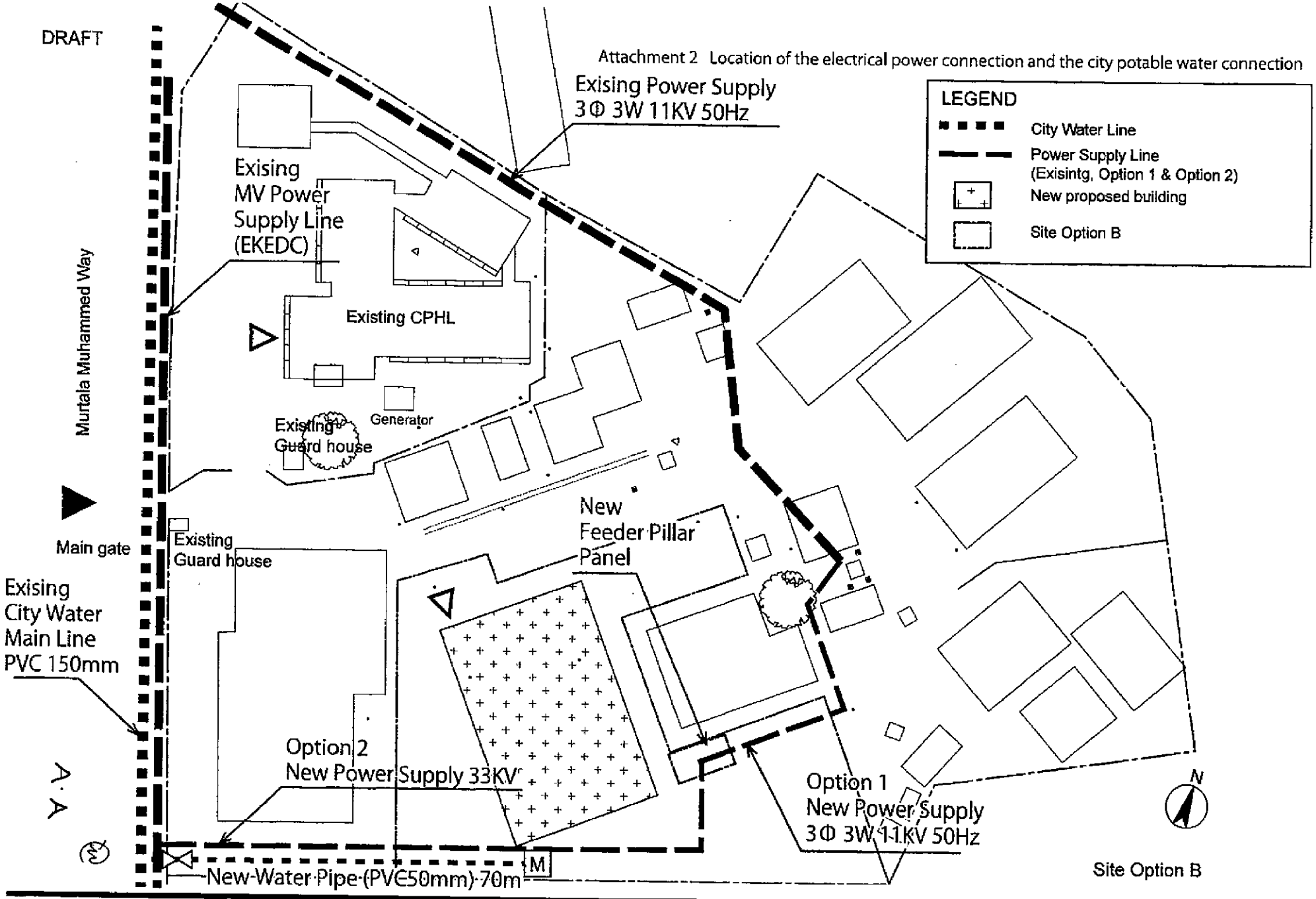
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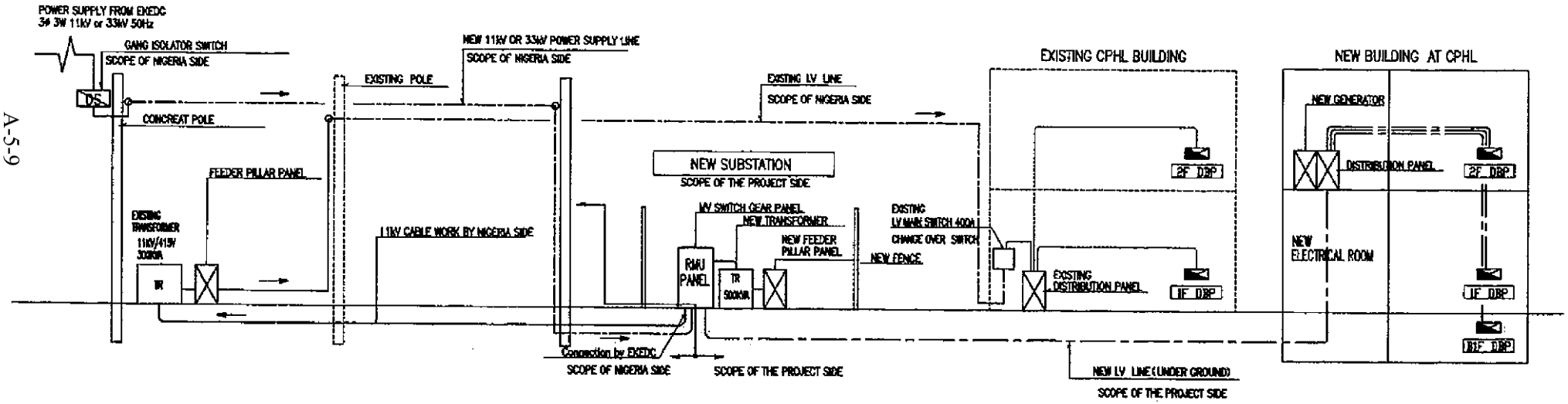
Attachment 2 Location of the electrical power connection and the city potable water connection
Exising Power Supply
3Φ 3W 11KV 50Hz
LEGEND
City Water Line
Power Supply Line
(Exisintg, Option 1 & Option 2)
New proposed building
Site Option B
Exising
MV Power
Supply Line
(EKEDC)
Existing CPHL
Generator
Existing
Guard house
Muritala Muhammed Way
Main gate
Existing
Guard house
New
Feeder Pillar
Panel
Exising
City Water
Main Line
PVC 150mm
Option 2
New Power Supply 33KV
Option 1
New Power Supply
3Φ 3W 11KV 50Hz
N
A
A
M
New Water Pipe (PVC50mm) 70m
Site Option B



SCHEMATIC DIAGRAM OF
MAIN FEEDER DIAGRAM

A-5-9

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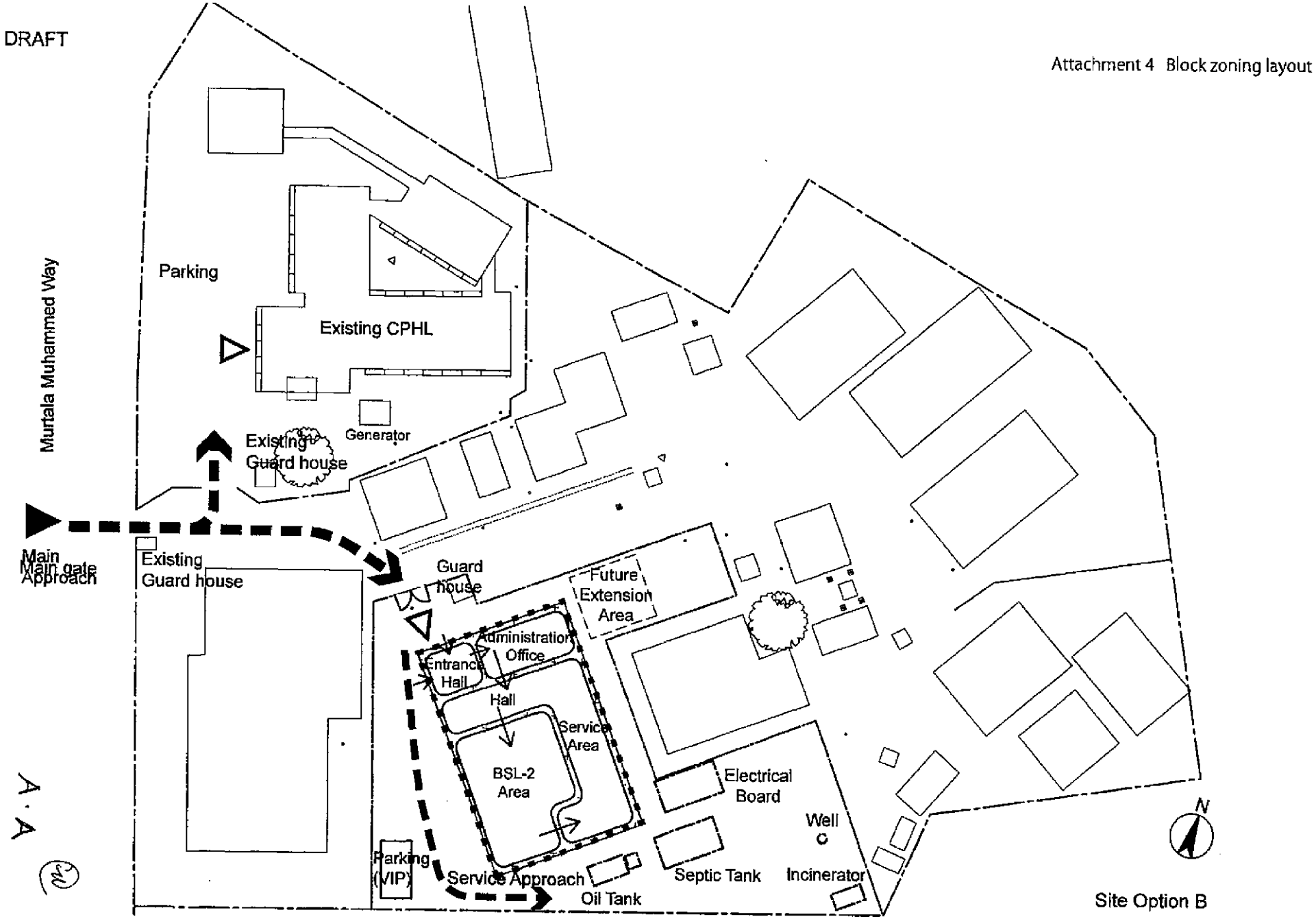
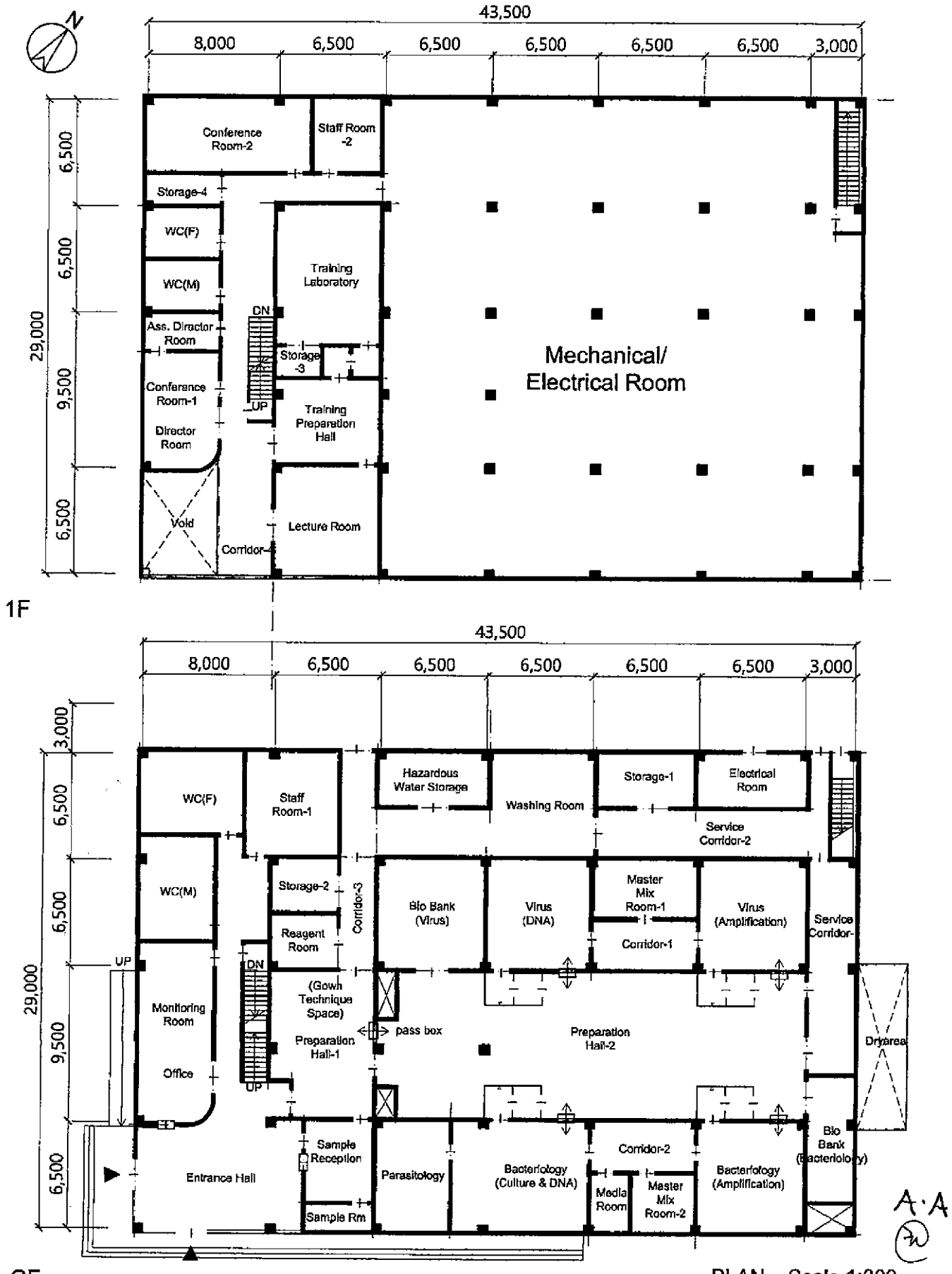
Attachment 4 Block zoning layout

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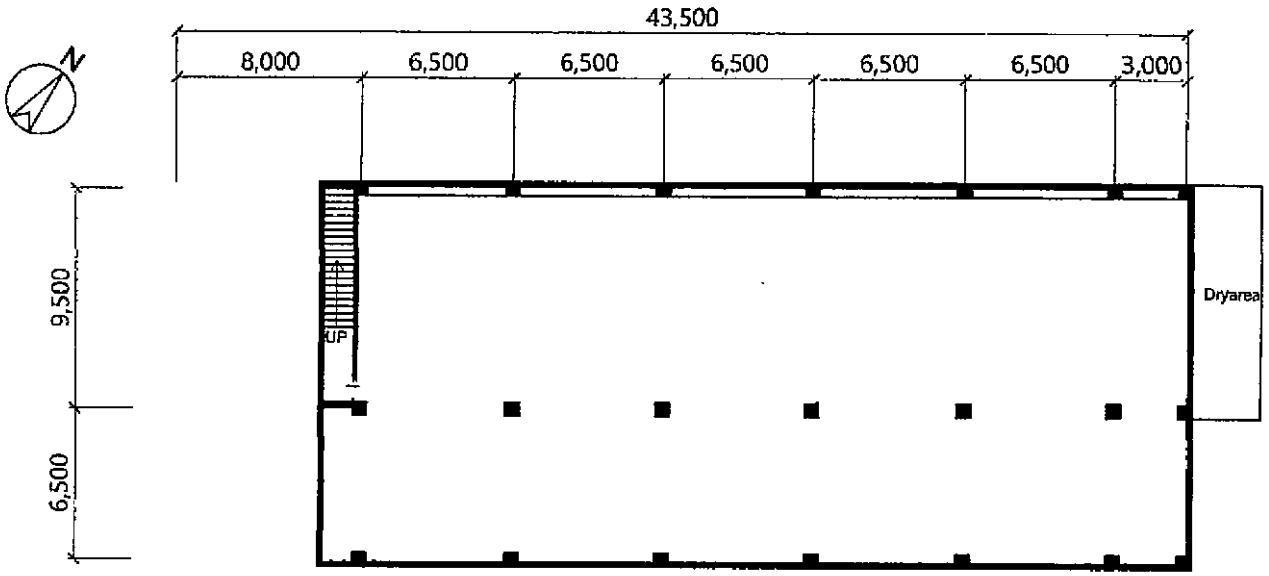
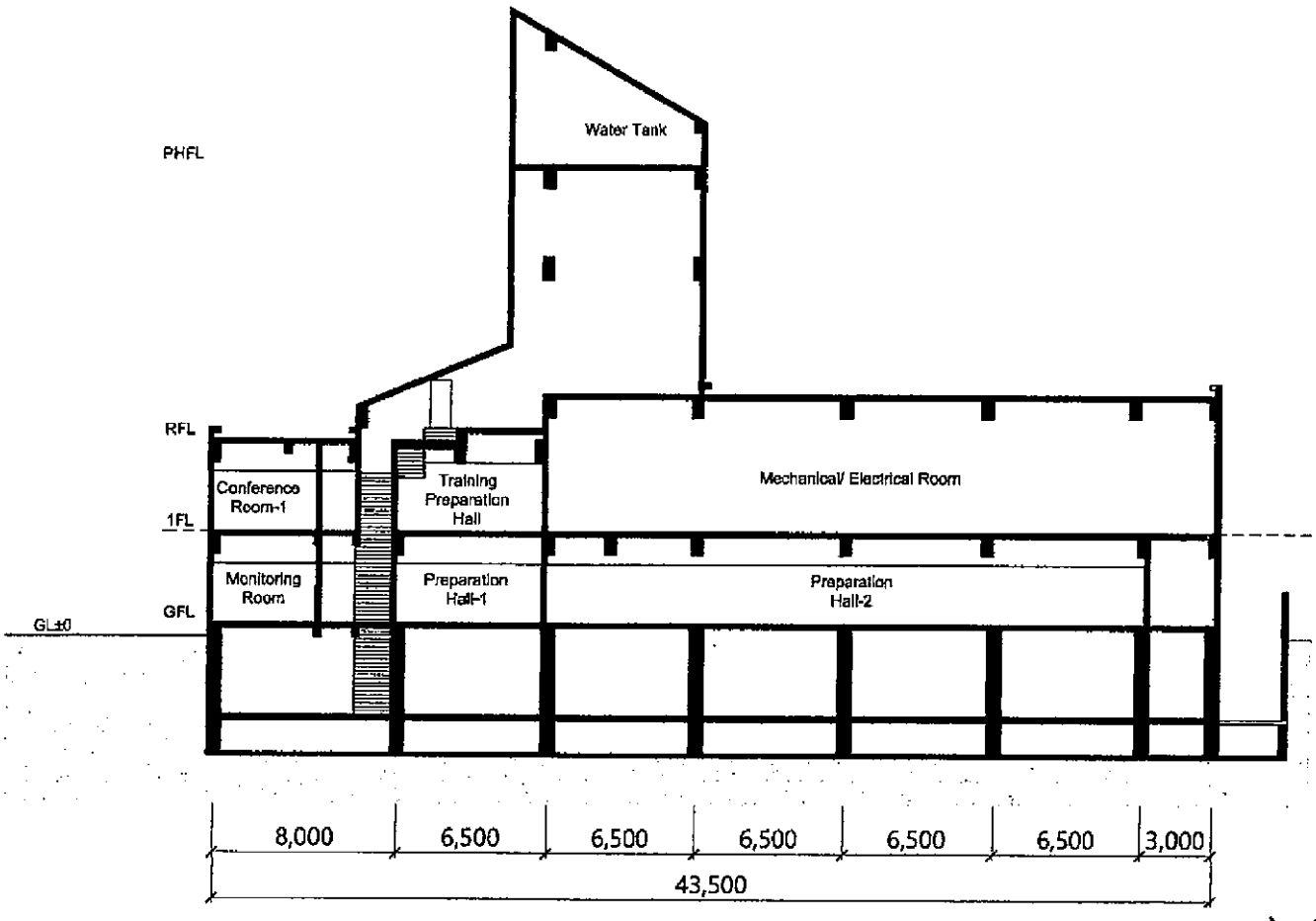
6,500
Conference Room-2
Staff Room -2
Storage-4
WC(F)
WC(M)
Ass. Director Room
Conference Room-1
Director Room
Void
Corridor-4
Training Laboratory
DN
Storage -3
UP
Training Preparation Hall
Lecture Room
Mechanical/ Electrical Room
1F
43,500
8,000
6,500
6,500
6,500
6,500
6,500
3,000
3,000
6,500
6,500
9,500
6,500
29,000
WC(F)
Staff Room-1
Hazardous Water Storage
Washing Room
Storage-1
Electrical Room
Service Corridor-2
WC(M)
Storage-2
Corridor-3
Reagent Room
UP
DN
(Gowh Technique Space)
Monitoring Room
Office
Preparation Hall-1
pass box
Bio Bank (Virus)
Virus (DNA)
Master Mix Room-1
Corridor-1
Virus (Amplification)
Service Corridor-
Preparation Hall-2
Dryarea
Entrance Hall
Sample Reception
Sample Rm
Parasitology
Bacteriology (Culture & DNA)
Corridor-2
Media Room
Master Mix Room-2
Bacteriology (Amplification)
Bio Bank (Bacteriology)
A·A
GF
PLAN Scale 1:300

Attachment 6 Floor plan (basement floor), Cross section



Basement Plan

PLAN Scale 1:300



A-A

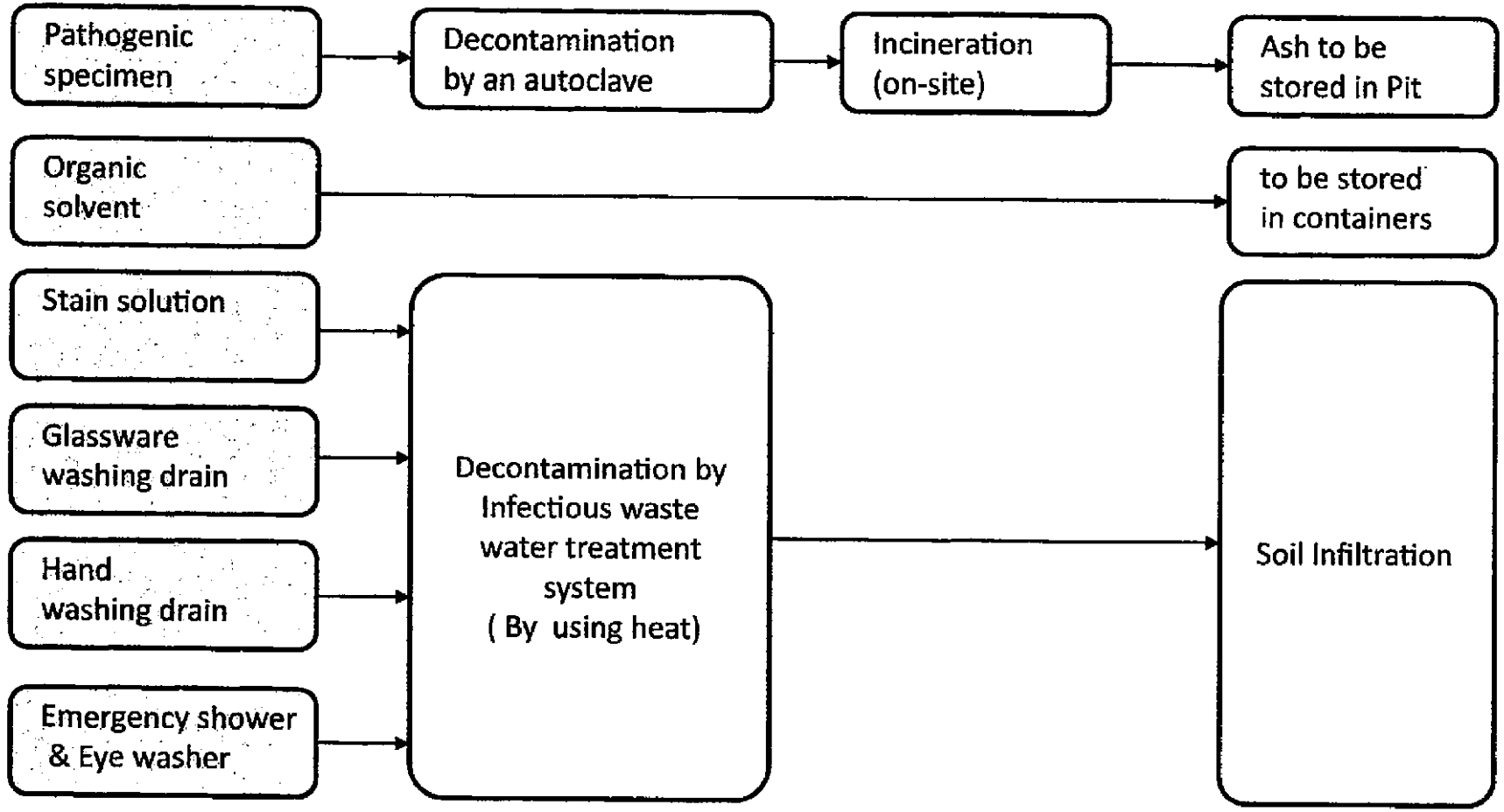
SECTION Scale 1:300

Components

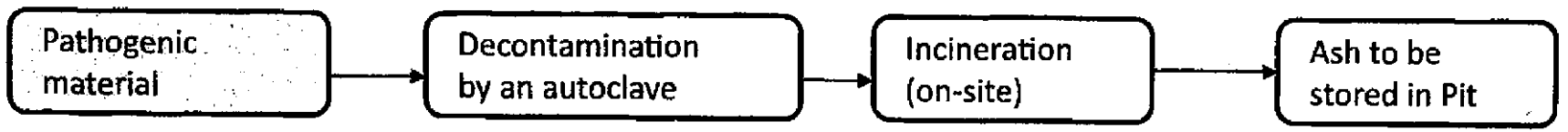
BSL-2 Barrier	Training Zone	Administrative Zone	Machine
Virus(DNA) Laboratory (incl. 2ante rooms)	Training Laboratory(incl. 2ante rooms)	Entrance Hall	Electrical Room
Virus(Amplification) Laboratory (incl. 2ante rooms)	Training Preparation Hall	Office, Monitoring Room	Machine Room
Bacteriology (Culture & DNA) Laboratory (incl. 2 ante rooms)	Storage	Staff Room	Air Conditioning Room
Bacteriology(Amplification) Laboratory (incl. 2 ante rooms)		WC (Male)	Ventilating Machine Room
Parasitology		WC (Female)	
Bio Bank (Virus)		Director Room	
Bio Bank (Bacteriology)		Conference Room	
Master Mix Room		Assistant Director Room	
Media Room			
Service Corridor			
Storage			
Washing Room			
Hazardous Water Storage			
Reagent Room			
Preparation Hall-1 (Gown Technique)			
Preparation Hall-2			
Sample Reception			
Sample Room			

A. A

Liquid waste



Solid waste



Attachment 9 Requested equipment

No.	Equipment Name	Q'ty
(Bacteriology Laboratory)		
1	Autoclave, vertical	1
2	Biosafety cabinet	1
3	Blood culture	1
4	Centrifuge, low speed	1
5	CO2 Incubator	1
6	Deep freezer -30℃	1
7	Deep freezer -80℃	1
8	Dry thermo unit	1
9	Incubator	1
10	Laboratory refrigerator	1
11	Magnetic stirrer	1
12	Microscope	1
13	Microscope, Fluoroscopy	1
14	Microwave oven	1
15	pH meter	1
16	Platform scale	1
17	Precision electronics balance	1
18	Spectrophotometer	1
19	Timer	1
20	Vortex mixer	1
21	Water bath	1
22	Work bench	1

No.	Equipment Name	Q'ty
(Virology Laboratory)		
1	Autoclave, vertical	1
2	Biosafety cabinet	1
3	Centrifuge, highspeed	1
4	Centrifuge, low speed	1
5	Deep freezer -30℃	1
6	Deep freezer -80℃	1
7	Dry thermo unit	1
8	ELISA set	1
9	Hot plate	1
10	Incubator	1
11	Laboratory refrigerator	1
12	Magnetic stirrer	1
13	ph meter	1
14	Platform scale	1
15	Precision electronics balance	1
16	Vortex	1
17	Water bath	1
18	Work bench	1
(PCR room)		
1	Domestic refrigerator	1
2	Electrophoresis system	1
3	Gel imager	1
4	PCR work station	1
5	Real time PCR	1
6	Thermocycler	1
7	UV transilluminator	1
8	Work bench	1
(Laboratory kitchen)		
1	Autoclave, vertical	1
2	Drying oven	1
3	Water distiller	1

A. A

Attachment 10 Equipment list for CPHL

No.	Equipment Name	Q'ty
Reception, sample receiving		
1	Laboratory refrigerator	1
2	Biosafety cabinet	1
Parasitology		
1	Microscope, Binocular	2
2	Work bench B	1
Bacteriology		
Sample separation/incubation/extraction room		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	Centrifuge, micro	2
6	CO2 Incubator	1
7	Deep freezer -30℃	1
8	Deep freezer -80℃ A	1
9	Dry thermo unit	1
10	Incubator	2
11	Laboratory refrigerator	1
12	Magnetic stirrer	1
13	Micropipette set, single	1
14	Micropipette set, Multi	1
15	Microscope, Binocular	1
16	pH meter	1
17	Platform scale	1
18	Precision electronics balance	1
19	Spectrophotometer	1
20	Timer	1
21	Vortex mixer	2
22	Water bath	1
23	Work bench A	2
Medium preparation room		
1	Autoclave, vertical	1
2	Drying oven	1
3	Stainless shelf	2
4	Work bench F	1

No.	Equipment Name	Q'ty
Master Mix room		
1	Domestic refrigerator	1
2	PCR work station	1
3	Work bench E	1
Amplification and ELISA room		
1	Electrophoresis set A	1
2	Gel imager	1
3	Laboratory refrigerator	1
4	RT PCR	1
5	Thermocycler	1
6	UV transilluminator	1
7	Work bench A	2

A-A

No.	Equipment Name	Q'ty
Virology		
Sample separation and extraction room		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	Centrifuge, micro	1
6	Deep freezer -30℃	1
7	Deep freezer -80℃ A	1
8	Dry thermo unit	1
9	Incubator	2
10	Laboratory refrigerator	1
11	Magnetic stirrer	1
12	Micropipette set, single	1
13	Micropipette set, Multi	1
14	Microscope, Binocular	1
15	Microscope, Fluoroscopy	1
16	Microwave oven	1
17	pH meter	1
18	Platform scale	1
19	Precision electronics balance	1
20	Spectrophotometer	1
21	Timer	1
22	Vortex mixer	2
23	Water bath	1
24	Work bench A	2
Master Mix room		
1	Domestic refrigerator	1
2	PCR work station	1
3	Water distiller	1
4	Work bench D	1
Amplification and ELISA room		
1	Electrophoresis set A	1
2	Gel imager	1
3	Laboratory refrigerator	1
4	RT PCR	1
5	Thermocycler	1
6	UV transilluminator	1
7	Work bench A	2
Bio-bank (virus)		
1	Deep freezer -80℃ B	6
Bio-bank (bacteria)		
1	Deep freezer -80℃ B	2
Washing room		
1	Water distiller	1

No.	Equipment Name	Q'ty
Training Lab.		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	Centrifuge, micro	1
6	CO2 Incubator	1
7	Deep freezer -30℃	1
8	Dry thermo unit	1
9	Electrophoresis set A	1
10	ELISA set	1
11	Gel imager	1
12	Hot plate	1
13	Incubator	2
14	Laboratory refrigerator	1
15	Magnetic stirrer	1
16	Micropipette set, single	1
17	Micropipette set, Multi	1
18	Microscope, Binocular	2
19	Microscope, Teaching	1
20	Microwave oven	1
21	PCR work station	1
22	ph meter	1
23	Platform scale	1
24	Precision electronics balance	1
25	RT PCR	1
26	Spectrophotometer	1
27	Thermocycler	1
28	Timer	2
29	UV transilluminator	1
30	Vortex mixer	2
31	Water bath	1
32	Work bench C	2
Lecture hall		
1	Chair	20
2	Table	20
3	Display	2

A·A

Attachment 11 Equipment list for network laboratories

A	Standard Equipment Name	ISTH	UBTH	UCHI	UNTH	NHA	LUTH	UTH	Total
Bacteriology									
Sample separation and incubation room									
1	Autoclave, vertical	1	-	1	1	1	-	1	5
2	Biosafety cabinet	1	-	1	2	1	-	2	7
3	Blood culture	1	-	1	-	1	-	-	3
4	Burner, electric	2	-	-	-	-	-	-	2
5	Centrifuge, low speed	-	1	1	-	1	-	-	3
6	Deep freezer -30°C	1	-	-	1	-	-	1	3
7	Deep freezer -80°C	1	1	-	-	-	-	1	3
8	Incubator	2	4	2	2	2	-	2	14
9	Laboratory refrigerator	1	1	2	2	1	-	2	9
10	Micropipette set, single	1	1	1	1	1	-	1	6
11	Micropipette set, Multi	1	1	1	1	1	-	1	6
12	Microscope	5	5	2	3	1	-	2	18
13	Microwave oven	-	-	-	-	1	-	-	1
14	pH meter	-	-	-	-	1	-	-	1
15	Platform scale	-	-	-	1	-	-	1	2
16	Precision electronics balance	-	-	-	1	-	-	-	1
17	Water bath	-	-	-	1	-	-	-	1
18	Work bench G	-	-	-	4	-	-	-	4
Laboratory kitchen									
1	Autoclave, vertical	1	1	1	1	1	-	1	6
2	Drying oven	1	-	-	1	-	-	-	2
3	Water distiller	1	-	1	1	-	-	1	4
Extraction room									
1	Autoclave, vertical	-	1	1	1	-	-	1	4
2	Biosafety cabinet	-	-	1	1	-	-	1	3
3	Centrifuge, highspeed	-	1	1	1	-	-	1	4
4	Centrifuge, low speed	-	-	1	1	-	-	1	3
8	Centrifuge, micro	-	-	1	1	-	-	1	3
5	Laboratory refrigerator	-	1	1	1	-	-	1	4
6	Dry thermo unit	-	-	1	1	-	-	1	3
9	Vortex mixer	-	-	1	1	-	-	1	3
10	Work bench H	-	-	1	1	-	-	1	3

A·A (2)

A	Standard Equipment Name	ISTH	UBTH	UCHI	UNTH	NHA	LUTH	UITH	Total
Mastermix room									
1	Domestic refrigerator	-	1	1	1	-	-	1	4
2	PCR work station	-	1	1	1	-	-	1	4
3	Work bench H	-	1	1	1	-	-	1	4
Amplification room									
1	ELISA set	-	1	-	1	-	-	1	3
2	RT PCR	-	1	1	1	-	-	1	4
3	Work bench H	-	1	1	1	-	-	1	4
Virology									
Sample separation and extraction room									
1	Biosafety cabinet	-	-	-	-	-	1	-	1
2	Deep freezer -80°C	-	-	-	-	-	4	-	4
3	Micropipette set, Single	-	-	-	-	-	1	-	1
4	Micropipette set, Multi	-	-	-	-	-	1	-	1
5	Microscope, Fluoroscopy	-	-	-	-	-	1	-	1
6	Microscope, inverted	-	-	-	-	-	1	-	1
Amplification room									
1	Electrophoresis set	-	-	-	-	-	1	-	1
2	Gel imager	-	-	-	-	-	1	-	1
	Total	18	22	26	36	11	9	29	151

No.	Facility name	Code
1	Irrua Specialist Hospital, Irrua, Edo	ISTH
2	University of Benin Teaching Hospital Benin	UBTH
3	University College Hospital Ibadan	UCHI
4	University of Nigeria Teaching Hospital Enugu	UNTH
5	National Hospital Abuja	NHA
6	University of Lagos Teaching Hospital	LUTH
7	Central Public Health Laboratory	CPHL
8	University of Ilorin Teaching Hospital Ilorin	UITH

A·A (2)

Attachment 12 Necessary measures for equipment planning

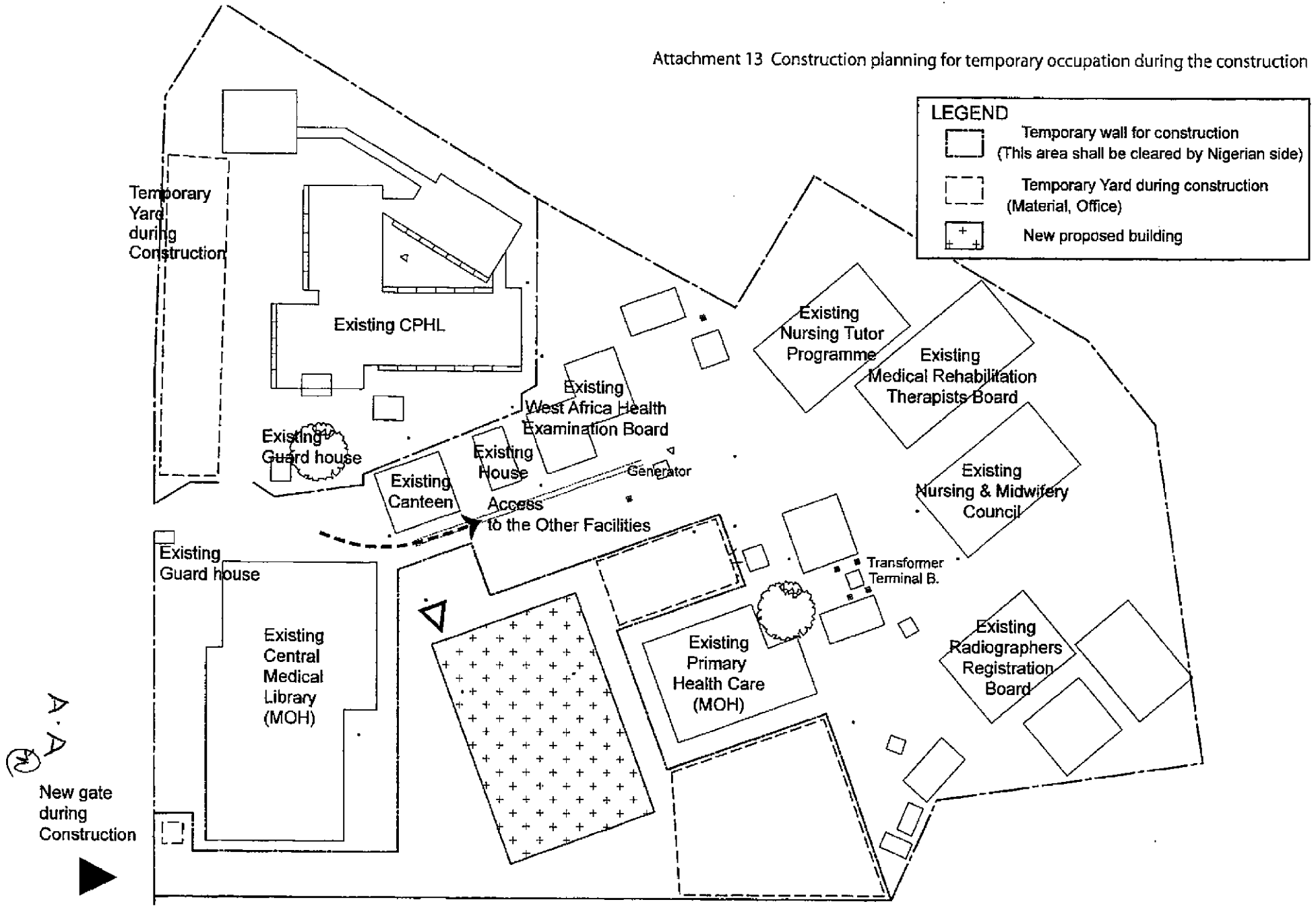
No.	Hospital name	Target laboratory		Requirement for equipment supply.	
		Bacteriology	Virology	Bacteriology	Virology
1	Irrua Specialist Hospital, Irrua, Edo	○	○	- A PCR laboratory shall be newly established. At least 3 laboratory rooms, some trained a scientist and technicians are required.	-
2	University of Benin Teaching Hospital Benin	○	○	-	- Virology laboratory is belong to microbiology. Reorganize existing mastermix and amplification room.
3	University College Hospital Ibadan	○	×	- A PCR laboratory shall be established. At least 3 laboratory rooms and some trained scientist and technician is required.	- Establish a virology laboratory department.
4	University of Nigeria Teaching Hospital Enugu (Ituku Ozalla)	○	○	- Provide sufficient infrastructure. (Power supply and water supply)	- Provide sufficient infrastructure. (Power supply and water supply) - Start up the equipment that not used after provision. (RT- PCR and related equipment, etc.)
5	National Hospital Abuja	○	×	-	-
6	University of Lagos Teaching Hospital	X	○	- A PCR laboratory shall be newly established. At least 3 laboratory rooms, some trained a scientist and technicians are required.	-
7	The Central Public Health Laboratory	○	○	Equipment transfer and installation after construction of new facility.	
8	University of Ilorin Teaching Hospital Ilorin	○	○	- Provide back up power supply on working time. - A PCR laboratory shall be newly established. At least 3 laboratory rooms, some trained a scientist and technicians are required.	- Provide back up power supply on working time. - Start us the equipment that not used after provision. (RT- PCR and related equipment, etc.)

*Common requirements for all hospital

1. Enlarge door for equipment installation, if necessary.
2. Security measures while installation.
3. Allocate enough consumable budget for operation.
4. Provide periodical and corrective maintenance by biomedical engineer for equipment.
5. Establish maintenance contract with manufacture for selected equipment.
6. Decommission obsolete equipment and remove them from laboratory.

A·A

Attachment 13 Construction planning for temporary occupation during the construction



Record of Meeting

The Preparatory Survey on the Project for Strengthening the Capacity of the Nigeria Centre for Disease Control Network Laboratories in the Federal Republic of Nigeria

This record of meeting was prepared and signed in accordance with discussions held between the Central Public Health Laboratory (CPHL) and the Consultant regarding the new building facility and equipment during the filed survey for the captioned project (hereafter referred to as "the Project").

1. Project Site

Project area:

(1) The Consultant explained that the Project Area inside the compound of the Federal Ministry of Health (FMoH) in Yaba district, which would be required for the construction of the new building facility implemented by the Project, as indicated in the Attchment-1, and CPHL acknowledged the explanation.

(2) CPHL commented that the availability of spaces both for the temporary access road at the Central Medical Library and the branching panel at the existing transformer area would be verified with NCDC (Abuja), and the Consultant acknowledged his comment.

2. Building and Facility Planning

Architectural planning:

(1) The Consultant explained the site layout, the floor plan (ground floor, 1st floor) as shown in the Attachment-2, 3, respectively, and CPHL acknowledged the planning.

The Consultant explained the basement floor would be planned for the facility system such as the infectious waste water treatment system, water reservoir tanks, boiler system etc., and CPHL acknowledged the explanation.

(2) The Consultant explained the layout of BSL-2 laboratories which comprise the preparation hall, parasitology lab., virology lab., bacteriology lab. annexed with PCR rooms, ante rooms, shower rooms etc., and CPHL acknowledged the explanation and requested to finalize with NCDC Abuja).

(3) CPHL commented that the area of sample reception should be enough for furnishing the biosafety cabinet and 2 working desks, and the Consultant acknowledged his comment.

(4) CPHL acknowledged that the laboratories would not be furnished with the working bench attached to the walls but with a center laboratory table (an island-type working bench), which is the same design concept as applied and approved for the new laboratory of NRL in Gaduwa.

3. Equipment Planning

(1) The Consultant explained the equipment to be examined for the provision by the Project as indicated in the equipment list Attachment-4, and CPHL requested to introduce an additional biosafety cabinet to the Reception, sample receiving area.

(2) In addition to the provision of the equipment, CPHL explained the needs for the training, installation, calibration and maintenance of the equipment. The Consultant acknowledged their importance.

4. Other Relevant Issues

Land Ownership and Land Use of the NCDC/NRL compound:

(1) CPHL commented that this issue would be discussed to clarify with NCDC (Abuja) because the

FMoH is supposed to be a landowner.

Building Approval for the building facility of the Project:

(2) CPHL commented that this issue would be discussed to clarify with NCDC (Abuja) because this is the construction to be implemented inside the property of the federal government.

Environmental Impact Assessment:

(3) CPHL commented that this issue would be discussed to clarify with NCDC (Abuja) because this is the construction to be implemented inside the property of the federal government.

Field Survey by Local sub-consultant:

(4) The Consultant requested to extend the approval given by CPHL after the study team's departure for the following survey to be continued, and CPHL approved the request.

1) Topographic survey in the compound
2) Geological survey in the compound
3) Electrical power supply survey including measurement of the fluctuation of at the power receiving room in the exiting CPHL building
4) Water supply survey including sampling and measurement of water flow of the existing well

Questionnaires:

(5) The Consultant requested answers to the questionnaires Chapter-4a: Current Operation and Future Plan for Biomedical Research Activities, Chapter-4b: CPHL, Chapter-7: Equipment Plan for CPHL, Chapter-10: Operation and Maintenance Plan, which have remained blank partially for answers, and NCDC acknowledged the request.

(End of Notes)

Attachment 1 Project Area
Attachment 2 Block layout Location and Scope of works for the electrical power connection
Attachment 3 Floor plan (ground floor)
Attachment 4 Equipment list

Lagos, January 22, 2019

Mrs. Babatunde Olajumoke
Deputy Director
Central Public Health Laboratory

Mr. Teruyasu EZURE
Chief Consultant, JICA Study Team
Oriental Consultants Global Co., Ltd.

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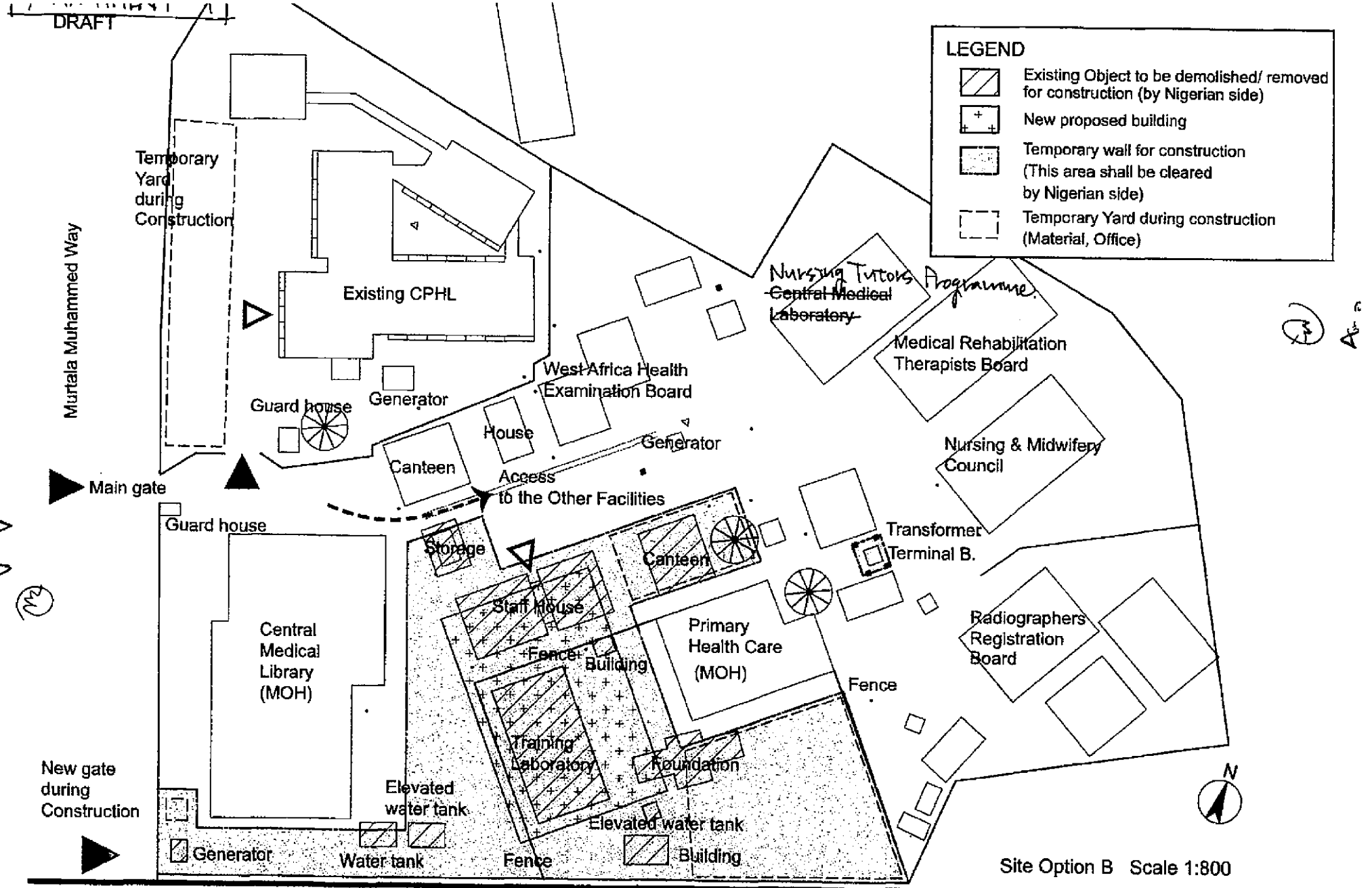
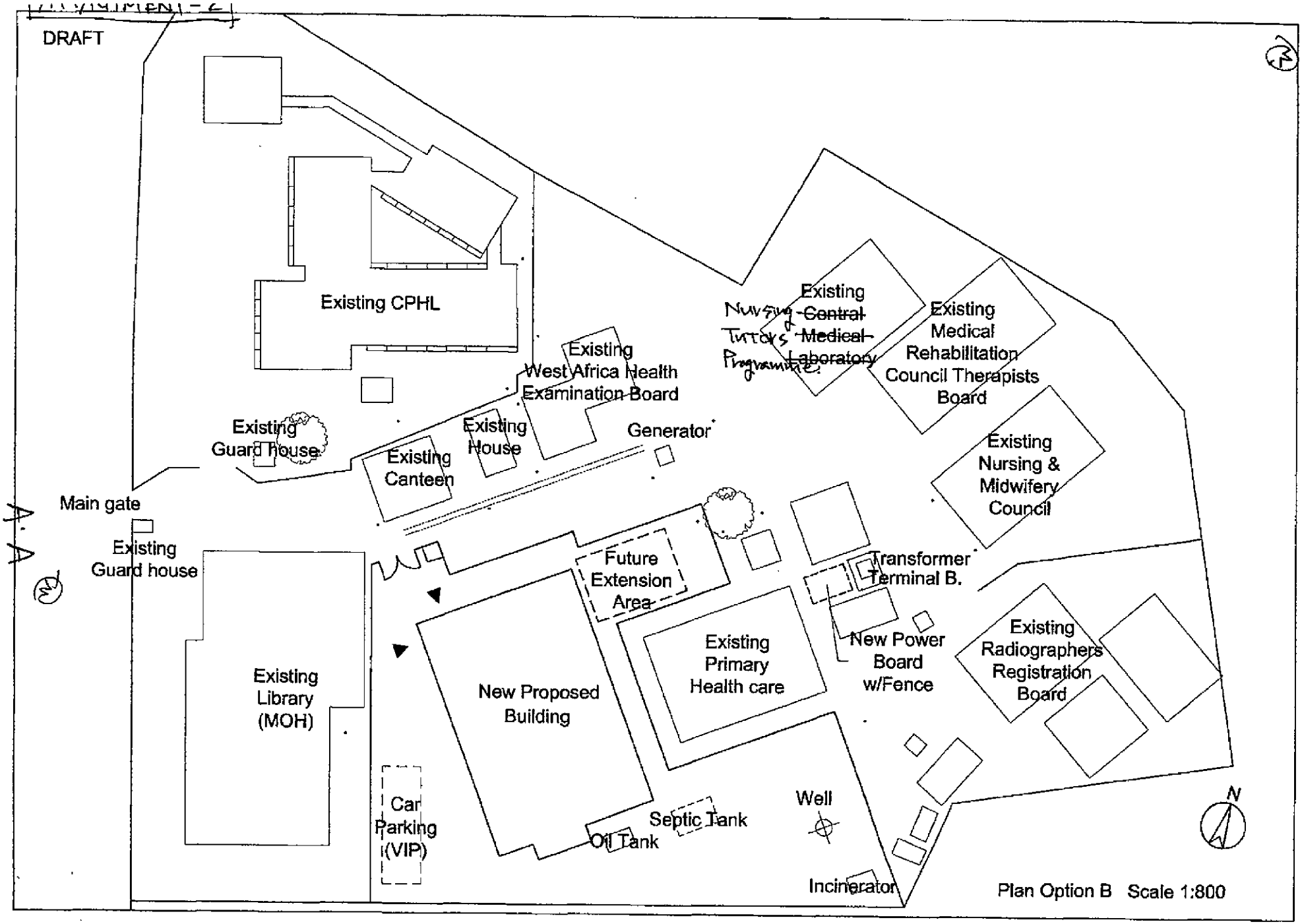


The Project for Strengthening the Capacity of Nigeria Centre for Disease Control Network Laboratories

JICA STUDY TEAM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Existing CPHL
Existing West Africa Health Examination Board
Existing Guard House
Existing House
Existing Canteen
Generator
Nursing Tutors Programme
Existing Central Medical Laboratory
Existing Medical Rehabilitation Council Therapists Board
Existing Nursing & Midwifery Council
Main gate
Existing Guard house
Future Extension Area
Transformer Terminal B.
Existing Library (MOH)
New Proposed Building
Existing Primary Health care
New Power Board w/Fence
Existing Radiographers Registration Board
Car Parking (VIP)
Oil Tank
Septic Tank
Well
Incinerator
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Plan Option B Scale 1:800
A-5-25
A-A
A-D

ATTACHMENT-3

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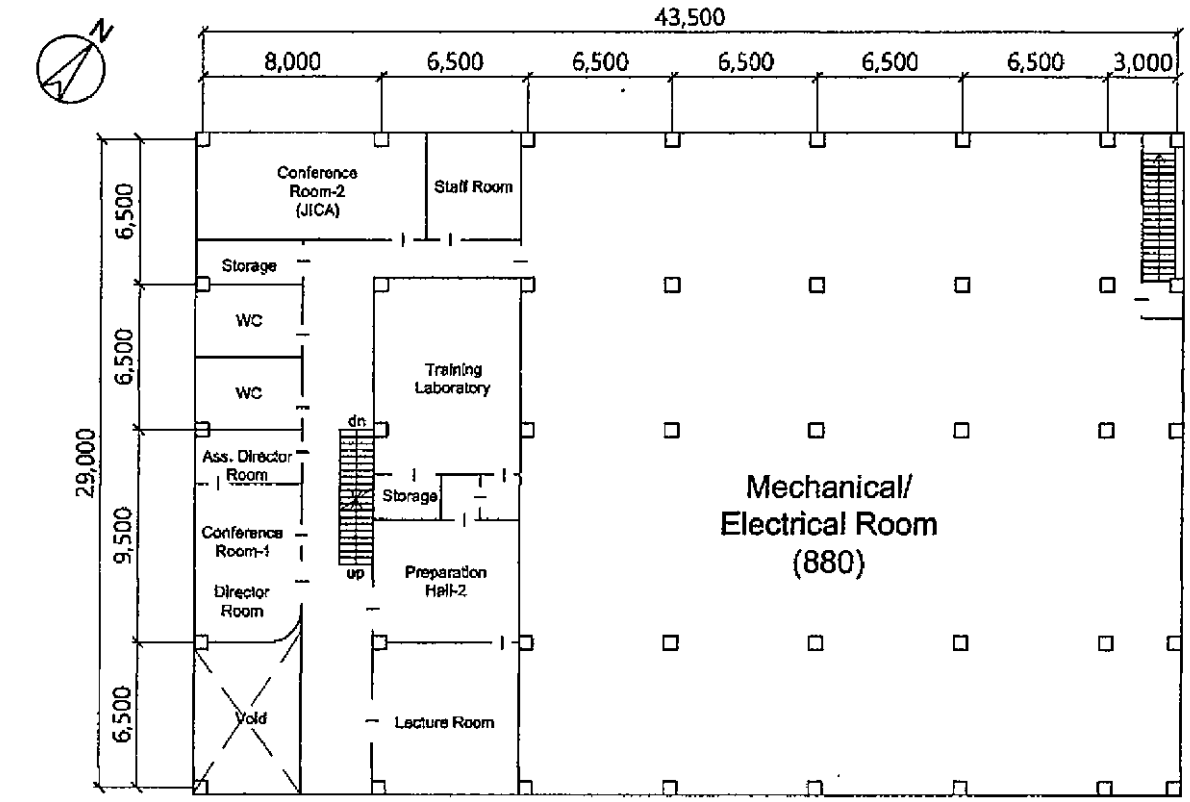

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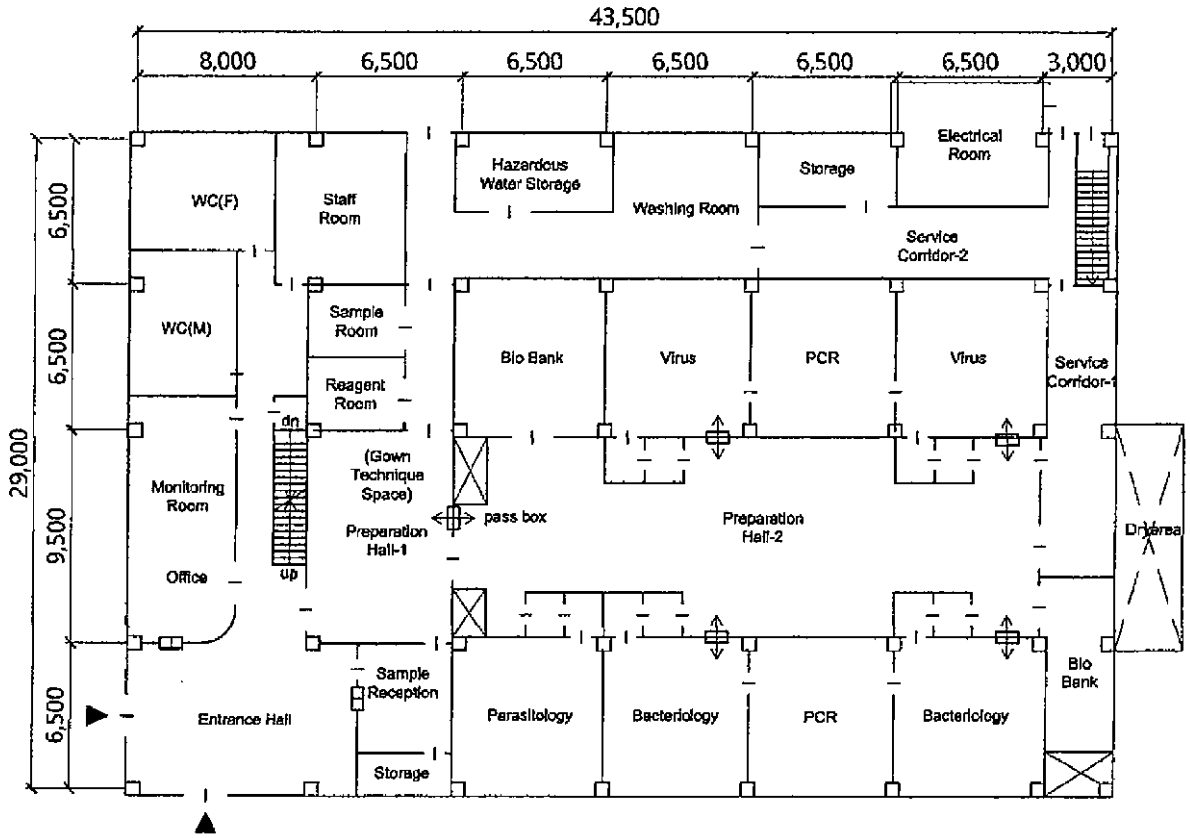

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PLAN Scale 1:300

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A-5

ATTACHMENT- 4

Equipment Plan for CPHL

No.	Equipment Name	Q'ty
Reception, sample receiving		
1	Laboratory refrigerator	1
Microbiology Laboratory		
(Reagent preparation)		
1	Biosafety cabinet	1
2	pH meter	1
3	Platform scale	1
4	Precision electronics balance	1
5	Timer	1
6	Water bath	1
7	Work bench	1
(Medium preparation)		
1	Autoclave, vertical	2
2	Microwave oven	1
3	Drying oven	2
4	Stainless shelf	2
5	Water distiller	1
(Extraction / Incubation area)		
1	Autoclave, vertical	1
2	Biosafety cabinet	1
3	Blood culture	1
4	Centrifuge, low speed	1
5	Centrifuge, high speed	1
6	CO2 Incubator	1
7	Deep freezer -80℃	1
8	Deep freezer -30℃	1
9	Dry thermo unit	1
10	Incubator	2
11	Laboratory refrigerator	1
12	Magnetic stirrer	1
13	Microscope	1
14	Microscope, Fluoroscopy	1
15	pH meter	1
16	Spectrophotometer	1
17	Timer	2
18	Work bench	2
(PCR area)		
1	Autoclave, vertical	1
2	Electrophoresis system	1
3	Gel imager	1
4	Laboratory refrigerator	1
5	PCR work station	1
6	Realtime PCR	1
7	Thermocycler	1
8	UV transilluminator	1
9	Work bench	1
Virology Laboratory		
(Reagent preparation)		
1	Biosafety cabinet	1

A-A

A-O

2	pH meter	1
3	Platform scale	1
4	Precision electronics balance	1
5	Timer	1
6	Water bath	1
7	Work bench	1
(Extraction / Incubation area)		
1	Autoclave, vertical	1
2	Biosafety cabinet	1
3	Blood culture	1
4	Centrifuge, low speed	1
5	Centrifuge, high speed	1
6	CO2 Incubator	1
7	Deep freezer -80℃	1
8	Deep freezer -30℃	1
9	Dry thermo unit	1
10	Incubator	2
11	Laboratory refrigerator	1
12	Magnetic stirrer	1
13	Microscope	1
14	Microscope, Fluoroscopy	1
15	Microwave oven	1
16	pH meter	1
17	Spectrophotometer	1
18	Timer	2
19	Work bench	2
(PCR area)		
1	Electrophoresis system	1
2	ELISA set	1
3	Gel imager	1
4	Laboratory refrigerator	1
5	PCR work station	1
6	Realtime PCR	1
7	Thermocycler	1
8	UV transilluminator	1
9	Work bench	1
Bio-bank		
1	Deep freezer -80℃	6
Training Lab.		
1	Autoclave, vertical	1
2	Biosafety cabinet	2
3	Centrifuge, high speed	1
4	Centrifuge, low speed	1
5	CO2 Incubator	1
6	Deep freezer -30℃	1
7	Dry thermo unit	1
8	Electrophoresis system	1
9	ELISA set	1
10	Gel imager	1
11	Hot plate	1
12	Incubator	2

A-0

A-A

13	Laboratory refrigerator	1
14	Magnetic stirrer	1
15	Microscope, teaching	1
16	Micrsocoep, inverted	1
17	Micrsocoep, fluorescent	1
18	Microwave oven	1
19	ph meter	2
20	Platform scale	1
21	Precision electronics balance	2
22	Real time PCR	1
23	Spectrophotometer	1
24	Thermocycler	1
25	Timer	2
26	Vortex mixer	2
27	Water bath	1
28	Work bench	2

A·A

A-5-29

13	Laboratory refrigerator	1
14	Magnetic stirrer	1
15	Microscope, teaching	1
16	Micrsocoep, inverted	1
17	Micrsocoep, fluorescent	1
18	Microwave oven	1
19	ph meter	2
20	Platform scale	1
21	Precision electronics balance	2
22	Real time PCR	1
23	Spectrophotometer	1
24	Thermocycler	1
25	Timer	2
26	Vortex mixer	2
27	Water bath	1
28	Work bench	2

A·A

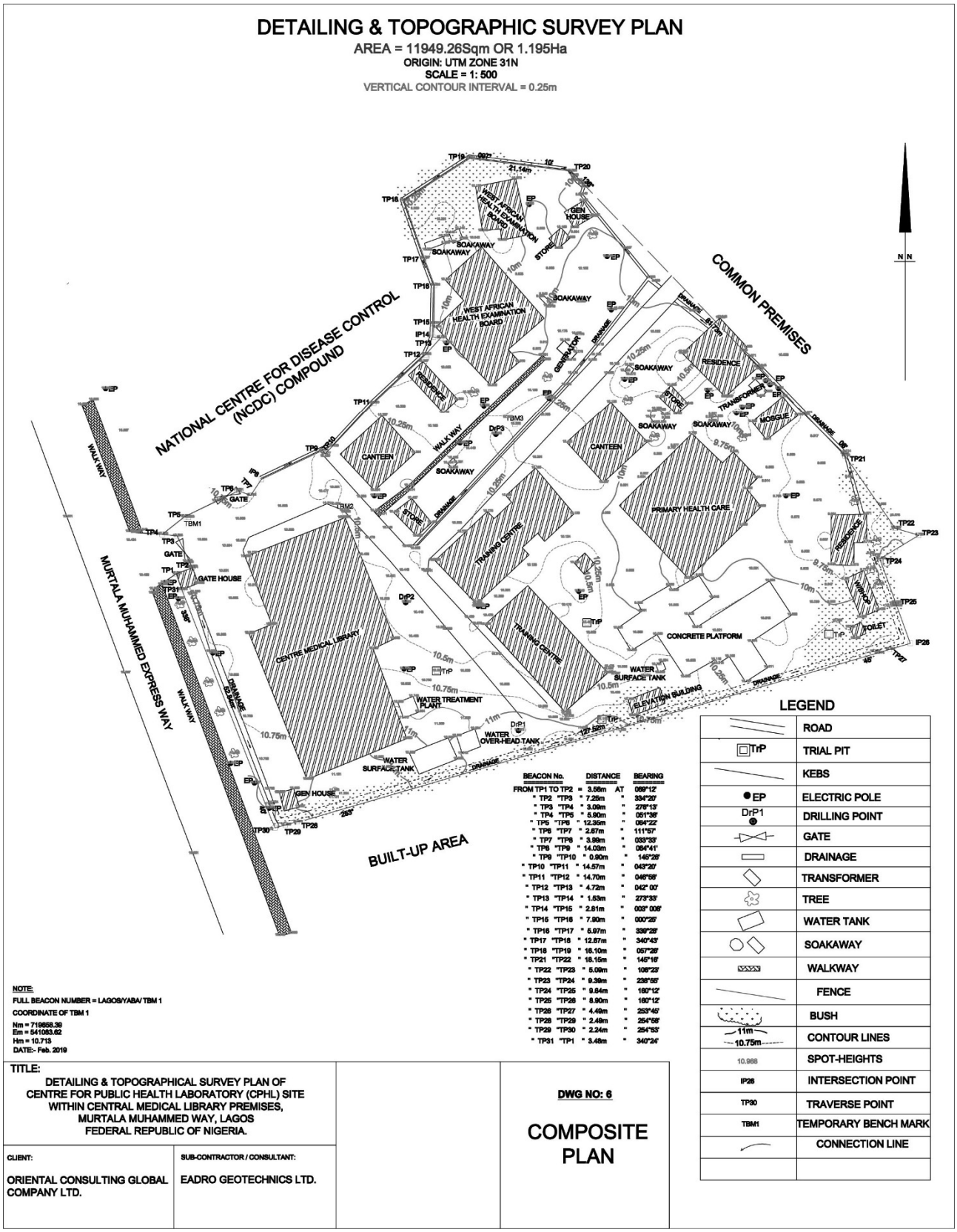
A-0

Appendix-6 List of reference documents to be collected

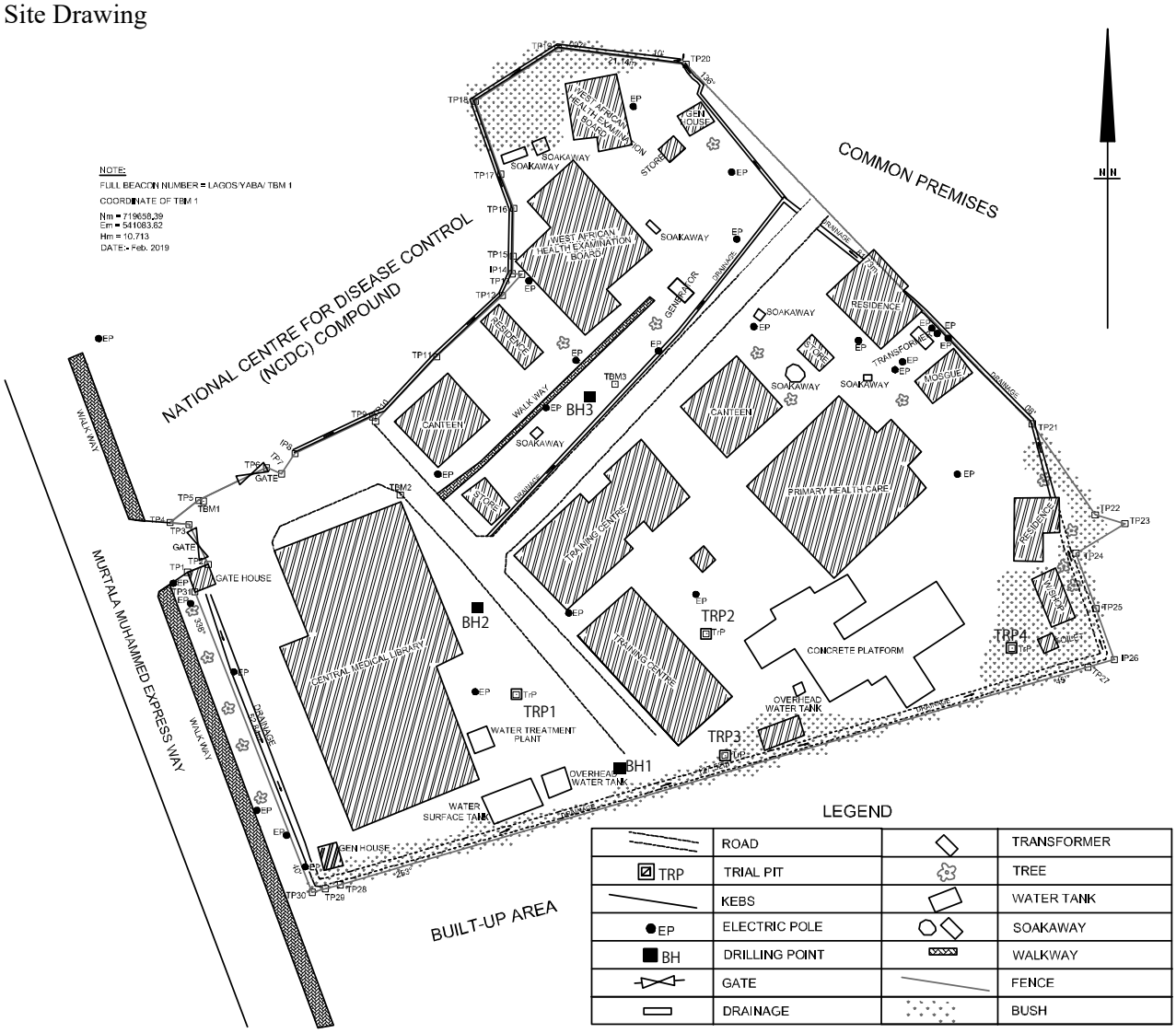
No.	Name	Publication	Form	Collection date	Genre				
					Collection Documents	Created by Experts	JICA	Text	Others
1	NCDC Laboratory network map	NCDC	Digital Media	18 December, 2018	1				
2	Nigeria_Tax-sheet20180907	JICA	Digital Media	19 December, 2018			1		1
3	National Action Plan on Health Security 2018-2022	Federal Ministry of Health	Digital Media	9 February, 2019	1				
4	Technical Guidelines for Integrated Disease Surveillance and Response in African Region, 2nd Edition	WHO, USCDC	Digital Media	26 March, 2019	1				
5	Diagnostic and treatment delay among pulmonary tuberculosis patients in Ethiopia: a cross sectional study.	BMC Infectious Diseases	Digital Media	22 April, 2019	1	1			
6	Lassa fever epidemiology in Nigeria Implications for research	NCDC	Digital Media	24 April, 2019	1				
7		JICA	Digital Media	24 May, 2019	1				
8		JICA	Digital Media	17 June, 2019			1		
9		Federal Government of Nigeria	Digital Media	25 June, 2019	1				
10	Nigeria Health Budget Analysis	Yourbudgit	Digital Media	25 June, 2019	1				
11	Ebola Health Funding in Focus Countries	Yourbudgit	Digital Media	25 June, 2019	1				
12	Nigeria's 2018 budgetary allocation for health	Health News	Digital Media	25 June, 2019					1
13	2018 approved budget details Health	Federal Government of Nigeria	Digital Media	27 June, 2019	1				
14	2019 executive budget proposal 2019 Health budget	Federal Government of Nigeria	Digital Media	27 June, 2019	1				
15	Nigeria's budget 2015~2019	Budget Office of the Federation	Digital Media	16 October, 2019	1				

Appendix-7 Other Relevant Data

Topographical Plan



Soil Investigation
Site Drawing



調査写真

Bore hole 1

Bore hole 2

Bore hole 2

Trial Pit 1

Trial Pit 2

Trial Pit 3

Trial Pit 4 Under excavation

ボーリング調査、柱状図

- BH1

Eadro Geotechnics Limited 60 PH/ABA EXPRESSWAY, OPP. AIRFORCE MKT, RUMUOMASI, PORT HARCOURT. TEL.: 0803 316 7811, 0803 3107489	CLIENT: ORIENTAL CONSULTANTS GLOBAL CONTRACTOR: EADRO GEOTECHNICS LIMITED PROJECT: CPHL LOCATION: YABA - LAGOS	**BH 1** 541151.798mE 719614.478mN	Elev. (m) 11.37 WL = 3.0m

Elevation (m)	Depth below g.l (m)	Layer thickness (m)	Strata	STRATA DESCRIPTION	SPT N-VALUE	W_n (%)	LL (%)	PL (%)	γ (kN/m^3)	C_u (kN/m^2)	ϕ (°)
					8	18.2	35.8	18.9			
				Reddish light brown, lateritic, stiff, sandy CLAY; slightly gravelly	11	17.6					
8.37	3.0	5.25			22	18.7	37.8	15.3			
						17.3			20.9	56	0
5.37	6.0	2.00		Yellowish, reddish to beige to light brown, fine to coarse grained gravelly, medium to dense SAND	38				21.1	0	35
							35.9	17.2			
2.37	9.0	4.50		Reddish, brownish to light gray, stiff, sandy Clay with brownish silts	21						
						17.9			21.3	113	0
-0.63	12.0	3.00		Yellowish, reddish to light gray, fine to coarse grained, medium to dense SAND with lenses of gravels	58		33.0	13.3			
-3.63	15.0	2.25		Brownish, whitish gray, stiff to very stiff, sandy Clay	71	14.2	34.6	16.8	20.1	0 82	38 0
-6.63	18.0	2.75		Yellowish brown, fine to coarse grained SAND, slightly silty.	60				21.3	0	40

DRILLED BY: STEPHEN	EQUIPMENT: PERCUSSION RIG	STANDARD: ISO 22475-1: 2006; BS 5930: 2015
LOGGED BY: TONYE OBA	METHOD: PERCUSSIVE (SHELL & AUGER)	EQUIPMENT INSTALLED: NIL

- BH2

Eadro Geotechnics Limited	CLIENT: ORIENTAL CONSULTANTS GLOBAL	BH 2	
60 PH/ABA EXPRESSWAY, OPP. AIRFORCE MKT, RUMUOMASI, PORT HARCOURT. TEL.: 0803 316 7811, 0803 310 7489	CONTRACTOR: EADRO GEOTECHNICS LIMITED		
	PROJECT: CPHL	541128.485mE	Elev. (m) 10.38
	LOCATION: YABA - LAGOS	719640.87mN	WL = 2.6m

Elevation (m)	Depth below g.l (m)	Layer thickness (m)	Strata	STRATA DESCRIPTION	SPT N-VALUE	W_n (%)	LL (%)	PL (%)	γ (kN/m^3)	C_u (kN/m^2)	ϕ (°)
							36.5	17.8			
				Reddish light brown, lateritic, stiff, sandy CLAY; slightly gravelly		20.3			19.8	57	0
7.38	3.0	5.25				18.1			20.3	97	
					25		32.5	16.1			
4.38	6.0	2.00		Yellowish, reddish to beige to light brown, fine to coarse grained gravelly, medium to dense SAND	63				20.3	0	36
1.38	9.0	4.50		Reddish, brownish to light gray, stiff, sandy Clay with brownish silts	30		41.7	16.3			
						18.7			19.9	116	0
-1.62	12.0				41						
		3.00		Yellowish, reddish to light gray, fine to coarse grained, medium to dense SAND with lenses of gravels	46				20.2	0	37
-4.62	15.0				44						
		2.25		Brownish, whitish gray, stiff to very stiff, sandy Clay		17.1	32.2	11.9	20.3	118	0
-7.62	18.0	2.75		Yellowish brown, fine to coarse grained SAND, slightly silty.	68				21.1	0	39

DRILLED BY: STEPHEN	EQUIPMENT: PERCUSSION RIG	STANDARD: ISO 22475-1: 2006; BS 5930: 2015
LOGGED BY: TONYE OBA	METHOD: PERCUSSIVE (SHELL & AUGER)	EQUIPMENT INSTALLED: NIL

- BH3

Eadro Geotechnics Limited 60 PH/ABA EXPRESSWAY, OPP. AIRFORCE MKT, RUMUOMASI, PORT HARCOURT. TEL.: 0803 316 7811, 0803 310 7489	CLIENT: ORIENTAL CONSULTANTS GLOBAL CONTRACTOR: EADRO GEOTECHNICS LIMITED	**BH 3**						
	PROJECT: CPHL	541147.113mE					Elev. (m)	10.34
	LOCATION: YABA - LAGOS	719675.59mN					WL =	2.4m

Elevation (m)	Depth below g.l (m)	Layer thickness (m)	Strata	STRATA DESCRIPTION	SPT N-VALUE	W_n (%)	LL (%)	PL (%)	γ (kN/m^3)	C_u (kN/m^2)	ϕ (°)
					8	18.1	31.0	13.0			
				Reddish light brown, lateritic, stiff, sandy CLAY; slightly gravelly	13	17.5					
7.34	3.0	5.50			20	17.9	35.8	15.8			
						17.2			20.5	74	0
4.34	6.0	1.75		Yellowish, reddish to beige to light brown, fine to coarse grained gravelly, medium to dense SAND	57				21.3	0	34
							44.0	21.6			
1.34	9.0	4.50		Reddish, brownish to light gray, stiff, sandy Clay with brownish silts		17.9	39.8	18.9	21.3	113	0
					25						
-1.66	12.0	3.25		Yellowish, reddish to light gray, fine to coarse grained, medium to dense SAND with lenses of gravels	40						
-4.66	15.0				43				20.6	0	37
		2.00		Brownish, whitish gray, stiff to very stiff, sandy Clay		23.5	37.8	20.1	21.1	115	0
-7.66	18.0	2.75		Yellowish brown, fine to coarse grained SAND interspersed with intercalation rings of sandy Clay	27		42.3	19.9			
					73			21.5		0	41

DRILLED BY: STEPHEN	EQUIPMENT: PERCUSSION RIG	STANDARD: ISO 22475-1: 2006; BS 5930: 2015
LOGGED BY: TONYE OBA	METHOD: PERCUSSIVE (SHELL & AUGER)	EQUIPMENT INSTALLED: NIL

フィールド透磁率試験結果

- BH1

EADRO GEOTECHNICS LIMITED

FIELD PERMEABILITY TEST RESULTS - FALLING HEAD

OPEN BOREHOLE TEST

Borehole No:	1
Depth of borehole:	20 m
Diameter of hole	0.1016 m
Water Table level	3 m

$$k = \frac{A}{fd}\frac{\log_e(H_0/H_t)}{t}$$

k= Coefficient of permeability
A = Area of borehole
f = Intake factor
H_0 = Differential head at start of test
H_t = Differential head at end of test
t = time
d= diamter of borehole

Test Observations

Time (t) minutes	Depth to water level (m)	H	H_0/H	$x = \text{Log}_e H_0/H$	x/t (10-3)
0	0	3	1.00	0.00	0
1	0.3	2.7	1.11	0.11	1.76
2	0.4	2.6	1.15	0.14	1.19
4	0.9	2.1	1.43	0.36	1.49
6	0.25	2.75	1.09	0.09	0.24
8	0.29	2.71	1.11	0.10	0.21
10	0.35	2.65	1.13	0.12	0.21
15	0.5	2.5	1.20	0.18	0.20
20	0.61	2.39	1.26	0.23	0.19
25	0.8	2.2	1.36	0.31	0.21
30	0.9	2.1	1.43	0.36	0.20
40	1.15	1.85	1.62	0.48	0.20
60	1.55	1.45	2.07	0.73	0.20
90	2	1	3.00	1.10	0.20
120	2.4	0.6	5.00	1.61	0.22
150	2.77	0.23	13.04	2.57	0.29
180	2.6	0.4	7.50	2.01	0.19
220	2.9	0.1	30.00	3.40	0.26
				Average	0.44

Coefficient of permeability, k = 1.2721E-05m/s

- BH2

EADRO GEOTECHNICS LIMITED

FIELD PERMEABILITY TEST RESULTS - FALLING HEAD

OPEN BOREHOLE TEST

Borehole No: 2
Depth of borehole: 20 m
Diameter of hole 0.1016 m
Water Table level 2.61 m

$$k = \frac{A}{fd}\frac{\log_e(H_0/H_t)}{t}$$

k= Coefficient of permeability
A = Area of borehole
f = Intake factor
H_0 = Differential head at start of test
H_t = Differential head at end of test
t = time
d= diamter of borehole

Test Observations

Time (t) minutes	Depth to water level (m)	H	H_0/H	$x = \text{Log}_e H_0/H$	x/t (10-3)
0	0	2.61	1.00	0.00	0
1	0.1	2.51	1.04	0.04	0.65
2	0.12	2.49	1.05	0.05	0.39
4	0.2	2.41	1.08	0.08	0.33
6	0.3	2.31	1.13	0.12	0.34
8	0.35	2.26	1.15	0.14	0.30
10	0.44	2.17	1.20	0.18	0.31
15	0.6	2.01	1.30	0.26	0.29
20	0.8	1.81	1.44	0.37	0.31
25	1	1.61	1.62	0.48	0.32
30	1.08	1.53	1.71	0.53	0.30
40	1.31	1.3	2.01	0.70	0.29
60	2	0.61	4.28	1.45	0.40
90	2.14	0.47	5.55	1.71	0.32
120	2.35	0.26	10.04	2.31	0.32
150	2.49	0.12	21.75	3.08	0.34
180	2.59	0.02	130.50	4.87	0.45
210	2.6	0.01	261.00	5.56	0.44
				Average	0.36

Coefficient of permeability, k = 1.0419E-05m/s

- BH3

EADRO GEOTECHNICS LIMITED

FIELD PERMEABILITY TEST RESULTS - FALLING HEAD

OPEN BOREHOLE TEST

Borehole No: 2
Depth of borehole: 20 m
Diameter of hole 0.1016 m
Water Table level 2.61 m

$$k = \frac{A}{fd}\frac{\log_e(H_0/H_t)}{t}$$

k= Coefficient of permeability
A = Area of borehole
f = Intake factor
H_0 = Differential head at start of test
H_t = Differential head at end of test
t = time
d= diamter of borehole

Test Observations

Time (t) minutes	Depth to water level (m)	H	H_0/H	x = Log_e H_0/H	x/t (10-3)
0	0	2.61	1.00	0.00	0
1	0.1	2.51	1.04	0.04	0.65
2	0.12	2.49	1.05	0.05	0.39
4	0.2	2.41	1.08	0.08	0.33
6	0.3	2.31	1.13	0.12	0.34
8	0.35	2.26	1.15	0.14	0.30
10	0.44	2.17	1.20	0.18	0.31
15	0.6	2.01	1.30	0.26	0.29
20	0.8	1.81	1.44	0.37	0.31
25	1	1.61	1.62	0.48	0.32
30	1.08	1.53	1.71	0.53	0.30
40	1.31	1.3	2.01	0.70	0.29
60	2	0.61	4.28	1.45	0.40
90	2.14	0.47	5.55	1.71	0.32
120	2.35	0.26	10.04	2.31	0.32
150	2.49	0.12	21.75	3.08	0.34
180	2.59	0.02	130.50	4.87	0.45
210	2.6	0.01	261.00	5.56	0.44
				Average	0.36

Coefficient of permeability, k = 1.0419E-05m/s

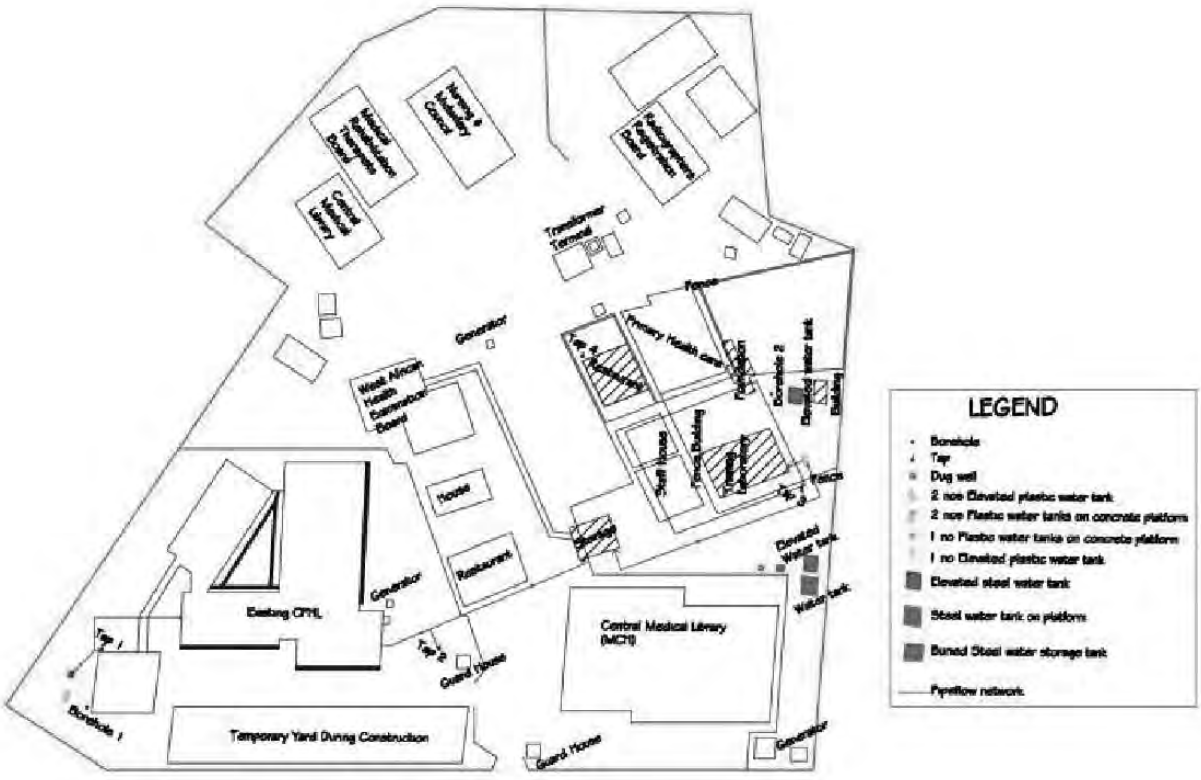
Hydrological Survey
1.CPHL

Photos

Borehole 1

Borehole 2

Site Drawing



Supply Water Sample Analysis

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: Tap 1 Date Collected: 06/02/2019

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1.	Appearance	Clear	Clear	Clear
2.	Colour	Colourless	-	Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 20° C	6.0	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
-	Conductivity (μScm^{-1})	540.0	900.0	12000
7.	Total Solids (ppm)	250.0	500.0	500
8.	Dissovled Solids (ppm)	250.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	40.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	30.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	18.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	14.0	75	200
5.	Chloride Cl^- (ppm)	14.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	3.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	1.10	5	30
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO_2 (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.01	-	0.03
14.	Iron Fe (ppm)	0.06	0.1	1.0
15.	Copper Cu (ppm)	0.03	0.005	1.5
16.	Manganese, Mn (ppm)	0.01	0.005	0.5
17.	Zinc Zn (ppm)	1.18	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.3	-	-

N. D = Not Detected

MICROBIOLOGICAL CHARACTERISTICS

	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^2

Comments: Quality of analyzed sampled water was not satisfactory based on the pH value as shown in the analytical report. Adequate treatment is recommended in order to make the water conform to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA
(Established by Decree No.100 of 1992)
Practice LicenceNO.00319
Signature.....
Date.....19-02-2019

h

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: Tap 2 — Date Collected: 06/02/2019

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1.	Appearance	Clear	Clear	Clear
2.	Colour	Colourless	-	Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 20°C	5.4	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
-	Conductivity (μScm^{-1})	430.0	900.0	12000
7.	Total Solids (ppm)	210.0	500.0	500
8.	Dissovled Solids (ppm)	210.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	50.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	30.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	16.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	12.0	75	200
5.	Chloride Cl⁻ (ppm)	12.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	2.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	0.93	5	30
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO_2 (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.01	-	0.03
14.	Iron Fe (ppm)	0.05	0.1	1.0
15.	Copper Cu (ppm)	0.02	0.005	1.5
16.	Manganese, Mn (ppm)	0.01	0.005	0.5
17.	Zinc Zn (ppm)	0.98	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.4	-	-

N. D = Not Detected

MICROBIOLOGICAL CHARACTERISTICS

	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^2

Comments: Quality of analyzed sampled water was not satisfactory based on the pH value as shown in the analytical report. Adequate treatment is recommended in order to make the water conform to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA (Established by Decree No.100 of 1992) Practice LicenceNO,00319 Signature ... Date 19-02-2019

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: Tap 3 — Date Collected: 06/02/2019

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1.	Appearance	Clear	Clear	Clear
2.	Colour	Colourless	-	Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 20°C	5.2	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
-	Conductivity (μScm^{-1})	410.0	900.0	12000
7.	Total Solids (ppm)	200.0	500.0	500
8.	Dissovled Solids (ppm)	200.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	50.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	30.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	16.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	12.0	75	200
5.	Chloride Cl⁻ (ppm)	12.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	2.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	0.86	5	30
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO_2 (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.01	-	0.03
14.	Iron Fe (ppm)	0.05	0.1	1.0
15.	Copper Cu (ppm)	0.02	0.005	1.5
16.	Manganese, Mn (ppm)	0.01	0.005	0.5
17.	Zinc Zn (ppm)	0.92	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.4	-	-

N. D = Not Detected

MICROBIOLOGICAL CHARACTERISTICS

	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^2

Comments: Quality of analyzed sampled water was not satisfactory based on the pH value as shown in the analytical report. Adequate treatment is recommended in order to make the water conform to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA (Established by Decree No.100 of 1992) Practice LicenceNO,00319 Signature ... 19-02-2019

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: Tap 4 — Date Collected: 06/02/2019.

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1.	Appearance	Clear	Clear	Clear
2.	Colour	Colourless	-	Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 20°C	5.2	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
-	Conductivity (μScm^{-1})	420.0	900.0	12000
7.	Total Solids (ppm)	210.0	500.0	500
8.	Dissovled Solids (ppm)	210.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	50.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	30.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	16.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	12.0	75	200
5.	Chloride Cl⁻ (ppm)	12.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	2.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	0.90	5	30
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO_2 (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.01	-	0.03
14.	Iron Fe (ppm)	0.05	0.1	1.0
15.	Copper Cu (ppm)	0.02	0.005	1.5
16.	Manganese, Mn (ppm)	0.01	0.005	0.5
17.	Zinc Zn (ppm)	0.97	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.3	-	-

N. D = Not Detected

MICROBIOLOGICAL CHARACTERISTICS

	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^2

Comments: Quality of analyzed sampled water was not satisfactory based on the pH value as shown in the analytical report. Adequate treatment is recommended in order to make the water conform to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA (Established by Decree No.100 of 1992) Practice LicenceNO,00319 Signature ... 19-02-2019

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: Chemistry Laboratory — Date Collected: 06/02/2019.

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1.	Appearance	Clear	Clear	Clear
2.	Colour	Colourless	-	Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 20°C	5.5	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
-	Conductivity (μScm^{-1})	720.0	900.0	12000
7.	Total Solids (ppm)	350.0	500.0	500
8.	Dissovled Solids (ppm)	350.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	50.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	30.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	20.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	16.0	75	200
5.	Chloride Cl⁻ (ppm)	14.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	4.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	1.20	5	30
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO_2 (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.02	-	0.03
14.	Iron Fe (ppm)	0.07	0.1	1.0
15.	Copper Cu (ppm)	0.03	0.005	1.5
16.	Manganese, Mn (ppm)	0.01	0.005	0.5
17.	Zinc Zn (ppm)	1.26	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.4	-	-

N. D = Not Detected

MICROBIOLOGICAL CHARACTERISTICS

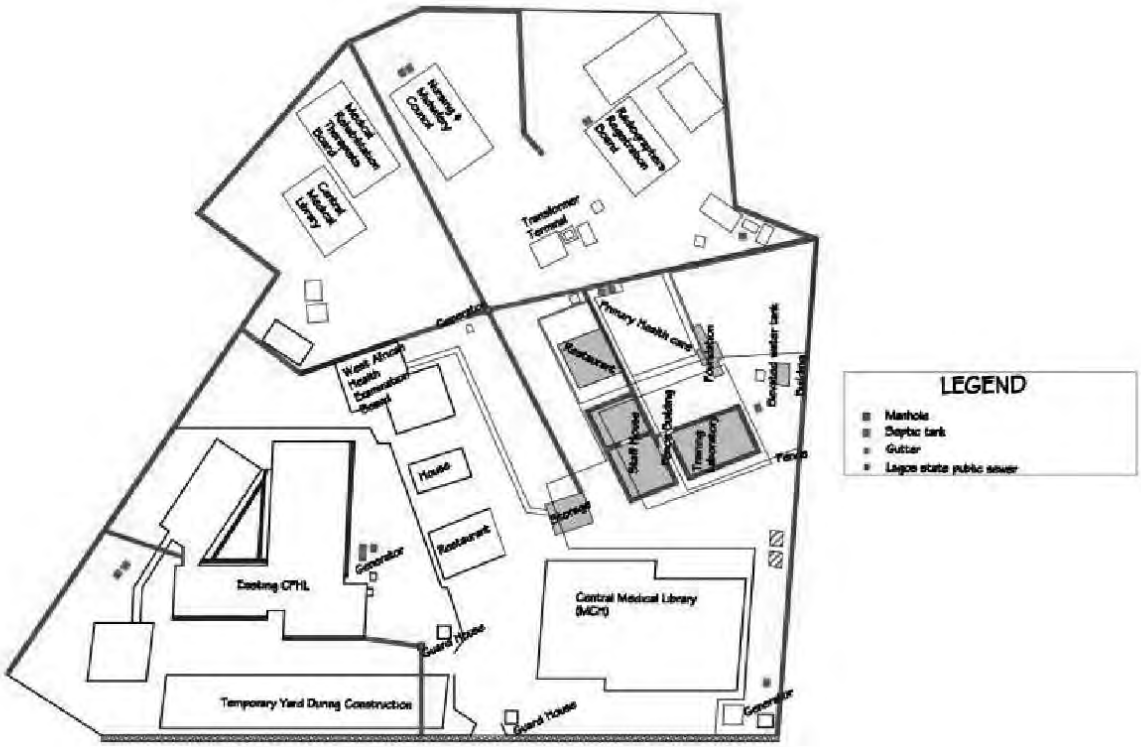
	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^2

Comments: Quality of analyzed sampled water was not satisfactory based on the pH value as shown in the analytical report. Adequate treatment is recommended in order to make the water conform to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA (Established by Decree No.100 of 1992) Practice LicenceNO,00319 Signature ... 19-02-2019

Drainage flow



Drainage Water Sample Analysis

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant
Institute of Public Analysts of Nigeria (IPAN), Decree 106, 1992

Sample Identity: Sewage Water **Sampling Date:** 06 / 02 / 2019

Brief Description of Sample: Faint yellowish with an objectionable odour

I hereby certify that we have analyzed the above described sample in the condition submitted to us and state hereunder our findings together with comments.

PHYSICO CHEMICAL CHARACTERISTICS			
S/N	Parameter	Level Detected	FMEnv Effluent Limit
1.	pH	7.4	6.0 – 9.0
2.	Conductivity (μScm^{-1})	1230.0	NS
3.	Turbidity (FTU)	16.0	NS
4.	Appearance	Not Clear	NS
5.	Odour	Objectionable	NS
6.	Total Solids	630.0	600
7.	Total Dissolved Solids, TDS (mg/l)	610.0	2000
8.	Total Suspended Solids , TSS (mg/l)	20.0	30
9.	Chloride Cl^- (mg/l)	280.0	300
10.	Nitrate, NO_3^- (mg/l)	2.21	2000
11.	Phosphate, PO_4^{3-} (mg/l)	0.02	5
12.	Sulphate, SO_4^{2-} (mg/l)	7.9	5
13.	Ammonium Nitrogen (mg/l)	ND	500
14.	Sulphide, S^{2-} (mg/l)	ND	NS
15.	Cyanide, CN^- (mg/l)	ND	NS
16.	Phenol (mg/l)	ND	0.2
17.	Oil and Grease, O & G (mg/l)	ND	0.2
18.	Total Hydrocarbon Content, THC (mg/l)	ND	10
19.	Detergents (mg/l)	7.62	NS
20.	Dissolved Oxygen, D O (mg/l)	5.2	NS
21.	BOD_5^{20} (mg/l)	15.0	10
22.	COD (mg/l)	20.0	15
23.	Barium, Ba (mg/l)	ND	NS
24.	Cadmium, Cd (mg/l)	ND	NS
25.	Copper, Cu (mg/l)	0.09	NS
26.	Iron, Fe (mg/l)	0.25	NS
27.	Manganese, Mn (mg/l)	0.03	NS
28.	Nickel, Ni (mg/l)	ND	NS
29.	Lead, Pb (mg/l)	ND	NS
30.	Vanadium, V (mg/l)	ND	NS
31.	Zinc, Zn (mg/l)	2.28	NS
32.	Alkalinity (mg/l)	40.0	NS

MICROBIOLOGICAL CHARACTERISTICS			
S/N	Organism	Count (Cfu/ml)	Limit (Cfu/ml)
1.	Coliform (CFU/ml)	Nil	Nil
2.	Escherichia Coli (CFU/ml)	1.1×10^1	Nil
3.	Faecal Coliform	1.2×10^1	Nil
4.	Total Counts	5.4×10^2	1.0×10^3

Comments: The treated effluent sample quality is not satisfactory based on the odour, sulphate, BOD_5^{20}, COD and presence of Escherichia coli and faecal coliform. Adequate treatment is recommended.

Analyst:

NS = Not Specified, ND = Not Detected

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA
(Established by Decree No.100 of 1992)
Practice Licence No.00319
Signature
Date 19 Dec 2019

Supply Water Sample Analysis

2.ISTH

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FACULTY OF ENGINEERING
OFFICE OF THE HEAD, DEPARTMENT OF CIVIL ENGINEERING

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INDEPENDENCE LAYOUT
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Phone: (042) 451253 Ext. 42

Date:
21st February, 2019

ANALYSIS RESULTS

SAMPLE DESCRIPTION: VIROLOGY IRRUA LAB.
ANALYSIS REQUIRED: CHARACTERISATION OF BOREHOLE WATER

PARAMETERS	UNIT	WHO STANDARD (Maximum permissible)	VIROLOGY IRRUA LAB.
ACIDITY	mg/L	-	25
ALKALINITY	mg/L	100	25
pH	-	6.50-9.50	7.0
HARDNESS	mg/L	500	34
CHLORIDE	mg/L	250	35.5
COD	mg/L	-	228
TEMPERATURE	°C	-	31.6
CONDUCTIVITY	µs/Cm	1200 (µs/cm^{-1})	127.2
TURBIDITY	NTU	5.ONTU	200
LEAD	mg/L		NIL
COPPER	mg/L	1.5	NIL
IRON	mg/L	3	NIL
PHSOPHORUS	mg/L	-	0.1374
MAGNESIUM/ CALCIUM	mg/L	20	10.09
SULPHATE	mg/L	500	NIL
T.S.S.	mg/L	-	450
T.D.S	mg/L	-	360
DO	mg/L	-	1.18
NITRATE	mg/L	50	NIL
TS	mg/L	1500	81

The value of total solid and turbidity of the water taken from VIROLOGY IRRUA LAB. are higher than the specified values of WHO, NAFDAC and SON standards for drinking water. Other values were within the ranges specified by WHO, NAFDAC and SON Standards. This means that the water needs treatment to make it suitable for us.

22/02/2019
Engr. ANIAGO V. A.
For: Head of Department
Department of Civil Engineering, ESUT

ENUGU STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY
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Phone: (042) 451253 Ext. 42.

Date:
21st February, 2019

ANALYSIS RESULTS

SAMPLE DESCRIPTION: WATER TREATMENT PLANT IRRUA
ANALYSIS REQUIRED: CHARACTERISATION OF BOREHOLE WATER

PARAMETERS	UNIT	WHO STANDARD (Maximum permissible)	WATER TREATMENT PLANT IRRUA.
ACIDITY	mg/L	-	25
ALKALINITY	mg/L	100	25
pH	-	6.50-9.50	6.7
HARDNESS	mg/L	500	NIL
CHLORIDE	mg/L	250	56.8
COD	mg/L	-	222.4
TEMPERATURE	°C	-	30.3
CONDUCTIVITY	µs/Cm	1200 (µs/cm^{-1})	20.1
TURBIDITY	NTU	5.ONTU	5.0
LEAD	mg/L		NIL
COPPER	mg/L	1.5	NIL
IRON	mg/L	3	NIL
PHSOPHORUS	mg/L	-	0.0634
MAGNESIUM/CALCIUM	mg/L	20	4.037
SULPHATE	mg/L	500	NIL
T.S.S.	mg/L	-	11.0
T.D.S	mg/L	-	200
DO	mg/L	-	1.38
NITRATE	mg/L	50	NIL
TS	mg/L	1500	211

The result of the water sample taken from bore hole at PLANT, IRRUA were within the ranges specified by WHO, NAFDAC and SON Standards for drinking water. I therefore recommend it for drinking.

Engr. ANIAGO V. A. 22/02/2019
For: Head of Department
Department of Civil Engineering, ESUT.

3.UBTH

ENUGU STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY
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Date: 21st February, 2019

ANALYSIS RESULTS

SAMPLE DESCRIPTION: MICROBIOLOGY LAB UBTH BENIN
ANALYSIS REQUIRED: CHARACTERISATION OF BOREHOLE WATER

PARAMETERS	UNIT	WHO STANDARD (Maximum Permissible)	MICROBIOLOGY LAB UBTH BENIN
ACIDITY	mg/L	-	25
ALKALINITY	mg/L	100	25
pH	-	6.50 – 9.50	6.7
HARDNESS	mg/L	500	NIL
CHLORIDE	mg/L	250	85.2
COD	mg/L	-	211.2
TEMPERATURE	°C	-	31.6
CONDUCTIVITY	µs/Cm	1200 (µs/cm-1)	33.8
TURBIDITY	NTU	5.0 NTU	3.5
LEAD	mg/L		NIL
COPPER	mg/L	1.5	NIL
IRON	mg/L	3	NIL
PHOSPHORUS	mg/L	-	0.2176
MAGNESIUM/CALCIUM	mg/L	20	4.0337
SULPHATE	mg/L	500	NIL
T.S.S.	mg/L	-	7.7
T.D.S	mg/L	-	120
DO	mg/L	-	1.18
NITRATE	mg/L	50	NIL
TS	mg/L	1500	127

The result of the water sample taken from bore hole at UBTH, Benin were within the ranges specified by WHO, NAFDAC and SON Standards for drinking water. I therefore recommend it for drinking.

Engr. ANIAGO V.A. 22/02/2019
For: Head of Department
Department of Civil Engineering, ESUT

ENUGU STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY
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Date:
21st February, 2019

ANALYSIS RESULTS

SAMPLE DESCRIPTION: **WATER : UBTH BENIN.**
ANALYSIS REQUIRED: CHARACTERISATION OF BOREHOLE WATER

PARAMETERS	UNIT	WHO STANDARD (Maximum permissible)	WATER DRAINAGE UBTH BENIN.
ACIDITY	mg/L	-	25
ALKALINITY	mg/L	100	25
pH	-	6.50-9.50	6.8
HARDNESS	mg/L	500	NIL
CHLORIDE	mg/L	250	49.7
COD	mg/L	-	204
TEMPERATURE	°C	-	33.6
CONDUCTIVITY	µs/Cm	1200 (µs/cm^{-1})	34.7
TURBIDITY	NTU	5.ONTU	4.0
LEAD	mg/L		NIL
COPPER	mg/L	1.5	NIL
IRON	mg/L	3	NIL
PHSOPHORUS	mg/L	-	0.0617
MAGNESIUM/ CALCIUM	mg/L	20	6.056
SULPHATE	mg/L	500	NIL
T.S.S.	mg/L	-	9.0
T.D.S	mg/L	-	100
DO	mg/L	-	1.47
NITRATE	mg/L	50	NIL
TS	mg/L	1500	109

The result of the water sample taken from bore hole at UBTH, Benin were within the ranges specified by WHO, NAFDAC and SON Standards for drinking water. I therefore recommend it for drinking.

Engr. ANIAGO V. A. 22/02/2019
For: Head of Department
Department of Civil Engineering, ESUT.

4.UCH

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: Distribution Tank – UCH, Ibadan Date Collected: 06/02/2019

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1.	Appearance	Clear	Clear	Clear
2.	Colour	Colourless		Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 20°C	7.7	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
	Conductivity (μScm^{-1})	1020.0	900.0	12000
7.	Total Solids (ppm)	510.0	500.0	500
8.	Dissolved Solids (ppm)	510.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	30.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	50.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	60.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	44.0	75	200
5.	Chloride Cl (ppm)	20.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	6.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	2.15	5	30
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO_2 (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.02	-	0.03
14.	Iron Fe (ppm)	0.11	0.1	1.0
15.	Copper Cu (ppm)	0.07	0.005	1.5
16.	Manganese, Mn (ppm)	0.02	0.005	0.5
17.	Zinc Zn (ppm)	2.20	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.2	-	-

N. D = Not Detected

MICROBIOLOGICAL CHARACTERISTICS

	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^2

Comments: Quality of analyzed sampled water was found to be unsatisfactory as level of dissolved solids in the sampled water did not conform to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA
(Established by Decree No.100 of 1992)
Practice LicenceNO.00319
Signature
19-02-2019

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: Microbiology Laboratory – UCH, Ibadan Date Collected: 06/02/2019

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1.	Appearance	Clear	Clear	Clear
2.	Colour	Colourless	-	Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 20°C	7.6	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
	Conductivity (μScm^{-1})	880.0	900.0	12000
7.	Total Solids (ppm)	440.0	500.0	500
8.	Dissolved Solids (ppm)	440.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	30.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	50.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	50.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	40.0	75	200
5.	Chloride Cl (ppm)	18.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	5.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	1.84	5	30
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO_2 (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.01	-	0.03
14.	Iron Fe (ppm)	0.09	0.1	1.0
15.	Copper Cu (ppm)	0.06	0.005	1.5
16.	Manganese, Mn (ppm)	0.02	0.005	0.5
17.	Zinc Zn (ppm)	1.89	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.1	-	-

N. D = Not Detected

MICROBIOLOGICAL CHARACTERISTICS

	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^2

Comments: Analyzed sampled water was found to be satisfactory as shown in the analytical report as analyzed parameters conformed to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA
(Established by Decree No.100 of 1992)
Practice LicenceNO.00319
Signature
19-02-2019

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: Water Treatment Plant – UCH, Ibadan Date Collected: 06/02/2019

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1	Appearance	Clear	Clear	Clear
2.	Colour	Colourless	-	Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 20°C	7.4	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
	Conductivity (μScm^{-1})	860.0	900.0	12000
7.	Total Solids (ppm)	420.0	500.0	500
8.	Dissolved Solids (ppm)	420.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	30.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	49.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	50.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	40.0	75	200
5.	Chloride Cl (ppm)	18.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	5.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	1.81	5	30
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO_2 (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.02	-	0.03
14.	Iron Fe (ppm)	0.09	0.1	1.0
15.	Copper Cu (ppm)	0.06	0.005	1.5
16.	Manganese, Mn (ppm)	0.02	0.005	0.5
17.	Zinc Zn (ppm)	0.86	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.0	-	-

N. D = Not Detected

MICROBIOLOGICAL CHARACTERISTICS

	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^2

Comments: Quality of analyzed sampled water was found to be unsatisfactory as sampled water had an unobjectionable odour. Adequate treatment is recommended to ensure water conform to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA
(Established by Decree No.100 of 1992)
Practice LicenceNO.00319
Signature
19-02-2019

5.UNTH

ENUGU STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY
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P.M.B. 01660, ENUGU, NIGERIA
Phone: (042) 451253 Ext. 42

Date: 21st February, 2019

ANALYSIS RESULTS

SAMPLE DESCRIPTION: **UNTH, ENUGU**

ANALYSIS REQUIRED: CHARACTERISATION OF BOREHOLE WATER

PARAMETERS	UNIT	WHO STANDARD (Maximum permissible)	UNTH ENUGU
ACIDITY	mg/L	-	25
ALKALINITY	mg/L	100	25
pH	-	6.50-9.50	7.0
HARDNESS	mg/L	500	10
CHLORIDE	mg/L	250	28.4
COD	mg/L	-	200
TEMPERATURE	°C	-	32.0
CONDUCTIVITY	µs/Cm	1200 (µs/cm^{-1})	60
TURBIDITY	NTU	5.ONTU	3.0
LEAD	mg/L		NIL
COPPER	mg/L	1.5	NIL
IRON	mg/L	3	NIL
PHSOPHORUS	mg/L	-	0.2120
MAGNESIUM/ CALCIUM	mg/L	20	6.056
SULPHATE	mg/L	500	NIL
T.S.S.	mg/L	-	6.6
T.D.S	mg/L	-	260
DO	mg/L	-	1.97
NITRATE	mg/L	50	NIL
TS	mg/L	1500	266.6

The result of the water sample taken from bore hole at UNTH, Enugu were within the ranges specified by WHO, NAFDAC and SON Standards for drinking water. I therefore recommend it for drinking.

Engr. ANIAGO V. A. 22/02/2019
For: Head of Department
Department of Civil Engineering, ESUT.

6.NHA

FEDERAL CAPITAL TERRITORY WATER BOARD

No 7/9 Orlu Street, Area 3
P.M.B. 164, Garki- Abuja
07044384003
07040157007
07040157059
07040157011
E-mail:admin@fctwb.com
www.fctwb.com

FCT/630/1233

Date: 20th February, 2019

WATER ANALYSIS REPORT

WATER SAMPLE FROM: MICROBIOLOGY LAB NATIONAL HOSPITAL ABUJA.
SAMPLE COLLECTED BY: CLIENT.
SAMPLE ANALYSED BY: SCIENTIFIC OFFICERS.
DATE ARRIVED AT LAB: 18-02-2019 DATE CONCLUDED: 20- 02 – 2019

PHYSICAL ANALYSIS	RESULT	WHO STD	BACTERIOLOGICAL ANALYSIS	RESULT	WHO STD
TEMPERATURE °C	27.6	30	MPN /100 ML	<2.2	0
TURBIDITY (NTU)	1.73	5.0	COLIFORMS	-VE	-VE
APPEARANCE	Clear	Clear	E.Coli	-VE	-VE
ODOUR	U.O*	U.O*			
COND. (µS/cm)	23.4	1250			
TASTE	U.O*	U.O*			
PH	7.0	6.5-8.5			
CHEMICAL ANALYSIS					
T.D.S (mg/l)	14.25	1500			
DISSOLVED OXYGEN (mg/l)	4.52	****			
R. CHLORINE(mg/l)	*****	0.2			
T. HARDNESS (mg/l)	36	200			
T. ALKALINITY (mg/l)	40	200			
CHLORIDE ION(mg/l)	18.46	250			
SALINITY (g/l)	0.3	200			
NITRATE-N_2(mg/l)	0.8	50			
NITRITE-N_2 (mg/l)	0.005	0.5			
PHOSPHATE(mg/l)	0.09	6.5			
IRON(mg/l)	0.04	0.3			
MANGANESE(mg/l)	0.2	0.4			
SULPHATE(mg/l)	0	400			

REMARKS
- All parameters analysed conformed to World Health Organisation (WHO) guideline

OKOBI, O.Y (MRS)
HOD (QC)
FOR: GM

WHO = World Health Organization. STD. = Standard,
T =Total, T.D.S =Total Dissolved Solids. O*= Objectionable. U.O*= Unobjectionable. R = Residual.
-VE = Negative. +VE= Positive. R = Residual. **** = No Result. COND. = Conductivity. N_2 = Nitrogen

FEDERAL CAPITAL TERRITORY WATER BOARD

No 7/9 Orlu Street, Area 3
P.M.B. 164, Garki- Abuja
07044384003
07040157007
07040157059
07040157011
E-mail:admin@fctwb.com
www.fctwb.com

FCT/630/1234

Date: 20th February, 2019

WATER ANALYSIS REPORT

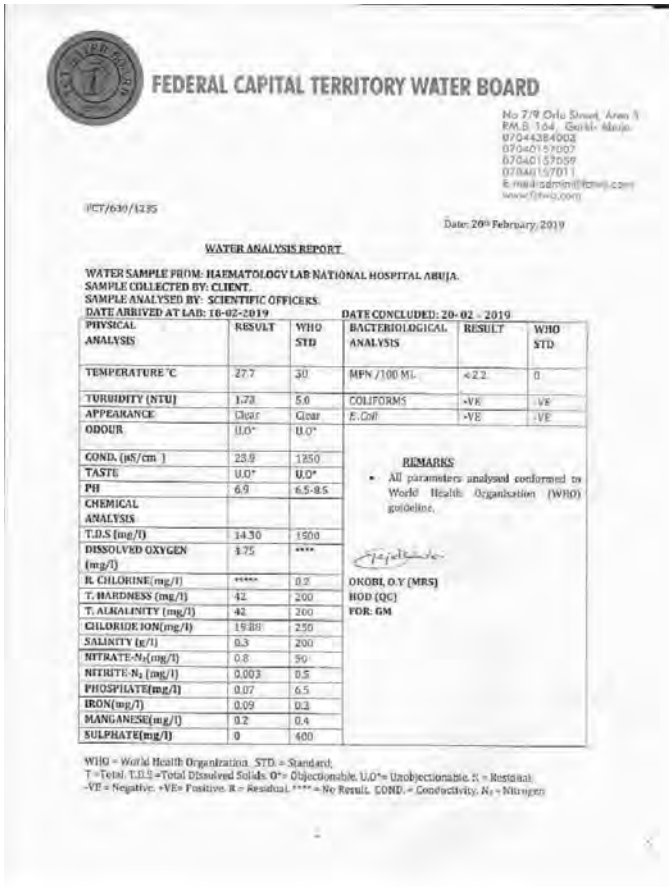
WATER SAMPLE FROM: HISTOPATHOLOGY LAB NATIONAL HOSPITAL ABUJA.
SAMPLE COLLECTED BY: CLIENT.
SAMPLE ANALYSED BY: SCIENTIFIC OFFICERS.
DATE ARRIVED AT LAB: 18-02-2019 DATE CONCLUDED: 20- 02 – 2019

PHYSICAL ANALYSIS	RESULT	WHO STD	BACTERIOLOGICAL ANALYSIS	RESULT	WHO STD
TEMPERATURE °C	27.5	30	MPN /100 ML	<2.2	0
TURBIDITY (NTU)	0.91	5.0	COLIFORMS	-VE	-VE
APPEARANCE	Clear	Clear	E.Coli	-VE	-VE
ODOUR	U.O*	U.O*			
COND. (µS/cm)	21.6	1250			
TASTE	U.O*	U.O*			
PH	7.0	6.5-8.5			
CHEMICAL ANALYSIS					
T.D.S (mg/l)	12.98	1500			
DISSOLVED OXYGEN (mg/l)	4.78	****			
R. CHLORINE(mg/l)	*****	0.2			
T. HARDNESS (mg/l)	32	200			
T. ALKALINITY (mg/l)	42	200			
CHLORIDE ION(mg/l)	18.46	250			
SALINITY (g/l)	0.3	200			
NITRATE-N_2(mg/l)	0.9	50			
NITRITE-N_2 (mg/l)	0.003	0.5			
PHOSPHATE(mg/l)	0.06	6.5			
IRON(mg/l)	0.03	0.3			
MANGANESE(mg/l)	0.2	0.4			
SULPHATE(mg/l)	0	400			

REMARKS
- All parameters analysed conformed to World Health Organisation (WHO) guideline

OKOBI, O.Y (MRS)
HOD (QC)
FOR: GM

WHO = World Health Organisation. STD. = Standard,
T =Total, T.D.S =Total Dissolved Solids. O*= Objectionable. U.O*= Unobjectionable. R = Residual.
-VE = Negative. +VE= Positive. R = Residual. **** = No Result. COND. = Conductivity. N_2 = Nitrogen



FEDERAL CAPITAL TERRITORY WATER BOARD

No 7/9 Orlu Street, Area 1
P.M.B. 164, Garki- Abuja.
07044384003
07040157007
07040157059
07040157011
E-mail:admin@fctwb.com
www.fctwb.com

FCT/630/1285

Date: 26th February, 2019

WATER ANALYSIS REPORT

WATER SAMPLE FROM: HAEMATOLOGY LAB NATIONAL HOSPITAL ABUJA.
SAMPLE COLLECTED BY: CLIENT.
SAMPLE ANALYSED BY: SCIENTIFIC OFFICERS.
DATE ARRIVED AT LAB: 18-02-2019 DATE CONCLUDED: 20-02 - 2019

PHYSICAL ANALYSIS	RESULT	WHO STD
TEMPERATURE °C	27.7	30
TURBIDITY (NTU)	1.78	5.0
APPEARANCE	Clear	Clear
ODOUR	U.O*	U.O*
COND. (µS/cm)	23.9	1250
TASTE	U.O*	U.O*
PH	6.9	6.5-8.5
CHEMICAL ANALYSIS		
T.D.S (mg/l)	14.30	1500
DISSOLVED OXYGEN (mg/l)	4.75	****
R. CHLORINE(mg/l)	*****	0.2
T. HARDNESS (mg/l)	42	200
T. ALKALINITY (mg/l)	42	200
CHLORIDE ION(mg/l)	19.80	250
SALINITY (g/l)	0.3	200
NITRATE-N_2(mg/l)	0.8	50
NITRITE-N_2 (mg/l)	0.003	0.5
PHOSPHATE(mg/l)	0.07	6.5
IRON(mg/l)	0.09	0.3
MANGANESE(mg/l)	0.2	0.4
SULPHATE(mg/l)	0	400

BACTERIOLOGICAL ANALYSIS	RESULT	WHO STD
MPN /100 ML	<2.2	0
COLIFORMS	-VE	-VE
E.Coli	-VE	-VE

REMARKS

- All parameters analysed conformed to World Health Organisation (WHO) guideline.

OKOBI, O.Y (MRS)
HOD (QC)
FOR: GM

WHO = World Health Organization. STD. = Standard,
T =Total, T.D.S =Total Dissolved Solids. O*= Objectionable, U.O*= Unobjectionable, R. = Residual,
-VE = Negative, +VE= Positive, R.= Residual, **** = No Result, COND. = Conductivity, N_2 = Nitrogen

7.LUTH

BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: Washing Station - LUTH Date Collected: 06/02/2019

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1.	Appearance	Clear	Clear	Clear
2.	Colour	Colourless	-	Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 28° C	5.3	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
6.	Conductivity (uScm $^{-1}$)	750.0	900.0	12000
7.	Total Solids (ppm)	370.0	500.0	500
8.	Dissolved Solids (ppm)	370.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	50.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	30.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	22.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	18.0	75	200
5.	Chloride Cl (ppm)	16.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	5.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	1.25	5	50
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.02	-	0.03
14.	Iron Fe (ppm)	0.08	0.1	1.0
15.	Copper Cu (ppm)	0.04	0.005	1.5
16.	Manganese, Mn (ppm)	0.02	0.005	0.5
17.	Zinc Zn (ppm)	1.32	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.3	-	-

N. D = Not Detected

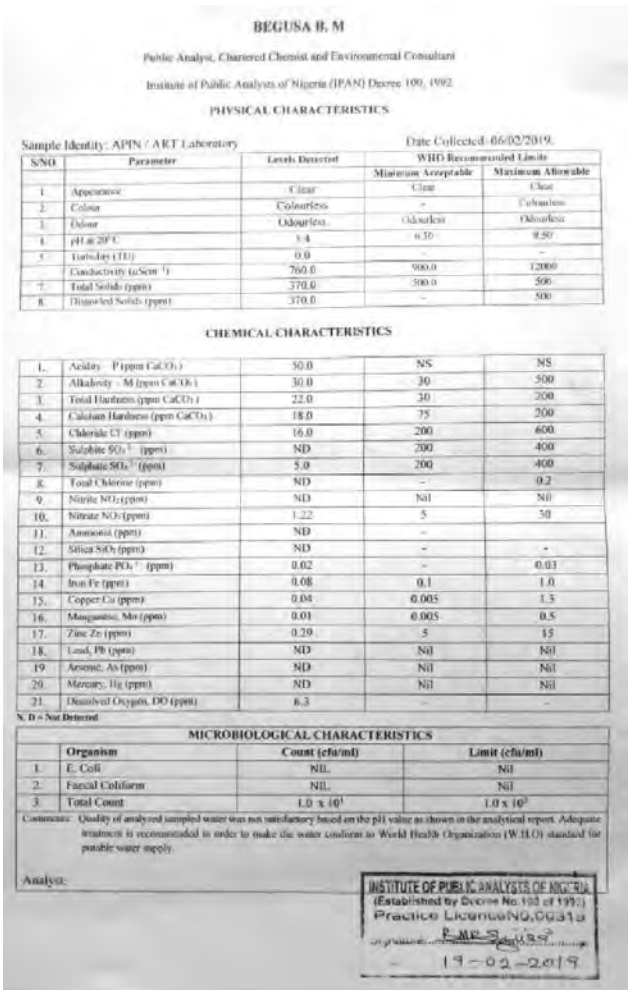
MICROBIOLOGICAL CHARACTERISTICS

	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^3

Comments: Quality of analysed sampled water was not satisfactory based on the pH value as shown in the analytical report. Adequate treatment is recommended in order to make the water conform to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA
(Established by Decree No.100 of 1992)
Practice LicenceNO,0031a
Signature
19-02-2019



BEGUSA B. M

Public Analyst, Chartered Chemist and Environmental Consultant

Institute of Public Analysts of Nigeria (IPAN) Decree 100, 1992

PHYSICAL CHARACTERISTICS

Sample Identity: APIN / ART Laboratory Date Collected: 06/02/2019.

S/NO	Parameter	Levels Detected	WHO Recommended Limits	
			Minimum Acceptable	Maximum Allowable
1.	Appearance	Clear	Clear	Clear
2.	Colour	Colourless	-	Colourless
3.	Odour	Odourless	Odourless	Odourless
4.	pH at 28° C	5.4	6.50	8.50
5.	Turbidity (TU)	0.0	-	-
6.	Conductivity (uScm $^{-1}$)	760.0	900.0	12000
7.	Total Solids (ppm)	370.0	500.0	500
8.	Dissolved Solids (ppm)	370.0	-	500

CHEMICAL CHARACTERISTICS

1.	Acidity – P (ppm $CaCO_3$)	50.0	NS	NS
2.	Alkalinity – M (ppm $CaCO_3$)	30.0	30	500
3.	Total Hardness (ppm $CaCO_3$)	22.0	30	200
4.	Calcium Hardness (ppm $CaCO_3$)	18.0	75	200
5.	Chloride Cl (ppm)	16.0	200	600
6.	Sulphite SO_3^{2-} (ppm)	ND	200	400
7.	Sulphate SO_4^{2-} (ppm)	5.0	200	400
8.	Total Chlorine (ppm)	ND	-	0.2
9.	Nitrite NO_2 (ppm)	ND	Nil	Nil
10.	Nitrate NO_3 (ppm)	1.22	5	50
11.	Ammonia (ppm)	ND	-	
12.	Silica SiO (ppm)	ND	-	-
13.	Phosphate PO_4^{3-} (ppm)	0.02	-	0.03
14.	Iron Fe (ppm)	0.08	0.1	1.0
15.	Copper Cu (ppm)	0.04	0.005	1.5
16.	Manganese, Mn (ppm)	0.01	0.005	0.5
17.	Zinc Zn (ppm)	0.29	5	15
18.	Lead, Pb (ppm)	ND	Nil	Nil
19	Arsenic, As (ppm)	ND	Nil	Nil
20.	Mercury, Hg (ppm)	ND	Nil	Nil
21.	Dissolved Oxygen, DO (ppm)	6.3	-	-

N. D = Not Detected

MICROBIOLOGICAL CHARACTERISTICS

	Organism	Count (cfu/ml)	Limit (cfu/ml)
1.	E. Coli	NIL	Nil
2.	Faecal Coliform	NIL	Nil
3.	Total Count	1.0×10^1	1.0×10^3

Comments: Quality of analysed sampled water was not satisfactory based on the pH value as shown in the analytical report. Adequate treatment is recommended in order to make the water conform to World Health Organization (W.H.O) standard for potable water supply.

Analyst:

INSTITUTE OF PUBLIC ANALYSTS OF NIGERIA
(Established by Decree No. 100 of 1992)
Practice LicenceNO,0031a
Signature
19-02-2019

8.UITH

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
FACULTY OF ENGINEERING
UNIVERSITY OF LAGOS
LAGOS, NIGERIA
Email.: kaiyesimoju@unilag.edu.ng
THE UNIVERSITY OF 1ST CHOICE & THE NATION'S PRIDE
Tel: +234 802 344 9255

WATER QUALITY ANALYTICAL REPORT.

Sample Name: LIGHTYEAR ENGINEERING CO. LTD.

Location: Microbiology Laboratory, University of Ilorin Teaching Hospital

I the undersigned **Registered PUBLIC ANALYST (No: 00602),** do hereby certify that the sample as described above was submitted to our Lab; for analysis. The said sample while in the same condition as received was analyzed and findings are as stated hereunder.

A	PHYSICAL CHARACTERISTICS		
S/No.	Parameters	Results	WHO Limits
1.	Appearance	Clear	Clear
2.	Colour	Colourless	Colourless
3.	Odour	Odourless	Odourless
4.	pH @ 25°C [no unit]	6.5	6.50 – 8.50
5.	Turbidity [FTU]	1.0	5.0
6.	Conductivity [μScm^{-1}]	250.0	1,200
7.	Total Dissolve Solids [ppm]	183.0	500
8.	Total Solids [ppm]	183.0	1,500
9.	Salinity [ppm]	120.0	1,000
B	CHEMICAL CHARACTERISTICS		
1.	Alkalinity – M (ppm $CaCO_3$)	72.0	500
2.	Acidity – P (ppm $CaCO_3$) -	48.0	500
3.	Total Hardness (ppm $CaCO_3$)	52.0	200
4.	Calcium Hardness (ppm $CaCO_3$)	40.0	75
5.	Chloride, Cl^- (ppm)	108.0	250
6.	Sulphate, SO_4^{2-} (ppm)	2.05	200
7.	Nitrite, NO_2^- (ppm)	ND	0.0
8.	Nitrate, NO_3^- (ppm)	0.021	30
9.	Phosphate, PO_4^{3-} (ppm)	ND	0.03
10.	Manganese, Mn (ppm)	0.252	0.5
11.	Iron, Fe^{2+} (ppm)	0.061	0.3
12.	Residual Chlorine (ppm)	ND	0.2
13.	Dissolved Oxygen (DO)	4.62	---
C.	MICROBIOLOGICAL EXAMINATION		
	Organisms	Counts	WHO LIMITS.
1.	Total faecal Coliform (cfu/ml)	0.00	0.00
2.	E. Coli. (cfu/ml)	0.00	0.00
3.	Total Bacteria Count (cfu/ml)	10.0×10^1	1.0×10^2

ND = Not Detected

REMARKS

Water Sample Quality Satisfy the World Health Organization standards on Potable Water Supply.

However, it should be treated to reduce the microbial load and enhance its quality.

Orebiyi Kazeem
[MIPAN]
Analyst – In – Charge.
Registered Public Analyst No: 00602.

29 MAR 2019

HEAD OF DEPARTMENT: PROFESSOR K. O. AIYESIMOJU B.Sc. (Lagos), M.S. Ph.D. (Berkeley), F.E.

Electrical Power Supply Survey
1.CPHL

Photos

Existing Feeder pillar

Existing Transformer 1*300KVA、11／0.415KV

Existing Generator 3Units、
2Units（1*27KVA, 415V、1*20KVA, 415V）Available

Logged data

S/N	Date	Time	Power Status	Remarks
1	20/1/2019	0100-0159	OFF	LOAD S
2		0200-0959	ON	SUPPLY
3		1000-2259	OFF	LOAD S
4		2300-2459	ON	SUPPLY
5	21/1/2019	0100-0759	ON	SUPPLY
6		0800-1059	OFF	LOAD S
7		1100-1559	ON	SUPPLY
8		1600-2359	OFF	LOAD S

S/N	Date	Time	Power Status	Remarks
9		2400-2459	ON	SUPPLY
10	22/1/2019	0100-0659	ON	SUPPLY
11		0700-1059	OFF	LOAD S
12		1100-1959	ON	SUPPLY
13		2000-2159	OFF	LOAD S
14		2200-2459	ON	SUPPLY
15	23/1/2019	0100-0959	ON	SUPPLY
16		1000-1459	OFF	LOAD S

S/N	Date	Time	Power Status	Remarks
17		1500-1959	ON	SUPPLY
18		2000-2459	OFF	LOAD S
19	24/1/2019	0100-0659	ON	SUPPLY
20		0700-1059	OFF	LOAD S
21		1100-1459	ON	SUPPLY
22		1500-1959	OFF	LOAD S
23		2000-2059	ON	SUPPLY
24		2100-2459	OFF	LOAD S
25	25/1/2019	0100-0459	OFF	LOAD S
26		0500-0659	ON	SUPPLY
27		0700-2459	OFF	LOAD S
28	26/1/2019	0100-0659	ON	SUPPLY
29		0700-0959	OFF	LOAD S
30		1000-1159	ON	SUPPLY
31		1200-1959	OFF	LOAD S
32		2000-2459	ON	SUPPLY
33	27/1/2019	0100-0659	ON	SUPPLY
34		0700-0959	OFF	LOAD S

S/N	Date	Time	Power Status	Remarks
35		1000-1359	ON	SUPPLY
36		1400-2459	OFF	LOAD S
37	28/1/2019	0100-1259	OFF	LOAD S
38		1300-1759	ON	SUPPLY
39		1800-2459	OFF	LOAD S
40	29/1/2019	0100-0459	OFF	LOAD S
41		0500-1059	ON	SUPPLY
42		1100-1559	OFF	LOAD S
43		1600-1959	ON	SUPPLY
44		2000-2359	OFF	LOAD S
45		2400-2459	ON	SUPPLY
46	30/1/2019	0100-0959	ON	SUPPLY
47		1000-1959	OFF	LOAD S
48		2000-2459	ON	SUPPLY
49	31/1/2019	0100-0759	ON	SUPPLY
50		0800-1659	OFF	LOAD S
51		1700-1959	ON	SUPPLY
52		2000-2459	OFF	LOAD S

2.ISTH

Existing Transformer
1*2.5MVA 33/11kv

Existing Feeder pillar

Existing Generator
1Unit 1*500KVA

Commercial supply is less than 10 hours/day, unstable.

3.UBTH

Existing Transformer
7.5MVA 33/11kv

Existing Transformer
2*500KVA 11/0.415KV

Existing Generator
1Unit 1*500KVA

Commercial supply is about 17 hours/day, stable.

4.UCH

Existing Transformer
2*7.5MVA 33/11kv

Existing Generator for the laboratory 1*275KVA

Commercial supply is stable.

5.UNTH

Existing Transformer
7.5MVA 33/11kv

Existing Transformer
2*500KVA 11/0.415KV

Existing Generator
1Unit1*500KVA

Commercial supply is about 17 hours/day, stable.

6.NHA

There are some Existing Transformers, Gear switches and Transformers in NHA

Existing Generator
1Unit, total output is 6MW

Commercial supply is about 20 hours/day, electricity is stable and reliable.

7.LUTH

Existing connector switch
7.5MVA 33/11kv

Existing 100AMP Change Over Panel

There is an independent electrical plant in LUTH, and electricity is stable and reliable.

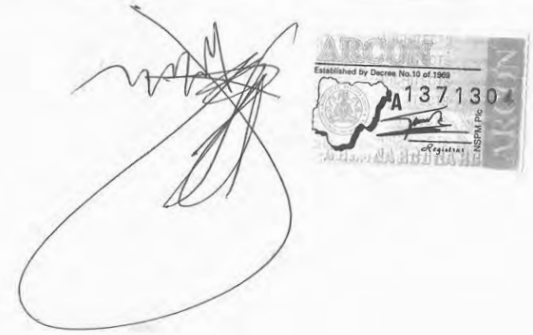
8.UITH

Existing Transformer
2*500KVA, 33/0.415KV

Existing Generator for the laboratory
1*2.5KVA, 220/240V

Existing invertor battery

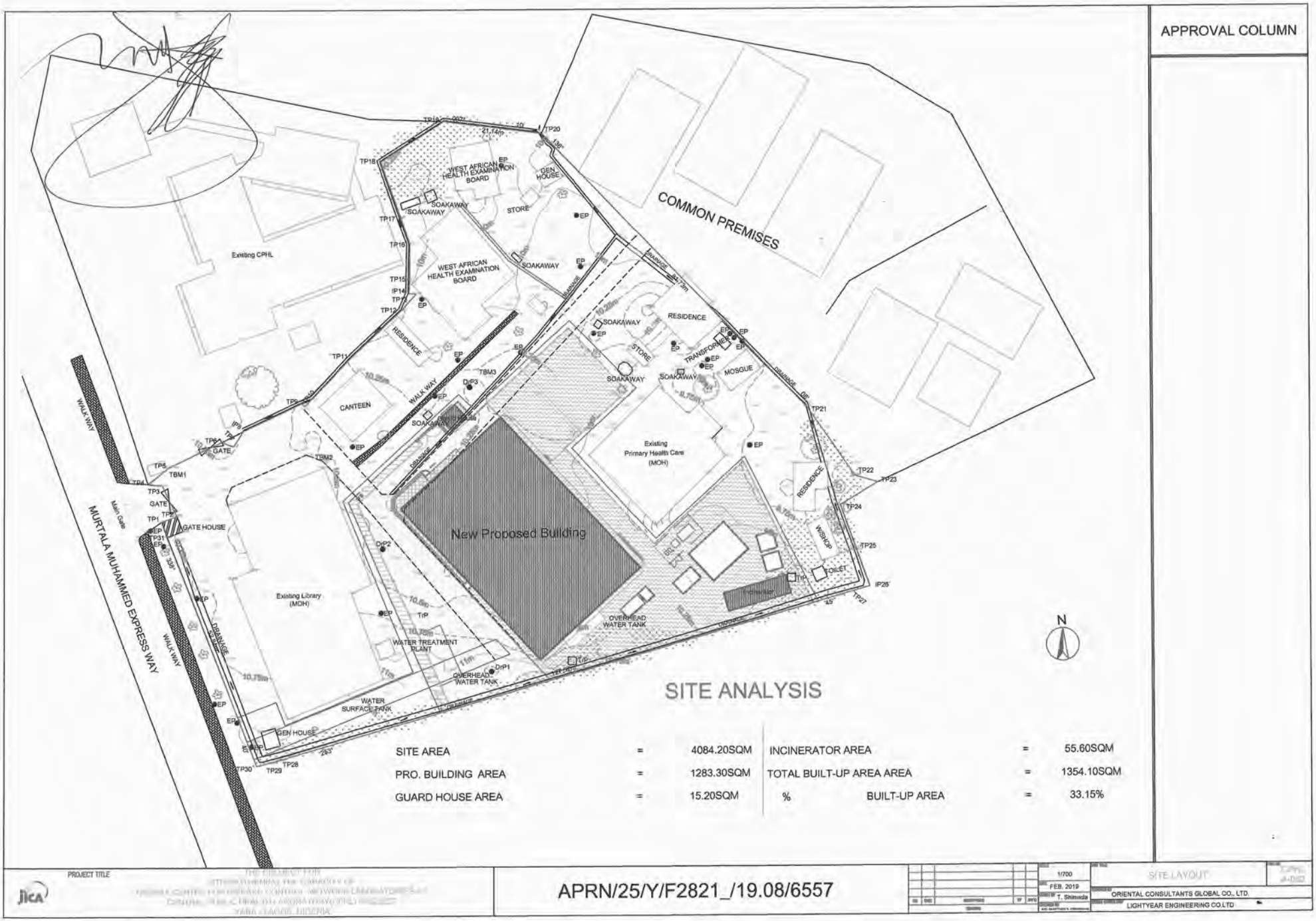
Commercial supply is unstable and unreliable.

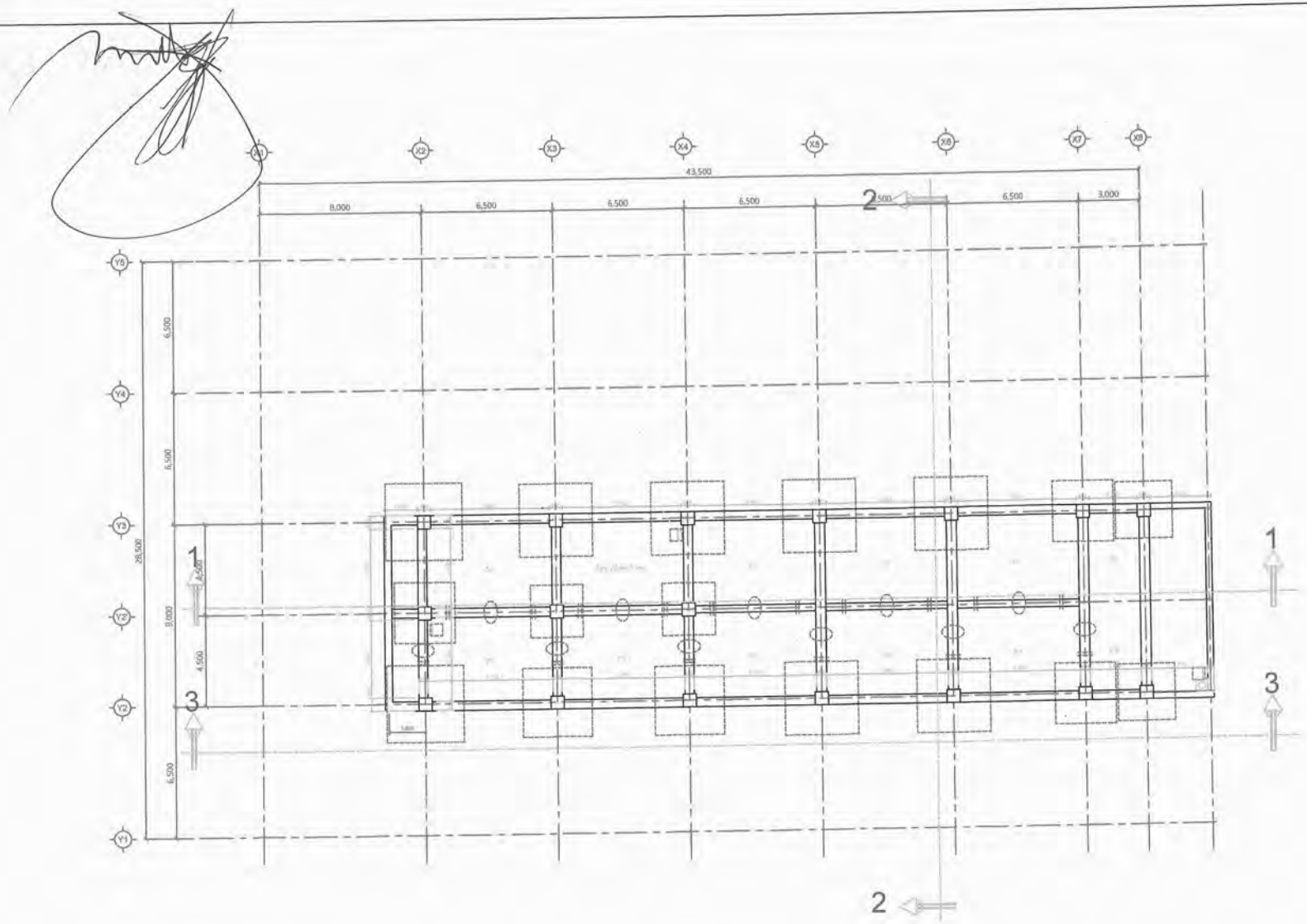


APRN/25/Y/F2821_/19.08/6557

THE PROJECT FOR STRENGTHENING THE CAPACITY OF NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES AT CENTRAL PUBLIC HEALTH LABORATORY(CPHL) PROJECT YABA - LAGOS, NIGERIA

FEBRUARY, 2019


APPROVAL COLUMN
COMMON PREMISES
Existing CPHL
WEST AFRICAN HEALTH EXAMINATION BOARD
GEN HOUSE
STORE
SOAKAWAY
RESIDENCE
TRANSFORMER
MOSQUE
CANTEEN
WALK WAY
Existing Primary Health Care (MOH)
New Proposed Building
WORKSHOP
TOILET
INCINERATOR
OVERHEAD WATER TANK
WATER TREATMENT PLANT
WATER SURFACE TANK
Existing Library (MOH)
GATE HOUSE
GATE
MURTALA MUHAMMED EXPRESS WAY
Main Gate
DRAINAGE
N
SITE ANALYSIS
SITE AREA = 4084.20SQM
PRO. BUILDING AREA = 1283.30SQM
GUARD HOUSE AREA = 15.20SQM
INCINERATOR AREA = 55.60SQM
TOTAL BUILT-UP AREA AREA = 1354.10SQM
% BUILT-UP AREA = 33.15%
PROJECT TITLE
APRN/25/Y/F2821_/19.08/6557
1/700
FEB. 2019
T. Shimuta
SITE LAYOUT
ORIENTAL CONSULTANTS GLOBAL CO., LTD.
LIGHTYEAR ENGINEERING CO.LTD



APPROVAL COLUMN

Legend

PROJECT TITLE

THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES AT
CENTRAL PUBLIC HEALTH LABORATORY(CPHL) PROJECT
YABA - LAGOS, NIGERIA

APRN/25/Y/F2821_/19.08/6557

SCALE	1/200
DATE	FEB. 2019
DRAWN BY	T. Shimada
CHECKED BY	B.IDENGA(mnia)

1ST FLOOR PLAN

DRAWING NO. CPHL A-003

DESIGNED BY ORIENTAL CONSULTANTS GLOBAL CO., LTD.

DRAWN CHECKED BY LIGHTYEAR ENGINEERING CO.LTD

STRUCTURAL NOTES

GENERAL STRUCTURAL NOTES

STRUCTURE

1. THIS STRUCTURE IS SAFELY DESIGNED TO BS 8110
   NO ALTERATION SHOULD BE MADE WITHOUT CONSULTING THE DESIGN ENGINEER
2. DURING CONSTRUCTION, THE STRAP BEAM BETWEEN THE FOOTINGS SHOULD NOT BEAR AGAINST THE SOIL, HENCE THE GROUND DIRECTLY UNDER THE BEAM SHOULD BE LOOSENED AND LEFT UNCOMPACTED
3. CONCRETE FLOOR TO BE 150mm
   THICK SMOOTH FINISH CAST ON PLACED HARDCORE
   25mm BED OF SHARP SAND
4. AGGREGATES SHALL BE GRANITE OF 19mm MAX SIZE
5. BARS SHALL BE CLEANSED OF ALL RUST BEFORE PLACEMENT
6. LAP TO BARS SHALL BE MINIMUM OF 500mm IN FOOTINGS AND 750mm IN COLUMNS
7. ENGINEER IS NOT RESPONSIBLE FOR BUILDING NOT SUPERVISED BY HIM
8. READ DRAWINGS ALONGSIDE ARCHITECTURAL AND OTHER RELEVANT WORKING DRAWINGS

CONCRETE

1. CONCRETE STRENGTH MUST ACHIEVE A MINIMUM ULTIMATE STRENGTH AT 28 DAYS AS LISTED BELOW:
   FOOTINGS: – 20N/mm²(1:2:4–20mm AGGREGATES)
   SLABS ON GRADE: – 20N/mm²(1:2:4–12mm AGGREGATES)
   COLUMNS AND BEAMS: – 25N/mm²(1:2:3–12mm AGGREGATES)
   SUSPENDED SLAB: – 20N/mm² (1:2:4–12mm AGGREGATES)
2. CONCRETE SLUMP FOR STANDARD CONCRETE SHALL BE HELD AT 75mm +25mm

REINFORCING STEEL

1. ALL REINFORCING BARS SHALL BE HIGH YIELD DEFORMED BARS OF 410N/mm²
2. STIRRUPS AND TIES SHALL BE SMOOTH BARS OF 250N/mm² MILD STEEL
3. CONCRETE COVER FOR REBARS IN CONCRETE:
   50mm FOR ALL SUBSTRUCTURAL WORKS
   30mm FOR COLUMNS AND BEAMS ABOVE THE GROUND
   50mm FOR REBARS INSIDE BLOCKWALLS INCLUDING WALL THICKNESS
4. LAP LENGTHS FOR ALL BARS SHALL BE 50 TIMES THE BAR DIAMETER

CMU BLOCKS

1. ALL STRUCTURAL CMU BLOCKS TO BE CEMENT SAND RATIO 1:9 (3.5N/mm²) BEDDED IN CEMENT MORTAR 1:5 (7N/mm²)

WOOD

1. ALL STRUCTURAL WOOD IN ROOF MEMBERS SHOULD BE WELL SEASONED HARDWOOD (EKHIMI OR DANTA):
   STRENGTH IN BENDING – 17.5N/mm²
   STRENGTH IN TENSION – 10.5N/mm²
   STRENGTH IN COMPRESSION – 16.5N/mm²

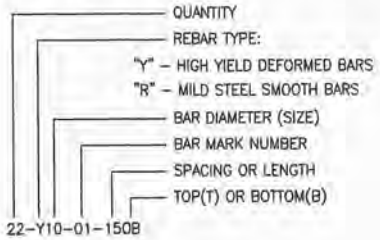
STEEL

1. ALL STRUCTURAL STEEL MEMBERS SHOULD BE OF GRADE 43 STEEL

ABBREVIATIONS

FFL	– FINISH FLOOR LEVEL
FL	– FLOOR LEVEL
GL	– GROUND LEVEL
GFL	– GROUND FLOOR LEVEL
RSL	– ROOF SLAB LEVEL
PHR	– PENTHOUSE ROOF
MR	– MEZZANINE ROOF
CONC	– CONCRETE
RC	– REINFORCED CONCRETE
CMU	– CONCRETE MASONRY UNITS
ARB	– ADDITIONAL REINFORCED BAR
HOR.	– HORIZONTAL
DIRG.	– DIAGONAL
VERT.	– VERTICAL
FG	– FOUNDATION GIRDER
FB	– FOUNDATION BEAM
F	– FOUNDATION FOOTING
FS	– FLOOR SLAB
W	– WALL
RW	– RETAINING WALL
CB	– CONCRETE BLOCK WALL
G	– GIRDER
B	– BEAM
C	– COLUMN
CS	– CANTILEVER SLAB
DFS	– DIRT FLOOR SLAB
P	– PILLAR
CG	– CANTILEVER GIRDER
MID	– MIDDLE
DN	– DOWN
EPS	– ELECTRICAL PIPE SPACE

BAR NOTATIONS

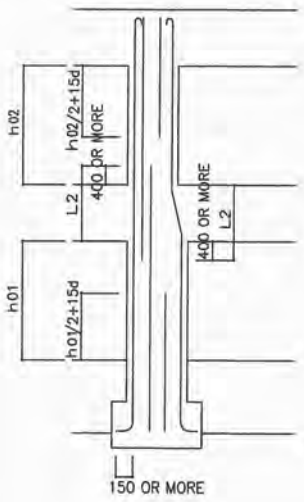


DRAWING INDEX

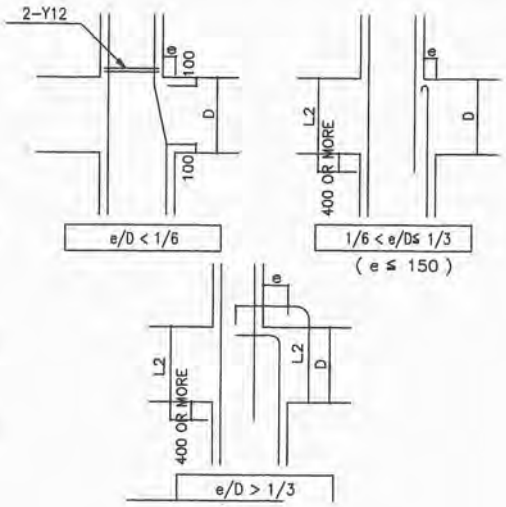
A-7-26

PROJECT TITLE: THE PROJECT FOR STRENGTHENING THE CAPACITY OF NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES IN THE FEDERAL REPUBLIC OF NIGERIA	PROPOSED CENTRE FOR DISEASE CONTROL CENTRAL PUBLIC HEALTH LABORATORY / CPHL YABA,LAGOS,NIGERIA		MARCH 2018 / ORIENTAL CONSULTANTS GLOBAL CO., LTD.

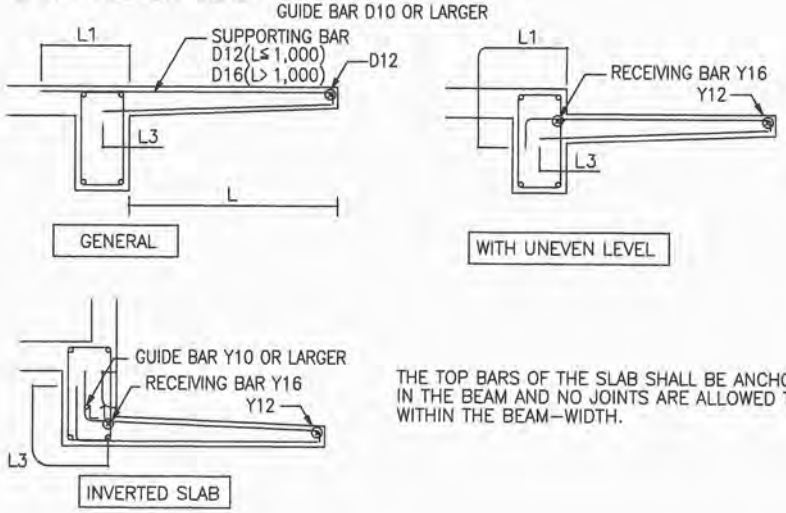
1-1 ANCHORAGE



1-2 CONNECTION OF DEFERENT COLUMN SIZE

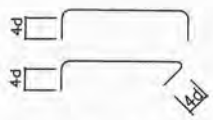


2 CANTILEVER SLAB



THE TOP BARS OF THE SLAB SHALL BE ANCHORED IN THE BEAM AND NO JOINTS ARE ALLOWED TO BE WITHIN THE BEAM-WIDTH.

3 TIE BARS

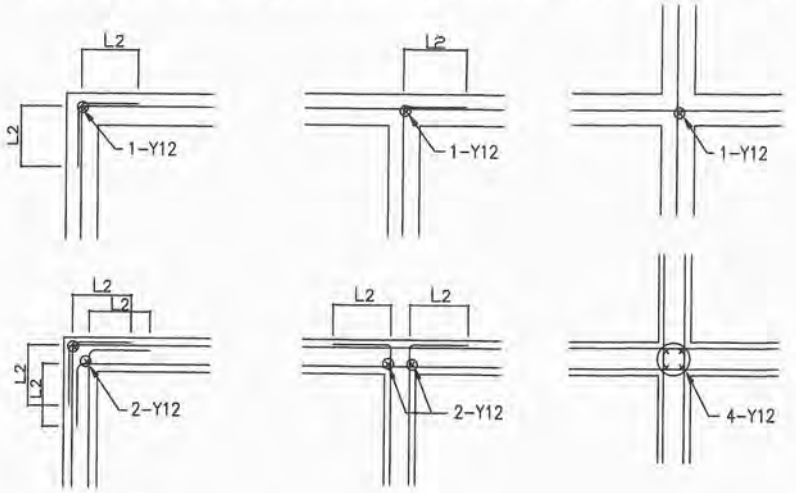


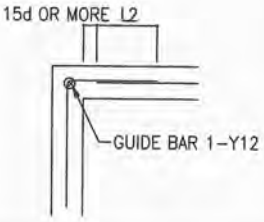
(1) TIE BARS ALLOCATION DISTANCE SHALL BE SMALLER THAN 1,000mm.

(2) WHEN THE WEB BAR IS IN 2 STEPS OR MORE, TIE BARS SHALL NOT BE PLACED IN THE SAME LOCATIONS, BUT ARRANGED IN STAGGERED POSITIONS.

3) RECEIVING BARS OF 2 STEPS ARRANGEMENT

4 ANCHORAGE TO WALL (WHEN TRANSVERSE BARS ARE TO BE ANCHORED TO WALL)





ANCHORAGE AT CORNERS SHALL CONFORM TO THE METHOD AS SHOWN IN THE FIG. ABOVE FOR BOTH THE SINGLE AND DOUBLE BAR ARRANGEMENT.

A-1-27

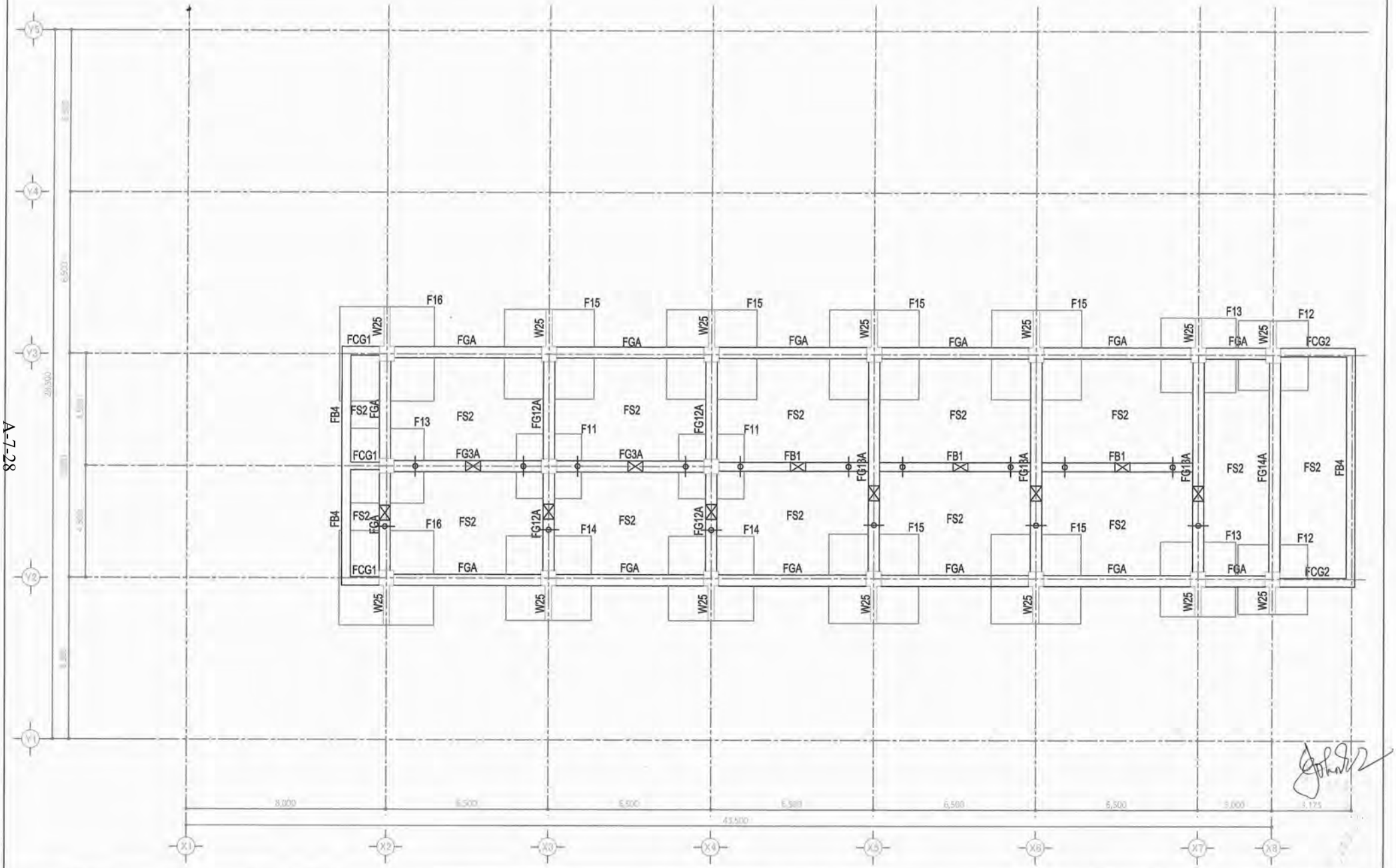
PROJECT TITLE
THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA

PROPOSED CENTRE FOR DISEASE CONTROL
CENTRAL PUBLIC HEALTH LABORATORY (CPHL)
YABA-LAGOS,NIGERIA

MARCH 2019

MISCELLANEOUS DETAILS

ORIENTAL CONSULTANTS GLOBAL CO., LTD.



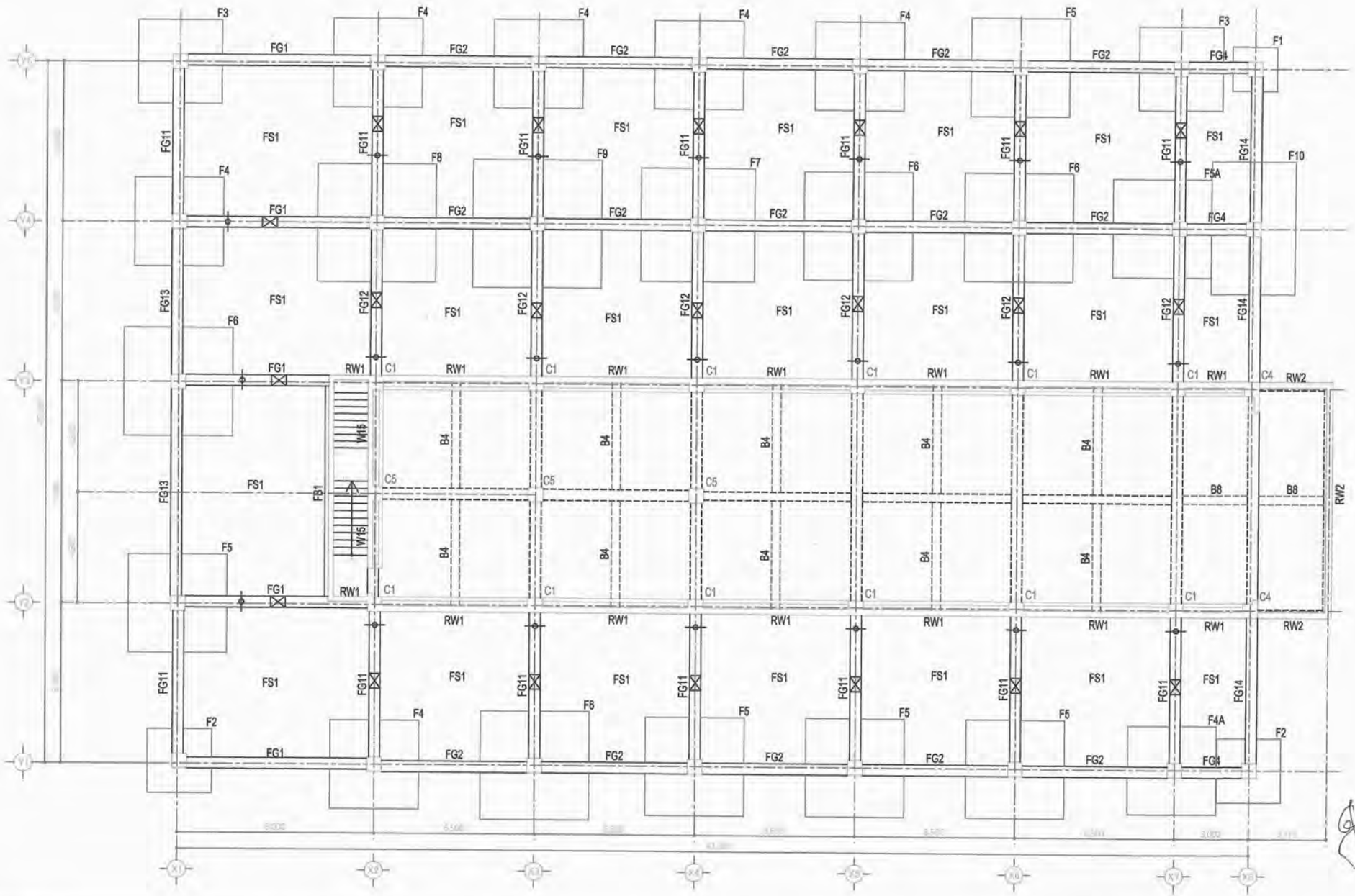
A-7-28

PROJECT TITLE

THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA

PROPOSED CENTRE FOR DISEASE CONTROL
CENTRAL PUBLIC HEALTH LABORATORY (CPHL)
YABA-LAGOS,NIGERIA

SCALE	-
DATE	MARCH 2019
DRAWN BY	
CHECKED BY	
DRAWING TITLE	BASEMENT FLOOR FRAMING PLAN
DRAWING NO.	S-03
DESIGNED BY	ORIENTAL CONSULTANTS GLOBAL CO., LTD.



A-7-29

PROJECT TITLE

JICA

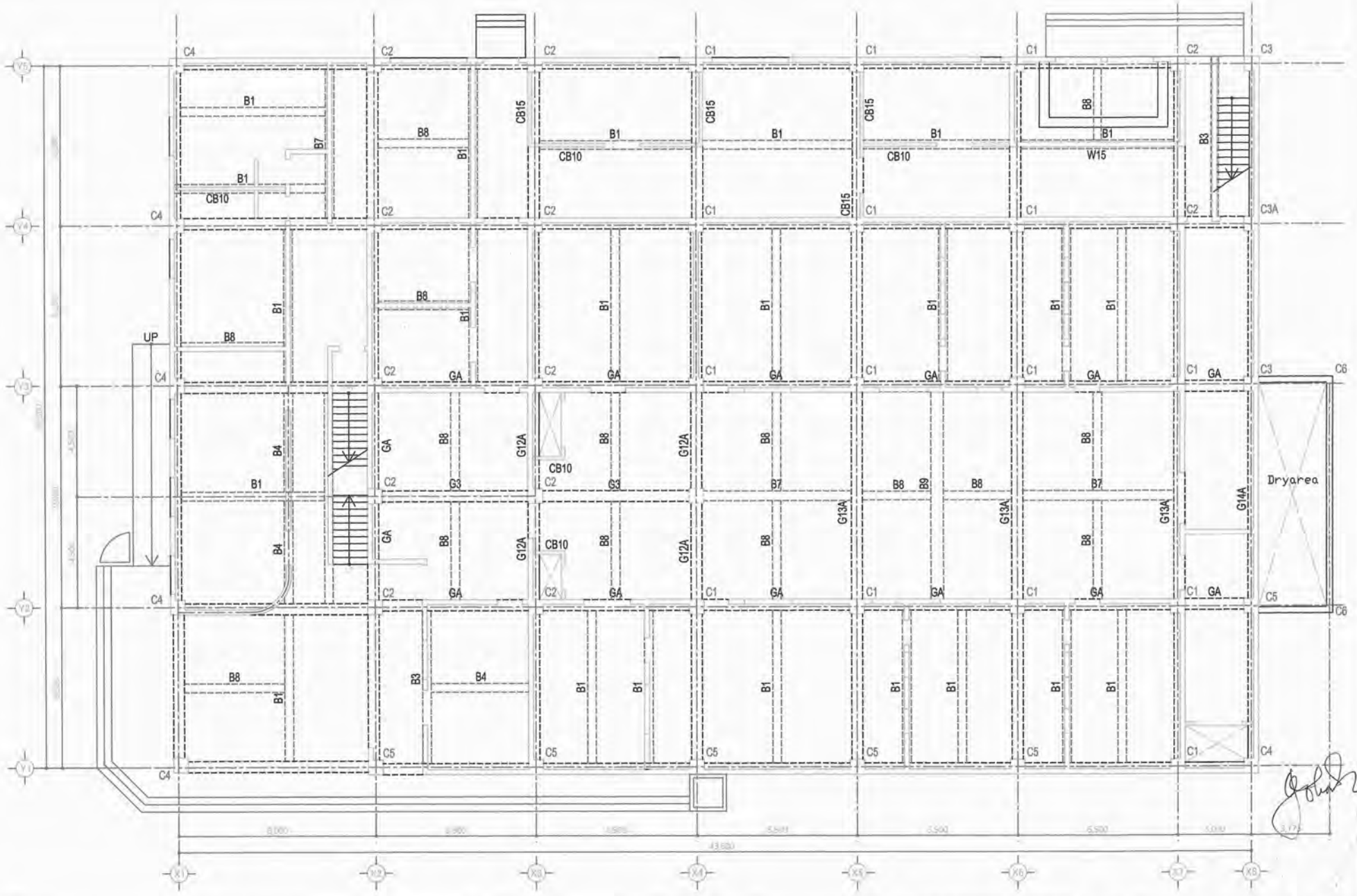
THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA

PROPOSED CENTRE FOR DISEASE CONTROL
CENTRAL PUBLIC HEALTH LABORATORY (CPHL)
YABA-LAGOS,NIGERIA

MARCH 2019

FOUNDATION FRAMING PLAN

ORIENTAL CONSULTANTS GLOBAL CO., LTD.



PROJECT TITLE

THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA

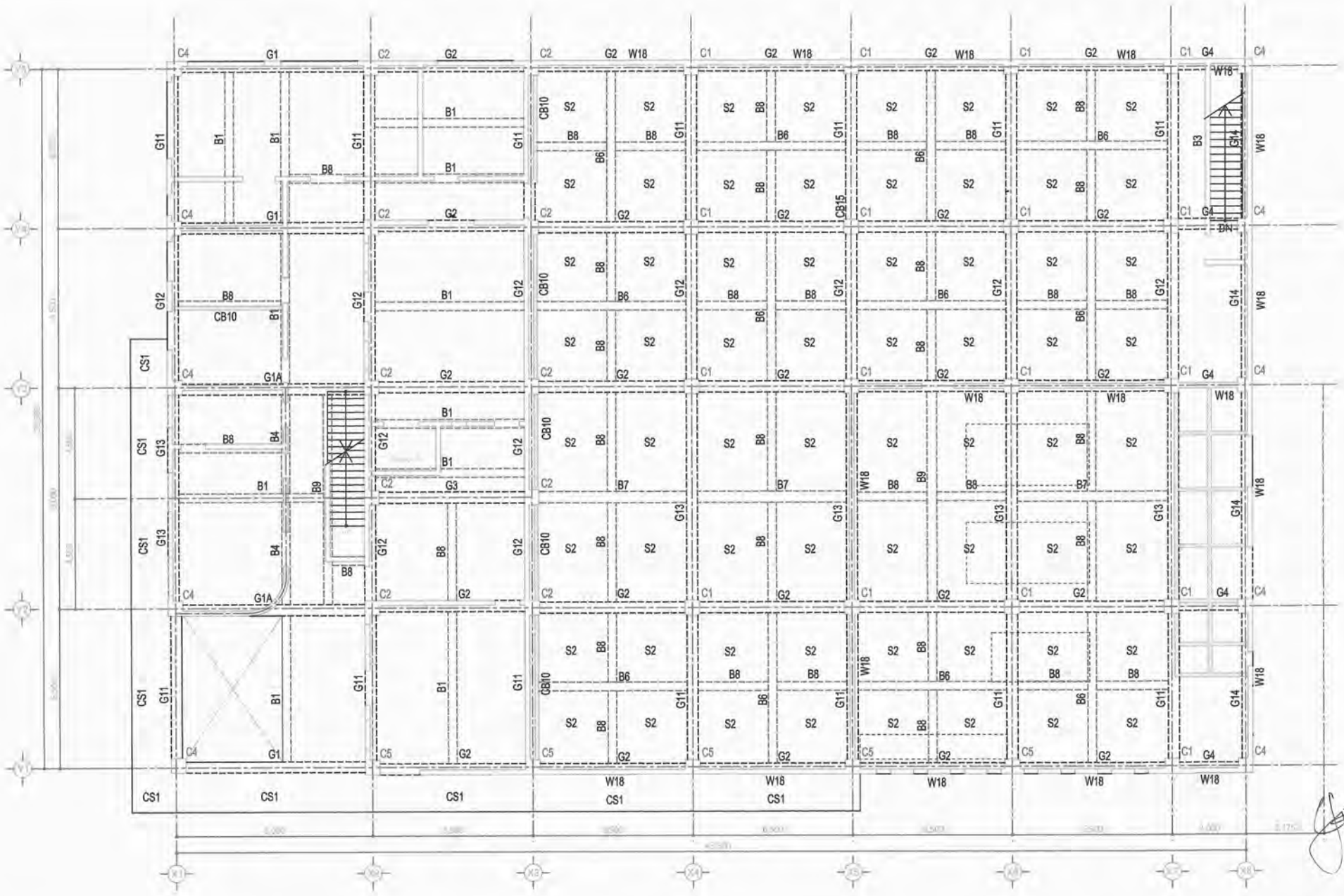
PROPOSED CENTRE FOR DISEASE CONTROL
CENTRAL PUBLIC HEALTH LABORATORY (CPHL)
YABA-LAGOS,NIGERIA

MARCH 2019

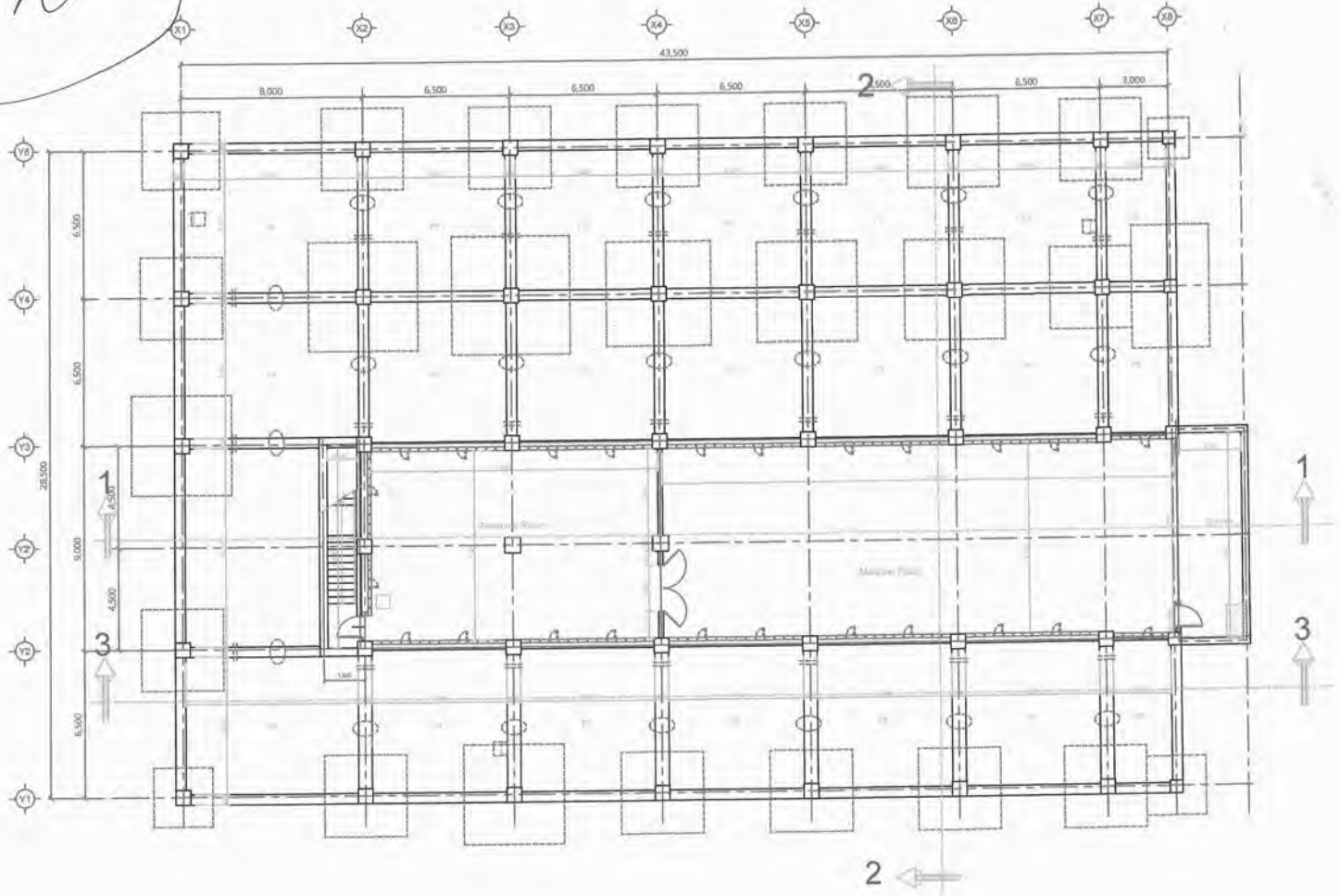
GROUND FLOOR FRAMING PLAN

S-05

ORIENTAL CONSULTANTS GLOBAL CO., LTD.



PROJECT TITLE: THE PROJECT FOR STRENGTHENING THE CAPACITY OF NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES IN THE FEDERAL REPUBLIC OF NIGERIA	PROPOSED CENTRE FOR DISEASE CONTROL CENTRAL PUBLIC HEALTH LABORATORY (CPHL) YABA-LAGOS,NIGERIA	MARCH 2019	FIRST FLOOR FRAMING PLAN — S-05
			ORIENTAL CONSULTANTS GLOBAL CO., LTD.



APPROVAL COLUMN

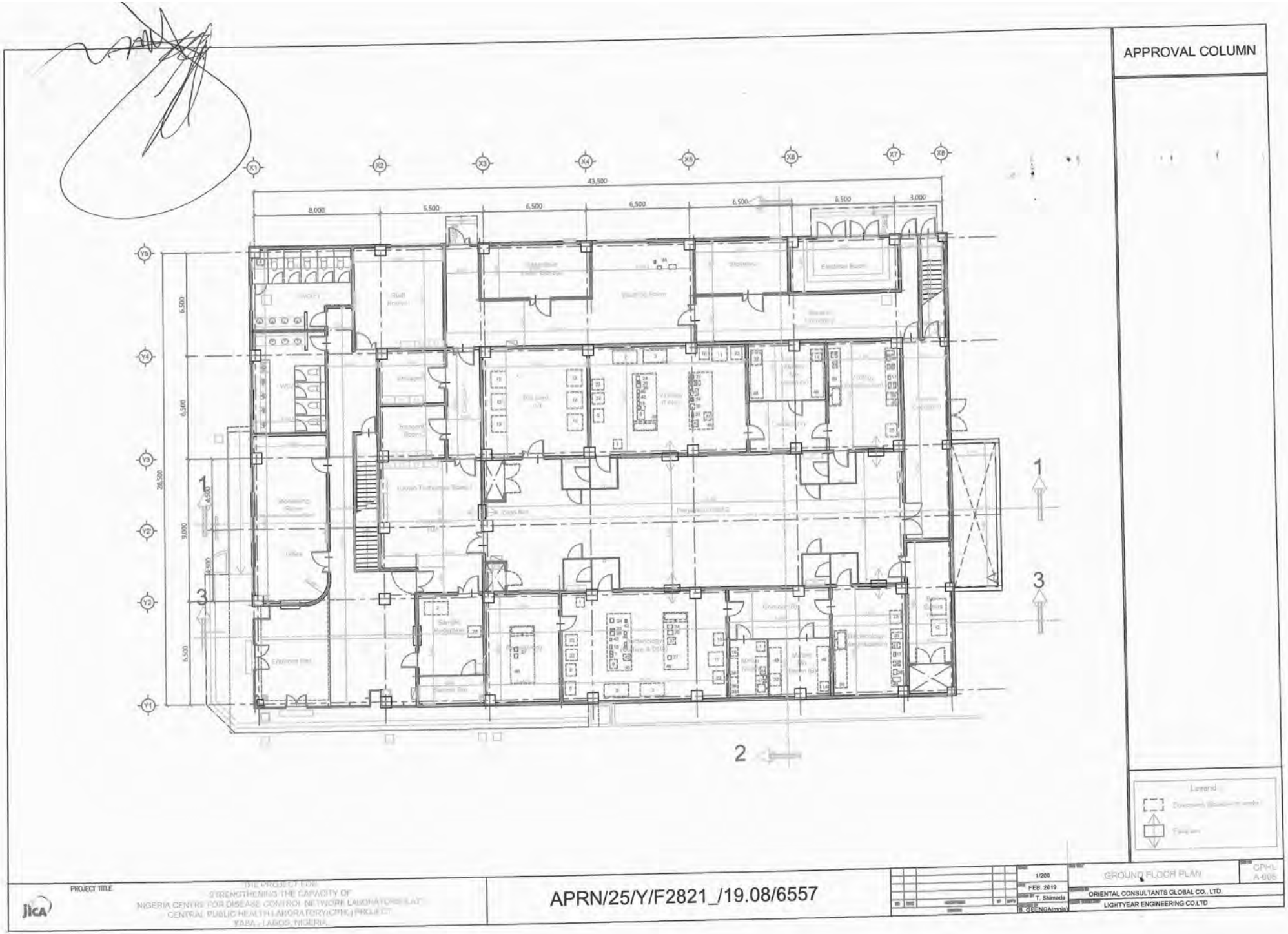
Legend

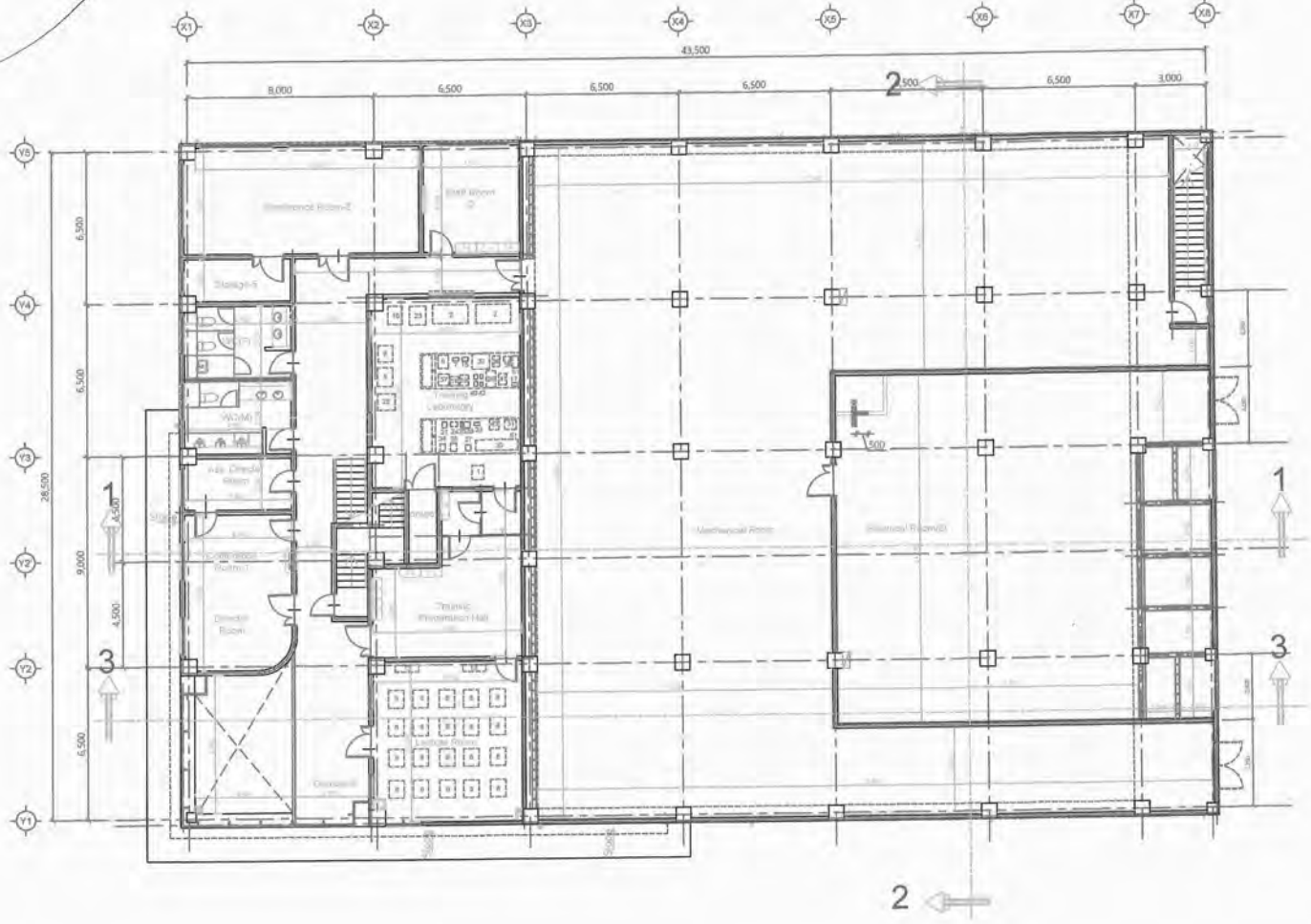
PROJECT TITLE

THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES AT
CENTRAL PUBLIC HEALTH LABORATORY (CPHL) PREMISES
YABA, LAGOS, NIGERIA

APRN/25/Y/F2821_/19.08/6557

SCALE	1/200
DATE	FEB. 2019
DESIGNED BY	T. Shimada
CHECKED BY	B. OBENG-Amoah
DRAWING TITLE	BASEMENT FLOOR PLAN
DRAWING NO.	CPHL A-004
DESIGNED BY	ORIENTAL CONSULTANTS GLOBAL CO., LTD.
CHECKED BY	LIGHTYEAR ENGINEERING CO.LTD


APPROVAL COLUMN
X1
X2
X3
X4
X5
X6
X7
X8
Y1
Y2
Y3
Y4
Y5
43,500
8,000
6,500
6,500
6,500
6,500
6,500
3,000
28,500
6,500
6,500
9,000
6,500
1
2
3
Legend
PROJECT TITLE
THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES AT
CENTRAL PUBLIC HEALTH LABORATORY(CPHL) PROJECT
YABA , LAGOS, NIGERIA
APRN/25/Y/F2821_/19.08/6557
1/200
FEB. 2019
T. Shimada
R. GBENGA(main)
GROUND FLOOR PLAN
CPHL
A-005
ORIENTAL CONSULTANTS GLOBAL CO., LTD.
LIGHTYEAR ENGINEERING CO.LTD



APPROVAL COLUMN

Legend

Equipment (Equipment work)

PROJECT TITLE

THE PROJECT FOR
STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES AT
CENTRAL PUBLIC HEALTH LABORATORY(CPHL) PROJECT
YABA - LAGOS, NIGERIA

APRN/25/Y/F2821_/19.08/6557

SCALE	1/200
DATE	FEB. 2019
DESIGNED	T. Shimada
DRAWN	R.OBENGA(mnla1

FIRST FLOOR PLAN

CPHL
A-000

ORIENTAL CONSULTANTS GLOBAL CO., LTD.

LIGHTYEAR ENGINEERING CO.LTD

ELECTRICAL DRAWING LIST

DWG.NO	DRAWING TITLE	SCALE A1	SCALE A3	REMARKS
E — 00	ELECTRICAL DRAWING LIST (電気図面一覧表)	NONE	NONE	
E — 01	GENERAL LEGEND (凡例)	NONE	NONE	
E — 02	SITE PLAN (全体配置図)	1/300	1/600	
E — 03	CCTV SYSTEM SITE PLAN(CCTV全体配置図)	NONE	1/100	
E — 04	SINGLE LINE DIAGRAM (単線結線図)	NONE	1/100	
E — 05	FLOOR PLAN FOR EMERGENCY GENERATOR STSTEM (発電機配置図)	NONE	NONE	
E — 06	SCHEMATIC DIAGRAM OF MAIN FEEDERS SYSTEM (幹線系統図)	NONE	NONE	
E — 07	PANEL SCHEDULE-1 (電灯盤表)	NONE	NONE	
E — 08	PANEL SCHEDULE-2 (電灯盤表)	NONE	NONE	
E — 09	PANEL SCHEDULE-3 (電灯盤表)	NONE	NONE	
E — 10	B1 FLOOR PLAN FOR MAIN FEEDER SYSTEM & POWER(幹線動設備　B1階平面図)	1/75	1/150	
E — 11	GROUND FLOOR PLAN FOR MAIN FEEDER SYSTEM & POWER (幹線動設備　1階平面図)	1/75	1/150	
E — 12	1st FLOOR PLAN FOR MAIN FEEDER SYSTEM & POWER(幹線動設備　2階平面図)	1/75	1/150	
E — 13	ROOF FLOOR PLAN(1) FOR MAIN FEEDER SYSTEM & POWER(幹線動設備　R階平面図(1))	1/75	1/150	
E — 14	ROOF FLOOR PLAN(2) FOR MAIN FEEDER SYSTEM & POWER(幹線動設備　R階平面図(2))	1/75	1/150	
E — 15	LIGHTING FIXTURES (照明姿図)	NONE	NONE	
E — 16	B1 FLOOR PLAN FOR LIGHTING SYSTEM (電灯設備　B1階平面図)	1/75	1/150	
E — 17	GROUND FLOOR PLAN FOR LIGHTING SYSTEM (電灯設備　1階平面図)	1/75	1/150	
E — 18	1st FLOOR PLAN FOR LIGHTING SYSTEM (電灯設備　2階平面図)	1/75	1/150	
E — 19	ROOF FLOOR PLAN(1) FOR LIGHTING SYSTEM (電灯設備　R階平面図(1))	1/75	1/150	
E — 20	ROOF FLOOR PLAN(2) FOR LIGHTING SYSTEM (電灯設備　R階平面図(2))	1/75	1/150	
E — 21	B1 FLOOR PLAN FOR RECEPTACLE OUTLET SYSTEM (コンセント設備　B1階平面図)	1/75	1/150	
E — 22	GROUND FLOOR PLAN FOR RECEPTACLE OUTLET SYSTEM (コンセント設備　1階平面図)	1/75	1/150	
E — 23	1st FLOOR PLAN FOR RECEPTACLE OUTLET SYSTEM (コンセント設備　2階平面図)	1/75	1/150	
E — 24	ROOF FLOOR PLAN(1) FOR RECEPTACLE OUTLET SYSTEM (コンセント設備　R階平面図(1))	1/75	1/150	
E — 25	ROOF FLOOR PLAN(2) FOR RECEPTACLE OUTLET SYSTEM (コンセント設備　R階平面図(2))	1/75	1/150	
E — 26	SCHEMATIC DIAGRAM OF TELEPHONE & LAN SYSTEM (電話, LAN設備　系統図)	NONE	NONE	
E — 27	GROUND FLOOR PLAN FOR TELEPHONE & LAN SYSTEM (電話, LAN設備　1階平面図)	1/75	1/150	
E — 28	1st FLOOR PLAN FOR TELEPHONE & LAN SYSTEM (電話, LAN設備　2階平面図)	1/75	1/150	
E — 29	SCHEMATIC DIAGRAM OF FIRE ALAM SYSTEM(自動火災報知設備 系統図)	NONE	NONE	
E — 30	B1 FLOOR PLAN FOR FIRE ALARM SYSTEM (自動火災報知設備　B1階平面図)	1/75	1/150	
E — 31	GROUND FLOOR PLAN FOR FIRE ALARM SYSTEM (自動火災報知設備　1階平面図)	1/75	1/150	
E — 32	1st FLOOR PLAN FOR FIRE ALARM SYSTEM (自動火災報知設備　2階平面図)	1/75	1/150	
E — 33	ROOF FLOOR PLAN(1) FOR FIRE ALARM SYSTEM (自動火災報知設備　R階平面図(1))	1/75	1/150	
E — 34	ROOF FLOOR PLAN(2) FOR FIRE ALARM SYSTEM (自動火災報知設備　R階平面図(2))	1/75	1/150	
E — 35	SCHEMATIC DIAGRAM OF ACCESS CONTROL SYSTEM (入退室管理設備 系統図)	NONE	NONE	

DWG.NO	DRAWING TITLE	SCALE A1	SCALE A3	REMARKS
E — 36	GROUND FLOOR PLAN FOR ACCESS CONTROL SYSTEM (入退室管理設備 1階平面図)	1/75	1/150	
E — 37	1st FLOOR PLAN FOR ACCESS CONTROL SYSTEM (入退室管理設備 1階平面図)	1/75	1/150	
E — 38	SCHEMATIC DIAGRAM OF CCTV SYSTEM(CCTV設備系統図)	NONE	NONE	
E — 39	GROUND FLOOR PLAN FOR CCTV SYSTEM (CCTV設備　1階平面図)	1/75	1/150	
E — 40	1st FLOOR PLAN FOR CCTV SYSTEM (CCTV設備　2階平面図)	1/75	1/150	
E — 41	LIGHTNING PROTECTION EQIPMENT FIXTURES (避雷設備　機器表)	NONE	NONE	
E — 42	GROUND FLOOR PLAN FOR LIGHTNING PROTECTION SYSTEM (避雷設備　1階平面図)	1/75	1/150	
E — 43	1st FLOOR PLAN FOR LIGHTNING PROTECTION SYSTEM (避雷設備　2階平面図)	1/75	1/150	
E — 44	ROOF FLOOR PLAN(1) FOR LIGHTNING PROTECTION SYSTEM (避雷設備　R階平面図(1))	1/75	1/150	
E — 45	ROOF FLOOR PLAN(2) FOR LIGHTNING PROTECTION SYSTEM (避雷設備　R階平面図(2))	1/75	1/150	
E — 46	PLAN FOR INCINERATOR ROOM,OIL PUMP ROOM,GURD HOUSE (焼却炉、燃料ポンプ室、守衛所)	1/50	1/100	

COREN
REGISTERED ENGINEER
In accordance with Decree 55 of 1970
C0784245
Registrar

PROJECT TITLE
THE PROJECT FOR STRENGTHENING THE CAPACITY OF NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES IN THE FEDERAL REPUBLIC OF NIGERIA.

1/150

DRAWING LIST

ORIENTAL CONSULTANTS GLOBAL CO., LTD.

PANEL AND SMALL POWER

SYMBOL	DESCRIPTION
	LIGHTING & POWER CONTROL PANEL
	POWER CONTROL PANEL
	BRANCH PANELS(RESIDENCE & EXPERIMENTAL)
	WALL TYPE SOCKET OUTLET 1P 220V +E (2 GANG) 16A 1P 220V+E
	WALL TYPE SOCKET OUTLET 1P 220V +E (2 GANG) 16A (WP) WP 220V+E
	(WITH WEATHER COVER RECEPTACLE)
	SOCKET OUTLET 1P 220V+E (FOR FANS) 16A. LOCKED TYPE 1P 220V+I (1GANG)
	(LOCKING PLUGS SUPPLY--BY ELECTRICAL WORK)
	SOCKET OUTLET 1P 220V +E (20A) 1P 220V+E (1 GANG)
	WALL TYPE SOCKET OUTLET 1P 220V (15A) 1P 220V+E(1 GANG)
	FLOOR TYPE SOCKET OUTLET 1P 220V. (OA FLOOR) 1P 220V (OA TAP)
	SOCKET OUTLET 1P 220V+E (FOR AC UNIT) 16A. 1P 220V+I (1GANG)(LOCKED TYPE)
	(LOCKING PLUGS SUPPLY--BY ELECTRICAL WORK)
	SWITCH BOX (MCB 16A)
	ONE GANG ONE WAY FLUSH SWITCH (10A)
	ONE GANG ONE WAY FLUSH SWITCH (10A)(WATER PROOF TYPE)
	3 WAY FLUSH SWITCH (10A)
	4 WAY FLUSH SWITCH (10A)
	ONE GANG ONE WAY FLUSH SWITCH (FOR CEILING E/F)
	AUTO ON/OFF SWITCH (PHOTO SWITCH)
	PVC 2 x 2.5sqmm + PE2.5 (PVC PIPE 3/4") (CONSEALED IN CONCRETE)
	PVC 3 x 2.5sqmm + PE2.5 (PVC PIPE 3/4") (CONSEALED IN CONCRETE)
	PVC 3 x 2.5sqmm + PE2.5 (PVC PIPE 3/4") (CONSEALED IN CONCRETE)
	PVC 4 x 2.5sqmm + PE2.5 (PVC PIPE 3/4") (CONSEALED IN CONCRETE)
	PVC 5 x 2.5sqmm + PE2.5 (PVC PIPE 1") (CONSEALED IN CONCRETE)
	PVC 6 x 2.5sqmm + PE2.5 (PVC PIPE 1 1/4") (CONSEALED IN CONCRETE)
	PVC INSULATED ELECTRIC WIRE.(COPPER CONDUCTOR)

WIRING CONNECTION SYSTEM

SYMBOL	DESCRIPTION
	CONSEALED PIPING IN THE BUILDING
	UNDER FLOOR CABLE IN COMPUTER TRAINING ROOM
	EXPOSED CABLING
	UNDER GROUND CABLE IN CONDUIT (HDPE)
	JUNCTION BOX (3 WAY OR 4 WAY) (CONCRETE BOX WITH SUS COVER)
	UP OR DOWN CABLE
	MAN HOLEHOLE(1500x1500x1500)(SIDE OF BUILDING-CONSTRUCTED BY CIVIL)
	MAN HOLEHOLE(1500x1500x1500)(INSIDE GREEN BELT-ELECTRICAL SCOPE)
	HANDHOLE(900x 900x 1000mmDepth)(ELECTRICAL WORK)

REMARKS:

PVC	POLYVINYL CHLORIDE
XLPE/PVC	CROSS LINKED POLYETHYLENE INSULATED PVC SHEATHED CABLE
HDPE	HIGH DENSITY POLYETHYLENE CORRUGATED PIPE

LIGHTING FIXTURE

SYMBOL	DESCRIPTION	
	FLUORESCENT LAMP	FL 40W-2
	FLUORESCENT LAMP (WITH BATTERY AND CHARGER)	FL 40W-2
	FLUORESCENT LAMP	FL 40W-1
	FLUORESCENT LAMP (WITH BATTERY AND CHARGER)	FL 40W-1
	DOWN LIGHT	FDL 18W OR 27W
	BRACKET LIGHT	FDL 18W-1
	DOWN LIGHT (FLOOD LIGHT WITH PIPE PENDANT)	MF 150Wx1
	EXIT LIGHT	FL 18W-1(OR EQUIVALENTS)
	EXIT LIGHT	FL 18W-1(OR EQUIVALENTS)
	EXIT LIGHT	FL 18W-1(OR EQUIVALENTS)
	GARDEN LIGHT	FDL 27Wx1
	STREET LIGHT	HF 100Wx2 OR MF150Wx1
	JUNCTION BOX (3 WAY)	OUTLET BOX 119x119x54mm WITH COVER
	JUNCTION BOX (4 WAY)	OUTLET BOX 119x119x54mm WITH COVER
	JUNCTION BOX (SQUARE TYPE WITH WATER PROOF)	
	PVC 2 x 2.5sqmm + PE2.5 (PVC PIPE 3/4")	(CONSEALED IN CONCRETE)
	PVC 3 x 2.5sqmm + PE2.5 (PVC PIPE 3/4")	(CONSEALED IN CONCRETE)
	PVC 3 x 2.5sqmm + PE2.5 (PVC PIPE 3/4")	(CONSEALED IN CONCRETE)
	PVC 4 x 2.5sqmm + PE2.5 PVC PIPE (3/4")	(CONSEALED IN CONCRETE)
	PVC 5 x 2.5sqmm + PE2.5 (PVC PIPE 1")	(CONSEALED IN CONCRETE)
	PVC 6 x 2.5sqmm + PE2.5 (PVC PIPE 1 1/4")	(CONSEALED IN CONCRETE)
	PVC INSULATED ELECTRIC WIRE.(COPPER CONDUCTOR)	

AUDIO SYSTEM

SYMBOL	DESCRIPTION
	AUDIO RACK(SUPPLIED BY CONGORIAN SIDE)
	MAIN SPEAKER 240W(SUPPLIED BY CONGORIAN SIDE)
	SUB SPEAKER (SUPPLIED BY CONGORIAN SIDE)
	WIRELESS ANTENNA(SUPPLIED BY CONDORIAN SIDE)
	MIC JACK WALL TYPE(SUPPLIED BY CONGORIAN SIDE)
	SPEAKER PLUGS (SULLIED BY CONDORIAN SIDE)
	MIC RECEPTACLE WALL TYPE(JACK-SULLIED BY CONGORIAN SIDE)
	LCD PROJECTOR OUTLET (CEILING MOUNT)
	(JACK & PLATES -ARE SULLIED BY CONGORIAN SIDE)

TELEPHONE SYSTEM

SYMBOL	DESCRIPTION
	PRIVATE AUTOMATIC BRANCH EXCHENGER(IP TYPE)
	MAIN DISTRIBUTION FRAME
	TERMINAL BOARD
	TELEPOHNE OUTLET
	TELEPOHNE OUTLET(OA TAP TYPE)
	TIEV 1 x 0.65-4 (PVC PIPE 3/4")
	TIEV 2 x 0.65-4 (PVC PIPE 3/4")
	TIEV 3 x 0.65-4 (PVC PIPE 3/4")
	TIEV 4 x 0.65-4 (PVC PIPE 3/4")
	TIEV 5 x 0.65-4 (PVC PIPE 1 1/4")
	PVC INSULATED LOCAL TELEPHONE CABLE (0.56mm Dia. CONDUCTOR)

LAN SYSTEM

SYMBOL	DESCRIPTION
	LAN RACK
	LAN ROSETTE(1 GANG)
	LAN ROSETTE(OA 1 GANG)(MODULAR JACK TYPE)
	SWITCHING UNITT
	HUB SWITCHING UNITT
	ROUTER UNIT
	CAT 6 x 1 (PVC 3/4")
	CAT 6 x 2 (PVC 3/4")
	CAT 6 x 3 (PVC 1")
	CAT 6 x 4 (PVC 1")
	CAT 6 x 5 (PVC 1 1/4")

REMARKS:
CAT 6 CABLE SHALL BE UTP TYPE , SOLID WIRES AND FR TYPE.

FIRE ALARM SYSTEM

SYMBOL	DESCRIPTION
	FIRE ALARM CONTROL PANEL
	TERMINAL BOARD
	INDICATION LAMP
	EMERGENCY CALL PUSH BUTTON
	BELL
	MAINTENANCE TELEPHONE

LIGHTNING PROTECTION SYSTEM

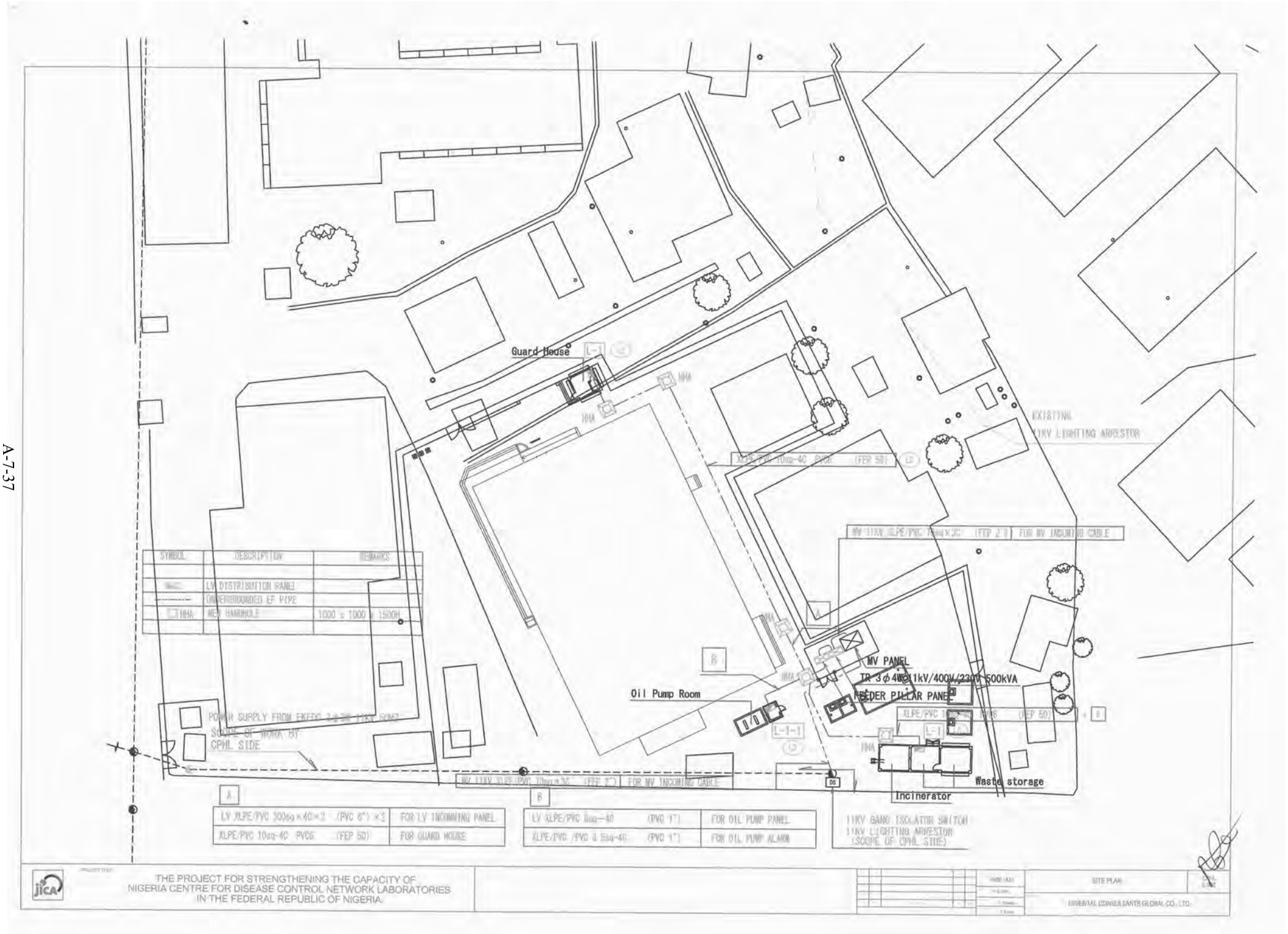
SYMBOL	DESCRIPTION
	AIR TERMINAL(DYNASPHERE TYPE)
	LIGHTNING EVENT CONTER DEVICE
	INDIVISUAL GROUNDING SYSTEM
	TEST WELL POINT FOR GROUNDING RESISTANCE

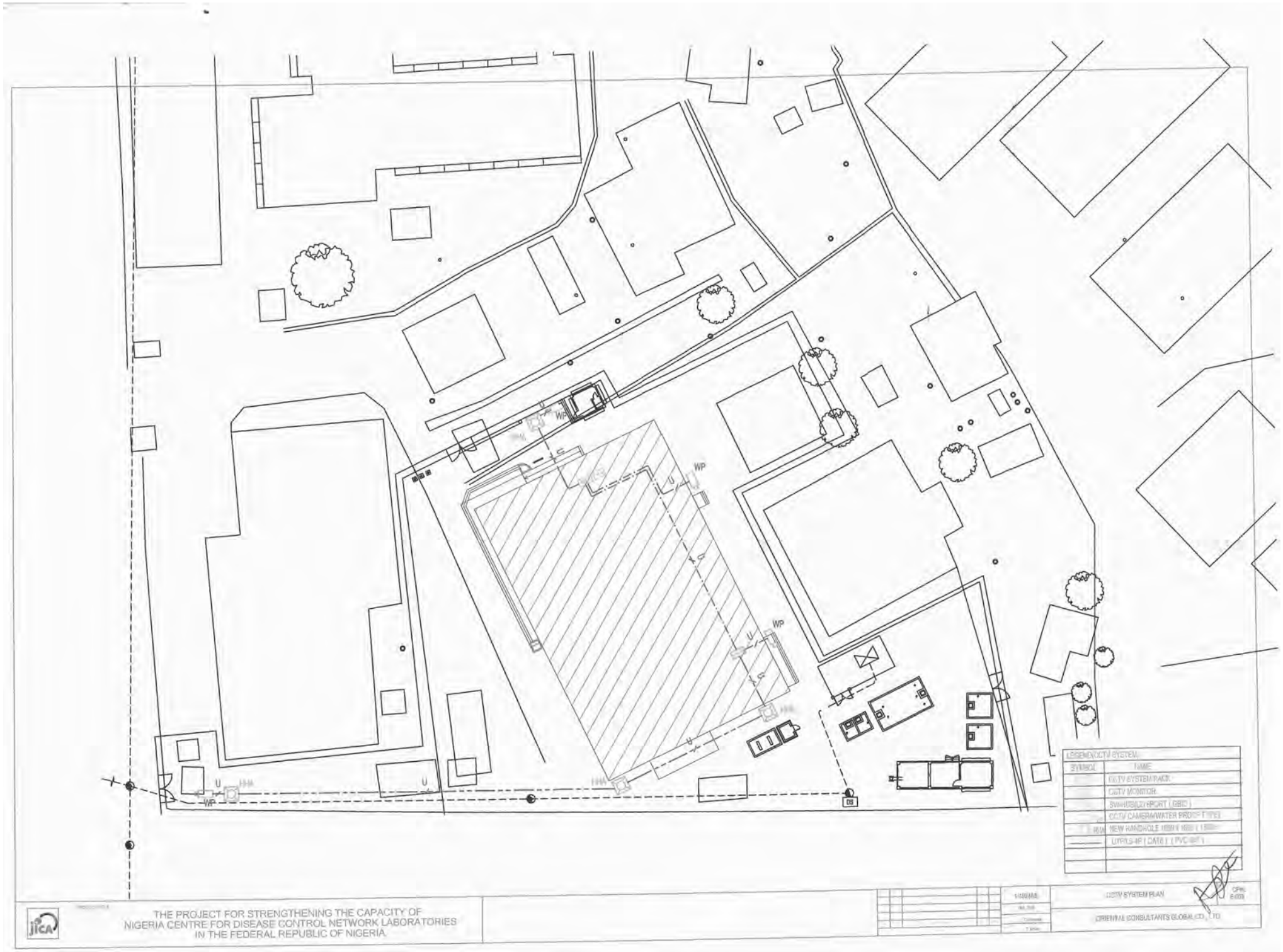
PROJECT TITLE

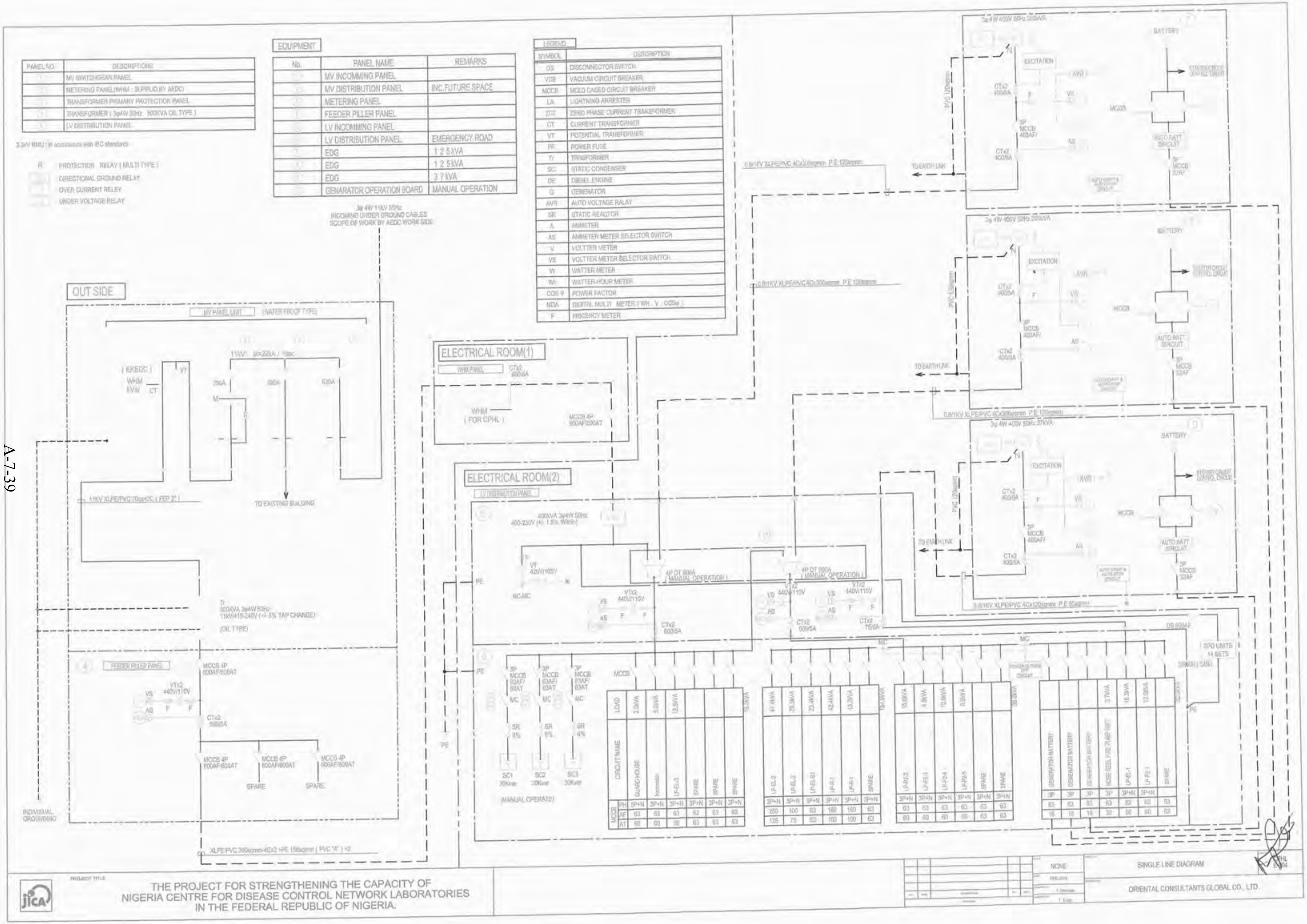
JICA

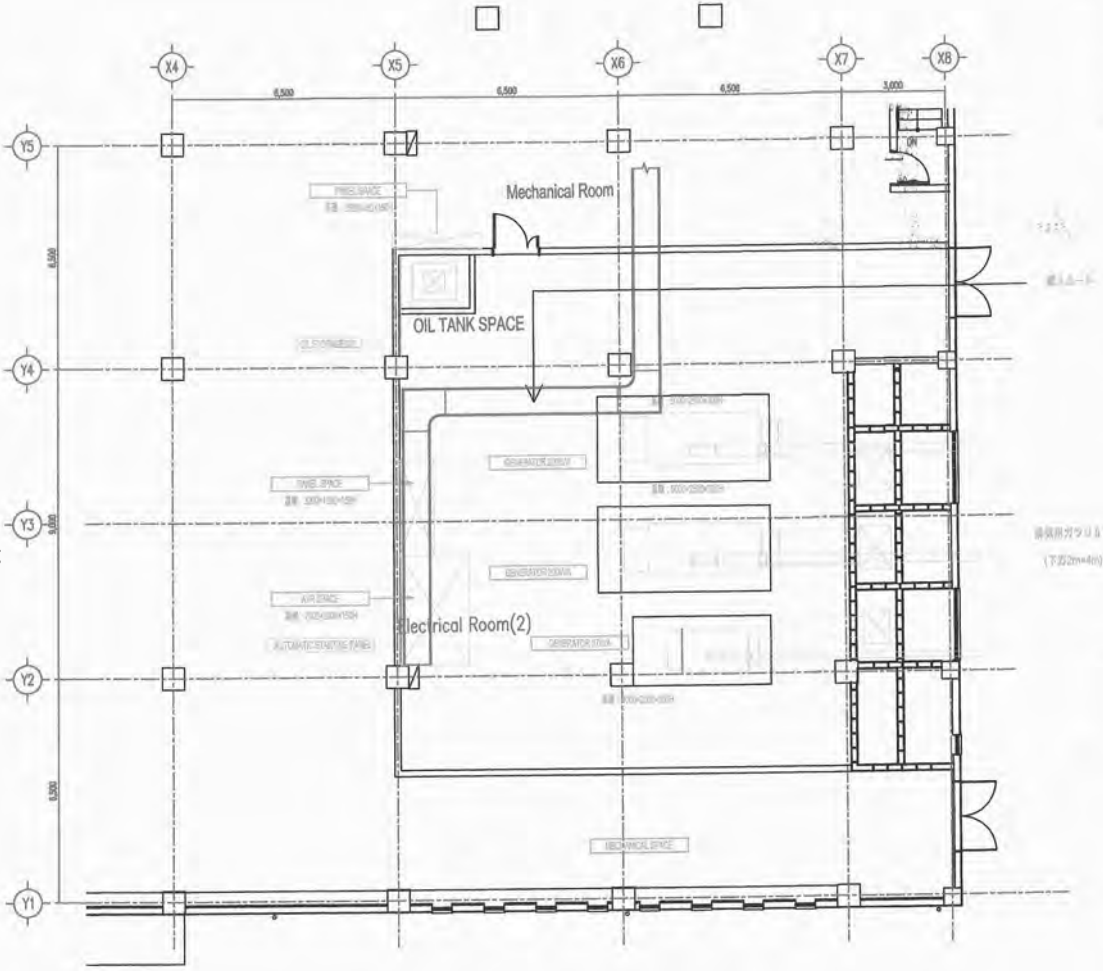
THE PROJECT FOR STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA.

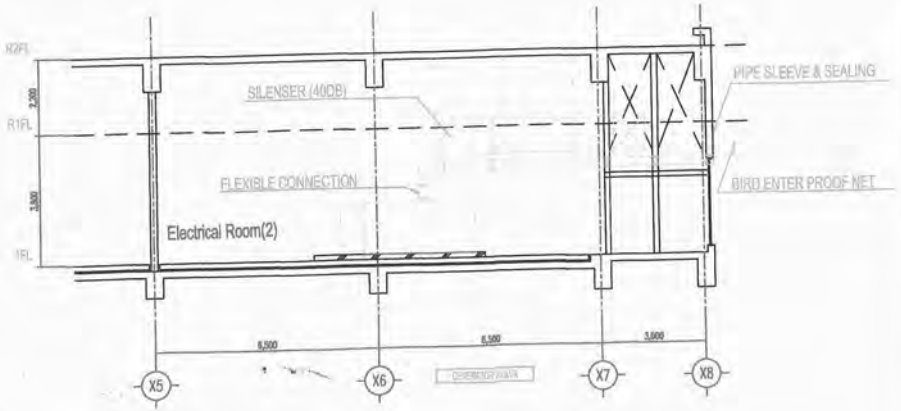
	1/100
	GENERAL LEGEND
	DRAWING NO. E-001
	ORIENTAL CONSULTANTS GLOBAL CO., LTD.


Guard House
Oil Pump Room
MV PANEL
Waste storage
Incinerator
EXISTING
11KV LIGHTING ARRESTOR
POWER SUPPLY FROM EKEDC
SCOPE OF WORK BY
CPHL SIDE
FOR MV INCOMING CABLE
FOR LV INCOMING PANEL
FOR GUARD HOUSE
FOR OIL PUMP PANEL
FOR OIL PUMP ALARM
11KV GANG ISOLATOR SWITCH
11KV LIGHTING ARRESTOR
(SCOPE OF CPHL SIDE)
THE PROJECT FOR STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA.
SITE PLAN
ORIENTAL CONSULTANTS GLOBAL CO., LTD.


WP
U
LEGEND(CCTV SYSTEM)
SYMBOL
NAME
CCTV SYSTEM PACK
CCTV MONITOR
SWITCH(L2) HPORT (GBIC)
CCTV CAMERA(WATER PROOF TYPE)
NEW HANDHOLE
UTP(CL4P (CAT6) (PVC
THE PROJECT FOR STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA
CCTV SYSTEM PLAN
ORIENTAL CONSULTANTS GLOBAL CO., LTD.

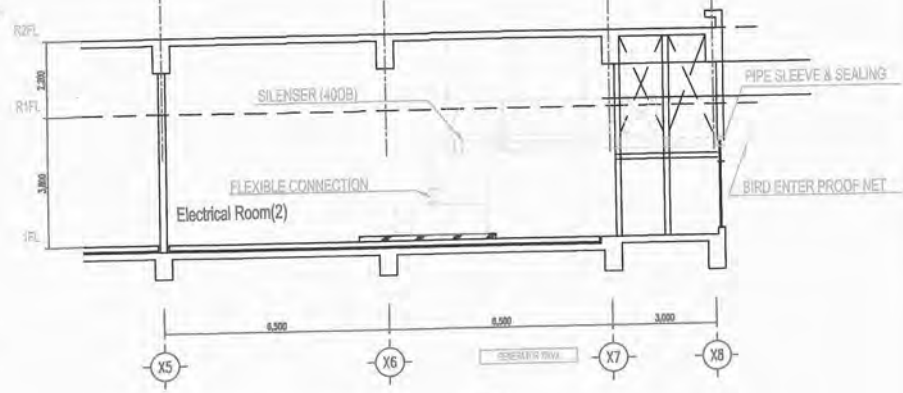

PANEL NO. | DESCRIPTIONS
MV SWITCHGEAR PANEL
METERING PANEL(WHM : SUPPLID BY AEDC)
TRANSFORMER PRIMARY PROTECTION PANEL
TRANSFORMER (3φ4W 50Hz 500KVA OIL TYPE)
LV DISTRIBUTION PANEL
3.3kV RMU : in accordance with IEC standards
R PROTECTION RELAY (MULTI TYPE)
DIRECTIONAL GROUND RELAY
OVER CURRENT RELEY
UNDER VOLTAGE RELAY
EQUIPMENT
No. | PANEL NAME | REMARKS
MV INCOMMING PANEL
MV DISTRIBUTION PANEL | INC.FUTURE SPACE
METERING PANEL
FEEDER PILLER PANEL
LV INCOMMING PANEL
LV DISTRIBUTION PANEL | EMERGENCY ROAD
EDG | 12.5kVA
EDG | 12.5kVA
EDG | 3.7kVA
GENARATOR OPERATION BOARD | MANUAL OPERATION
3φ 4W 11kV 50Hz
INCOMMING UNDER GROUND CABLES
SCOPE OF WORK BY AEDC WORK SIDE
LEGEND
SYMBOL | DESCRIPTION
DS | DISCONNECTOR SWITCH
VCB | VACUUM CIRCUIT BREAKER
MCCB | MOLD CASED CIRCUIT BREAKER
LA | LIGHTNING ARRESTER
ZCT | ZERO PHASE CURRENT TRANSFORMER
CT | CURRENT TRANSFORMER
VT | POTENTIAL TRANSFORMER
PF | POWER FUSE
Tr | TRANSFORMER
SC | STATIC CONDENSER
DE | DIESEL ENGINE
G | GENERATOR
AVR | AUTO VOLTAGE RALAY
SR | STATIC REACTOR
A | AMMETER
AS | AMMETER METER SELECTOR SWITCH
V | VOLTTER METER
VS | VOLTTER METER SELECTOR SWITCH
W | WATTER METER
Wh | WATTER-HOUR METER
COS φ | POWER FACTOR
MDA | DIGITAL MULTI METER (WH , V , COSφ)
F | FRECENCY METER
OUT SIDE
MV PANEL UNIT (WATER PROOF TYPE)
ELECTRICAL ROOM(1)
WHM PANEL
WHM (FOR CPHL)
ELECTRICAL ROOM(2)
LV DISTRIBUTION PANEL
400kVA 3φ4W 50Hz
TO EXISTING BUILDING
FEEDER PILLER PANEL
4P DT 800A (MANUAL OPERATION)
BATTERY
EXCITATION
AUTO BATT CIRCUIT
TO EARTH LINK
SPD UNITS 14 SETS
INDIVISUAL GROUNDING
SINGLE LINE DIAGRAM
ORIENTAL CONSULTANTS GLOBAL CO., LTD.
NONE
PROJECT TITLE
THE PROJECT FOR STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA.





SPECIFICATION FOR DIESEL ENGINE GENERATOR
MODEL : SOUND PROOF TYPE
(WITH AUTOMATIC PARALLEL OPERATION AND BATTERY)
CAPACITY : 200kVA
NO.OF PHASES : 3φ4W 50HZ
VOLTAGE : 400V
FUEL TANK : 380L
FUEL CONSUMPTION 31.6L/hr(at 75% LOAD)

(NOTE)
TWO EMERGENCY GENERATOR SHALL BE BUILT IN WITH AUTOMATIC PARALLEL OPERATION CONTROL SYSTEM
1.GENERATORS SHALL BE MANUALLY OPERATED BY ELECTRICAL ENGINEER TO SUPPLY POWER DURING THE DAYTIME FOR HEAVY LOADS.
2 . THE FIRST GENERATOR UNIT IS ACTIVATED BY MANUALLY OR REMOTE SWITCH.
3 . THE SECOND GENERATOR SHALL BE AUTOMATIC PARALLEL OPERATION ACCORDING TO THE LOAD POWER CAPACITY.



SPECIFICATION FOR DIESEL ENGINE GENERATOR
MODEL : SOUND PROOF TYPE
(WITH AUTOSTARTING BOARD AND BATTERY)
CAPACITY : 37kVA
NO.OF PHASES : 3φ4W 50HZ
VOLTAGE : 400V
FUEL TANK : 100L
FUEL CONSUMPTION 31.6L/hr(at 75%LOAD)

(NOTE)
EMERGENCY GENERATOR WITH AUTOMATIC STARTING PANEL SYSTEM
1 . GENERATORS SHALL BE MANUALLY OPERATED BY ELECTRICAL ENGINEER TO SUPPLY POWER DURING NIGHT TIME FOR SPECIFIC LOADS.
2 . GENERATOR UNIT IS ACTIVATED BY MANUALLY OR REMOTE SWITCH.

A-7-40

PROJECT TITLE
THE PROJECT FOR STRENGTHENING THE CAPACITY OF NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES IN THE FEDERAL REPUBLIC OF NIGERIA.

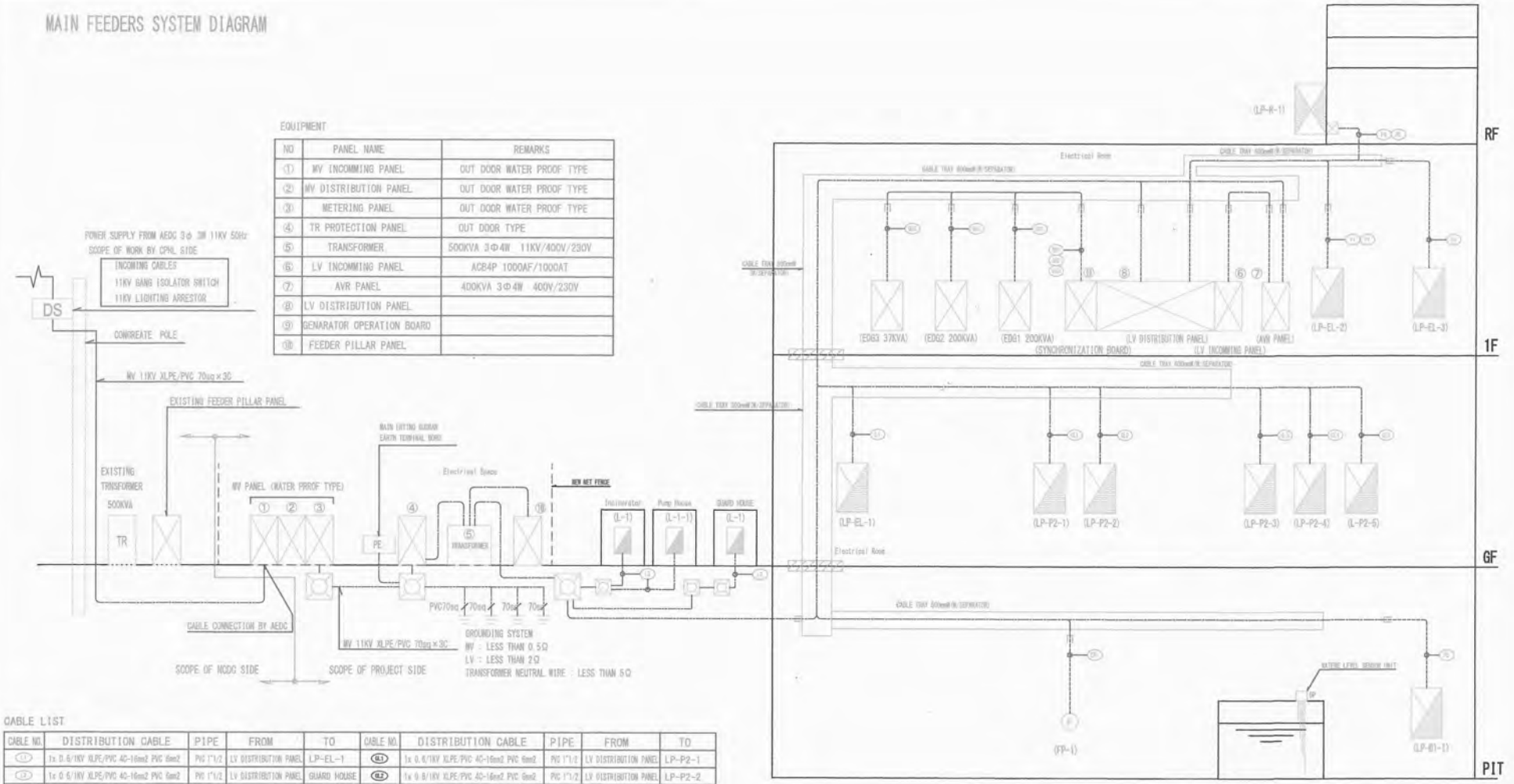
						SCALE	NONE
						DATE	FEB. 2019
NO.	DATE	DESCRIPTION	BY	APP'D		DRAWN	T. Shimada
						CHECKED	T. Enura

DRAWING TITLE: FLOOR PLAN FOR EMERGENCY GENERATOR SYSTEM
DRAWING NO.: CPHL E-005
ORIENTAL CONSULTANTS GLOBAL CO., LTD.

MAIN FEEDERS SYSTEM DIAGRAM

EQUIPMENT

NO	PANEL NAME	REMARKS
①	MV INCOMMING PANEL	OUT DOOR WATER PROOF TYPE
②	MV DISTRIBUTION PANEL	OUT DOOR WATER PROOF TYPE
③	METERING PANEL	OUT DOOR WATER PROOF TYPE
④	TR PROTECTION PANEL	OUT DOOR TYPE
⑤	TRANSFORMER	500KVA 3Φ4W 11KV/400V/230V
⑥	LV INCOMMING PANEL	ACB4P 1000AF/1000AT
⑦	AVR PANEL	400KVA 3Φ4W 400V/230V
⑧	LV DISTRIBUTION PANEL	
⑨	GENARATOR OPERATION BOARD	
⑩	FEEDER PILLAR PANEL	



CABLE LIST

CABLE NO.	DISTRIBUTION CABLE	PIPE	FROM	TO	CABLE NO.	DISTRIBUTION CABLE	PIPE	FROM	TO
①	1x 0.6/1KV XLPE/PVC 4C-16mm2 PVC 6mm2	PVC 1"1/2	LV DISTRIBUTION PANEL	LP-EL-1	⑪	1x 0.6/1KV XLPE/PVC 4C-16mm2 PVC 6mm2	PVC 1"1/2	LV DISTRIBUTION PANEL	LP-P2-1
②	1x 0.6/1KV XLPE/PVC 4C-16mm2 PVC 6mm2	PVC 1"1/2	LV DISTRIBUTION PANEL	GUARD HOUSE	⑫	1x 0.6/1KV XLPE/PVC 4C-16mm2 PVC 6mm2	PVC 1"1/2	LV DISTRIBUTION PANEL	LP-P2-2
③	1x 0.6/1KV XLPE/PVC 4C-16mm2 PVC 6mm2	PVC 1"1/2	LV DISTRIBUTION PANEL	Incinerator	⑬	1x 0.6/1KV XLPE/PVC 4C-16mm2 PVC 6mm2	PVC 1"1/2	LV DISTRIBUTION PANEL	LP-P2-3
④	1x 0.6/1KV XLPE/PVC 4C-16mm2 PVC 6mm2	PVC 1"1/2	LV DISTRIBUTION PANEL	LP-EL-3	⑭	1x 0.6/1KV XLPE/PVC 4C-16mm2 PVC 6mm2	PVC 1"1/2	LV DISTRIBUTION PANEL	LP-P2-4
					⑮	1x 0.6/1KV XLPE/PVC 4C-16mm2 PVC 6mm2	PVC 1"1/2	LV DISTRIBUTION PANEL	LP-P2-5
㉑	1x 0.6/1KV XLPE/PVC 4C-50mm2 PVC 25mm2	PVC 2"	LV DISTRIBUTION PANEL	LP-EL-2					
㉒	1x 0.6/1KV XLPE/PVC 4C-35mm2 PVC 16mm2	PVC 2"	LV DISTRIBUTION PANEL	LP-EL-2	⑱	1x 0.6/1KV XLPE/PVC 4C-300mm2 PVC 150mm2	PVC 6"	SYNCHRO BOARD	EDG1 INPUT
㉓	1x 0.6/1KV XLPE/PVC 4C-35mm2 PVC 16mm2	PVC 2"	LV DISTRIBUTION PANEL	LP-EL-B1	⑲	1x 0.6/1KV XLPE/PVC 4C-300mm2 PVC 150mm2	PVC 6"	SYNCHRO BOARD	EDG2 INPUT
㉔	1x 0.6/1KV XLPE/PVC 4C-50mm2 PVC 25mm2	PVC 2"	LV DISTRIBUTION PANEL	LP-EL-R	⑳	1x 0.6/1KV XLPE/PVC 4C-50mm2 PVC 16mm2	PVC 2"	SYNCHRO BOARD	EDG3 INPUT
㉕	1x 0.6/1KV XLPE/PVC 4C-50mm2 PVC 25mm2	PVC 2"	LV DISTRIBUTION PANEL	LP-EL-R					
					㉖	1x 0.6/1KV XLPE/PVC 4C-4mm2 PVC 4mm2	PVC 1"	LV DISTRIBUTION PANEL	FP-1

NOTE

: SHOWS FIRE SEAL REFER TO LAYOUT DRAWINGS FOR HORIZON SECTION FIRE SEAL

LIGHTING DISTRIBUTION PANEL

MOTOR CONTROL PANEL

LIGHTING DISTRIBUTION/MOTOR CONTROL PANEL

———	CONCEALED IN CONDUIT
- - - -	UNDER FLOOR CABLE
———	EXPOSURE
———	IN PIT, ABOVE CEILING, CABLE TRAY
———	UNDER GROUND CABLE IN CONDUIT
———	EXISTING

PROJECT TITLE

THE PROJECT FOR STRENGTHENING THE CAPACITY OF NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES IN THE FEDERAL REPUBLIC OF NIGERIA.

SCALE	NONE
SCHEMATIC DIAGRAM OF MAIN FEEDERS SYSTEM	CPHL E-008
ORIENTAL CONSULTANTS GLOBAL CO., LTD.	

LEGEND (PLUMBING SYSTEM)

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	POTABLE WATER PIPE		BALL TAP		INTERNAL HYDRANT BOX
	PRIMENTARY (HOT) HOT WATER PIPE		WATER FLOW CONTROL VALVE		MULTIPURPOSE CHEMICAL FIRE EXTINGUISHER (6Kg)
	HOT WATER SUPPLY PIPE		WATER METER W/ BOX		W/ PEDESTAL
	SEWERAGE PIPE		FAUCET FOR IRRIGATION W/ BOX		
	INFECTIOUS WASTE WATER PIPE		GREASE SEPARATOR		
	VENT PIPE		SEWERY MANHOLE W/ COVER		
	VENT PIPE FOR INFECTIOUS WASTE WATER		STORM MANHOLE W/ COVER		
	STEAM SUPPLY PIPE		AUTOMATIC AIR RELEASE VALVE		
	STEAM CONDENSING DRAIN PIPE		PUSHING VALVE		
	FIRE HYDRANT PIPE		FAUCET FOR WATER		
	INDICATOR FOR UNDERGROUND PIPE		MIXING FAUCET		
	VALVE BOX		FAUCET FOR HOT WATER		
	GATE VALVE		SHOWER SET		
	BALL VALVE		SPRAY GUN WITH HOSE		
	CHECK VALVE		FLUSH DRAIN TRAP		
	SOLENOID VALVE (EMERGENCY SHUTOFF)		FLOOR CLEAN OUT		
	BUTTERFLY VALVE		FLOOR CLEAN OUT(WATER PROOF LAYER)		
			CLEAN OUT		
			VENT CAP		
			FLEXIBLE JOINT FOR DRAINAGE		
			VENT CAP(CW MEMBRES) PC/SUS		
	LIQUID SOAP DISPENSER				
	ELECTRIC HAND DRIER				
	AND DRY POWDER FIRE EXTINGUISHER				

GENERAL NOTES FOR PLUMBING SYSTEM

A. GENERAL NOTES

1. DRAWINGS ARE DIAGRAMMATIC/SCHEMATIC AND INDICATE DESIGN INTENT AND GENERAL ARRANGEMENT OF THE SYSTEMS AND WORKS AND DO NOT NECESSARILY PURPORT TO SHOW THE EXACT FUNCTIONAL/S/S ON DETAILS OF THE EQUIPMENT
2. LOCATIONS OF EQUIPMENT AND FIXTURES INDICATED ON THE DRAWINGS ARE APPROXIMATE ONLY AND SUBJECT TO MINOR ADJUSTMENTS IN THE FIELD WORK COORDINATED WITH ALL OTHER TRADES TO AVOID INTERFERENCE
3. ALL ROUTINGS FOR PIPING INDICATED DO NOT INDICATE PRECISE POSITIONS OF SERVICES BUT FEASIBLE TO INSTALL THE SERVICES WITHIN THE DENOTAL INDICATED, AND SHALL BE SELECTED AND DETERMINED BY THE CONTRACTOR COMPLYING WITH ALL REQUIREMENTS OF THE SPECIFICATIONS
4. DRAWINGS ARE NOT INTENDED TO SHOW EVERY OFFSET OR FITTING OR EVERY STRUCTURAL DIFFICULTY THAT MAY BE ENCOUNTERED DURING INSTALLATION OF THE WORK. LOCATION OF ALL ITEMS NOT DIRECTLY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. EXACT LOCATIONS NECESSARY TO SECURE BEST CONDITIONS AND RESULTS SHALL BE SELECTED AND DETERMINED AT THE SITE BY THE CONTRACTOR

LEGEND (AIR CONDITIONING AND VENTILATION SYSTEM)

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	AIR CONDITIONING (INDOOR UNIT)		REFRIGERANT PIPE (W/ INSULATION)		VOLUME DAMPER
	(FOR WALL MOUNTED) TYPE		AIR CONDENSING DRAIN PIPE (W/ INSULATION)		NON RETURN DAMPER
	AIR CONDITIONING(INDOOR UNIT)		COOLED WATER SUPPLY (W/ INSULATION)		SHUT OFF DAMPER
	FOR CEILING MOUNTED TYPE		COOLED WATER RETURN (W/ INSULATION)		RELEASE DAMPER
	AIR CONDITIONING(OUTDOOR UNIT)		OIL SUPPLY PIPE		VARIABLE AIR VOLUME DAMPER
	CENTRIFUGAL FAN		OIL RETURN PIPE		CONSTANT AIR VOLUME DAMPER
			OIL VENT PIPE		
	CENTRIFUGAL FAN (W/ INVERTER				DIFFERENTIAL PRESSURE GAUGE
	CEILING FAN		GATE VALVE		SUPPLY AIR DUCT
	LINE FAN		BALL VALVE		EXHAUST AIR DUCT
	PROPELLER FAN		SMOOK VALVE		OUTDOOR AIR DUCT
	EXHAUST HOOD FOR KITCHEN		FLEXIBLE JOINT		RETURN AIR DUCT
	AIR CONDITIONING(INDOOR UNIT)		OIL STRAINER (DOUBLE TYPE)		
	FOR CEILING CONCEALED TYPE				

GENERAL NOTES FOR HVAC SYSTEM

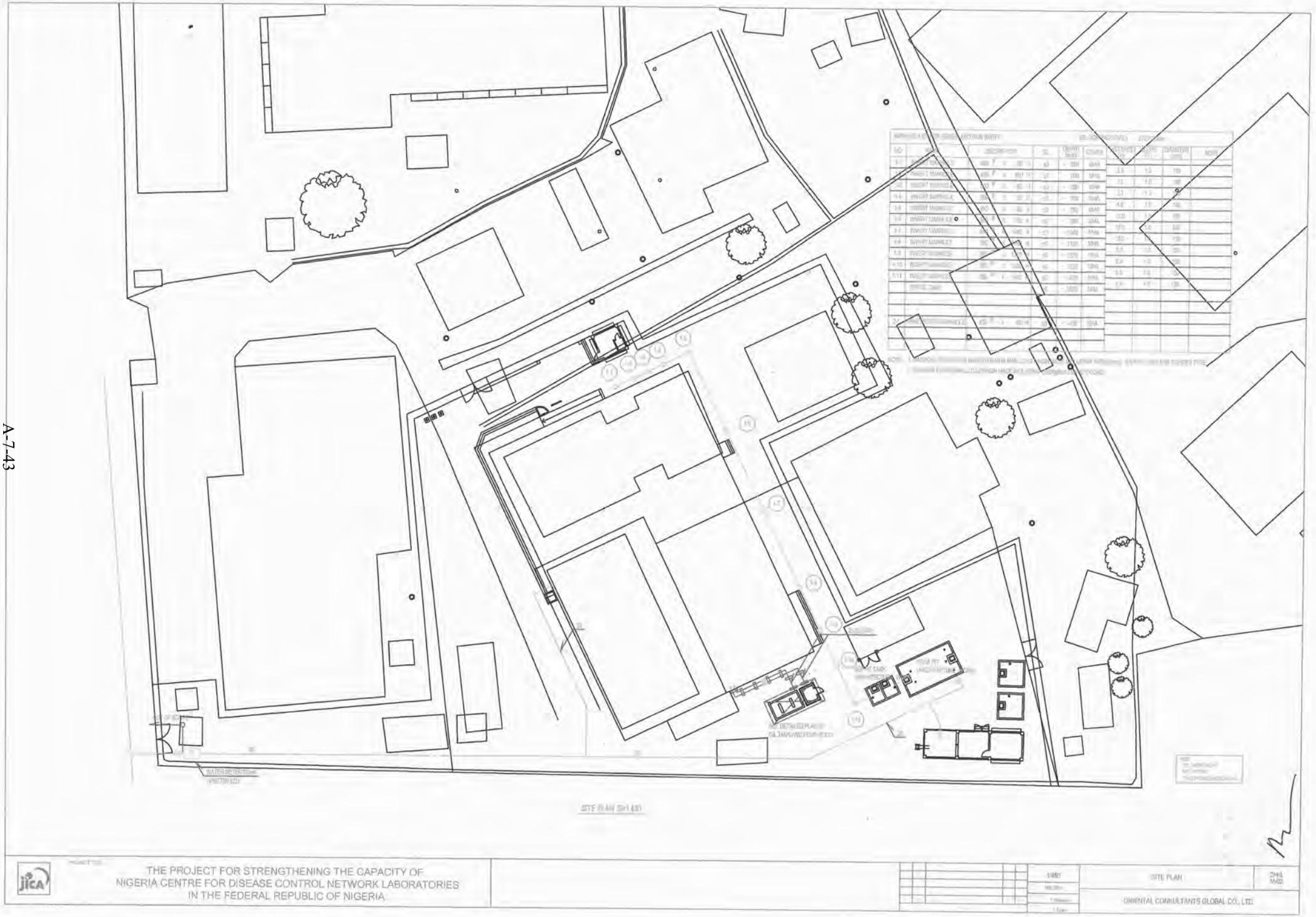
A. GENERAL NOTES

1. DRAWINGS ARE DIAGRAMMATIC AND INDICATE DESIGN INTENT AND GENERAL ARRANGEMENT OF THE SYSTEMS AND WORKS AND DO NOT NECESSARILY PURPORT TO SHOW THE EXACT POSITIONS SIZE OR DETAILS OF THE EQUIPMENT
2. THE CONTRACTOR SHALL SATISFY THEMSELVES THAT THE EQUIPMENT OFFERED BY THEM CAN BE ACCOMMODATED IN THE AVAILABLE SPACE AND POSITIONED IN SUCH A WAY THAT ACCESS FOR OPERATION AND MAINTENANCE ARE NOT OBSTRUCTED
3. ALL ROUTINGS FOR PIPING AND DUCTING DO NOT INDICATE PRECISE POSITIONS OF SERVICES BUT FEASIBLE TO INSTALL THE SERVICES WITHIN THE GENERAL INDICATION AND SHALL BE SELECTED AND DETERMINED BY THE CONTRACTOR COMPLYING WITH ALL REQUIREMENTS OF THE SPECIFICATIONS
4. DUCT SIZES AND ALL OPENINGS THROUGH THE BUILDING CONSTRUCTION SHALL SUIT EQUIPMENT FURNISHED
5. COORDINATE DIFFUSER GRILLE AND REGISTER LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS
6. TRAPPED CONDENSATE DRAINS FROM ALL MECHANICAL EQUIPMENT SHALL BE PROVIDED FOR PROPER DRAINAGE TO SUIT EQUIPMENT FURNISHED
7. ACCESS PANELS IN DUCTWORK FOR CEILINGS SHALL BE PROVIDED WHERE REQUIRED FOR OPERATION BALANCING OR MAINTENANCE OF ALL MECHANICAL EQUIPMENT
8. UNLESS OTHERWISE NOTED ALL EQUIPMENT AND VALVE DRAINS SHALL BE INDEPENDENTLY PIPED TO THE NEAREST PLUMBING DRAIN
9. LOCATE DUCTWORK PIPING AND MECHANICAL EQUIPMENT AWAY FROM THE SPACE ABOVE ELECTRICAL PANELS TRANSFORMERS AND OTHER ELECTRICAL EQUIPMENT

COREN
REGISTERED ENGINEER
In accordance with Decree 33 of 1970
C 0784232
Registrar

A-7-42

JICA	PROJECT TITLE: THE PROJECT FOR STRENGTHENING THE CAPACITY OF NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES IN THE FEDERAL REPUBLIC OF NIGERIA.		N/A	LEGEND / CPNL M-01
			YES 2019	ORIENTAL CONSULTANTS GLOBAL CO., LTD.


SITE PLAN Sh1:#00
THE PROJECT FOR STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA
SITE PLAN
ORIENTAL CONSULTANTS GLOBAL CO., LTD.

EQUIPMENT SCHDULE FOR PLUMBING WORK

EQUIP.NO	NAME	SPECIFICATION	LOCATION	Elect Data: Ø,PH	Elect Data: VOLT	Elect Data: kW	QTY	REMARKS
WT-1	WATER RESERVOIR TANK FRP MADE	CAPACITY : 12.0m3 (NOMINAL), 9.6 m3 (EFFECTIVE)	RESERVOIR ROOM (BF)	-	-	-	1	CONCRETE FOUNDATION (BY ARCH. WORK)
		DIMENSION : (2.0+2.0) x 1.5 x 1.5mH, (1.5+1.5) x 2.0 x 2.0mH						
ET-1	ELEVATED WATER TANK FRP MADE	CAPACITY : 4.0 m3 (3.6 m3)	ROOF (PH2F)	-	-	-	1	CONCRETE FOUNDATION (BY ARCH. WORK)
		DIMENSION : 2.0 x 1.0 x 2.0mH						
WR-1	WATER LIFT UP PUMP	TYPE : CENTRIFUGAL PUMP	RESERVOIR ROOM (BF)	3	400	2.2	2	2 PUMPS
		CAPACITY : 500 x 150 L/min x 20m						MOTOR CONTROL PANEL (BY ELECTRICAL WORK)
		(AUTOMATIC ALTERNATIVE TYPE)						
DP-1	SUBMERSIBLE RAIN WATER PUMP C/W FLOAT BALL	CAPACITY : 500 x 100 L/min x 10m x2 PUMPS	PIT	3	400	1.5	1	WATER LEVEL OPERATION
DP-2	SUBMERSIBLE WASTE WATER PUMP C/W FLOAT BALL	CAPACITY : 500 x 100 L/min x 10m x2 PUMPS	PIT	3	400	0.75	1	WATER LEVEL OPERATION
FT-1	FIRE WATER TANK FRP MADE	CAPACITY : 1.0 m3 (0.3m3)	ROOF (PH1F)	-	-	-	1	CONCRETE FOUNDATION (BY ARCH. WORK)
		DIMENSION : 1.0 x 1.0 x 1.0mH						
FP-1	HOSE REEL FIRE PUMP UNIT	CAPACITY : 300 L/min x 40m	RESERVOIR ROOM (BF)	3	400	3.7	1	
		C/W PRIMING TANK, FLOW MEASURING UNIT CONTROL PANEL AND AUXILIARY VALVES						
WD-1	STERILIZATION UNIT	TREATED CAPACITY : 80 L / BATCH	MACHINE ROOM (BF)	3	400	7.0	1	CONCRETE FOUNDATION (BY ARCH. WORK)
		STORAGE TANK FOR P2 100L						
		STORAGE TANK FOR P3 300L						

SANITARY FIXTURE SCHEDULE

SCHE.NO.	SANITARY FIXTURE NAME	MODEL NO.	INSTITUTE BF: MACHINE ROOM	INSTITUTE BF: RESERVOIR ROOM	INSTITUTE GF: WC(F)	INSTITUTE GF: WC(M)	INSTITUTE GF: MTB ROOM	INSTITUTE GF: P2 VIROLOGY	INSTITUTE GF: [illegible]	INSTITUTE GF: P2 PARASITOLOGY	INSTITUTE GF: P2 BACTERIOLOGY	INSTITUTE GF: P3 BACTERIOLOGY	INSTITUTE 1F: WC(F)	INSTITUTE 1F: WC(M)	INSTITUTE 1F: STORAGE	INSTITUTE 1F	EXTERIOR	GUARD HOUSE GF: GUARD HOUSE	GUARD HOUSE GF	GUARD HOUSE GF	TOTAL	REMARKS
C-1	WATER CLOSET (WESTERN TYPE)	WASH DOWN TYPE WITH LOW TANK			3	4							3	1				1			12	
	PAPER HOLDER																					
C-2	WATER CLOSET (FOR HANDY CAPPED)	W/ FLUSH VALVE																				
	PAPER HOLDER																					
L-1	LAVATORY	COUNTER TOP TYPE			4	3							2	2				1			12	
L-2	LAVATORY	WALL HUNG TYPE, C/W FAUCET FOR ELBOW LEVER																				
L-3	LAVATORY	WALL HUNG TYPE (FOR DISABLED PEOPLE)																				
U-1	URINAL	WALL HUNG TYPE C/W FLUSH VALVE				6								3							9	
SK-1	SERVICE SINK	WALL HUNG TYPE C/W FAUCET			1								1								2	
M-1	MIRROR				4	3															7	
KS-1	KITCHEN SINK	(BY ARCH. WORK)																				
F-1	MIXING FAUCET																					
F-2	FAUCET	C/W ELBOW LEVER																				
F-3	HOSE BIBB		1	1													3				5	
LS-1	LABORATORY SINK	(BY EQUIPMENT WORK)						(1)	(1)	(1)	(1)	(1)			(2)						(7)	
ES-1	EMERGENCY SHOWER						4														4	
ES-2	MIXING SHOWER																					
EW-1	EYE WASHER	C/W WASHING BASIN																				

PROJECT TITLE

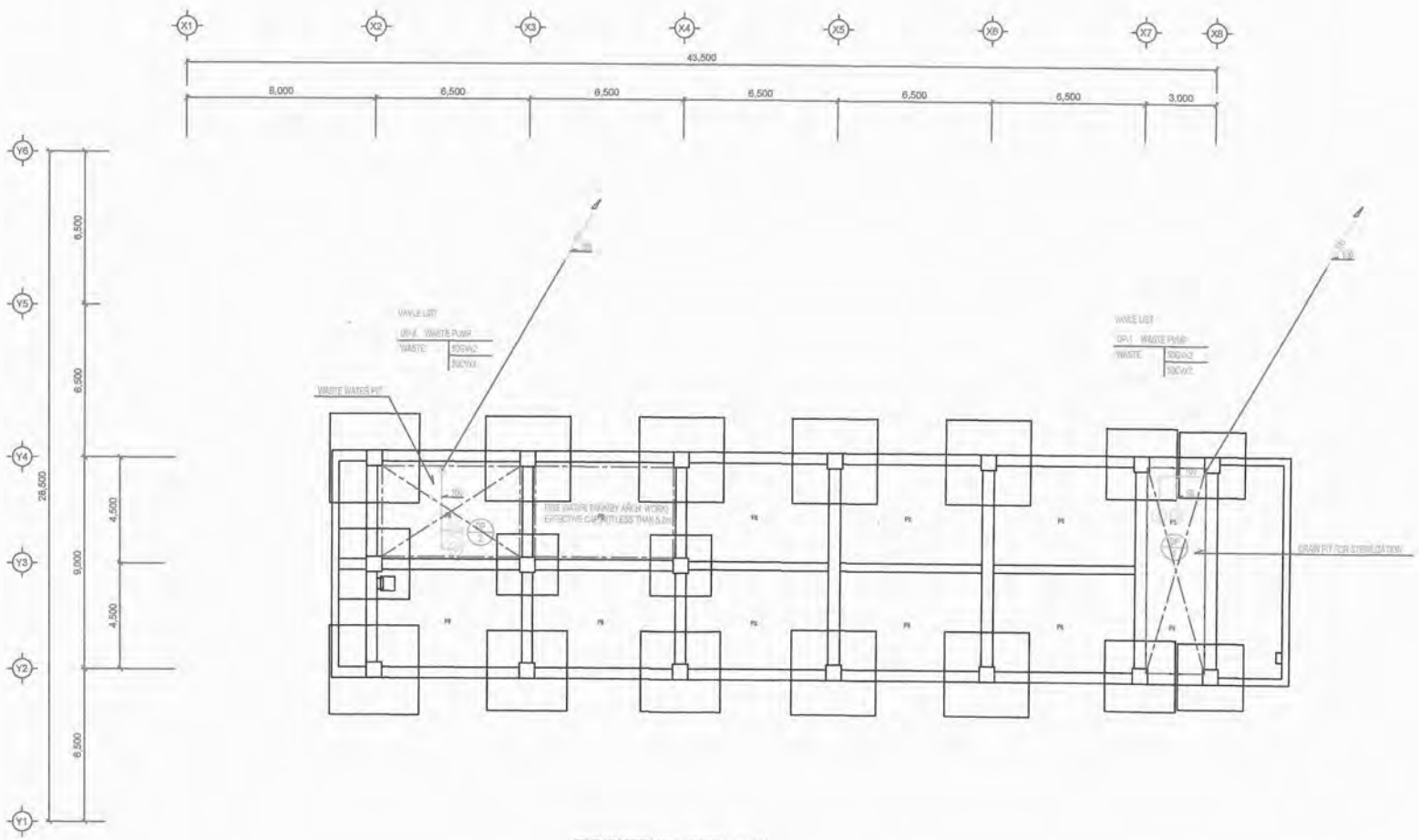
THE PROJECT FOR STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA.

N/A

EQUIPMENT SCHEDULE FOR PLUMBING SYSTEM

CPHL M-03

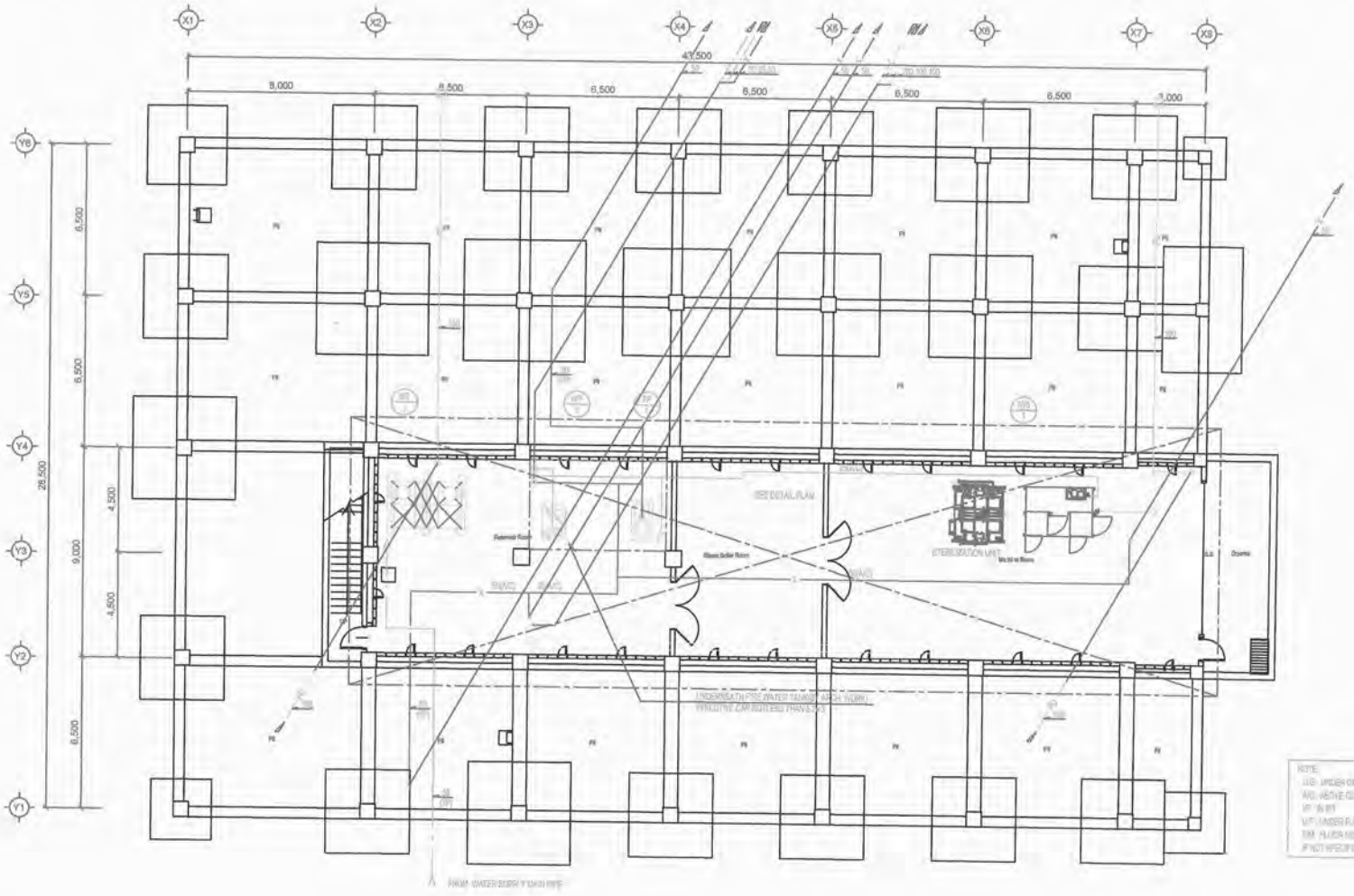
ORIENTAL CONSULTANTS GLOBAL CO., LTD.



PIT PLAN FOR PLUMBING SYSTEM SCALE 1:200

A-7-45

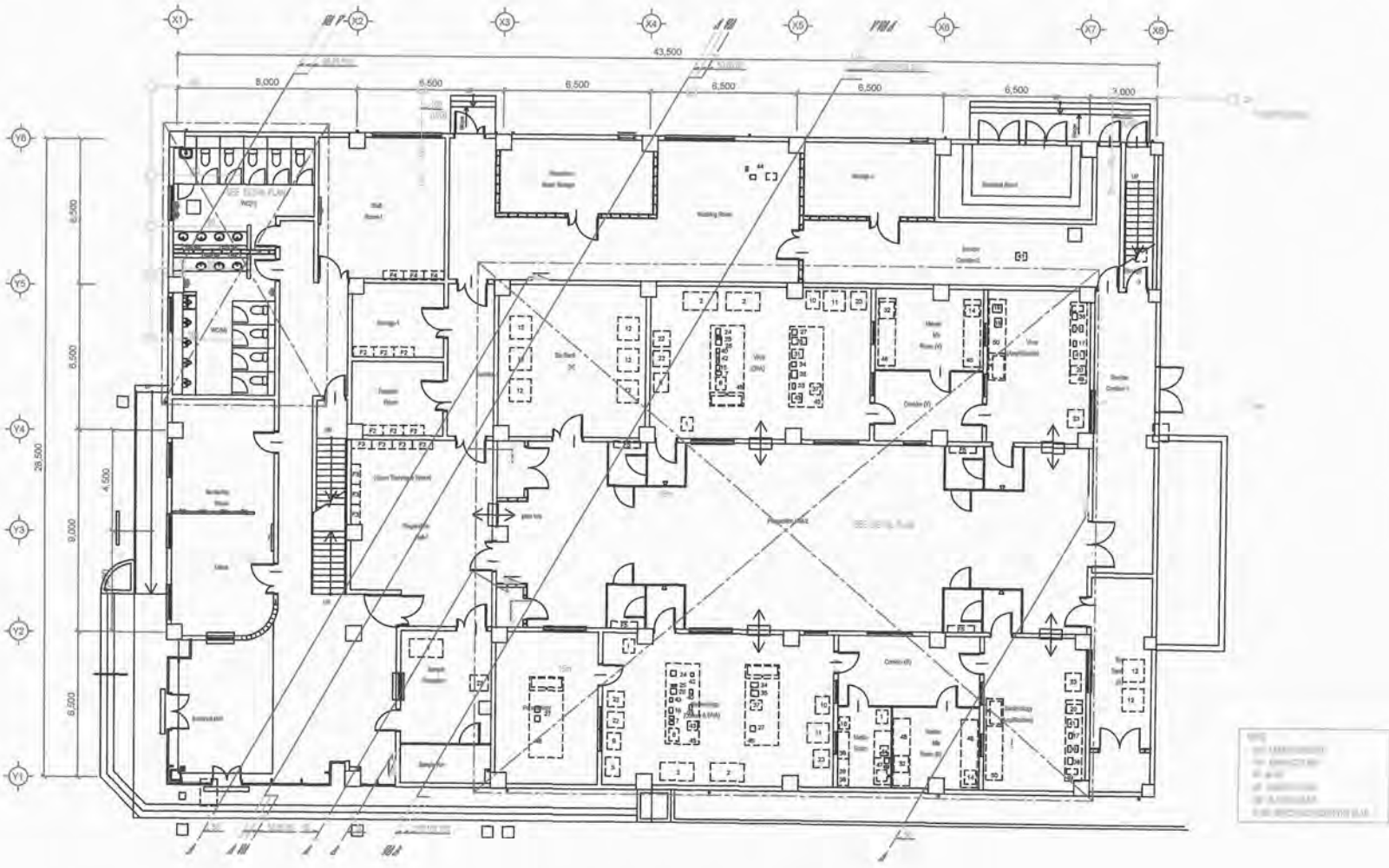
JICA	THE PROJECT FOR STRENGTHENING THE CAPACITY OF NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES IN THE FEDERAL REPUBLIC OF NIGERIA.	1/200	PIT PLAN FOR PLUMBING SYSTEM	CPHL M-04
			ORIENTAL CONSULTANTS GLOBAL CO., LTD.	



BASEMENT FLOOR PLAN FOR PLUMBING SYSTEM S=1:200

THE PROJECT FOR STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA.

1/200	BASEMENT FLOOR PLAN FOR PLUMBING SYSTEM	CPHE M-05
	ORIENTAL CONSULTANTS GLOBAL CO., LTD.	



GROUND FLOOR PLAN FOR PLUMBING SYSTEM

THE PROJECT FOR STRENGTHENING THE CAPACITY OF
NIGERIA CENTRE FOR DISEASE CONTROL NETWORK LABORATORIES
IN THE FEDERAL REPUBLIC OF NIGERIA.

GROUND FLOOR PLAN FOR PLUMBING SYSTEM

CPHL
M-05

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ARCHITECTS REGISTRATION COUNCIL OF NIGERIA

HOUSE 1A & 1B DOLPHIN SCHEME, BEHIND FEDERAL SECRETARIAT IKOYI, LAGOS
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UTAKO DISTRICT, ABUJA. TEL: 09-2917487, 08165528570

RECEIPT

No 0071385

Date: 15th Aug 2019

ARCON

Received from: Arc Babatunde Gbenga Ezekiel

the sum of: One hundred and Fifty Five thousand Naira Only

Cash: 2BR 1803-2493-0293, 1503-2498-2407

		₦	K
1.	Registration fee.	150000	=
2.	Annual Subscription fee for:		
3.	Seal.		
4.	Security Stamps. A1346804 - A1371304	5000	=
5.	Publications:		
	(a)		
	(b)		
	(c)		
	(d)		
6.	Others ARB/25/9/F2821-119. 08/6557		
	Total ₦	155,000	

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