Ministry of Education, Science and Technology

The Republic of Malawi

PREPARATORY SURVEY REPORT

ON

THE PROJECT FOR RECONSTRUCTION AND EXPANSION OF SELECTED COMMUNITY DAY SECONDARY SCHOOLS AND CONVENTIONAL SECONDARY SCHOOLS (PHASE III)

IN

THE REPUBLIC OF MALAWI

MAY 2014

JAPAN INTERNATIONAL COOPERARION AGENCY
(JICA)

MATSUDA CONSULTANTS INTERNATIONAL CO., LTD.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to Matsuda Consultants International Co., Ltd.

The survey team held a series of discussions with the officials concerned of the Government of Malawi, 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 Government of Malawi for their close cooperation extended to the survey team.

May, 2014

Takao Toda
Director General,
Human Development Department
Japan International Cooperation Agency

SUMMARY

1 Overview of Malawi

The Republic of Malawi (hereinafter referred to as "Malawi") is a landlocked country in south-eastern Africa. It gained independence from the United Kingdom in 1964. In shape it is long and narrow north to south, and has a land area of 118,000 km^2, approximately one-fifth of which is occupied by Lake Malawi. It has a population of 15.91 million and its population is growing at an annual rate of 2.9% (in 2012, World Bank). It is one of the most densely populated countries in sub-Saharan Africa. Agriculture accounts for approximately 30% of GDP, and 80% of the working population are engaged in agriculture or agriculture-related industries. The country's main agricultural products include tobacco, tea, sugar, cotton, nuts and coffee. Export of agricultural products accounts for 80% of total exports. The economy of Malawi grew by 9.0 % in 2009 owing to the good agricultural production and high prices for its export commodities in the international market in the recent years. However, the economic growth rate has been on the decline since then. The economy of Malawi grew by 4.0 % and 2 % in 2011 and 2012, respectively (World Bank). The GDP and *per capita* GNI of Malawi in 2012 remained at US$4,264 million and US$320, respectively (World Bank). These figures put Malawi among the poorest countries in sub-Saharan Africa. Its agriculture-based economic foundation is unstable as agricultural production and income are heavily dependent on weather conditions and demand in the international market. In order to sustain economic growth and reduce poverty, Malawi will have to not only improve agricultural productivity, but also develop the economic infrastructure and promote the business activities of small-scale enterprises. In addition, new sources of foreign currency such as mineral resources will also have to be addressed.

2 Background to and Outline of the Requested Grant Aid

The introduction of "Free Primary Education" in 1994 resulted in doubling of the number of enrolments in primary education from 1.89 million students (1994) to 4.03 million students (2011) in Malawi. This increase has led to a rapid increase in the number of enrolments in secondary education, from 50,000 students in 2003 to 256,000 students in 2011 and construction of school facilities has failed to keep up with the increasing demand for secondary education.

In response to the shortage of facilities caused by the increase in the number of enrolments, the Government of Malawi (hereinafter referred to as "GOM") has upgraded adult education facilities constructed by local communities to Community Day Secondary Schools (CDSSs). In addition, the GOM describes improvement and expansion of educational facilities as a priority issue in "The National Education Sector Plan (NESP) 2008 – 2017" and has taken measures to expand and improve secondary education facilities with concrete numerical targets such as 1) an increase in the access to secondary education (to raise gross enrolment

rate to 23.5 % by 2012 and to 30.5 % by 2017) and 2) an increase in the number of classrooms in public secondary schools, from 3,754 classrooms in 2007 to 6,348 classrooms by 2017. However, the gross enrolment rate has increased only slightly in recent years, from 20.3 % in 2008 to 21.4 % in 2011. The severe shortage of classrooms is a factor hindering access to secondary education.

There are 856 public secondary schools in the 12 districts in six Education Divisions in Malawi. More than 60 % of them (543) are CDSSs (MOEST Education Statistics 2012). Most of these CDSSs have difficulty in providing basic, secondary education because of the severe shortage and deterioration of basic facilities such as classrooms and laboratories. Many of conventional secondary schools (CSSs) constructed mainly by the government also suffer from shortage of facilities and equipment. Therefore, provision of basic facilities and equipment mainly to leader schools in school clusters, the focal point of education in rural areas, is urgently required.

The Government of Japan (hereinafter referred to as "GOJ") has implemented "The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools" (hereinafter referred to as "Phase 1") and "The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools Phase 2" (hereinafter referred to as "Phase 2") in order to support the education improvement plan of the GOM, which aims at elimination of the shortage of facilities. The GOM requested the Japanese Grant Aid from the GOJ for "The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools Phase 3," a follow-up project of the Phase 1 and Phase 2, for the construction, expansion and improvement of facilities for secondary education at 12 sites in five Education Divisions in the country.

3 Summary of the Survey Results and Content of the Project

JICA dispatched the Preparatory Survey Team to Malawi from July to August 2013. The Team verified the demand for secondary education, the necessity for and relevance of the construction, expansion and improvement of secondary school facilities in the proposed 12 project sites, as well as educational policies and strategies of the GOM. The Team also concluded that this Project could be implemented under the scheme of Grand Aid for Community Empowerment on the basis of the results of the survey on the capacities of local contractors for managing the construction works concerning the provision of facilities and equipment and for procurement, and the capacity of the Ministry of Education, Science and Technology for supervising project implementation. The Team and the Malawian side discussed the findings of the survey and reached an agreement that the Project should be implemented at the eleven sites listed in the table below and that, should it become necessary to reduce the number of sites due to restrictions on the scale of the Project or for any other reason, project sites should be chosen in accordance with the order of priority.

Table: Project Sites

No.	School	District	Education Division
Priority ranking - A			
U1	Kabwabwa CDSS	Lilongwe City	Central West
U2	Mlodza CDSS	Lilongwe City	Central West
U3	M'binzi CDSS	Lilongwe City	Central West
U4	Zomba Urban CDSS	Zomba Urban	South East
U5	Umbwi CSS Boarding	Dedza	Central West
R2	Mwatibu CDSS	Lilongwe Rural East	Central West
R4	Kabekere CDSS	Ntcheu	Central East
Priority ranking - B (in the order of priority)			
R6	Mzoma CDSS	Mzimba South	North
R5	Mwalawanyenje CDSS	Kasungu	Central East
R3	Chimwalira CSS Day	Zomba Rural	South East
R1	Muhasuwa CDSS	Chirazulu	Shire Highlands

After the First Preparatory Survey, the Survey Team analysed the results of the field survey, prepared the outline design, project cost estimation, and compiled the result as the "Preparatory Survey Report on the CDSS Phase 3". The Team visited Malawi from 3rd to 10th December 2013 and explained the summary of the outline design to the Malawian side

In principle, in a project implemented under the scheme of Grant Aid for Community Empowerment (GACE), facilities are constructed by a contractor or contractors from the recipient country. The GACE scheme allows for more cost reduction and better efficiency as compared to Grant Aid for General Projects because it uses standard design specifications based on local construction. An outline of this Project prepared by the Survey Team on the basis of the outcome of discussions with the Malawian side is given below:

1) Components of the Scope of Japanese Side

Facilities established in conventional secondary schools (hereinafter referred to as "CSS") as standard facilities and utilised effectively in Malawi will be considered as components of this Project. The minimal level of facilities (classrooms, laboratories, administrative offices, libraries and sanitary facilities) and equipment (furniture and laboratory equipment) required for the implementation of the secondary education curriculum will be provided to all the sites. Although a multipurpose hall is a standard facility of a CSS, multipurpose halls will be constructed only at the sites in urban areas where they are expected to be used by a large number of students and there is an urgent need for them, because of limitation on the budget. Since appropriate housing for teachers is essential for the assignment and long-term commitment of qualified teachers to work at schools in rural areas, teachers' houses will be constructed at the sites in rural areas. The number of houses to be constructed will be

determined in accordance with the budget availability for the construction. Groundwater supply systems will be established at the sites in rural areas where the public water supply system is not available. Photovoltaic power generation systems will be installed at the sites where there is no power grid nearby and, thus, it is not possible to extend power supply lines to the sites from a power grid.

2) Outline of the Facility and Equipment Plans

The table below gives an outline of the facility and equipment plans. Since this Project is to be implemented under the scheme of Grant Aid for Community Empowerment, the exact scope of the Grant Aid will be determined at the project implementation stage.

Table: Facilities

Site		Facility component									Total floor area (m^2)
		Classroom	Laboratory block	Administration block	Library	Toilet block	Multipurpose hall	Teacher's house	Groundwater supply system	Photovoltaic power generation system	
U1	Kabwabwa	6	1	1	1	4	1	-	-	-	2,092.88
U2	Mloza	8	1	1	1	4	1	-	-	-	2,280.74
U3	M'binzi	12	1	1	1	4	1	-	-	-	2,656.46
U4	Zomba Urban	8	1	1	1	4	1	-	-	-	2,280.74
U5	Umbwi	4	1	1	-	2	-	-	-	-	978.04
R1	Muhasuwa	4	1	1	1	2	-	4	○	-	1,451.96
R2	Mwatibu	8	1	1	1	2	-	12	○	-	2,684.92
R3	Chimwalira	4	1	1	-	2	-	2	○	-	1,162.89
R4	Kabekere	8	1	1	1	2	-	8	○	○	2,256.30
R5	Mwalawanyenje	8	1	1	1	2	-	4	○	-	1,827.68
R6	Mzoma	8	1	1	1	2	-	6	○	-	2,041.99
Total		78	11	11	9	30	4	36	6	1	21,714.60

Table: Furniture

Site		Classroom block				Laboratory block	Administration/ library block											Multipurpose hall		Exterior
		Desks for students	Chairs for students	Desks for teachers	Chairs for teachers	Stools	Desk for the head teacher	Chair for the head teacher	Desks for administrators	Desk for teachers	Chair for teachers	Library tables	Tables	Tables for PC	Office chairs	Chairs for visitors	Pipe chairs	Cabinets	Pipe chairs	Rostrums	Dustbins
U1	Kabwabwa	300	300	6	6	104	1	1	2	25	25	11	1	2	6	16	37	11	630	1	5
U2	Mlodza	400	400	8	8	104	1	1	2	25	25	11	1	2	6	16	37	11	630	1	5
U3	M'binzi	600	600	12	12	104	1	1	2	25	25	11	1	2	6	16	37	11	630	1	5
U4	Zomba Urban	400	400	8	8	104	1	1	2	25	25	11	1	2	6	16	37	11	630	1	5
U5	Umbwi	200	200	4	4	104	1	1	2	24	24	0	1	2	6	16	4	9	0	0	5
R1	Muhasuwa	200	200	4	4	104	1	1	2	17	17	11	1	2	6	16	37	9	0	0	5
R2	Mwatibu	400	400	8	8	104	1	1	2	17	17	11	1	2	6	16	37	9	0	0	5
R3	Chimwalira	200	200	4	4	104	1	1	2	16	16	0	1	2	6	16	4	7	0	0	5
R4	Kabekere	400	400	8	8	104	1	1	2	17	17	11	1	2	6	16	37	9	0	0	5
R5	Mwalawanyenje	400	400	8	8	104	1	1	2	17	17	11	1	2	6	16	37	9	0	0	5
R6	Mzoma	400	400	8	8	104	1	1	2	17	17	11	1	2	6	16	37	9	0	0	5
Total		3900	3900	78	78	1144	11	11	22	225	225	99	11	22	66	176	341	105	2520	4	55

Table: Laboratory Equipment

Classification	Equipment	Use	No. of Items	Quantity /School
Equipment for biology and physical science laboratories	Test tubes, beakers, flasks, measuring cylinders, funnels, evaporating dishes, petri dishes, pipettes, alcohol lamps, Bunsen burners, tripod stands, clamps, stop watches, Roberval balances, rulers, ammeters, voltmeters, autoclaves, laboratory tools, etc.	Biology and physical science/ equipment for basic experiments Common equipment for preparation room	62	593
Equipment for biology laboratories	Model of human eye on stand, model of human ear, human teeth set model and human skeletons Microscope, hand lens, Dissecting set, dishes and boards, forceps, etc.	Biology/for basic teaching materials Observation practice Dissection practice	14	63
Equipment for science laboratory	Periodic tables, thermometer, Mason's thermometer hygrometer, magnets, bi-metallic strips, Electric circuit board kits, rheostats, motors, diode, Pulley blocks, inclined slope sets, balances, brass hangers, Lenses, prisms, ray optics boxes, filters, etc.	Science/basic teaching materials For basic electrical experiments and practice For experiments in motion, energy, mechanics, etc. For optical experiments	33	235

4 Project Implementation System, Construction Period and Project Cost Estimation

1) Implementation System

For the implementation of this Project under the scheme of the Japanese Grant Aid for Community Empowerment, an Exchange of Notes (E/N) on the project implementation will be concluded between the GOJ and the GOM, followed by a Grant Agreement (G/A) concluded between JICA and the GOM. The GOM will entrust the Japanese procurement agent with implementation of the Project via an Agent Agreement (A/A) concluded between the two parties in accordance with the provisions of the Agreed Minutes (A/M) attached to the E/N and of the G/A. The procurement agent will implement the Project on behalf of the GOM and manage the various procurement agreements (with the supervising consultant, constructors, and suppliers of furniture and equipment), the progress of project implementation and project funds. The construction works will be carried out by contractors selected through a competitive bidding process between local construction companies, and the equipment will be procured by contractors selected through an international competitive bidding process under the concluded agreements. The Japanese Consultant who prepared the outline design will supervise the implementation of the Project with local engineers.

2) Construction Period and Project Cost Estimation

The period of the construction work in this Project is expected to be 31 months in total; 8 months from the conclusion of the A/A to the preparation for the bidding, conclusion of the construction agreement and commencement of the construction work, 22 months for the construction work, and 1 month for settling of business and handover after the completion. The procurement of the equipment and furniture is expected to take 20 months from the preparation for the bidding to the delivery and handover. The procurement work will be completed within the 22 months of the construction work.

The cost required for the implementation of this Project borne by the GOM will be approximately 5.4 million yen.

5 Verification of the Relevance of the Project

1) Relevance

- In TICAD V, “establishment of a society in which all the people benefit from the development” was declared as a goal of African development for the next five years and an increase in the enrolment rate and completion rate in primary and secondary education and improvement of the quality of education for the establishment of a strong foundation for the tertiary education were described as issues to be tackled in the education sector. Also in TICAD V, the GOJ announced its intention to provide Malawi with assistance in provision of basic social services including education, as well as

in agriculture, mining and infrastructure development. While many other donors focus their assistance in the education sector on primary education, the GOJ intends to provide assistance focused on improvement and expansion of secondary education.

- The demand for secondary education has been rising in Malawi since the introduction of the policy of "Free Primary Education" in 1994. However, the secondary education gross enrolment rate has not risen significantly since 2008 (from 20.3 % in 2008 to 21.4 % in 2011) against the target figure of 30.5 % by 2017, because facility construction has failed to keep up with the growing demand for education. The severe shortage of classrooms is a significant factor hindering expansion of access to secondary education.

- The GOM recognises the education as a priority sector in its national development strategy, "Vision 2020," and in its medium-term development strategy, MGDS II, and states that the expansion of equitable access and improvement of the quality of education are priority issues in the secondary education subsector of the NESP. The GOM is promoting, as government policy, the construction of new classrooms, the upgrading of CDSSs, the improvement and expansion of school facilities and the construction of teachers' houses for teachers working in remote areas, in the action plan based on NESP.

- The Project aims to provide direct assistance to issues facing secondary education in Malawi through the construction of classrooms and provision of facilities and equipment necessary for 11 schools in the five Education Divisions, construction of the multipurpose halls at the five urban sites, and construction of teachers' houses at the six rural sites; the Project is consistent with the NESP.

- The GOJ is committed to provide assistance to basic social services including education, agriculture, mining and infrastructure development in Malawi. Since this Project intends to provide assistance focusing on improvement of secondary education where many other donors focus their assistance on primary education, it is also consistent with the assistance policies/strategies of the GOJ. In addition, this Project is in compliance with one of the elements of Human Security; education and human resource development.

- In this Project, facilities and equipment will follow the local standard designs and the local specifications used in projects supported by other donors. Therefore, specialised technologies will not be required for the operation and maintenance of the facilities and equipment. The increase in the number of newly employed school staff including 52 teachers as a result of the Project is expected to correspond to 0.076% of the MoEST budget for personnel emoluments/expenditure in 2013/2014 (44,769 million Mwk).

Since the MoEST's budget for personnel emoluments has increased by an annual average of 35% or more in the last three years, it is considered that the Ministry will have no problem in securing and disbursing the additional budget for newly employed staff. The increase in facility maintenance costs expected after the completion of this Project will be within the range that can be covered by the existing schools' own budgets, such as the operating fund of each school. On the basis of these observations, it is considered that the implementation of this Project is relevant in terms of the operation and maintenance of facilities and equipment.

2) Effectiveness

[Quantitative Effects]

The following quantitative effects are expected from the implementation of this Project:

- The construction of facilities in this Project will increase the capacity of enrolments in the schools at the 11 planned project sites from the current capacity of 4,421 students confirmed in the Preparatory Survey (2012/2013) to 5,400 students. This increase will provide at least 979 more students with access to secondary education every year.
- The secondary schools at the 11 planned project sites will be able to enrol a total of 1,350 new students, 430 more annually than those enrolled in the school year 2012/2013.
- Construction of facilities and provision of equipment required for the implementation of the secondary education curriculum is expected to reduce the number of students per class from current 85.0 to 50.0 and the alleviation of the overcrowding in classrooms is expected to improve the learning environment and quality of education.

[Qualitative Effects]

The following qualitative effects are expected from the implementation of this Project:

- The construction of teachers' houses is expected to improve the quality in education as it will create a better environment for qualified teachers to be employed and to work for a long period of time at the schools.
- Construction of separate toilet blocks for male and female students and incinerators for female students is expected to improve sanitary condition in the schools and improve the internal efficiency concerning girls' enrolment.

On the basis of the above, this Project is considered to have a high level of relevance and is expected to be effective.

Contents

Preface

Summary

Contents

Location Map/Perspective

List of Figure and Tables/Abbreviations

Chapter 1. Background of the Project 1

1-1 Background and Summary of the Project 1

1-2 Natural Conditions 3

1-3 Environmental and Social Considerations 6

1-4 Other Issues (including Global Issues) 7

Chapter 2. Contents of the Project 9

2-1 Basic Concept of the Project 9

2-2 Outline Design of the Requested Grant Aid 9

2-2-1 Design Policy 9

2-2-2 Basic Design 17

2-2-3 Outline Design Drawings 38

2-2-4 Implementation/Procurement Plan 60

2-3 Obligations of Recipient Country 79

2-4 Project Operation and Maintenance/Management Plan 80

2-5 Project Cost Estimation 84

2-5-1 Initial Cost Estimation 84

2-5-2 Operation and Maintenance Costs 84

Chapter 3. Project Evaluation 90

3-1 Preconditions 90

3-2 Necessary Inputs by Recipient Country 90

3-3 Important Assumptions 91

3-4 Project Evaluation 92

3-4-1 Relevance 92

3-4-2 Effectiveness 94

APPENDIX

1 The Survey Team Members

2 Itinerary of the Survey

3 List of the people concerned

4 Minutes of Discussions (M/D)

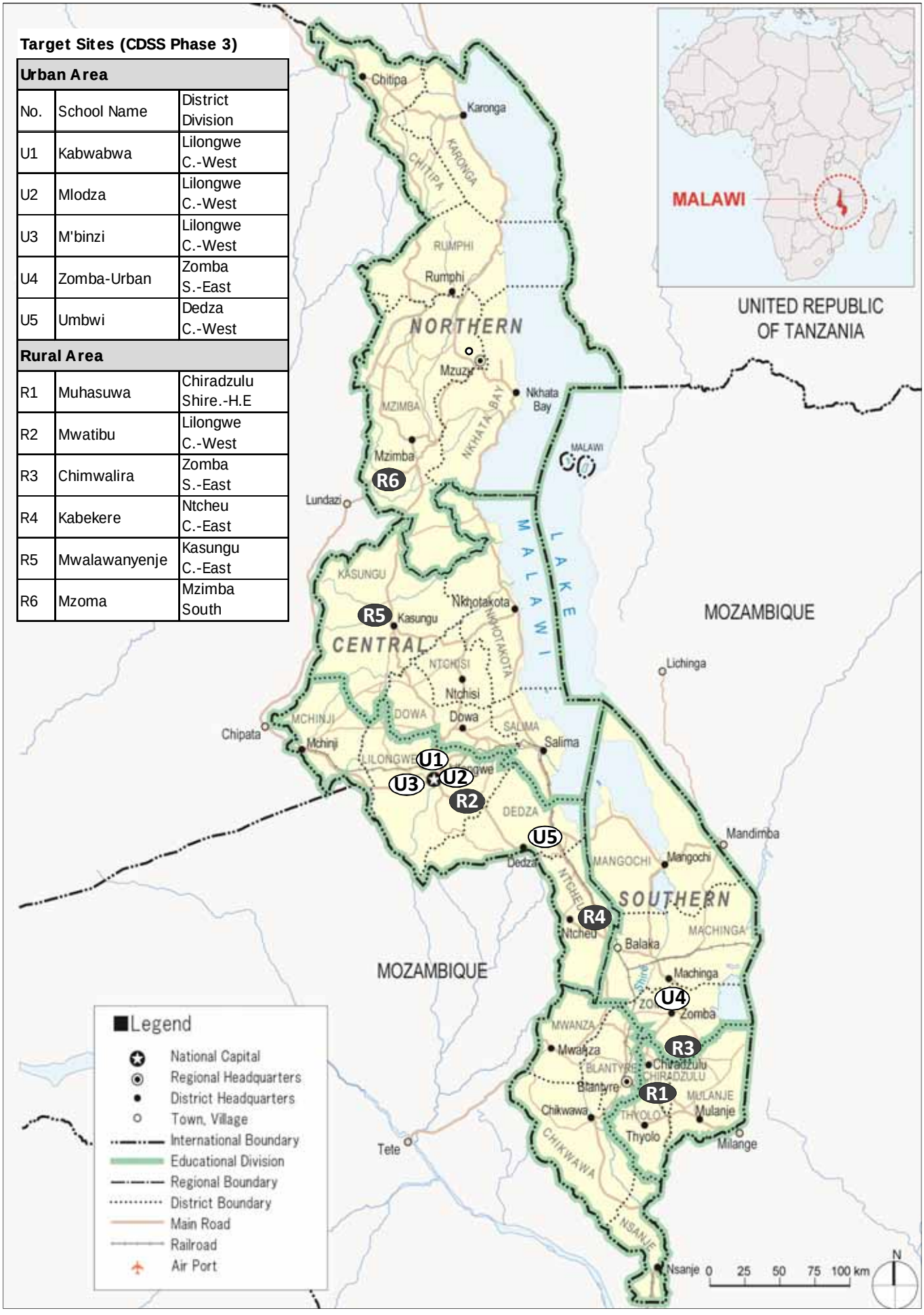
5 References

6 Other materials and data

Project Sites Location Map

Target Sites (CDSS Phase 3)

Urban Area		
No.	School Name	District Division
U1	Kabwabwa	Lilongwe C.-West
U2	Mlodza	Lilongwe C.-West
U3	M'binzi	Lilongwe C.-West
U4	Zomba-Urban	Zomba S.-East
U5	Umbwi	Dedza C.-West
Rural Area		
R1	Muhasuwa	Chiradzulu Shire.-H.E
R2	Mwatibu	Lilongwe C.-West
R3	Chimwalira	Zomba S.-East
R4	Kabekere	Ntcheu C.-East
R5	Mwalawanyenje	Kasungu C.-East
R6	Mzoma	Mzimba South



Perspective

List of Figures and Tables

Figure 1-1 Average Temperature and Precipitation at the Project Sites 3

Figure 2-1 Comparison of the Floor Plans of Classroom 26

Figure 2-2 Conceptual Diagram of Implementation System 62

Figure 2-3 Schematic Representation of the Comparative Analysis of the Systems for Construction Supervision Used in the Previous phases and the System Planned for this Project 73

Figure 2-4 Conceptual Diagram of Construction Supervision System 75

Figure 2-5 Implementation Schedule 79

Table 1-1 Project Sites 2

Table 1-2 Result of Geotechnical Survey 5

Table 1-3 Result of the Test Drilling 6

Table 1-4 Gender Disparity in Secondary Education 8

Table 2-1 Project Sites and Order of Priority 10

Table 2-2 Furniture and Equipment 12

Table 2-3 Demand for Enrolment at Each Project Site 19

Table 2-4 Facility Components of the Project and Their Quantities 22

Table 2-5 Furniture Components and Their Quantities 23

Table 2-6 Comparison of Floor Areas of Classroom 26

Table 2-7 Quantities of Facilities at Each Project Site 29

Table 2-8 Outline of Fire-Fighting Equipment 33

Table 2-9 Comparison of Specifications of Main Parts 33

Table 2-10 Quantities of Furniture 35

Table 2-11 Laboratory Equipment List 35

Table 2-12 List of Definitions of Firm Classifications 64

Table 2-13 Excerpt from NCIC List of Registered Contractors 64

Table 2-14 List of Tax Exemption Procedures by Target 65

Table 2-15 Lot Division 67

Table 2-16 Methods for Procurement of Different Scales Defined by ODPP 69

Table 2-17 Order of Tenders 71

Table 2-18 Parameters for Quality Control 75

Table 2-19 Sources of Procurement of Materials 77

Table 2-20 Details of Work to be Borne by the Malawian Side 80
Table 2-21 Amounts of ORT Allocated to the Target Schools 81
Table 2-22 School Fees, etc. Collected by the Target Schools 82
Table 2-23 Required Number of New Teachers to be Assigned to Each Target School 82
Table 2-24 Estimation of Additional Expenditures on Emoluments of New Teachers per Year 85
Table 2-25 Estimation of Annual Water Charges at Each Site 86
Table 2-26 Estimation of the Annual Electricity Charges by Site 87
Table 2-27 Annual Maintenance Cost at Each Project Site 88
Table 2-28 Proportion of the Maintenance Costs to the Estimated Ordinary Budgets 88
Table 3-1 Expected Quantitative Effects 95

Abbreviation

A/A	Agent Agreement
A/M	Agreed Minutes on Procedural Details
AfDB	African Development Bank
BQ/BOQ	Bill of Quantities
BS	British Standard
CDSS	Community Day Secondary School
CSS	Conventional Secondary School
DEC	Distance Education Center
EIA	Environment Impact Assessment
EIMU	Education Infrastructure Management Unit
E/N	Exchange of Note
ESIP	Education Sector Implementation Plan
G/A	Grant Agreement
GER	Gross Enrollment Ratio
GOJ	Government of Japan
GOM	Government of Malawi
IPC	Internal Procurement Committee
JCE	Junior Certificate Examination
JICA	Japan International Cooperation Agency
JICS	Japan International Cooperation System
MBS	Malawi Bureau of Standard
M/D	Minutes of Discussion
MDGs	Millennium Development Goals
MGDS	Malawi Growth and Development Strategy
Mwk	Kuwacha
MoEST	Ministry of Education, Science and Technology
MRA	Malawi Revenue Authority
MSCE	Malawi School Certificate Examination
NCIC	National Construction Industry Council
NESP	National Education Sector Plan
PIF	Policy and Implementation Framework
PSLCE	Primary School Leaving Certificate Examination
PTA	Parent-Teacher Association
QS	Quantity Surveyor
SABS	South African Bureau of Standard
SDF	School Development Fund
SSB	Stabilized Soil Block
VAT	Value Add Tax
WB	World Bank

Chapter 1 Background of the Project

Chapter 1. Background of the Project

1-1 Background and Summary of the Project

The Government of Malawi (hereinafter referred to as GOM) has emphasised the importance of education as an element of "Social Development" within the framework of the growth and development strategy for poverty reduction in its national development strategy, "Vision 2020", and its medium-term national development strategies, "Malawi Growth and Development Strategy: MGDS/2006 – 2011" and "Malawi Growth and Development Strategy II: MGDS II/2011 – 2016". The national policy for education, the "National Education Sector Plan: NESP/2008 – 2017", describes an increase in equitable access to education, improvement of the quality in education and improvement of the management capacity in education as priority issues in the entire education sector and an increase in the number of enrolments, improvement and expansion of educational facilities and an increase in the number of teachers/qualified teachers among the priority issues in secondary education.

In Malawi, the introduction of the policy of "Free Primary Education" in 1994 resulted in a rapid increase in the number of enrolments in secondary education, from 54,000 students in 2003 to 260,000 students in 2011, and this increase resulted in a rapid increase in demand for school facilities and teachers. The GOM has responded to the increasing demand for secondary education by upgrading adult education facilities constructed by local communities to "Community Day Secondary Schools (CDSSs)" in 1998 as a measure to alleviate the shortage of secondary education facilities caused by the increase in the number of enrolments. Despite this response, the gross enrolment rate still remains at 21.4 % (2011). Construction of educational facilities including classrooms is urgently required in urban areas, in particular, where severe shortage of classrooms caused by the population growth is a factor hindering an increase in the access to secondary education. Meanwhile, since CDSSs in rural areas have difficulty in providing even education at the minimum level because of severe shortage and deterioration of basic facilities for education, such as classrooms and laboratories, construction mostly in leader schools in school clusters, the focal points in education in rural areas, is urgently required. Although JICA has implemented "The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools" and "The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools Phase 2" in order to eliminate such shortage of facilities, additional measures are required for children who are unable to enrol in secondary education because of the shortage of facilities. Under these circumstances, the GOM requested Grant Aid under the scheme of Grant Aid for Community Empowerment (hereinafter referred to as "GACE") from the Government of Japan (hereinafter referred to as GOJ) for construction,

expansion and improvement of secondary education facilities in the entire country for the purpose of eliminating the shortage of classrooms and improving the basic facilities for education.

The GOJ dispatched a Preparatory Survey Team to Malawi from July to August 2013 to conduct a site survey of the 12 target schools. The team evaluated current state of school management and existing facilities, conditions of the sites and infrastructure in and around them and conditions for construction based on the result of the site survey and verified that all 12 sites satisfied the technical requirements for the implementation of the Project. Then, the team held a discussion with the Malawian side on the Project with the realistic project scale in mind. The two parties agreed to select project sites from a total of 11 candidate sites in the North (one school), Central West (five), Central East (two), Shire Highlands (one) and South East Education Divisions (two) and decided the order of priorities among them in the discussion. After having analysed the survey result, prepared the outline design and carried out a quantity survey to estimate project cost in Japan, the team decided to include all 11 candidate sites in the Project. The table below shows the 11 planned project sites and their priority ranking.

Table 1-1 Project Sites

	No.	School	District	Education Division
Priority ranking - A				
	U1	Kabwabwa	Lilongwe City	Central West
	U2	Mlodza	Lilongwe City	Central West
	U3	M'binzi	Lilongwe City	Central West
	U4	Zomba Urban	Zomba Urban	South East
	U5	Umbwi	Dedza	Central West
	R2	Mwatibu	Lilongwe Rural East	Central West
	R4	Kabekere	Ntcheu	Central East
Priority ranking - B (in the order of priority)				
1	R6	Mzoma	Mzimba South	North
2	R5	Mwalawanyenje	Kasungu	Central East
3	R3	Chimwalira	Zomba Rural	South East
4	R1	Muhasuwa	Chirazulu	Shire Highlands

The Survey Team explained the summary of the outline design to, held discussion on the design with and obtained approval for the design from the Malawian side during the period between 3rd and 10th December 2013 in Malawi. The team compiled the outcomes of the discussion in this document, “The Preparatory Survey Report on the Project for Re-Construction and Expansion of Selected Community Day Secondary Schools Phase 3”.

1-2 Natural Conditions

(1) Climate

Malawi is located in the subtropical climate zone and has a distinct rainy season and dry season in the course of a year. The rainy season lasts from December to March and 95 % of the annual precipitation is recorded during this season. The annual precipitation varies from 725 mm to 2,500 mm depending on the region. The average annual precipitation is 900 mm in the capital, Lilongwe, around 1,300 mm in Mzuzu located in the north and around 1,150 mm in Blantyre located in the south. It is hot during the rainy season and the average highest temperature in Lilongwe sometimes exceeds 30ºC. The average temperature during the cold dry season between May and August, which is a relatively comfortable season, ranges between 16°C and 20°C. The temperature rises gradually from September to October, the hottest months of the year. The temperature varies in accordance with altitude and latitude: the temperature in Mzuzu located in the north at a higher altitude is approximately 2°C lower than the temperature in Lilongwe. On the other hand, the average annual highest temperature exceeds 25°C in the area around Blantyre located in the south. Floods often cause damage mainly in the lowlands during the rainy season. As traffic networks are often cut during the rainy season, it would be desirable to implement the construction work during the dry season.

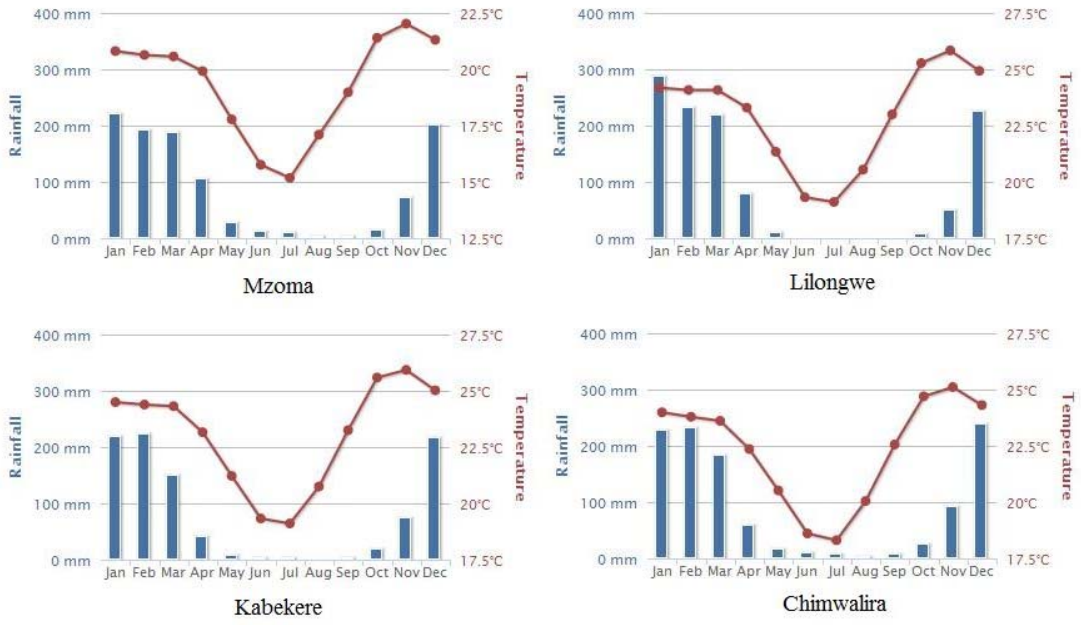


Figure 1-1 Average Temperature and Precipitation at the Project Sites

(2) Natural Disasters

The Survey Team learned of several cases of small scale damage such as damage to roofs caused by strong wind shown in the table below in the interviews on damage caused by natural disasters during the site survey. However, the team did not find any case of damage which would require special measures in the building design.

R5	Mwalawanyenje	Central East	Damage to a roof caused by strong wind (in 2010)
R6	Mzoma	North	Damage to a roof caused by strong wind (in 2010)

Meanwhile, the Survey Team observed depressions caused by soil erosion by rainwater on levelled ground at some sites of similar projects which they inspected. Therefore, deliberate planning is required for the landscape design on matters such as rainwater drainage, protection of slopes and layout and elevation of roads in the premises for sites in lowland and valleys which are topographically prone to flooding and sites on slopes.

(3) Topography

The Survey Team subcontracted with a local surveying company to conduct a topographic survey (field surveying and levelling) at all the sites for the preparation of the basic facility design. The surveyor created survey drawings which showed the latitude, longitude, azimuth, as well as adjacent existing structures, trees, obstacles and infrastructure, using the results of the levelling conducted with a gridize of 5 m x 5 m and a contour interval of 0.5 m. The surveying revealed that the planned project sites generally have flat or gently sloping terrain, which was not likely to pose any problem to the facility construction.

(4) Geology

The Survey Team subcontracted with a local geotechnical surveyor to conduct a geotechnical survey at all the sites for the preparation of the optimal basic facility design. The surveyor conducted dynamic cone penetration tests at an average of 50 locations per site at the depth of 3 m max. below the ground level on the assumption that a single story building was to be constructed. The surveyor collected undisturbed samples from each site and conducted three types of laboratory tests (atterberg limits test, particle size distribution and triaxial compression test) on the samples to determine physical properties of the soil at the site. The surveyor also conducted water penetration tests of the soil to measure permeability of the soil which is required for the preparation of an appropriate drainage plan. The survey results showed that the soil at all the sites had sufficient bearing capacity, *i.e.* above 150 kN/m^2. The surveyor found large and small rocks on

almost the entire area of the project sites. Meanwhile, the organic expansive soil observed in Phase 1 was not found at any site.

Table 1-2 Result of Geotechnical Survey

Site		Pit (m)	Soil Type	SBC (kN/m^2)	Percolation Value	
					(mm/min)	Judge
U1	Kabwabwa	3	Very firm greyish non plastic sandy soils, rock beyond 1 m	>150	N/A	high
U2	Mlodza	2	Reddish stiff gravelly clays of intermediate plasticity	272	1.55-2.00	low
U3	M'binzi	3	Very firm light grey no plastic sandy soils, grey rock beyond 1.2 m	>150	2.42-N/A	medium
U4	Zomba Urban	2	Red silty sands of intermediate plasticity, rocks at advancing depth	377	1.40-1.90	low
U5	Umbwi	2	Red sandy clays of intermediate plasticity	170	1.82-4.29	medium
R1	Muhasuwa	2	Dark red stiff red clayey sands of low plasticity with traces of gravel	319	2.40-4.10	medium
R2	Mwatibu	2	Greyish stiff clays of intermediate plasticity with presence of gravel and sand size particles	269	0.61-1.08	low
R3	Chimwalira	3	Light red stiff non plastic sandy gravels soils to decomposed light red rock	425	2.17-2.91	medium
R4	Kabekere	3	Very firm light red non plastic sandy soils, rock beyond 1 m	150	3.20-5.17	high
R5	Mwalawanyenje	2	Predominantly reddish silty sands of intermediate plasticity, rock beyond 2 m	219	N/A	high
R6	Mzoma	2	Predominantly reddish slightly clayey sands of intermediate plasticity	239	3.29-5.00	high

SBC: Soil Bearing Capacity

(5) Groundwater Sources

Electrical prospecting of groundwater was conducted at the six sites in rural areas where a public water supply grid had not been established (from August to September). In the prospecting, electrical resistivity was measured and evaluated using horizontal electrical profiling and vertical electrical sounding (electrical resistivity method) and used for predicting locations and depths where existence of groundwater is expected. Test drillings based on the results of the electrical prospecting had been conducted. The specifications for the test drilling are as follows:

- Diameter of finished borehole: 6 inches, Average drilling depth: 60 m
- Screen/casing diameter: 6 inches (external diameter: 160 mm), PVC
- Installation of screens at the depth of the aquifer and gravel packing in the space between the borehole surface and the screens
- Borehole development
- Pumping test (step-drawdown test, constant discharge test and recovery test)
- Water quality analysis (in accordance with the guidelines of Malawi and the WHO Guidelines for Drinking-Water Quality)

The results of the test drillings at 6 targetted sites confirmed the presence of groundwater expected to yield 10 m^3/day or more, the volume of water required at those sites.

Samples of water taken from the boreholes were sent to the Central Water Laboratory of the Ministry of Agriculture, Irrigation and Water Development, and the quality of the sample water was analyzed in accordance with the standards of drinking-water quality of Malawi and the WHO Guidelines for Drinking-Water Quality. The results of the analysis revealed that the quality of the sample water satisfied the criteria for drinking water.

Table 1-3 Result of the Test Drilling

Site	Succeeded drilling No.	Borehole depth	Evaluation on water quantity & quality
R1 Muhasuwa	No.1	67m	◎
R2 Mwatibu	No.1	60m	◎
R3 Chimwalira	No.1	51m	◎
R4 Kabekere	No.3	51m	◎
R5 Mwalawanyenje	No.1	54m	◎
R6 Mzoma	No.2	52m	◎

1-3 Environmental and Social Considerations

(1) Impact of Project Implementation on the Natural and Social Environments

The objective of this Project is to expand the facilities of the existing secondary schools. Therefore, relocation of people, significant change in the living environment of the residents living near the sites or new negative impact on the natural and social environment in and around the school premises is not expected from its implementation. Since some changes to the environment are expected from land preparation in sloping areas of the school premises and installation of rainwater and wastewater disposal facilities, the Project is to be designed to have minimum undesirable impact on the environment in view of the following:

- There should be no need to transport earth outside the premises by maximising the topographic features of the sites and minimising land preparation in site planning.
- There should be no soil runoff or erosion by disposing rainwater within the premises by drain ditches and infiltration pits appropriately installed on the premises.
- Septic tanks should be constructed on the premises and wastewater should be disposed of by infiltration in the tanks so that the wastewater has no negative impact on the environment outside the premises. Measures should also be taken to prevent the wastewater generated on the premises from polluting the underground water veins.
- Construction of facilities where trees stand or where there is a water vein should be minimised in consideration of conservation of the environment and protection of the ecosystem inside and outside the premises.

By incorporating the above-mentioned considerations, this Project is considered to be classified category C which is "a project deemed to have minimum or no undesirable impact on the environment and society", on the environmental and social considerations guideline of JICA.

(2) Laws and Regulations on Environmental Impact Assessment (EIA) and Application for EIA

The GOM enacted the Environmental Act and established the Guidelines for Environmental Impact Assessment (EIA). Environmental Affairs Department in the Ministry of Forestry, Fisheries and Environmental Affairs is the competent authority for EIA. Section 24/1 of the Environmental Act provides projects subject to EIA by type and content. If the provisions of the section apply to a project, an Outline of Project Brief must be submitted to the Environmental Affairs Department for assessment of the project in regard to the need for EIA.

This Project can be classified as "A4. Infrastructure Projects" provided in the Environmental Act. However, since no specific provisions of Section 24/1 apply to the Project, there is no need to submit the Outline of Project Brief and, hence, there is no need for EIA.

1-4 Other Issues (including Global Issues)

Although the GOM has stated achievement of gender equity in access to education as an element of its policy on secondary education, the gender disparity in secondary education is not small as the indicators in education in the table below show. In addition to the prejudice in the society against educating girls, concern over security of long-distance commuting and self-boarding and dropouts due to pregnancy and childbirth are

considered as causes of the disparity. It is generally known that non-existence of separate clean toilets for boy and girl students is a factor hindering school enrolment of girls. This Project will be designed to include construction of flush toilets in separate building blocks for boy and girl students and incinerators for sanitary items in order to eliminate one of the factors hindering enrolment of girl students.

Table 1-4 Gender Disparity in Secondary Education

	Number of enrolments	Proportion to the total number of enrolments	Passing Rate of JCE	Passing Rate of MSCE	Number of dropouts
Boys	142,548	54.8%	73.3%	59.4%	6,178
Girls	117,516	45.2%	58.3%	48.6%	8,466

Data source: Education Statistics 2012, MOEST

Note: The data on the pass rates of the JCE and MSCE are those for the year 2011.

Chapter 2 Contents of the Project

Chapter 2. Contents of the Project

2-1 Basic Concept of the Project

(1) Objective of the Project

The GOJ has implemented "The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools" (hereinafter referred to as "Phase 1") and "The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools Phase 2" (hereinafter referred to as "Phase 2") in order to support the education improvement plan of the GOM, which aims at elimination of the shortage of facilities. The objective of this Project, which is planned as a successor project of Phase 1 and Phase 2, is to improve access to secondary education and learning environment through construction, expansion and improvement of secondary school facilities in the planned project area, in accordance with the overall goals of the GOM.

(2) Project Components

In this Project, school facilities considered as standard facilities in Malawi (ordinary classrooms, laboratories, libraries, administration offices, toilets, multipurpose halls, teachers' houses and other required facilities such as overhead water tanks and septic tanks) will be constructed and classroom furniture and equipment for laboratories will be installed, in order to achieve the above-mentioned objective at the 11 sites out of 12 requested sites selected in the final decision, using the site selection criteria agreed upon by the Malawian and Japanese sides.. Implementation of this Project is expected to increase the number of enrolments in secondary education by increasing the capacity of education facilities at the secondary level. Furthermore, it willand to create a good teaching/learning environment with provision of various facilities required for implementation of secondary education in the project area.

2-2 Outline Design of the Requested Grant Aid

2-2-1 Design Policy

(3) Basic Policy

In this Project, which is to be implemented under the Japanese Grant Aid for Community Empowerment scheme, standard design specifications established with local construction methods, local construction technologies and locally available materials and equipment will be used in designing the facilities and equipment.

1) Selection of the Planned Project Sites

The Survey Team implemented site surveys at the 12 requested project sites and verified whether or not each site satisfied the technical selection criteria for the project implementation mentioned below.

- There is sufficient demand for enrolment.
- There is sufficient space for facility expansion within the school premises.
- There is no risk of serious natural disasters or insecurity at the site.
- There is no hindrance to construction work and access to site for construction.
- There is no duplication with any construction/improvement projects by other donors or the Government.
- The land use right is established.
- The Government ensures that the candidate school will be allocated a budget for operation and maintenance.

The Survey Team verified that all 12 sites satisfied the above-mentioned technical criteria in the site surveys.[1] The team held a discussion with the GOM on the results of the site surveys within the limits on the scale of and budget for the project. As a result of the discussion, the two parties agreed not to consider Nkhorongo CDSS for the implementation of this Project. The reasons for this decision are 1) that the construction work at this site is expected to cost more than that at the other sites because of its location in Mzuzu in the north of the country and 2) that the demand for enrolment at this site is relatively low compared with the other sites. The two parties confirmed in the discussion that the remaining 11 sites should be considered as the candidate project sites. The parties also agreed that, should it be necessary to select some sites from the 11 sites for the project implementation, priority should be given to the sites in urban areas where implementation of the Project was required more urgently than in rural areas and agreed upon the priority order among the sites in rural areas. It was decided to divide the 11 sites into two groups, giving high priority for 7 sites ("Priority ranking – A group") and comparatively lower priority for 4 sites ("Priority ranking – B group") for the sake of convenience of conducting tenders for the project implementation.

Table 2-1 Project Sites and Order of Priority

No.	School	District	Education Division
Priority ranking - A			
U1	Kabwabwa CDSS	Lilongwe City	Central West
U2	Mlodza CDSS	Lilongwe City	Central West
U3	M'binzi CDSS	Lilongwe City	Central West
U4	Zomba Urban CDSS	Zomba Urban	South East
U5	Umbwi CSS Boarding	Dedza	Central West
R2	Mwatibu CDSS	Lilongwe Rural East	Central West

[1]There is no legal document concerning the land use right at the project sites. The Survey Team was able to examine the actual usage of land at the project sites because they are all within the premises of the existing schools. Upon request from the Survey Team, MoEST has begun the procedure for Title Deed of the planned 11 project sites.

R4	Kabekere CDSS	Ntcheu	Central East
Priority ranking - B (in the order of priority)			
R6	Mzoma CDSS	Mzimba South	North
R5	Mwalawanyenje CDSS	Kasungu	Central East
R3	Chimwalira CSS Day	Zomba Rural	South East
R1	Muhasuwa CDSS	Chirazulu	Shire Highlands

2) Selection of Components

The Malawian side and the Survey Team discussed and agreed to select components with great necessity mentioned below from the requested project components for implementation in this Project, in order to keep the scale of the Project implementable and budget within a limit. As the Malawian side insisted that each site should be provided with all the selected facility and equipment components, the two parties agreed that, if it became necessary to downsize the Project because of shortage of funds at the time of tender after the Project was launched, the number of the project sites, not the components, should be reduced.

a. Facility Components

- Classrooms, administration offices, libraries, laboratories and toilets

  Construction of these facilities, which are considered absolutely indispensable for the operation of a secondary education institution and implementation of the secondary school curriculum, should be included in the Project.

- Teachers' houses (at the sites in rural areas)

  The GOM has employed people who have experience of working as a primary school teacher as secondary school teachers in response to the rapid increase in the number of enrolments in secondary education. As a consequence, officially qualified secondary school teachers comprise only approx. 48 % of secondary school teachers (2012). Of particular concern is the fact that the proportion of qualified teachers at CDSSs (42 %) is significantly lower than that at CSSs (86 %). Therefore, improvement of the quality of the teachers at CDSSs is a significant issue. Construction of decent teachers' houses is essential to have qualified teachers work for a long period of time at secondary schools in rural areas because the living environment around schools in rural areas is not so developed as in urban areas. Therefore, construction of teachers' houses restricted to the sites in rural areas should be a component of the Project.

- Multipurpose halls (at the sites in urban areas)

  A multipurpose hall is essential for daily school operation as it is used for various meetings and students' activities. Many CSSs have multipurpose halls as standard facilities, while most of CDSSs constructed by local community do not have them. Some CDSSs use churches in the neighbourhood for important school events. However, in reality, only a limited number of churches are available for such a purpose. Even though the need for a multipurpose hall is more or less the same at all

the sites, it is particularly difficult for the schools at the urban sites to find alternative facilities to the multipurpose halls because they have larger numbers of students, PTA members and students of cluster schools than the schools in rural areas. Because of the limitation on budget, construction of multipurpose halls restricted to the sites in urban areas should be a component of the Project.

- Groundwater supply systems (at the sites in rural areas)

  In principle, the Malawian side should extend waterworks to the project sites. However, it is necessary to drill boreholes to secure groundwater sources at the sites in rural areas because public infrastructure for water supply has not been developed at those sites. At present, a ground water supply system equipped with a hand pump is available at each of the rural project sites, the said system is shared with community. Therefore, construction of boreholes equipped with electric pumps as a source of groundwater exclusively for the schools at the project sites should be included in the project components.

b. Equipment

The Malawian side and the Survey Team agreed to procure equipment in this Project as in Phase 2. In Phase 2, equipment for physical education was given priority rank B. However, in reality, the surplus generated in the tender for the procurement of the equipment was used for implementing facility components, instead of procuring the equipment for physical education. The two parties agreed to include procurement of the equipment for physical education in the scope of the Malawian side in this Project.

Table 2-2 Furniture and Equipment

Item		Place of installation	Scope
Furniture	Desks and chairs	Classrooms, laboratories, administration offices and libraries	Japanese side
	Chairs and rostrums	Multipurpose halls	
	Cabinets	Administration offices and libraries	
Teaching material	Laboratory equipment	Laboratories	Japanese side
	Equipment for physical education	Outdoors	Malawian side

(4) Policy on Natural Conditions

1) Climate

There is little difference in meteorological conditions at the planned project sites, despite the fact that they are spread widely in all three regions in Malawi at an altitude between 800 m and 1,200 m above sea level. The annual precipitation at the planned sites is within the range between 900 mm and 1,600 mm. As 95 % of the annual precipitation is recorded in the rainy season between December and March, floods frequently cause damage mainly in lowlands. As these floods often cut off traffic networks, it is advisable to limit construction work during the rainy season to a minimum. There is no problem in using the measures against meteorological conditions in the standard design and specifications for the Project.

- Facilities should be designed to provide a comfortable environment inside the school throughout the year without using much energy by using eaves of roofs to prevent strong sunlight and rainwater from entering inside the facilities and ensuring efficient natural lighting and ventilation.

2) Geology and Topography

The analysis of the results of the geotechnical survey revealed that the soil composition of laterite and sandy soil was found in all the project sites except for R5/Mwalawanyenje, where the soil composition of gravel mixed with silt was found. The analysis confirmed that the load bearing capacities of the soil at the sites were within the range between 150 kN/m^2 and 300 kN/m^2, which indicated that the soil at all the sites satisfied a required and sufficient safety standard. There are many rocks underground near the ground surface at most of the sites. Construction work should be implemented with attention paid to the existence of those rocks.

Only four of the 11 planned project sites are located on flat ground and the rest are located on gentle slopes. The strategies mentioned below should be followed in designing facilities for rainwater disposal at the time of heavy rainfall during the rainy season (between December and March).

- The principal method of rainwater disposal should be disposal within the premises with the construction of drainage ditches and infiltration pits. Facilities required for appropriate disposal of overflow water outside the site should also be designed because the soil at the planned project sites has poor water permeability.
- Soil erosion around the planned facilities should be minimised with appropriately designed land preparation and landscaping.

3) Earthquakes

Earthquakes occur near the Great Rift Valley along the shores of Lake Malawi. The most recent was a series of earthquakes that occurred near Koronga in the Northern Region in

December 2009. None of the earthquakes released a large amount of seismic energy and no record of damage caused by earthquakes was verified in the site surveys. The facilities should be designed with the seismic horizontal force calculated with a seismic story-shear coefficient of 0.08 as in the previous phases taken into consideration.

(5) Policy on Socio-Economic Conditions

As a general anti-theft measure, burglar bars should be installed on the doors and windows of rooms where theft is a concern, including rooms in the administration blocks and laboratory blocks. As the Town and Country Planning Standards and Guidelines for Developments apply to construction projects implemented in urban areas, where building permits are required for construction projects, construction of a boundary as stipulated in the Standards and Guideline as a measure to prevent theft and crimes will be required at the project sites in those areas. It is advisable that the Malawian side should construct such boundary walls at the urban project sites.

(6) Policy on Construction and Procurement Conditions

1) Building Standards, Related Legislation and Permits/Approvals

Construction standards and specifications

Malawi does not have its own design standards. Instead, British Standards (BS) and South African Bureau of Standards (SABS) are in general referred to as the construction standards and specifications. The facilities to be constructed in this Project will be designed in accordance with local standard designs based on BS and SABS in principle and Japanese standards as necessary.

Building permit

Application for building permits is required for both public and private building construction projects in an urban area. The application is to be submitted to the Planning Department of the town hall concerned. Among the planned project sites of this Project, five are in urban areas. An applicant for a building permit has to be an architect/structural designer with official qualifications and registration. EIMU, which has employees with required qualifications, will submit applications for this Project. The consultant will submit drawings to EIMU at the stage of approval of tender documents and EIMU will submit the drawings with signature of an officially qualified architect/structural designer on them to the Planning Department of the town halls concerned. Submission of site location maps, site plan drawings, general plans (floor, elevation and section plans) and, if construction of large-span frames is planned, structural drawings of the frames concerned is required for the application. A maximum of 60 days are said to be required for the examination of an application for a building permit. An application is examined whether a project concerned conforms to the provisions on the performance-oriented bulk control system in the Town and Country

Planning Standards and Guidelines for Developments (a trial version) or not. The actual evaluation items include the boundaries of the premises, land utilisation, floor area of the buildings, accessibility, parking lots, construction materials, water supply and drainage, laying of power cables, hygiene, measures for the disabled and firefighting services.

Although building permits are not required for construction at the planned project sites in rural areas, the buildings should be designed appropriately and reasonably in accordance with the guidelines mentioned above to satisfy the minimum required building standards.

Since Malawi has neither a Fire Services Act nor standards governing the installation of firefighting equipment, each project requires an agreement with the local fire department on installation of such equipment at each project site. In this Project, the policy of installing the minimum required firefighting equipment deduced from examples of agreements with local fire departments in the previous phases should be adopted.

Environmental Impact Assessment

Since this Project is for expansion of the existing educational facilities as the previous phases and no project site has an area larger than 30 ha, the procedure for the environmental impact assessment provided in the Environmental Management Act 1996 of Malawi will not apply to the Project. If the necessity to implement the assessment has arisen as a result of revision of the act, EIMU will have to implement the assessment without delay using the experience in similar projects in the past.

2) Construction and Procurement Circumstances

Materials and equipment required for the construction including imported materials and equipment are commercially available in Malawi. Cement, secondary concrete products including aggregate and concrete blocks, timber and plywood are among the major construction materials produced in Malawi. Many of the other construction materials and equipment are imported from South Africa. The policy of this Project is to use local products and general-purpose imports selected from the procurable goods. Sufficiently workable, cost-efficient and maintainable materials and equipment should be selected.

3) Utilisation of Local Construction Methods

Most of the existing school buildings at the project sites are constructed with burnt bricks. However, as the brick plants have not produced burnt brick in recent years for environmental conservation, most of the burnt bricks available in the market are cottage industry products produced with no quality control. Therefore, use of such bricks in the public works is prohibited, in principle. What is recommended instead is the masonry structure using stabilised soil blocks (SSBs). Masonry with SSBs will be the main structure to be used in this Project as in the previous phases.

(7) Policy on Utilisation of Local Companies

1) Local Construction Companies

Local construction companies are registered with the National Construction Industry Council (NCIC). NCIC-registered companies are classified by type of business and companies in the same type of business are classified into different categories in accordance with the scale of business, number of engineers, types and quantities of equipment owned and works completed. There are rules based on the NCIC registration list on eligibility of companies to participate in tenders and methods to select contractors for public works of different scales. In the previous phases, construction companies in the highest category, which are eligible to participate in a tender worth unlimited, and those eligible to participate in a tender worth five million Mwk or below were invited to participate in the tender. The contract was awarded to one of the companies in the highest category and this contractor completed the construction work. The actual performance of the contractor in the previous phases indicates that an NCIC-registered construction company in the unrestricted category has sufficient technological and financial capacity to implement a project with the size and components equivalent to this Project. Therefore, a registered construction company in the same category will also be utilised in this project.

2) Local Suppliers

Medium-sized suppliers of construction materials are found in the capital of the nation, Lilongwe, and the commercial capital, Blantyre. Meanwhile, only small construction material dealers with the size of a retail shop are found in the rest of the country, including rural areas. In many cases, construction companies import construction materials directly from manufacturers in South Africa and other foreign countries by themselves after being awarded contracts and procurement from local suppliers is restricted to a very limited number of materials and replenishment of materials which have run out.

Orders for the procurement of equipment and furniture in this Project should be placed with specialised suppliers separately from the order for the construction of the facilities. In Malawi, there are some large-scale factories independently manufacturing furniture while there are also many suppliers which deliver completed furniture imported from third countries. With regard to the procurement of laboratory equipment, there are local suppliers specialising in such equipment. The previous phases have a proven record of successful delivery of such equipment and furniture. Based on these facts, procurement of the furniture and equipment in this Project is expected to be implemented without problem.

3) Local Consultant

10 architects firms, 26 engineering firms and 11 quantity surveyor (QS) firms are registered with NCIC. The Malawi Institute of Architects, the Malawi Institute of Engineers and the Quantity Surveyors Institute of Malawi manage the qualification systems for architects, engineers and QSs, respectively. In this Project, on the assumption that the Japanese Consultant who prepared the outline design for this Project will supervise the construction work at the implementation stage, a policy of employing local consultant and engineers for work supervision as necessary will be adopted.

(8) Policy on Operation and Maintenance

Easy-to-maintain facilities should be built and facilities and equipment which do not require specialised techniques for operation and maintenance should be procured and installed in this Project. Materials and equipment which are difficult to maintain or whose consumable spare parts are not easily obtainable should not be adopted in the Project. In order to reduce the operating/maintenance costs, the facility designs to be adopted should ensure, in addition to natural lighting and ventilation, low electric power consumption by keeping the use of mechanical facilities to the minimum required level.

(9) Policy on Grade Setting of Facilities and Equipment

Facility grades should be in accordance with local standard designs and specifications. While the policy of this Project is to procure the same equipment as that actually used in the secondary education curriculum, the specifications of equipment locally obtainable through a bidding process and which can be maintained locally should be adopted as the specifications of the equipment to be procured in this Project.

(10) Policy on Construction Period

The Survey Team concluded that a period of approx. 20 months per bidding lot was appropriate as the standard construction period based on the results of the analysis of the works completed in the previous phases and the findings in the surveys including the interviews with the local assistant consultant and staff of the construction company, consultant and procurement agent conducted in the site surveys. An appropriate schedule should be designed for the entire work by scheduling as little work as possible in the rainy season (between December and March), utilising construction methods adapted to the local conditions and preparing reasonable plans for procurement management and construction work.

2-2-2 Basic Design

(1) A Study on the Demand for Enrolments in the Commuting Area of Each Site

With the exception of U5/Umbwi boarding school, all the schools at the ten remaining sites are full-time day schools. Among those ten schools, R3/Chimwalira is a CSS

established by the government and the remaining nine are community-established CDSSs. Each of these ten schools has a commuting area within a radius of 10 km in principle and enrols qualified children who graduated from primary schools (which are called feeder schools) within its commuting area. Demand for enrolment of the target secondary school at each project site was estimated by calculating the number of students in its feeder schools who were expected to have passed the PSLCE in 2016, the year following the year in which this Project should be completed, from the number of students currently in the feeder schools. The following conditions were used in the estimation.

- Since the number of students who pass the PSLCE is approx. 30 % of the number of students who are enrolled in Form 1 at the national level, almost all students who have passed the PSLCE will have to be enrolled in secondary education in order to achieve the goal of the gross enrolment rate in secondary education of 30.5 % by 2017. Therefore, the number of students who pass the PSLCE should be assumed as potential demand for enrolment.
- Many students who enroll in private secondary schools, with the exception of a very limited number of super-elite schools (which also charge extremely high school fees), do so because they have no other option after having failed to be selected for enrolment in public schools. Therefore, the number of enrolments in private secondary schools should be disregarded in the estimation.
- Some feeder schools of an urban project site are also feeder schools of neighbouring secondary schools (or students of a feeder school are selected for enrolment in more than one secondary school). Therefore, this project school concerned does not have to meet the entire potential demand for enrolment in its commuting area, on the assumption that the capacities of secondary schools in the area should remain unchanged, the number obtained by subtracting "the number of students who are enrolled in other secondary schools" from "potential demand for enrolment in the area" should be considered as the demand for enrolment of the school concerned.

Table 2-3 Demand for Enrolment at Each Project Site

No.	Site	Number of students in the feeder schools				Number of enrolments in secondary schools other than the one at the project site from its feeder schools[*5]	Demand for enrolment[*6]	Required number of F1 classes[*7]
		In 2013	In 2016 (projections)					
		Total number of students[*1]	Total number of students[*2]	Number of G8 students[*3]	Number of students who have passed the PSLCE[*4]			
U1	Kabwabwa CDSS	42,247	57,754	3,228	2,107	292	1,815	36
U2	Mlodza CDSS	32,935	45,024	2,517	1,643	212	1,431	29
U3	M'binzi CDSS	19,147	26,175	1,463	955	466	489	10
U4	Zomba Urban CDSS	12,899	17,634	986	644	203	441	9
U5	Umbwi CSS Boarding	No estimation was made because students in the entire district are enrolled in this school						
R1	Muhasuwa CDSS	6,913	7,705	431	281	0	281	6
R2	Mwatibu CDSS	10,853	12,097	676	441	24	417	8
R3	Chimwalira CSS	8,673	9,667	540	352	0	352	7
R4	Kabekere Scottish CDSS	2,632	2,934	164	107	0	107	2
R5	Mwalawanyenje CDSS	5,361	5,975	334	218	0	218	4
R6	Mzoma CDSS	4,599	5,126	287	187	0	187	4

*1 The numbers in the survey sheets were used as the data on feeder schools, in principle. However, data in EMIS 2012 were also used to supplement those missing in the survey sheets.

*2 Projection based on the average annual rates of the increase in the number of students for the period between 2003 and 2012 (8.13 % in urban areas and 2.75 % in rural areas) estimated from the data in the Education Statistics (EMIS)

*3 Estimates based on the assumed proportion of the number of 8th form students to the total number of students of 5.59 % in 2016 estimated from the tendency in the period between 2003 and 2012 (on a gradual increase because of the improvement in the internal efficiency)

*4 In 2011, 94.8 % of 8th form students took the PSLCE and 68.85 % of them passed it. These percentages are used in the estimation.

*5 The numbers of F1 enrolments in secondary schools which enrol students from feeder schools of a secondary school at a project site were divided by the numbers of their respective feeder schools and the results of the divisions were added up. The lists of feeder schools for 2013/2014 obtained from the Education Division Offices were used in the estimation. (A figure in this column is equal to ("total F1 enrolments in the commuting area of the school at a project site" on the left in the table) - ("number of F1 enrolments in the school at a project site").

*6 ("number of students who have passed the PSLCE") - ("number of student enrolments in other schools")

*7 ("demand for enrolment") / 50 (the standard number of students per classroom)

The results of the estimation shown in Table 2-3 have confirmed the following on the demand for enrolments.

- There will be demands for enrolment large enough for the standard scale of the secondary school with three classes per form (three stream schools) in urban areas

and two classes per form (two stream schools) in rural areas in 2016 at all the project sites, except U5.

- The school at U5/Umbwi is a district boarding CSS which enrols outstanding students from the entire district. Therefore, it is impossible to estimate the demand for enrolment of this school from the number of students in feeder schools. (At present, the school has a commuting area for girl students because the school does not have a hostel for them. However, the school is expected to be a full-boarding school for both boy and girl students when the plan to construct a hostel for girl students with the budget of MoEST is completed.) As there is sufficient unmet demand for the enrolment in the district, it is reasonable to assume that the facilities to be constructed in this Project will be used efficiently.

(2) Scale of the Scope of Japanese Side

1) Facility Components

- Classrooms

  As in the previous phases, the scales of the three streams ((3 classes/form) x 4 forms = 12 classrooms per school) in urban areas and two streams ((2 classes/form) x 4 forms = 8 classrooms per school) in rural areas regarded as the guidelines by MoEST should be used as the design scales of the classroom blocks at the project sites. The number of classrooms to be constructed at each site should be decided by subtracting the number of existing classrooms considered usable in the inspection of their conditions from the number of classrooms required at the site. The number of students per classroom of 50 as specified in the Standards of MoEST should be used in the Project.

- Laboratories

  In the previous phases, it was decided to construct two laboratories (one for natural science and the other for biology) at each site in both urban and rural areas on the basis of the result of a study on the utilisation rate of the laboratories. This strategy should be followed also in this project. Two laboratories should be constructed at all the 11 sites as none of the schools at the project sites has a facility which could be used for practical lessons.

- Administration/library blocks

  None of the existing facilities in the project sites conforms to the standard specifications for an administration block in terms of structures, facilities and equipment or has rooms to accommodate additional teachers to be assigned. As in the previous phases, standard administration offices (*i.e.* Headteacher's and deputy headteacher's rooms, an accountant's room, a staffroom and a storeroom) and a library should be housed in a building to be constructed at each site. At U5/Umbwi, as the library block is considered fit for continued use, a building block only for the

administration offices should be constructed. At R3/Chimwalira, a new building block only the administration offices should be constructed and the existing administration block which is considered fit for continued use should be converted into a library block.

- Teachers' houses (at the rural sites)

  Seventy-five per cent of the standard number of teachers is the target of MoEST for the construction of teachers' houses. As the schools at all the six rural sites are two-stream schools, the required number of houses is 12 per site ((standard number of teachers = 16) x 0.75). As in the previous phases, two houses should be constructed as a semi-detached unit. The number of units to be constructed at each site should be determined by subtracting the number of the existing inhabitable houses from the required number of houses (max.12 houses) and dividing the result of the subtraction by 2. (If the difference of the subtraction is an odd number, the number of housing units to be constructed shall be the quotient of the difference and 2.)

- Multipurpose halls (at the urban sites)

  The multipurpose hall should have space to allow all the students (600 students), teachers and other staff members in a school to be seated on chairs.

- Toilets

  It is obligatory to install flush toilets at schools in urban areas. Emptying of pit latrines is not practiced and pit latrines are for single use in rural Malawi. Flush toilets using borehole water should be planned even at the rural sites in this Project, in consideration of building life-span and sanitary education. Separate toilet blocks should be constructed for boy and girl students. In accordance with the design scales of the schools, two toilet blocks should be constructed for both boys and girls at the urban sites and one toilet block each should be constructed for boys and girls at the rural sites. As the existing flush toilet facilities at U5/Umbwi are fit for continued use, one toilet block each should be constructed for boys and girls. Meanwhile, the existing single-use toilets should be retained so that students and the staff could use toilets when water supply is cut off.

- Infrastructure development

  Extension of electric power cables will be required at six sites among the 11 project sites. Five among those six sites are located within 1 km from the nearest power grid and the electric power can be supplied from those grid to the sites. Meanwhile, it is practically impossible to extend power cables to R4/Kabekere, because it is located 21 km from the nearest power grid. Therefore, a solar power generation system should be installed at this site, as was done in similar sites in the previous phases. Extension of high-voltage and low-voltage cables (to the teachers' houses) should be the

responsibilities of the Japanese and Malawian sides, respectively. The classification of the local electric power supplier, ESCOM, should be used as the definitions of high and low voltages.

Public water supply systems have been extended to all the urban sites, with the exception of U3/M'binzi. Since there is no problem in extending a water supply pipe to U3 located near a trunk road, the Malawian side should extend the water supply to the site. There are boreholes at all the rural sites, and all of them are equipped with hand pumps. A borehole equipped with an electric pump should be constructed at each rural site to supply water to the laboratories and flush toilets.

Table 2-4 Facility Components of the Project and Their Quantities

Site		Current state					Plan for the Project											
				No. of usable facilities					No. of classrooms									
		Stream	Number of Students	Classroom (a)	Hall	Teacher's house	Stream	Number of Students	Planed (b)	To be constructed (b)-(a)	Laboratory block	Administration block	Library block	Toilet block	Multipurpose hall	Teacher's house	Well	Photovoltaic power generation system
U1	Kabwabwa	2	862	6	0	-	3	600	12	6	1	1	1	4	1	-	-	-
U2	Mlodza	1	442	4	0	-	3	600	12	8	1	1	1	4	1	-	-	-
U3	M'binzi	1	86	0	0	-	3	600	12	12	1	1	1	4	1	-	-	-
U4	Zomba Urban	1	435	4	0	-	3	600	12	8	1	1	1	4	1	-	-	-
U5	Umbwi	2	652	8	1	-	3	600	12	4	1	1	0	2	-	-	-	-
R1	Muhasuwa	1	372	4	-	7	2	400	8	4	1	1	1	2	-	4	1	-
R2	Mwatibu	1	431	0	-	0	2	400	8	8	1	1	1	2	-	12	1	-
R3	Chimwalira	1	348	4	-	9	2	400	8	4	1	1	0	2	-	2	1	-
R4	Kabekere	1	240	0	-	4	2	400	8	8	1	1	1	2	-	8	1	1
R5	Mwalawanyenje	1	435	0	-	7	2	400	8	8	1	1	1	2	-	4	1	-
R6	Mzoma	1	118	0	-	5	2	400	8	8	1	1	1	2	-	6	1	-
Total		13	4421	30	1	32	27	5400	108	78	11	11	9	30	4	36	6	1

2) Equipment Components

a. Furniture

Minimum furniture required for the operation of the facility components of the Project should be procured as in the previous phases. Furniture for the teachers' houses should be procured not in this Project but by their occupants. Furniture to be procured in this Project should conform to the standard specifications of MoEST. The table below shows the types and quantities of furniture to be procured for each room.

Table 2-5 Furniture Components and Their Quantities

		Desks for students	Desk for the head teacher	Desks for administrators	Desks for teachers	Library tables	Tables	Tables for PC	Rostrums	Chairs for students	Chairs for teachers	Chair for the head teacher	Office chairs	Chairs for visitors	Pipe chairs	Stools	Cabinets	Dustbins
Classroom		50			1					50	1							
Head teacher's office			1				1					1	2	3			1	
Deputy head teacher's office				1									2	3			1	
Account's Office				1									2	3			1	
Reception room								2						4				
Store room															4			
Staff room	U				24						24			3			6	
	R				16						16			3			4	
Library					1	11					1				33		2	
Laboratory																51		
Preparation room																1		
Multipurpose hall									1						630			
Others																		5

b. Laboratory equipment

The Survey Team has confirmed that there has been no change in the equipment essential for the implementation of the current curriculum since Phase 2. The curriculum stipulates that students in lower and upper secondary education should have four and five lessons, respectively, of laboratory works per week. Practical lessons/exercises on eight subjects in biology and 18 subjects in natural science are in the syllabus. Teaching materials and equipment to be used in the lessons and purpose of their use are provided in the teaching guidelines. While chemical reagents and other consumables will not be procured in this Project because the project is to be implemented under the scheme of the Grand Aid of Japan, procurement of glassware, such as test tubes and beakers, necessary for the experiments and exercises, will be included in this Project. In the previous phases, the following criteria were used for the selection of required items and their quantities. The same criteria should be used in this Project.

[Criteria for selection]

- Equipment required for the implementation of the curriculum for experiments in secondary education
- Equipment utilised in similar schools whose usefulness has been confirmed

- Equipment relatively easy to maintain

[Criteria for exclusion from the Grant Aid]

- Equipment which can be replaced by other equipment
- Equipment requiring expensive consumables or consumables which is difficult to procure
- Equipment requiring a specific technique for its maintenance

[Basic rules on the quantities of items to be procured]

- It was decided in a consultation between the Malawian side and the Survey Team that the equipment to be procured should be classified into equipment to be used in experiments by groups of students and that for the demonstration by teachers and the quantity of each type of equipment should be decided on the basis of intended use of the equipment concerned.
- In principle, equipment for experiments conducted by 12 groups of students, one group per laboratory bench (equipped with a sink and a gas valve), will be procured in a set of 12 and equipment for experiments conducted by six groups of students (students at the small laboratory benches near the windows and those at the laboratory in the middle formed groups) will be procured in a set of six.
- The quantity of equipment used in teacher's demonstration to be procured in this Project should be one.

(3) Facility Plan

Major facility construction projects in the secondary education sector in Malawi have been implemented by the World Bank and the African Development Bank (AfDB) in recent years. These projects have been implemented with slightly different but almost identical facility designs and specifications. Therefore, the designs used in these projects are considered as local standards. In the previous phases, these designs were used as the basis for designing the project. However, after having found ways to improve these designs in the site surveys, the Survey Team has decided to design a functional and maintenance-friendly facility plan for this Project based on the local standard design and, at the same time, with required improvement incorporated.

1) Layout Plan

Facility layout in the premises of a project site should be designed appropriately following the basic rules mentioned below and with site specific conditions (size, shape and gradient of the premises, conditions of access road, existing facilities in the premises, etc.) taken into consideration.

- In principle, facilities should be constructed in the east-west direction so that the strong sunlight does not enter the rooms in the morning and late afternoon. The side

with a corridor of a building which has longer eaves than the other side should be on the northern side to shield strong sunlight from the north at midday, in principle.

- Facility layout and a temporary work plan should be prepared in such a way to preserve as many trees grown on the premises as possible.
- Construction of boundary walls by the Malawian side should be taken into consideration when designing the location of the access route and entrance to site premises. At least, the parking space for the maintenance work and visitors and a space for a turnaround should be set aside.
- As most of the planned project sites have lateritic soil which is likely to become muddy during the rainy season, connecting passageways should be constructed between building blocks.
- Buildings should be constructed with a certain distance which the site conditions allow between them.
- Toilet blocks should be at locations easily accessible from all building blocks and, at the rural sites, at locations sufficiently far from the existing and new boreholes.
- The possibility of future facility expansion should be taken into consideration when designing a facility layout plan.

2) Floor Plan

Appropriate floor plans should be prepared on the basis of the Standard Design, in accordance with the strategies mentioned below and with the functions of various rooms taken into consideration.

- A masonry structure with SSBs should be the basic structure. Workability should be improved with the use of span arrangement suited for the masonry modules.
- Facilities should be designed with side-corridor floor plans which allow natural lighting from both sides of the facilities.
- Details and sizes of various types of rooms in each building block should be determined with the activities to be carried out and furniture layout in the rooms taken into consideration. The floor areas of facilities and rooms are measured from the centrelines of pillars and walls.

a. Classroom blocks

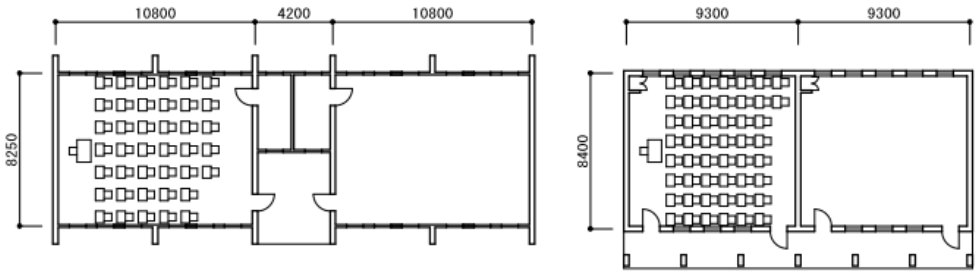
- In the previous phases, the classroom blocks were designed with classrooms smaller than those in the local standard design, assuming a classroom capacity of 40 students per classroom, the target figure of MoEST, for cost reduction. However, currently, the Education Division Offices enrol new students in secondary schools under their jurisdiction, assuming a standard classroom capacity of 50 students per classroom, at present. Judging from the current state of the secondary education in Malawi, there is an extremely slim possibility of the classroom capacity being reduced. Therefore,

rooms should be designed to have floor areas sufficient for the capacity of 50 students per classroom.

- In the Standard Design, there is a storeroom, as an ancillary facility, for every two classrooms. The storeroom is designed with an alcove from which one can enter classrooms on both sides. The Survey Team confirmed that these storerooms had not been used effectively in the site surveys. Therefore, each classroom should be designed to have built-in equipment storage shelves, instead of an ancillary storeroom, in this Project.
- Two types of classroom blocks should be designed in accordance with the difference in the required number of classrooms at each project sites.

Table 2-6 Comparison of Floor Areas of Classroom

	AfDB	Previous phases	This Project
Floor area	89.10 m^2 (10.80 m × 8.25 m)	64.26 m^2 (8.40 m × 7.65 m)	78.12 m^2 (9.30 m × 8.40 m)
Capacity	40 students	40 students	50 students
Floor area per student	2.23 m^2/student	1.61 m^2/student	1.56 m^2/student



A classroom block of the AfDB-assisted project (for 40 students)

A classroom block of this Project (for 50 students)

Figure 2-1 Comparison of the Floor Plans of Classroom

b. Administration/library blocks

- Administration offices and a library are housed in separate blocks in the Standard Design. Meanwhile, the floor area of the library was reduced in accordance with the actual usage of the facility and the smaller library was designed to be housed in the same building block as the administration offices in the previous phases in order to reduce the cost and the number of building blocks to be constructed. This design of housing the library and administration offices in the same building block should be followed in this Project.
- Since the numbers of teachers at a school differ between the schools at the urban sites and those at the rural sites, two designs of administration/library block with different

capacities should be prepared. Since the existing library at U5/Umbwi is considered fit for continued use, a library should not be constructed at this site. The existing administration office block at R3/Chimwalira is considered structurally fit for continued use, though not sufficient to fulfil the functions required as an administration office block. Therefore, a new administration office should be constructed and the existing one should be used as a library block.

- The administration block of the Standard Design is composed of the basic components of the Headteacher's Room, Deputy Headteacher's Room, Accountant's Room, Staffroom and a storeroom. The block also has toilets and a kitchen where supply of city water is available. Each room in the Standard Design is considered to have an appropriate floor area to install furniture required in it. The administration offices should be designed using the Standard Design as a basis with modification to improve traffic lines.
- The library of the Standard Design has a floor area of 138.60 m^2 (16.80 m x 8.25 m), exclusive of corridors. This floor area is approximately twice the floor area of a classroom. Functionally, the library is composed of 1) space for reception and administration by librarians, 2) space for bookshelves and 3) space for reading. Although the numbers of books in the libraries vary among the schools concerned, most of them are textbooks. Therefore, it was decided in the previous phases to limit the function of the library to storage and lending of textbooks and reference materials and to reduce the space for the bookshelves and reading to a minimum for cost reduction. As a result, the floor area of the library was reduced to the equivalent of the floor area of a classroom. The same design should be followed in the Project.

c. Laboratory blocks

- A natural science laboratory and a biology laboratory should be constructed as a building unit. Laboratory benches for students' practical lessons should be installed in an island-like arrangement in each laboratory. A sink and a gas valve for experiments should be installed on each laboratory bench. The laboratory benches were installed parallel to the teacher's desk in the previous phases. They should be installed perpendicular to the desk for the convenience of students when observing teacher's demonstrations.
- Two preparation rooms, a common storeroom and a storeroom of gas bottles should be constructed for every two laboratories. Work benches and shelves required in those rooms should be installed in those rooms as built-in furniture.

d. Toilet blocks

- Emptying of latrine pits is not practiced in Malawi. A single-use pit latrine is the common type of toilet in Malawi; they dig a hole, build a shed around the hole and

stop using it when the hole becomes full. In order to use facilities for long periods and to promote sanitary education, flush toilets should be installed not only at the urban sites but also at the rural sites.

- The standard design has one toilet block for boys and girls. However, as this toilet block is large and has few openings for ventilation, a bad smell tends to remain inside for a long period of time. The floor area of the toilet block should be reduced with adoption of the principle of construction of separate toilets for boys and girls, to ensure good natural ventilation in toilet blocks and, at the same time, to reduce the cost of land preparation on slopes for the construction of toilet blocks.
- The standard design of this Project is to construct two toilet blocks each for boys and girls at the urban sites (1 booth/37.5 students) and one each for boys and girls at the rural sites (1 booth/40 students). Urinals should be installed in boys' toilet blocks in place for several booths. As the existing flush toilets at U5/Umbwi are considered fit for continued use, one additional toilet block each for boys and girls will be constructed at this site. A booth for the disabled should be installed in each toilet block.
- An incinerator for feminine hygiene products should be constructed adjacent to each toilet block for girls.
- Toilets for teachers and other school staff should be constructed in the administration/library blocks as in the Standard Design.
- In principle, the existing single-use toilets will be retained so that people can use toilets when water supply is disrupted.

e. Multipurpose halls

- A multipurpose hall should have the capacity to seat all students, teachers and other school staff in it.
- Storage space accessible at the same level as the hall floor should be created on both sides of the stage.
- A sufficiently large porch space should be created in front of the entrance for the convenience of users during the rainy season.
- Barrier-free access to the stage requested by the Malawian side should be established.
- Cost reduction with natural lighting and ventilation should be incorporated in the design.

f. Teachers' houses

- Teachers' houses are designed as detached houses in the Standard Design, while a design of a semi-detached house (two houses in one block) was adopted in the previous phases. The design used in the previous phases should be used in this Project.

- In the Standard Design, the living room and dining room is separated by a closet wall. However, this design makes both rooms too small and inconvenient. Therefore, the closet wall should be removed to create a large living/dining room in the design for this Project.
- A flush toilet should be installed in the house as in the Standard Design.

The table below shows the facilities and their floor areas designed for each project site in accordance with the strategies for the floor plan mentioned above.

Table 2-7 Quantities of Facilities at Each Project Site

Site		Type of facility												
		Classroom block		Laboratory block	Admin./lib. block		Admin. block		Toilet block				Multipurpose hall	Housing unit for teachers
		Two-classroom	Three-classroom		Urban area	Rural area	Urban area	Rural area	Urban area (boys)	Urban area (girls)	Rural area (boys)	Rural area (girls)		
	Floor area	187.86	281.79	282.24	336.42	299.04	261.66	224.28	29.21	29.21	33.17	33.17	806.4	214.56
U1	Kabwabwa	-	2	1	1	-	-	-	2	2	-	-	1	-
U2	Mloza	1	2	1	1	-	-	-	2	2	-	-	1	-
U3	M'binzi	-	4	1	1	-	-	-	2	2	-	-	1	-
U4	Zomba Urban	1	2	1	1	-	-	-	2	2	-	-	1	-
U5	Umbwi	2	-	1	-	-	1	-	1	1	-	-	-	-
R1	Muhasuwa	2	-	1	-	1	-	-	-	-	1	1	-	2
R2	Mwatibu	4	-	1	-	1	-	-	-	-	1	1	-	6
R3	Chimwalira	2	-	1	-	-	-	1	-	-	1	1	-	1
R4	Kabekere	1	2	1	-	1	-	-	-	-	1	1	-	4
R5	Mwalawanyenje	4	-	1	-	1	-	-	-	-	1	1	-	2
R6	Mzoma	4	-	1	-	1	-	-	-	-	1	1	-	3
Total		21	12	11	4	5	1	1	9	9	6	6	4	18

3) Structure Plan

a. Structural format

Main structure

- Masonry structure with stabilised soil blocks (SSBs) should be the structure of the facilities. The header bond should be the principle method for the construction of structure.
- A reinforced concrete column and beam structure should be used for the multipurpose halls as they have large cross-sections. SSB masonry structure should be used for the construction of non-bearing walls of the halls.

Foundation structure

- In the Standard Design, continuous footing without underground beams is used as the foundation structure and the load of masonry walls is supported by (60 cm-wide) continuous bottom slabs. Meanwhile, reinforced concrete continuous footing was used in the previous phases in consideration of durability. The foundation structure used in the previous phases should be used in this Project.

b. Structural criteria and load conditions

Based on the survey results of the natural conditions in this Project, the load conditions shown below should be adopted:

Subgrade bearing capacity: Based on the results of ground survey, the subgrade bearing capacity should be set at 100kN/m^2 in the plan.

Wind load: Since Malawi is a landlocked country, the meteorological data in the past at the project sites shows no record of impact caused by strong wind created by cyclones. However, since a boundary wall constructed in Phase 1 with the design standard wind velocity of 21 m/sec recommended by the Malawi Institute of Architects and used in the projects of other donors partially collapsed with strong wind. Cases of damage to roofs by strong wind have been confirmed at some rural sites. Therefore, a standard wind velocity of 31.5 m/sec should be used in this Project to ensure safety of the facilities.

Earthquake load: The Great Rift Valley runs along part of the shore of Lake Malawi and there are records of earthquakes in Malawi. None of those earthquakes released large seismic energy and no evidence of damage caused by an earthquake was found even on old school buildings in the site survey. The Survey Team estimated the seismic horizontal force using the assumed seismic story shear coefficient of Co = 0.08 and compared it with the wind load horizontal force. As the comparison revealed that the wind load horizontal force was larger than the seismic horizontal force on all the facilities, structural analysis using seismic horizontal force will not be implemented.

c. Structural materials

The structural materials, conforming with the specifications of the local standard design, should be as shown below:

Concrete: The design strength used in the previous phases, *i.e.* 18 N/mm^2 for the foundation and 21 N/mm^2 for the underground beams, floor mould slabs, floor slabs, beams and pillars, should be applied.

Reinforcing bars: Although British Standards (BS) are specified in the standard specifications, South African Bureau of Standards (SABS) specifications should be adopted in this Project as general-purpose products available on the market are in compliance with SABS. *The numbers in brackets represent tensile strength.

- Deformed bar Grade 45 (45kN/cm^2)
- Round bar Grade 25 (25kN/cm^2)

Steel products: General-purpose products available on the market commonly comply with SABS as shown below. These products should be adopted in this Project.

- Section steel 300WA (45kN/cm^2)
- Bolt Grade 88 (80kN/cm^2)
- Anchor bolt Grade 43 (43kN/cm^2)

SSB: Should be made on site using machinery. The quality should meet Malawi Bureau of Standards (MBS) specifications. Two types of SSBs with different mixing ratios of cement, sand and soil should be used on different parts.

- Mixing ratios Volume ratio of cement, sand and soil = 1:2:4, Compressive strength after drying: 3.5 N/mm^2 or above (for exterior walls)

  Volume ratio of cement and soil = 1:12, compressive strength after drying: 2.5 N/mm^2 or above (for interior walls with finishing mortar)

Concrete blocks: Should be made on site using designate moulds: The quality should meet MBS specifications. Structural concrete blocks should have an average compressive strength of 5.0N/mm^2 and a minimum compressive strength of 4.0N/mm^2.

Wooden trusses: Should be made on site using local pine lumber compliant with the Malawian Standards and treated with termite repellent.

4) Electrical and Mechanical Installation Plan

a. Electrical installation plan

- New power supply cables should be installed at six out of the 11 project sites. Since it is practically difficult to extend power supply cables from the existing distribution network to R4/Kabekere, because of its location far from any power grid, a solar power generation system should be installed at R4.

- In this Project, a new independent low-voltage electric power supply system should be established to supply required electric power to the new facilities to be constructed.

Power Receiving/Transforming/Trunk Line Equipment

- The electric power should be supplied from the existing high-voltage (11kV – 33kV) electric power grid to the school facilities to be constructed in this Project. The high-voltage power should be transformed to 3-phase, 4-wire 380 V power by transformers on electric poles and the transformed electric power should be fed to independent feeder pillars to be installed in the premises as low-voltage power. The Malawian side will install cables from transformers on electrical poles to individual teachers' houses and electricity meters on the exterior walls of individual houses.

Lighting Equipment

- As in the standard design, the appropriate number of light fittings required for the rooms should be installed. Security lighting should be installed on exterior walls of each building. A 58W fluorescent lamp should be the standard lamp to be installed on the basic indoor lighting fixture. A stage lighting system should be installed in multipurpose halls and 100W halogen lamps, which are generally available at the local market, should be installed on the system.

Wall Sockets

- As in the standard design, wall sockets necessary for each room should be installed. Wall sockets should be installed in the libraries in the quantities sufficient for PCs and printers to be procured in future.

Communication Equipment

- The Standard Design has piping and wiring for telephone lines in the administration offices. However, there is no wire telephone in most of the existing schools and private mobile phones are used as the standard communication devices. Therefore, installation of communication facilities should not be included in this Project, as in the previous phases.

b. Air-conditioning and ventilation system installation

- Wall-mounted ventilation fans should be installed in the draft chambers in laboratories in accordance with the Standard Design, as in the previous phases.

c. Water supply/drainage and sanitation system installation

Water Supply System

The Malawian side should extend new water supply pipes to the urban project sites without working on the existing piping. Because water supply is cut off almost daily during the dry season, water reservoir tanks should be installed at those sites. The extension of water supply pipes up to water meters should be the responsibility of the

Malawian side and the piping in buildings from the water meters should be carried out in this Project.

- Deep boreholes equipped with a water pump and overhead tank should be constructed at the rural sites. The boreholes constructed in the test drilling should be used for the planned borehole.

Sanitation Equipment

- Sanitary equipment should be installed in the administration, laboratory and toilet blocks and teachers' houses where supply of water is required.
- All the toilets should be flush type. Squat toilets should be installed in the toilets for students, while western-style toilets should be installed in the toilets for teachers and the physically handicapped and in teachers' houses.

Wastewater Treatment Plant

- Wastewater should be treated in simple septic tanks and disposed of in infiltration inlets within the site premises.
- In principle, rainwater and grey water should be drained into infiltration inlets in the premises through drainage ditches to be constructed around school buildings. Water overflowed from the inlets should be discharged outside the premises in an appropriate way.

d. Firefighting Services

In the standard design, fire hydrants, extinguishers, emergency alarms and other firefighting equipment are installed in each building. The table below shows the fire-fighting equipment installed in the previous phases based on the consultation with local fire departments and the experience of similar projects. The same equipment should be installed in this Project.

Table 2-8 Outline of Fire-Fighting Equipment

Block Name	Fire Extinguishing Equipment
Classroom block	Indoor hydrant (30m) ×1, fire extinguisher (9kg) ×1, CO2 fire extinguisher (5kg) ×1
Administration/Library block	Indoor hydrant (30m) ×1, fire extinguisher (9kg) ×1, CO2 fire extinguisher (5kg) ×1
Laboratory block	Indoor hydrant (30m) ×1, fire extinguisher (9kg) ×1, CO2 fire extinguisher (5kg) ×1, Bubble fire extinguisher (9kg) ×2, no smoking signs
Toilet block	No obligation
Multipurpose hall	Indoor hydrant (30m) ×1, fire extinguisher (9kg) ×1, CO2 fire extinguisher (5kg) ×1, fire alarm
Teachers' houses	No obligation

5) Building Material Plan

The table below shows the specifications of each part of the school buildings prepared by improving part of the specifications used in the previous phases which was prepared on the basis of the Standard Design with basic standards required by school facilities and robustness, durability and workability of the buildings taken into consideration.

Table 2-9 Comparison of Specifications of Main Parts

Element		Specification/Construction Method for the Project	Standard Design	Rational for Selection
Exterior Part				
Roof		IBR colour steel sheet, t=0.6mm	Same on the left	It is a proper material for construction and maintenance and disseminated as a standard design in Malawi.
Wall		SSB fair face masonry work + brick sealer	Same on the left	It is a general and standard design in Malawi.
Windows		Steel frame + top-hinged out-swinging, burglar bar shall be installed at necessary rooms such as equipment storages.	Same on the left	It is a standard design in Malawi and adopted since no operational troubles were founded during the site survey.
Doors		Steel frame + wooden framed, burglar bar door	Same on the left	Same as the above
Interior Part				
Floors	General part	Mortar steel trowel (25mm)	Same on the left	There is no general method for concrete monolithic surface finish and local contractors' abilities are not clear, thus the standard method shall be adopted.
	Open corridor	Pre-cast concrete paving slabs	Same on the left	Considering no shrinkage crack, easy maintenance and economic efficiency, the standard design shall be adopted.
Walls	General part	Mortar + Paint	Same on the left	It is a general and standard design in Malawi.
	Hall	SSB fair face masonry works	Same on the left	Considering lower cost and no troubles with quality, the standard design shall be adopted.
	Toilet block	Mortar + paint with partial tile cladding	Mortar + Paint	Ease of maintenance should be achieved with the use of easy-to-clean materials

Ceilings	General part	Plywood + Paint suspended ceilings with wooden furring	Exposed IBR sheets on wooden trusses	Classes and school operation are disturbed by loud sound of raindrops hitting the roof in school buildings built in accordance with the standard specifications. Ceiling boards should be installed in buildings for sound insulation.
	Rooms of teachers' houses	Plywood + Paint suspended ceilings with wooden furring	Exposed IBR sheets on wooden trusses	Considering the improvement of interior space and cutting off the quantities for upper separation wall, suspended ceiling shall be adopted.

(4) Furniture and Laboratory Equipment Plan

1) Furniture

The minimum educational furniture required for school operation, as selected in the previous phases, should be installed. Furniture which satisfies the standard specifications of MoEST should be procured. The installation should be performed as follows, based on the types and quantities of furniture to be installed at each project site as shown in Table 2-5.

Table 2-10 Quantities of Furniture

Site		Desks for students	Desk for the head teacher	Desks for administrators	Desks for teachers	Library tables	Tables	Tables for PC	Rostrums	Chairs for students	Chairs for teachers	Chair for the head teacher	Office chair	Chairs for visitors	Pipe chairs	Stools	Cabinets	Dustbins
U1	Kabwabwa	300	1	2	31	11	1	2	1	300	31	1	6	16	667	104	11	5
U2	Mlodza	400	1	2	33	11	1	2	1	400	33	1	6	16	667	104	11	5
U3	M'binzi	600	1	2	37	11	1	2	1	600	37	1	6	16	667	104	11	5
U4	Zomba Urban	400	1	2	33	11	1	2	1	400	33	1	6	16	667	104	11	5
U5	Umbwi	200	1	2	28	0	1	2	0	200	28	1	6	16	4	104	9	5
R1	Muhasuwa	200	1	2	21	11	1	2	0	200	21	1	6	16	37	104	9	5
R2	Mwatibu	400	1	2	25	11	1	2	0	400	25	1	6	16	37	104	9	5
R3	Chimwalira	200	1	2	20	0	1	2	0	200	20	1	6	16	4	104	7	5
R4	Kabekere	400	1	2	25	11	1	2	0	400	25	1	6	16	37	104	9	5
R5	Mwalawanyenje	400	1	2	25	11	1	2	0	400	25	1	6	16	37	104	9	5
R6	Mzoma	400	1	2	25	11	1	2	0	400	25	1	6	16	37	104	9	5
Total		3900	11	22	303	99	11	22	4	3900	303	11	66	176	2861	1144	105	55

2) Laboratory Equipment

Laboratory equipment should be procured in accordance with the policy of the basic design. Students are to conduct experiments and take practical lessons in six groups in the plan of the Malawian side. Therefore, equipment for students' experiments should be procured in sets of six, in principle. However, equipment for certain experiments should be procured in different quantities if necessary. Equipment for teacher's demonstrations on a teacher's desk should be procured in sets of one or two. The table below shows the equipment selected for the procurement and design quantity of each piece of the equipment.

Table 2-11 Laboratory Equipment List

No.	Item	Design quantity			*No.*	Item	Design quantity		
		Laboratory		Total			Laboratory		Total
		Science	Biology				Science	Biology	
L-1	Test tube	2	1	3	*L-56*	Thermometer	6	6	12
L-2	Beaker 100ml	24	24	48	*L-57*	Mason's thermometer hygrometer	1		1
L-3	Beaker 250ml	12	12	24	*L-58*	Periodic table chart	1		1
L-4	Beaker 500ml or 600ml	3	3	6	*L-59*	Magnet	6		6
L-5	Flask 100ml	6	6	12	*L-60*	Plotting compass	12		12
L-6	Flask 250ml	6	6	12	*L-61*	Electrodes	6		6
L-7	Flask 500ml	1	1	2	*L-62*	Bi-metallic strip	1		1
L-8	Flask 250ml	1	1	2	*L-63*	Dissecting dishes		6	6
L-9	Flask, distillation	1	1	2	*L-64*	Dissecting boards		6	6
L-10	Measuring flask 250ml	6		6	*L-65*	Dissecting set		6	6
L-11	Funnel 100mm	6	6	12	*L-66*	Forceps	6	6	12
L-12	Dropping Funnel	6		6	*L-67*	Hand Lens		12	12
L-13	Measuring cylinder 25ml	6	6	12	*L-68*	Microscope		6	6
L-14	Measuring cylinder 100ml	6	6	12	*L-69*	Microscope slides		1	1
L-15	Measuring cylinder 250ml	6	6	12	*L-70*	Cover slips		1	1
L-16	Petri dish		12	12	*L-71*	Set of prepared slides of animal cells		3	3
L-17	Evaporating basin	6	6	12	*L-72*	Blood slides		6	6
L-18	Trough	1	1	2	*L-73*	Model of the human eye on stand		1	1
L-19	Pipette	6	6	12	*L-74*	Model of the human ear		1	1
L-20	Dropping pipette with teat	6		6	*L-75*	Human teeth set model		1	1
L-21	Pipette filler	6		6	*L-76*	Human skeleton		1	1
L-22	Burette 50ml	6	6	12	*L-77*	Stop watch	6	12	18

L-23	Liebig condenser	1	1	2
L-24	Stirring rod	12	6	18
L-25	Tubing	6	6	12
L-26	Tubing	6	6	12
L-27	Tubing	6	6	12
L-28	Burner/spirit	6	6	12
L-29	Bunsen burner	6	6	12
L-30	Gauze	6	6	12
L-31	Tripod stand	6	6	12
L-32	Spatula, spoon	12		12
L-33	Retort stand base	6	6	12
L-34	Retort stand rod	6	6	12
L-35	Burette clamp	6		6
L-36	Bosshead	6	6	12
L-37	Retort clamp	6	6	12
L-38	G clamp	6	6	12
L-39	Test tube holders	12	12	24
L-40	Stoppers	6	6	12
L-41	Tubing (6mm dia.)	1		1
L-42	Tubing (10mm dia.)		1	1
L-43	Cork borer	1		1
L-44	Cork stoppers	1		1
L-45	Glass cutter	1		1
L-46	Laboratory tool kit, comprising	1		1
L-47	Test tube stand	12	12	24
L-48	Wash bottle	6	6	12
L-49	Reagent bottle	6		6
L-50	Reagent bottle	6		6
L-51	Brush	6	6	12
L-52	Brush	6	6	12
L-53	Brush	6	6	12
L-54	Autoclave		1	1
L-55	Thermometer	6	6	12

L-78	Triple beam balance	6		6
L-79	Metre rule	12		12
L-80	Measuring tape (30m)		1	1
L-81	Roberval balance	6		6
L-82	Analytical balance (open)	1	1	2
L-83	Ammeter	6		6
L-84	Voltmeter	6		6
L-85	Electric bell	1		1
L-86	Diode	12		12
L-87	Small motor/generator unit	1		1
L-88	Resistor	12		12
L-89	Rheostat	6		6
L-90	Knife switch	12		12
L-91	Electric circuit board kit	6		6
L-92	Balance (10x0.1N)	6		6
L-93	Balance (1x0.01N)	6		6
L-94	Pulley block	6		6
L-95	Brass hanger	6		6
L-96	Slotted brass weight	12		12
L-97	Slotted iron weight, 100g	12		12
L-98	Hexagonal iron mass, 500g	2		2
L-99	Inclined slope set	6		6
L-100	Lens, biconvex	6		6
L-101	Lens, biconcave	6		6
L-102	Lens	6		6
L-103	Lens holder	12		12
L-104	Plane mirror	6		6
L-105	Plane mirror	6	6	12
L-106	Prism	6		6
L-107	Prism	6		6
L-108	Ray optics box	6		6
L-109	Optical filter set	6		6

2-2-3 Outline Design Drawings

Site Plan Drawings

U1 Kabwabwa CDSS

U2 Mlodza CDSS

U3 M'binzi CDSS

U4 Zomba Urban CDSS

U5 Umbwi CSS

R1 Muhasuwa CDSS

R2 Mwatibu CDSS

R3 Chimwalira CSS

R4 Kabekere CDSS

R5 Mwalawanyenje CDSS

R6 Mzoma CDSS

Floor Plans, Elevation Plans and Section Plans

A-01 Classroom block (with two classrooms)

A-02 Classroom block (with three classrooms)

A-03 Laboratory block

A-04 Administration/library block (for the urban sites)

A-05 Administration/library block (for the rural sites)

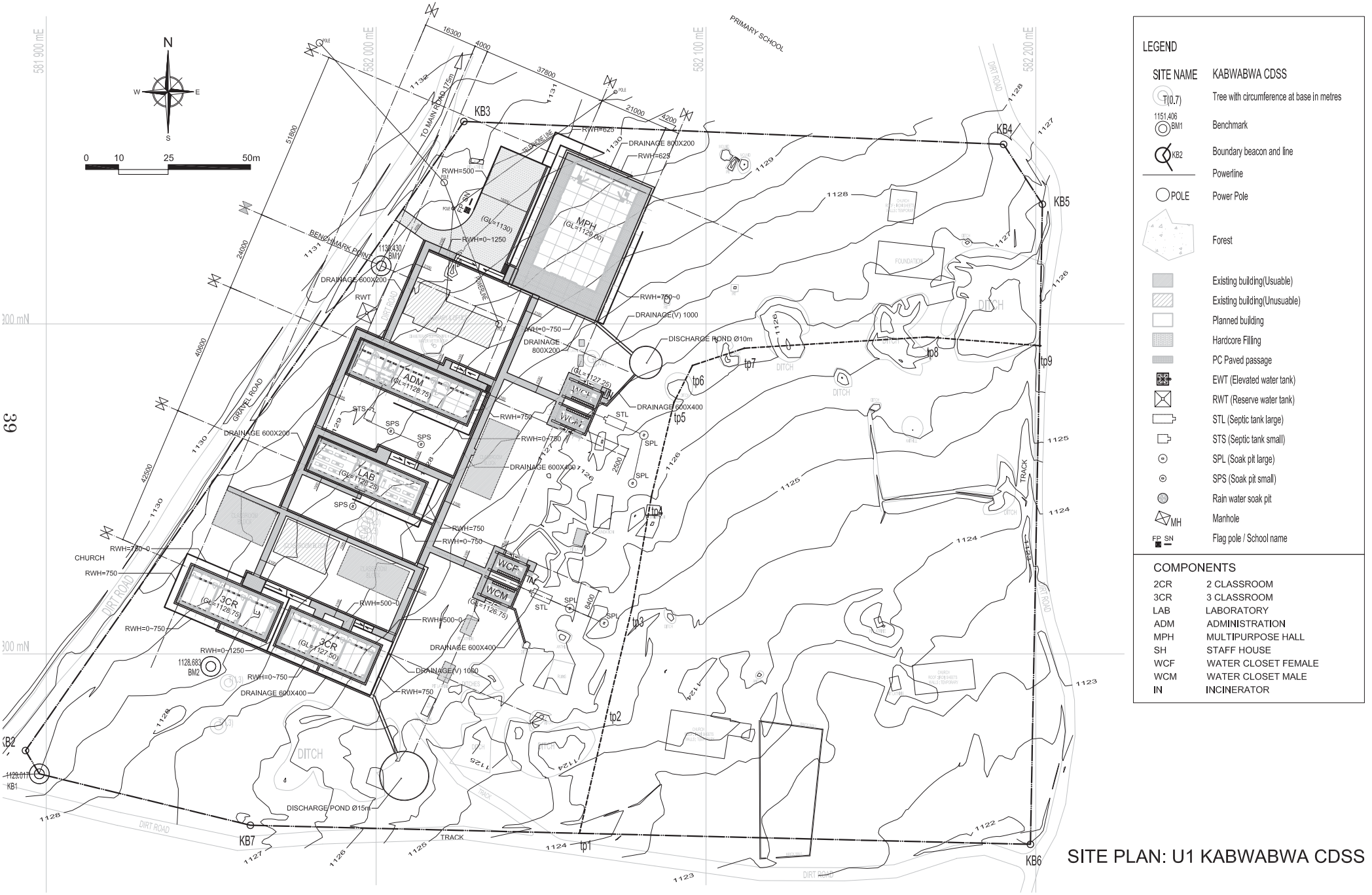
A-06 Administration block (for the urban sites)

A-07 Administration block (for the rural sites)

A-08 Multipurpose hall

A-09 Toilet block

A-10 Teacher's house



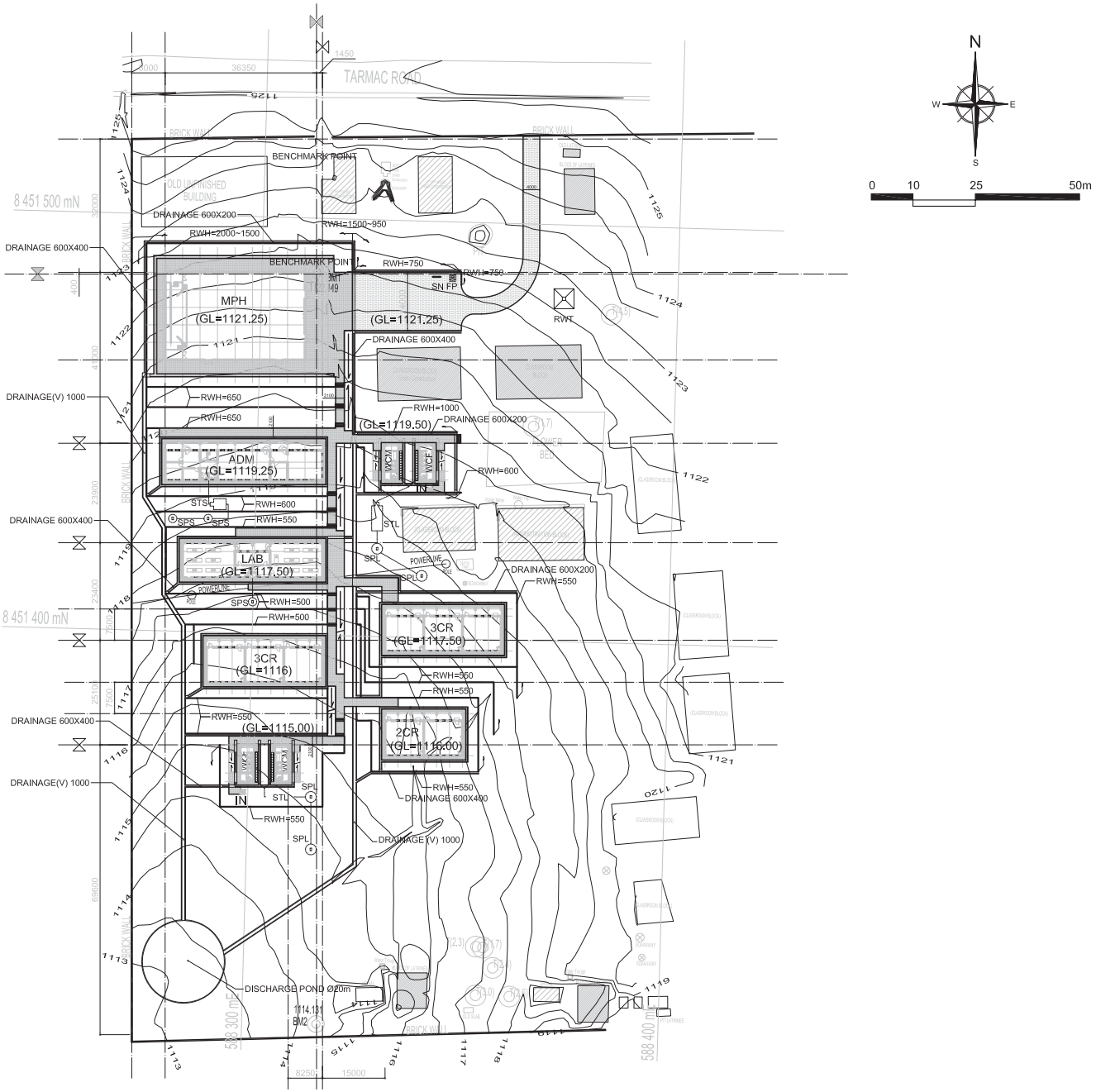
LEGEND

SITE NAME	KABWABWA CDSS
T(0.7)	Tree with circumference at base in metres
1151.406 BM1	Benchmark
KB2	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Planned building
	Hardcore Filling
	PC Paved passage
EWT	EWT (Elevated water tank)
RWT	RWT (Reserve water tank)
STL	STL (Septic tank large)
STS	STS (Septic tank small)
SPL	SPL (Soak pit large)
SPS	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

SITE PLAN: U1 KABWABWA CDSS



LEGEND

SITE NAME	MLODZA CDSS
T(0.7)	Tree with circumference at base in metres
1151.406 BM1	Benchmark
KB2	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Planned building
	Hardcore Filling
	PC Paved passage
	EWT (Elevated water tank)
	RWT (Reserve water tank)
	STL (Septic tank large)
	STS (Septic tank small)
	SPL (Soak pit large)
	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

SITE PLAN: U2 MLODZA CDSS

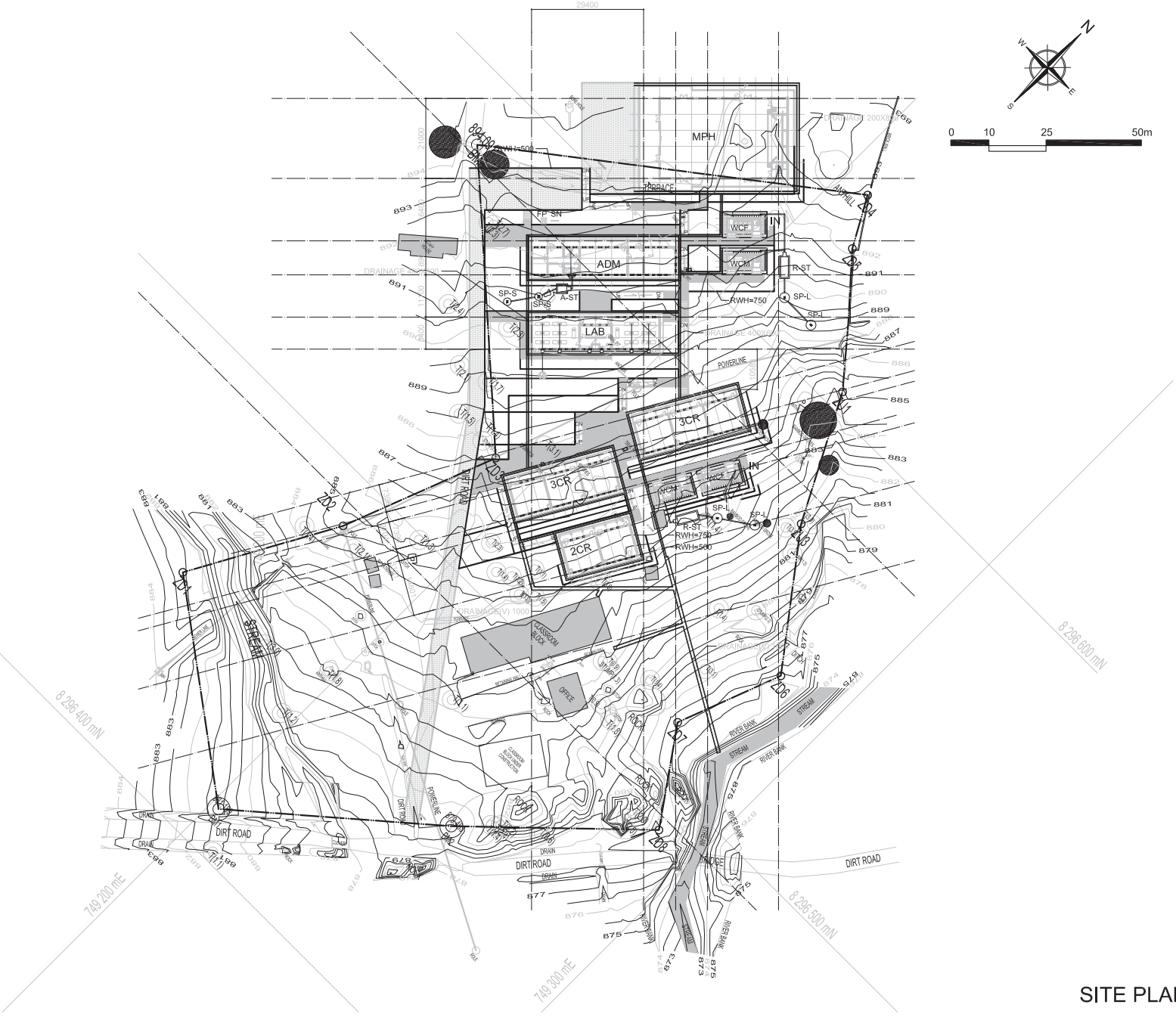
LEGEND

SITE NAME	M'BINZI CDSS
T(0.7)	Tree with circumference at base in metres
1151.406 BM1	Benchmark
KB2	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Planned building
	Hardcore Filling
	PC Paved passage
EWT	EWT (Elevated water tank)
RWT	RWT (Reserve water tank)
STL	STL (Septic tank large)
STS	STS (Septic tank small)
SPL	SPL (Soak pit large)
SPS	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

SITE PLAN: U3 M'BINZI CDSS



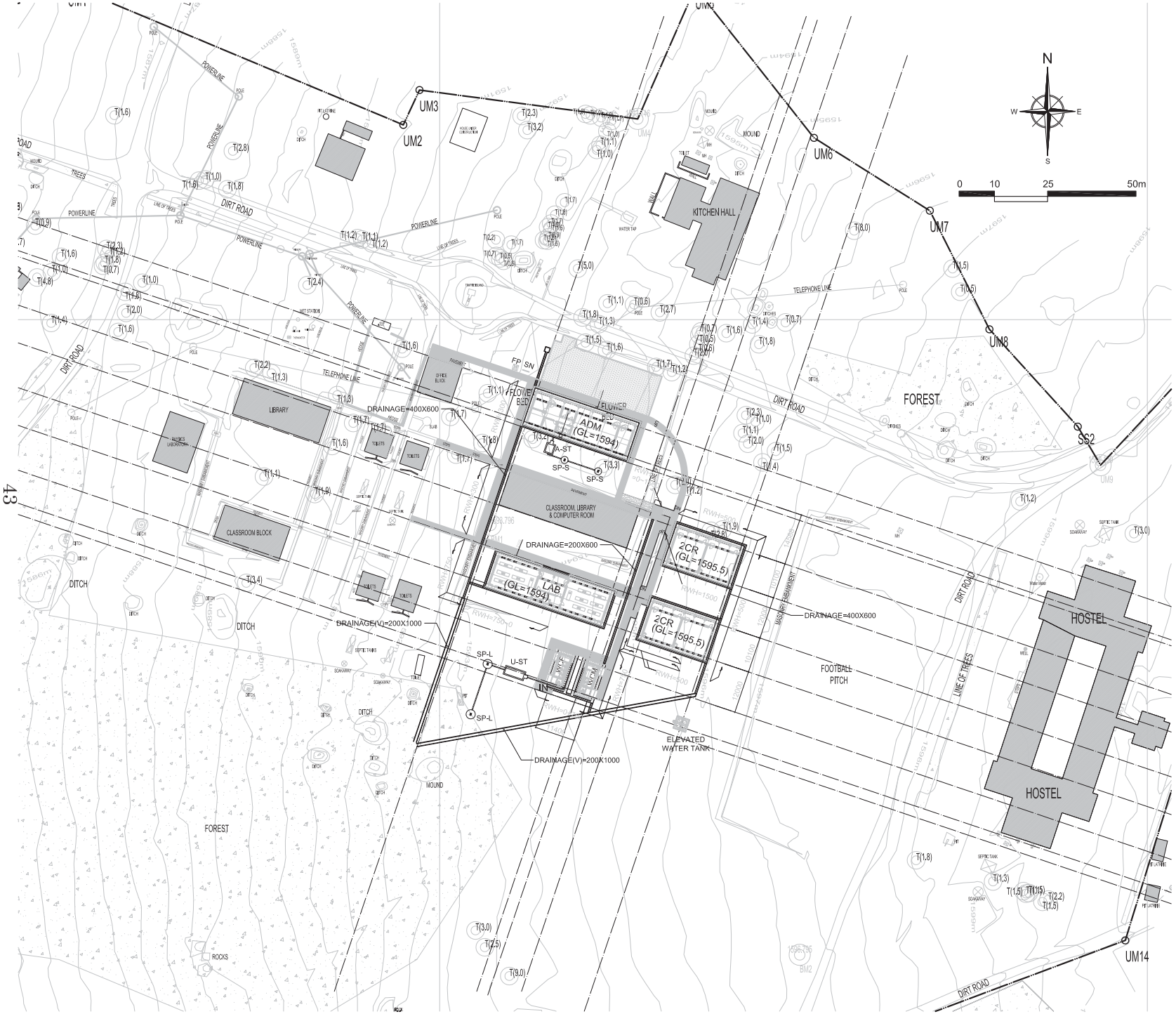
LEGEND

SITE NAME	ZOMBA URBAN CDSS
T(0.7)	Tree with circumference at base in metres
1151.406 BM1	Benchmark
KB2	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Planned building
	Hardcore Filling
	PC Paved passage
	EWT (Elevated water tank)
	RWT (Reserve water tank)
	STL (Septic tank large)
	STS (Septic tank small)
	SPL (Soak pit large)
	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

SITE PLAN: U4 ZOMBA URBAN CDSS



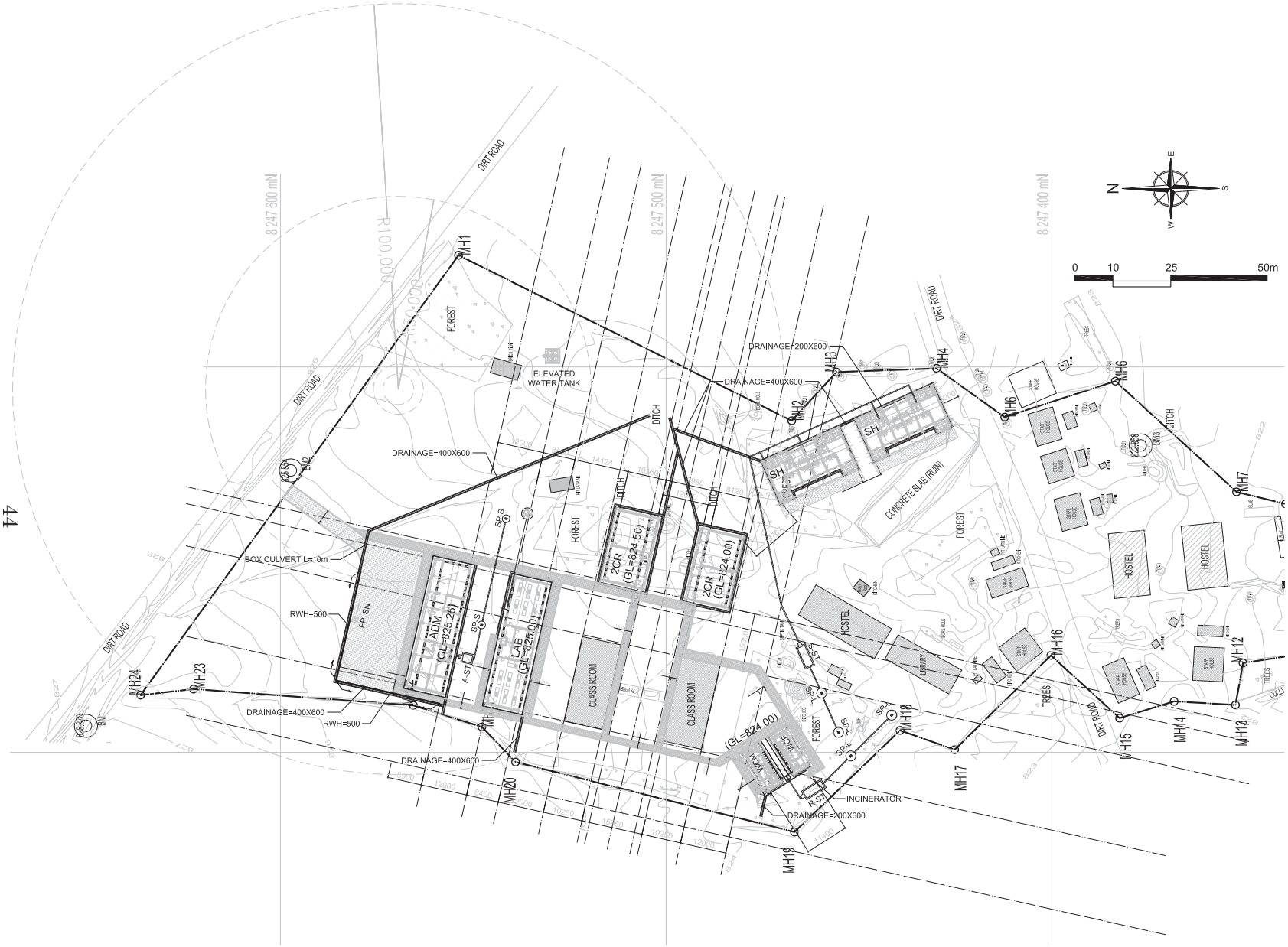
LEGEND

SITE NAME	UMBWI CSS
T(0.7)	Tree with circumference at base in metres
1151.406 BM1	Benchmark
KB2	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Planned building
	Hardcore Filling
	PC Paved passage
EWT	EWT (Elevated water tank)
RWT	RWT (Reserve water tank)
STL	STL (Septic tank large)
STS	STS (Septic tank small)
SPL	SPL (Soak pit large)
SPS	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

SITE PLAN: U5 UMBWI CSS



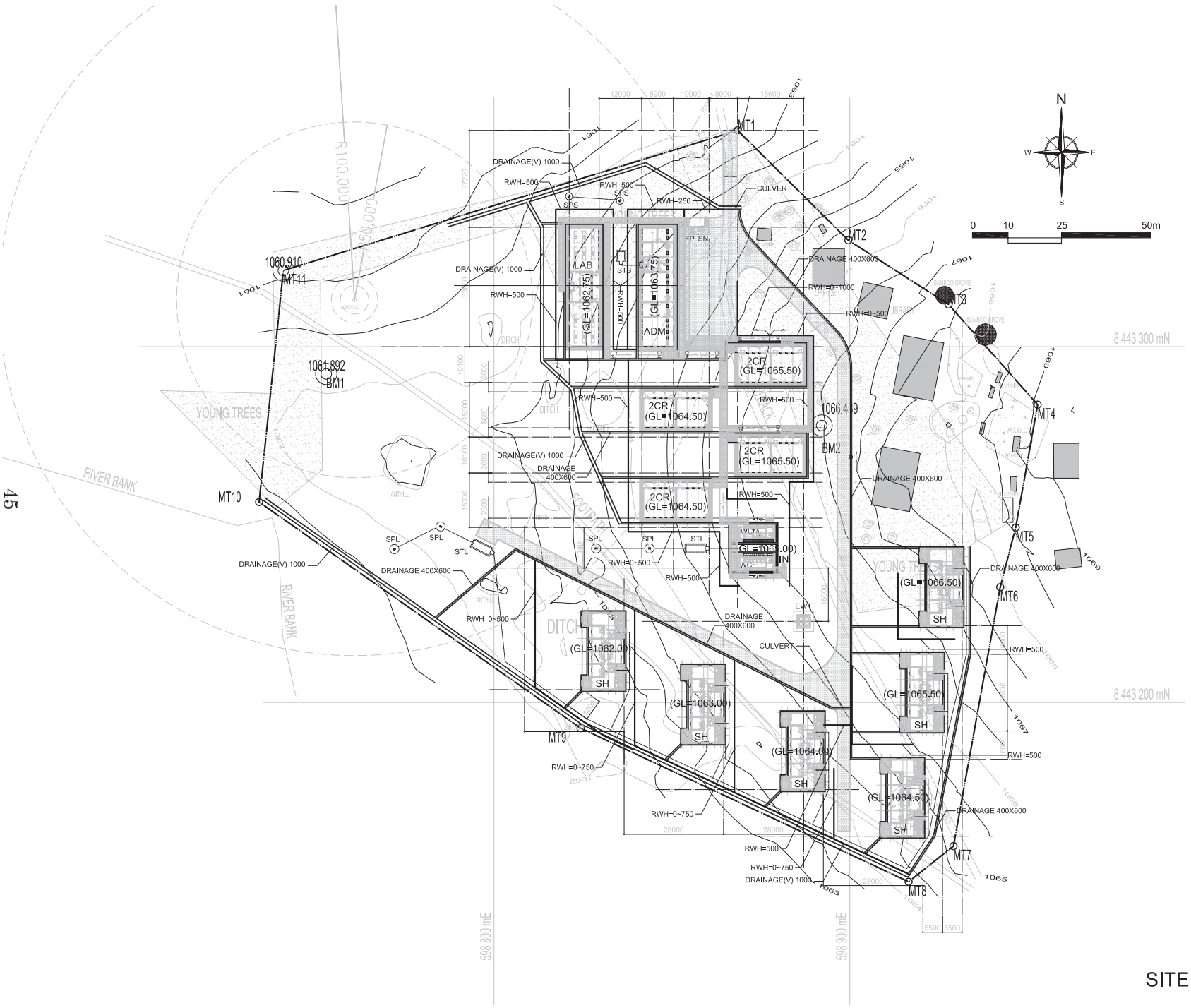
LEGEND

SITE NAME	MUHASUWA CDSS
T(0.7)	Tree with circumference at base in metres
1151.406 BM1	Benchmark
KB2	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Planned building
	Hardcore Filling
	PC Paved passage
EWT	EWT (Elevated water tank)
RWT	RWT (Reserve water tank)
STL	STL (Septic tank large)
STS	STS (Septic tank small)
SPL	SPL (Soak pit large)
SPS	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

SITE PLAN: R1 MUHASUWA CDSS



LEGEND

SITE NAME	MWATIBU CDSS
T(0.7)	Tree with circumference at base in metres
1151.406 BM1	Benchmark
KB2	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Planned building
	Hardcore Filling
	PC Paved passage
EWT	EWT (Elevated water tank)
RWT	RWT (Reserve water tank)
	STL (Septic tank large)
	STS (Septic tank small)
SPL	SPL (Soak pit large)
SPS	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

SITE PLAN: R2 MWATIBU CDSS

SITE PLAN: R3 CHIMWALIRA CSS

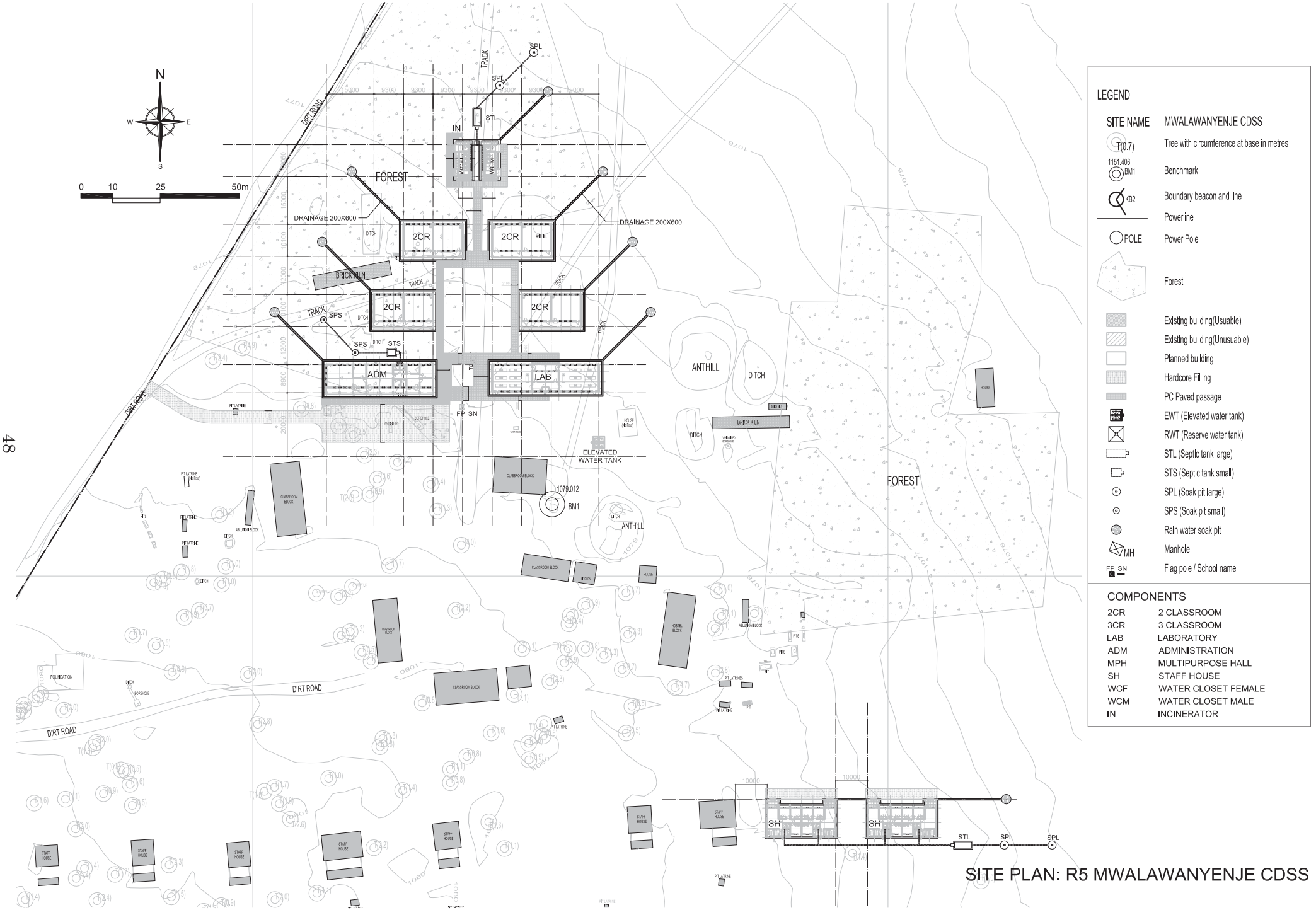
LEGEND

SITE NAME	KABEKERE CDSS
T(0.7)	Tree with circumference at base in metres
1010.787 KB8	Benchmark
KB7	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Hardcore Filling
	Planned building
	PC Paved passage
EWT	EWT (Elevated water tank)
RWT	RWT (Reserve water tank)
STL	STL (Septic tank large)
STS	STS (Septic tank small)
SPL	SPL (Soak pit large)
SPS	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

SITE PLAN: R4 KABEKERE CDSS



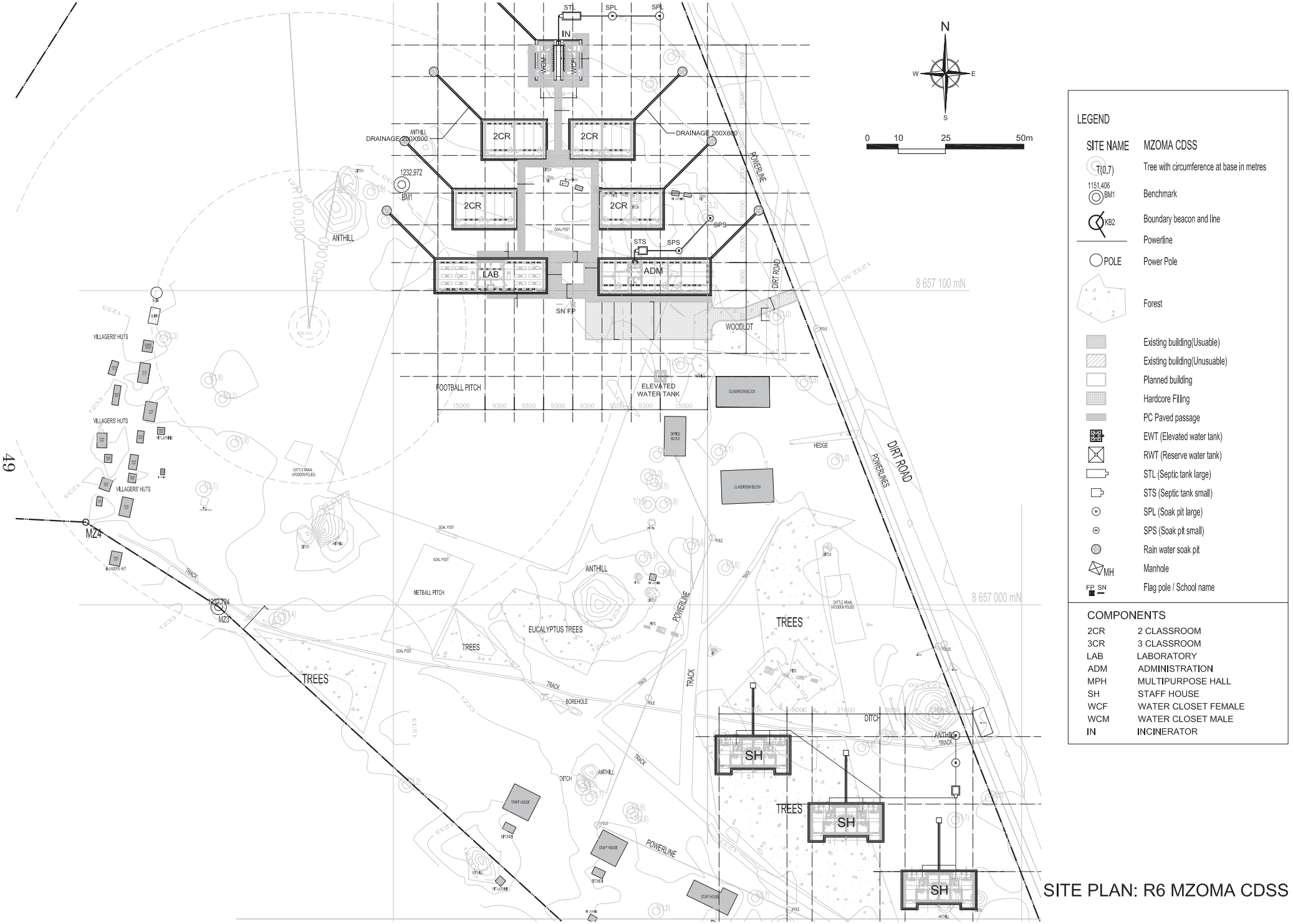
LEGEND

SITE NAME	MWALAWANYENJE CDSS
T(0.7)	Tree with circumference at base in metres
1151.406 BM1	Benchmark
KB2	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Planned building
	Hardcore Filling
	PC Paved passage
	EWT (Elevated water tank)
	RWT (Reserve water tank)
	STL (Septic tank large)
	STS (Septic tank small)
	SPL (Soak pit large)
	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

SITE PLAN: R5 MWALAWANYENJE CDSS



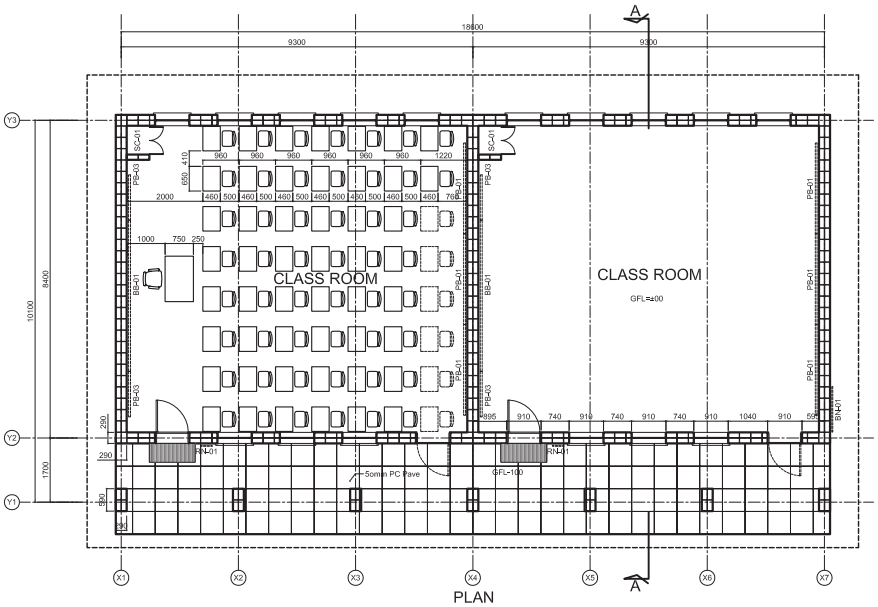
LEGEND

SITE NAME	MZOMA CDSS
T(0.7)	Tree with circumference at base in metres
1151.406 BM1	Benchmark
KB2	Boundary beacon and line
	Powerline
POLE	Power Pole
	Forest
	Existing building(Usuable)
	Existing building(Unusuable)
	Planned building
	Hardcore Filling
	PC Paved passage
	EWT (Elevated water tank)
	RWT (Reserve water tank)
	STL (Septic tank large)
	STS (Septic tank small)
	SPL (Soak pit large)
	SPS (Soak pit small)
	Rain water soak pit
MH	Manhole
FP SN	Flag pole / School name

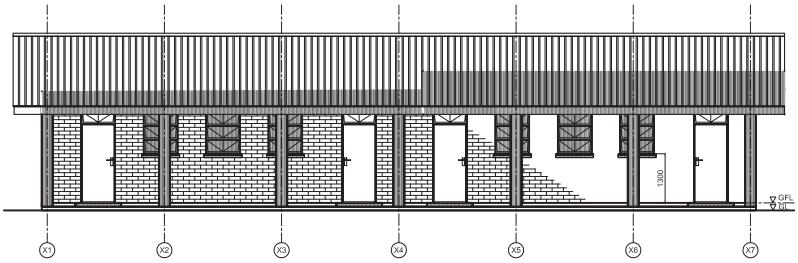
COMPONENTS

2CR	2 CLASSROOM
3CR	3 CLASSROOM
LAB	LABORATORY
ADM	ADMINISTRATION
MPH	MULTIPURPOSE HALL
SH	STAFF HOUSE
WCF	WATER CLOSET FEMALE
WCM	WATER CLOSET MALE
IN	INCINERATOR

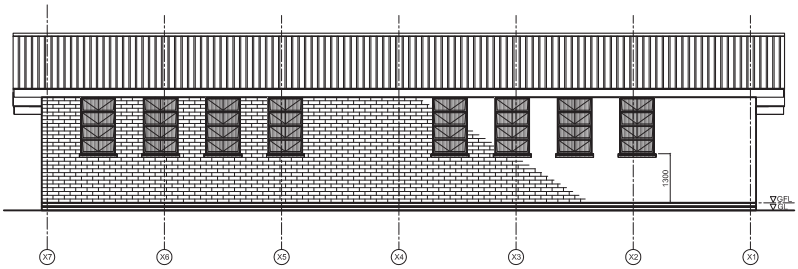
SITE PLAN: R6 MZOMA CDSS



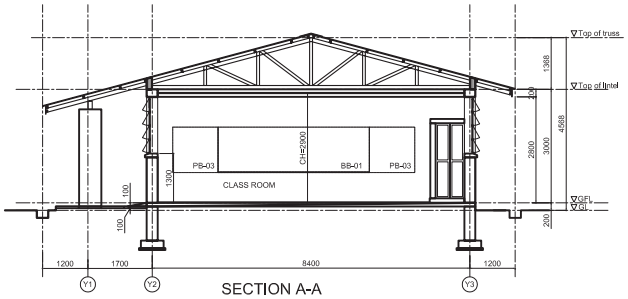
PLAN
2 CLASSROOM BLOCK



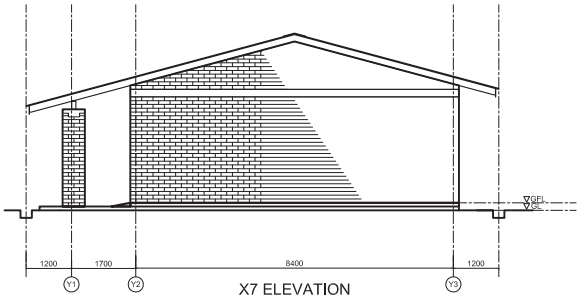
Y1 ELEVATION



Y3 ELEVATION



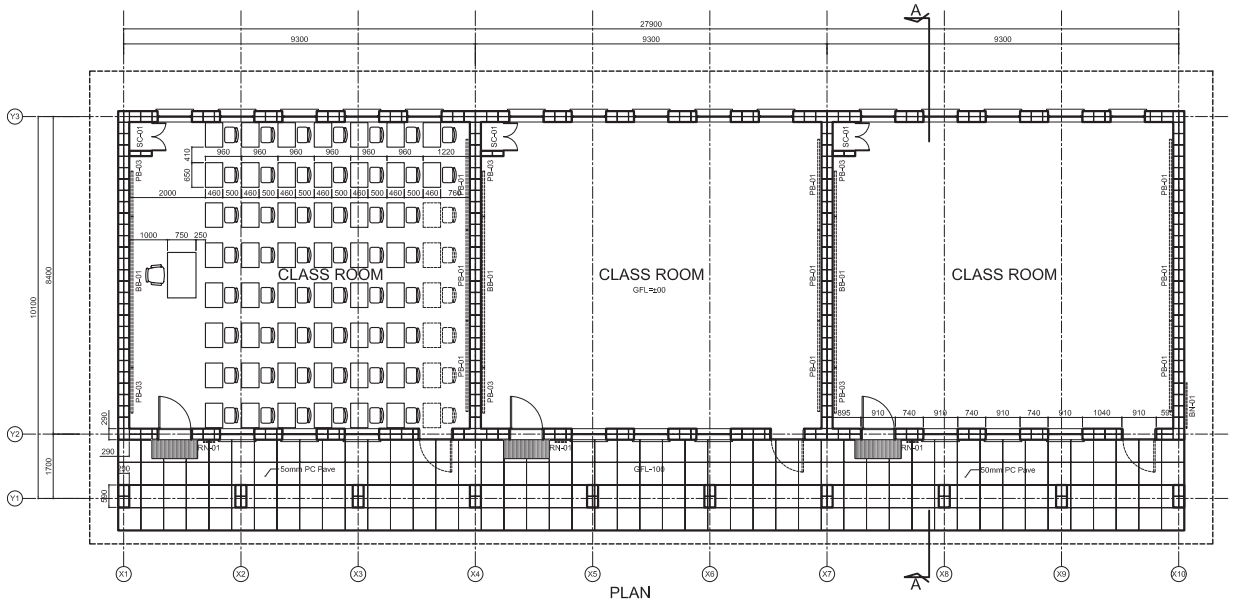
SECTION A-A



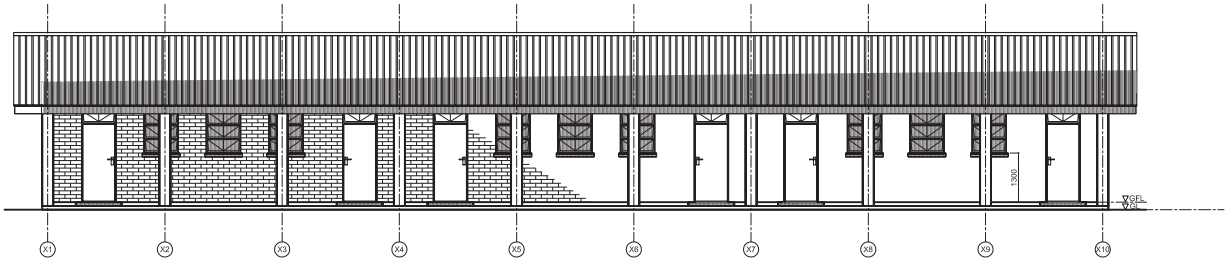
X7 ELEVATION

A-01 CLASSROOM BLOCK(2CR)

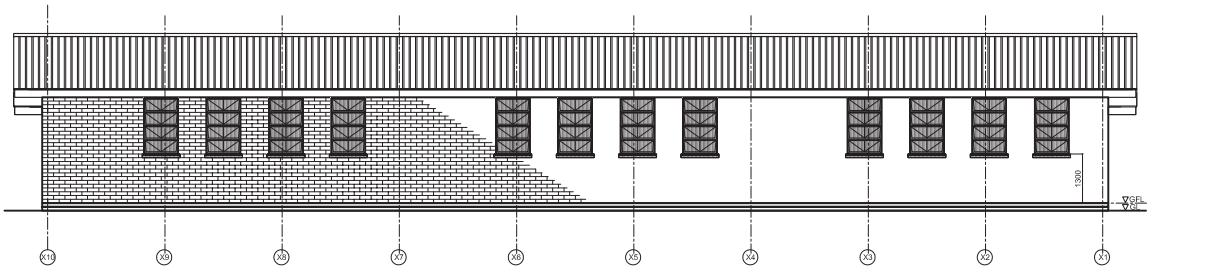
SCALE 1:200



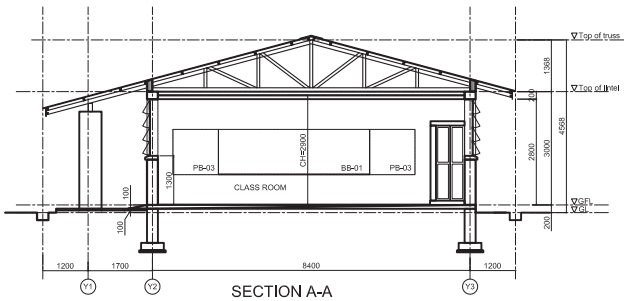
PLAN
3 CLASSROOM BLOCK



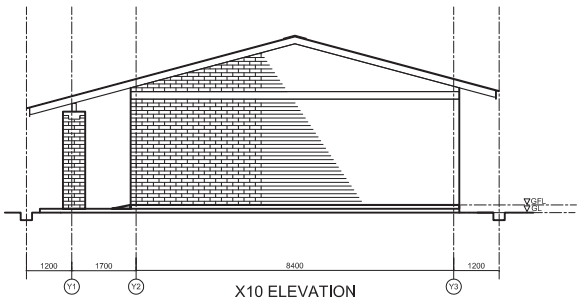
Y1 ELEVATION



Y3 ELEVATION



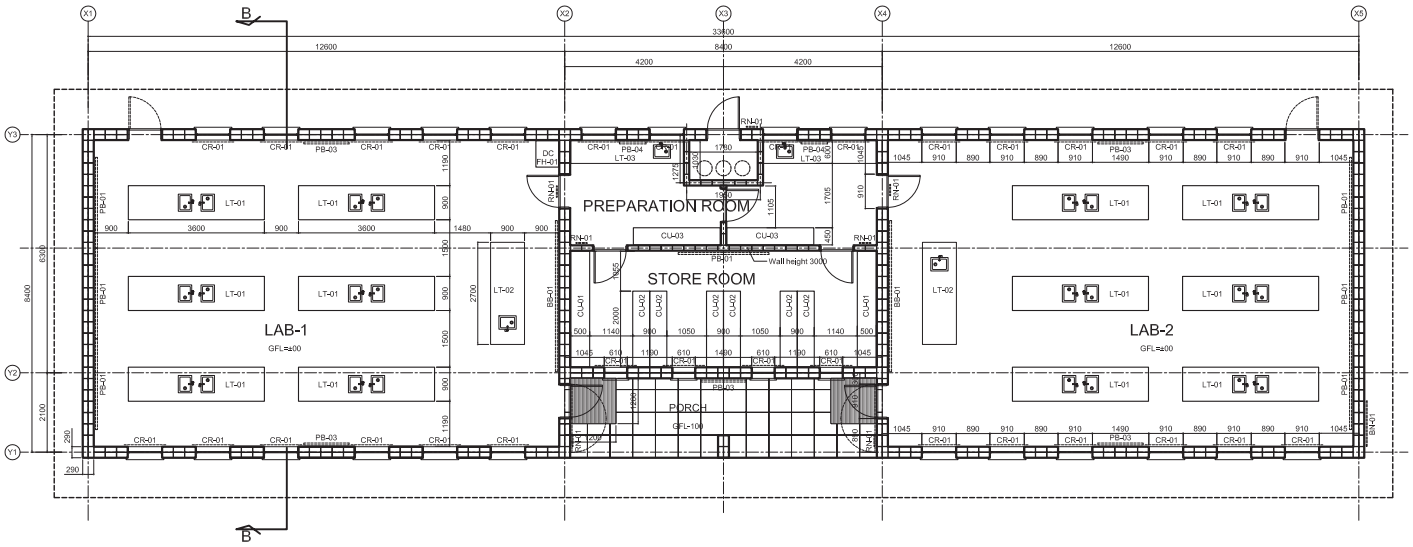
SECTION A-A



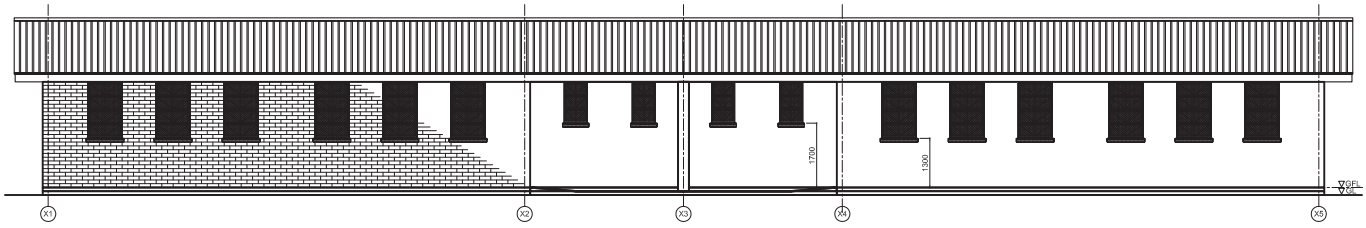
X10 ELEVATION

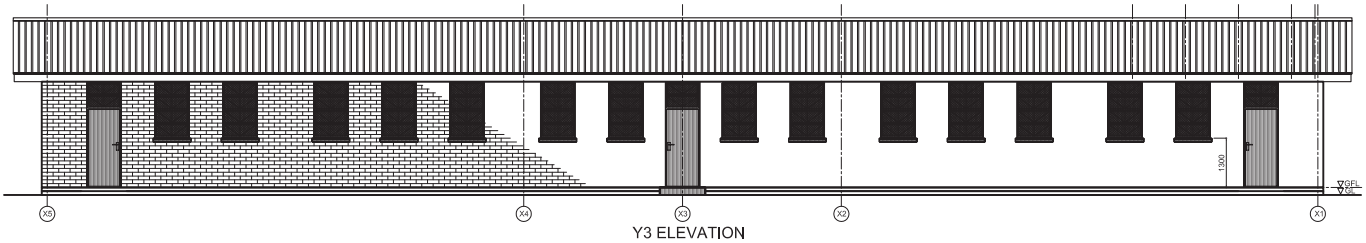
A-02 CLASSROOM BLOCK(3CR)

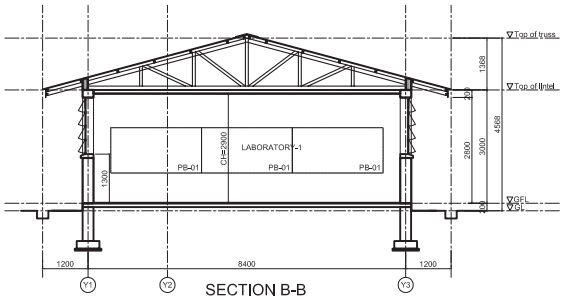
SCALE 1:200

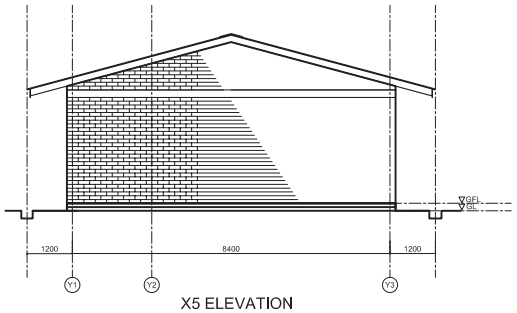


PLAN
LABORATORY BLOCK



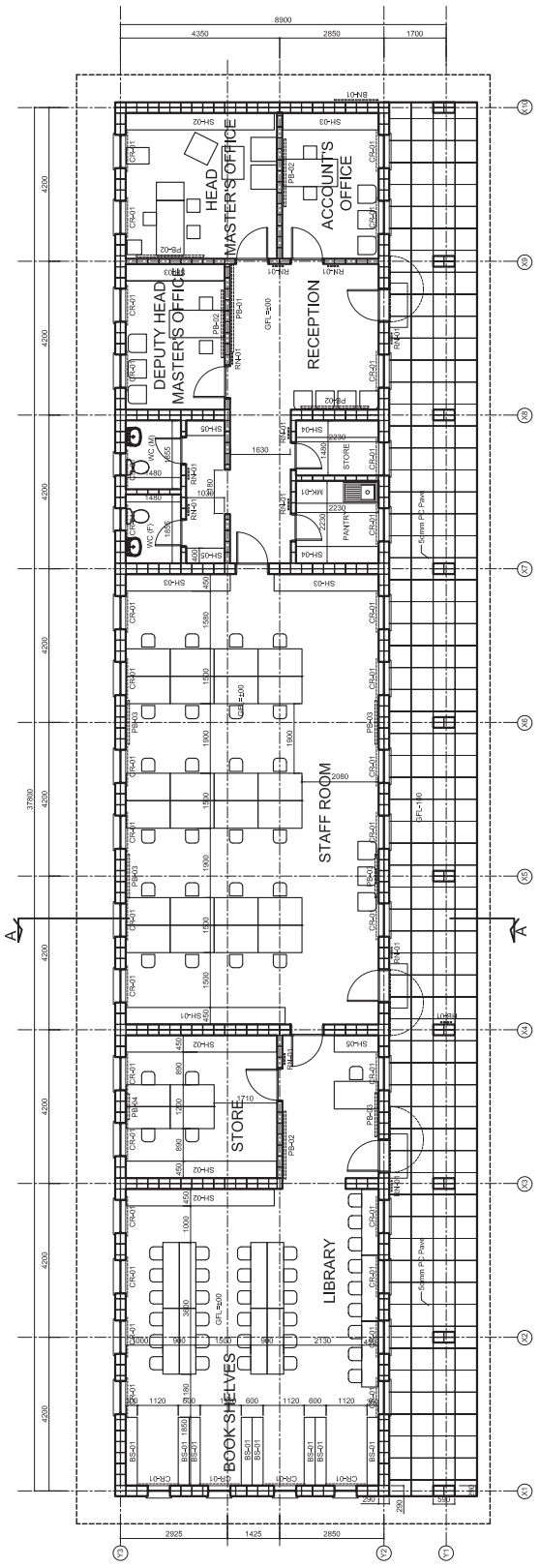




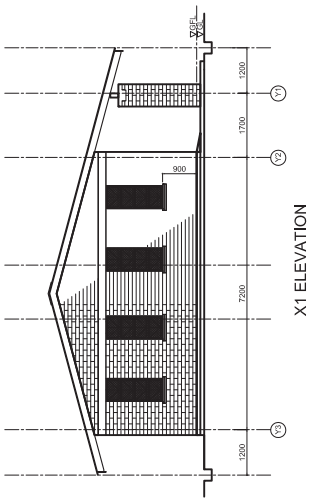


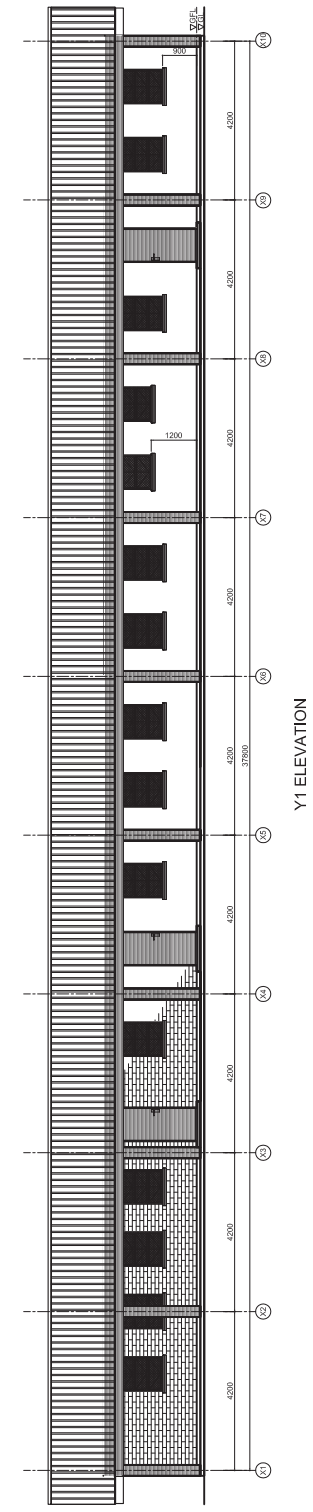
A-03 LABORATORY

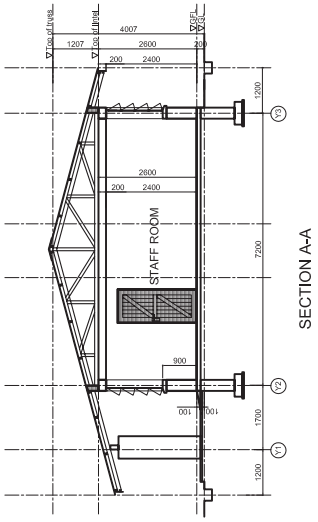
SCALE 1:200

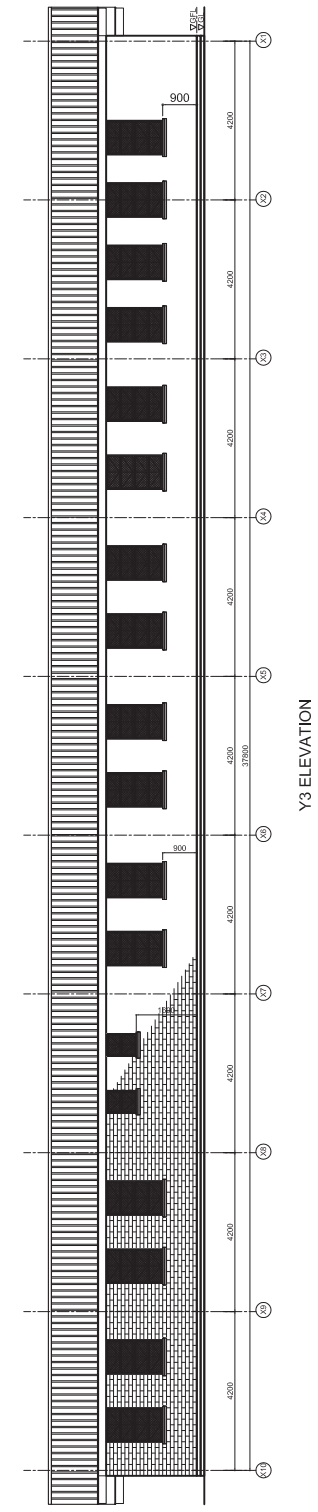


PLAN
ADMINISTRATION/LIBRARY BLOCK-U



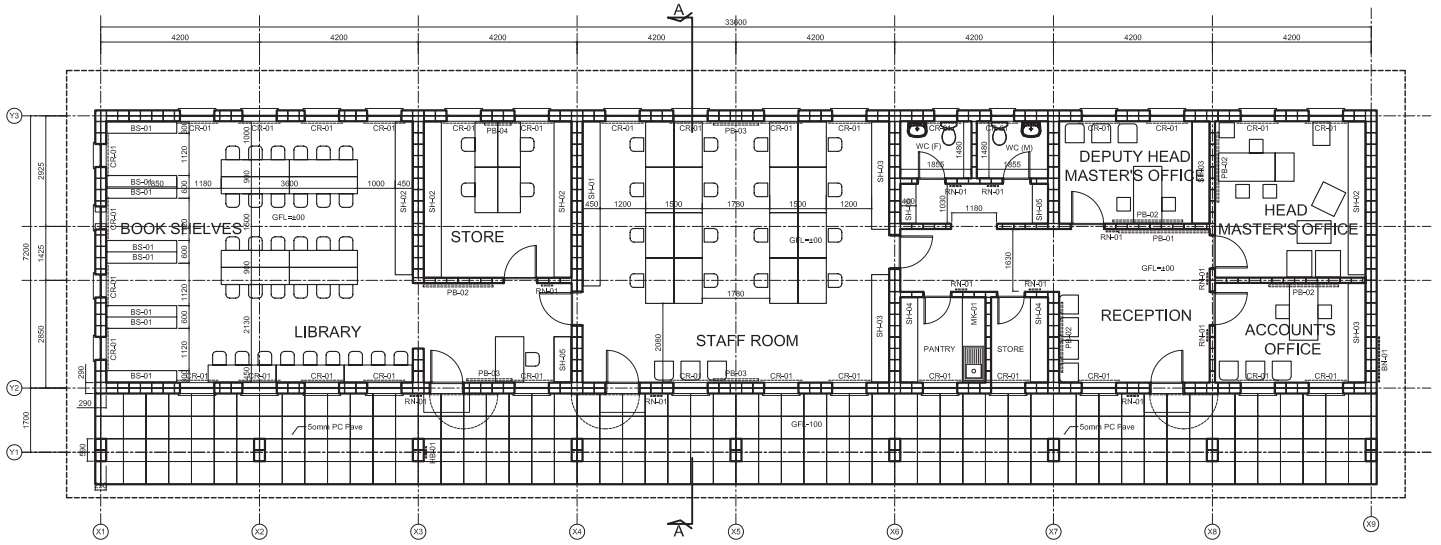




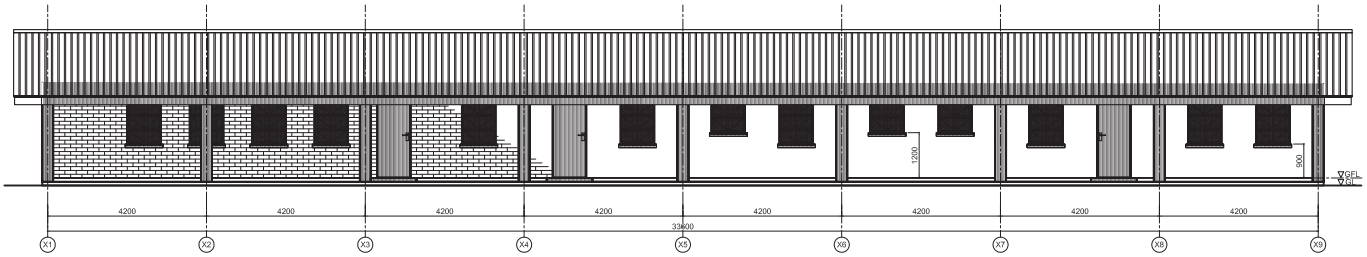


A-04 ADMINISTRATION AND LIBRARY BLOCK(URBAN SITE)

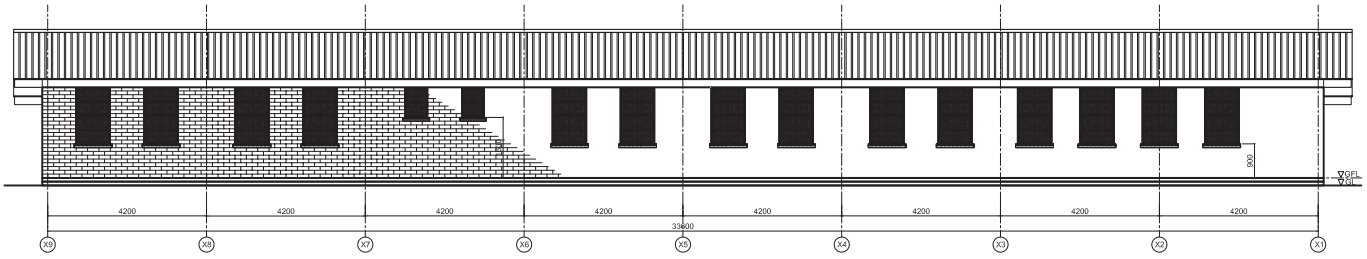
SCALE 1:200



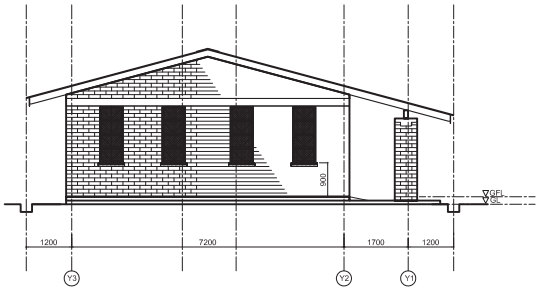
PLAN
ADMINISTRATION/LIBRARY BLOCK-R



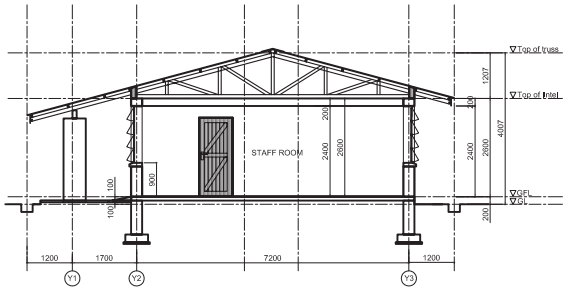
Y1 ELEVATION



Y3 ELEVATION



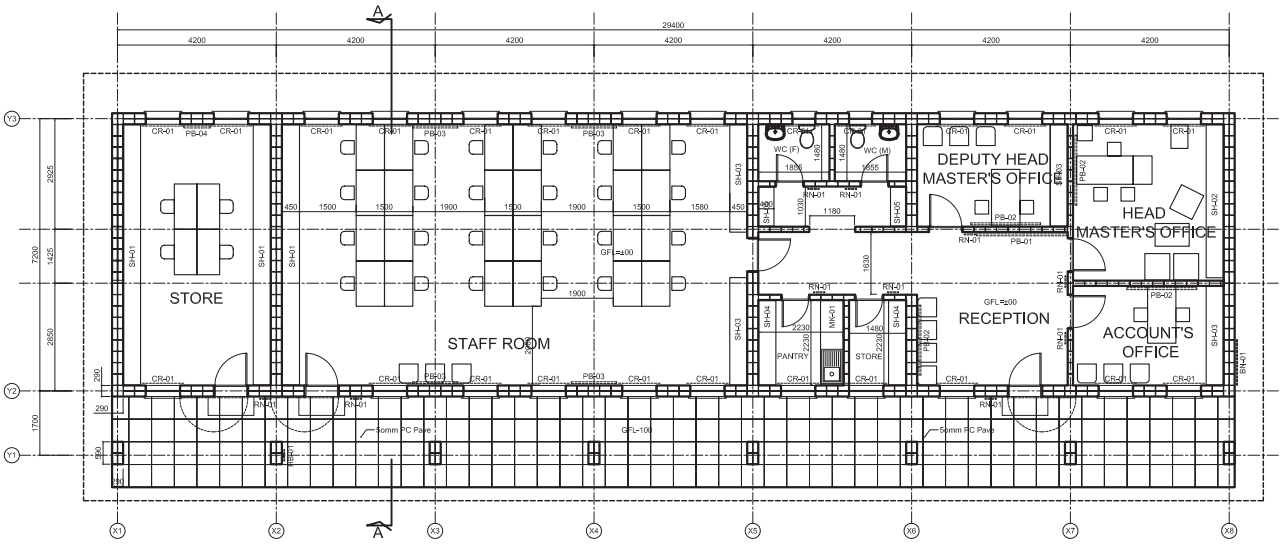
X1 ELEVATION



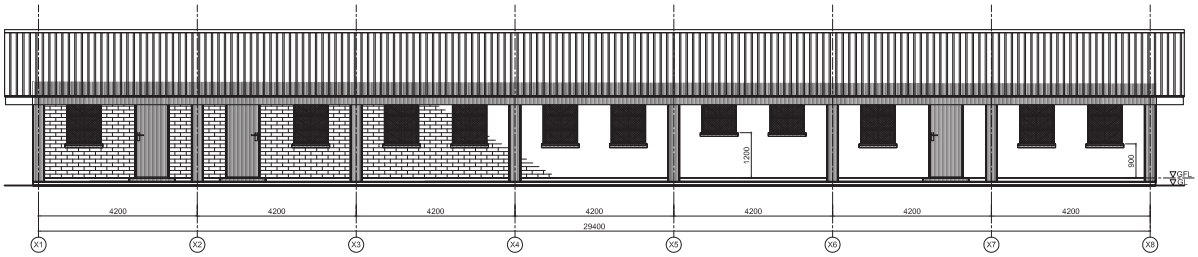
SECTION A-A

A-05 ADMINISTRATION AND LIBRARY BLOCK(RURAL SITE)

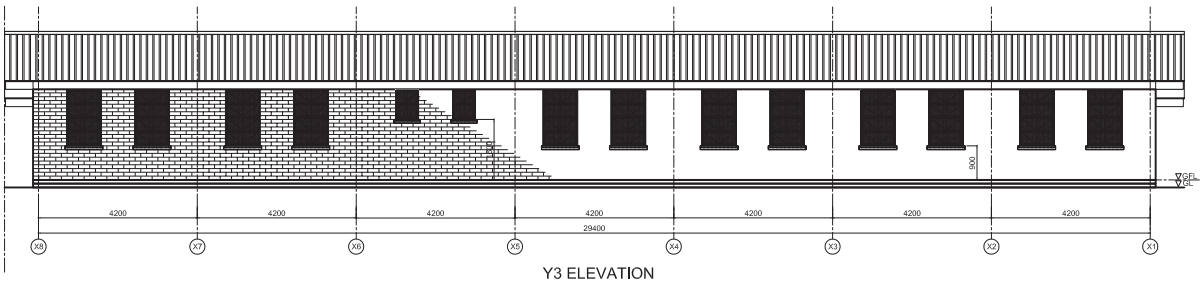
SCALE 1:200



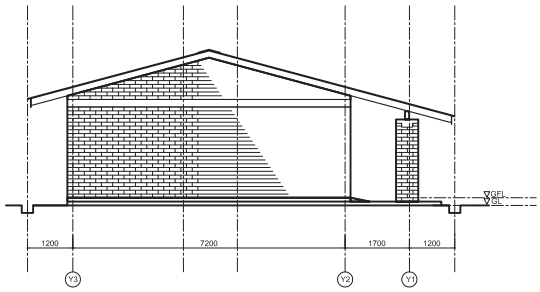
PLAN
ADMINISTRATION BLOCK-U



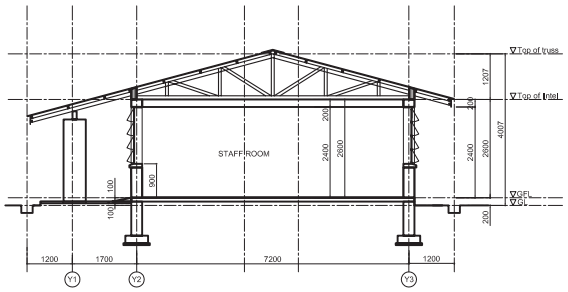
Y1 ELEVATION



Y3 ELEVATION



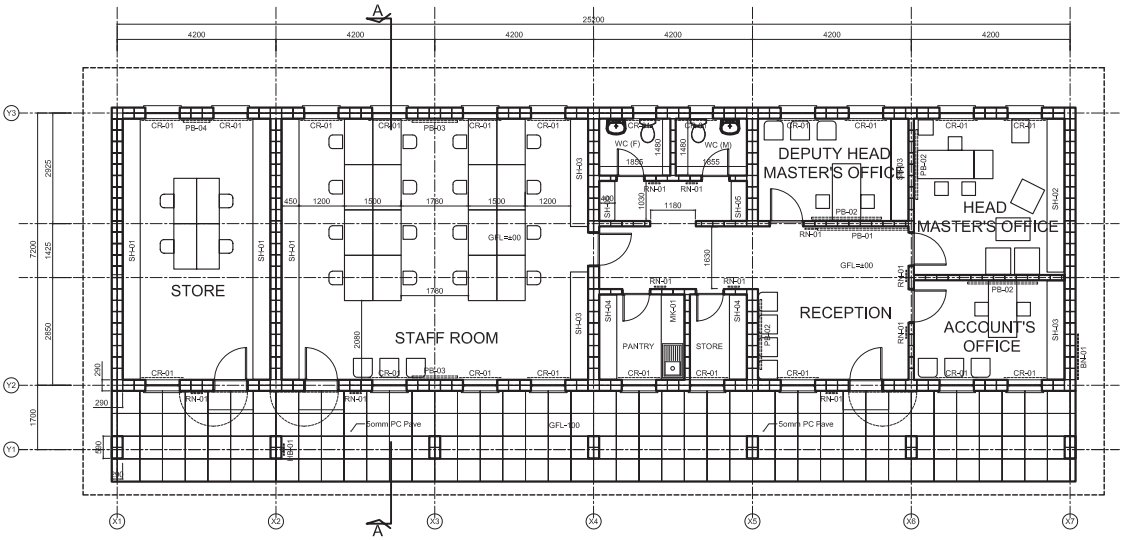
X1 ELEVATION



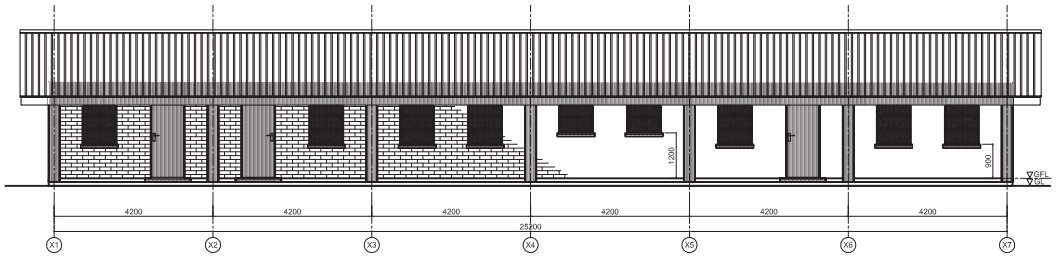
SECTION A-A

A-06 ADMINISTRATION BLOCK(URBAN SITE)

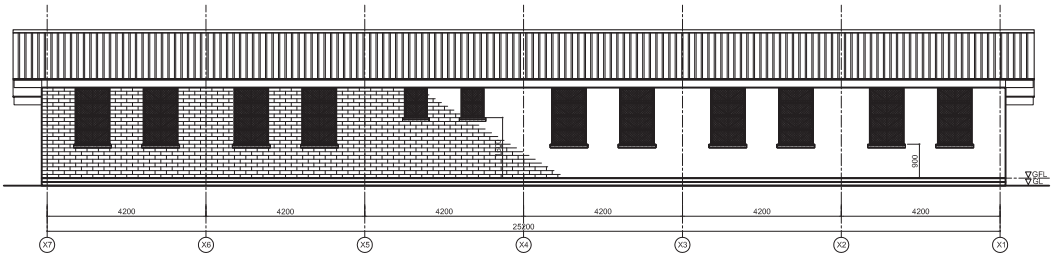
SCALE 1:200



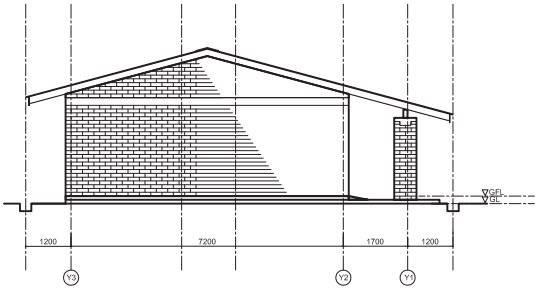
PLAN
ADMINISTRATION BLOCK-R



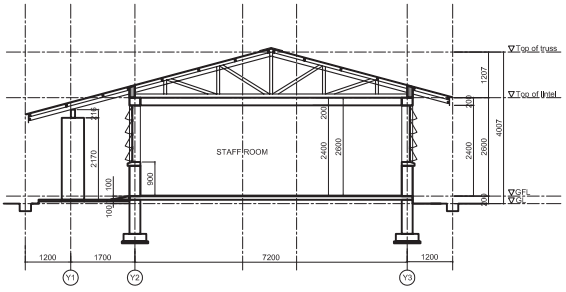
Y1 ELEVATION



Y3 ELEVATION



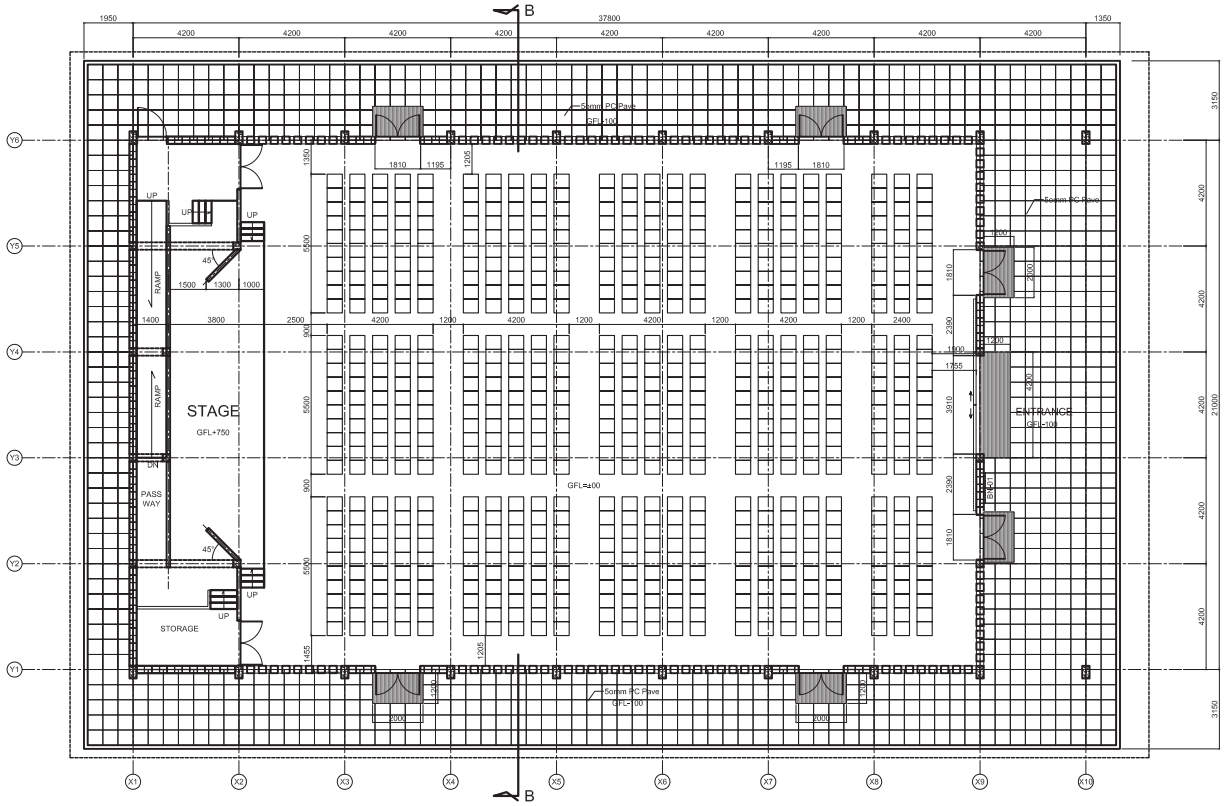
X1 ELEVATION



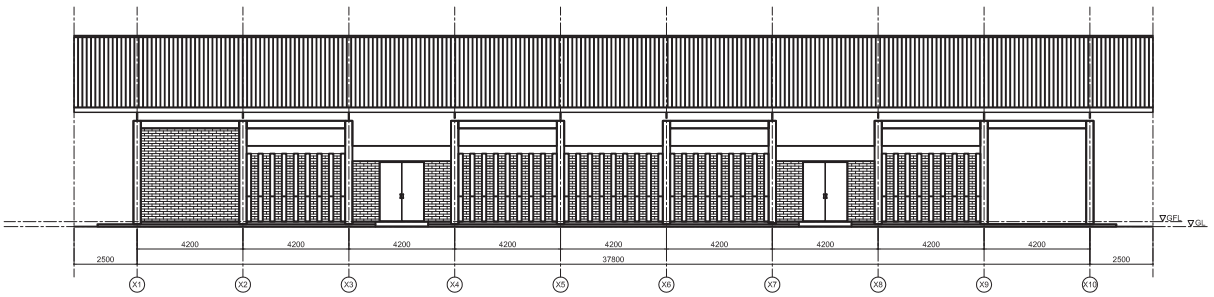
SECTION A-A

A-07 ADMINISTRATION (RURAL SITE)

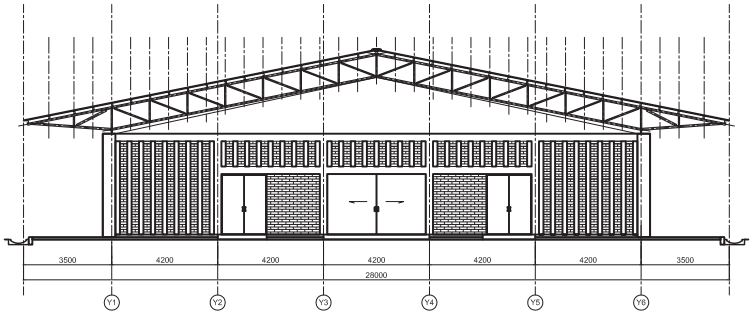
SCALE 1:200



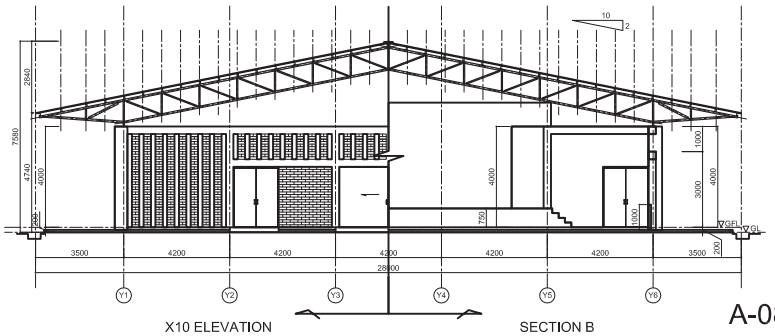
PLAN
MULTI PURPOSE HALL



Y1 ELEVATION



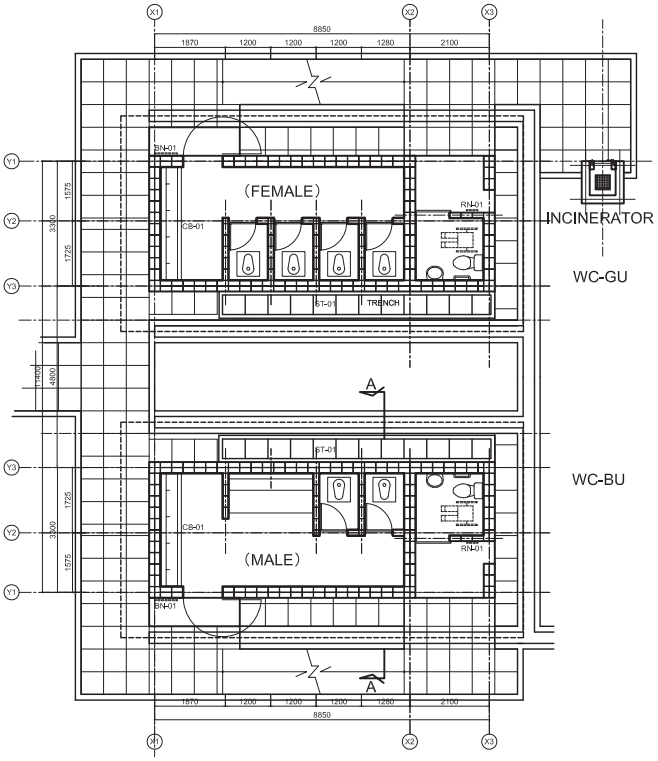
X10 ELEVATION



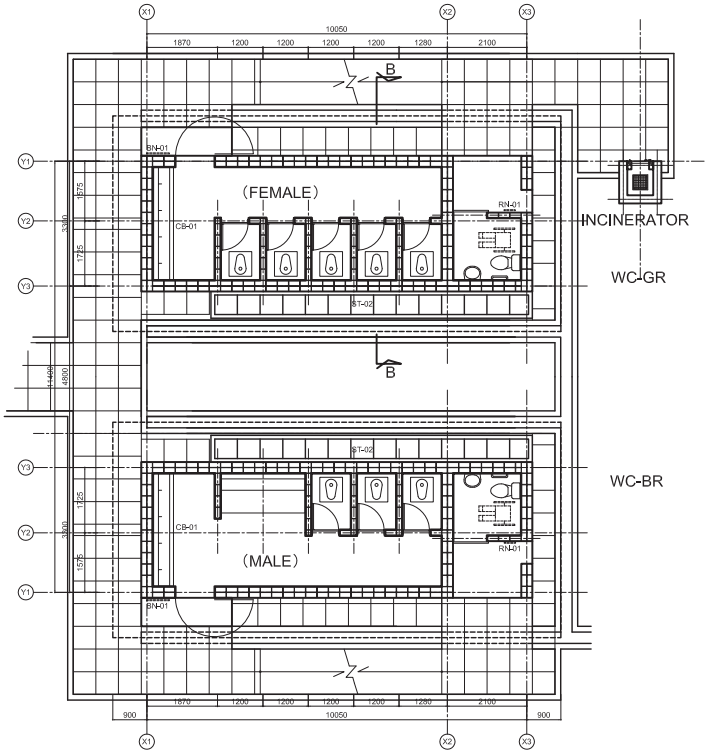
X10 ELEVATION SECTION B

A-08 MULTIPURPOSE HALL

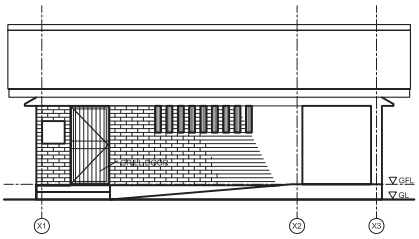
SCALE 1:300



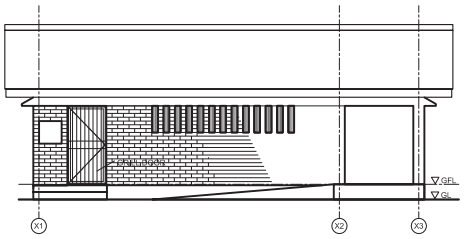
PLAN
FLUSH TOILET BLOCK
(URBAN SITE)



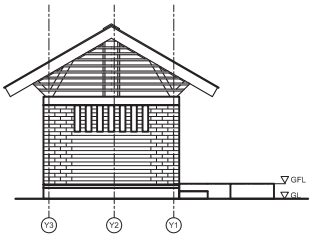
PLAN
FLUSH TOILET BLOCK
(RURAL SITE)



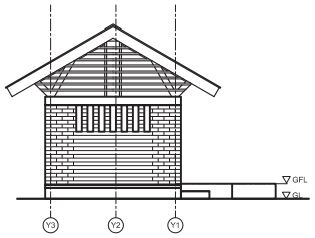
Y1 ELEVATION



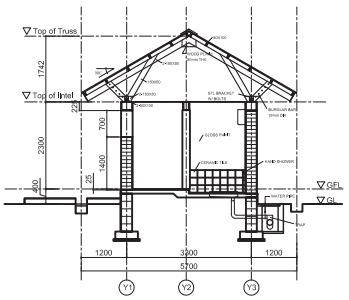
Y1 ELEVATION



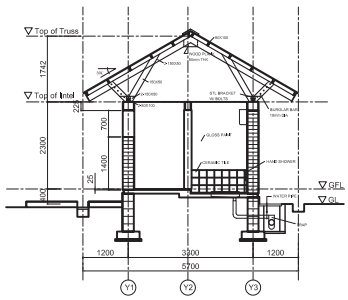
X1 ELEVATION



X1 ELEVATION



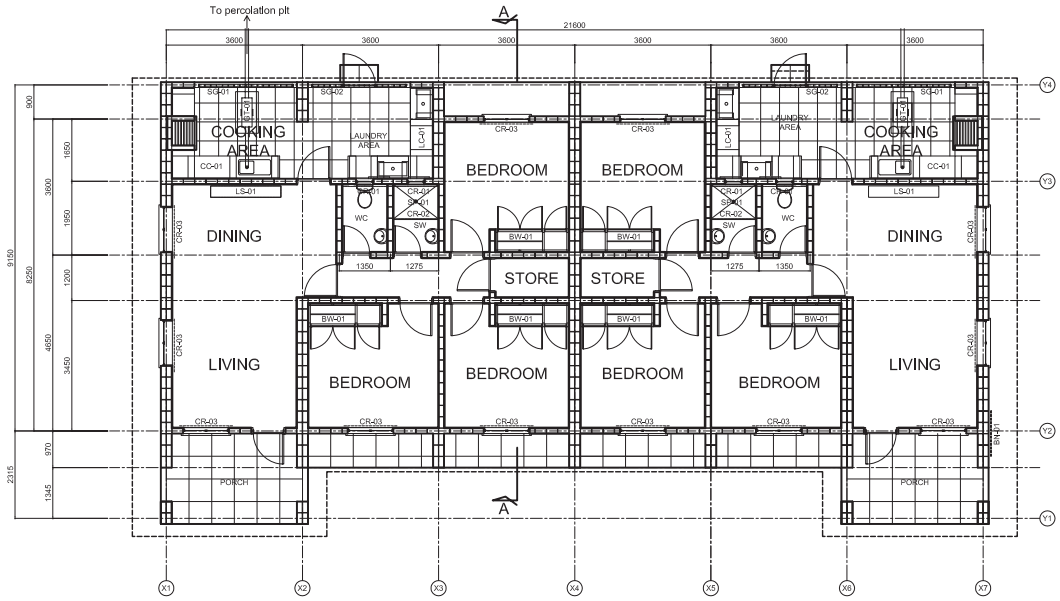
SECTION A-A



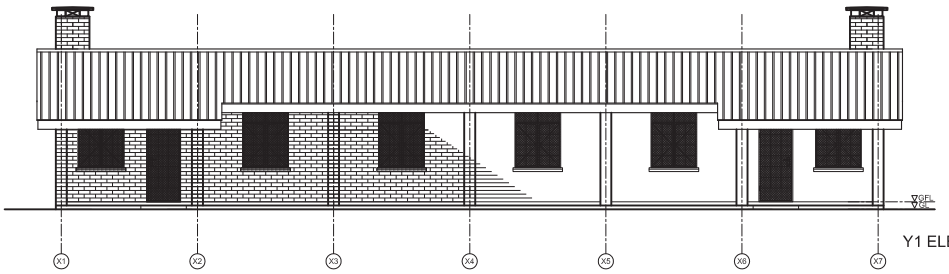
SECTION B-B

A-09 FLUSH TOILET (URBAN/RURAL TYPE)

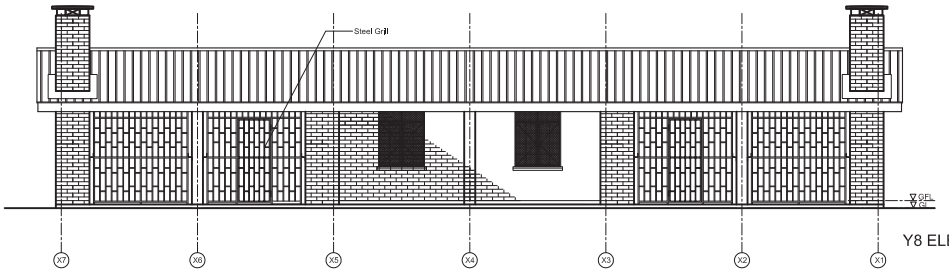
SCALE 1:200



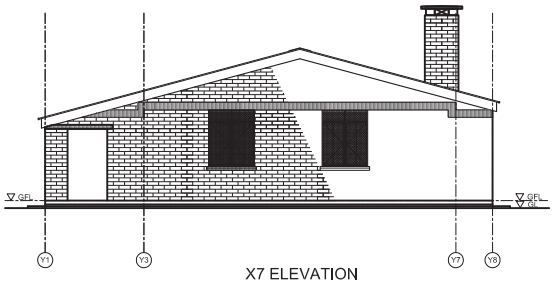
PLAN
STAFF HOUSE



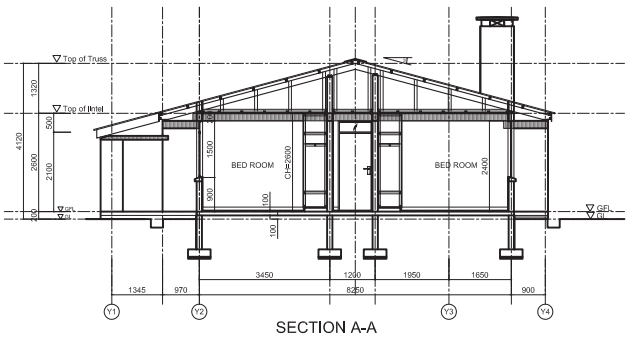
Y1 ELEVATION



Y8 ELEVATION



X7 ELEVATION



SECTION A-A

A-10 STAFF HOUSE

SCALE 1:200

2-2-4 Implementation/Procurement Plan

2-2-4-1 Implementation/Procurement Policies

(1) Basis for Project Implementation

This Project, after being examined by the Japanese organisations concerned based on this report, needs to be approved by cabinet decision of the Government of Japan before its implementation. The Exchange of Note (E/N) regarding the project implementation will then be concluded between the two Governments, and the Grant Agreement (G/A) will be concluded between JICA and the Government of Malawi. The Government of Malawi, based on the Agreed Minutes on Procedural Details (A/M) attached to the E/N defining the details of the implementation procedures and the G/A, will conclude an Agent Agreement (A/A) with a Japanese Procurement Agent and entrust the agent with project implementation. The Procurement Agent, for the sake of smooth project implementation, will implement the Project on behalf of the Government of Malawi, managing the funds and various contracts (with Supervising Consultant, contractors, and equipment suppliers) and implementing progress management.

(2) Council

After the E/N and the G/A are concluded, the two Governments will establish a Council as a place for discussion and coordination to ensure proper and effective operation of the Project. The Council will consist of members of the Ministry of Education, Science and Technology (MoEST) and the JICA Malawi Office, and will establish, as required, a Working Group chaired by a person from the Malawian side as a subordinate organisation of the Council. The Council will be attended by representatives of the Procurement Agent from the Japanese side as advisors.

(3) Implementing Organisation on the Malawian Side

The Ministry of Education, Science and Technology (MoEST) will be the competent authority on this Project on the Malawian side. The Directorate of Education Planning and its subordinate, the Education Infrastructure Management Unit (EIMU), will be the implementing agencies responsible for the operation of the project including overall coordination and necessary budgetary measures. The Directorate of Education Planning and EIMU should supervise the organisations involved in the Project including Education Division Offices and District Education Offices on the work to be implemented by the Malawian side, including site preparation and extension of power supply and water supply and implement the said work and other practical work including acquisition of required permits, approvals and consensus. The Ministry of Foreign Affairs and International Cooperation should be the competent authority for the conclusion of the exchange of note between the governments and a representative of the Ministry of Finance should sign the agreement on behalf of the GOM.

(4) Procurement Agent

The Procurement Agent will conclude an A/A with MoEST, the implementation agency on the Malawian side, and select Japanese Consultant to be in charge of supervising implementation, local contractors and local equipment suppliers according to this contract, and conclude a contract with each of them to implement the Project.

The role of Procurement Agent covers the items below:

- To serve as the local project manager to control the entire project, carry out tender operations, and manage funds regarding payment of contract deposit.
- To report to the organisations concerned regarding tender evaluations and construction progress as required.
- To bring to intergovernmental consultations any changes in the scope of cooperation required due to budget expenditure status, summarise the changes to be made, and implement the necessary coordination and procedures for the changes.
- To confirm the work supervision plans of the Consultant, and provide necessary guidance and advice as required.
- To conduct the acceptance inspections and check the details of the report on intermediate inspections, completion inspections, and defect inspections conducted by the Consultant.

(5) Supervision Consultant

This Project is stipulated to be implemented by a consultant as the principal contractor. Therefore, a Japanese consultant should employ local engineers and local consultants and supervise the tender and work execution with them. Such a consultant should provide assistance to the tender by the procurement agent and supervise the work execution for the agent in accordance with an agreement that the consultant has concluded with the procurement agent with the recommendation from JICA.

(6) Contractors/Equipment Supplier

The contractors/equipment suppliers, in accordance with the construction or procurement contract concluded with the Procurement Agent as well as the contract documents, will implement construction work and procurement of equipment within the due date for implementation.

(7) Implementation System

The figure below shows the implementation system in this Project:

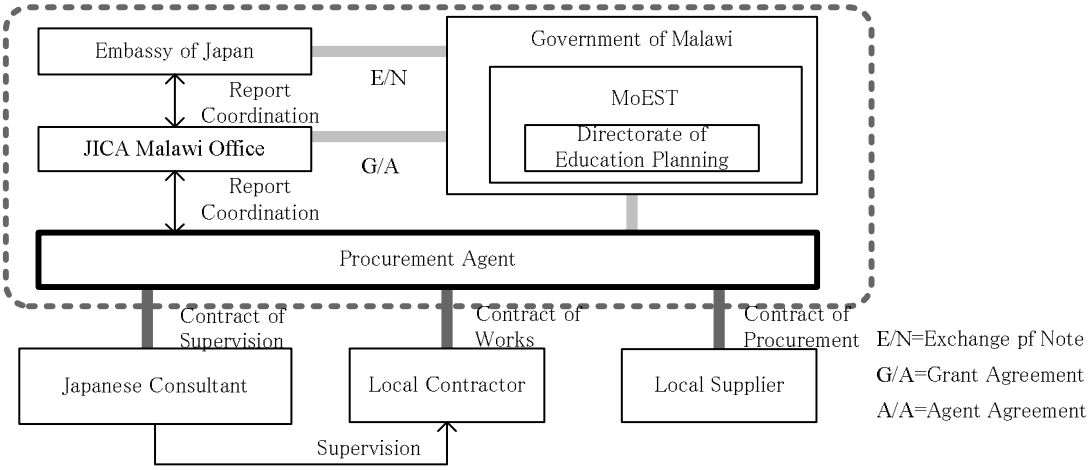


Figure 2-2 Conceptual Diagram of Implementation System

2-2-4-2 Implementation Conditions

(1) Labourers' Skill Levels

General labour can be procured at all the planned sites in this Project. However, most of skilled workers are found in urban areas and it is difficult to employ skilled workers at the rural sites. Large-scale construction companies, which are expected to be invited to participate in the tender for this Project as in the previous phases, have experience in implementing projects in the whole of Malawi and they have a system established for the implementation of construction projects in rural areas, in which construction companies dispatch full-time skilled workers required for project implementation to project sites to work with locally-employed general labourers. Therefore, overhead costs such as labourers' lodgings, transportation fees, and travel allowances are relatively more expensive in rural area than in urban area.

(2) Transportation Conditions

None of the planned sites has any significant problems regarding access or allowing heavy vehicles to transport equipment and materials. However, those vehicles have to use unpaved roads branching from trunk roads to reach most of the rural project sites. The access route to R6/Mzoma CDSS, in particular, includes a 40 km-long unpaved road (a one hour drive) running west from M1 (national highway route 1) which is rutted in many places. Therefore, vehicles should be driven very carefully on this road in the rainy season. This condition should be taken into consideration in the preparation of the work schedule.

(3) Suppliers of Materials and Equipment

Medium-sized suppliers of construction materials are found in the capital Lilongwe, and the commercial capital, Blantyre. Meanwhile, only small construction material dealers

the size of a retail shop are found in the rest of the country, including rural areas. In many cases, construction companies import construction materials directly from manufacturers in South Africa and other foreign countries by themselves after being awarded contracts and procurement from local suppliers is restricted to a very limited number of materials and replenishment of materials which have run out.

Many furniture suppliers have their own plants. It is a general practice in Malawi for a furniture supplier to procure raw material domestically or from foreign countries after receiving an order, process the materials and assemble furniture in its plant, and deliver products throughout the country.

Most of the suppliers of laboratory equipment are sales agents of manufacturers headquartered in foreign countries. In many cases, they receive orders with records of previous orders or item numbers in catalogues and there are only a few samples in their shops.

(4) Transport and Installation of Furniture and Fixture

Manufacturers of educational furniture which own furniture plants, transport furniture finished at the plants to project sites. Therefore, there will be no furniture installation work in this Project.

(5) Contractors

1) Definition of Registration Systems and Contractors of Recipient Country

Malawian contractors, suppliers and consultants have to obtain corporate status from the Ministry of Justice, obtain tax payer identification numbers from the Malawi Revenue Authority (MRA) and register with the National Construction Industry Council (NCIC) before providing services.

Grade classification of companies in the construction industry of NCIC

The contractors are included in the list of registered members, categorised by type of work (such as construction, civil engineering, electricity) and the scale of work for which they can receive orders. Although the criteria for qualification for registration are the company scale (capital, number of qualified engineers, and amount of equipment owned) and past construction records, there are no clear divisions regarding the criteria. Therefore, there is a concern that contractors registered in the same class may have different financial and construction capabilities.

In addition, “Procedures for Registration of Persons Engaged in the Construction Industry” published by NCIC used to provide the definitions concerning nationality of the owner and proportion of Malawian capital mentioned below for the classification of the registered firms into three categories until its 2009 edition. However, the definitions have not been provided in the document since the 2010 edition.

Table 2-12 List of Definitions of Firm Classifications (Source: NCIC, 2009)

Firm	Definition	Remarks
Malawian firm	Malawian firms are those owned by indigenous Malawians and having more than 51 per cent of their capital originating from Malawi.	Malawian owner and more than 51% of capital from within Malawi
Local firm	Local firms are those owned by non Malawians but with more than 51 per cent of their capital originating from within Malawi.	Non-Malawian owner and more than 51% of capital from within Malawi
Foreign firm	Foreign firms are those owned by non Malawians and having over 51 per cent of their capital originating from outside Malawi.	Non-Malawian owner and more than 51% of capital from outside Malawi

In the selection of contractors to be invited to selective tender for Phase 2, 13 contractors from the registration list with the grade classification published in newspapers and the official gazette on 21st October 2009 using the criterion of a non-foreign firm in the two highest categories (allowable contract prices: unlimited and five million Mwk) which was considered appropriate for the estimated contract price of Phase 2 and invited them to participate in the tender. In the tender, a bid of a contractor with experience in large projects similar to this Project was accepted and the successful bidder was awarded a contract. The selection criterion based on the definitions of the 2009 edition of the above-mentioned document of NCIC is expected to be useful in selecting eligible contractors for this Project.

2) Eligible Bidders

Number of eligible bidders when eligibility criteria include a contractor being of the recipient country

From the result of the tenders in the previous phases and the results of the pre-qualification of contractors by the Procurement Agent, Malawian Firms and Local Firms in the categories of unlimited allowable contract price and maximum allowable contract price of five million Mwk are considered as eligible bidders satisfying the stipulated conditions. A study should be carried out for the selection of the contractors from the firms in the above-mentioned two categories.

Table 2-13 Excerpt from NCIC List of Registered Contractors (as of 18th October 2011)

Category for the acceptable contract amount	Construction type	Number of Contractors (Only Malawian/local firms, excluding foreign firms)
Unlimited	Entire construction	11
Max. 500 million Mwk (about 280 million JPY)	Entire construction	2

*The number of contractors may vary as there are companies that had not updated their registration with the NCIC at the time of the survey.

Technological Level, Past Records, etc.

Site surveys and hearing surveys of consultants were conducted regarding facilities constructed in the previous phases and similar projects (WB secondary education facilities, AfDB secondary education facilities, college of education, and University of Malawi) in terms of technology levels and work performance. The results revealed that the majority of the facilities were constructed by contractors classified as local firms and that, from the viewpoint of quality management and schedule control, they have sufficient experience of performing construction work on a scale equivalent to this Project.

(6) Measures for Tax Exemption

Tax exemption measures should be applied to procurement of all the supplies/equipment and services related to implementation of this Project under the tax laws in Malawi. Different tax exemption methods and procedures are used for different goods and services. Serious problems with regard to tax exemption were not observed in the previous phases. The table below shows the details of tax exemption measures and precautions with a focus on the different target items.

Table 2-14 List of Tax Exemption Procedures by Target (Source: Ministry of Finance and MRA)

Item and Timing	Procedure		
After the Conclusion of Contract	The Procurement Agent should submit (1) a letter to MRA to apply for "Free Status" of VAT and Customs Duty for this Project. The letter should be accompanied by G/A, A/A, and a copy of the contracts with contractors.		
Target Category	VAT Exemption	VAT Refund	Customs Duty
	Locally procured construction materials and supplies/equipment	Services such as consultant contracts, lawyer contracts, etc.	Imported materials and equipment
Prior Approval	The responsible department of MRA at Petroda Glass House (Lilongwe) will issue a letter of approval to the Procurement Agent.		The responsible department of MRA at Msonkho House (Lilongwe) will issue a letter of approval to the Procurement Agent.
Application	Apply for tax exemption for supplies/equipment before purchase using Exemption Form ST14 with the letter of approval attached. Each of the applications can be made directly by the contracted contractors if the letter in (1) above specifies the contractor's name.	Apply for tax exemption after contract conclusion using Exemption Form ST11 with the letter of approval attached. It is customary for applications to be accepted in three months.	Apply for tax exemption after the arrival of imported materials and equipment at Lilongwe Port or Blantyre Port using Declaration Form 12 with the invoice for the imported products and the letter of approval attached. It is customary for the contractor's Customs Agent to prepare the process. A staff member of MoEST, the beneficiary, needs to go to the port in person to sign the papers.
Approval	MRA reviews and approves	MRA reviews and approves	MRA reviews and approves the

	the application.	the application.	application.
Purchase or payment and receipt of procured articles	Contractors can purchase tax-free articles by presenting an approved ST14.	Payment is made including VAT.	Imported tax-free articles are received after customs clearance. For freight that arrives at Blantyre Port, application for customs clearance can be made in Lilongwe.
Refund	—	Tax exemption measures are not legally possible. A check is sent instead to the Procurement Agent.	—
Others	Labour costs are not subject to tax exemption. Renting of vehicles and offices for use by the Consultants, for which "exclusive use for this Project" cannot be clearly identified, are not likely to be approved as tax exemption targets.		

(7) Contract and Dispute Settlement

In Malawi, disputes arising from construction work are settled through following fixed procedures: (a) Settlement via consultation between the contracting parties, (b) Arbitration by the arbitration organisation specified in the contract and (c) Settlement in the court, in that order. In Malawi, there are following three organisations to which companies can apply for ruling or arbitration/mediation regarding construction contracts: (1) NCIC, (2) Office of the Director of Public Procurement (ODPP) and (3) the Architects & Quantity Surveyors Registration Board.

Exchange of claim letters and responses took place in the previous phases. However, there has been no case where solution of dispute has required arbitration, mediation or judgement and all the disputes have been solved in the consultation between parties concerned.

2-2-4-3 Scope of Work

(1) Outline of the Lot Division

Lot division should be designed to allow responses to the changes in the project cost with the priorities of the sites and facilities taken into consideration. This project is a multiple site project: Its 11 sites are scattered throughout a wide target area (approx. 400 km in the north-south direction x approx. 200 km in the east-west direction) including five education divisions over the entire Malawi. The project will be composed of construction of classroom blocks, administration blocks, laboratory blocks, toilet blocks, multipurpose halls and teachers' houses and procurement of furniture and equipment. Each project site has a small compact area in the range between approx. 1,400 m^2 and 2,600 m^2. Under these site conditions and the restriction of the GACE scheme, ways to divide the tender into batches and the contract into lots may become a significant issue in the preparation of project implementation plan as the performance of local resources (contractors and consultants) depends directly on scales of tender batches and contract lots. The lot division should be designed in accordance with the following strategies established on the basis of the result of the site surveys.

- Each lot should be composed of the sites separated by the shortest distance, if possible. It is decided to compose a lot with one or two sites as it is known from the experience in the previous phases that this is the size of work for which contractors in the "unlimited" category and the "up-to-500 million Mwk" category, which have experience in implementing sizable projects, can bid.
- In order to make troubleshooting of problems such as those which emerged during the implementation of the previous phases (delay in construction, cancellation of contracts by successful bidders, etc.) easy, the 11 project sites should be divided into the first batch of six sites in Northern and Central Regions and the second batch of five sites in Central and Southern Regions, the tender for the first batch should be conducted at first and, while the progress of the tender process for the first batch is being monitored, preparation for the tender for the second batch should be carried out in stages.
- As in the previous phases, procurement of educational furniture and experimental equipment should be lots of their own and these lots should compose the third batch in the procurement plan.
- When the price of a successful bid is larger than an estimated tender price or the need to use the remaining amount (an increase in project components) arises, appropriate number of sites should be removed from the project sites in accordance with the priority order shown in the table below or the quantities of components should be increased/decreased.

The table below shows the division of tender batches, contract lots and the priority ranking of the project site.

Table 2-15 Lot Division

Tender batch	Contract lot	Project site	Priority ranking of site	Total number of sites
Batch 1 Northern and Central Regions	Lot 1	U1/Kabwabwa	A	2
		R6/Mzoma	B1	
	Lot 2	U3/M'binzi	A	2
		R5/Mwalawanyenje	B2	
	Lot 3	U2/Mlodza	A	2
		R2/Mwatibu	A	
Batch 2 Central and Southern Regions	Lot 4	U5/Umbwi	A	2
		R4/Kabekere	A	
	Lot 5	U4/Zomba Urban	A	2
		R3/Chimwalira	B3	
	Lot 6	R1/Muhasuwa	B4	1

Batch 3	Lot 7	Furniture for the above-mentioned 11 sites
	Lot 8	Laboratory equipment for the above-mentioned 11 sites

* B1, B2, B3 and B4 represent the priority of the sites in a descending order.

(2) Tender Plan

Tendering should be performed according to the Procurement Guidelines of Grant Aid for Community Empowerment, taking into consideration the procurement guidelines for public works in Malawi as well as the general procedures and conditions adopted by MoEST and other donors in the country. MoEST, after receiving the tender reference documents from JICA and confirming the contents, should deliver them to the Procurement Agent. The Procurement Agent, after reviewing the tender reference documents, should adjust them as required and obtain approval from MoEST, and compile them as the final tender documents.

1) Tenders Carried Out by Other Donors and MoEST

MoEST does not carry out tenders for construction of educational facilities by themselves. The implementing organisations of the ongoing projects supported by the main donors in the sector, the World Bank and AfDB, and EIMU (the Education Infrastructure Management Unit) jointly control the tender process. In the tenders carried out so far for projects for construction of educational facilities supported by other donors, a designated competitive tender system has been used. In this system, contractors in the NCIC price categories at or above an estimated tender price may participate in a tender without pre-qualification. In addition to the NCIC class designation, other qualification conditions have been used in the designated competitive tenders. Those qualifications include 1) the total of prices of contracts awarded per year equal to or exceeding the estimated price of the project concerned, 2) successful completion of a project equivalent to the project concerned, 3) number of engineers with experience in a project equivalent to the project concerned and 4) financial status. There is no qualification subject concerning bidder's execution capacity to evaluate bidder's bidding capacity on the basis of the amount of on-going work.

Multiple-lot tender in which tender is conducted on multiple construction projects is the standard tender method in projects supported by AfDB. This method is used with the expectation that it will increase competitiveness of the tender and improve the quality of finished works, while maintaining its advantage in competitiveness over single-lot tenders, by urging high-ranking contractors to participate in the tender with a possibility of winning a lump-sum order with a large contract prices.

2) Procurement as Defined by the Office of the Director of Public Procurement (ODPP)

The Office of the Director of Public Procurement (ODPP) evaluates, supervises and monitors tenders for public works. ODPP classifies and defines procurement methods as shown in the table below. However, ODPP's classification and definitions will not apply to a project which is implemented in accordance with an agreement such as A/M concluded by donor countries and Malawi, as this Project.

ODPP is a supervisory institution under direct jurisdiction of the President independent from ministries. ODPP verifies whether or not tender process and bid evaluation have been implemented appropriately in accordance with "the Public Procurement Act" in terms of impartiality, competitiveness and transparency. ODPP will be involved in this Project through EIMU.

Table 2-16 Methods for Procurement of Different Scales Defined by ODPP

Scale of procurement	Procurement method	Remarks
Mwk 5,000,000 or below	Comparison of estimates	To be carried out using the list of suppliers of NCIC with approval of the Internal Procurement Committee (IPC)
Above Mwk 5,000,000 and at or below Mwk 1,000,000,000	Domestic competitive tender	To be implemented with the participation of the Director of Building, the Department of Building, and prior approval of ODPP
Above Mwk 1,000,000,000	International competitive tender	To be implemented with the participation of the Director of Building, the Department of Building, and prior approval of ODPP

3) Tender Plan for this Project

In principle, the tender method compliant with the Procurement Guidelines of GACE used in the previous phases should be used in this Project. The basic policy of this Project is to simultaneously conduct tenders for multiple lots in which contractors in the higher NCIC categories are expected to participate, in order to ensure that the project is implemented with a required execution management system and quality, while setting qualification criteria deliberately to ensure competitiveness of tender and implementation capacity of contractors.

4) Process of Bid Evaluation

In tenders conducted by the GOM, the following process is used for the approval of the results of bid evaluation. As the same process was used in the previous phases, it will be used in the Project.

- The procurement agent prepares a draft evaluation report and submits it to EIMU.
- EIMU submits the evaluation report to a permanent institution in MoEST, IPC.
- IPC approves the results of the bid evaluation (usually in 10 days and approx. two weeks in the previous phases).

- IPC submits an approval report to ODPP.
- ODPP approves the tender result and issues an approval note to MoEST (usually in ten days and approx. two weeks in the previous phases).
- Upon approval of ODPP, EIMU and the procurement agent finalise the Minutes of Discussion on the results of the bid evaluation.
- The procurement agent issues a Letter of Acceptance to a successful bidder.

5) Selection of Contractors

Based on objective information obtained from the tender results during the previous phases (in particular, the results of analysis of company information) such as financial and technical capabilities, and past records, nominated competitive tendering should be performed for contractors with adequate capabilities ("Building" branch contractors classified as "Unlimited" or "500 million Mwk") to ensure smooth implementation of the Project. During this procedure, particular attention should be paid to evaluating the financial capability of the contractors including those which are registered with NCIC in the unlimited category.

The criteria for the selection of the contractors of this Projects are as follows: the rank in the NCIC classification, totals of prices of contracts awarded per year for the last five years (the total of every year has to be equal to or above the estimated price the Project), successful completion of a project similar in contents and scale to the Project in the last five years, qualifications and experience of the technical personnel, numbers of equipment required for the implementation of the Project, financial status and amount of current assets associated with the Project. The basic tender policy is to use bidding capacity as an essential condition for the qualification, in addition to the criteria mentioned above, to ensure execution capacity and quality of finished works.

Because it is expected that the tender cannot be conducted appropriately from the technical point of view if only Malawian Firms are allowed to participate in it, Local Firms with excellent records in implementing a similar project of the nationality recommended by MoEST and local consultant, instead of contractor of "neighbouring countries", should be allowed to participate in the tender as a next best measure. In addition, international equity of the tender should be guaranteed by including the results of a detailed analysis of the information on companies provided in the bid proposals for the previous phases in the grounds for the selection.

6) Order of the Tenders

In order to improve efficiency of the project implementation and to prevent occurrence of potential problems associated with a multiple-site project, the tenders for the work at the sites in Northern and Central Regions where it is difficult to procure materials and equipment should be conducted at first in three stages as shown in the table below. The

tenders should be implemented in succession after an adjustment period which includes the rainy season and traditional end-of-the-year holidays.

Table 2-17 Order of Tenders

Batch	Lot No.	Site No.	Site	Construction work		
				Priority ranking-Total floor area	Priority ranking-Total floor area	Total floor area per lot
1	1	U1	Kabwabwa	2,092.88 m^2		
		R6	Mzoma		2,041.99 m^2	4,134.87 m^2
	2	U3	M'binzi	2,656.46 m^2		
		R5	Mwalawanyenje		1,827.68 m^2	4,484.14 m^2
	3	U2	Mlodza	2,280.74 m^2		
		R2	Mwatibu	2,684.92 m^2		4,965.66 m^2
2	4	U5	Umbwi	978.04 m^2		
		R4	Kabekere	2,256.30 m^2		3,234.34 m^2
	5	U4	Zomba Urban	2,280.74 m^2		
		R3	Chimwalira		1,162.89 m^2	3,443.63 m^2
	6	R1	Mhasuwa		1,451.96 m^2	1,451.96 m^2
Total floor area – Grand total				13,137.20 m^2	6,484.52 m^2	21,714.60 m^2
3	7	-	Educational furniture required at the 11 sites			
	8	-	Laboratory equipment required at the 11 sites			

- Batch 1: Construction at a total of six project sites, four first priority sites in Central Region and two second priority sites
- Batch 2: Construction at a total of five project sites, three first priority sites in Central and Southern Regions and two second priority sites
- Batch 3: Procurement of equipment required at the secondary schools (furniture and laboratory equipment) at the above-mentioned 11 sites.

7) Tender Method

The procurement conditions defined in the previous phases should be followed and the following basic principles should be used in the tender

- The tenders for Batch 1 and Batch 2 should be conducted on the condition that “the quantities of the work may change depending on the price of the successful bid”.
- When the tender for Batch 1 or 2 is completed with surplus funds, the surplus funds should be used for procuring project components whose quantities for procurement were reduced in the selection stage of the preparatory survey. The contractor for the sites concerned should either receive an additional order for the procurement of such components or conclude a procurement agreement after increasing the contract price by the amount of the surplus funds in the stage of evaluation of bid proposals. On the contrary, when the price of the successful bid is higher than the estimated price,

the difference should be compensated by excluding the lowest ranked site(s) among the priority ranking-B sites.

- When the tender for the third batch is completed with surplus funds in the budget for the procurement of furniture and laboratory equipment (especially, when the amount of the surplus funds exceeds the limit of reimbursement of 3 % of the amount agreed upon in the E/N), the agent and the successful bidder should conclude an agreement after increasing the quantity of furniture at the stage of the bid evaluation (*e.g.* by procuring furniture for existing classrooms which do not have enough of such furniture). With the measure mentioned above, it will be possible to reduce the surplus funds at least below 3 % of the amount agreed upon in the E/N. On the contrary, when the price of the successful bid exceeds the estimated price because of the rise in the price of items to be procured and it becomes impossible to procure all the furniture and equipment with the designed quantities, the Malawian side should procure the furniture and equipment which the Project has failed to provide.

2-2-4-4 Construction Supervision Plan

As this Project is to be implemented by a consultant as the principal contractor, a Japanese consultant should supervise the tender process and construction work. The Japanese consultant recommended by JICA should perform the duties consisting mainly of 1) assistance to the tender process and 2) construction supervision.

A consultant who will prepare detailed design of this Project and supervise the construction work should conclude an agreement with the procurement agent and perform the duties under the instruction of a Japanese engineer of the procurement agent. The consultant should understand the intention of the outline design of this Project fully before performing his duties, prepare the detailed design after having an intensive discussion with the implementing organisations, MoEST and EIMU, and prepare documents required for the tender. The consultant should have a resident supervisor at each project site at the stage of construction supervision. The supervisor at each site should supervise and advise the contractors, conduct various inspections on the construction work and maintain communication for coordination with the relevant authorities including MoEST and District Education Offices.

(1) A study on the Systems for Construction Supervision in the Previous phases for the Establishment of the System for this Project

As mentioned above, this Project is a multiple-site project with 11 project sites scattered throughout Malawi. As a wide area including the project areas of Phase 1 (in Central and Southern Regions) and Phase 2 (in Northern and Central Regions) is in the target area of this Project, the Survey Team conducted a comparative analysis between the planned system for construction supervision of this Project and the systems for construction

supervision used in the previous phases. The figure below shows the schematic diagrams of those systems.

As is seen in the figure below, there is a need to establish two independent supervision systems for the Northern/Central Regions and the Central/Southern Regions in order to efficiently implement and complete all the project components simultaneously at several sites in a limited implementation period.

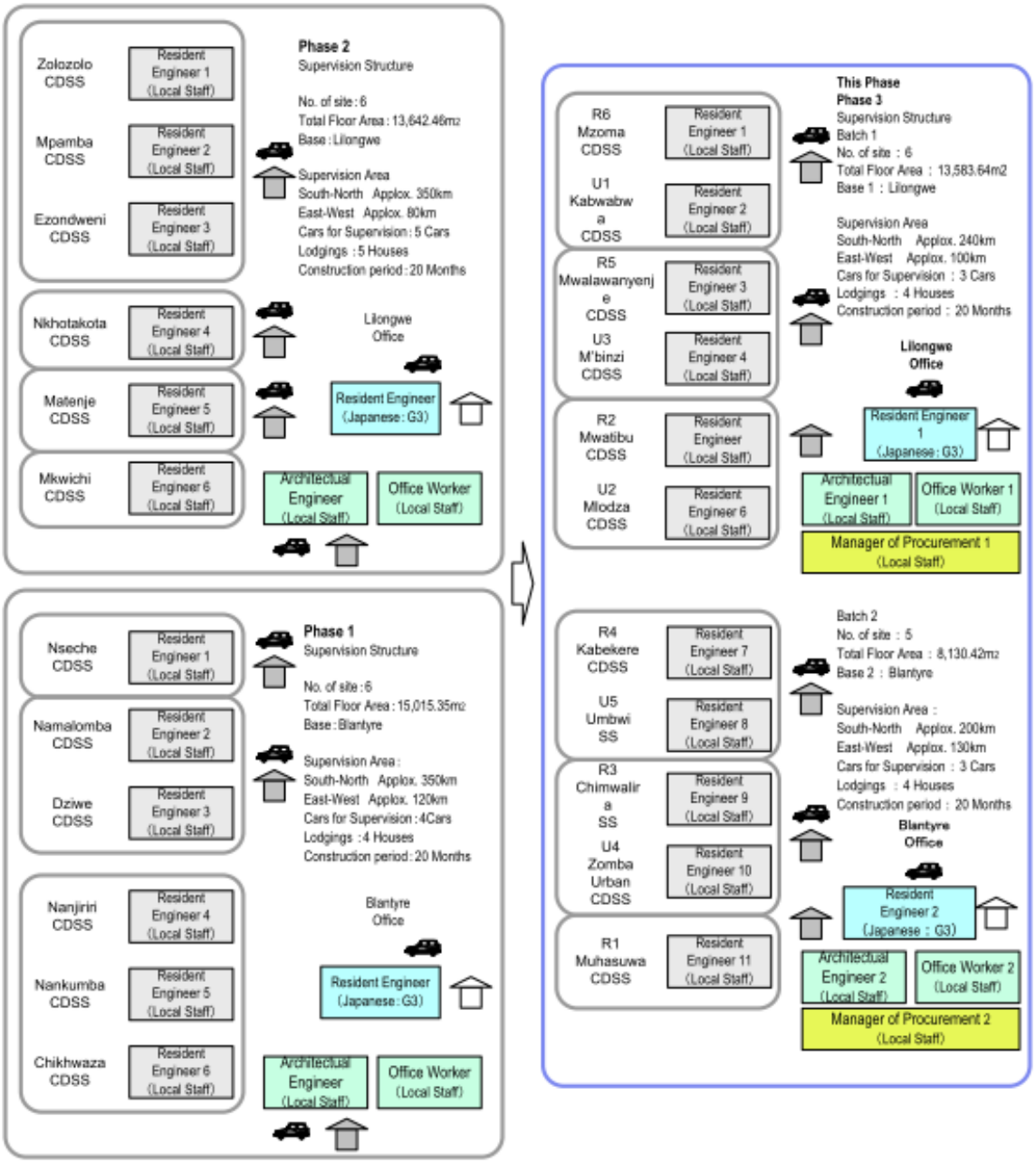


Figure 2-3 Schematic Representation of the Comparative Analysis of the Systems for Construction Supervision Used in the Previous phases and the System Planned for this Project

(2) Tender Process

At the stage of the tender, a resident Japanese supervisor and a local construction engineers required for conducting the tenders should carry out the activities mentioned below under the supervision of a general supervisor of the Japanese Consultant. Before compiling tender documents, they should have consultation with the procurement agent and MoEST and reconfirm the contents of the reference materials for the tender prepared by the Preparatory Survey Team with them and agree with them on the subjects to be reviewed.

- Support for creating tender documents: Review the tender reference documents including detailed designs (draft) created in the outline design survey in order to support creation of tender documents.
- Assistance in tendering: Provide technical support for the tendering operations performed by the Procurement Agent.

(3) Construction Supervision

The Japanese consultant should assign local supervision engineers under its direct employment and engineers of the local consultant and other required local staff to project sites. They should implement the following activities under the guidance of the resident supervisors of the Japanese consultant.

- Creation of standard documents for supervision

  To standardise construction supervision operations performed at different sites, create a check list summarising the check items in construction supervision, and the standard forms for reports on various tests, inspection results and regular reports.

- Construction supervision

  Dispatch resident engineers to the sites, and using the construction supervision form mentioned above, perform inspections to ensure construction quality, compliance with the construction schedule, and safety. The Chief Supervisor should periodically visit all the sites to manage the progress of the entire project and provide guidance to the resident engineers to ensure unified construction quality.

- Assessment of workmanship

  In response to billing from the contractors, check the completed volumes according to the instructions from the Procurement Agent and report the results to the Procurement Agent.

- Implementation of completion inspection

  At the time of construction completion, conduct a completion inspection and report the inspection results to the Procurement Agent.

- Implementation of defect inspection

  At the time of expiration of the defect warranty period, conduct defect inspection and report the inspection results to the Procurement Agent.

  The figure below shows the construction supervision system of the Consultant.

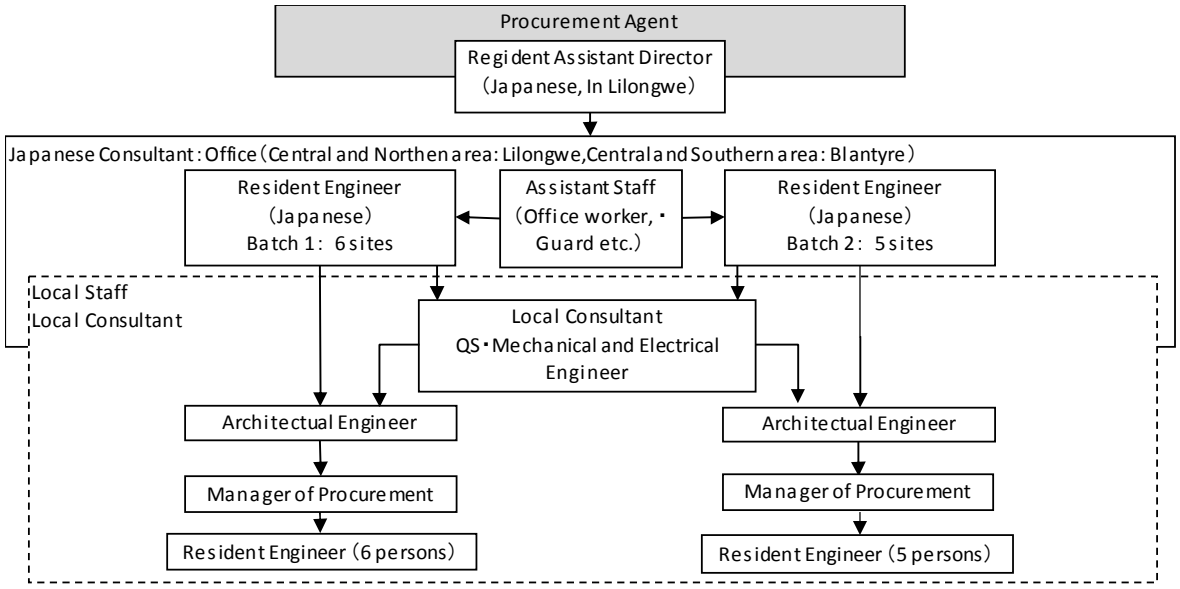


Figure 2-4 Conceptual Diagram of Construction Supervision System

2-2-4-5 Quality Control Plan

(1) Facilities

On the assumption that the planned facilities will be constructed by local contractors, the quality control procedures described below should be performed in conformance with local standard designs and construction methods, with the focus on building frameworks that have significant effect on basic performance such as strength and durability. The test methods and material specifications should basically conform to the standards commonly adopted in Malawi.

Table 2-18 Parameters for Quality Control

Items	Method
Ground condition at site	・Condition of foundation beds should be confirmed by visual inspection and compared with the test results. ・In case of lower evaluation, a soil loading test should be conducted to confirm the design load capacity.
Building layout	・Layout of buildings should be confirmed in the presence of the Consultant and the contractors after establishing a benchmark using a measurement device.
Reinforcing	・A mill sheet shall be submitted for confirmation of the material quality by delivery site

bars, steel beams	and type, and a tensile test should be carried out for each steel beam diameter in an authorised laboratory.
Inspection of reinforcing bar work	・Reinforcing bar work should be inspected in the presence of the Consultant and the contractors to confirm the accuracy, quantity, position, joint and anchor length of the reinforcing bars, and installation status of the spacers.
Cement	・A test result report should be obtained by the manufacturer to confirm the material quality. ・Storage environment for cement and the number of cement bags to be piled up shall be controlled to avoid any damage due to moisture which may harden the material.
Aggregate	・A test should be carried out by an authorised laboratory to confirm the mass/particle aggregate and water absorption ratio at each site. ・Maximum particle diameter, silt content and water content, etc. should be confirmed by visual inspection for each delivery at the sites.
Concrete	・A water quality test for the mixing water for concrete should be carried out at each site by an authorised laboratory. ・Mixing by volume should be adopted as the standard mixing method and 28-day compression strength should be confirmed through trial mixing. ・Water-cement ratio should be designated by a slump test and the ratio should be less than the specified maximum value in the specifications. ・A compressive strength test should be conducted to confirm that the average strength of sample at 28 days of age exceeds Fc by a large margin.
SSB	・A compression test should be carried out by an authorised laboratory to confirm the necessary strength. ・The maximum height of piled blocks should be 1.2 meters and the pile should be covered by a protective sheet.
Concrete block	・A compression test should be carried out by an authorised laboratory to confirm the necessary strength. ・As the blocks will be used only for the construction of foundation, no stipulation on the stacking height will be provided.

The major control items listed above should be summarised into a check sheet, which will then be used by the Supervision Consultant on site in a unified manner, confirmed by both the Consultant's resident supervisors and the contractor's engineers at each stage, and the records will be filed and stored.

(2) Furniture and Laboratory Equipment

The procurement agent should play a major role in the acceptance and inspection of the furniture and laboratory equipment and the Japanese Consultant should support the activities of the procurement agent. The major duties of the consultant with regard to the procurement of furniture and laboratory equipment should be verification of the compliance of manufactured samples to the stipulated specifications, consistency between the samples and delivered furniture/equipment and the quantities of the delivered goods.

2-2-4-6 Procurement Plan for Equipment, Materials and Others

(1) Availability of Construction Materials and Equipment in the Recipient Country

Construction materials produced in Malawi are limited to cement and secondary concrete products, SSBs (made on site), and lumber. Although the majority of other materials are

imported mainly from South Africa, general imported materials are regularly available on the market.

Since the construction materials and equipment to be used in this Project conform to local specifications and standards and are mostly general-purpose materials commonly used in local standard school construction, they can be procured locally via local suppliers or import agents. Procurement of construction materials and equipment in the target areas in the Central Region, where the capital Lilongwe is located, and in the commercial capital, Blantyre, is not problematic. Meanwhile, as the rural project sites in Northern Region are located far from the nearest commercial centres, long-distance transport will be required for the delivery of the procured materials and equipment to those sites. Therefore, the procurement plan to be prepared should have to allocate sufficient time for the delivery. For the fittings, which are made by a limited number of manufacturers, procurement supervision is required to ensure that they are ordered at an appropriate timing to avoid any adverse impact on the construction period. The following table shows categories for the procurement of construction materials.

Table 2-19 Sources of Procurement of Materials

Construction Materials	Country of Procurement		Remarks
	Malawi	Third Country	
Building materials			
Cement	○		Domestic product available in Malawi Products of countries in the region, *e.g.* South Africa, when short in supply
Sand (fine aggregate)	○		River sand near the site
Crushed stone (aggregate)	○		Procured from a crusher plant near the site
Reinforcing bars			Marketed materials made in South Africa in accordance with SABS standards
SSBs	○		Produced at each site
Wooden trusses	○		Produced at yards in depots of the contractors for the urban area Produced at each site with pre-fabricated members delivered to the rural sites
Roofing (iron sheets)	○		Marketed material made in South Africa in accordance with SABS standards
Dressed lumber	○		Domestic material from Northern Province
Plywood forms	○		Plywood produced in Malawi or South Africa
Concrete blocks	○		Produced at each site
Wooden/steel fittings	○		Produced at a domestic factory with technical/production capabilities
Furniture hardware	○		Marketed materials made in Europe or South Africa
Glass	○		Same as the above
Coating	○		Marketed mixed materials made from South African products
Mechanical materials			

Pipes and fixing parts	○		Imported materials marketed in Malawi
Sanitary ware	○		Marketed products made in Europe or South Africa
Equipment (pumps etc.)	○		Marketed products made in Europe or South Africa
Electrical cables	○		Products marketed in Malawi
Lighting fixtures	○		Marketed local products for maintenance such as parts replacement
Distribution panels	○		Produced and procured by a reliable receiving/transforming equipment manufacturer

(2) Procurement of Products in Third Countries

As mentioned above, there are not many construction materials produced or manufactured in Malawi. Most of the materials to be used in the project are commercially available general materials including imports. A contractor may decide to procure certain construction materials required in large quantities from a third country using its own route. As shortage of cement, in particular, was observed during a previous phase, the procurement plan should be design to accommodate changes in countries of procurement. In the estimation of the project cost, a quantity survey should be conducted on the assumption that contractors procure all construction materials, including imported products of third countries, locally.

2-2-4-7 Implementation Schedule

(1) Overall Schedule

If it has been decided to implement this Project under the Grant-Aid scheme of GOJ, the project should be implemented in accordance with the implementation schedule after the conclusion of E/N, G/A, A/A and the Consultancy Agreement for Construction Supervision between parties concerned, shown in Figure 2-5.

(2) Construction Schedule

The construction period, based on past records of the previous phases and the results of surveys of local consultants and contractors, should be set at 18 months for the main construction or 20 months per lot including the preparation period before the start of construction and the period required for completion inspection and handover. Since Malawi has a rainy season that lasts from December to March, the construction schedule plan should be made to avoid the adverse impact of the rainy season. However, as it cannot be completely avoided due to restrictions of period for cabinet meetings and E/N timing, the start of construction should be set so that the peak of foundation work comes in the dry season.

It is considered possible to complete the procurement of the equipment (furniture and educational equipment) including preparation and verification of shop drawings, ordering, manufacturing and acceptance inspection in approximately 10 months. However, as the time of placing orders is to be determined by calculating backward from the time of the

adjustment of project cost for the confirmation of the amount of surplus funds, the time required for the procurement is estimated at 15 months.

In the outline project implementation schedule which was prepared with periods both before and after the construction period set aside for the preparation of the procurement agent in Malawi, the project implementation period is estimated at 31 months. The outline project implementation schedule is shown below.

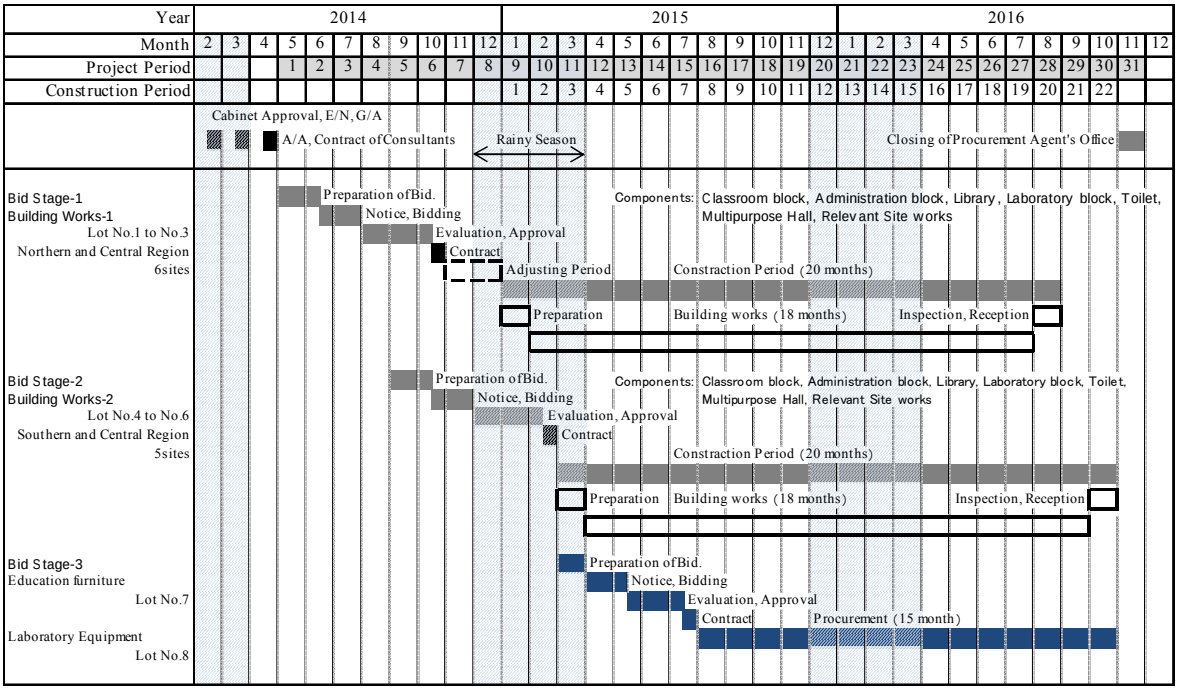


Figure 2-5 Implementation Schedule

2-3 Obligations of Recipient Country

The work to be borne by the Malawian side in this Project is as follows:

- To acquire building permits and other approvals required to implement this Project.
- To provide sites for the facility construction and remove any existing structures, trees and other obstacles that may disturb the construction.
- To construct any external facilities that are not included in the scope of work to be borne by the Japanese side, such as boundary walls, gates, school yards and planting, as required.
- To provide electricity extension to the planned premises (including installation of necessary transformers and meters).
- To provide public water extension to the planned premises and install individual water meters and shutoff valves in the necessary facilities.
- To procure general furniture, teaching materials, equipment, fixtures, and fittings which are

not included in the scope of work to be borne by the Japanese side.

- To pay the handling charge for payments to Japanese banks according to the banking arrangement.
- To perform promptly the procedures for customs clearance and domestic transport of products procured according to the contracts.
- To secure exemption from customs duties, domestic taxes including value-added tax, and any other financial surcharges imposed on products procured according to the contracts and on services of the persons and employees engaged in the Project.
- To provide the services necessary for the Japanese and third-country persons who will supply the services according to the contracts to enter and stay in Malawi.
- To secure the budget and personnel required to appropriately and effectively operate and maintain the facilities supplied under the Japanese Grant Aid Scheme.
- To bear all the expenses required for the project implementation which are not covered by the Japanese Grant Aid Scheme.

The following table shows the details of the construction work to be borne by the Malawian side at each site:

Table 2-20 Details of Work to be Borne by the Malawian Side

Site		Work required before the start of construction		Work required after the start of construction	
		Building permits	Removal of trees	Extension of electricity	Extension of public water
U1	Kabwabwa	○	○	○ For additional capacity	○ For additional capacity
U2	Mlodza	○	○	○ For additional capacity	○ For additional capacity
U3	M'binzi	○	○	○ For new extension	○ For new extension
U4	Zomba Urban	○	○	○ For new extension	○ For additional capacity
U5	Umbwi	○	○	○ For additional capacity	○ For additional capacity
R1	Muhasuwa	-	○	○ For new extension	-
R2	Mwatibu	-	○	○ For new extension	-
R3	Chimwalira	-	○	○ For additional capacity	-
R4	Kabekere	-	○	-	-
R5	Mwalawanyenje	-	○	○ For new extension	-
R6	Mzoma	-	○	○ For	-

				additional capacity	

Note: The circles (○) indicate sites with work that needs to be borne by the Malawian side.

2-4 Project Operation and Maintenance/Management Plan

(1) Operation and Maintenance System

The operation and management of secondary education including the CDSSs covered in this Project are under the control of six Education Division Offices which are the local branches of the central MoEST office. The Education Division Offices assign teachers, select and allocate students within the Divisions and distribute the budget for ordinary expenses except for personnel emoluments. The operation of each school is performed by the headteacher and the teaching staff under his/her control based on a certain level of autonomy. Each school has a School Management Committee (SMC) consisting of the headteacher, influential persons in the community, representatives of parents, teachers and etc., and the Parent-Teacher Association (PTA) which discusses and determines basic items regarding school operation and cooperates with the school to solve problems regarding facility improvement and maintenance/management.

All the target schools, except U5/Umbwi boarding school, have SMCs. However, their status and numbers of members vary significantly among schools. Division of work between PTA and SMC is sometimes ambiguous. However, PTA is generally a decision making body, while SMC is generally an executive body.

(2) Budget for Maintenance

Schools accredited as cost centres receive allocation of ORT directly from the exchequer and the other schools receive it from the Education Division Offices. The amount of ORT from the exchequer to a cost centre school is determined on the basis of the application for the budget from the school concerned. The amount of ORT allocated from the exchequer is far larger than the amount of ORT allocated by the Education Division Offices. Moreover, it is reported that the allocation of ORT by the Education Division Offices is often delayed. MoEST has already stated that all the target schools of this Project will be accredited as cost centre schools if this Project is implemented. The accreditation is expected to stabilise the foundation of school management at the schools concerned.

Table 2-21 Amounts of ORT Allocated to the Target Schools (in Mwk)

Cost Centre			Non Cost Centre		
No.	School	Amount of ORT	No.	School	Amount of ORT
U4	Zomba Urban CDSS	1,320,000	U1	Kabwabwa CDSS	60,000
U5	Umbwi CSS-Boarding	7,000,000	U2	Mlodza CDSS	0
R3	Chimwalira CSS-Day	3,800,000	U3	M'binzi CDSS	270,000
R5	Mwalawanyenje CDSS	1,320,000	R1	Muhasuwa CDSS	360,000

	R2	Mwatibu CDSS	30,000
	R4	Kabekere CDSS	0
	R6	Mzoma CDSS	341,000

Each school is operated with the ORT allocated from either the exchequer or the Education Division Office and school fees collected from the guardians of the students with participation of PTA and SMC. The table below shows the annual payment per student in each target school. Among the fees collected from students, the school development fund and general purpose fund can be used for the maintenance of facilities and equipment. As schools can decide the amount of school development fees to be collected, they are an important source of funds for establishing sustainability of the school maintenance.

Table 2-22 School Fees, etc. Collected by the Target Schools (in Mwk)

No.	School	School fees	Textbook fund	School development fund	General purpose fund	Others	Total
U1	Kabwabwa CDSS	1,500	250	3,000	1,500	3,000	9,250
U2	Mlodza CDSS	1,500	250	7,500	1,500	1,800	12,550
U3	M'binzi CDSS	1,500	750	4,500	1,500	2,250	10,500
U4	Zomba U. CDSS	1,500	250	3,000	1,500	0	6,250
U5	Umbwi CSS	1,500	250	12,000	3,000	37,500	54,250
R1	Muhasuwa CDSS	1,500	250	1,500	1,500	3,000	12,250
R2	Mwatibu CDSS	1,500	250	3,000	1,500	0	6,250
R3	Chimwalira CSS	1,500	250	300	1,500	0	3,550
R4	Kabekere S. CDSS	1,500	250	7,250	1,500	0	10,500
R5	Mwalawanyenje CDSS	1,500	250	1,500	6,000	1,850	11,100
R6	Mzoma CDSS	1,500	250	4,500	1,500	7,750	15,500

Source: the results of the site surveys

In addition, schools may ask for donations from families of students as the need arises. There is more than one case where the school facilities have been constructed with help from guardians and community members after the opening of schools. The new school building at U4/Zomba Urban, teachers' houses at R3/Chimwalira, the girls' hostel at U5/Umbwi, the boys' and girls' hostels at R5: Mwalawanyenje are such examples. The Survey Team witnessed guardians of students repairing facilities on a voluntary basis mainly in rural areas (*e.g.* R3). On the basis of these observations, one can expect continuous assistance of guardians and community members to the operation of the target schools.

(3) Plan for Assignment of Teachers

The standard assignment of teachers stipulated by MoEST requires assignment of at least eight teachers to operate four classes, a class each for each form, (one-stream operation). Therefore, additional teachers will have to be assigned to the target schools until the

number of teachers in a two-stream school in the rural sites reaches 16 and that in a three-stream school in the urban sites reaches 24. The table below shows the number of new teachers to be assigned to each target school obtained by subtracting the number of teachers at work from the minimum number of teachers required when this Project has been implemented.

Table 2-23 Required Number of New Teachers to be Assigned to Each Target School

No.	Site	Number of teachers at work			Required number of teachers	Number of additional teachers to be assigned
		Qualified	Under-qualified	Total		
U1	Kabwabwa CDSS	21	15	36	24	—
U2	Mlodza CDSS	17	4	21	24	3
U3	M'binzi CDSS	8	0	8	24	16
U4	Zomba U. CDSS	13	11	24	24	—
U5	Umbwi CSS	20	5	25	24	—
R1	Muhasuwa CDSS	6	4	10	16	6
R2	Mwatibu CDSS	10	3	13	16	3
R3	Chimwalira CSS	10	0	10	16	6
R4	Kabekere S. CDSS	4	4	8	16	8
R5	Mwalawanyenje CDSS	10	7	17	16	—
R6	Mzoma CDSS	1	5	6	16	10
	Total	120	58	178	216	52

MoEST assured and agreed to assign sufficient number of qualified teachers to the target schools of this Project when this project has been implemented and the facilities in the target schools have been improved. In addition, in the project for expansion of facilities in CDSSs supported by AfDB, additional teachers were assigned to the schools after the facilities had been improved. Therefore, a fairly good chance for the assignment of new teachers is expected for this Project.

(4) Maintenance/Management Plan

The daily maintenance/management of the school facilities should be performed with the participation of the school staff and students under the supervision of the headteacher. Furthermore, the School Management Committee including the Parent-Teacher Association and the parties concerned from the local community should provide support for school improvement and facility maintenance/management as required. Although no special skills are needed for maintenance/management of the facilities constructed in this Project, to maintain the buildings in a good condition over a long period of time, it is necessary to perform daily cleaning and inspections as well as appropriate repair of wear, breakage, and deterioration, and to secure the required minimum budget for maintenance/management.

- Periodical cleaning: The classroom block should be cleaned every day by the students themselves under the guidance of the teachers. The administration and shared sections

should be cleaned by the janitor and the cleaning/school yard manager, and by the students and teachers in periodical thorough cleaning as extracurricular activities.

- Routine repairs: If periodical inspections and appropriate daily management are performed, no repairs or mending will be needed for several years after the completion of the construction. Thereafter, periodical repairs such as repainting of painted parts (once every 10 years or so) and inspection and adjustment of fittings (once a year or so) will be required.
- Maintenance/management of equipment: A daily management system such as daily inspections, simple repairs, mending, and parts replacement should be devised. The septic tanks and osmosis layers should be cleaned once every two years.
- Maintenance/management of external facilities and planting: To prevent ground erosion and other damages caused by rain, it will be necessary to appropriately implement and maintain/manage planting on the premises. In preparation for the rainy season, the drainage ditches and grid must be inspected and cleaned.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Costs to be Borne by the Japanese Side

Not to be disclosed until the contractors are approved.

(2) Costs to be Borne by the Malawian Side 17,734,000 Mwk Approx. 5.4 million JPY

Item	Amount (1,000 Kw)	Equivalent to (1,000 Yen)
Acquisition of Construction Permits	4,340	1,325
Removing of trees and obstacles at the construction area	326	100
Provision of facility for electricity distribution	6,230	1,902
Provision of facility for water supply	1,000	305
Bank charge	5,838	1,782
Total	17,734	5,414

(3) Conditions for Estimate of Accumulation

- Estimated as of: November 2013
- Exchange rate: 1 US$ = 100.47 JPY, 1 US$ = 329.13 Mwk, 1 Mwk = 0.30526 JPY
- Construction period: Period for the construction is as shown in the construction

schedule.

- Others: This plan is to be implemented according to the systems of the Japanese Grant Aid Scheme.

2-5-2 Operation and Maintenance Costs

The following is an estimate of the expected costs required for the operation and maintenance of the facilities after the completion of this Project:

(1) Operation Costs

1) Personnel Emoluments

Due to implementation of this Project, the number of personnel assigned to the nine out of 11 target schools covered in this Project needs to be increased as described in Table 2-24. The personnel emoluments of the target schools assumed according to the salary categories by service type of MoEST in 2013 are shown in the table below. The personnel emoluments are estimated at 34 million Mwk for the 11 schools in total, which accounts for 0.076% of the budget for personnel emoluments in 2013/2014 (44,769 million Mwk). Since the MoEST budget for personnel emoluments in the past three years increased on average by 35% or more over the previous fiscal year, no problems are likely to be expected in this increase of amount.

Table 2-24 Estimation of Additional Expenditures on Emoluments of New Teachers per Year (Mwk)

Site	Teacher		Assistant librarian		Assistant accountant		Total
	Number	580,000	Number	215,000	Number	215,000	
U1/Kabwabwa	-	-	-	-	-	-	-
U2/Mlodza	3	1,740,000	1	215,000	-	215,000	2,170,000
U3/M'binzi	16	9,280,000	1	215,000	1	215,000	9,710,000
U4/Zomba Urban	-	-	1	215,000	1	215,000	430,000
U5/Umbwi	-	-	-		-		-
R1/Muhasuwa	6	3,480,000	1	215,000	1	215,000	3,910,000
R2/Mwatibu	3	1,740,000	1	215,000	1	215,000	2,170,000
R3/Chimwalira	6	3,480,000	1	215,000	1	215,000	3,910,000
R4/Kabekere	8	4,640,000	1	215,000	1	215,000	5,070,000
R5/Mwalawanyenje	-	-	1	215,000	1	215,000	430,000
R6/Mzoma	10	5,800,000	1	215,000	1	215,000	6,230,000
Total	52	30,160,000	9	1,935,000	8	1,935,000	34,030,000

Note) The estimation of the personnel emoluments was made on the basis of the emoluments of the staff at the emolument grades assumed as mentioned below in 2013.
Teacher: Grade J1, assistant librarian and assistant accountant: Grade M1

2) Facility Operation Costs

The costs required for facility operations are estimated as shown below. Tables 2-25, 2-26 and 2-27 show the calculation results respectively.

- Water charges: As city water is to be used at the six urban sites, the target schools at those sites will have to pay the water charges. The schools at the five rural sites, with the exception of R4/Kabekere where solar power generation system is to be provided, will have to pay electricity charges for the operation of water pumps.
- Fuel charges: LPG gas to be used in the laboratories is not included in the estimation in this section as it is regarded as equivalent to the consumables or reagents to be supplied by the Government of Malawi.
- Communication charges: Telephone and other means of communications should be provided at the expense of the Malawian side. Thus they are not included in this estimation.
- Electricity charges: Charges for the smallest amount of power supply required to maintain ordinary operation of the school facilities at the 10 sites, excluding R4/Kabekere, should be estimated.

  Calculation conditions: The number of annual operation days is basically 280 days (*i.e.* 40 weeks). Assuming that the number of operation days for estimation is five days per week, the number of annual operation days for the facilities is set at 220 days.
- Teachers' houses: The electricity charges for teachers' houses are not included in this estimation as they should be paid by each of the occupants in principle.

① Water charges

Conditions for the estimation

Consumption: School staff and students: 20 L/person/day, Daily maximum consumption = Consumption/day x number of population

Average daily consumption = average maximum consumption x 0.7, Number of days in which water is used: 220 days/year

Table 2-25 Estimation of Annual Water Charges at Each Site

	(Number of school staff + students)/site (person)	Consumption /day/site (t)	Average consumption/ day/site (t)	Average consumption/ month/site (t)
		20 L/person	x0.7	x220 days/12
Urban sites (U1-U5)	630	12.6	8.82	162

Consumption (t)/month	Monthly rate charges (Mwk)	Consumption by rate (t)	Average monthly charges (Mwk)	Annual water charges/site (Mwk)

0-5	501	5	2,505	
5-10	103	5	515	
10-40	123	30	3,690	
>40	136	122	16,592	
Total		162	23,302	279,624

② Electricity charges

Conditions for the Estimation

Average demand factors: 0.85 for lighting fixture and 0.1 for wall socket circuits

Estimated power consuming hours: 2 h/day in classrooms etc. and power consumption by pumps; 0.75kW/h 100L/min

Operating days per year: 220 days/year

Table 2-26 Estimation of the Annual Electricity Charges by Site

	Power consumption/day (kWh/day)	Operating days per year	Annual power consumption
	kWh/day		kWh/year
Classroom block with two classrooms	8.305	220	1,827
Classroom block with three classrooms	12.4575	220	2,741
Administration/ library block	11.32	220	2,490
Laboratory block	5.02	220	1,104
Multipurpose hall	4.65	220	1,023
Submersible water pump	1.52	220	334

Site	Annual electric power consumption kWh/year			Annual electricity charges (Mwk)
	Power consumption in the facilities	Power consumption by submersible water pumps	Total (A)	[A]x4.09 Mwk/kWh
U1/Kabwabwa	8,994	-	8,994	36,787
U2/Mlodza	10,821	-	10,821	44,260
U3/M'binzi	14,476	-	14,476	59,205
U4/Zomba Urban	10,821	-	10,821	44,260
U5/Umbwi	6,144	-	6,144	25,130
R1/Muhasuwa	6,144	334	6,478	26,496
R2/Mwatibu	9,798	334	10,132	41,442
R3/Chimwalira	6,144	334	6,478	26,496
R5/Mwalawanyenje	9,798	334	10,132	41,442
R6/Mzoma	9,798	334	10,132	41,442

(2) Maintenance Cost

No major repair should be required for approx. 30 years of the completion of construction of the facilities in this Project, should they be maintained appropriately and regularly. The required regular maintenance includes overall repainting, partial repair of facilities and equipment, replacement of parts and daily inspection and cleaning of equipment. The table below shows the annual maintenance costs of the facilities and equipment to be provided in this Project, estimated using average repair and maintenance costs of each type of components established on the basis of the actual cases of maintenance of facilities of similar size and nature.

Table 2-27 Annual Maintenance Cost at Each Project Site

	Facilities	Equipment	Furniture	Laboratory equipment	Total	
	Construction cost x 0.08 %	Cost for equipment x 0.2 %	Cost for furniture x 0.5%	Cost of the equipment x 1%	(usd)	(Mwk)
U1/Kabwabwa	590	143	319	70	1,122	369,241
U2/Mlodza	631	149	358	70	1,208	397,559
U3/M'binzi	709	159	437	70	1,374	452,310
U4/Zomba Urban	637	150	358	70	1,216	400,131
U5/Umbwi	253	92	265	70	679	223,510
R1/Muhasuwa	426	126	172	70	795	261,565
R2/Mwatibu	813	196	251	70	1,329	437,573
R3/Chimwalira	330	109	158	70	667	219,524
R4/Kabekere	654	470	251	70	1,445	475,649
R5/Mwalawanyenje	601	162	251	70	1,084	356,819
R6/Mzoma	693	180	251	70	1,194	392,925
Total					12,113	3,986,807

(3) Calculation of the Maintenance Cost

The table below shows the annual maintenance cost and estimated budget for each site. As the proportions of the maintenance cost, excluding personnel cost, to the budget are within the range of 12 % and 39 %, it is considered that these costs are not likely to be a problem for continuous operation and maintenance.

Table 2-28 Proportion of the Maintenance Costs to the Estimated Ordinary Budgets (in thousand Mwk)

	Maintenance cost (preliminary calculation)				Estimated budget			E/R
	Water charge	Electricity charge	Maintenance cost	Total [E]	ORT	PTA	Total [R]	
U1/Kabwabwa	278	38	369	685	1,848	9	1,857	37%
U2/Mlodza	278	44	398	720	1,848	13	1,861	39%
U3/M'binzi	278	59	452	789	1,848	11	1,859	42%

U4/Zomba Urban	278	44	400	722	1,848	6	1,854	39%
U5/Umbwi	278	25	224	527	1,848	54	1,902	28%
R1/Muhasuwa	-	26	262	288	1,848	12	1,860	15%
R2/Mwatibu	-	41	438	479	1,848	6	1,854	26%
R3/Chimwalira	-	26	220	246	1,848	0	1,848	13%
R4/Kabekere	-	-	476	476	1,848	11	1,859	26%
R5/Mwalawanyenje	-	41	357	398	1,848	11	1,859	21%
R6/Mzoma	-	41	393	434	1,848	16	1,864	23%

Estimation conditions: ・Accreditation of the target schools as cost centres is assumed.

・The preliminary calculation is based on the estimation as of 2013.

・Although the schools at U5 and R3 are CSS-Boarding and CSS-Day, respectively, the calculation was carried out on the assumption that they were ORTI as the rest of the schools.

Chapter 3 Project Evaluation

Chapter 3. Project Evaluation

3-1 Preconditions

The following are the preconditions for smooth implementation of this Project.

(1) Implementation of the Work to be Borne by the Malawian Side

The Malawian side will have to complete the work to be undertaken by the Malawian side described above in Chapter 2-3, including site development (felling of trees within the sites) and the extension of electric power and water supply to the sites before the implementation of this Project. In addition, a building permit will have to be obtained prior to the start of construction work at the project sites located in urban areas. As the Malawian side had completed site development and acquired the building permit prior to the implementation of the previous phases, it is expected that they will carry out the same procedure in this phase.

(2) Tax Exemption

This Project is to be implemented under the scheme of Grant Aid for Community Empowerment. Therefore, tax exemption should apply to the procurement of goods and services for the implementation of this Project in accordance with the E/N to be concluded between the two governments for the implementation of this Project. The Malawian side will be required to take the appropriate measures to ensure that goods to be procured and services to be provided by contractors and their employees in accordance with the agreements for construction of facilities and procurement of equipment are exempt from any domestic tax, including customs duties and value added tax, and other fiscal levies during implementation of the Project. As the Malawian side has already taken such measures regarding tax-exemption for the previous phases, it is expected that they will carry out the same procedure for this phase.

3-2 Necessary Inputs by Recipient Country

The Malawian side has already taken appropriate measures set out below which they should address for the realisation and maintenance of the project outputs. Therefore, it is considered unlikely that non-fulfilment of the preconditions might hinder the achievement of the goal.

(1) Appropriate Assignment of School Staff

New teachers and other school staff will have to be employed and assigned to the target schools before the completion of the Project, in order to fill the vacancies created by the construction of the new facilities. The numbers of teachers at these schools will have to meet the standards for the assignment of teachers. In addition, the teachers will need to have the appropriate qualifications and ability to implement the secondary education curriculum. The implementation of this Project will create a demand for 52 new qualified teachers at the 11 target schools. The Domasi College of Education (DCE) under MoEST

is expected to continue to turn out approximately 200 new teachers every year via its new teacher training diploma course and the same number of qualified teachers in its distance-learning diploma course for under-qualified teachers in service. Also, the University of Malawi and other universities are making efforts to expand their bachelor's courses in teacher training. Thus, it is considered that there will be no problem in assigning 52 new qualified teachers to the 11 target schools.

(2) Provision of Textbooks, Teaching Materials and Consumables for Science Experiments

The Malawian side will have to make effective use of the facilities and equipment by providing the newly constructed libraries with textbooks and teaching materials, and by continuously providing the science laboratories with reagents and other consumables required for experiments. The GOM is promoting the distribution of textbooks and teaching materials to 717 public secondary schools and the distribution of science experiment kits to 400 CDSSs in accordance with the "Education Sector Implementation Plan (hereinafter referred to as "ESIP") 2009 – 2013." The GOM is expected to implement the same distribution under the ESIP II (2014 – 2017) in preparation. Equipment and consumables such as reagents for science experiments are being distributed to area cluster core schools in the Support to Secondary Education Project ("Education V" (2007 – 2012)) of AfDB, and reagents and other consumables are being distributed to cluster schools from cluster core schools. From this observation, it is considered that the Malawian side will be able to make effective use of the facilities after the completion of this Project by continuing to maintain the system for the procurement and distribution of educational materials and equipment.

(3) Guarantee of the Operating and Maintenance Budget

The appropriate maintenance and smooth operation of the facilities will require securing and allocation of the necessary budget. While four of the target schools were accredited cost centres at the time of this survey, budget equivalent to that allocated to a cost centre school is expected to be allocated to the remaining seven schools while this Project is being implemented.

3-3 Important Assumptions

The following are the important assumptions for the realisation and maintenance of the effects of this Project.

(1) The GOM will not Change its Policy for Education

The GOM mentions an increase in equitable access and improvement of quality of education as the priority issues in secondary education and has set the targets including an increase in the gross enrolment rate in secondary education (to 30.5 % by 2017) and an increase in the number of classrooms in public secondary schools (to 6,348 by 2017) in

the overall development plans. As this Project is considered to provide direct support to implementation of the overall development plans and action plans, realisation and sustenance of the effects of this Project requires continued implementation of the overall development plan by the GOM.

(2) Management of Risk such as Security and Inflation

Smooth implementation of this Project will require stability of the security situation in Malawi. The construction of the facilities and procurement of equipment as planned will require economic conditions and prices to remain stable at current levels and will also require the stable importation and procurement of petroleum and other fuels.

3-4 Project Evaluation

3-4-1 Relevance

The implementation of this Project under the GACE of Japan is considered relevant because of the following reasons.

(1) Beneficiaries of the Project

The direct beneficiaries of this Project are the students learning at the target schools, and the teachers and other staff at the schools. The increased access to secondary education and improvement in the enrolment environment in the target areas will bring benefits to the residents in the area, and in the long term, to all the people of Malawi.

(2) Purpose and Urgency of the Project

The introduction of the policy of free primary education has resulted in a rapid increase in the number of enrolments in secondary education in Malawi. However, since the construction of school facilities has failed to keep up with the increase in the demand for secondary education, the gross enrolment rate in secondary education has remained around 21.4 % (the figure in 2011) over the past few years against the targets of the GOM of 23.5 % by 2012 and 30.5 % by 2017. Serious shortage of classrooms is a factor hindering enrolment in secondary education. Students in secondary schools are forced to study in a constantly overcrowded facility environment. Shortage and deterioration of the basic facilities such as classrooms and laboratories are serious in almost all CDSSs. For these reasons, it is difficult to provide secondary education even at the minimum level. The implementation of this Project is required urgently as it aims to increase access to secondary education and improve the learning environment in the project areas by constructing classrooms, laboratories and other school facilities at the secondary schools at the 11 project sites.

(3) Consistency with the Overall Development Plan

The GOM emphasises an increase in equitable access to secondary education and improvement of the quality of secondary education in the overall development plans

including the national development strategy, MGDS II, and describes insufficiency of classrooms and facilities for science education and insufficient library function as problems to be solved. Implementation of this Project is expected to contribute to the achievement of goals of the overall development plans of Malawi by constructing school facilities including classrooms, laboratories and libraries and providing equipment for the facilities.

(4) Consistency with the Assistance Policy and Strategies of the Government of Japan

In TICAD V, "establishment of a society in which all the people benefit from the development" was declared as a goal of African development for the next five years and an increase in the enrolment rate and completion rate in primary and secondary education and improvement of the quality of education for the establishment of a strong foundation for the tertiary education were described as issues to be tackled in the education sector. Also in TICAD V, the GOJ announced its intention to provide Malawi with assistance in provision of basic social services including education, as well as in agriculture, mining and infrastructure development. While many other donors focus their assistance in the education sector on primary education, the GOJ intends to provide assistance focused on improvement and expansion of secondary education. The objective of this Project of improving access to secondary education and educational environment in Malawi is consistent with the policy and strategies for the assistance to Malawi of the GOJ. Since the expansion of access to secondary education through the implementation of this Project is expected to increase the number of students passing MSCE, it will also be in compliance with one of the elements of Human Security, namely, education and human resource development.

(5) Relevance of the Project with regard to its Operation and Maintenance

No special technology will be required for the operation and maintenance of the facilities and equipment to be provided in this Project, as they are to be of the standard designs and specifications used in past projects implemented by MoEST with assistance from other donors. Since the Malawian side have been making full use of existing facilities constructed to similar specifications with appropriate allocation of budget and appropriate assignment of teachers and other staff, the Malawian side will be sufficiently able to operate and maintain the facilities and equipment to be provided in this Project with its funds, human resources and technologies. The Malawian side will have to employ new teachers and other school staff after the completion of the Project. The increment in the personnel salaries due to the employment of these new staff members is estimated at 34 million Mwk per year, which corresponds to 0.076 % of the budget for personnel salaries of the entire MoEST (44,769 million Mwk) for the fiscal year 2013 and 2014. Since the MoEST budget for personnel salaries has increased at an average annual rate of more than 35% over the last three years, MoEST is expected to be able to allocate the budget for the

increment. Each target school is expected to be able to maintain the provided facilities from its own budget, including school funds. In addition, all the target schools will be accredited as cost centres and provided with the budgetary allocation accorded to cost centre schools. This budgetary allocation will facilitate the effective use of the schools' own budgets. These facts indicate the relevance of this Project in terms of the operation and maintenance.

(6) Feasibility of the Implementation of this Project with the Grant Aid for Community Empowerment

The facilities and the equipment to be provided in this Project are similar to those in the similar projects implemented by other donors in the past. MoEST has sufficient experience in conducting general competitive tenders for the similar projects with local bidders. Since there are several highly-qualified local contractors sufficiently capable of construction management and quality control of facilities on the scale of this Project, there will be no problem in selecting the contractors for the construction work of this Project in competitive bidding limited to local construction companies. The competitiveness of the bidding process is expected to be enhanced by dividing the construction work appropriately into small-scale lots and conducting separate bidding for these lots. These observations indicate that there will be no significant problem in implementing this Project under the scheme of Grant Aid for Community Empowerment.

(7) Relevance of the Project with Regard to its Socio-environmental Impact

Since this Project is for the expansion and improvement of the facilities in the existing schools, implementation of this Project will not require large-scale land preparation or relocation of residents. Therefore, this Project is considered as a project with minimum negative socio-environmental impact.

3-4-2 Effectiveness

(1) Quantitative Effects

The following quantitative effects are expected from the implementation of this Project:

- Construction of facilities in this Project is expected to increase a total capacity of the target schools from the total number of enrolments in those schools at present of 4,421 students (2012/2013) to 5,400 students, or provide 979 more children with access to secondary education every year.
- Implementation of this Project is expected to increase the number of enrolment of new students in the schools at the project sites to 1,350 students and, thus, enable those schools to enrol 430 more students than they did in the school year 2012/2013 every year.

- Construction of facilities and provision of equipment required for the implementation of the secondary education curriculum is expected to reduce the number of students per class from current 85.0[1] to 50.0 and the alleviation of the overcrowding in classrooms is expected to improve the educational environment and quality of education.

The table below summarises the effects mentioned above.

Table 3-1 Expected Quantitative Effects

Indicator	Standard figure (2012/2013)	Target figure (2016/2017)	Effect
Total number of student capacity	4,421 students	5,400 students[2]	Increase by 979 students
Number of new enrolments to be allowed every year	920 students	1,350 students	Increase by 430 students

(2) Qualitative Effects

The following qualitative effects are expected from the implementation of this Project:

- Construction of teachers' houses is expected to improve the quality of education by creating an environment which facilitates employment and assignment of qualified teachers to the schools in the rural area and their long-term commitment to work there.
- The construction of separate toilet blocks for boys and girls equipped with clean flush toilets and incinerator for girls is expected to improve the sanitary environment at the schools and, consequently, improve the internal efficiency of girl students.

On the basis of the above, this Project is considered to have a high level of relevance and is expected to be effective.

[1] Total number of enrolments in 11 target schools at present of 4,421 students / 52 total classrooms currently used of those schools =85

[2] Although the Survey Team has confirmed the existence of the policy of the school at U1/Kabwabwa to transfer it into a two-session school, it is considered as a one-session school in the estimation. The number of new enrolments to be allowed every year was calculated in the same way.