Ministry of Education, Science and Technology

The Republic of Malawi

PREPARATORY SURVEY REPORT

ON

THE PROJECT FOR RE-CONSTRUCTION AND EXPANSION OF SELECTED COMMUNITY DAY SECONDARY SCHOOLS (CDSS) PHASE 2

IN

THE REPUBLIC OF MALAWI

FEBRUARY 2012

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.

February, 2012

Nobuko Kayashima
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 15.26 million and its population is growing at an annual rate of 2.8% (in 2009, the 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 primary, secondary and tertiary sectors of industry contribute 35.5%, 19.9% and 44.6%, respectively, of GDP (estimates for 2009). Because of the good agricultural production and high prices for its export commodities in the international market, the economy of Malawi has grown rapidly in recent years, by 5.8% in 2007, 8.6% in 2008 and 7.6% in 2009. Even with this high level of economic growth, the GDP and *per capita* GNI of Malawi in 2009 remained at US$4,727 million and US$290, respectively (World Bank, 2009). These figures put Malawi among the poorest countries in sub-Saharan Africa. Its agriculture-based economic foundation is fragile 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, identification of new sources of foreign currency such as mineral resources will have to be addressed as another issue.

2. Background to and Outline of the Requested Assistance

In Malawi, the Government recognizes 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 strategy, "Malawi Growth and Development Strategy (hereinafter referred to as "MGDS") 2006 – 2011". The national policy for education, the "National Education Sector Plan (hereinafter referred to as "NESP") 2008- 2017", describes as priority issues in the education sector the provision of equitable opportunity for education, the improvement and expansion of educational facilities, an increase in enrollment in secondary education, an increase in the number of teachers/qualified teachers, etc. Practical targets in secondary education include 1) an increase in enrollment in secondary education (an increase to 90% by 2017, in comparison with 2007), 2) an increase in the number of classrooms in public secondary schools (from 3,754 to

6,348), 3) an increase in the proportion of girls enrolled (a target boy/girl ratio of 1:1) and 4) improvement in the passing rate of the Malawi School Certificate Examination (hereinafter referred to as “MSCE”) (from 38.6% to 65%).

In Malawi, the introduction of the policy of “Free Primary Education” in 1994 resulted in a rapid increase in the number of enrollments in secondary education to 180,000 in 2004 (a three-fold increase over the previous year). The demand for secondary education has risen each year since then. The Government has responded to the shortage of secondary education facilities by upgrading adult education facilities constructed by local communities to “Community Day Secondary Schools (CDSS).” However, the number of enrollments has increased only slightly in the three-year period from 2008, from 233,000 (a gross enrollment rate of 20.3%) in 2008 to 241,000 (a gross enrollment rate of 20.5%) in 2010, in contrast to the steady increase seen in previous years, as facility construction failed to keep up with increasing demand. As of 2008, 620 of 769 public secondary schools throughout the country were CDSSs. Many of these CDSSs are unable to implement the secondary education curriculum, because they neither satisfy the standard for the number of classrooms nor have laboratories or libraries. Despite the constantly increasing demand for secondary education, achievement of the targets has been largely hindered by the shortage and underdevelopment of facilities. Against this background, the Government of Malawi (hereinafter referred to as “GOM”) formulated “The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools (CDSSs)” for the construction, expansion and improvement of facilities at 21 CDSS sites in the six Education Divisions across country, and requested assistance under the Japanese Grant Aid Scheme from the Government of Japan (hereinafter referred to as “GOJ”) for its implementation. In response, the GOJ is implementing a project, “The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools (CDSSs),” for the construction, expansion and improvement of facilities at six CDSS sites in the Central West, South East, South West and Shire Highlands Education Divisions, under the scheme of Japanese Grand Aid for Community Empowerment. The GOM requested assistance under the scheme of the Japanese Grant Aid from the GOJ for the second phase of the CDSS project, “The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools Phase 2 (hereinafter referred to as “CDSS Phase 2”), for the construction, expansion and improvement of school facilities at 12 CDSS sites in the Central West, Central East and Northern Education Divisions.

3. Summary of the Survey Results and Content of the Project

JICA dispatched a Preparatory Survey Team to Malawi from February to March 2011. The Team verified the demand for secondary education and the necessity for and relevance of the construction, expansion and improvement of secondary school facilities in the proposed project areas after studying the background to the requested assistance, the current state of and demand for secondary education and teacher training, as well as educational policies and strategies of the GOM. The Team also concluded that this Project could be implemented with assistance from

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 (hereinafter referred to as “MoEST”) 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 six 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 of the project components.

Table. Planned Six Sites

Order of priority in the Central Education Divisions	School	Education Division	Order of priority in the Northern Education Division	School	Education Division
1	Mkwichi CDSS	Central West	1	Zolozolo CDSS	Northern
2	Matenje CDSS	Central East	2	Mpamba CDSS	Northern
3	Liwaladzi CDSS	Central East	3	Ezondweni CDSS	Northern

The Survey Team analyzed the results of the survey, prepared the outline design, carried out a quantity survey to estimate project cost, formulated the project plan in Japan and explained the summary of the outline design to the Malawian side between 1st to 18th October 2011 in Malawi. The Survey Team prepared the Preparatory Survey Report on the ”CDSS Phase 2” by compiling the outcomes of the processes mentioned above.

In principle, in a project implemented with assistance from Grant Aid for Community Empowerment, facilities are constructed by a contractor or contractors from the recipient country. The aims of implementing this Project with assistance from Grant Aid for Community Empowerment are cost reduction and better efficiency in comparison with the project being implemented with assistance from Grant Aid for General Projects, with the use of standard design specifications based on local construction methods. 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 Requested Assistance

Facilities established in conventional secondary schools (hereinafter referred to as “CSS”) as standard facilities and utilized effectively in Malawi shall be considered as components of this Project. The highest priority shall be given to the provision of 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 in the existing CDSSs.

At sites in rural agricultural areas, the construction of hostels and dining halls/kitchens to accommodate some of the girl students who are forced to travel long distances to and from school shall be given top priority equally with the facilities mentioned in the preceding paragraph.

Since teachers' housing is indispensable for the assignment and long-term commitment of qualified teachers to work at schools in rural agricultural areas in particular, the construction of teachers' houses will be given the second highest priority in the Project. The number of houses to be constructed will be determined in accordance with the budget available for the construction.

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 with assistance from Grant Aid for Community Empowerment, the exact scope of the assistance will be determined at the project implementation stage.

Table. Facilities

Site	Facility Description	Number of Blocks	Floor Area (m^2)	Total Floor Area (m^2)
Mkwichi CDSS	Classroom block	3 (6 classrooms)	493.29	1,172.14
	Administration/library block C-type	1	307.44	
	Laboratory block	1	291.06	
	Toilet block (flush)	1	73.26	
	Guard station	1	7.09	
Matenje CDSS Liwaladzi CDSS Mpamba CDSS	Classroom block	2 (4 classrooms)	328.86	2,569.85
	Administration/library block A-type	1	269.01	
	Laboratory block	1	291.06	
	Toilet block (for students)	4	72.00	
	Toilet block (for teachers)	1	23.76	
	Girls' hostel	2	525.84	
	Multipurpose hall / kitchen	1	617.40	
	Teacher's house	2 (4 houses)	441.92	
Zolozolo CDSS	Classroom block	3 (6 classrooms)	493.29	2,267.78
	Administration/library block C-type	1	307.44	
	Toilet block (for students)	4	72.00	
	Toilet block (for teachers)	1	23.76	
	Girls' hostel	2	525.84	
	Multipurpose hall / kitchen	1	617.40	
	Teacher's house	1	220.96	

		(2 houses)		
	Guard station	1	7.09	
Ezondweni CDSS	Classroom Block	2 (4 classrooms)	328.86	2,492.99
	Administration block B-type	1	192.15	
	Laboratory block	1	291.06	
	Toilet block (for students)	4	72.00	
	Toilet block (for teachers)	1	23.76	
	Girls' hostel	2	525.84	
	Multipurpose hall / kitchen	1	617.40	
	Teacher's house	2 (4 houses)	441.92	
Total				13,642.46

Table. Furniture

Classification	Main Furniture	Use/Place of Use	Quantity
Furniture for classroom blocks	Desks and chairs for students and desks and chairs for teachers	Classrooms	2,324
Furniture for laboratory blocks	Stools for students	Physical science and biology laboratories	440
Furniture for administration blocks/libraries	Office desks and chairs, tables and cabinets	Principal's room, deputy principal's room, staff room and administration office	690
Furniture for multipurpose halls	Tables and chairs	Dining tables and chairs for students	1,790
Furniture for kitchens	Chairs for employees	Kitchen offices and anterooms	30
Furniture for hostels	Bunk beds	For students/hostel rooms	280
	Lockers	For students/hostel rooms	560
Total			6,114

Table. Equipment for Science Experiments

Classification	Equipment	Use	Number 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, table balances, rulers, ammeters, voltmeters, Autoclaves, tools for experiments, etc.	Physical science and biology/ glassware and equipment for basic experiments Equipment for common preparation room	62	587
Equipment for biology laboratories	Human eye, ear, dental and skeletal models Microscope, specimen prepared, Dissection tool kits, dishes and plates, tweezers, etc.	Biology/for basic teaching materials Observation practice, Dissection practice	14	63
Equipment for science laboratory	Periodic tables, thermometers, thermo-hygrometers, magnets, bi-metallic strips,	Physics and chemistry /basic teaching materials	33	163

	Circuit board kits, variable resistors, motors, diodes, Pulley systems, inclined plane table sets, spring balances, hooked weights, Lenses, prisms, ray boxes, filters, etc.	Physics/for basic electrical experiments and practice Physics/for experiments in motion, energy, mechanics, etc. Physics/for optical experiments		

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4. Project Implementation System, Construction Period and Project Cost Estimate

1) Implementation System

For the implementation of this Project with assistance from 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, and a Grant Agreement (G/A) will be 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 by local engineers.

2) Construction Period and Project Cost Estimate

The completion of the construction work in this Project is expected to take a total of 27.5 months; 6.5 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, 20 months for the construction work, and one month for settling of business after the completion and handover. The procurement of the equipment and furniture is expected to take 12 months, from the preparation for the bidding to the delivery and handover of the equipment and furniture. The procurement work will be completed within the 20 months of the construction work.

The cost required for the implementation of this Project borne by the Government of Malawi will be approximately 4.8 million yen.

5. Verification of the Relevance of the Project

1) Relevance

The demand for secondary education has been rising in Malawi since the introduction of the policy of “Free Primary Education.” However, the gross secondary education enrollment rate has not risen

significantly since 2008, because facility construction has failed to keep up with the growing demand for education. Against the target of the overall development plan of achieving gross secondary school enrollment of 30.5% by 2017, the actual gross rate still remained at 20.5% as of 2010. This fact shows that the shortage of school facilities is a significant factor hindering the expansion of access to secondary education.

The GOM recognizes the education sector as a priority sector in its national development strategy, "Vision 2020," and in its medium-term development strategy, MGDS, 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, the construction of girls' hostels and the construction of teachers' houses, as an incentive to teachers working in schools in remote areas, in the action plan based on NESP.

Since the aim of this Project is to provide direct assistance to strategic issues in the development of teachers in secondary education in Malawi through the construction of new classrooms and the provision of the facilities and equipment required for the implementation of the secondary education curriculum in six CDSSs in the Central and Northern Education Divisions and through the construction and furnishing of girls' hostels and teachers' houses in some of those schools in rural agricultural areas, the Project is consistent with the overall development plan.

The GOJ is committed to provide assistance to Malawi in a) sustainable economic growth (agriculture and rural development), b) social development (improvement of education, water resource development and health/medical services) and c) infrastructure development (promotion of the construction of transport infrastructure and rural electrification). Thus, this Project 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, namely, education and human resource development.

The local standard designs and the local specifications used in projects supported by other donors will be applied to the facilities to be constructed and the equipment to be procured in this Project. Therefore, specialized technologies will not be required for the operation and maintenance of the facilities and equipment. The increase in the personnel salaries for new school staff including 44 teachers to be employed as a result of the implementation of this Project is expected to correspond to 0.14% of the MoEST budget for personnel salaries in 2010/2011. Since the MoEST's budget for personnel salaries has increased by an annual average of 21.9% in the last three years, it is considered that the Ministry will have no problem accommodating this increase in its budget. 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 total of 56 classrooms (composed of existing 24 classrooms and use 4 other rooms as classrooms, 28 new classrooms) in the six target schools will enable the increase of capacity of enrollments from 1,014 students (in 2011) to 2,240 students (capacity of 40 students x 56 classrooms). This increase in enrollment will expand the opportunity to attend secondary school to those students in the project areas who were previously not able to do so.
- The construction of girls' hostels (accommodation capacity 560 girls: 112 girls×5sites) at each of in the five project sites will enable girls in the project areas to attend secondary schools who were unable to attend secondary school due to difficulty of commuting for long distances. The proportion of girl students in the total enrollment (1,760 students: capacity of 40 students x 22 existing classrooms with 22 new classrooms) of the five project schools will be possibly improved up to 50% (the proportion of girls to boys is one to one which is the target of the national education policy of the government of Malawi).

[Qualitative Effects]

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

- The expansion of access to secondary education as a result of the construction of new classrooms in the target schools is expected to raise the ratio of promotion to secondary schools from primary schools and the enrollment rate in secondary school in the project areas.
- The improvement of the educational environment and quality in education through the construction of the facilities and provision of the equipment required for the implementation of the secondary education curriculum is expected to improve the passing rate of the Junior Certificate Examination (JCE) and Malawi School Certificate Examination (MSCE) (JCE: 60.55% and MSCE: 52.99% in 2010).
- The construction of girls' hostels is expected to increase the proportion of girls enrolled in the schools and to improve internal efficiency (*i.e.* reduction in the percentage of students repeating a grade and the percentage of students leaving school before the end of the course) by reducing the number of female students who are forced to leave school due to long commuting distances or other difficulties in commuting to and from the school.
- The construction of teachers' houses in the target schools is expected to improve the quality of secondary education at the schools to increase the percentage of qualified teachers among the assigned teachers, as it will create more favourable conditions for qualified teachers to be employed and assigned to the schools and to work for a long period of time.

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

Contents

References

1 The Survey Team Members
2 Itinerary of the Survey Team
3 List of the people concerned (interviewees)
4 Minutes of Discussions (M/D)
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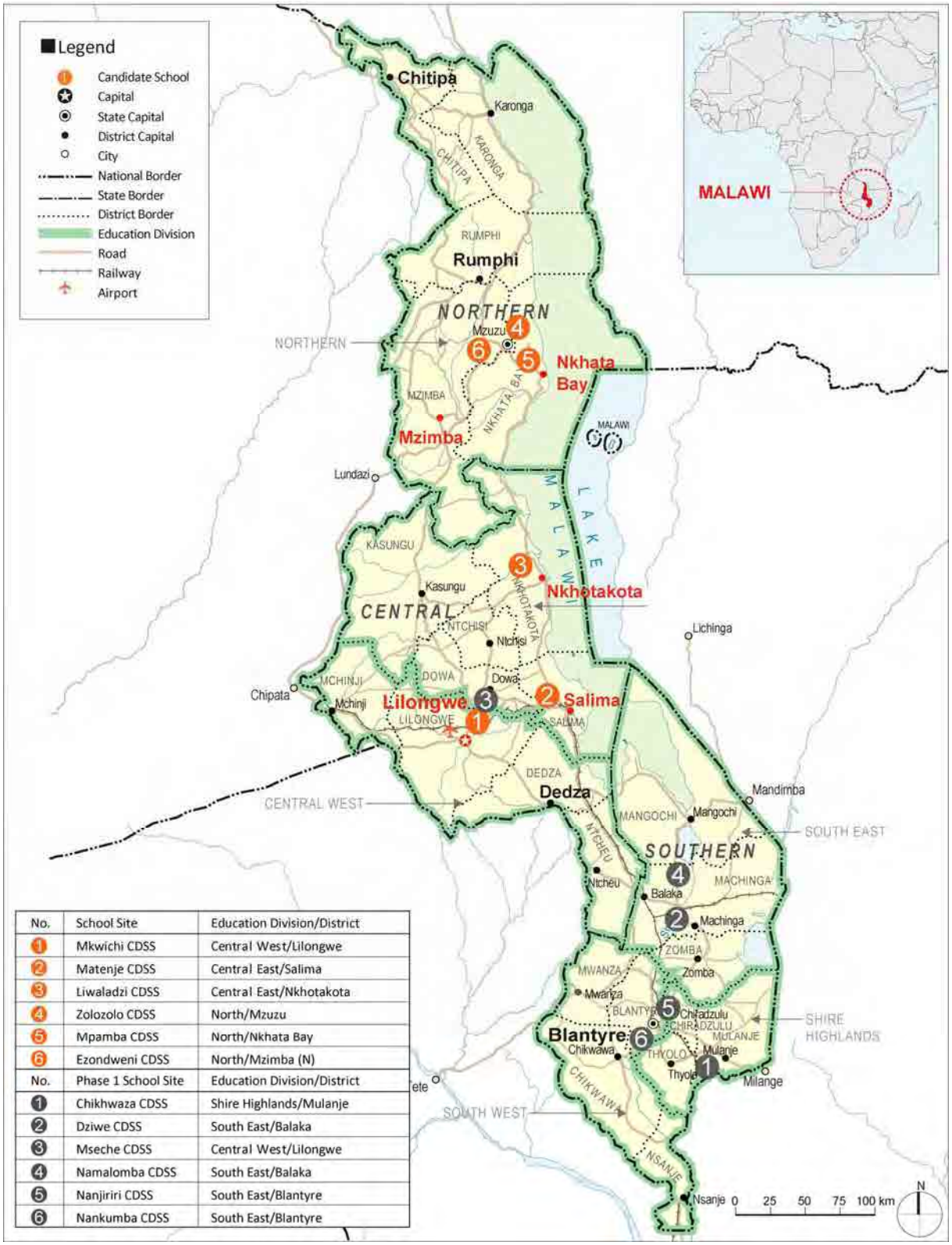
Location Map



No.	School Site	Education Division/District
1	Mkwichi CDSS	Central West/Lilongwe
2	Matenje CDSS	Central East/Salima
3	Liwaladzi CDSS	Central East/Nkhotakota
4	Zolozolo CDSS	North/Mzuzu
5	Mpamba CDSS	North/Nkhata Bay
6	Ezondweni CDSS	North/Mzimba (N)
No.	Phase 1 School Site	Education Division/District
1	Chikhwaza CDSS	Shire Highlands/Mulanje
2	Dziwe CDSS	South East/Balaka
3	Mseche CDSS	Central West/Lilongwe
4	Namalomba CDSS	South East/Balaka
5	Nanjiriri CDSS	South East/Blantyre
6	Nankumba CDSS	South East/Blantyre

PERSPECTIVE

リワラジサイト パース
Perspective: Liwaladzi Community Day Secondary School

ソロゾロサイト パース
Perspective: Zolozolo Community Day Secondary School

List of Figures and Tables

Abbreviation

A/A	Agent Agreement
A/M	Agreed Minutes on Procedural Details
AfDB	African Development Bank
BQ/BOQ	Bill of Quantity
BS	British Standard
CDSS	Community Day Secondary School
CPD	Continuing Professional Development
CSS	Conventional Secondary School
DCE	Domasi College of Education
DEC	Distance Education Center
DTED	Department of Teacher Education and Development
EDMU	Education Development Management Unit
EFA	Education for All
EFA-FTI	Education for All-Fast Truck Initiative
EIA	Environment Impact Assessment
EIMU	Education Infrastructure Management Unit
E/N	Exchange of Note
EMAS	Education Method & Advisory Services
EMIS	Education Management Information System
ESIP	Education Sector Implementation Plan
FORM -ST14	FORM-Sur Tax 14
FPE	Free Primary Education
G/A	Grant Agreement
GER	Gross Enrollment Ratio
GPF	General Purpose Fund
HIV/AIDS	Human Immune-Deficiency Virus/ Acquired Immune-Deficiency Syndrome
INSET	In-Service Education and Training
IPC	Internal Procurement Committee
JCE	Junior Certificate Examination
JICA	Japan International Cooperation Agency
JICS	Japan International Cooperation System
JV	Joint Venture
MASAF	Malawi Social Action Fund
MBS	Malawi Bureau of Standard
M/D	Minutes of Discussion
MDGs	Millennium Development Goals
MGDS	Malawi Growth and Development Strategy
MKw	Kuwacha
MoEST	Ministry of Education, Science and Technology
MRA	Malawi Revenue Authority
MSCE	Malawi School Certificate Examination
MTTC	Machinga Teacher Training College

NCIC	National Construction Industry Council
NESP	National Education Sector Plan
NSTED	National Strategy for Teacher Education and Development
OS	Open School
PIF	Policy and Implementation Framework
PRESET	Pre-Service Education and Training
PSLCE	Primary School Leaving Certificate Examination
PTA	Parent-Teacher Association
QS	Quantity Surveyor
SABS	South African Bureau of Standard
SDF	School Development Fund
SEP	Secondary Education Project
SMASSE	Strengthening of Mathematics and Science in Secondary Education
SSB	Stabilized Soil Block
TRF	Textbook Revolving Fund
TTC	Teacher Training College
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 recognizes the education sector as a priority sector in its national development strategies, "Vision 2020" and "Malawi Growth and Development Strategy (MGDS) (2006-2011)". Its national education policy, "Policy and Investment Framework (PIF)" mentions improvement in access to and the quality of education as priority issues. While the "National Education Sector Plan (NESP) (2008-2017)" mentions upgrading of the basic education[1] as a priority issue for the achievement of the Millennium Development Goal, it also recognizes an increase in enrollment, guarantee of equity, upgrading and promotion of efficient use of educational facilities as priority issues. The detailed target values provided in the NESP are: 1) an increase in enrollment in secondary education (by 30 % by 2012 and by 90 % by 2017[2]), 2) an increase in the number of classrooms in public secondary schools (from 3,754 to 6,348), 3) an increase in the proportion of girls enrolled (to a boy-to-girl ratio of 1:1), 4) a decrease in the number of students per teacher in CDSSs (from 1:104 to 1:60) and 5) improvement in the passing rate of the Malawi School Certificate Examination (MSCE) (from 38.6 % to 65 %).

The introduction of Free Primary Education in Malawi in 1994 also resulted in a rapid increase in enrollment at secondary level from 50,000 in 1993 to 180,000 in 2004. Since then enrollment demand has been increasing every year. The Government of Malawi has responded to the shortage of facilities resulting from the rapid increase in enrollment by upgrading the adult education facilities constructed by local communities to "Community Day Secondary Schools (CDSSs)". However, enrollment has remained stagnant in the past three years as the pace of facility construction has failed to meet the increased demand for secondary education (enrollment of 233,000 students in 2008, 244,000 in 2009, and 241,000 in 2010). The number of public secondary schools increased from 623 in 2003 to 769 in 2008[3], of which 620 are CDSSs. Many CDSSs are unable to provide even the minimum required level of education due to the shortage of classrooms and laboratories, undevelopment of libraries and dilapidation of the buildings, etc. However, it is difficult for CDSSs to implement large-scale repairs independently because of their limited school operation budgets. It is also difficult for The Government of Malawi to repair CDSS facilities with its limited budget. Based on such background, The Government of Malawi formulated "The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools (CDSS) Phase 2" (hereinafter referred to as "CDSS Phase 2") for upgrading CDSS facilities with the aim of achieving the targets provided in the NESP, including an increase in enrollment at secondary level and equal access to secondary education, and requested Grant Aid assistance from the Government of Japan (GoJ) for its implementation. This request was made for the new project to be implemented at 12 CDSSs in the Central West, Central East and Northern Education Divisions as a follow-up on the project implemented at the six CDSSs in the Central West, Southern East, Southern West and Shire Highlands Education Divisions selected from the 21 candidate sites throughout Malawi with assistance from Grant Aid for Community Empowerment in 2010, "The Project for Re-Construction and Expansion of Selected Community Day Secondary Schools (CDSSs)"

[1] Primary, pre-primary and non-formal education
[2] Compared with the figure for 2007
[3] Since 2009, EMIS has not provided the total number of schools by type of school. EMIS 2010 gives the number of secondary schools as 1,045 (699 government schools, 161 religious agencies and 161 private schools).

(hereinafter referred to as “CDSS Phase 1”)

Government of Japan dispatched a preparatory survey team to Malawi to conduct site survey of the 12 CDSSs at the confirmed survey sites in February and March 2011. As a result of the evaluation made based on the site survey for the necessity for classroom development, site conditions and accessibility for the construction work, The Government of Malawi and the Survey Team concluded that the Project should be implemented at a total of seven planned project sites, three CDSSs in the Central West and Central East Education Divisions and four CDSSs in the Northern Education Division. The two parties also agreed to establish two separate orders of priority for the planned project sites, one for those in the Central (West and East) Education Divisions and the other for those in the Northern Education Division. Later, during the processes of domestic analysis, preparation of outline design and estimation of accumulation for project cost, the number of CDSSs in this Project was decided as six in order to meet the project cost ceiling. The table below shows the schools subject to survey, candidate proposed schools and schools subject to the cooperation project:

Table 1-1 Planned Sites

School	District	U/R	Education Division	Project Implementation
Mkwichi CDSS	Lilongwe Urban	Urban	Central West	○
Matenje CDSS	Salima	Rural	Central East	○
Liwaladzi CDSS	Nkhotakota	Rural	Central East	○
Zolozolo CDSS	Mzuzu	Urban	Northern	○
Mpamba CDSS	Nkhata Bay	Rural	Northern	○
Ezondweni CDSS	Mzimba North	Rural	Northern	○
Edingeni CDSS	Mzimba South	Rural	Northern	×
Dwambazi CDSS	Nkotakota	Rural	Central East	
Baula CDSS	Mzimba North	Rural	Northern	
Chadabwa CDSS	Lilongwe East	Rural	Central West	
Katowo CDSS	Rumphi	Rural	Northern	
Nthalire CDSS	Chitipa	Rural	Northern	

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 November to April, and 95 % of the annual precipitation is recorded during this period. The precipitation varies between 725 mm and 2,500 mm depending on the region. The average annual precipitation is 900 mm in Lilongwe, around 1,300 mm in Mzuzu and approximately 1,200 mm to 1,700 mm in the western shore of Lake Malawi including Khata Bay, Nkhotakota and Salima. The temperature is high during the rainy season-: the average highest temperature in Lilongwe during the rainy season exceeds 30°C, while 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 28°C in the lowlands on the shores of Lake Malawi.

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.

The table below shows the meteorological data for the major cities in the Central and Northern Regions in which this Project will be implemented:

Table 1-2 Meteorological Data of the Planned Project Area

Location	Item	1	2	3	4	5	6	7	8	9	10	11	12	Annual Average
Lilongwe	AHT ℃	26.2	26.8	27.0	26.6	25.8	24.1	23.8	25.6	28.2	30.1	30.0	27.7	26.8
Altitude	ALT ℃	17.6	17.3	16.7	14.8	11.5	9.0	8.6	9.7	12.3	15.1	17.1	17.8	13.9
1134m	Precipitation ㎜	272.8	196.5	144.9	28.2	0.1	0.8	0.1	0.3	1.2	5.9	79.9	162.3	893.0
Mzuzu	AHT ℃	25.8	25.9	25.2	23.7	22.4	20.8	20.5	22.3	24.9	27.4	27.8	26.6	24.4
Altitude	ALT ℃	16.5	16.7	16.4	15.3	11.8	8.3	7.0	7.4	9.4	12.5	14.6	16.1	12.6
1254m	Precipitation ㎜	209.3	153.9	255.5	202.7	32.1	21.4	30.3	13.6	28.5	31.7	76.5	189.0	1,244.5
Mzimba	AHT ℃	25.4	25.6	25.7	25.3	24.5	22.8	22.4	23.6	26.1	27.9	28.2	26.4	25.3
Altitude	ALT ℃	16.3	16.2	16.1	15.7	13.5	10.8	10.5	15.1	14.2	16.7	17.3	16.7	14.9
1349m	Precipitation ㎜	229.5	191.5	164	43.3	8.4	0.9	0.9	0.3	0.6	5	55.9	203	903.3
Salima	AHT ℃	29.4	29	29.5	28.9	27.8	26.2	25.9	27.8	30.6	32.5	32.2	30.3	29.2
Altitude	ALT ℃	21.4	21.3	21.4	20.7	17.9	15.9	15.8	16.9	18.7	21.3	22.3	22.2	19.7
512m	Precipitation ㎜	339.4	266.4	254.4	92.5	10.7	2	0.4	0.4	0.3	6.4	43.6	250	1,266.5
Nkhotakota	AHT ℃	28.5	28.6	28.5	28	26.9	25.7	25.4	26.9	29.5	31.8	31.5	29.4	28.4
Altitude	ALT ℃	21.1	21.4	20.9	20.1	17.9	15.7	15.3	15.9	18	20.8	22	21.3	19.2
500m	Precipitation ㎜	320	266.3	407.6	227.7	33.5	11.5	7.9	2.1	0.7	10.2	79.8	282	1,649.3
Nkata Bay	AHT ℃	28.8	28.9	28.8	28.6	27.3	25.8	25.5	26.6	28.7	30.2	30.4	29.2	28.2
Altitude	ALT ℃	21.1	21.1	20.8	20	17.9	15.7	15.2	15.6	17.4	19.8	21.2	21.3	18.9
500m	Precipitation ㎜	224.2	200.7	358	283	134	37.2	32.5	5.2	3.2	14	118	247	1,657.0

Source: Malawi Meteorological Services 1998-2008
ATH: Average highest temperature, ALT: Average lowest temperature

(2) Topography/Geology

The Nyassa Rift Valley located on the south-western edge of the Great Rift Valley lies along Lake Malawi. Minerals crystalized in the Precambrian and Paleozoic Eras are found in the greater part of the ground in Malawi. After a long period of complicated processes of sedimentation, epeirogenic movement and lake-forming processes, the surface layer consisting of various types of deposits has been created. The surface soil mainly consists of clay, laterite and sandy soil.

(3) Survey of Damage Caused by Natural Disasters

1） Earthquakes

In Malawi, earthquakes occur near the Great Rift Valley along the shores of Lake Malawi. The most recent earthquake which occurred in December 2009 caused casualties in Karonga in the Northern Region. There are no records of large-scale earthquakes in the Central and Southern Regions. Although none of these earthquakes released large amounts of seismic energy, cracks created by the recent earthquake could still be seen on the brick walls of the teachers' house at Nthalire CDSS in Chitipa District, the northernmost of the 12 surveyed sites. With regard to the damage caused by strong wind, the

roofs of the old, dilapidated buildings of Baula CDSS and Ezondweni CDSS in Mzimba North District of Northern Region had been damaged. For these reasons, an analysis for certain earthquake-resistant and wind-resistant structures is required for the facilities.

Floods caused by heavy rain often cause damage in Malawi. Most recently, flood in January 2003 caused serious damage including inundation of farmland, residential areas and roads, and destruction of power pylons and bridges on trunk roads in a wide area covering the Northern, Central and Southern Regions. Although there are no records of damage caused by flood at any of the 12 survey sites, Dwambazi CDSS in the Central East Region was excluded from the scope of the Project because of its location on a lowland swamp.

(4) Survey of the Natural Conditions

Sub-contracted local consultants conducted a survey of the natural conditions consisting of a site surveying, soil survey at the 7 candidate sites and groundwater survey (electrical prospecting at the 5sites, borehole at the 4 sites) shown in the table below.

Site	Education Division	District	Topographic Survey	Soil Survey		Groundwater Survey	
				DCPT/Test drilling	WPT	Electrical prospecting	Borehole
Mkwichi CDSS	Central West	Lilongwe City	3.8ha	○/Test drilling at six points	○: Three points	Public water	-
Matenje CDSS	Central East	Salima	4.0ha	same as the above	same as the above	○	○
Liwaladzi CDSS	Central East	Nkhotakota	3.0ha	same as the above	same as the above	○	○
Zolozolo CDSS	Northern	Mzuzu City	2.9ha	same as the above	same as the above	Public water	-
Mpamba CDSS	Northern	Nkhata Bay	5.9ha	same as the above	same as the above	○	○
Ezondweni CDSS	Northern	Mzimba North	3.7ha	same as the above	same as the above	○	○
Edingeni CDSS	Northern	Mzimba South	9.1ha	same as the above	same as the above	○	-

DCPT: Dynamic Cone Penetration Test
WTP: Water Penetration Test

1) Site Surveying

The Survey Team obtained district-level topographic maps showing the locations of the CDSSs concerned and basic topographic data, and other available data relevant to the Project including simple aerial photographs, and acquired knowledge of the locations and general conditions of the sites before the site survey. During the site survey, the Team conducted a simple surveying of the site boundaries with a portable GPS device and drew site sketches. The Team then subcontracted with a local surveying company to conduct a plane surveying and levelling at the 7 candidate sites. It was decided that the levelling was to be conducted using a grid size of 5 m x 5 m with a contour interval of 0.5 m, and the survey drawings were to be created with latitude, longitude, directions as well as the existing structures, trees, obstacles and infrastructure in the adjacent plots shown on them.

The surveying revealed that the planned project sites have flat or gently sloping terrain in general.

Therefore, any problems regarding the construction work are not expected. Furthermore, all the planned project sites have adequate space for the construction of the planned facilities.

2) Soil Survey

The Survey Team subcontracted with a local engineering company to conduct soil surveys at the seven candidate project sites (Ezondweni, Mkwichi, Mpamba, Matenje, Liwaladzi, Edingeni and Zolozolo CDSSs) for preparation of the optimal basic design. The subcontractor implemented dynamic cone penetration tests (50 to 60 locations per site) at a depth of 2.0 m below the ground level on the assumption that single-story buildings will be constructed, laboratory soil property tests of undisturbed samples (six samples per site, Atterberg limits test and triaxial compression test) and water penetration tests of the soil at the sites (three locations per site). The table below shows the results of the soil surveys:

Table 1-3 Results of the Soil Survey

Site	Depth	Soil	Permeability (mm/min)	Bearing capacity of soil (kN/m^2)	Shape and depth of foundation
Mkwichi CDSS	GL-2.0m	Dark brown hard sandy clay mixed with gravel	3.55 (Good)	311	690 mm-wide continuous footing, GL-1.0 m or below
Matenje CDSS	GL-2.0m	Dark brown hard cohesive soil	3.8 (Good)	324	690 mm-wide continuous footing, GL-1.0 m or below
Liwaladzi CDSS	GL-2.0m	Dark brown hard cohesive soil	N/A Welling water	155	690 mm-wide continuous footing, GL-1.0 m or below
Zolozolo CDSS	GL-2.0m	Light grey sandy soil with silt	N/A (Extremely good)	100	690 mm-wide continuous footing, GL-1.0 m or below
Mpamba CDSS	GL-2.0m	Reddish brown sandy soil with silt	1.23 (Low permeability	100	690 mm-wide continuous footing, GL-1.0 m or below
Ezondweni CDSS	GL-2.0m	Dark brown hard adhesive soil with sand	2.25 (Good)	270	690 mm-wide continuous footing, GL-1.0 m or below
Edingeni CDSS	GL-2.0m	Reddish brown hard sandy clay	N/A (Extremely good)	263	690 mm-wide continuous footing, GL-1.0 m or below

The survey results show that the bearing capacity of the soil at Zolozolo and Mpamba CDSSs at 100 kN/m^2 is lower than the other sites. However, it can be dealt with a minimum width of 690mm which is adopted for the construction of a single-story building with mansory walls as a foundation form.

3）Groundwater Survey

The groundwater survey was implemented in two stages, electrical prospecting (in March and April) and test drilling (from September to November). Of the seven CDSS candidate sites, the electrical prospecting was conducted at five sites that have no public water supply (*i.e.* Matenje CDSS, Liwaladzi CDSS, Mpamba CDSS, Ezondweni CDSS, and Edingeni CDSS). The locations and depths at which it was

expected groundwater would be found were estimated by analyzing the data on electrical resistivity below the surface measured using horizontal electrical prospecting and vertical electrical sounding. On the basis of the results of the electrical prospecting, test drilling was conducted at four of the five sites, with no test drilling carried out at Edingeni CDSS. The test drilling was conducted following the survey specifications described below:

- 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)

As can be seen in Table 2-8 below, the results of the test drilling at Matenje CDSS, Liwaladzi CDSS and Ezondweni CDSS confirmed the presence of groundwater expected to yield 10 m^3/day or more, the volume of water required at these sites. The results of the test drilling at Mpamba CDSS revealed that the groundwater at this site could also be used.

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 2-8. Results of the Test Drilling

Drilling Site	Borehole	Location		Depth of Borehole (Drilling Depth)	Water Quality Evaluation
		Latitude (South)	Longitude (East)		
Matenje CDSS	Matenje No.(1)	13°35′42.7″S	34°17′49.9″E	29m (35m)	◎
Liwaladzi CDSS	Liwaladzi No.(1)	12°36′50.0″S	34°09′43.9″E	39m (40m)	◎
Ezondweni CDSS	Ezondweni No.(1)	11°24′25.0″S	33°44′40.0″E	－ (29m)	×
	Ezondweni No.(2)	11°24′24.3″S	33°44′48.7″E	64m (64m)	◎
Mpamba CDSS	Mpamba No.(1)	11°32′48.0″S	33°44′48.7″E	45m (60m)	○

1-3 Environmental and Social Considerations

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

The objective of this Project is to upgrade the existing CDSSs constructed by the local communities with financial input from the Malawi Social Action Fund (MASAF) (from 1976 to 2005).

Among the six planned sites, CDSSs except for Mkwichi CDSS in Lilongwe City and Zolozolo CDSS in Mzuzu City are located in rural agricultural area. While the surrounding areas of the premises of Mkwichi CDSS have already been bordered by roads and are ready for urbanization, the other CDSSs in rural area including Zolozolo CDSS are surrounded by unused grassland or farmland and the planned construction sites are located in vacant lots, grassland or land used for private farming by some of the teachers, which are near the existing school buildings. Since the upgrading of the school facilities in this Project will be conducted through expansion of the existing school facilities, there will be no relocation or significant changes in the living conditions of the neighbourhood residents. Thus, no new negative impact on the natural or social environment within or around the school premises requiring consideration is expected. Since some changes to the environment are expected from land preparation in sloping areas of the school premises, installation of rainwater and wastewater disposal facilities, and construction of boundary walls for security control, 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 maximizing the topographic features of the sites and minimizing 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 minimized 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 as “a project deemed to have minimum or no undesirable impact on the environment and society”.

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

The Government of Malawi 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)

Since the adoption of multi-party democracy in 1994, The Government of Malawi has been implementing various reform programs for “poverty reduction” while decentralizing the authorities, and has recognized the education sector as an important sector for poverty reduction.

At present, there is a significant disparity between boys and girls as shown in the educational indices in Table 2-9 below. This disparity is largely attributed to the poor social and facility environment which make it difficult for girls to enroll in and commute to secondary schools. The poor facility environment forces girls whose homes are distant from school to self-board near the schools. The education policy of The Government of Malawi mentions development of an environment conducive to girls’ enrollment and attendance at schools and consideration for gender equality as a means of eliminating factors that impede girls’ enrollment, and its action plan prioritizes the construction of girls’ hostel in the construction plan of hostels.

In this Project, since the six project sites except for Mkwichi CDSS in Lilongwe urban area own Feeder Schools in the surrounding rural area where commuting area exceeds 10km, priority will be given to the construction of a girls’ hostel for these five CDSSs. As a measure to ensure security within the premises of the CDSSs and of the girls’ hostels in particular, boundary walls should be constructed around the premises.

Table 1-5 Gender Disparity in Secondary Education (EMIS 2010)

	Ratio of Girls to Boys	Gross Enrollment Ratio	Passing Rate of JCE	Passing Rate of MSCE	Leaving Rate
Boys	55.1%	22.6%	65.5%	57.8%	4.8%
Girls	44.9%	18.4%	54.8%	46.5%	7.4%

Chapter 2 Contents of the Project

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2-1 Basic Concept of the Project

(1) Overall Goal and Project Pupose

The Government of Malawi (GoM) recognizes the education sector as a priority sector in its national development strategies “Vision 2020” and “Malawi Growth and Development Strategy (MGDS)”. Its national education policy “Policy and Implementation Framework (PIF)” mentions improvement in access to and the quality of education. Another national education policy, the “National Education Sector Plan (NESP 2008-2017)”, aims at increased enrollment in secondary education (by 30 % by 2012 and by 90 % by 2017 from the figure in 2007), an increase in the number of classrooms in public secondary schools (from 3,754 to 6,348), an increase in the proportion of girls enrolled and improvement in the passing rate of the Malawi School Certificate Examination (MSCE) (from 38.6 % to 65 %). The Ministry of Education, Science and Technology (MoEST) has responded to increasing demand for opportunities for secondary education since the introduction of Free Primary Education (FPE) in 1994 by upgrading the “Distance Education Center (DEC)” constructed by local communities nationwide since 1998 to “Community Day Secondary Schools (CDSS)”. However, although the statistics, *i.e.* 4,976 classrooms, enrollment figure of 240,918 (an increase of 14.5 % over the figure for 2007), the proportion of girl students at 44.9 % and MSCE passing rate of 53 % show some improvement, the gross secondary education enrollment ratio has remained at around 20 % for the past three years as facility construction has failed to keep up with the increased demand for education. The number of public secondary schools increased fron 623 in 2003 to 769 in 2008, out of which 80 % comprise of CDSSs. Since most of the CDSSs have four classrooms in old and dilapidated buildings, they have only one class per form. In addition, insufficient laboratory and library facilities make it impossible for most of the CDSSs to provide secondary education in accordance with the curriculum.

The purpose of this Project is to improve the environment and to expand the opportunity for children attending secondary schools for in the planned project sites through reconstruction and improvement of the facilities at CDSSs as a means to support the achievement of increased enrollment, expansion of equal access and improvement in the quality of secondary education, which are the targets of the NESP of the Government of Malawi.

(2) Basic Concept of the Project

This Project, whose purpose is reconstruction and expansion of the facilities of selected CDSSs in Central and Northern Regions in Malawi, will be implemented as the “Project for Re-construction and Expansion of Selected Community Day Secondary Schools (hereinafter referred to as CDSS Phase 2)” which is a follow-up of the “Project for Re-construction and Expansion of Selected Community Day Secondary Schools (hereinafter referred to as CDSS Phase 1)” being implemented at six CDSSs in the Central West, South East, South West and Shire Highlands Education Divisions in Malawi.

CDSS Phase 2 will be implemented at six existing CDSSs, three in the Central West and Central East Education Divisions and another three in the Northern Education Division, selected from the 12 requested project sites in accordance with the site selection criteria and order of priority of the project components at each site. At the six selected CDSSs, school facilities (classrooms, laboratories, libraries, administration offices, toilets, girls' hostels, dining halls/kitchens, teachers' houses and other necessary facilities such as warterworks and septic tanks) will be constructed and classroom furniture and laboratory equipment will be installed in accordance with the standards of Malawi. Implementation of this Project is expected to increase enrollment in secondary education due to the increased accommodation capacity of the secondary education facilities and to improve the quality of education through improvement in the learning environment due to installation of the facilities and equipment required for implementation of the secondary education curriculum. In addition, increases in the proportion of girls' enrollment and the MSCE passing rate of girls are expected from improvement in the learning environment for girls through the construction of girls' hostels.

2-2 Outline Design of the Requested Japanese Assistance

2-2-1 Design Policy

(1) Basic Policy

In this Project, which is to be implemented under the Japanese Grant Aid for Community Empowerment, standard design specifications established on the basis of local construction methods, local procurement conditions and local technologies will be used in designing the facilities and equipment, on the assumption that, in principle, the contractors for the construction work will be selected through competitive bidding among local construction companies and the contractors for equipment procurement will be selected through international competitive bidding.

1) Selection of the Planned Project Sites

Site survey was conducted at the 12 requested project sites based on the following selection criteria:

- There is documentary evidence of landownership or right of use of the site concerned.
- There is no duplication with any construction/improvement projects by other donors or the Government.
- There is no risk of natural disasters or insecurity at the site.
- Construction work and supervision can be implemented without any problem at the site (*e.g.* in terms of access, size and terrain).
- There is sufficient demand for education at the site.
- The Government ensures that the candidate school will be allocated a budget for operation and maintenance.

Since the site survey revealed difficulties in implementing construction work and supervision at the 3 sites listed below, it was agreed in discussions between the Government of Malawi and the Survey Team that they should be excluded from the list of candidate project sites.

Implementation of work technically difficult due to marshy site conditions:

- Dwanbazi CDSS/Nkhotakota District, Central East Region

Hard access to the site for implementation of work:

- Nthalire CDSS/Chitipa District, Northern Region
- Katowa CDSS/Rumphi District, Northern Region

Since implementation of the work was also found to be difficult at 2 sites listed below due to extremely long distance for laying the power cables required for the work, it was agreed in discussions between the Government of Malawi and the Survey Team that they should be excluded from the list of candidate project sites.

Difficulty in laying power cables to the site:

- Chadabwa CDSS/Lilongwe East, Central West Region
- Baula CDSS/Mzimba (North) District, Northern Region

After the discussions, seven of the 12 requested sites (three in the Central Region and seven in the Northern Region) remained as the candidate project sites for the requested Japanese assistance. However, because of limitations on the scale and budget of the Project, the number of project sites was reduced to six in the end (three in the Central Region and another three in the Northern Region). In selecting the three sites in the Northern Region, it was decided to exclude one of the two sites in Mzimba District (Ezondweni CDSS/Mzimba North and Edingeni CDSS/Mzimba South) from the planned project sites. Since Ezondweni CDSS is in the same area and same school cluster as Baula CDSS/Mzimba North in Mzimba District which had been excluded from the list of the candidate sites, priority was given to Ezondweni CDSS.

Table 2-1 Sites in the Scope of the Requested Japanese Assistance

Education Division	School	District	Area	Remarks/Reason for Exclusion
Central (Central West and Central East)	Mkwichi CDSS	Lilongwe Urban	Urban	
	Matenje CDSS	Salima	Rural	
	Liwaladzi CDSS	Nkhotakota	Rural	
	Dwambazi CDSS	Nkotakota	Rural	× Marshy site condition
	Chadabwa CDSS	Lilongwe East	Rural	× Difficulty in laying power cable
Northern	Zolozolo CDSS	Mzuzu	Urban	
	Mpamba CDSS	Nkhata Bay	Rural	
	Ezondweni CDSS	Mzimba North	Rural	
	Edingeni CDSS	Mzimba South	Rural	× To be selected 1 CDSS from Mzimba
	Baula CDSS	Mzimba North	Rural	× Difficulty in laying power cable
	Katowo CDSS	Rumphi	Rural	× Hard accessibility
	Nthalire CDSS	Chitipa	Rural	× Hard accessibility

2) Order of Priority of the Project Components

This Project, “CDSS Phase 2” to be implemented at six schools in the Central West, Central East and Northern Education Divisions, will be designed based on the same concept as CDSS Phase 1, of which it is a follow-up, having been implemented at six schools in the Central West, Southern East, Southern West and Shire Highlands Education Divisions. It was agreed between the

Government of Malawi and the Survey Team that, of the project components, priority should be given to construction of the educational facilities indispensable for implementation of the secondary education curriculum (*i.e.* classrooms, laboratories, administration/library blocks and toilet blocks). It was also agreed that the construction of other ancillary facilities (*i.e.* hostels, dining/multipurpose halls and teachers' houses) should be given the same priority as that of the educational facilities at the schools in rural area while it should be lower at the schools in urban area. While hostels for both boys and girls are required, it was decided that construction of girls' hostels, which is a priority policy of the Government of Malawi, should be given higher priority than that of boys' hostels as in CDSS Phase 1. In the procurement of equipment, priority is to be given to furniture and laboratory equipment required for the facilities to be constructed.

In the discussions between the Government of Malawi and the Survey Team, the two parties agreed on the order of priority of the project components as shown in the table below:

Table 2-2 Facility Components

Facility Component	Order of Priority by Project Site	
	Matenje CDSS Liwaladzi CDSS Zolozolo CDSS Mpamba CDSS Ezondweni CDSS	Mkwichi CDSS
Classroom	A	A
Laboratory	A	A
Administration block /library	A	A
Hostel (for girls)	A	C
Hostel (for boys)	C	C
Dining/multipurpose hall	A	B
Kitchen	A	-
Toilet	A	A
Teachers' houses	B	C
Home economics laboratory	C	C
Borehole	B	-

Table 2-3 Furniture and Equipment Components

Furniture	Place of Installation	Order of Priority
Desks and chairs	Classrooms, laboratories, administration offices and library	A
Blackboards and notice boards	Classrooms and laboratories	
Tables and chairs	Dining/Multi-purpose hall (in rural CDSSs)	
Cabinets	Administration offices and library	
Beds	Hostels	
Equipment		
Laboratory equipment	Biology and science laboratories	A
Equipment for physical education	Outdoors	B

Note) A; Indispensable, B: Required, C: To be constructed by the Malawian side

For the implementation of this Project, a project design will be prepared for each site in

accordance with the order of priority of the project components after evaluating the necessity and relevance of the components at the site. The final adjustment as to which components shall be included in the Project shall be made in accordance with the order of priority taking into consideration the budget limitations and the response required to variations in the project costs during the implementation stage.

(2) Policy on Natural Conditions

1) Climate

The planned project sites are located in a wide area covering Central Western, Central Eastern and Northern Malawi. There is a rainy season (from December to April) and a dry season (from May to November) in the course of a year and annual precipitation varies between 900 m and 1,600 mm. The annual temperature varies depending on altitude and latitude. The average annual highest and lowest temperatures are within the range of 25.3°C to 28.4°C and 12.6°C to 19.7°C, respectively. With regard to the meteorological conditions, these data support the use of the standard design specifications for the same architecture and equipment plans in the entire project area. The facilities should be designed so that the eaves prevent direct sunshine and rainwater from entering the buildings. The facility design should also provide a comfortable environment throughout the year without using much energy by ensuring sufficient natural ventilation effectively. Rainwater should be disposed of within each site using drain ditches and osmosis pits installed appropriately around the facilities.

2) Geology and Topography

Analysis of the results of the soil surveys revealed that laterite and sandy soil were the major soil components common to all the planned project sites. The analysis also revealed that, while the bearing capacity of the soil at Zolozolo CDSS, Mpamba CDSS and Liwaradzi CDSS is rather low (between 100 kN/m^2 and 155 kN/m^2), the capacity at the other sites is between 263 kN/m^2 and 324 kN/m^2. These facts indicate that the required safety of the buildings can be adequately ensured by adopting a minimum foundation width of 690 mm to 700 mm, the standard for a single-story building, at all the sites.

The topography of all 6 planned project sites is generally flat with a few very gentle slopes. Therefore, no land preparation will be required for the construction of the facilities at the sites. Site plans appropriate for the topography of the sites and consistent with the location of the existing facilities should be prepared.

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. Although none of the earthquakes released a large amount of seismic energy, cracks presumably caused by the quakes of 2009 were observed in the walls of teachers' houses in Nthalire CDSS in Chitipa District, Northern Region, during the survey. There are no records of damage caused by earthquakes at the other sites. A study should be conducted of the seismic horizontal force necessary to be taken into consideration at the project sites and measure to ensure earthquake resistance of tne buildings to such seismic forece.

(3) Policy on Socio-Economic Conditions

All the school facilities are required to be enclosed by a boundary wall in urban area as a safety measure against theft and other crimes. Problems such as theft and vandalism are rarely observed in schools in rural and agricultural areas where community involvement in school management is high. However, even schools without boundary walls take security measures such as assignment of security guards. In this Project, since Town and Country Planning Standard and Guidelines for Developments will be applied for the construction of Mkwichi CDSS and Mzuzu CDSS for which building permits are required as they are in urban administrative area, construction of a boundary wall will be required for these two schools. On the other hand, although construction of a wall is not mandatory at the other four project schools, walls will be constructed specifically around the girls' hostels as a security measure.

Since each school has a limited operating budget due to the difficult economic conditions and educational finance, a facility plan which will minimize facility operating/maintenance costs should be designed. As the water supply infrastructure is undeveloped in rural area, the toilet and sanitary facilities in all the schools should be equipped with pit latrines instead of flush toilets. Although groundwater supply systems with boreholes will be established at the planned project sites in rural area, in order to keep the use of water and the electricity bill for the water supply as low as possible, a limited number of water supply points should be constructed and all the toilets should be equipped with pit latrines.

(4) Policy on Construction and Procurement Conditions

1) Building Standards, Related Legislation and Permits/Approvals

Malawi does not have its own design standards. Instead, British Standards (BS) and South African Bureau of Standards (SABS) are 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 permits/approvals are required for building construction projects in urban administrative area. Of the planned project sites, Mkwichi CDSS in Lilongwe Urban Area and Zolozolo CDSS in the jurisdiction of Mzuzu City are in such area. Ministry of Education, Science and Technology will submit the applications for building permits regarding this Project together with documents describing the outline of the construction and drawings of the buildings to the Planning Department at the respective town halls. The applications will be evaluated for their relevance to urban planning, the safety of the planned buildings and the impact on hygienic conditions and the environment in the surrounding areas in accordance with the Town and Country Planning Standards and Guidelines for Development. The actual evaluation items include the boundaries of the premises, land utilization, 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 area, 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 CDSS Phase 1 should be adopted.

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) Utilization of Local Construction Methods

Masonry structures of bricks or stabilised soil blocks (SSBs) are general and standard structure for educational facilities in Malawi. However, since it is difficult to procure bricks as the brick plants stopped production for environmental conservation, they have been replaced by SSBs. In accordance with the standard design, CDSS Phase 1 adopted an SSB structure, with the interior walls finished with mortar and paint and roofs of corrugated iron sheets, a commonly-used local construction method. This Project should adopt the same construction method.

(5) Policy on Utilization of Local Companies

1) Local Construction Companies

Construction companies, suppliers and Consultant are required to be registered under the Registration/Certificate of Incorporation of the Ministry of Justice in accordance with the Company Act, Tax Payer Identification Number system (TPIN) of the Malawi Revenue Authority and the National Construction Industry Council (NCIC) in order to run a business.

NCIC registered companies in the same type of business are classified into categories in the NCIC registration list in accordance with the scale of business, number of engineers, type and quantity of equipment owned and works completed in the past. Companies eligible to participate in tenders for procurement of services and/or goods for public works and the method of selecting

contractors in such tenders are defined in accordance with the costs of such procurement based on the categories in the NCIC registration list. .

In the NCIC registration list, there are companies which can receive orders worth up to 5 million Malawian Kwacha (MKw) and those which can receive orders worth 5 million MKw or more, without limitation. 27 Malawian-funded companies (more than 51% funded by Malawian capital) are registered in the latter category in the building construction business (as of 30th November 2010).

The contractors for the construction work in this Project should be selected by tender open only to construction companies in the recipient county as it is a condition of the Grant Aid for Community Empowerment scheme under which this Project is to be assisted. A study of the works completed in the past by construction companies in the category with no limitation revealed that most of them had the technical and financial capability to implement construction works on a scale equivalent to the work to be implemented in this Project.

2) Local Suppliers

Orders for the procurement of equipment and furniture in this Project should be placed with specialized 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 specializing in such equipment. Projects for upgrading educational facilities and equipment supported by other donors 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

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 should be adopted. 10 architecture companies, 26 engineering companies and 11 quantity surveyor companies 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 quantity surveyors, respectively.

(6) Policy on Operation and Maintenance

Easy-to-maintain facilities should be built and facilities and equipment which do not require specialized 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.

(7) 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.

(8) Policy on Construction Period

The field survey revealed that a shortage in the supply of locally procured materials, delays in payment by owners to contractors and the interference by rain in the rainy season are the major causes of delays in construction works in Malawi in general. One case in which it took 20 months to implement an actual construction project of the same scale as this Project in Malawi should be analyzed before the construction period for this Project is established. The shortest feasible construction period should be established by incorporating measures to reduce the construction period, including designing the work schedule in such a way as to avoid the rainy season (from December to March) as much as possible, adopting construction methods adapted to the local conditions and formulating a reasonable procurement management and implementation plan.

2-2-2 Basic Design (Facility Plan/Equipment Plan)

2-2-2-1 Study of Components and Scale in the Scope of Cooperation

The selection of necessary components and facility scales should be examined based on the evaluation of the planned sites in terms of situations for operations, enrollment in the commuting area, and enrollment demand.

(1) Analysis and Evaluation of School Operation at the Planned Schools

Through hearings and questionnaires conducted during the site survey and collection of data such as educational statistics, the situations for enrollment and operation at the planned areas and sites were surveyed. The three-year shifts in enrolled students, form organization, number of teachers, and number of existing classrooms at the surveyed schools are as shown in the table below:

Table 2-4 Overview of School Operation I

Site	Education Division District/ Location	Year of Establishment	Number of Students								Number of Teachers		Number of Classrooms	
			Year	F1	F2	F3	F4	Total	Girls	Percentage of Girls	Total	Qualified	Used as Classroom	Other Uses purpose
Mkwichi CDSS	Central West: Lilongwe City [Urban]	1998	2010/11	36	41	55	43	175	103	58.9	21	20	4	4
			2009	57	55	57	47	216	95	44.0				
			2008	53	57	76	60	246	110	44.7				
			2007	54	60	54	68	236	107	45.3				
Matenje CDSS	Central East: Salima [Rural]	1993	2010/11	46	50	36	44	176	77	43.8	7	2	4	2
			2009	53	63	46	28	190	93	48.9				
			2008	73	68	37	35	213	93	43.7				
			2007	61	61	56	75	253	117	46.2				
Liwaladzi CDSS	Central East: Nkhotakota [Rural]	1995	2010/11	31	50	23	0	104	39	37.5	7	1	4	0
			2009	46	55	0	0	101	32	31.7				
			2008	50	37	8	0	95	26	27.4				
			2007	40	46	14	2	102	35	34.3				
Zolozolo CDSS	Northern: Mzuzu City [Urban]	1993	2010/11	55	63	65	80	263	120	45.6	17	12	4	0
			2009	58	77	56	42	233	99	42.5				
			2008	52	71	50	40	213	101	47.4				
			2007	38	66	42	30	176	83	47.2				
Mpamba CDSS	Northern: Nkhata Bay [Rural]	1998	2010/11	30	50	34	25	139	61	43.9	9	2	4	0
			2009	34	34	18	16	102	42	41.2				
			2008	35	39	14	19	107	41	38.3				
			2007	35	32	23	18	108	42	38.9				
Ezondweni CDSS	Northern: Mzimba N [Rural]	1998	2010/11	45	64	22	26	157	82	52.2	7	2	4	0
			2009	42	44	18	17	121	54	44.6				
			2008	43	44	17	13	117	58	49.6				
			2007	35	32	23	22	112	55	49.1				

* F: Form

- Forms and Classes

  All the schools have four classrooms and operate with one stream per form (1 class per Form). In Liwaladzi CDSS, there are only three Forms due to a shortage of teachers. In 2012, however, a teacher will be assigned and an F4 class will be started. Since the number of existing classrooms in the target CDSSs is four respectively, it was confirmed that an increase of classrooms and appropriate assignment of teachers are necessary in order to run the schools with two streams (two classes per Form) in rural area and three streams (three classes per Form) in urban area, which is the standard school operation system specified by the MoEST.

- Number of Students to be Accepted

  Each school accepts 50 students per form assigned by the Education Division Office according to their scores in the Primary School Leaving Certificate Examination (PSLCE) from schools in their charge called "Feeder Schools". Basically, the number of students depends on the number of streams. Except for Zolozolo CDSS where the number of students reaches 55 to 80, exceeding the number suitable for one class and thus causing an

overcrowded operation, the number of students at the other schools is corresponding to the number of streams basically.

- Movement of Students

  Some of the planned schools in this Project have a smaller number of F1 students than the capacity of 50 or increasingly smaller numbers of students in higher Forms as many students give up enrolling or leave school before completion. The major causes are economic factors, difficulties in commuting due to long distances, poor facility environments, the low quality of teachers, and marriage or pregnancy as for girls. Furthermore, in each school, many students repeat a year because of failing the Junior Certificate Examination (JCE) of which the certificate is necessary for the students to be promoted to F3. Therefore, there are far more F2 students than in other Forms. The Education Division Office has implemented a system in which, if any students leave school before completion, additional selection (second selection) of students from among those who did not pass the selection at the beginning of the Form is performed to admit a certain number of students in mid-course.

- Gender Disparity/ Student Ratio for Girls

  The average ratio of girl students in the planned six schools (at the time of the survey in February~March 2011) is 47.0%, with the lowest 37.5% at Liwaladzi CDSS in the Central East Region. In comparison with 2007, the situation of gender disparity has improved at four schools and worsened at two schools. Of the four schools with an improved ratio in the year 2010/11, Mkwichi CDSS in Lilongwe has the highest girl student ratio at 58.9%, after dropping from 2007 (45.3%) to last year (44%). Furthermore, Ezondweni CDSS in the Northern Region has a high girl student ratio of 52.2%, after also dropping from 2007 (49.1%) to last year (44.6%). The girl student ratio at Matenje CDSS improved to 48.9% in 2009 but dropped again to 43.8% in 2010. As can be seen from these examples, the girl student ratio shows diverse movements every academic year depending on the school. The number of girl students in any academic year is considered to be largely depending on the number of persons who want to enroll in secondary schools, the commuting conditions of individual students in the region, boarding conditions, and etc.

The following table shows the situations of school operation including the presence of boarding students, holding of Open Schools, number of students per teacher, and number of students per classroom:

Table 2-5 Overview of School Operation II

Site	Self-boarding					Open School					Cost Center[*2]	Students/ Teachers Ratio		Students/ Classroom[*3]	
	Boys	Girls	Total	Boarders (%)	School Facilities	F1	F2	F3	F4	Total		Students / Teachers	Studenys /Qualified		Including other uses
Mkwichi CDSS						121	87	58	111	377	○	8.3	8.8	43.8	21.9
Matenje CDSS[*1]	81	95	176	100.0	60	69	95	26	10	200	○	25.1	88.0	44.0	29.3
Liwaladzi CDSS												14.9	104.0	26.0	26.0
Zolozolo CDSS						100	90	79	97	366		15.5	21.9	65.8	65.8

Mpamba CDSS	4		4	2.9	0	60	65	30	27	182		15.4	69.5	34.8	34.8
Ezondweni CDSS	15	12	27	17.2	0							22.4	78.5	39.3	39.3

*1 The number of boarders includes Open School students.

*2 Cost Center: Accredited schools receiving a budget allocated by the Ministry of Finance.

*3 The "Including other uses" column shows the number of students per classroom for all the classrooms including those that are currently used for other purposes but can be used as classrooms again.

- Boarding

  Although CDSSs are supposed to admit students who graduated from their respective Feeder Schools within the commuting area (standard distance five kilometers), actually all the six planned schools have Feeder Schools in a range exceeding five kilometers. At schools in rural area, so-called "self-boarding" i.e. spontaneous boarding in temporary facilities on campus or facilities near school, is practiced because of difficulties in commuting over long distances. At the planned schools, self-boarding is practiced by 176 students (81 boys and 95 girls/including Open School students) at Matenje CDSS, 27 students (15 boys and 12 girls) at Ezondweni CDSS, and four students (boys) at Mpamba CDSS. Only at Matenje CDSS, 60 girl students live together in an on-campus facility consisting of old classrooms, where the students are forced to cook their own meals outdoors, resulting in a poor residential environment. Other students board at private houses near the schools, but self-boarding girl students encounter many problems such as violence and pregnancy which generally discourage parents from sending their children away to school. Under these situations, there are some schools such as Zolozol CDSS e.g. who recommend no self-bording for girls. There are many boarding students regardless of gender, and boarding facilities are required for both. However, for those who use on-campus facilities, the schools give priority to girl students, out of consideration for their security. The shortage of boarding facilities is one of the causes that discourage student enrollment as those who cannot board are forced to commute to school or give up schooling altogether..

- Open School

  Four schools offer Open School to provide educational opportunities to students who were not selected (but who passed the PSLCE), by making the most of the time after regular class hours. The number of students who attend Open Schools are: 377 at Mkwichi CDSS, 200 at Matenje CDSS, 366 at Zolozolo CDSS and 182 at Mpamba CDSS. Although Open Schools are only held for about half the time of the regular course, the classes are taught by the same teachers as the regular course for extra pay, which is covered by the school fees paid by the students. In the same way as for the regular course, students who have finished four years of schooling qualify to take the Malawi School Certificate Examination (MSCE) and are able to be promoted to higher education. While some people criticize the system, saying that the shortage of course hours results in poor performance by many students, others assert that these students study earnestly by their own will despite their difficult situations, and many of them have achieved outstanding academic results. At any rate, the existence of the Open Schools reveals the large enrollment demand and the shortage of capacity in the regions where it is provided.

- Assignment of Teachers

Although no criteria for assignment of teachers is available yet, MoEST defines the number of teachers required for teaching the current curriculum as 16 for two streams and 24 for three streams and even specifies eight teachers in the case of one class per form as a standard at the current CDSSs. Three of the planned schools, with seven teachers each, do not meet this standard. Furthermore, there is a marked difference in the number of qualified teachers between urban and rural area. The rate of qualified teachers (EMIS 2010) is 56% in urban area and 37% in rural area. Among the planned schools, whereas Mkwichi CDSS in Lilongwe has 20 qualified teachers out of 21 in total (95%) and Zolozolo CDSS in the suburbs of Mzuzu has 12 qualified teachers out of 17 in total (70%), the other four schools in rural area have one or two qualified teachers each (14% to 28%), showing an even lower rate of qualified teachers than the average rate for rural area nationwide. Therefore, the number of students per qualified teacher is 8.8 at Mkwichi CDSS, 21.9 at Zolozolo CDSS, and in the range of 69.5 (Mpamba CDSS) to 104 (Liwaladzi CDSS) at the other four schools.

The low rate of qualified teachers in schools in rural area mainly results from lower living conditions than in urban area. Almost all the surveyed schools responded that the provision of teachers' houses equipped with electrical equipment was important for employment and retention of qualified teachers. Although the Government has a policy objective of providing teachers' houses for 75% of teachers, the six planned schools in this cooperation project currently provide teachers' houses only for 21.6% of the current teachers. Of the planned schools, Mkwichi CDSS in Lilongwe has teachers' houses due to EU assistance, but Zolozolo CDSS located in a mountain area approximately six kilometers' distance from Mzuzu does not have any, for which the school, District Education Office, and Mzuzu city Planning Authority have made strong requests for teachers' houses. Since additional teachers will be needed when the number of classrooms is doubled in this Project, teachers' houses will also be needed to improve the conditions for assigning qualified teachers.

- Accredited Schools

  The planned schools include two schools that are already designated as Cost Centers (Mkwichi CDSS and Matenje CDSS). Of the CDSSs operated basically with school fees collected from the students, the schools accredited as Cost Centers, which are allocated direct operating costs (ORT i.e. other recurrent transactions) by the Ministry of Finance according to the annual expenditure plans drawn up by the schools, have a stable financial base. The budgets allocated by the Ministry of Finance amount to 2.5 million KW per year for Mkwichi CDSS in urban area and 1.2 million KW per year for Matenje CDSS. The planned schools in this Project will be accredited as Cost Centers by the Government.

(2) Commuting Areas, Enrollment Demand and Facility Demand

Secondary schools in Malawi select students from among applicants according to their performance scores in the PSLCE and allocate the selected students, starting from those with the highest scores, to 1) National Secondary Schools (National CSSs: boarding schools, 4 in the country), 2) District Secondary Schools (boarding or day schools), and 3) CDSS schools, in that order. Whereas District Secondary Schools collect students from an entire district taking into consideration the commuting area, CDSS schools collect students from a range of Feeder Schools that are assigned to them. Although MoEST specifies the standard commuting area range as 5

kilometers, many secondary schools actually have a wider range of Feeder Schools than this.

This survey attempted to analyze and verify the enrollment demand at the planned sites, assuming as commuting area both the current range of the Feeder Schools and the entire districts that can be deemed as commuting area in case boarding facilities are provided, in order to survey the situations for the commuting area and district-level enrollment.

1) Status of Enrollment in the Commuting Area

- Primary schools under the charge of the planned schools
  The surveyed schools are in charge of three to 14 primary schools and about 1,400 to 17,800 students each, varying greatly depending on the population and distribution of schools in the surrounding area. Due to the low internal efficiency of primary education (at the planned schools, the number of G8 students accounts for 32% of the number of G1 students), the number of students in the final Form is 147 to 891, accounting for only 4% to 10% of the total number of students (2009). Students who wish to be promoted to secondary school are selected from among those who successfully passed the PSLCE (the national average passing rate is 72.5% for 2002 to 2009). The number of students who successfully pass the PSLCE, which shows a national average annual increase of 4.6% for this period, is expected to further increase with improvements in internal efficiency that will be made in future.

- Ratio of Promotion to the Planned Schools
  The promotion ratio from feeder schools to the planned secondary schools is 4% to 31%, varying greatly depending on the region. However, all the promotion ratio remain at a lower level than the national average of 36.2% (the number of F1 students in 2009/the number of G8 students in 2008).

- Commuting Areas
  MoEST specifies five kilometers as the standard range of the commuting area for the primary schools covered by the planned schools. However, none of the surveyed schools is located within the maximum distance of 5 kilometers or less from the primary schools in their charge. Among their Feeder Schools, Matenje CDSS, Zolozolo CDSS, and Ezondweni CDSS cover some primary schools at a distance of 10 to 12 kilometers. According to a hearing survey conducted at the planned schools, admittance to secondary school is limited to students within a commutable range including those who can commute by means such as boarding. Thus, the need is high for construction of boarding facilities at present in order to provide access to more enrollment applicants.

Table 2-6 State of Commuting Areas at the Surveyed Schools

Site	Education Division /District	Distance	Average Commuting Distance	Number of Students at Primary Schools					Number of Students at Secondary Schools		Promotion Rate
				2007	2008	2009			2010/11		F1/G8
						Total	G1	G8	Total	F1	%

Mkwichi CDSS	Central West / Lilongwe City								175	36	4.0
Feeder Schools	10 schools[*1]	1-6km	3.2km	11,700	14,222	17,803	3,484	891			
Matenje CDSS	Central East / Salima								176	46	16.7
Feeder Schools [*3]	10 schools	0.2-11km	6.4km	5,202	7,106	7,336	2,075	275			
Liwaladzi CDSS	Central East / Nkhotakota								104	31	13.7
Feeder Schools	6 schools	0.5-6km	2.8km	3,016	3,888	3,976	754	227			
Zolozolo CDSS	Northern / Mzuzu City								263	55	9.1
Feeder Schools	6 schools	2-10km	3.3km	6,947	7,079	7,554	1,142	605			
Mpamba CDSS	Northern / Nkhata Bay								139	30	6.4
Feeder Schools	11 schools	2-12km	5.9km	5,638	5,783	5,835	1,035	467			
Ezondweni CDSS	Northern / Mzimba North								157	45	30.6
Feeder Schools	3 schools	2-7km	4.9km	1,242	1,363	1,410	264	147			

*1 Including three private schools with no data on the number of students

*2 Calculated as Σ (Distance x Number of Students) / Total number of students

*3 One school has lost the data on the number of students in 2007

2) Study of Enrollment Demand in Commuting Area

The enrollment demand in the commuting area was analyzed as follows: the number of students in the final form at the Feeder Schools in 2009 (the updated year for official statistics) was used as the basis to estimate the number of students who can be promoted to the surveyed schools and calculate the promotion demand (the number of students who successfully passed the PSLCE who can be promoted to public school) in 2015, the year assumed to be following the year of project completion. This data represents the maximum demand generated in case all the qualified students are promoted to secondary schools. This data was compared with the current and after-expansion numbers of acceptable students at the schools to evaluate the potential enrollment demand in the commuting areas (see the table below):

Table 2-7 Enrollment Demand in Commuting Area
(according to the current range of Feeder Schools)

Site	District	Feeder School G8 Students	Successful PSLCE Students	Promotion Demand from Feeder School to Public School		Scale of Enrollment Demand in Commuting Areas (2015)	
		2009	2015	2009	2015	F1 Acceptance Quota [*3]	Demand/ Acceptance Quota
			Ax72.5%[*1] x1.311[*2]	Percentage of Public School Students	Demand for Promotion to Public School	Planned (Actual)	Planned (Actual)
		=A	=B	=C	BxC=D	E	D/E
Mkwichi CDSS	Lilongwe C	891	847	73.50%	623	150 (50)	4.15 (12.46)
Matenje CDSS	Salima	275	261	93.44%	244	100 (50)	2.44 (4.88)
Liwaladzi CDSS	Nkhotakota	227	216	77.50%	167	100 (29)	1.67 (5.76)

Zolozolo CDSS	Mzuzu C	605	575	66.24%	381	150	(50)	2.54	(7.62)
Mpamba CDSS	Nkhata Bay	467	444	58.58%	260	100	(50)	2.60	(5.20)
Ezondweni CDSS	Mzimba N	147	140	86.51%	121	100	(50)	1.21	(2.42)

*1 2002-2009 PSLCE national average passing rate: 72.5%

*2 2002-2009 average increase in the number of successful PSLCE students : 4.61%

*3 According to the MoEST-specified standard scale (two streams in rural area and three streams in urban area) and the current selection criteria (50 students per stream).

From the estimation results, the following were found:

- Unless the current acceptance quota is expanded, secondary school promotion demand in the commuting areas of the schools in 2015 will be 2.4 times (Ezondweni CDSS) to 12.5 times (Mkwichi CDSS) higher than the acceptance quota. Of the students who successfully passed the PSLCE, the percentage of students who can be promoted to secondary schools will be only 41% at most and 8% at Mkwichi CDSS.
- Even if the facilities are expanded to the standard scale in this Project (three streams in urban area and two streams in rural area) according to the MoEST standard, secondary school promotion demand in 2015 will be 1.2 times (Ezondweni CDSS) to 4.2 times (Mkwichi CDSS) higher than the acceptance quota. Therefore, the schools have sufficient enrollment demand in their commuting areas.

In this section, the current range of the feeder schools was assumed as the commuting area. However, from time to time each District Education Office reviews the Feeder Schools covered by the secondary schools according to the scale of their facilities. In addition, the construction of hostels will enable commuting from more remote primary schools. Therefore, the estimated enrollment demand is expected to further increase if the construction of facilities expands the acceptance capacity.

3) Study of Demand for Classroom Construction Based on Enrollment Demand in Commuting Area

Based on the above-estimated promotion demand for the planned schools in the commuting areas after the project completion, the facility (classroom) construction demand was studied in view of the state of the existing facilities. As a result of this analysis, the number of required classrooms turned out to be 8 to 56 per site, confirming the necessity of increasing the number of classrooms. Mkwichi CDSS in Lilongwe, in particular, needs 56 classrooms, an exceptional number compared with the others. Zolozolo CDSS, Matenje CDSS, and Mpamba CDSS need 20 classrooms or more each, also demonstrating the large demand for classroom construction.

Table 2-8 Classroom Construction Demand

Site	District	Assumed Promotion Demand 2015	F1 Students to be Accepted		Required Classrooms *1		Available Classrooms *2		Class room Shortfall
			Planned	Actual	F1	All Forms	Used as Class rooms	Used for Other Purposes	
Mkwichi CDSS	Lilongwe C	623	150	(50)	13	62	4	2	56

Matenje CDSS	Salima	244	100	(50)	5	24	2	2	20
Liwaladzi CDSS	Nkhotakota	167	100	(29)	4	17	4	0	13
Zolozolo CDSS	Mzuzu C	381	150	(50)	8	38	4	2	32
Mpamba CDSS	Nkhata Bay	260	100	(50)	6	26	4	0	22
Ezondweni CDSS	Mzimba N	121	100	(50)	3	12	4	0	8

*1 Calculated based on classroom capacity of 40 as standard and 50 as maximum, the number of classrooms needed for F1 as [Assumed promotion demand]/50 students, and the total number of required classrooms as [Assumed promotion demand]/40 students.

*2 The number of available classrooms includes those originally built as classrooms that are currently used for other purposes but can be used as classrooms again after the completion of this Project.

4) Study of district-level enrollment demand

As indexes representing the state of secondary education enrollment in the surveyed districts, the district-level total enrollment ratio and secondary school promotion ratio were estimated from the collected data. The total enrollment ratio in the educational statistics comes from the official public estimates of the National Statistical Office of Malawi based on the national census conducted in 1998. To reflect more up-to-date information, this estimation uses the population by district and age bracket obtained in the national census conducted in 2008.

Table 2-9 Enrollment Demand Indexes of Target Districts

Education Division	Population in Secondary Education Age Bracket (14-17 years old)				Number of Secondary School Students in 2009			Std 8	Total Second-ary School Enroll-ment Ratio in 2009	Std.8 to F1
Administrative District Education District	2008 Census	1998 Census	Increase Rate per Year	2009 Estimated Population	F1-F4 Students	F1 Students	New Students	Students in 2008		Promotion Ratio in 2009
Northern:	154,751	115,867	1.029	159,295	46,617	13,256	13,203	45,402	29.3%	29.1%
	(78,092)	(58,900)	(1.029)	(80,326)	(20,792)	(6,111)	(6,086)	(20,286)	(25.9%)	(30.0%)
Chitipa	17,452	12,687	1.032	18,017	4,973	1,602	1,599	5,967	27.6%	26.8%
Nkhata Bay	19,837	15,426	1.025	20,342	5,475	1,700	1,686	6,477	26.9%	26.0%
Rumphi	15,964	11,853	1.030	16,446	7,270	1,828	1,824	5,017	44.2%	36.4%
Mzimba	65,247	47,624	1.032	67,334	16,698	5,018	4,994	18,057	24.8%	27.7%
Mzimba North					8,189	2,549	2,540	8,571		
Mzimba South					8,509	2,469	2,454	9,486		
Mzuzu City	12,189	8,220	1.040	12,679	6,806	1,550	1,549	3,467	53.7%	44.7%
Central East:	179,976	134,958	1.029	185,232	35,462	10,228	10,062	30,419	19.1%	33.1%
	(90,091)	(66,726)	(1.030)	(92,837)	(15,364)	(4,766)	(4,655)	(13,835)	(16.6%)	(33.7%)
Nkhotakota	25,557	19,840	1.026	26,212	6,023	1,686	1,659	4,437	23.0%	37.4%
Salima	28,244	20,471	1.033	29,168	4,527	1,249	1,229	3,416	15.5%	36.0%
Central West:	297,839	219,900	1.031	307,013	61,451	16,838	16,696	38,806	20.0%	43.0%
	(149,775)	(112,361)	(1.029)	(154,142)	(27,779)	(7,819)	(7,751)	(17,802)	(18.0%)	(43.5%)
Lilongwe Rural	105,055	74,930	1.034	108,666	17,498	5,010	4,958	13,259	16.1%	37.4%
Lilongwe Rural East					6,953	2,081	2,048	5,827		
Lilongwe Rural West					10,545	2,929	2,910	7,432		
Lilongwe City	55,149	42,443	1.027	56,612	14,185	3,436	3,416	7,292	25.1%	46.9%
Entire Country	1,112,580	894,002	1.022	1,137,183	243,838	67,680	67,062	186,974	21.4%	35.9%
	(557,597)	(452,135)	(1.021)	(569,411)	(107,844)	(31,391)	(31,025)	(83,186)	(18.9%)	(37.7%)

Note: The figures in brackets in the lower columns indicate the number of girls.

From the estimation results, the following were found:

- The total secondary school enrollment ratio is lower than the target values in the overall development plan (NESP 2008-2017: 30.5% by 2017) in all the surveyed regions except for the two Northern Regions (Mzuzu City and Rumphi District), revealing a demand for expansion of the capacity of secondary education facilities. In particular, half of the surveyed schools, in response to strong demand from the local community, provide Open Schools to compensate for insufficient enrollment opportunities, suggesting that there is sufficient enrollment demand. The high enrollment ratio in Rumphi District is considered to be partly due to the fact that private schools have been developed and more than half of the students go to the private schools.

- The promotion ratio from the final form at primary school to secondary school remains at around 30% except in urban area. Due to insufficient capacity, many students cannot obtain the opportunity to be promoted to secondary school.

- The promotion ratio for girl students is slightly higher than those for boy students in the Northern, Central East, and Central West Education Divisions covered by this Project. This is because these are the ratio of students who enrolled in secondary school to the students who were in the final form of primary school (Std.8). The ratio of enrolled girl students to enrolled boy students is low at approximately 86%. The gross enrollment ratio for girl students is 2 to 3.4 points lower than the boy-girl average in all of the Education Divisions, and the school leaving ratio for girl students (8.3% in the Northern Region, 8.6% in the Central East Region, and 6.5% in the Central West Region) is nearly 3% higher than for boy students. A hearing survey conducted at the schools revealed that long-distance commuting, pregnancy and early marriage, household work, etc. are the major causes of girl students leaving school before completion. Many of the schools responded that the construction of boarding facilities is indispensable to allow girl students to continue their schooling by preventing long-distance commuting and avoiding danger to and from school.

(3) Result of Evaluation of Planned Sites in the Project

As a result of the above studies, it will be necessary to construct additional classrooms at all of the six planned sites with one stream for four forms in order to meet the MoEST-specified condition of two streams in eight classrooms in rural area and three streams in 12 classrooms in urban area. It was confirmed that there is sufficient enrollment demand even if the current number of classrooms is increased to the level needed to provide two to three streams. Additionally, it will be necessary to construct hostels at five sites in view of the enrollment status except for Mkwichi CDSS in Lilongwe City as those schools are in charge of schools with the commuting area exceeding 10 kilometers in the surrounding rural area. If such facilities are constructed, the enrollment demand in a broader area will be met.

(4) Components and Scale of the Project

The components and scale of the Project should be planned based on the above evaluation.

1) Planned Number of Classrooms

The plan is to construct eight classrooms in rural area to provide two-stream operation (two

classes per form x four forms) and 12 classrooms in urban area to provide three-stream operation (three classes per form x four forms).

The planned number of classrooms is based on the premise of using the existing (usable) classrooms and the classrooms currently used for other purposes which are to be used as classrooms again. The schools in rural area (four sites) will have four existing classrooms and four additional classrooms whereas the schools in urban area (two sites) will have six existing classrooms and six additional classrooms.

2) Laboratories

Since physical science and biology are both compulsory subjects in secondary education and the Malawi School Certificate Examination (MSCE) taken at the end of the 4th form includes tests in experiment skills, laboratories are required for implementation of the curriculum. This plan studies the construction of laboratories (i.e. physical science and biology laboratories) based on the curriculum as follows:

<Periods per week according to the curriculum>

Secondary education in Malawi is provided basically for five days a week, nine periods per day (one period = 40 minutes), and 45 periods per week. In the curriculum, both physical science and biology are taught for 4 periods per week each in junior secondary education F1 and F2 and for five periods per week each in senior secondary education F3 and F4. Therefore, total period for all the forms would be: 4 + 4 + 5 + 5 = 18 periods per week. The regulations specify that physical science lessons are taught for 18 periods per week in total for all forms and biology lessons are also taught for 18 periods per week in total for all forms.

<Operation rate for two laboratories and two streams>

If physical science and biology are taught in their respective laboratories, the calculation will be as follows: 18 periods per week in total for all forms x two classes per form/45 periods per week and room x 100% = 36/45 x 100% = Operation ratio of 80%. This operation rate for the laboratories represents a vacancy of one or two periods per day, which is not sufficient for making the necessary preparations before and after experiments. However, assuming that classrooms are sufficient for teaching about 40% of science classes, the usage time of the laboratories for the second subject will be 21.6 periods (18 periods per week in total for all forms x two classes per form x 0.6), and it will be possible to allocate the available time in the laboratories to the timetable for all the forms according to the syllabus.

<Operation rate for one laboratory and two streams>

The total class time for 36 periods of physical science (18 periods per week in total for all forms x two classes per form) and 36 periods of biology (same calculation as above) adds up to a total class time of 72 periods. The operation rate will be 160%, which means one laboratory will not be sufficient for sharing.

Even if classrooms are used for teaching about 40% of science classes in order to reduce the number of hours of use of the laboratory, the experiment time for the two subjects will be 43.2 periods per week (18 periods per week in total for all forms x two classes per form x two subjects

x 0.6), and the operation rate will be 96%. In this case as well, sufficient preparation time cannot be ensured before and after experiment classes, and it will be impossible to adjust the timetable for all the forms allowing for teaching continuous classes according to the syllabus.

<Operation rate for three streams>

At urban schools with three classes per form, two laboratories are basically assumed in the same way as for other schools with two classes per form. In this case, the class time for both physical science and biology is 54 periods per week (18 periods per week in total for all forms x three classes per form), and the operation rate will be 120%. However, the number of periods when these two subjects can be taught in classrooms is excluded from the class time in the laboratories. In this case, the class time for each subject is 32.4 periods per week (54 periods per week x 0.6), putting the operation rate in the range of 70% to 75% and generating a vacancy of two to three periods per day, so it will be possible to allocate the available time in the laboratories to the timetable.

Based on the above considerations, both 2 streams at school and 3 streams at school should have two laboratories each (physical science laboratory and biology laboratory). Zolozolo CDSS should be excluded from the target components as the laboratory block is under construction by USAID (scheduled for completion by the end of 2011).

3) Administration Offices/Libraries

Priority is given to the construction of administration offices and libraries, which are indispensable for the school operation. The administration block and library block in the Support to Secondary Education Project (Education V) by the African Development Bank are about to be established as the standard design/specification in secondary education facility construction. In this Project, therefore, this design/specification should be used as the basis for planning a block that includes the principal's room, deputy principal's room, administration office, staffroom, library and storeroom. At Ezondweni CDSS, only the administration office should be constructed as there is already a library in the existing facilities. With regard to the scale of staffrooms, two types should be available-: one conforming with three streams at schools in urban area (with 24 teachers) and another with two streams at schools in rural area (with 16 teachers).

4) Hostels

As described earlier, the current situation regarding the student hostels is very inadequate that some of the dilapidated classrooms are used as lodgings and some students have to seek boarding in private houses around the schools ("self-boarding"), forcing the students to take measures voluntarily. Due to current state of the school facilities, many students outside the standard commuting area are still unable to attend school. Although there is a high demand for construction of hostels for both boys and girls in rural area, priority should be given to the construction of girls' hostels in accordance with Malawi's priority policy issues. Note that Zolozolo CDSS is listed as an urban school as it is located in the administrative area of Mzuzu City, but in fact it is located in remote suburbs far from the built-up area of Mzuzu and the commuting area is in the surrounding rural area which covers a distance of 10 kilometers. Since

the Planning Authority and Education Division Office of Mzuzu have requested secondary school facilities equipped with a hostel in order to meet the enrollment demand from the target area, it is considered appropriate to provide aid to Zolozolo CDSS as a school in rural area.

The hostel construction promoted by MoEST requires the construction of houses for housemasters or janitors. However, since this Project assumes that teachers who live on campus will serve as housemasters, no separate housing will be constructed for housemasters. The accommodation capacity of the hostels, in compliance with the standard design example of the existing hostels constructed by MoEST, should be 112 persons (56 persons x two blocks), the same as in CDSS Phase 1. The area scales and specification plans should be reviewed as required.

5) Multipurpose Halls/Kitchens

At the sites where hostels are planned, multipurpose halls and kitchen facilities should be included in the plan. Multipurpose halls are usually used as dining halls and are sometimes used for student meetings, recreation and school events. They are also currently used for school administration gatherings, etc. with community participation and rented to outside parties at a charge, which is appropriated to school operating expenses. Regarding the construction of multipurpose halls/dining halls and kitchen facilities, standardization of the design specifications is promoted in the Education Sector Support Project 1 (ESSP 1, 2006-2011) by the World Bank. Therefore, this Project should include the necessary review according to CDSS Phase 1 which was planned based on these design specifications.

6) Teachers' Houses

Although the nationwide ratio of qualified secondary school teachers is 43%, that of teachers in urban area is 57% and that of teachers in rural area, to which 70% of all secondary school teachers are assigned, is as low as 37%. At present, there is a high probability of qualified teachers who are newly employed leaving their jobs due to problems such as assignment destinations and remuneration problems, and the number of teachers who resign every year reaches 5.87%[1] in total. One of the major causes for this is the shortage of teachers' houses. At present, teachers' houses are required even in urban area because of the commuting environment and financial problems regarding housing expenses. Particularly in rural area, teachers' houses with electricity are required for assignment and retention of qualified teachers for the sake of operation of the schools.

The Government is pursuing an increase in qualified teachers, upgrading of underqualified teachers, and construction of teachers' houses to enhance the incentive of teachers in remote areas as policy issues, thus aiming to provide 75% of houses to the total number of teachers. However, the CDSSs constructed by the communities are not equipped with such facilities due to financial difficulties.

[1] EMIS 2010/A turnover rate excluding cases of job relocation from teaching to administrative posts or from teaching at secondary school to teaching at other educational levels

The number of existing teachers' houses at the planned schools in this Project is two to four at four schools, one at Mkwichi CDSS in Lilongwe in urban area (constructed by EU assistance), and none at Zolozolo CDSS in the suburbs of Mzuzu, to which a strong request for construction has been made. In this Project, since two-stream operation (eight classes in four forms) at four schools and three-stream operation (12 classes in four forms) at two schools will be implemented, three to nine additional teachers will be required at each school.

Although it is highly required to construct teachers' houses in order to assign additional qualified teachers to the schools, plans should be made to construct as few houses as possible to accommodate the additional staff due to limitations on the budget. Therefore, although the teachers' houses are basically intended for the use by teachers with families, the number of new teachers to be assigned should be covered on the assumption that one house can accommodate up to three single persons. The number of planned facilities, in compliance with CDSS Phase 1 in which two houses were constructed as one block for the sake of cost efficiency, should be two blocks (four houses) at four schools with few qualified teachers and one block (two houses) at Zolozolo CDSS as the current number of qualified teachers seems to indicate that there are certain conditions which enable commuting. Mkwichi CDSS in Lilongwe is out of the scope of this Project as its priority for construction of teachers' houses is lower than the other schools. The table below shows the usage status by family use and single teachers use corresponding to the number of planned houses:

Table 2-10 Usage Status and Number of Teachers' Houses to be Constructed

	Number of Teachers				Number of Teachers' Houses and Usage Status						Total		Remarks
Site name	Current	Qualified	Needed	Increase	Existing		+1 house	+2 house	+3 house	+4 house	Increase in Occupant	Planned Houses	f: Family, s: Single
Mkwichi CDSS	21	20	24	**3**	1	f(1)							Out of the scope of this Project
Matenje CDSS	7	2	16	**9**	3	f(3)	f(1)	s(3)	s(3)	s(2)	**9**	**4**	4 houses for 1 family and 8 single persons
Liwaladzi CDSS	7	1	16	**9**	2	f(2)	f(1)	s(3)	s(3)	s(2)	**9**	**4**	4 houses for 1 family and 8 single persons
Zolozolo CDSS	17	12	24	**7**	0		f(1)	s(3)			**4**	**2**	2 houses in consideration of living and commuting conditions in the suburbs of the city
Mpamba CDSS	9	2	16	**7**	2	f(2)	f(1)	f(1)	s(3)	s(2)	**7**	**4**	4 houses for 2 families and 5 single persons
Ezondweni CDSS	7	1	16	**9**	4	f(4)	f(1)	s(3)	s(3)	s(2)	**9**	**4**	4 houses for 1 family and 8 single persons
Total	68	38	112	**44**	12						**38**	**18**	

Note that priority for the construction of teachers' houses should be set as the second order of priority "B", lower than for educational facilities. The final number of houses to be constructed should be adjusted according to the required to meet the fund in the project costs at the implementation stage.

Based on the above studies, the facility components and scales that need to be expanded at the six planned sites should be summarized as follows:

Table 2-11 Facility Components to be Expanded at the Planned Sites

Site	District/Area Classification	Classroom			Laboratory		Principal's Room /Staff Room		Laboratory /Storeroom		Dining Hall/ Kitchen		Hostel		Teachers' Houses		
		Existing	Added	Total	Existing	New	Existing	New	Existing	New	Existing	New	Existing	New	Existing	Added	Total
Mkwichi CDSS /Central West Division	Lilongwe U Urban area	4+(2)	6	12	×	○	To be used as class room ×→	○	To be used as class room ×→	○	×	×	×	×	1	-	1
Matenje CDSS /Central East Division	Salima Rural area	4	4	8	×	○	×	○	×	○	×	○	Temporary ×→	○	3	4	7
Liwalazi CDSS /Central eastern division	Nkhotakota Rural area	4	4	8	×	○	×	○	×	○	×	○	×	○	2	4	6
Zolozolo CDSS /Northern Division	Mzuzuz Suburban	4+(2)	6	12	○	-	To be used as class room ×→	○	To be used as class room ×→	○	×	○	×	○	0	2	2
Mpamba CDSS /Northern Division	Nkhata Bay Rural area	4	4	8	×	○	×	○	×	○	×	○	×	○	2	4	6
Ezondweni CDSS /Northern Division	Mzimbz N Rural area	4	4	8	×	○	×	○	○	-	×	○	×	○	4	4	8

Note: The figures in brackets for the existing classroomes indicate the number of facilities that are currently used for other purposes. These numbers are included in the number of classrooms on the assumption that they will be used as classrooms again.

(4) Outdoor Facilities and Infrastructure Construction

1) Boundary Fences of the Premises

For Mkwichi CDSS and Zolozolo CDSS, the construction of a fence around the premises should be included in the scope of this Project with secondary priority order "B" as it is specified in the Town and Country Planning Standard and Guidelines. For the other four sites with no specifications, the construction of a fence around the premises should be excluded from this Project as the need for security and safety is low in view of the surrounding environment, and only a boundary wall around the hostels on the premises should be constructed for safety.

2) Infrastructure Construction and Other Work Performed at the Expense of the Malawian Side

Based on the site survey results, the provision of electricity (two sites that already have electricity and four new sites that will have electricity) and public water (two sites: Mkwichi CDSS and Zolozolo CDSS) should be performed at the expense of the Malawian side. For the four sites without public water supply, boreholes should be constructed based on the groundwater survey, at the expense of the Japanese side.

(5) Equipment Components

1) Supply of Educational Furniture

Educational furniture should be supplied for the planned facility components in the Project. The furniture for teachers' houses should be procured at the expense of individual teachers. The grade setting should conform to that of CDSS Phase 1 which was established based on the AfDB's Support to Secondry Education Project (EDUCATION IV and V) and other similar projects.

2) Supply of Teaching Materials for Experiments

The minimum amount of basic teaching materials and equipment for science experiments required for the implementation of the current secondary education curriculum and syllabus in physical science and biology will be procured in this Project.

No consumables such as textbooks, sports equipment, chemicals nor personal computers should be included in the Project.

A list of components to be supplied to each of the planned schools is shown on the next page.

Table 2-12 List of Components to be Supplied to Each of the Planned Schools

Planned Schools		Building								Equipment		External Works			Infrastructures		
		Classroom 2Rooms /Block	Laboratory 2Rooms /Block	Administration		Toilet	Girls' Hostel 56person /Block	Dining/Hall /Kitchen	Staff Houses 2houses /Block	Educational Furniture	Laboratory Equipment	Boundary Fence	Sports Ground	Planting	Electricity Extension	Public Water Extension	Borehole
				with Library	without Library												
Mkwichi CDSS /CWED	Priority	A	A	A	-	A	-	-	-	A	A	B	GoM	GoM	GoM*	GoM	-
	(No. of Blocks)	(3)	(1)	(1)	-	(1)	-	-	-								
Matenje CDSS /CEED	Priority	A	A	A	-	A	A	A	B	A	A	GoM	GoM	GoM	GoM	-	J
	(No. of Blocks)	(2)	(1)	(1)	-	(5)	(2)	(1)	(2)								
Liwaladzi CDSS /CEED	Priority	A	A	A	-	A	A	A	B	A	A	GoM	GoM	GoM	GoM	-	J
	(No. of Blocks)	(2)	(1)	(1)	-	(5)	(2)	(1)	(2)								
Zolozolo CDSS /NED	Priority	A	-	A	-	A	A	A	B	A	A	B	GoM	GoM	GoM*	GoM	-
	(No. of Blocks)	(3)	-	(1)	-	(5)	(2)	(1)	(1)								
Mpamba CDSS /NED	Priority	A	A	A	-	A	A	A	B	A	A	GoM	GoM	GoM	GoM	-	J
	(No. of Blocks)	(2)	(1)	(1)	-	(5)	(2)	(1)	(2)								
Ezondweni CDSS /NED	Priority	A	A	-	A	A	A	A	B	A	A	GoM	GoM	GoM	GoM	-	J
	(No. of Blocks)	(2)	(1)	-	(1)	(5)	(2)	(1)	(2)								

Remarks:
A : Highest priority as essential facility.
B : Second highest priority as necessary facility.
GoM : To be covered by Malawian Government
J : To be covered by Japanese side
* : Extension of additional electric capacity

2-2-2-2 Facility Plan

The Ministry of Education, Science and Technology (MoEST) has promoted the construction of many secondary education facilities, including the aid projects of other donors, such as the construction of 20 secondary schools in the Secondary Education Project (SEP) by the World Bank, facility improvement of four national secondary schools by the Educational Sector Support Project (ESSP), and facility improvement of 18 secondary schools by the AfDB Support to Secondary Education Project (Education V). Specifically, all the facilities improved in the World Bank project and AfDB project are common facilities except that the former includes hostels and halls/kitchens and the latter does not include such facilities. As for the facility design specifications, the World Bank and AfDB projects are based on approximately common designs except for different bricks and blocks (SSBs) used as the external wall material. Although no standard designs or specifications have been formally established by MoEST yet, the designs and specifications used in these past projects are beginning to be established as the standard. Therefore, hereinafter they will be called the standard design in this Project. The overview is shown below:

- The facility components include administration offices, library, classrooms, science laboratories, home economics laboratory, multipurpose halls/kitchens, hostels, teachers' houses, and etc. At the national and district secondary schools, all of these components are available.
- All the facilities are one-storied, divided-roof buildings with rooms grouped into blocks according to use.
- The floor plan is designed to allow people to go through a balcony access type corridor or pilotis-style open space to enter the rooms. Blocks are connected with covered access corridors.
- The library has at least twice the area of a classroom and consists of a reading room, stock room, and administration office.
- Basically, two laboratories are constructed: one for physical science and the other for biology. The facilities for experiments i.e. water supply, drainage and gas facilities are provided on the laboratory tables for use by students.
- The hostel has bunk beds with toilets, shower rooms, and laundry rooms in the hostel block.
- The hostel is accompanied by a hall that usually serves as the dining hall, and a kitchen. The hall and kitchen are grouped into one block.
- Teachers' houses consist of three bedrooms, living room, dining room, kitchen, toilet, and shower room.
- As measures for the disabled, slopes are provided on all the passages including external facilities and to all the entrances, eliminating level differences in the plan.

- External facilities such as a gate and wall, flag pole, planting, and slope protection should be provided around the school building, creating a good educational environment in harmony with the building.

This Project should comply with CDSS Phase 1, which was established based on the standard designs and specifications of many educational facilities that have already been constructed in Malawi and reviewed with necessary considerations. The construction plan should also be developed in consideration of elements with which cost reduction is possible. Additionally, the relevant criteria should be met based on the results of discussions with the organizations concerned of the Government of Malawi.

(1) Layout Plan

The facility layout of the premises should be appropriately planned in consideration of the form of the premises, existing facilities, surrounding environment, etc. of each site in accordance with the principles shown below:

- The facilities should be laid out basically in an east-west direction so that strong sunlight in the morning and evening does not shine directly into the rooms.
- The facility layout should be planned so as to allow integral linkage with the existing facilities and ensure both the functional environment required for educational facilities and the living environment required for hostels and teachers' houses.
- The facility layout and land utilization plan should be developed in consideration of possible future expansion of the facilities.
- Since a borehole will be dug on the premises, the layout plan should allow the toilet sewerage facilities to be constructed at a necessary and appropriate distance from the borehole.

(2) Floor Plan

The floor plan should be a standard design based on a masonry structure made of SSBs, with span arrangements matching the modules. The rooms should be on an appropriate scale to ensure the minimum required functions after installing the furniture corresponding to the activities to be carried out in the rooms.

Classrooms

For a capacity of 40 students per classroom, the AfDB Support to Secondary Education Project specifies a classroom area of 89.10 m2 (10.80 m × 8.25 m), providing ample space of 2.23 m2 per student in the design. This Project is aimed at creating an efficient floor plan while maintaining an appropriate area by reducing the area of each classroom to 64.26 m2 (8.40 m × 7.65 m). With the classroom area in this Project (64.26 m2), 56 students can be accommodated in one classroom at the maximum when desks are lined up in units of two rows.

Table 2-13 Comparison of Classroom Areas

	AfDB Support to Secondary Education Project	General Grant Aid for Secondary School Attached to Domasi College of Education	This Project
Classroom area	89.10m2 (10.80m×8.25m)	75.00m2 (10.00m×7.50m)	64.26m2 (8.40m×7.65m)
Capacity (persons)	40	40	40
Area per person	2.23 m2	1.88 m2	1.61m2

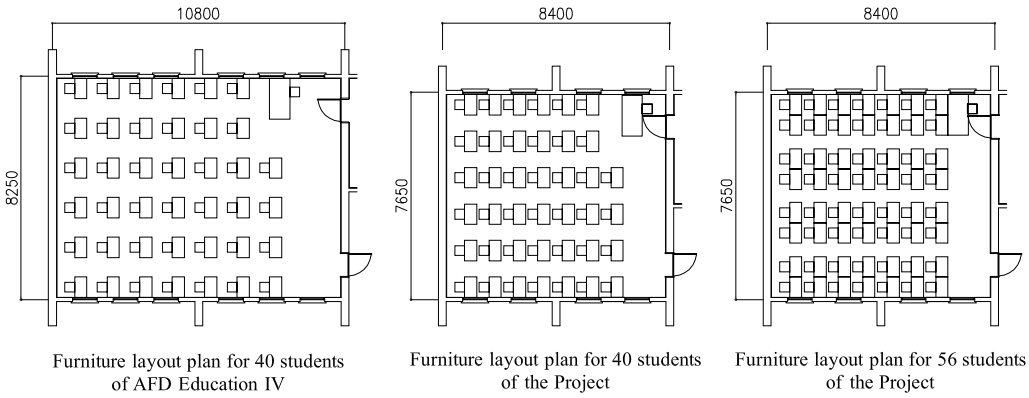


Figure 2-1 Furniture Layout of Classrooms

Administration/Library Block

The floor plan should conform to the administration/library block in CDSS Phase 1. However, all the staffrooms in CDSS Phase 1 are designed to accommodate 16 persons (A-type). In this Project, therefore, the staffrooms at Mkwichi CDSS and Zolozolo CDSS should be "C-type administration/library blocks" that can accommodate 24 teachers. At Ezondweni CDSS, since the existing library can continue to be used, the plan should be for a "B-type administration block," designed by removing the library from the administration/library block in CDSS Phase 1.

Administration Block

The administration block should consist of the headmaster's room, deputy headmaster's room, accountant's room, staffroom and storeroom as the basic components. As described earlier, two types of staffrooms should be available: one accommodating 16 persons (A-type) and the other accommodating 24 persons (C-type).

Library Block

In the standard design for similar projects by AfDB, the library has an area of 138.60 m2 (16.80 m × 8.25 m), approximately twice that of the classrooms, and consists of (1) reception and administration space, (2) stock space, and (3) reading space. Although the number of books in stock varies depending on the existing schools, the libraries in this Project should have library functions limited to storing and lending of textbooks and reference materials, and have the minimum space for stocks and reading, in compliance with CDSS Phase 1. The library should have an area of 60.48 m2 (8.40 m × 7.20 m) in view of the layout of the bookshelves and

furniture.

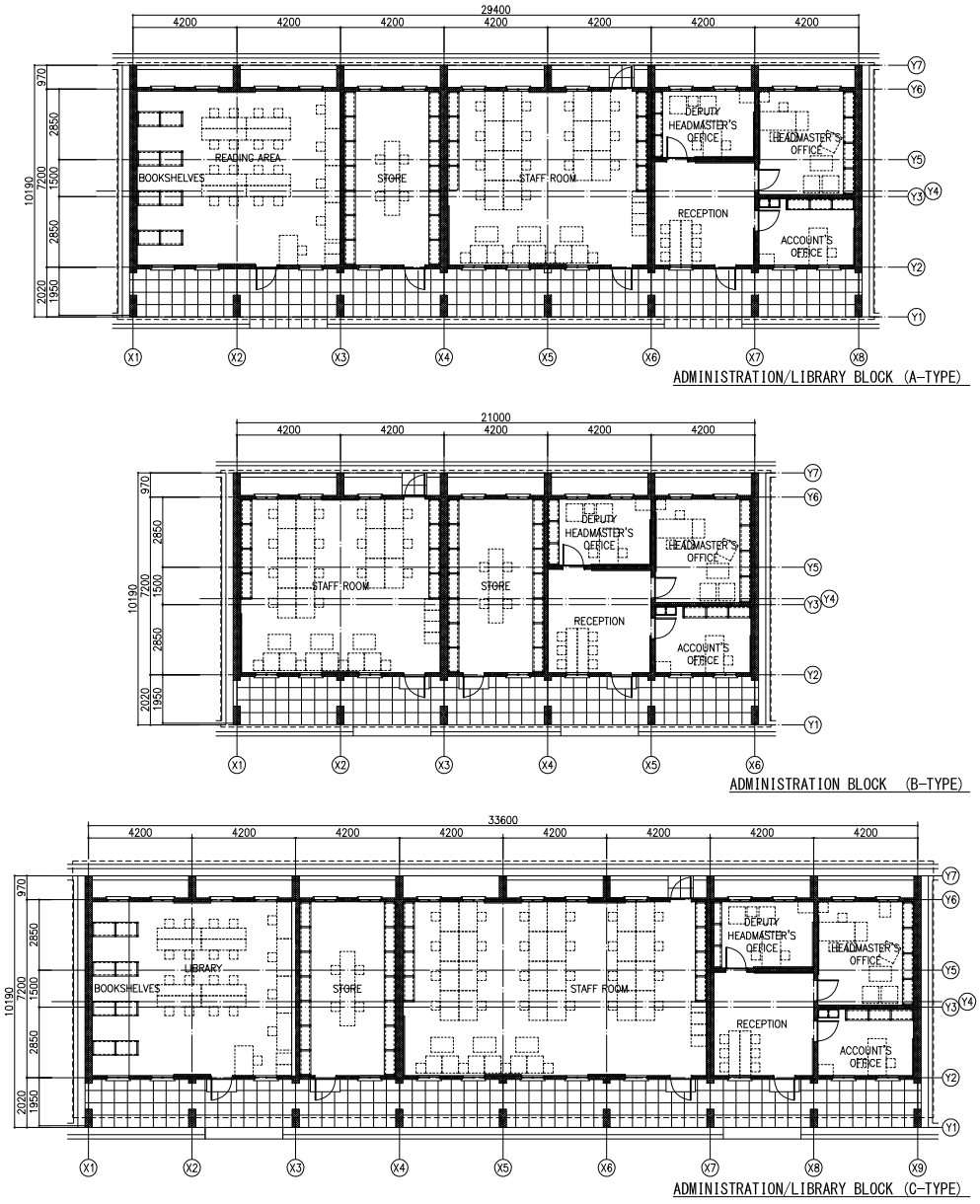


Figure 2-2 Administration/Library Block A-type, B-type and C-type

Laboratory Block

Based on the standard design, this block should be planned to accommodate two rooms-: a physical science laboratory and a biology laboratory. Both laboratories should be equipped with island-type laboratory tables, and each of them should have water supply, drainage and gas facilities to be used for experiments. In addition, each of the two laboratories should be equipped with a preparation room, storeroom and gas cylinder storage room, each of which provided with necessary workbenches and shelves as built-in furniture.

Toilet Block

Of the planned schools, only Mkwichi CDSS in Lilongwe City has flush toilets whereas all the others have pit latrines. This Project should construct flush toilets only at Mkwichi CDSS, and pit

latrines for the other schools to save water and reduce electricity costs.

In the standard design, all boy and girl toilets for students, toilets for teachers, and toilets for the disabled are planned as one block, constituting a relatively large toilet block. However, the chimney ventilation system does not function properly in such blocks, letting foul odor fill the toilet block. The maintenance and management of the toilet blocks is also in a poor state, probably because such an odor has an adverse effect on users' awareness. In contrast, the toilet blocks in schools constructed by the local community, such as the planned schools in this Project, were planned in a compact form with two to four stalls per block, performing good ventilation and emitting little odor. Learning from such community-based toilets and complying with CDSS Phase 1, this Project should construct multiple small toilet blocks, each consisting of four stalls as one unit for good ventilation. In order to provide one stall per classroom (including the existing classrooms), there should be two toilet blocks for girl students (eight stalls), two toilet blocks for boy students (four stalls + urinals), and two toilet blocks for teachers (one stall each for male and female teachers + two stalls for the disabled).

Hostel

In accordance with the standard design scale, one hostel should accommodate 56 students (4 students per room × 14 rooms) and there should be two blocks for 112 students. Although the hostels in CDSS Phase 1 are the open corridor access type, the hostels in this Project should be changed to the middle corridor type with 25% less area to reduce the construction costs. Furthermore, the toilets, which are ancillary facilities, should be changed to pit latrines in consideration of the local water supply, to save water and reduce electricity costs. The toilet and ablution facilities should be constructed as a separate block connected to the hostel block by a covered access corridor to ensure a good living and sanitary environment. Each of the hostel blocks should be surrounded by a boundary wall to ensure privacy and security.

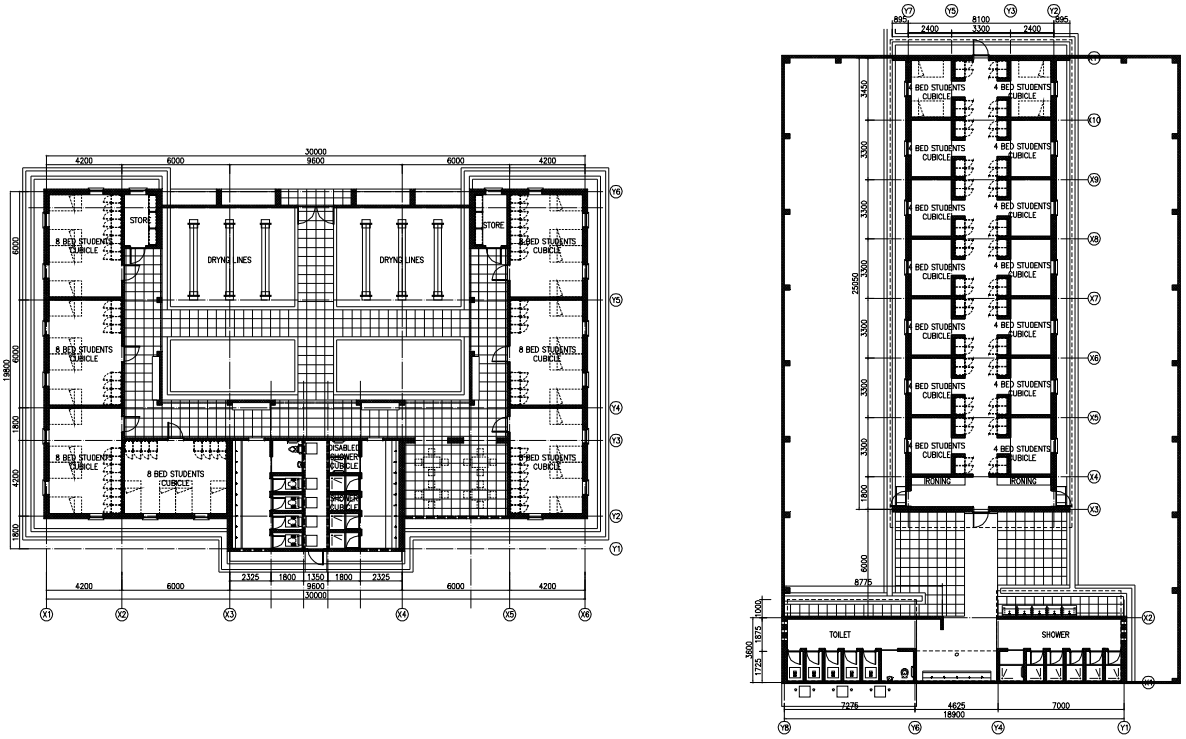


Figure 2-3 Comparison of Hostels in CDSS Phases 1 and 2

Multipurpose Hall/Kitchen Block

Hall

The hall should normally be used as the dining hall. On other occasions, it should be used for enrollment ceremonies, graduation ceremonies, meetings and recreation events for all the students, examinations and assemblies of the local community. In the same way as for CDSS Phase 1, the block should consist of a hall, stage and storeroom/changing room. The hall should have an area equivalent to that in a similar project by the World Bank which can accommodate 320 persons.

Kitchen

The kitchen, in compliance with CDSS Phase 1, should consist of kitchen space equipped with a wood-fueled boiler space, storerooms (2 rooms), serving space, washing place for students, and shop. The kitchen area should be 178.92 m2 (10.65 m × 16.80 m) to ensure the minimum required functions according to usage. This represents a 55% reduction from the 399.96 m2 (23.85 m × 16.77 m) in the standard design by the WB.

Teachers' Houses

Teachers' houses constructed by the MoEST consist of three bedrooms, a living room, dining room, kitchen, toilet, and ablution space. Teachers' houses constructed by the local community have three bedrooms as well. The teachers' houses in this Project should also have three

bedrooms with a scale, detail, and grade conforming with the above. Although the houses are generally planned as separate blocks, the houses in this Project should be constructed with two units as one block in pursuit of higher cost performances and construction efficiency. Toilets, based on teachers' houses constructed by the community, should be of the direct osmosis type constructed as a separate block for each house to facilitate maintenance and management.

Guard Station

A functional, basic guard station should be constructed beside the school gate.

The following table shows the details and room areas of facility by facility type based on the above plan:

Table 2-14 Details and Areas of Facility by Site (m^2)

Block name	Site Block area (m2)	Mkwichi CDSS	Matenje CDSS	Liwalazi CDSS	Zolozolo CDSS	Mpamba CDSS	Ezondweni CDSS
Classroom block	164.43	3	2	2	3	2	2
Administration/library block A-type	269.01	-	1	1	-	1	-
Administration block B-type	192.15	-	-	-	-	-	1
Administration/library block C-type	307.44	1	-	-	1	-	-
Laboratory block	291.06	1	1	1	-	1	1
Toilet block (boys)	18.00	-	2	2	2	2	2
Toilet block (girls)	18.00	-	2	2	2	2	2
Toilet block (teachers)	23.76	-	1	1	1	1	1
Toilet block (flush)	73.26	1	-	-	-	-	-
Hostel	202.91	-	2	2	2	2	2
Toilet block for hostel	60.01		2	2	2	2	2
Kitchen/hall block	617.40	-	1	1	1	1	1
Teachers' houses	209.44	-	2	2	1	2	2
Toilets for houses	5.76	-	4	4	2	4	4
Guard station	7.09	1			1		
Subtotal by site		1,172.14	2,569.85	2,569.85	2,267.78	2,569.85	2,492.99
Total of all sites							13,642.46

(3) Structure Plan

The structure plan should ensure that the structural strength and quality are based on the standard design and comply with CDSS Phase 1 with additional improvements.

Structural format

Main structure

In the standard design, the main structure should be a masonry structure made of bricks or SSBs, based on a commonly used construction method in the recipient country. This Project should use a similar structure using SSBs. The exterior walls should consist of an effective combination of one-layer and two-layer stacks with different wall thicknesses according to the standard design.

Depending on the wall length, a reinforcing wall should be installed to prevent collapse due to lateral pressure.

For kitchens and halls with a large wall surface, strength against lateral pressure should be enhanced by partial installation of reinforced concrete columns and efficient layout of reinforced concrete circumferential girders on the beams and the tops of SSB walls.

Foundation structure

In the standard design, a continuous foundation structure without any underground beams is used, and the load of the block walls is supported by a continuous bottom slab (60 cm wide) made of plain concrete. This Project should adopt a similar foundation form. However, continuous footing made of reinforced concrete should be used as the ground has relatively low bearing capacity. The foundation base level of the buildings should be DGL-90 cm according to the standard design.

Roof structure

Through a comparison of the meteorological data for the planned area and the wind pressure common in the recipient country, the cross-sectional dimensions of the wooden truss members were reduced. In the standard design, the wooden truss is fixed via the SSB block to the circumferential girder. In this Project, however, the opening height should be increased and the wooden truss should be directly fixed to the circumferential girder to enhance rigidity.

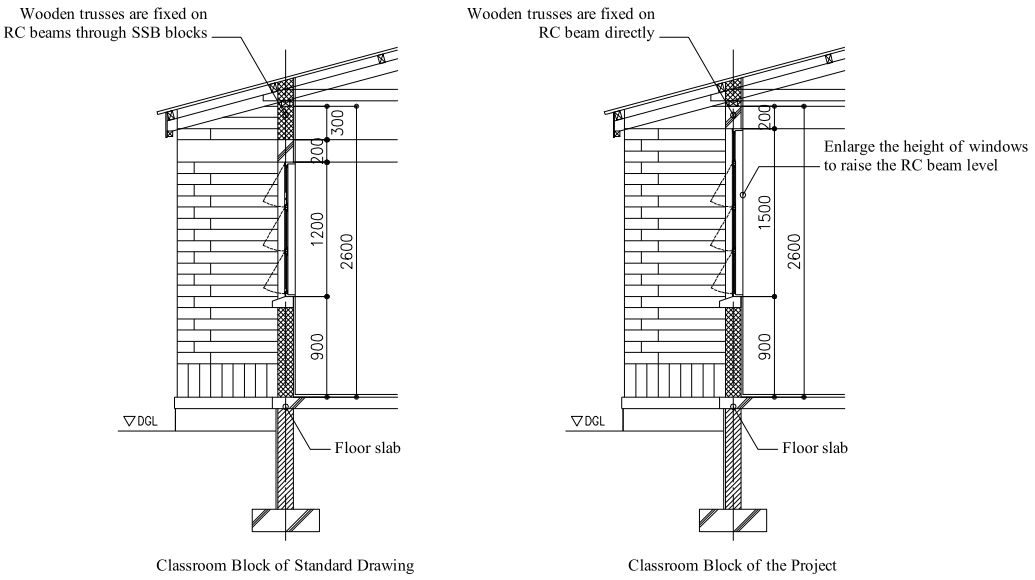


Figure 2-4 Comparison of Structural Section Plans

Additionally, the large-span roof frame of the kitchen/hall block in the standard design is a compound rafter made of laminated wood and steel tension members, which is not a commonly used specification in Malawi. Therefore, a steel truss that can be manufactured at a local factory should be used in this Project.

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, thesubgrade bearing capacity s hould be set at 50kN/m2 in the plan.

Wind load: Since Malawi is an inland country, no impact from storms such as cyclones is likely to be expected according to past meteorological data for the planned sites. In this Project, a reference wind speed of 21 m/sec and a wind pressure of 700 N/m2 should be adopted according to the recommended values of the Malawi Institute of Architects.

Earthquake load: The Great Rift Valley runs along part of the shore of Lake Malawi, where the occurrence of earthquakes has been recorded. However, no large seismic energy has been observed. For the facilities in this Project, therefore, a seismic story shear coefficient of Ci=0.08 is assumed in order to calculate the seismic horizontal force and compare it with the wind load horizontal force. As a result, it was confirmed that the wind load horizontal force exceeds the seismic horizontal force at all the facilities. Thus it was decided not to perform any structural analysis using the seismic horizontal force.

Structural materials

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

Concrete: According to the standard design, the design strengths should be 14N/mm2 for the foundations and 21N/mm2 for the underground beams, earth floor slabs, floor slabs, beams, and columns.

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/cm2)
- Round bar Grade 25 (25kN/cm2)

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/cm2）
- Bolt Grade 88（80kN/cm2）
- Anchor bolt Grade 43（43kN/cm2）

SSB： Should be made on site using machinery. The quality should meet Malawi Bureau of Standards (MBS) specifications. The mixing ratio of cement, sand

and soil should be changed depending on where the SSBs are to be used.

- General parts Volume ratio of cement : soil = 1:12; Compressive strength when dry = 2.5N/mm2 or higher
- Parts exposed to rainwater, etc. Volume ratio of cement : sand : soil = 1:3:6; Compressive strength when dry = 3.5N/mm2 or higher

Concrete blocks: Should be made on site using machinery. The quality should meet MBS specifications. Structural concrete blocks should have an average compressive strength of 5.0N/mm2 and a minimum compressive strength of 4.0N/mm2.

Wooden trusses: Should be made of home-grown pine lumber or equivalent that meets MBS specifications. Truss beams should be made on site and fixed with metallic materials.

(4) Equipment Plan

Electrical Equipment

Electrical power is currently supplied only to Mkwichi CDSS and Zolozolo CDSS. Installation of additional power should be required for these two sites, and new electrical power should be supplied to the other four sites (Matenje CDSS, Liwaladzi CDSS, Mpamba CDSS and Ezondweni CDSS) from the electrical distribution network. In this Project, the electrical power required due to facility expansion should be supplied and independent low-voltage power input should be provided apart from the existing facilities.

Power Receiving/Transforming/Trunk Line Equipment

Sites to which electricity can be supplied from the electrical distribution network should receive low-voltage power (3-phase 4-wire 380 V) via transforming equipment. For the school facilities in this Project, the electricity from the existing high-voltage 11 kV electrical distribution network is transformed by a pole transformer to 3-phase 4-wire 380 V and fed to a feeder pillar independently installed on the premises. In case of extension from the high-voltage electrical distribution network, the laying of wires with installation of the pole transformer and meter should be covered at the expense of the Malawian side, and the wiring work after the transformer should be covered by this Project. For the teachers' houses, an independent electricity meter should be installed at each house. Thus after the wiring up to the transformer, installation of electricity meter on the exterior walls of the houses should be covered by the Malawian side.

The table below shows the electricity required for the expanded facilities:

Table 2-15 Electric Capacity by Site

	Electrical load for expanded facilities	Current 3ph [1]	Allowing for 20% growth[1]×1.2	Feeder pillar capacity
Mkwichi CDSS	41 Kva	59 A	70.8 A	100 A
Matenje CDSS	117 Kva	211 A	253.2 A	300 A
Liwalazi CDSS	117 Kva	211 A	253.2 A	300 A
Zolozolo CDSS	117 Kva	211 A	253.2 A	300 A

Mpamba CDSS	117 Kva	211 A	253.2 A	300 A
Ezondweni CDSS	113 Kva	204 A	244.8 A	250 A

Lighting Equipment

As in the standard design, the appropriate number of light fittings required for the classrooms and other rooms should be installed. Security lights should be installed on the external walls of the blocks as external lighting. Although the standard indoor lighting equipment should be fluorescent lights, the lighting to be provided as stage lighting in the hall should be100W halogen lamps which can be commonly procured on the local market.

Wall Sockets

As in the standard design, wall sockets necessary for each room should be installed.

Air-Conditioning and Ventilation Equipment

As in the standard design, ventilating fans should be installed for the draft chambers in the laboratories.

Water Supply/Drainage and Sanitation Equipment

Water Supply System

All the planned schools have a water supply. Some use public water and others use well water. Of these schools, the two sites to which public water is already supplied will be treated differently as follows: At Mkwichi CDSS, since the facility expansion does not include construction of a hostel, there will be no significant increase in the water consumption. Thus, water should be supplied through a branch connection from the existing water pipe on the premises. At Zolozolo CDSS, since the facility expansion includes construction of a hostel and an increased water consumption is expected, additional water supply will be required. At this school, piping up to water meter should be covered by the Malawian side and the work after the piping should be covered by this Project.

All the other four sites that use well water are equipped with handpumps. These wells are shared with the local community and water sometimes runs short at some of the sites during the dry season as the wells are shallow. In this Project, to ensure a stable supply of water for school operations, water pumped from deep wells should be stored in water tanks, lifted up to elevated tanks (water tower) using a lifting pump, and gravity-fed to the water supply points. To reduce the school maintenance and operation costs by cutting water consumption and electricity costs, the sites that use electric water pumps should have water supply points only in the laboratory block, kitchen, ablution and washing facilities, and teachers' houses. With regard to toilet blocks, since flush toilets are not to be installed, water should only be supplied for washing hands. However, this policy does not apply to Mkwichi CDSS where the existing toilet facilities are flush toilets.

Sanitation Equipment

Toilet blocks used daily by the students should have a water supply only for washing hands. The toilets should not be flush toilets but equivalent to the existing toilets in order to alleviate problems in maintenance and management. The toilets in the teachers' houses should be the same.

These toilets, built as independent blocks with little sanitary impact on the living quarters, should be of the direct osmosis type from which solids are collected periodically. For Mkwichi CDSS, flush toilets should be adopted in the same way as its existing facilities.

Wastewater Treatment Plant

Wastewater should be treated within the premises. Rainwater and miscellaneous sewage should flow along drainage ditches installed around the blocks into the seepage pits. Toilet sewerage should be treated by the existing direct osmosis type system, from which solids are collected and cleaned periodically.

Firefighting Services

In the standard design, fire hydrants, extinguishers, emergency alarms and other firefighting equipment are installed in each building. The following is planned in the Project based on the consultations with local fire departments and the work done by other similar projects:

Table 2-16 Firefighting Services by Building

Block Name	Fire Extinguishing Equipment
Classroom block	No obligation
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
Kitchen	Indoor hydrant (30m) ×1, fire extinguisher (9kg) ×1, CO2 fire extinguisher (5kg) ×1, firefighting cloth×1
Hall	Indoor hydrant (30m) ×1, fire extinguisher (9kg) ×1, CO2 fire extinguisher (5kg) ×1, fire alarm
Hostel	Indoor hydrant (30m) ×1, fire alarm
Teachers' houses	No obligation

(5) Building Material Plan

Construction specifications should be planned based on the standard design in consideration of coordination with organizations concerned, visits to the facilities of similar past projects by other donors and previous facilities built by Grant Aid, as well as basic grades, robustness, durability and construction efficiency as school facilities.

Table 2-17 Comparison of Specifications of Main Parts

Element	Standard Design	Specification/Construction Method for the Project	Rational for Selection
Exterior Part			
Roof	IBR color 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 shall be installed at necessary rooms such as equipment storages.	Same on the left	Same as the above
Perimeter		Pre-cast concrete paving slabs	Gravel spread only	The gravel spread method is adopted in consideration of the fundamental function and lower cost because it is not used for pedestrians.
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.
Ceilings	General part	Exposed IBR sheets on wooden trusses	Same on the left	It is a general and standard design in Malawi.
	Rooms of teachers' houses	Exposed IBR sheets on wooden trusses	Plywood + Paint suspended ceilings with wooden furring	Considering the improvement of interior space and cutting off the quantities for upper separation wall, suspended ceiling shall be adopted.
Wooden Trusses	Whole	Termite treatment + Paint	Termite treatment only	The need for painting of the interior which is not exposed to wind and rain is not substantial.

2-2-2-3 Furniture and Laboratory Material Plan

(1) Furniture Plan

According to the details of the furniture installed in the local standard design, the minimum educational furniture required for school operations should be installed. The furniture specifications should conform to the standard specifications of the MoEST. The details and quantities of furniture for the rooms are shown below:

a. Classroom Block

Classrooms: Each classroom, with a capacity of 40 students, should be equipped with 40 desks and chairs for students and one desk and chair for the teacher.

Storeroom: Should be equipped with one stool as it functions as a preparation room for the teacher in charge.

b. Administration/Library Block

Principal's Room: Should be equipped with a desk and chair for the principal, two chairs for guests, one filing cabinet, three sofas, and one large low table.

Deputy Principal's Room: Should be equipped with a desk and chair for administration, one chair for guests, one filing cabinet, two sofas, and one small low table.

Accountant's Room: Should be equipped with a desk and chair for administration, one chair for guests, and one filing cabinet.

Reception: Should be equipped with six chairs for the teachers and two library desks for meetings with guests and discussions. Since no personnel will be assigned to the reception in the plan, no other furniture should be installed.

Storeroom: Should be equipped with two PC tables and four pipe chairs in the center of the room for working.

Staff Room: The working space should be equipped with 14 desks and chairs for teachers and four filing cabinets. The resting space should be equipped with about half as much furniture for resting as in the local standard design, i.e. six sofas, three large low tables, and four small low tables.

Library: Should be equipped with eight desks for reading, four PC tables, and 20 pipe chairs for reading. For the librarian, one desk and chair and two filing cabinets should be installed.

c. Laboratories

Laboratories: Each laboratory should be equipped with 42 laboratory stools for students and one laboratory stool for the teacher, making a total of 43 stools.

Preparation Room: Should be equipped with one stool.

d. Hostel

Hostel Rooms: In order to accommodate 112 students, 56 double-decker beds and 112 lockers

should be installed.

e. Kitchen/hall

Hall: Should be equipped with 320 pipe chairs in expectation of accommodating 320 persons. In addition, 38 dining tables (same as the library desks) should be installed.

Shop: Should be equipped with one stool.

f. Others

Dust Bins: Each school should be equipped with five dust bins which should be installed where required on campus.

Table 2-18 Furniture Quantity List

Furniture	Mkwichi CDSS	Matenje CDSS	Liwaradzi CDSS	Zolozolo CDSS	Mpamba CDSS	Ezondweni CDSS	Total
Desks for students	240	160	160	240	160	160	1,120
Desk for principal	1	1	1	1	1	1	6
Desks for administration	2	2	2	2	2	2	12
Desks for teachers	30	19	19	30	19	18	135
Library/hall desks	10	48	48	48	48	40	242
Low tables (large)	4	4	4	4	4	4	24
Low tables (small)	5	5	5	5	5	5	30
PC tables	6	6	6	6	6	2	32
Chairs for students	240	160	160	240	160	160	1,120
Chairs for teachers	40	29	29	40	29	28	195
Chairs for principal	1	1	1	1	1	1	6
Chairs for administration	2	2	2	2	2	2	12
Sofas	11	11	11	11	11	11	66
Pipe chairs	24	344	344	344	344	324	1,724
Stools	94	93	93	7	93	93	473
Steel cabinets	9	9	9	9	9	7	52
Bunk beds		56	56	56	56	56	280
Lockers		112	112	112	112	112	560
Dust bins		5	5	5	5	5	25

(2) Laboratory Material Plan

The minimum amount of basic teaching materials and equipment for science experiments required for the implementation of the current secondary education curriculum and syllabus in physical science and biology will be procured in this Project. The teaching materials and equipment will have to be such that science teachers can make full use of in science class experiments. Therefore, teaching materials and equipment compatible with those used in the curricula/manuals for experiments in the chemistry, physics and biology courses at the Domasi College of Education (DCE), which provides teacher training courses in secondary school science subjects, and equipment identical to that currently owned by the college and used in its laboratories for those subjects, should be procured.

The lists of equipment for science experiments in secondary education formulated by MoEST in the Support to Secondary Education Project (Education V) of AfDB were used in the selection of the equipment to be procured in this Project. Items in the lists were prioritized on the basis of the following criteria:

Priority rank A: Equipment that meets all the following three conditions:

- Equipment used in practical classes in the secondary education science curriculum/syllabus;
- Equipment whose use is stipulated in the implementation guidelines for the DCE curriculum/manual for chemistry, physics or biology experiments; and
- Equipment owned by the DCE and used in its chemistry, physics or biology laboratory

Priority rank B: Equipment which does not meet at least one of the above three conditions

Priority rank C: Consumables

In this Project, items of priority rank A will be procured and those of priority ranks B and C will not be procured. Consumables such as reagents cannot be procured in this Project as they are not subject to be covered by the assistance under the Japanese Grant Aid Scheme. Although glassware is classified as consumables, the glassware essential for implementation of practical chemistry experiments, etc., will be procured in this Project. Basic teaching materials which do not meet any of the three conditions listed above will be considered priority rank A* and will be procured in this Project if they are considered necessary for secondary education in science. The tables below show the evaluation of the items in the equipment lists.

Table 2-19 Evaluation List of Equipment for Experiments in Secondary Education prepared by MoEST LOT .No.3 (Glassware & Breakables)

ITEM NO.	ITEM of MoEST LIST LOT NO.3 GLASSWARE & BREAKABLE	DCE Status						CDSS		Priority
		List of Existing Lab Equipment			Lab. Manual			Lab. Curruculum		
		CHE	PHY	BIO	CHE	PHY	BIO	Phy.Sc	BIO	
1	Measuring cylinder, 50ml	○	×	○	○	×	○	×	×	B
2	Dropper bottles	×	×	×	×	×	○	×	×	B
3	Test tube stand (12holes)	○	×	○	○	×	○	○	○	A
4	Test tube stand (with pegs 6holes)									
5	Tubing→duplication No.99									
6	Tubing→duplication No.101									
7	Tubing (diameter, 16.6mm bore)	×	×	×	×	○	×	×	×	C
8	Tubing→included in Lot.4									
9	Tubing	○	×	×	○	×	×	×	×	C
10	Evaporating basin	○	×	○	○	×	×	○	○	A
11	Thermos flask	×	×	×	×	×	×	×	×	B
12	Black foil	×	×	×	×	×	×	×	×	C
13	Forceps	×	×	○	○	×	○	○	○	A
14	Blood slides	×	×	×	×	×	○	×	○	A*
15	Trough	×	×	○	○	×	×	○	○	B
16	Tubes→duplication									
17	Scalpel→included in Lot.4									
19	Cystallising basin	×	×	×	×	×	×	×	×	B
20	Beaker (capacity 25ml)	×	×	×	×	×	×	×	×	B
21	Beaker (capacity 50ml)	○	×	×	○	×	○	×	×	B
22	Beaker (capacity 100ml)	○	○	○	○	○	○	○	○	A
23	Beaker (capacity 150ml)	×	×	×	×	×	○	×	×	B
24	Beaker (capacity 250ml)	○	○	○	○	○	○	○	○	A
25	Beaker (capacity 400ml)	×	×	×	×	×	○	×	×	B
26	Beaker (capacity 600ml)	○	×	○	○	×	×	×	×	A
27	Beaker (capacity 1000ml)	×	×	×	○	×	○	○	○	B
28	Washbottle	○	×	△	○	×	△	○	○	A
29	Reagent bottle	○	×	○	○	×	○	○	○	B
30	Reagent bottle (clear/250ml)									A
31	Reagent bottle	○	×	○	○	×	○	○	○	B
32	Reagent bottle (amber/250ml)									A
33	Brush (beaker)	○	×	○	○	○	○	○	○	A
34	Brush (bottle)									A
35	Brush (test tube)									A
36	Brush (test tube)									B
37	Brush (test tube)									B
38	Brush (burette)									B
39	Burette	○	×	×	○	×	○	○	○	A
40	Crucible	○	×	×	○	×	×	×	×	B
41	Liebig condenser	○	×	×	○	×	×	○	○	A
42	Crucible lid	×	×	×	×	×	×	×	×	B
43	Flask (conical 100ml)	○	×	○	○	×	×	○	○	A

44	Flask (conical 250ml)	○	×	○	○	×	○	○	○	A
45	Filter Flask (500ml)	○	×	×	×	×	×	×	×	B
46	Flask (conical 500ml)	○	×	○	○	○	○	×	×	B
47	Flask (500ml)	○	×	○	○	×	○	○	○	A
48	Flask (250ml)	○	×	○	○	×	○	○	○	A
49	Flask (1000ml)	×	×	×	×	×	×	×	×	B
50	Separating funnel	×	×	×	×	×	×	×	×	B
51	Flask,distillation	○	×	×	○	×	×	○	○	A
52	Flask, volumetric 250ml	○	×	○	○	×	×	○	×	A
53	Flask, volumetric 2000ml	×	×	×	×	×	×	×	×	B
54	Funnel 100mm	×	×	○	×		×	×	×	B
55	Funnel 100mm glass	○	×	○	○		○	○	○	A
56	Funnel 250ml	○	×	×	○		×	○	×	A
57	Funnel, thistle	×	×	×	×	×	×	×	×	B
58	Funnel, thistle	×	×	×	×		×	×	×	B
59	Funnel, thistle	×	×	×	×		×	×	×	B
60	Filter Funnel	×	×	×	×		×	×	×	B
61	Measuring cylinder, 10ml	○	×	×	○		×	×	×	B
62	Measuring cylinder, 25ml	×	×	○	○	×	×	○	○	A
63	Measuring cylinder, 100ml	○	×	○	○		○	○	○	A
64	Measuring cylinder, 250ml	○	×	○	○		×	○	○	A
65	Measuring cylinder, 500ml	×	×	×	×	×	×	×	×	B
66	Measuring cylinder, 1000ml	○	×	×	×		×	×	×	B
67	Stirring rod	○	×	○	○	○	○	○	○	A
68	Gas jar	×	×	×	×	×	×	○	×	B
69	Gas jar cover	×	×	×	×	×	×	○	×	B
70	Bell jar, socket top	×	×	×	×	×	×	×	×	B
71	Bell jar	×	×	×	×	×	×	×	×	B
72	Thermometer	○	×	○	○	○	○	○	○	A
73	Clinical thermometer	×	×	×	×	×	×	×	×	B
74	Thermometer	○	×	×	○	○	×	○	○	A
75	Mason's thermometer hygrometer	×	×	×	×	×	×	○	×	A*
76	Thermometer→duplication No.72	×	×	○	×	×	○	×	×	
77~82	Lens, biconvex	×	×	×						A*
83~86	Lens, biconcave	×	×	×	×	○	×	○	×	A*
87	Lens	×	×	×						A*
88	Lens holder	×	×	×	×	○	×	○	×	A
89	Plane mirror	×	×	×				○	×	A
90	Plane mirror	×	×	×	×	○	×	×	×	A
	Plane mirror	×	×	○				×	○	A
91	Prism 60x60x60, 25mm	×	×	×						A*
92	Prism 60x60x60, 38mm	×	×	×	×	○	×	○	×	B
93	Prism 45x45x90, 35mm	×	×	×						A*
94	Mortar and pestle	×	×	×	×	×	×	×	○	B
95	Microscope slides	×	×	○	×	×	○	×	○	A
96	Cover slips	×	×	○	×	×	○	×	○	A
97	Set of prepared slides of animal cells	×	×	○	×	×	○	×	○	A
98	Crucible→duplication No.40									
99	Tubing, 4mm dia.	○	×	○	○					A
100	Tubing, 6mm dia.					○	○	○	○	A

101	Tubing, 8mm dia.									A
102	Test tube	○	×	○	○		○	○	○	A
103	Watch glass	○	×	○	○		○	×	×	B
104	Burner/spirit	○	×	○	○		○	○	○	A
105	Bulbs (1.25V)	×	○	×	×	○	×	○	×	C
106	Bulbs (2.5V)									C
107	Fuse	×	×	×				○		C

Table 2-20 Evaluation List of Equipment for Experiments in Secondary Education prepared by MoEST LOT No.4 (General Laboratory Items)

ITEM NO.	IITEM of MoEST LIST LOT NO.4 GENERAL LABORATORY	DCE Status						CDSS		Priority
		Existing Lab Equipment			Lab. Manual			Lab. Curriculum		
		CHE	PHY	BIO	CHE	PHY	BIO	Phy.Sc	BIO	
1	Microscope	×	×	○	×	×	○	×	○	A
2	Sweep nets	×	×	×	×	×	○	×	○	B
3	Autoclave	×	×	○	×	×	○	×	○	A
4	Jars (188×82×138mm)	×	×	○	×	×	○	×	×	B
5	Jars (300×196×138mm)	×	×							B
6	Ruler (30cm)	×	×	×	×	○	○	×	○	B
7	String	×	×	×		○				C
8	Sample tubes→ duplication No.47									
9	Tubing→duplication No.54									
10	Dissecting dishes (→Set with Board/No.29)	×	×	○	×	×	○	×	○	A
11	Model of the human eye on stand	×	×	×	×	×	×	×	○	A*
12	Model of the human ear	×	×	×	×	×	×	×	○	A*
13	Set of six hand lenses→ duplication Lot.3/No.77~87		×			○		○		
14	Petri dish	○	×	○	○	×	○	×	○	A
15	Pressure cooker suitable for gas or electric heating	×	×	×	×	×	×	×	×	B
16	Stop watch	○	○	×	○	○	○	○	○	A
17	Laboratory trays	×	×	×	×	○	×	×	×	B
18	Visking tubing	×	×	×	×	×	×	×	×	B
19	Bags	×	×	×	×	×	×	×	×	B
20	Scissors→included in No.30									
21	Pins→included in No.30									
22	Centrifuge,Nickel electro set	×	×	×	×	×	×	×	×	B
23	Enzymes sets	×	×	×	×	×	○	×	○	C
24	Protein sets comprising	×	×	×	×	×	○	×	○	C
25	Dialysis Membrane/tubing	×	×	×	×	×	×	×	×	B
26	Tile	×	×	×	×	×	○	×	○	B
27	Bundle of 100 Wood splints	×	×	×	×	×	×	×	×	C
28	First Aid Cabinet	×	×	×	○	×	×	○	×	C
29	Dissecting boards	×	×	○	×	×	○	×	○	A
30	Dissecting set	×	×	○	×	×	○	×	○	A

31	Dissecting awl→included in No.30									
32	Sheep skull model	×	×	×	×	×	×	×	×	B
33	Cat skull model	×	×	×	×	×	×	×	×	B
34	Dog skull model	×	×	×	×	×	×	×	×	B
35	Human teeth set model	×	×	×	×	×	×	×	○	A*
36	Human skeleton	×	×	×	×	×	×	×	○	A*
37	Cotton wool	×	×	×	×	×	○	×	○	C
38	Glass Writing Pencils (markers)	×	×	×	○	×	○	○	○	C
39	Gloves	×	×	×	×	×	×	×	×	C
40	Potometer	×	×	×	×	×	×	×	○	B
41	Potometer	×	×	×						B
42	Clinostat	×	×	×	×	×	×	×	○	B
43	Culture disposal bags	×	×	×	×	×	×	×	×	B
44	Photosynthesis apparatus	×	×	○	×	×	×	×	×	B
45	Drinking straw	×	×	×	×	×	×	×	×	C
46	Aspirator bottle	×	×	×	×	×	×	×	×	B
47	Tubes	×	×	×	○	×	○	×	×	B
48	Pipette	○	×	○	○	×	○	○	○	A
49	Dropping pipette with teat	○	×	○	○	×	○	○	×	A
50	Pipette filler	○	×	×	○	×	×	○	×	A
51	Stoppers	○	×	○	○	○	○	○	○	A
52	Syringe	○	×	×	×	×	○	×	×	B
53	Tubing (5mm dia.)	×	×	×				×	×	B
54	Tubing (6mm dia.)	×	×	○	○	○	○	○	○	A
55	Tubing (10mm dia.)	×	×	×				×	○	A
56	Adapter (Y-shape)	×	×	×	○	×	×	×	×	B
57	Adapter (T-shape)	×	×	×						B
58	Absorption tube	×	×	×	×	×	×	×	×	B
59	Test tube holders	○		○	○		○	○	○	A
60	Calorimeter	○	×	×	○	○	×	×	×	B
61	Balance (10x0.1N)	×	×	×	×	○	×	○	×	A
62	Balance (1x0.01N)	×	×	×				○	×	A
63	Burette clamp	×			○			○		A
64	Pulley block		×			○		○		A*
65	Triple beam balance	○	○	○	○	○	×	○	×	A
66	Battery hydrometer		×			×		×		B
67	Metre rule	×	×	×	×	○	○	○	×	A*
68	Half metre rule	×	×	×	×	○	○	×	×	B
69	Measuring tape (30m)	×	×	×	×	×	○	○	○	A*
70	Pulley block→duplication No.64		×			○				
71	Thermometer→ duplication Lot.3/No.72	○		○	○		○			
72	Brass hanger	×	○	×	×	○	×	○	×	A
73~75	Slotted brass weight	×	○	×	×	○	×	○	×	A
76	Slotted iron weight, 100g	×	○	×		○		○		A
77	Hexagonal iron mass, 500g	×	×			○		○		A
78	Hexagonal iron mass, 1kg	×	×			○		×		B
79	Hexagonal iron mass, 2kg	×	×			×		×		B
80	Hexagonal iron mass, 5kg	×	×			×		×		B
81	Stopclock	×	×	×	×	○	○	×	×	B
82	Ray optics box	×	○	×	×	○	×	○	×	A

83	Optical filter set	×	○	×	×	○	×	○	×	A
84	Newton's colour disc apparatus	×	×	×	×	×	×	×	×	B
85	Perspex block	×	○	×	×	○	×	×	×	B
86	Bar and gauge apparatus	×	×	×	×	×	×	×	×	B
87~89	Ball bearings, glass	×	×	×	×	×	×	×	×	B
90	Burner→substituted with No.92	○	×	×	○	○	×	○	×	A
91	Butane catridge	○	×	×	○	○	×	×	×	C
92	Bunsen burner	○	○	×	○	○	○	○	○	A
93	Bosshead	○	○	○	○	○	○	○	○	A
94	Retort stand base	○	○	○	○	○	○	○	○	A
95	Retort stand rod	○	○	○	○	○	○	○	○	A
96	Retort clamp	○	○	○	○	○	○	○	○	A
97	G clamp		○			○		○	○	A
98	Cork borer	○	×	×	○	○	○	○	○	A
99	Cork stoppers	○	×	×	○	○	○	○	○	A
100	Gauze	○	○	○	○	○	○	○	○	A
101	Gauze									B
102	Test tube holder→ duplication No.59									
103	Slinky spring	×	×	×	×	×	×	○	×	B
104	Spring, (10mm dia.)	×	×	×	×	×	×	○	×	B
105	Spring, (6mm dia.)	×	×	×						B
106	Polystyrene spheres	×	×	×	×	×	×	×	×	B
107	Spatula,spoon	○	×	○	○	×	○	○	○	A
108	Laboratory tool kit,comprising	×	×	×						A*
109	Tongs	×	×	×	○	×	×	×	×	B
110	Periodic table chart	×	×	×				○		A*
111	Triangle	×	×	×						B
112	Tripod stand	○	×	○	○	○	○	○	○	A
113	Magnet	×	×	×	×	×	×	○	×	A*
114~117	Copper wire	×	×	×	×	○	×	○	×	C
118~122	Constantan wire	×	×	×	×	○	×	○	×	C
123~127	Nichrome wire	×	×	×	×	○	×	○	×	C
128	Mains cable	×	×	×	×	○	×	○	×	C
129	Wire	×	×	×	×	○	×	○	×	C
130	Electric bell	×	×	×	×	×	×	○	×	A*
131	Crocodile clips (pack of 20)	×	○	×	○	○	×	○	×	A
132	Diode	×	○	×	×	○	×	○	×	A
133	Lamp holder→substituted with No.82									B
134	Voltmeter→duplication No.176	○	○		○	○		○		
135	Ammeter→duplication No.176	×	○		○	○		○		
136	Electroscope	×	×	×	×	×	×	×	×	B
137	Small motor/generator unit	×	○	×	×	×	×	○	×	A*
138	Accumulator	×	×	×	×	○	×	×	×	B
139~142	Resistor	×	○	×	×	○	×	○	×	A
143	Rheostat	×	○	×	×	○	×	○	×	A
144	Plotting compass	×	×	×	×	×	×	○	×	A*
145	Electrostatics kit	×	×	×	×	×	×	×	×	B

146	Soldering gun	×	×	×	×	×	×	×	×	B
147	Friction strip/rod	×	×	×	×	×	×	○	×	B
148	Friction strip/rod	×	×	×						B
149	Stirrup	×	×	×	×	×	×	×	×	B
150	Knife switch	×	○	×	×	○	×	○	×	A
151	Electric circuit board kit	×	○	×	×	○	×	○	×	A
152	Filter Paper (9cm dia.)	×	×	×	○	×	○	○	○	C
	Filter Paper (15cm dia.)	×	×	×						C
153	Dropping bottle→ duplication No.49						○			
154	Bench mat	×	×	×	×	×	×	×	×	B
155	Test tube with side arm	×	×	×	×	×	×	×	×	B
156	Crushing can	×	×	×	×	×	×	×	×	B
157	Bell jar and pump plate→ duplication Lot 3.No.71		×			×		×	×	B
158	Liquid level apparatus	×	×	×	×	×	×	×	×	B
159	Fluid pressure aooaratus	×	×	×	×	×	×	×	×	B
160	Ticker tape-timer	×	○	×	×	○	×	×	×	B
161	Gravity	×	×	×	×	×	×	×	×	B
162	Free Fall	×	×	×	×	×	×	×	×	B
163	Kinetic Theory Kit	×	×	×	×	×	×	×	×	B
164	Spheres	×	×	×	×	○	×	×	×	B
165	Paper Chromatography Kit	×	×	×	×	×	○	×	×	B
166	Daniel cell	×	×	×	×	○	×	×	×	B
167	Bar magnet→duplication No.113	×			○			○		
168	Battery charger	×	×	×	×	×	×	×	×	B
169	Beehive shelf	×	×	×	×	×	×	×	×	B
170	Evaporating basin → duplication Lot 3/No.10	○	×	○	○	×	×	○	○	
171	Water Deioniser	×	×	×	×	×	×	×	×	B
172	Pulley block single sheave →duplication No.64	×	×	×	×	○	×	×	×	
173	Slotted brass	×	×	×	×	×	×	×	×	B
174	Kinetic Theory Model→ duplication No.163	×	×	×	×	×	×	×	×	B
175	Torch	×	×	×	×	×	×	×	×	B
176	Ammeter	×	○	×	○	○	×	○	×	A
176-2	Voltmeter	○	○	×	○	○	×	○	×	A
177	Electrodes	×	×	×	○	×	×	○	×	A*
178	Bi-metallic strip	×	×	×	×	×	×	○	×	B
179	Vacuum pump	×	×	×	×	×	×	×	×	B
180	Gas lighter	×	×	×						C
181	Deflagrating spoons	×	×	×	×	×	×	×	×	B
182	Glass writing pencil	×	×	×						C
183	Chromatography paper→ duplication No.165									
184	Sonometer,simple pattern	×	×	×	×	○	×	×	×	B
185	Sonometer wires	×	×	×	×	○	×	×	×	B
186	Glass cutter	×	×	×						A
187	Charcoal blowpipe	×	×	×	×	×	×	×	×	B
188	First Aid Kit									
189	Metal blocks	×	×	×	×	×	×	×	×	B

190	Diamond mesh wire→ duplication No.100									
191	Laboratory trays→ duplication No.17									
192	Pail	×	×	×						B
196	Sprayer/sprinkler rotary type	×	×	×	×	×	×	×	×	B
206	scalpel high quality steel →included in No.30									
207	Syringe disposable	○	×	×	○	×	×	×	×	B

List of the Selected Equipment for Experiments

As students will carry out experiments/practical lessons in six groups, in principle six sets of equipment will be procured for such experiments/practical lessons. The number of items of equipment for certain experiments have been adjusted depending on the types of experiments. One or two sets of equipment will be procured for experiments to be demonstrated by the teacher on the teacher's desk. The table below shows the selected equipment and quantities required.

Table 2-21 List of Selected Laboratory Equipment for Experiments

ITEM NO.	ITEM	DESCRIPTION	Quantity		
			Laboratory		Total
			Phy.Sc	BIO	
L-1	Test tube	Test tube, pyrex glass, 125×16mm	2	1	3
L-2	Beaker 100ml	Beaker, squat form, Pyrex glass, with spout and graduations, capacity 100ml	24	24	48
L-3	Beaker 250ml	Beaker, squat form, Pyrex glass, with spout and graduations, capacity 250ml	12	12	24
L-4	Beaker 500ml	Beaker, squat form, Pyrex glass, heavy duty, with spout and graduations, capacity 500ml	3	3	6
L-5	Flask 100ml	Flask, conical, narrow mouth, pyrex glass, graduated, 100ml capacity	6	6	12
L-6	Flask 250ml	Flask, conical, narrow mouth pyrex glass, graduated, 250ml capacity	6	6	12
L-7	Flask 500ml	Flask, round bottom, 500ml, borosilicate glass	1	1	2
L-8	Flask 250ml	Flask, round bottom, 250ml, borosilicate pyrex glass	1	1	2
L-9	Flask,distillation	Flask, distillation, with side tube, 250ml, pyrex glass	1	1	2
L-10	Measuring flask 250ml	measuring, graduated, pyrex glass, 250×2.0 ml capacity	6		6
L-11	Funnel 100mm	Funnel,filter,100mm diameter, Borosilicate glass, short stem	6	6	12
L-12	Dropping Funnel	Funnel, dropping, cylindrical, open top with stopcock, 250ml, borosilicate glass	6		6
L-13	Measuring cylinder 25ml	Cylinder, measuring, graduated, pyrex glass, 3200 series, 25×0.5ml capacity	6	6	12
L-14	Measuring cylinder 100ml	Cylinder, measuring, graduated, pyrex glass, 3200 series, 100×1.0ml capacity	6	6	12
L-15	Measuring cylinder 250ml	Cylinder, measuring, graduated, pyrex glass, 3200 series, 250×2.0ml capacity	6	6	12
L-16	Petri dish	Petri dish, polysyrene, sterile, single vent, 90mm diameter		12	12

L-17	Evaporating basin	Evaporating basin, porcelain, round bottom, with spout, shallow form, schools'grade, glazed inside only	6	6	12
L-18	Trough	Trough, pneumatic, glass 300×125mm approx..	1	1	2
L-19	Pipette	Pipette, class B, 25ml capacity, soda glass	6	6	12
L-20	Dropping pipette with teat	Dropping pipette with teat	6		6
L-21	Pipette filler	Pipette filler, Pi-Pump, 25ml capacity	6		6
L-22	Burette 50ml	Plastic, single bore, pinch valve, 50 x 0.1ml	6	6	12
L-23	Liebig condenser	Borosilicate glass with narrow fused-on jaket, 500mm effective length	1	1	2
L-24	Stirring rod	Stirring rod, 200mm length, soda glass	12	6	18
L-25	Tubing	Tubing, soda glass, 4×0.9mm, 500mm length	6	6	12
L-26	Tubing	Tubing, soda glass, 6×0.9mm, 500mm length	6	6	12
L-27	Tubing	Tubing, soda glass, 8×0.9mm, 500mm length	6	6	12
L-28	Burner/spirit	Burner, spirit, glass type	6	6	12
L-29	Bunsen burner	Bunsen burner, for butane/propane gas with 13mm outside diameterD.burner tube,air regulator	6	6	12
L-30	Gauze	Gauze, iron wire, 125×125mm approx.	6	6	12
L-31	Tripod stand	Tripod stand, 125mm side, 200mm height approx..	6	6	12
L-32	Spatula,spoon	Spatula, spoon, stainless steel, 15 cm approx..	12		12
L-33	Retort stand base	Retort stand base, steel with tapped hole in centre of one short side, 160×100mm approx.	6	6	12
L-34	Retort stand rod	Retort stand rod, plated mild steel, 600×12.5mm approx.	6	6	12
L-35	Burette clamp	Burette clamp for 50ml Burette	6		6
L-36	Bosshead	Bosshead, cast alloy, with two slots at right angles to take rods up to 16mm diameter, 120×30mm (length×diameter) approx..	6	6	12
L-37	Retort clamp	Retort clamp, pressed steel, 3-prong to accept up to 90mm diameter, with rubber -lined diecast jaws	6	6	12
L-38	G clamp	G clamp, capacity 50mm	6	6	12
L-39	Test tube holders	Wood, with steel spring for closing jaw, 180mm long approx.	12	12	24
L-40	Stoppers	Stoppers, rubber, solid pack of assorted sizes (13, 15, 19, 25mm dia.) x 10 each,	6	6	12
L-41	Tubing (6mm dia.)	Tubing, rubber, 6×1.5mm (bore×wall thickness)	1		1
L-42	Tubing (10mm dia.)	Tubing, rubber, 10×2mm (bore×wall thickness)		1	1
L-43	Cork borer	Cork borer, plated brass, diameter range 5.0 to 11.25mm	1		1
L-44	Cork stoppers	Cork stoppers, assorted pack comprising 24 each 9,12,16,20 & 23mm and 6 each 26,29,32 & 35mm small end diameters	1		1
L-45	Glass cutter	Glass cutter, blade size 63×12×1.5mm, handle 57×43mm approx.	1		1
L-46	Laboratory tool kit,comprising	Laboratory tool kit,comprising ; 1 Combination pliers, 1 Snips, length 190mm, 1 Hacksaw and hacksaw blades, 1 Hand drill and drill set, max. 8mm, 2 Files (flat and round second cut) with handles, 1 Claw hammer, 1 Spanner, adjustable, 1 Screwdriver set,general purpose, 1 Mole self-grip wrench, 7inches, 1 Wire stripper, 1 Pair of Scissors, 1 Screwdriver set,	1		1
L-47	Test tube stand	Test tube stand, comprising MDF base and top with single row of holes, without pegs. Height 110mm x length 440mm approx., hole diameter 21mm, 12holes	12	12	24
L-48	Washbottle	Washbottle, polyethylene, narrow neck, oval, 250ml capacity	6	6	12

L-49	Reagent bottle	Reagent bottle, clear glass, narrow neck, glass stopper with plastic top, capacity 250ml	6		6
L-50	Reagent bottle	Reagent bottle, amber glass, narrow neck, glass stopper with plastic top, capacity 250ml	6		6
L-51	Brush	Brush fot beaker, white bristle with head 65×45mm section at widest part×150mm long approx, on wooden handle	6	6	12
L-52	Brush	Brush for bottle, white nylon, head diameter 50mm approx.	6	6	12
L-53	Brush	Brush for test tube, white bristle, head diameter 15mm for tubes 12 to 16mm diameter	6	6	12
L-54	Autoclave	Autoclave,portable,Aluminium alloy, tempreture more than 121℃, capacity 10 L		1	1
L-55	Thermometer	Thermometer, general purpose, -10 to 110℃ × 1℃, mercury, yellow backed	6	6	12
L-56	Thermometer	Thermometer, general purpose, -10 to 360℃ × 2℃, mercury, yellow backed	6	6	12
L-57	Mason's thermometer hygrometer	Mason's thermometer hygrometer, mercury-in-glass thermometers, engraved zinc scale range -5 to ＋50℃ × 1℃ mounted in plastic case.	1		1
L-58	Periodic table chart	Periodic table chart, Classroom size	1		1
L-59	Magnet	Magnet, rectangular section, 6% chrome steel, 100mm long, in pairs with keepers	6		6
L-60	Plotting compass	Plotting compass, in a metal case, 16mm diameter approx.	12		12
L-61	Electrodes	Electrodes,carbon, 100mm approx.	6		6
L-62	Bi-metallic strip	Bi-metallic strip,brass and steel	1		1
L-63	Dissecting dishes	Dissecting dishes,Aluminium, 229×.286×44mm approx.,(Keep away from reactive elements)		6	6
L-64	Dissecting boards	Dissecting boards, wooden, rectangular 312×462×17mm approx.		6	6
L-65	Dissecting set	Dissecting set,in plastic wallet, comprising; 1 forceps, 125mm long, straight, with fine points, 1 forceps, 125mm long, straight, with blunt points, 2 needles,stainless steel, in metal handle, 1 section lifter, 1 seeker, stainless steel in metal handle, 1 scalpel, blade length 38mm, 1 scalpel,blade length 45mm, 1 scalpel,blade length 54mm, 1 pair of scissors, 125mm long straight with fine points		6	6
L-66	Forceps	Forceps, straight, fine points & guide pin, length 115mm	6	6	12
L-67	Hand Lens	Biconvex, diameter 75mm, FL approx.250mm, with handle		12	12
L-68	Microscope	Microscope,Student range,student inclined type		6	6
L-69	Microscope slides	Microscope slides, good quality glass, 1.0 to 1.2mm thick. Size 76×26mm. Boxes of 100		1	1
L-70	Cover slips	Cover slips, Number 1.5. Thickness 0.16/0.19mm, 40×22mm. Boxes of 100		1	1
L-71	Set of prepared slides of animal cells	Set of prepared slides of animal cells		3	3
L-72	Blood slides	Blood slides prepared		6	6
L-73	Model of the human eye on stand	Model of the human eye on stand, approximately five times enlarged, manufactured in latex rubber with the cornea, lens and vitreous body in transparent material, flexible and finelycoloured throughout, showing internal eye structure and the accessory organs		1	1

L-74	Model of the human ear	Model of the human ear, enlarged about 3 times, showing the external ear canal, middle and inner ear, ear drum with hammer,and anvil removable, cochlea removable and dissectable, two bone parts closing the inner and outer ear, totally 6 parts on base, 340×160×190mm approx..		1	1
L-75	Human teeth set model	Human teeth set model		1	1
L-76	Human skeleton	Human skeleton, plastic, full size replica fully articulated		1	1
L-77	Stop watch	Stop watch, L.C.D.digital, to include lap/cumulative timing functions up to 59min. 59.99 seconds.	6	12	18
L-78	Triple beam balance	Triple beam balance, single pan, capacity 610g, sensitivity 0.1g	6		6
L-79	Metre rule	Metre rule, wooden, hardwood	12		12
L-80	Measuring tape (30m)	Measuring tape, 30m long		1	1
L-81	Roberval balance	Automatic even balance, readability 200g, with weights	6		6
L-82	Analytical balance (open)	Portable precision balamce, range 0~600g, readability 0.1g, Pan 120mm dia. AC/ Adopter/batteris,	1	1	2
L-83	Ammeter	Meter, Interscale demonstration, to be supplied with interchangeable dials, ranges d.c. current 10-0-10mA, 0-500mA, 0-10A,	6		6
L-84	Voltmeter	d.c. voltage 0-1V,a.c. current 0-500mA, 0-10A,a.c. voltage 0-300V	6		6
L-85	Electric bell	Electric bell, twin coil, for battery (3 to 6V) or transformer (3 to 8V) operation, 0.5A, size 145×80×32mm approx.	1		1
L-86	Diode	Diode, Zener type, 500mW, 4.3V	12		12
L-87	Small motor/generator unit	Small motor/generator unit, Item Reference No.P31560 or similar	1		1
L-88	Resistor	Resistor, carbon film, 1/3Watts, 2.2, 4.7, 5.6, 10 ohms	12		12
L-89	Rheostat	Rheostat, single tube, open, 10A, 3.5ohms, size 305×52×92mm approx.	6		6
L-90	Knife switch	Knife switch, low voltage, single pole, on plastic base for use at voltages up to 50V a.c. & 75V d.c.	12		12
L-91	Electric circuit board kit	Electric circuit board kit comprising Worcester Circuit Board Kit	6		6
L-92	Balance (10x0.1N)	Balance, spring, rectangular and flat plastic case, 10×0.1N (1000g capacity, 10g readability)	6		6
L-93	Balance (1x0.01N)	Balance,spring,rectangular and flat plastic case, 1×0.01N (100g capacity, 1g readability)	6		6
L-94	Pulley block	Pulley block, 3 in-line (Triple sheave)	6		6
L-95	Brass hanger	Brass hanger, 50g	6		6
L-96	Slotted brass weight	Slotted brass weight (10g, 20g, 50g)	12		12
L-97	Slotted iron weight, 100g	Slotted iron weight, 100g	12		12
L-98	Hexagonal iron mass, 500g	Hexagonal iron mass, with lifting ring 500g	2		2
L-99	Inclined slope set	Inclined plane table with graduations, cart, weight dish, weight, etc.	6		6
L-100	Lens, biconvex	Lens, biconvex, spherical, 50mm diameter, FL:50, 100, 150, 200, 300, 500mm	6		6
L-101	Lens, biconcave	Lens, biconcave, spherical, 50mm diameter, FL: 100, 150, 200, 250mm	6		6
L-102	Lens	Lens, planoconvex, 100mm diameter, 150mm FL	6		6
L-103	Lens holder	Lens holder, comprising a metal holder with sides grooved to hold the lens, holder finished in matt black and is free standing on bench	12		12

L-104	Plane mirror	Plane mirror, glass, unmounted, back silvered, with protective coating, 150×50mm	6		6
L-105	Plane mirror	Plane mirror, glass, unmounted, back silvered, with protective coating, 150×100mm	6	6	12
L-106	Prism	Prism, glass, 60×60×60 degrees, 25×25mm	6		6
L-107	Prism	Prism, glass, 90×45×45 degrees, 35×25mm	6		6
L-108	Ray optics box	Ray optics box, metal, with 12V, 24W straight filament bulb, the lampholder with 1m of twin flex. Body has slots for a lens & triple slit screen	6		6
L-109	Optical filter set	Filters, Cinemoid, mounted (Set of three primary & three secondary acetate filters for use in optical boxes)	6		6

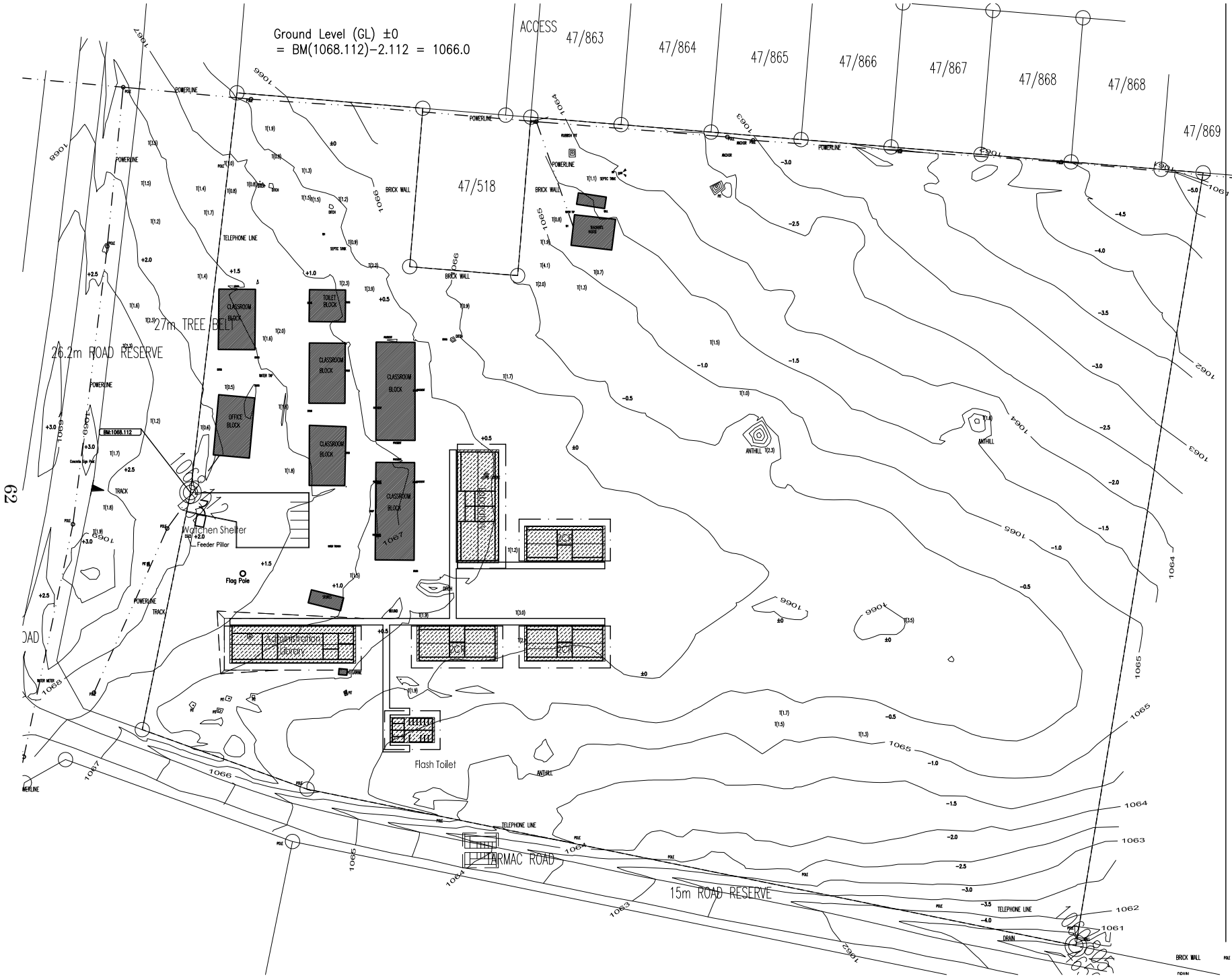
2-2-3 Outline Design Drawings

Site Plan Drawings

C-01	Mkwichi CDSS
C-02	Matenje CDSS
C-03	Liwaladzi CDSS
C-04	Zolozolo CDSS
C-05	Mpamba CDSS
C-06	Ezondweni CDSS

Floor Plan, Elevation Plan, and Section Plan

A-01	Classroom block	
A-02	Administration/library block	Type-A
A-03	Administration/library block	Type-B, C
A-04	Laboratory block	
A-05	Toilet block A	
A-06	Toilet block B	
A-07	Hostel	
A-08	Kitchen/hall block	Floor Plan
A-09	Kitchen/hall block	Elevation, Section Plan
A-10	Kitchen/hall block	Section Plan
A-11	Teachers’ houses/toilets	



SITE NAME : MKWICHI

LOCATION : Lilongwe, Urban
SITE ARE : 51,667 sqm.(measuring by CAD)
FEATURE : flat
ACCESS : paved road
EXISTING BLDG. : class room, administration, flash toilet
BOUNDARY : nothing
INFRASTRUCTURE: in the site – city water, electricity
NEIGHBORHOOD : houses, stadium

COMPONENT
- ADMI/LIBRARY (TYPE C) x 1
- LABORATORY BLOCK x 1
- CLASSROOM x3
- FLASH TOILET x1

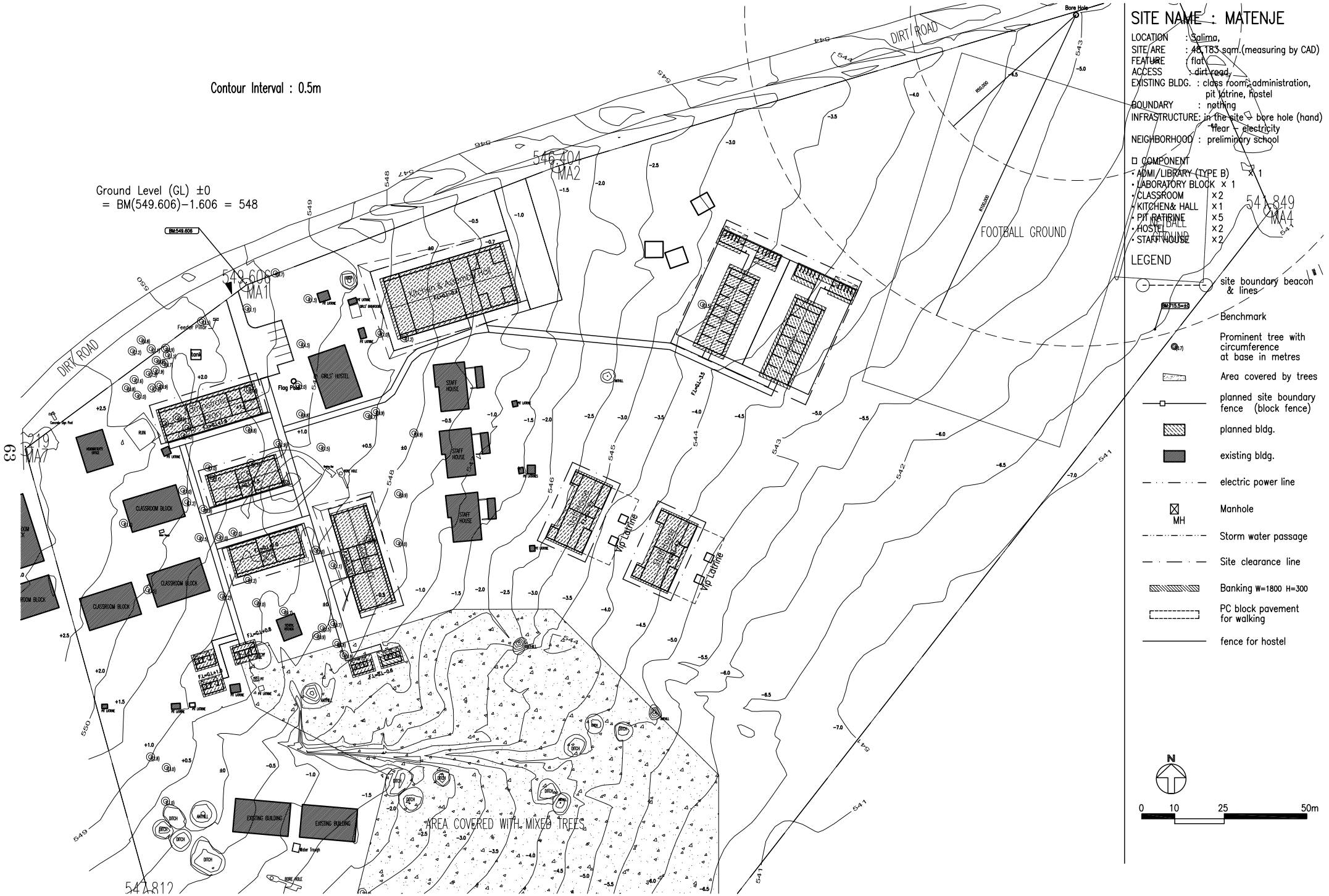
LEGEND

- site boundary beacon & lines
- Benchmark
- Prominent tree with circumference at base in metres
- Area covered by trees
- planned site boundary fence (block fence)
- planned bldg.
- existing bldg.
- 47/910 electric power line
- MH Manhole
- Storm water passage
- Site clearance line
- Banking W=1800 H=300
- PC block pavement for walking

N

0 10 25 50m

SITE PLAN (Mkwichi CDSS) C-01



SITE NAME : MATENJE

LOCATION : Salima,
SITE ARE : 48,183 sqm.(measuring by CAD)
FEATURE : flat
ACCESS : dirt road,
EXISTING BLDG. : class room, administration, pit latrine, hostel
BOUNDARY : nothing
INFRASTRUCTURE: in the site - bore hole (hand)
near - electricity
NEIGHBORHOOD : preliminary school

□ COMPONENT

• ADMI/LIBRARY (TYPE B)	x 1
• LABORATORY BLOCK	x 1
• CLASSROOM	x 2
• KITCHEN& HALL	x 1
• PIT LATRINE	x 5
• HOSTEL	x 2
• STAFF HOUSE	x 2

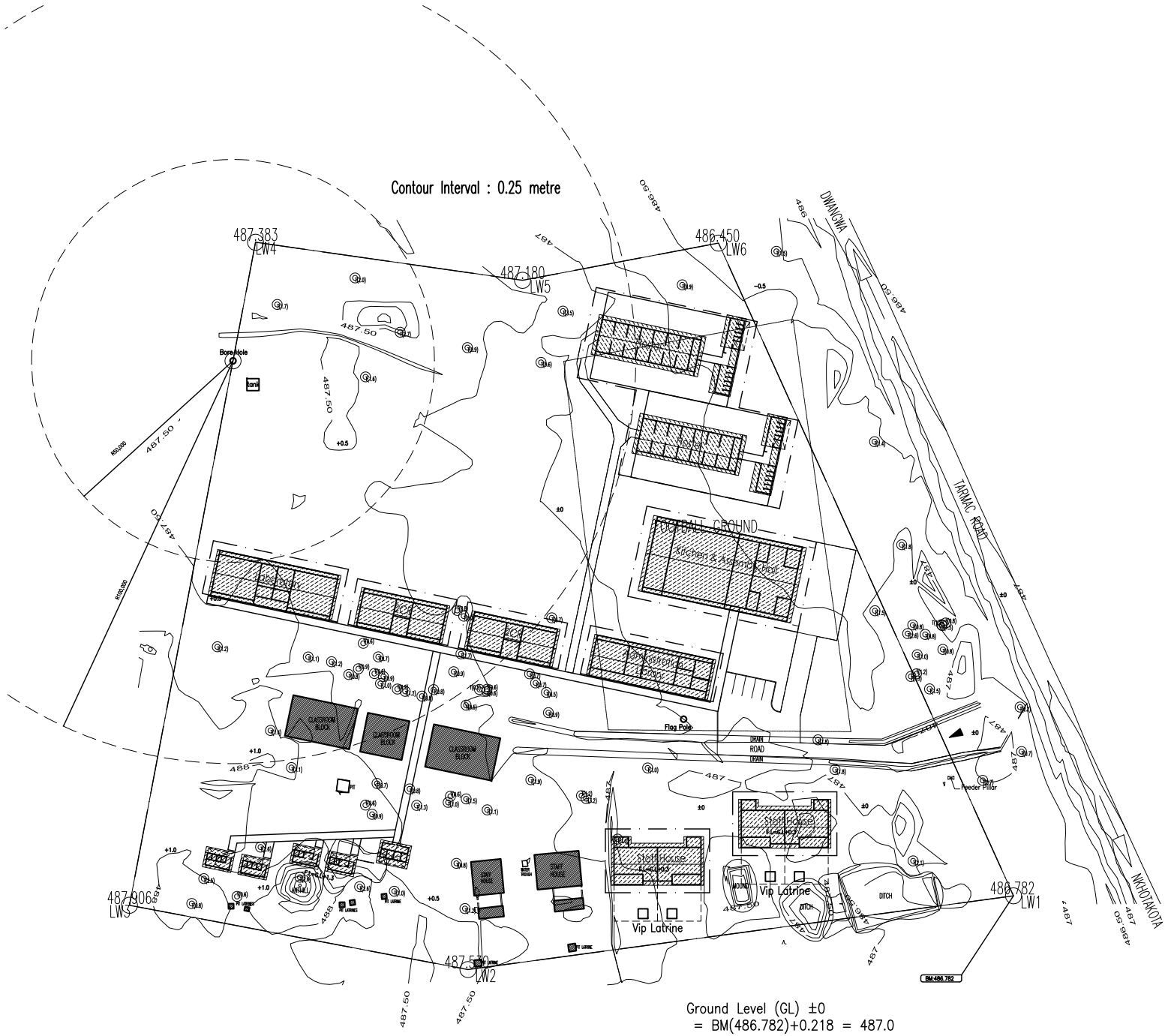
LEGEND

- site boundary beacon & lines
- Benchmark
- Prominent tree with circumference at base in metres
- Area covered by trees
- planned site boundary fence (block fence)
- planned bldg.
- existing bldg.
- electric power line
- Manhole
- Storm water passage
- Site clearance line
- Banking W=1800 H=300
- PC block pavement for walking
- fence for hostel

N

0 10 25 50m

SITE PLAN (Matenje CDSS) C-02



SITE NAME : LIWALADZI

LOCATION : Nkhotakota
SITE ARE : 28,650 sqm.(measuring by CAD)
FEATURE : flat
ACCESS : paved road
EXISTING BLDG. : class room, administration
pit latrine, staff house
BOUNDARY : nothing
INFRASTRUCTURE: in the site – bore hole (hand)
near – electricity
NEIGHBORHOOD : farmland, vacancy

□ COMPONENT

- ADMI/LIBRARY (TYPE A) × 1
- LABORATORY BLOCK × 1
- CLASSROOM ×2
- KITCHEN& HALL ×1
- PIT RATIRINE ×5
- HOSTEL ×2
- STAFF HOUSE ×2

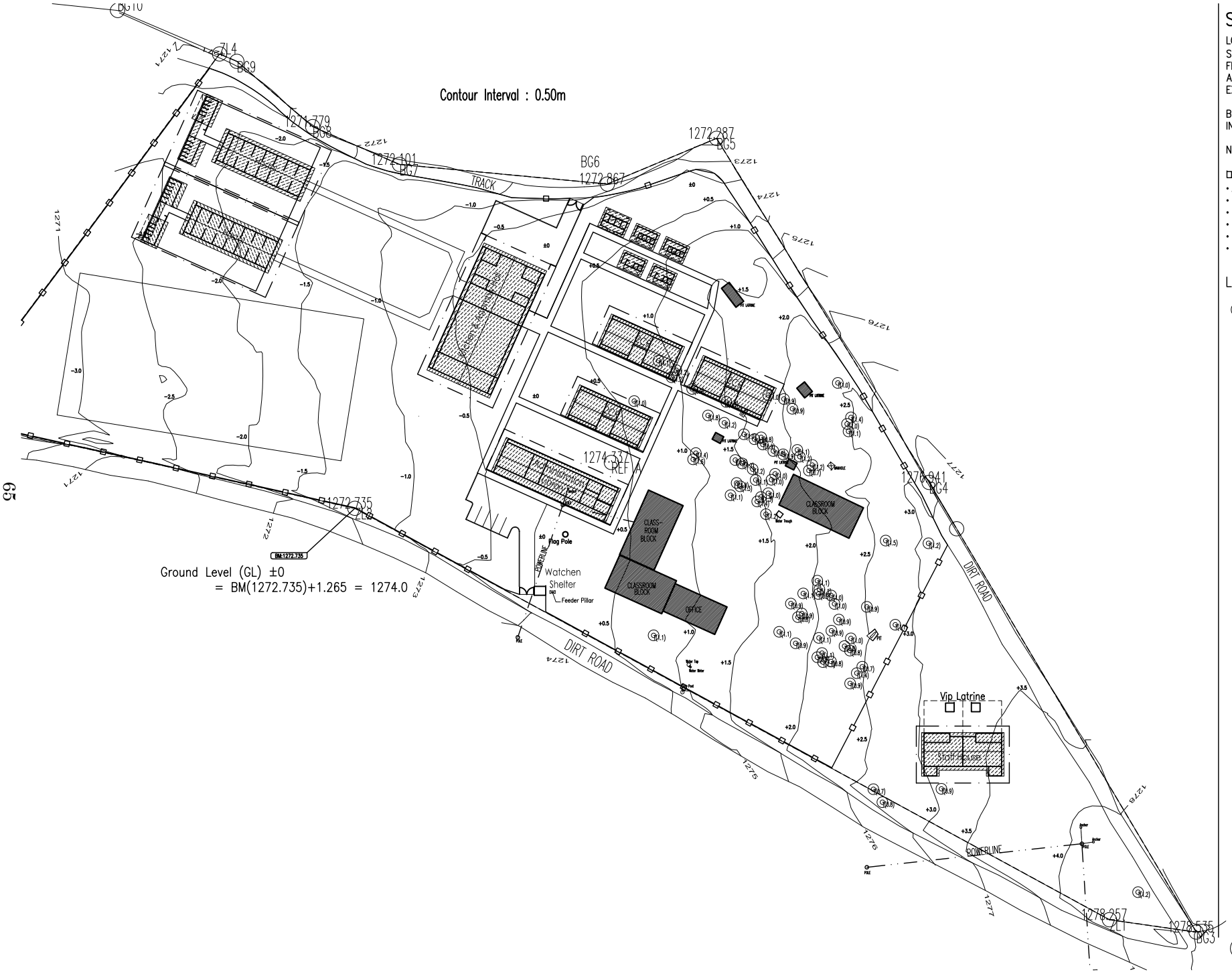
LEGEND

- site boundary beacon & lines
- Benchmark
- Prominent tree with circumference at base in metres
- Area covered by trees
- planned site boundary fence (block fence)
- planned bldg.
- existing bldg.
- electric power line
- Manhole
- Storm water passage
- Site clearance line
- Banking W=1800 H=300
- PC block pavement for walking
- fence for hostel

N

0 10 25 50m

SITE PLAN (Liwalazi CDSS) C-03



SITE NAME : ZOLOZOLO

LOCATION : Mzuzu, Urban
SITE ARE : 32,011 sqm.(measuring by CAD)
FEATURE : flat
ACCESS : rough road
EXISTING BLDG. : class room,administration, pit latrine
BOUNDARY : nothing
INFRASTRUCTURE: in the site – city water, electricity
NEIGHBORHOOD : houses

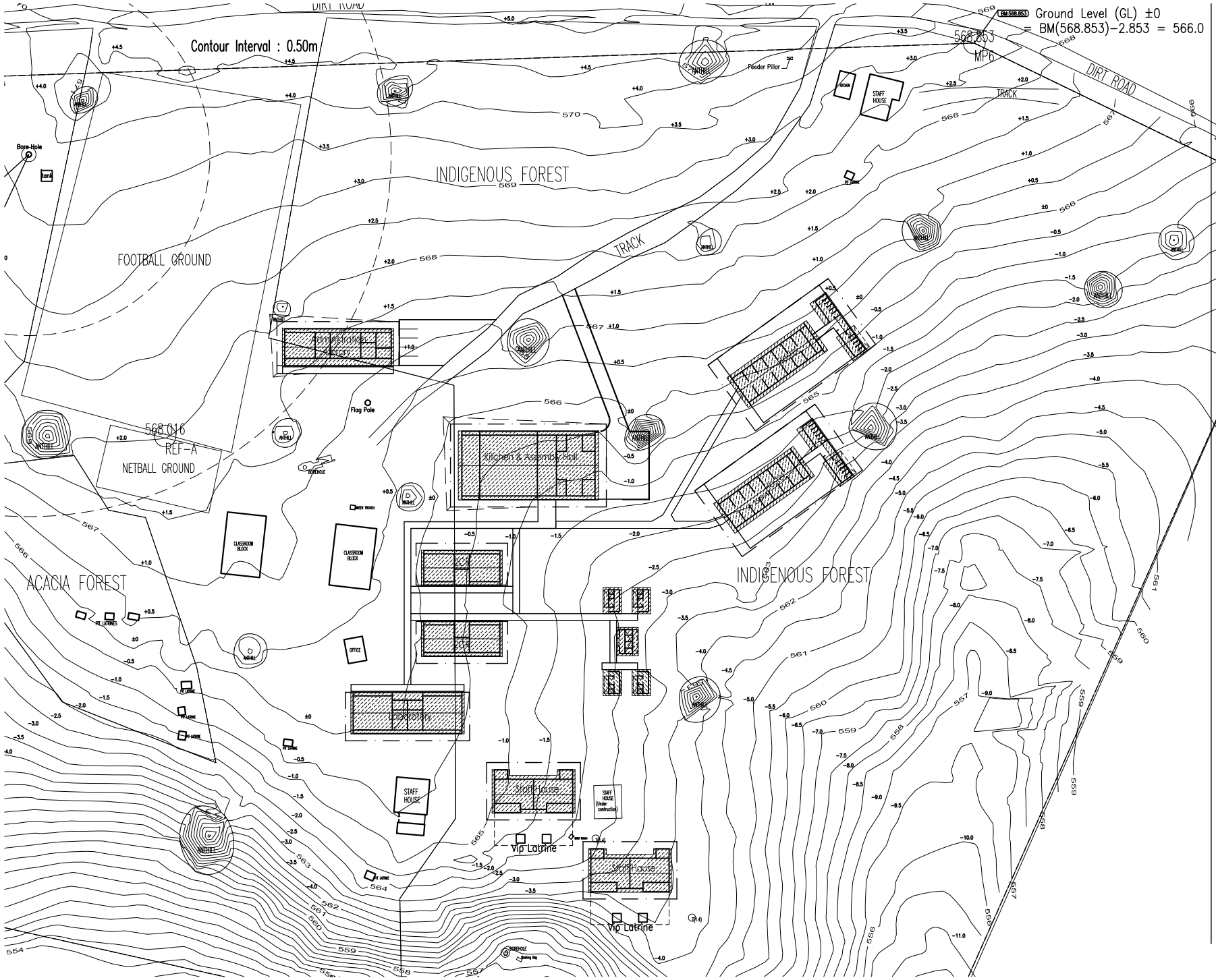
□ COMPONENT

- ADMI/LIBRARY (TYPE C) × 1
- CLASSROOM ×3
- KITCHEN& HALL ×1
- PIT RATIRINE ×5
- HOSTEL ×2
- STAFF HOUSE ×1

LEGEND

- site boundary beacon & lines
- Benchmark
- Prominent tree with circumference at base in metres
- Area covered by trees
- planned site boundary fence (block fence)
- planned bldg.
- existing bldg.
- electric power line
- Manhole MH
- Storm water passage
- Site clearance line
- Banking W=1800 H=300
- PC block pavement for walking
- fence for hostel

SITE PLAN (Zolozolo CDSS) C-04



SITE NAME : MPAMBA

LOCATION : Nkhata Bay
SITE ARE : 99,323 sqm.(measuring by CAD)
FEATURE : flat
ACCESS : rough road
EXISTING BLDG. : class room, administration
pit latrine, staff house
BOUNDARY : nothing
INFRASTRUCTURE: in the site – bore hole (hand)
near – electricity
NEIGHBORHOOD : farmland, vacancy

COMPONENT	
• ADMI/LIBRARY (TYPE A)	x 1
• LABORATORY BLOCK	x 1
• CLASSROOM	x 2
• KITCHEN& HALL	x 1
• PIT RATIRINE	x 5
• HOSTEL	x 2
• STAFF HOUSE	x 2

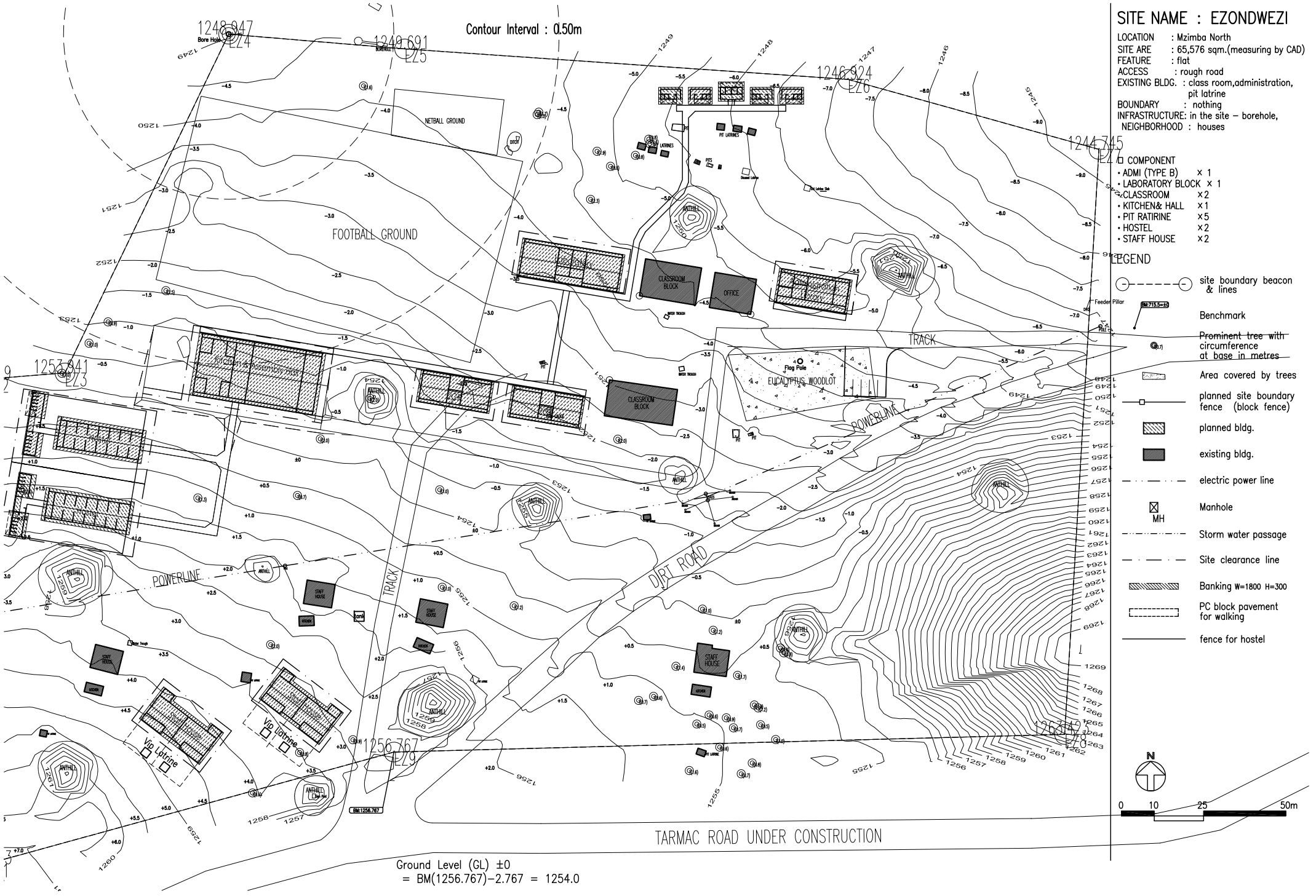
LEGEND

- site boundary beacon & lines
- Benchmark
- Prominent tree with circumference at base in metres
- Area covered by trees
- planned site boundary fence (block fence)
- planned bldg.
- existing bldg.
- electric power line
- Manhole (MH)
- Storm water passage
- Site clearance line
- Banking W=1800 H=300
- PC block pavement for walking
- fence for hostel

N

0 10 25 50m

SITE PLAN (Mpamba CDSS) C-05



SITE NAME : EZONDWEZI

LOCATION : Mzimba North
SITE ARE : 65,576 sqm.(measuring by CAD)
FEATURE : flat
ACCESS : rough road
EXISTING BLDG. : class room,administration, pit latrine
BOUNDARY : nothing
INFRASTRUCTURE: in the site – borehole,
NEIGHBORHOOD : houses

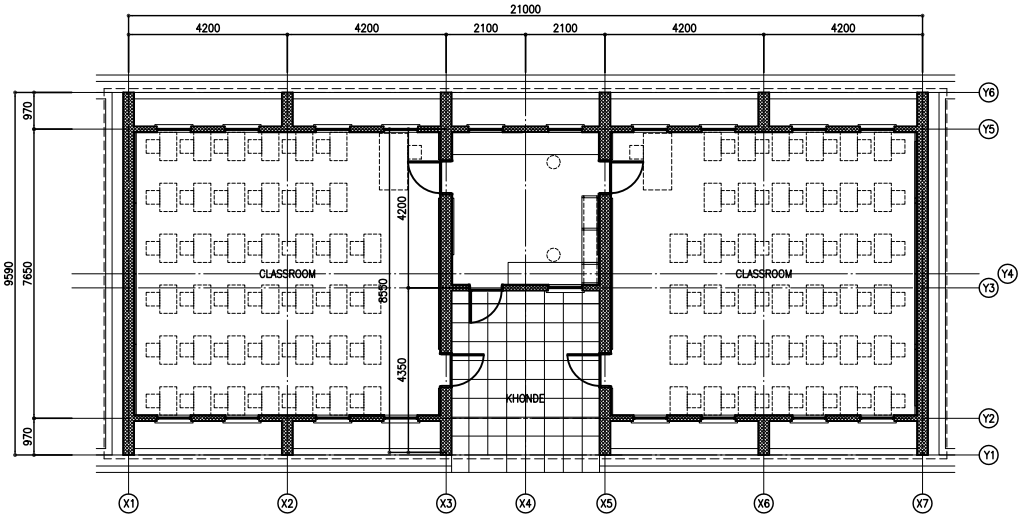
COMPONENT

- ADMI (TYPE B) x 1
- LABORATORY BLOCK x 1
- CLASSROOM x2
- KITCHEN& HALL x1
- PIT RATIRINE x5
- HOSTEL x2
- STAFF HOUSE x2

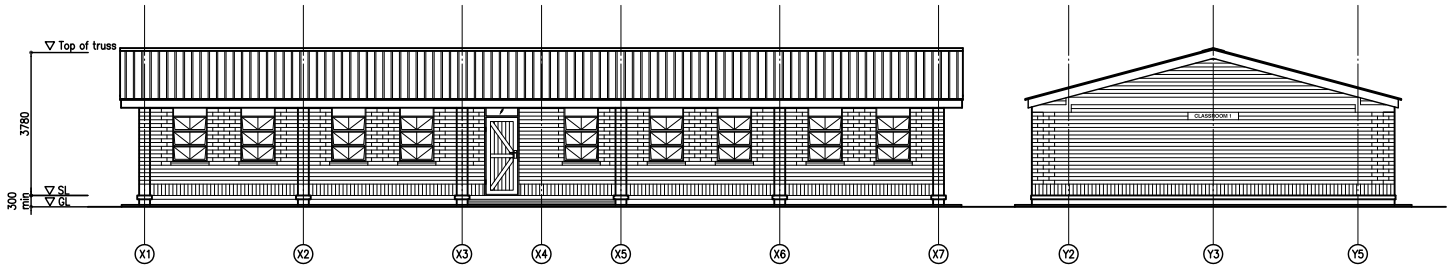
LEGEND

- site boundary beacon & lines
- Benchmark
- Prominent tree with circumference at base in metres
- Area covered by trees
- planned site boundary fence (block fence)
- planned bldg.
- existing bldg.
- electric power line
- Manhole MH
- Storm water passage
- Site clearance line
- Banking W=1800 H=300
- PC block pavement for walking
- fence for hostel

SITE PLAN (Ezondweni CDSS) C-06

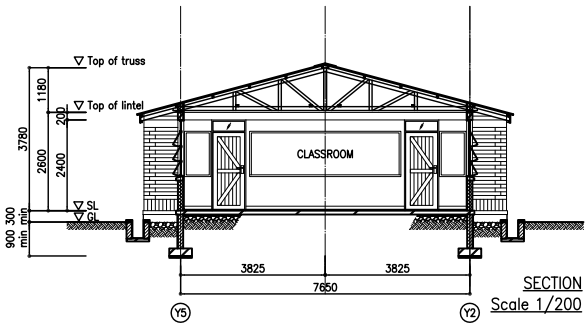


FLOOR PLAN
Scale 1/200

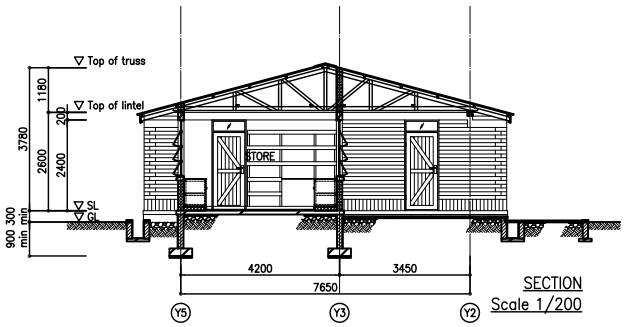


ELEVATION
Scale 1/200

ELEVATION
Scale 1/200

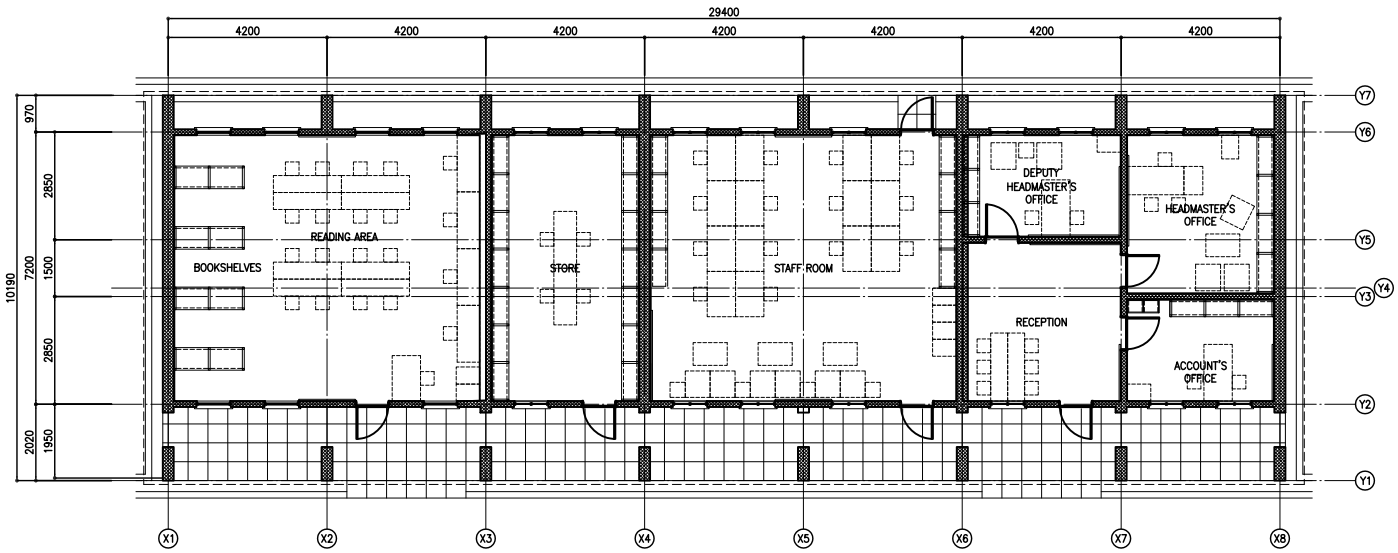


SECTION
Scale 1/200

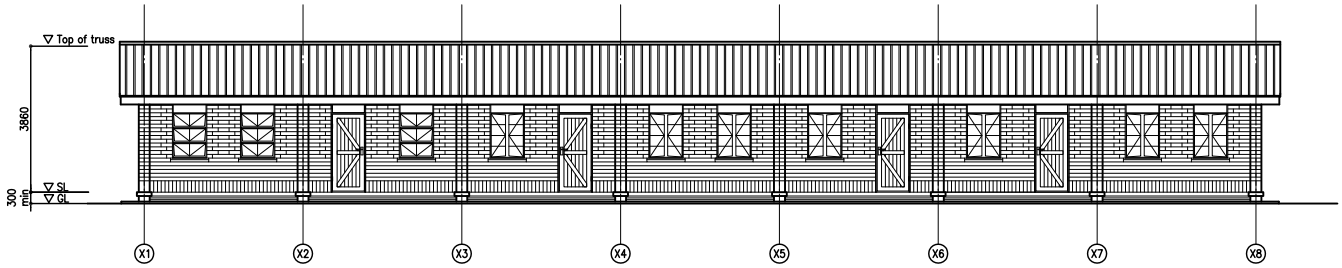


SECTION
Scale 1/200

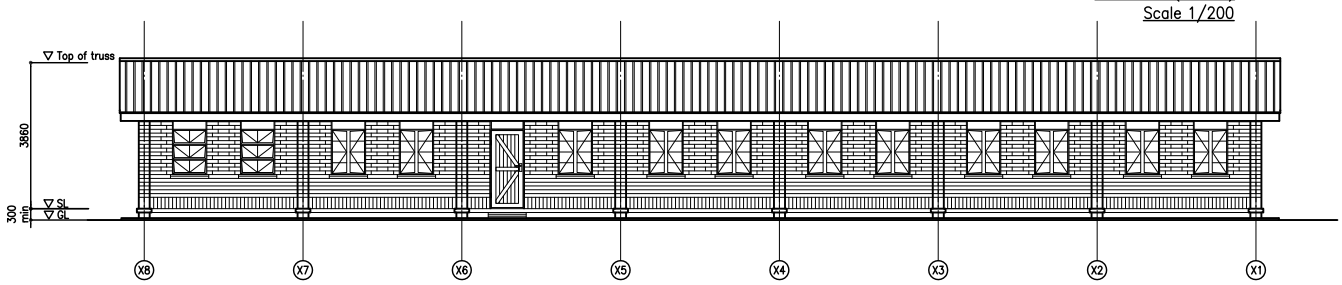
CLASSROOM BLOCK A-01



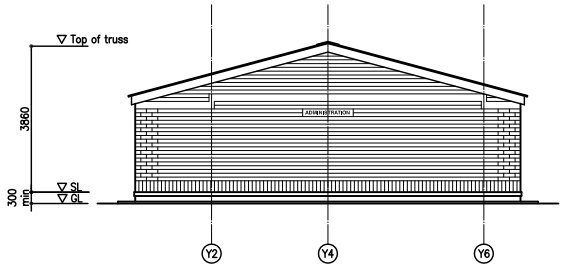
FLOOR PLAN (TYPE A)
Scale 1/200



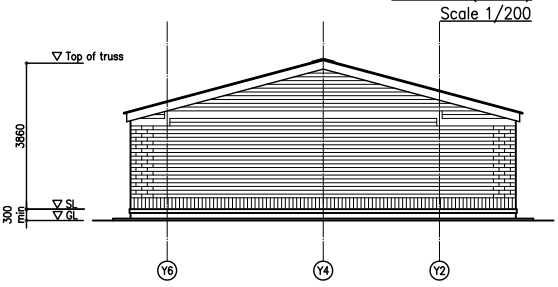
ELEVATION (TYPE A)
Scale 1/200



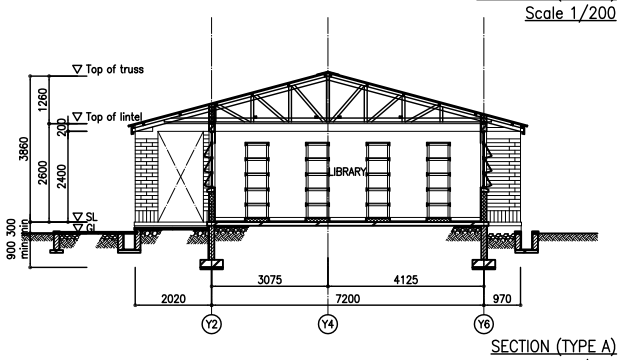
ELEVATION (TYPE A)
Scale 1/200



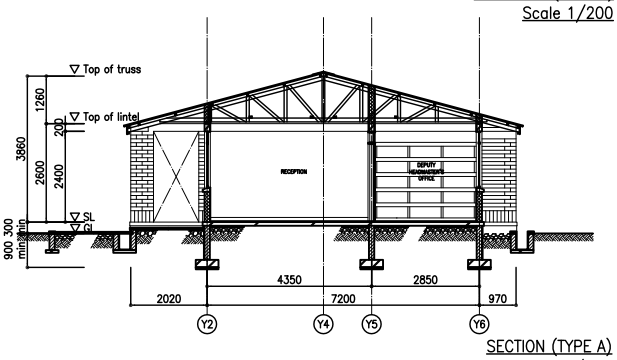
ELEVATION (TYPE A)
Scale 1/200



ELEVATION (TYPE A)
Scale 1/200

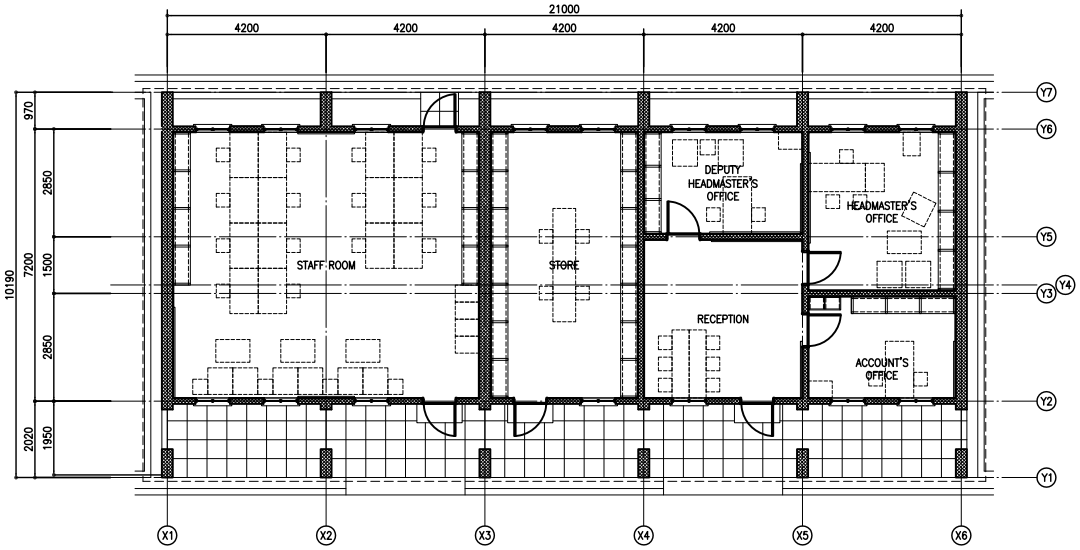


SECTION (TYPE A)
Scale 1/200

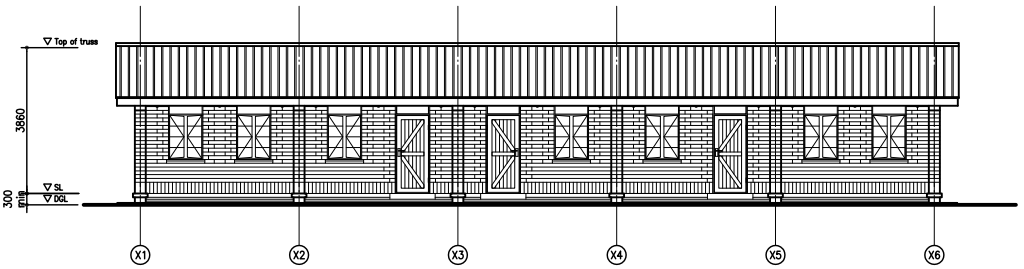


SECTION (TYPE A)
Scale 1/200

ADMINISTRATION/LIBRARY BLOCK (A) A-02

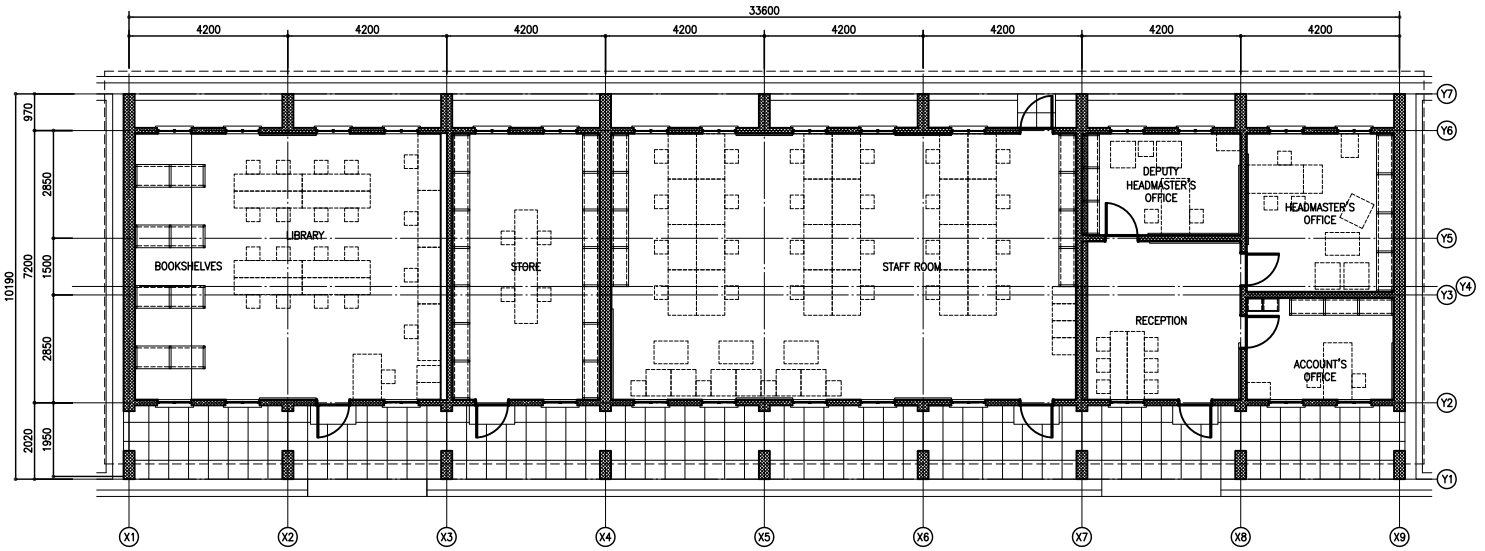


FLOOR PLAN (TYPE B)
Scale 1/200

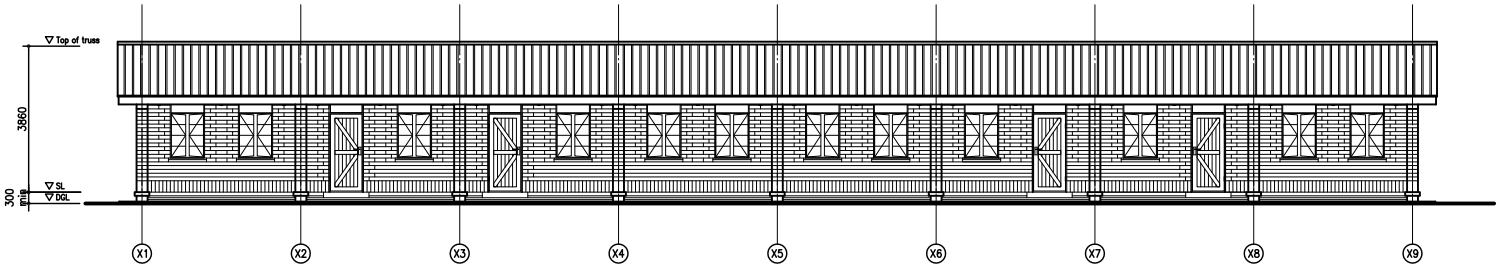


FRONT ELEVATION (TYPE B)
Scale 1/200

ADMINISTRATION BLOCK (B)

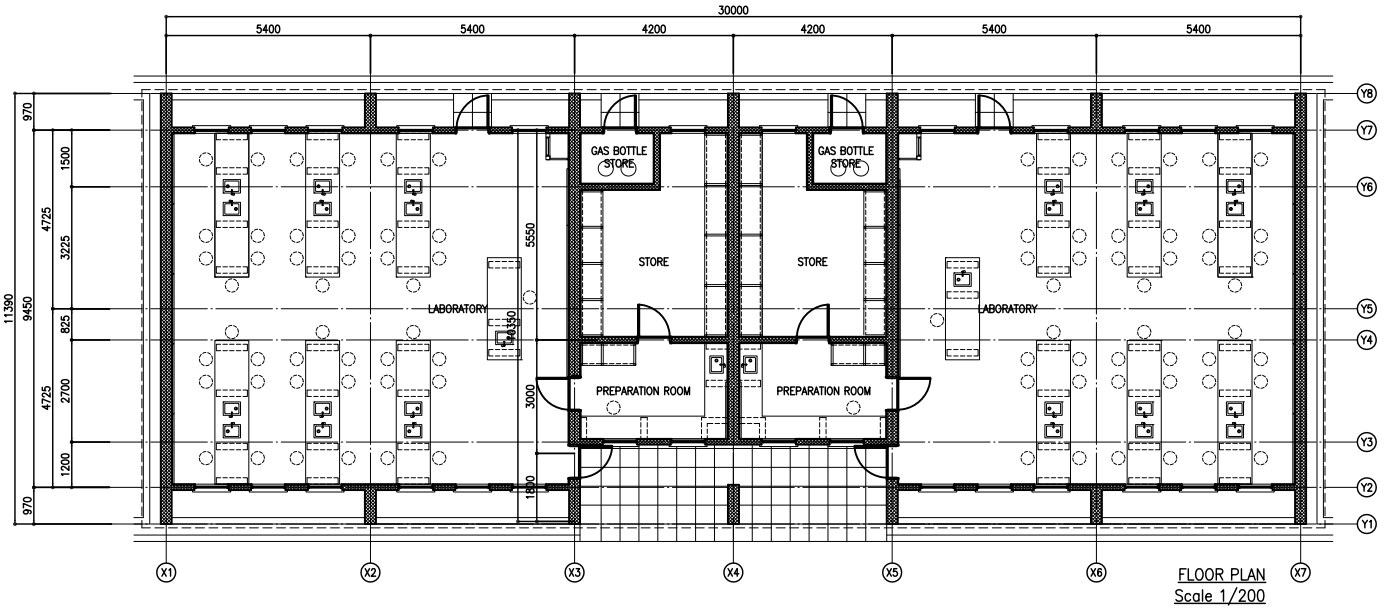


FLOOR PLAN (TYPE C)
Scale 1/200

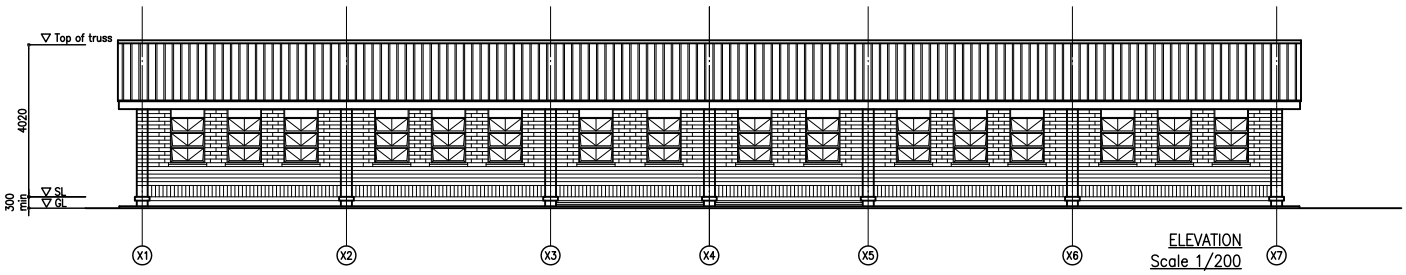


FRONT ELEVATION (TYPE C)
Scale 1/200

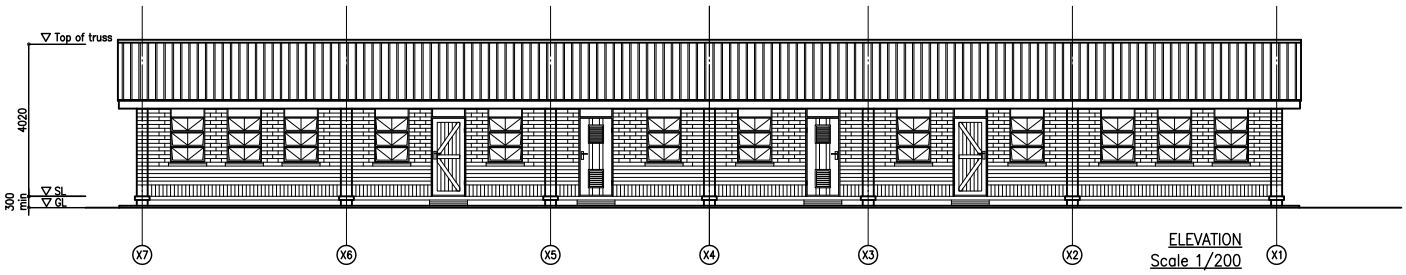
ADMINISTRATION/LIBRARY BLOCK (C) A-03



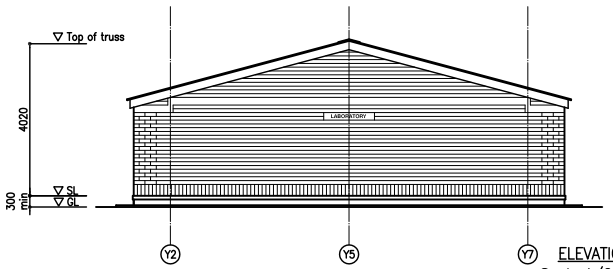
FLOOR PLAN
Scale 1/200



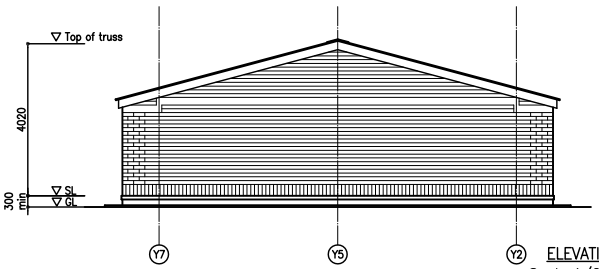
ELEVATION
Scale 1/200



ELEVATION
Scale 1/200



ELEVATION
Scale 1/200



ELEVATION
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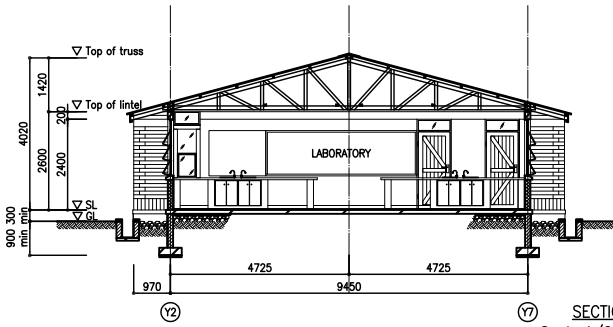

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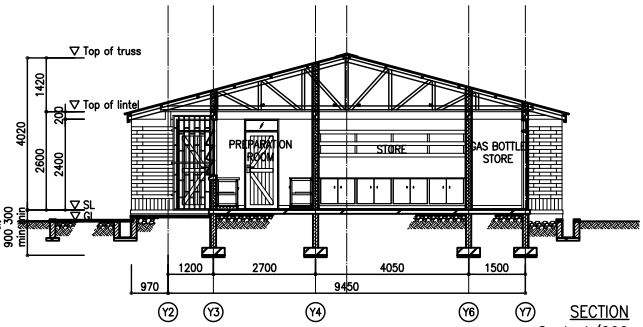

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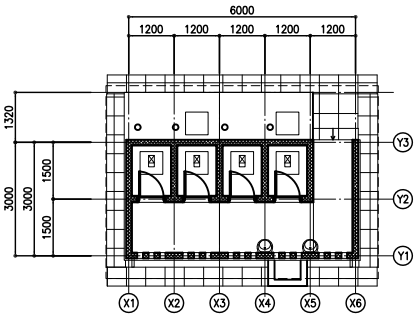
LABORATORY BLOCK A-04



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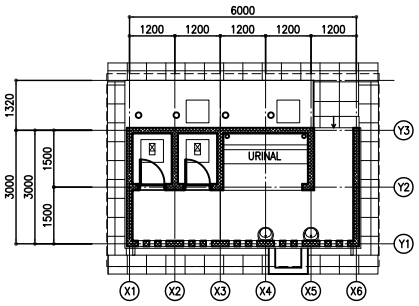
Scale 1/200



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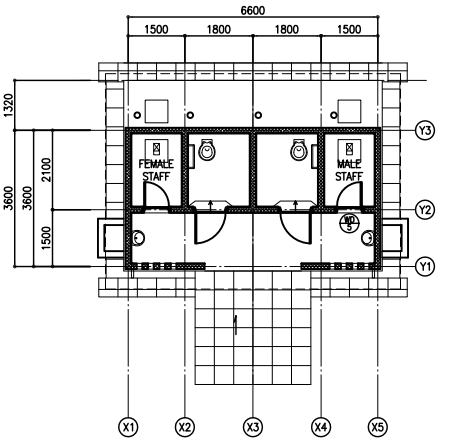
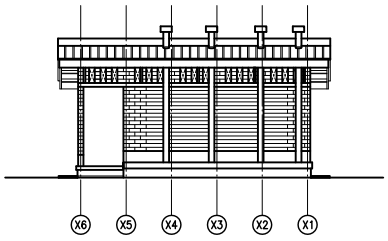
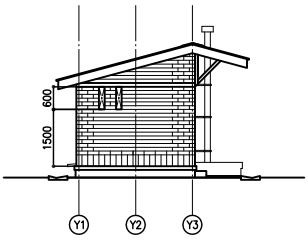
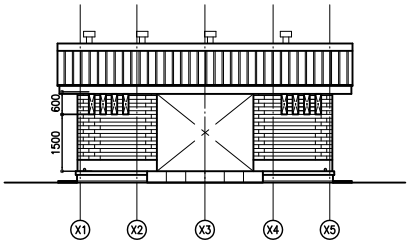
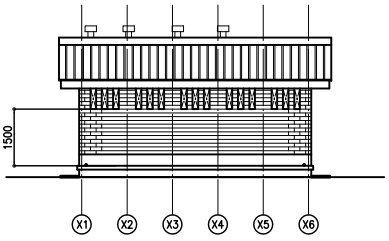


FLOOR PLAN
STAFF TOILET
Scale 1/200









FRONT/REAR ELEVATION
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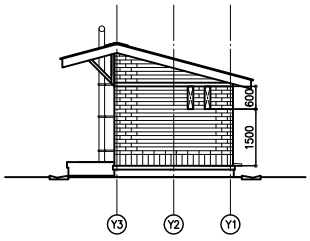
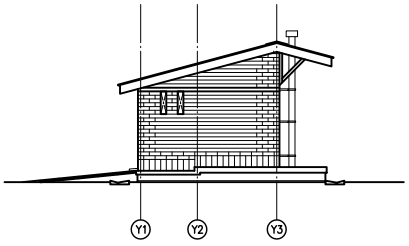


SIDE ELEVATION
MALE/FEMAL STUDENT TOILET
Scale 1/200



FRONT/SIDE ELEVATION
STAFF TOILET
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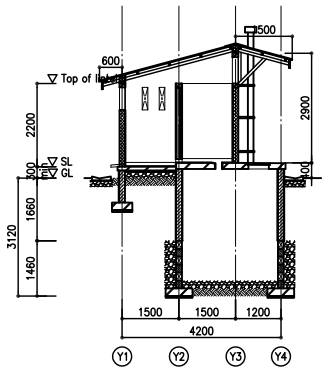

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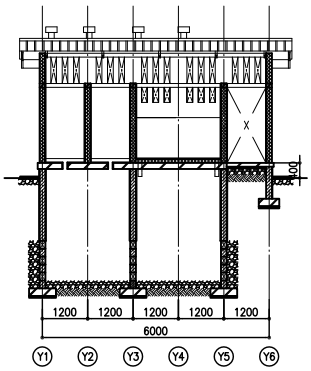

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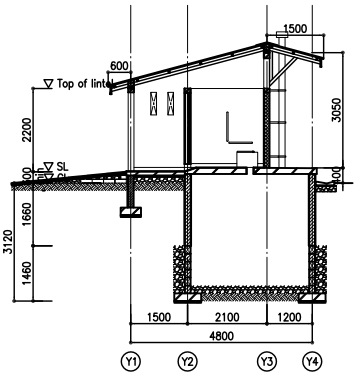

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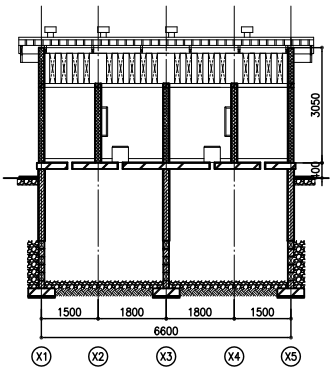

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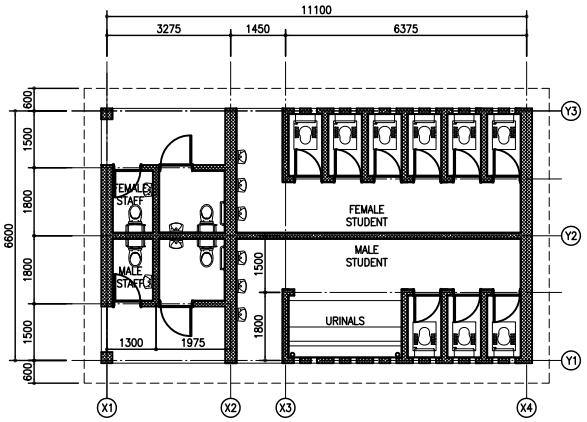
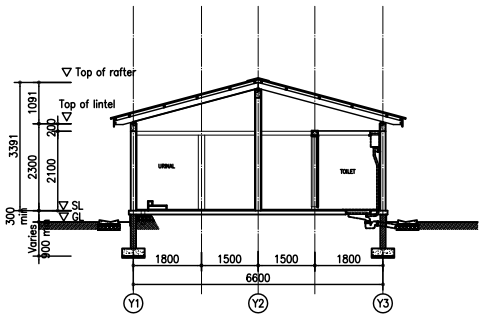
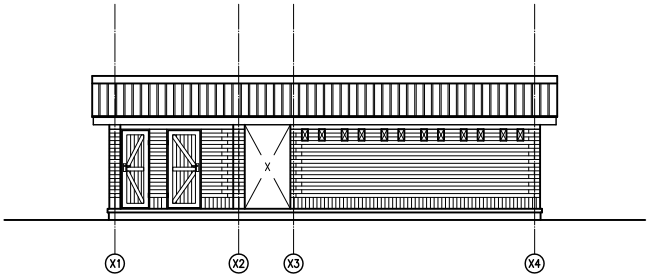


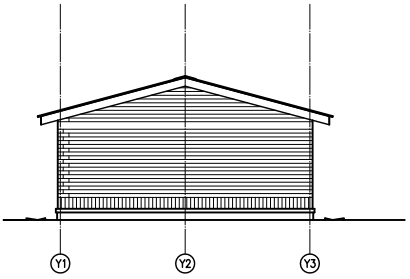
FLOOR PLAN
FLASH TOILET
Scale 1/200



SECTION
Scale 1/200



FRONT/REAR ELEVATION
Scale 1/200



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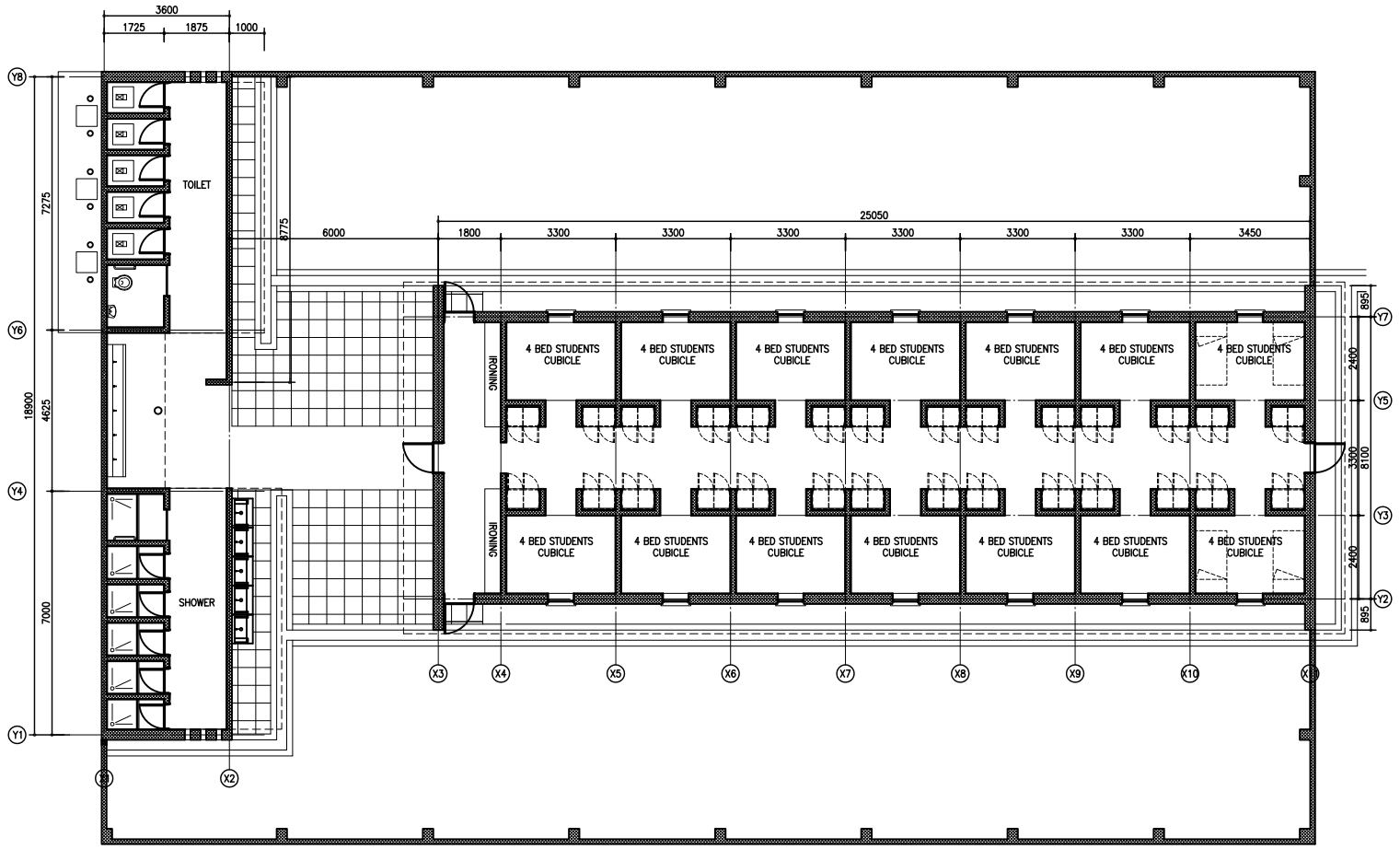

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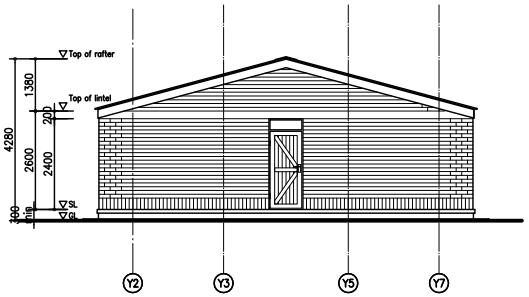

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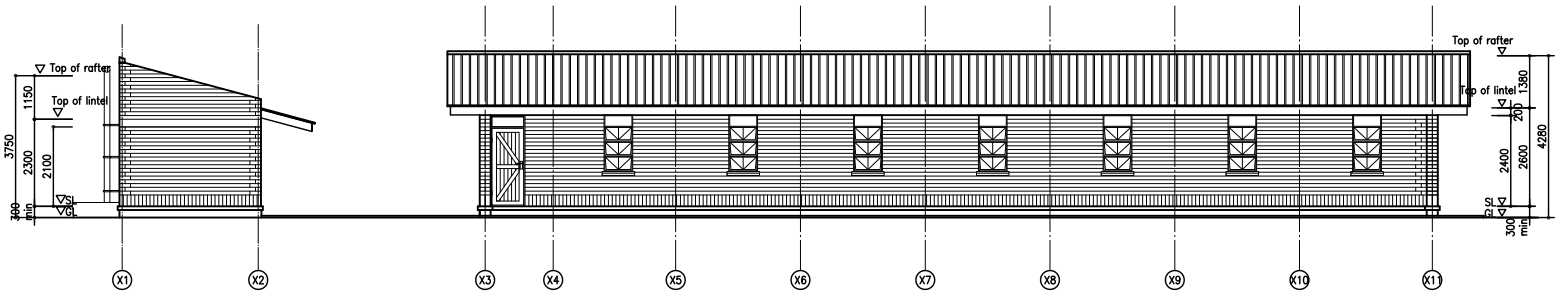

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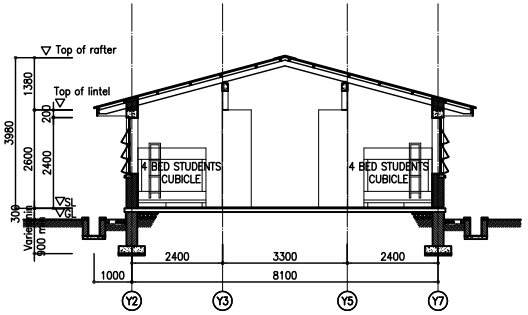
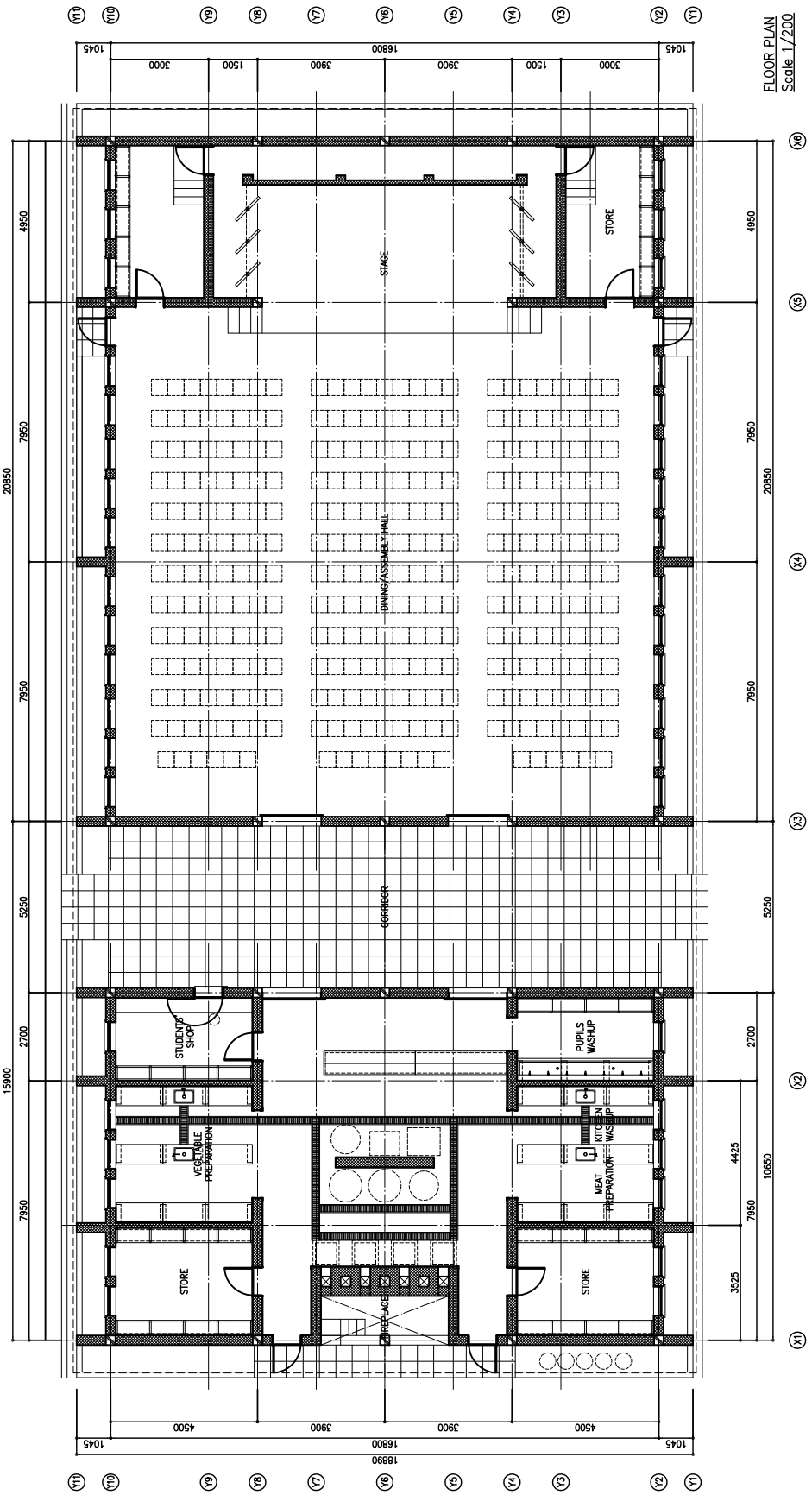


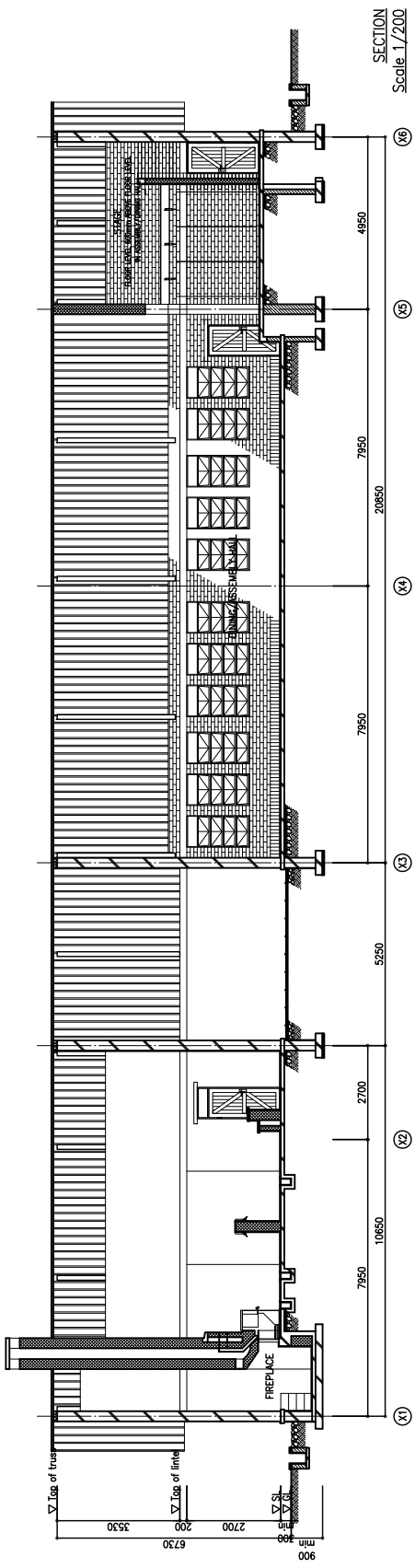
SECTION
Scale 1/200

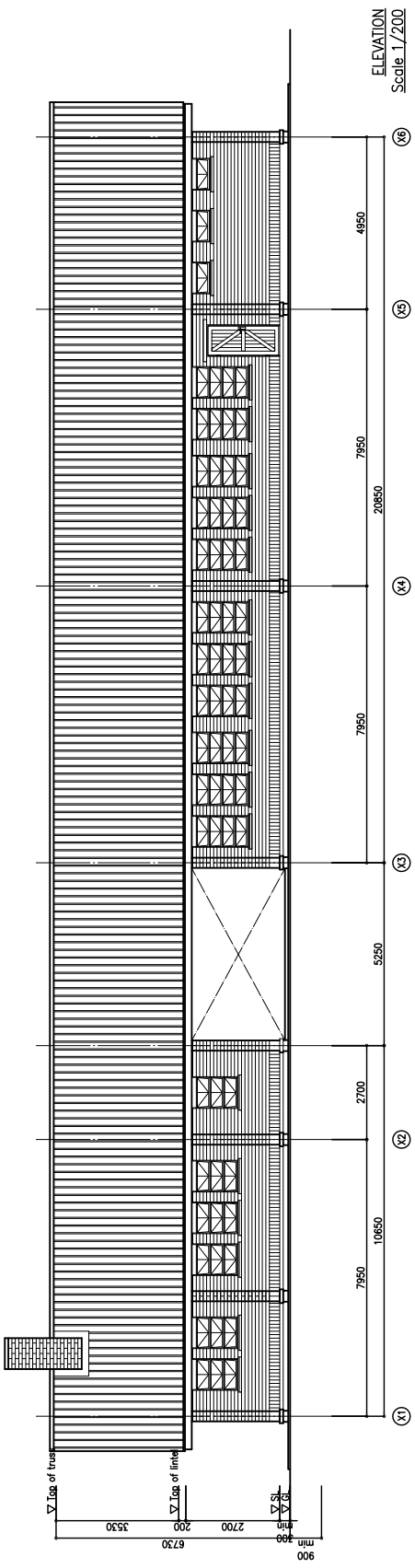
74

HOSTEL A-07

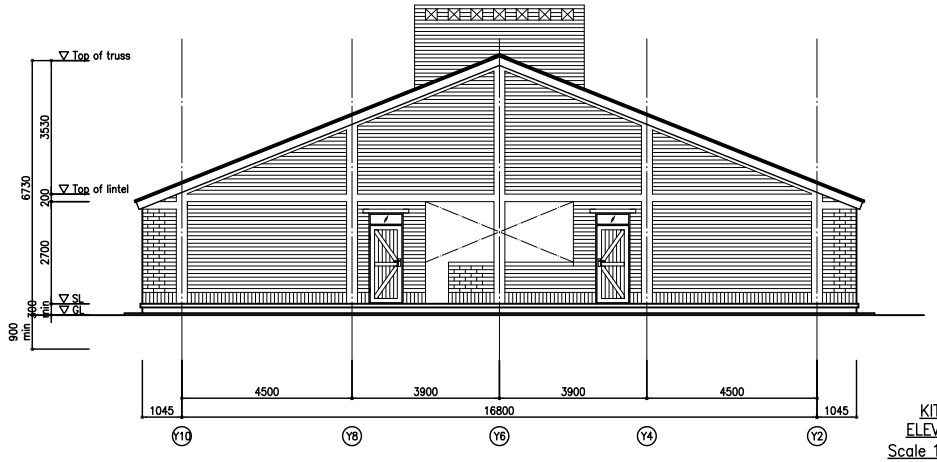


KITCHEN/ASSEMBLY HALL 1 A-08

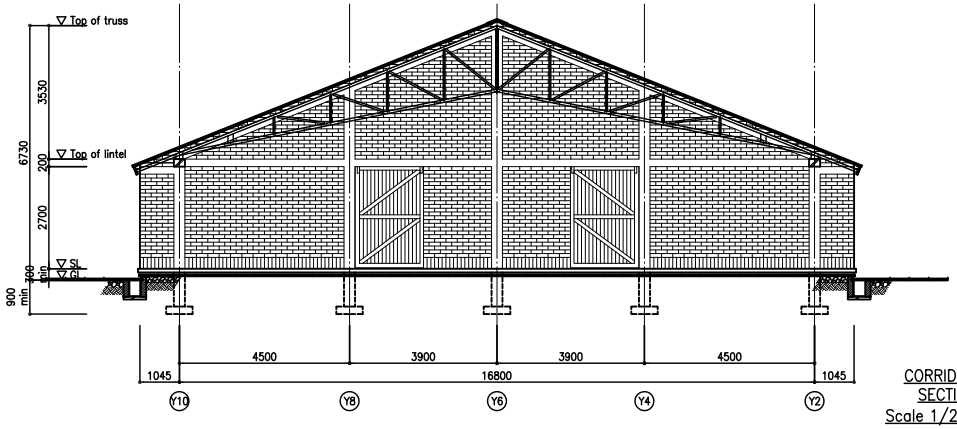




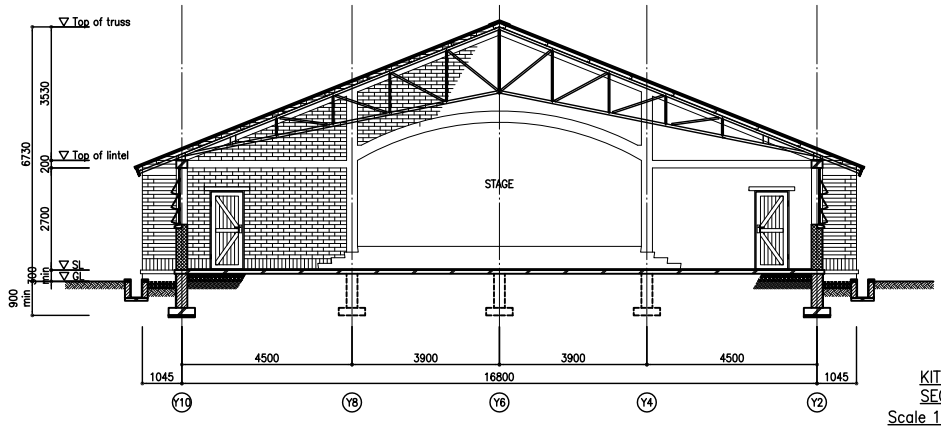
KITCHEN/ASSEMBLY HALL 2 A-09



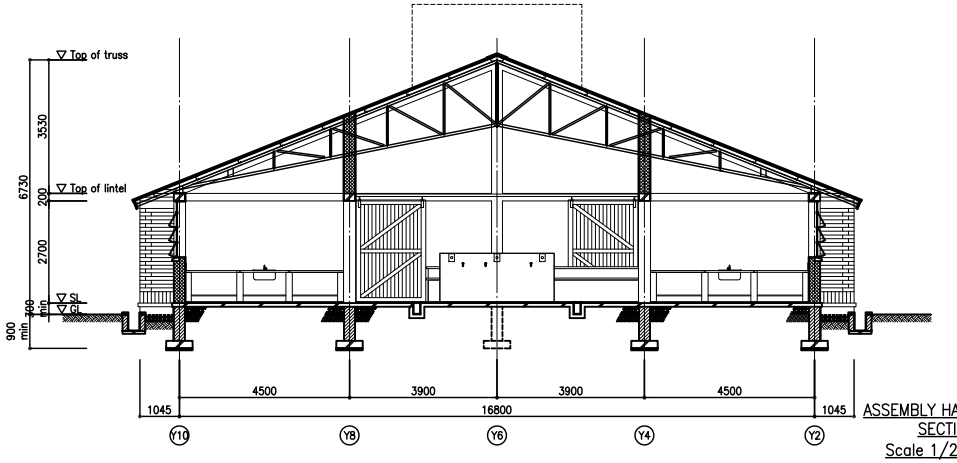
KITCHEN
ELEVATION
Scale 1/200



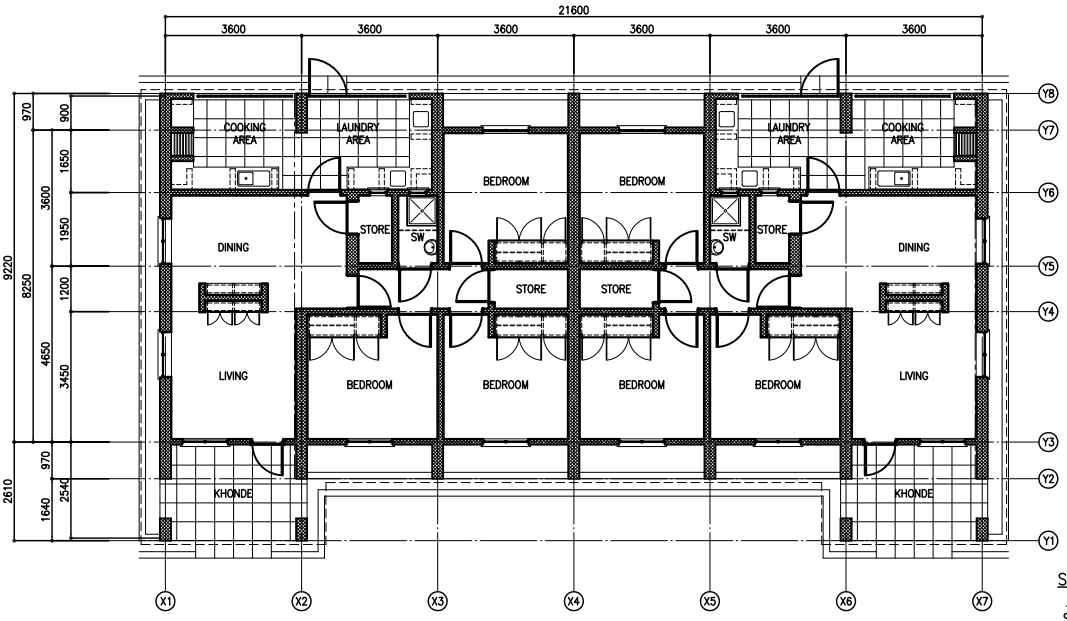
CORRIDOR
SECTION
Scale 1/200



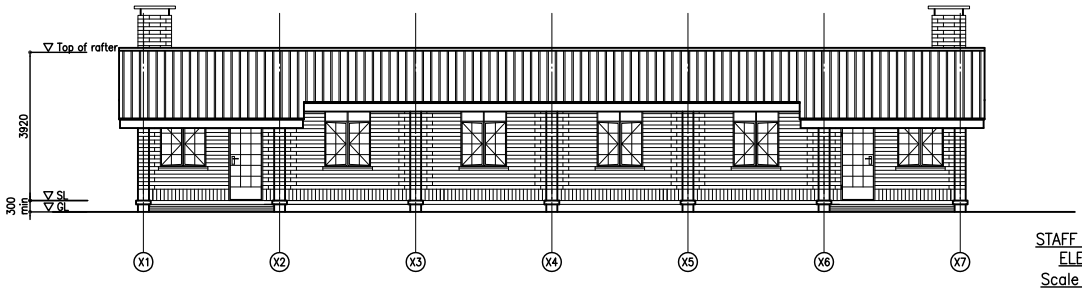
KITCHEN
SECTION
Scale 1/200



ASSEMBLY HALL
SECTION
Scale 1/200



STAFF HOUSE
FLOOR PLAN
Scale 1/200



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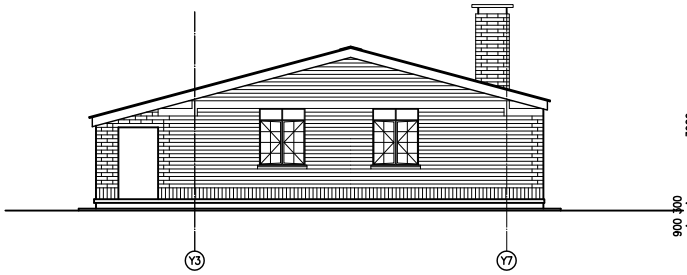
Scale 1/200



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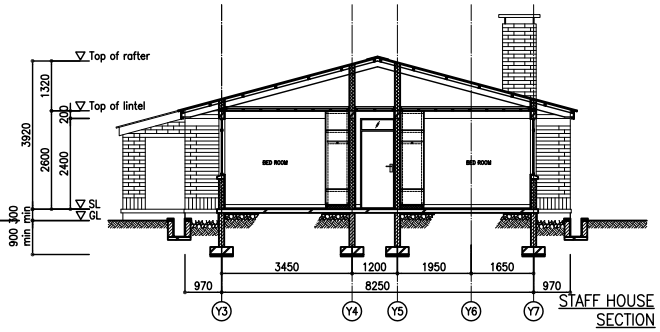
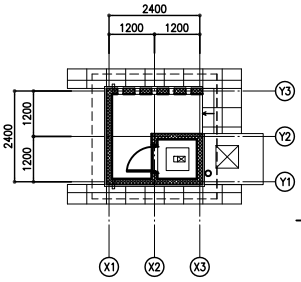
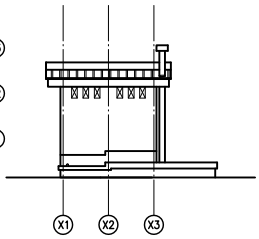
Scale 1/200



STAFF HOUSE
SECTION
Scale 1/200



STAFF HOUSE WC
FLOOR PLAN
Scale 1/200



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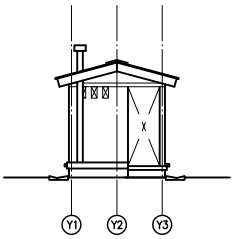

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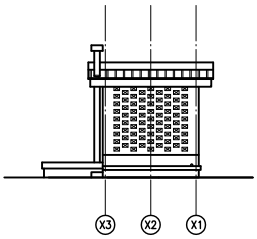

STAFF HOUSE
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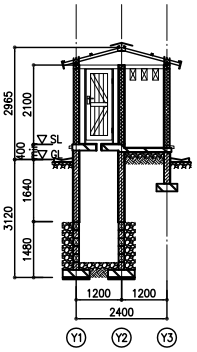
Scale 1/200



STAFF HOUSE
SECTION
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 organizations concerned based on this report, needs to be approved by cabinet decision of the Japanese Government 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 organization of the Council. The Council will be attended by representatives of the Procurement Agent from the Japanese side as advisors.

(3) Implementing Organization on the Malawian Side

The Ministry of Education, Science and Technology (MoEST) is responsible for implementing this Project on the Malawian side. The Directorate of Education Planning of MoEST is the implementation agency in charge of coordination of the entire project and operations including the necessary budgetary measures. The Directorate of Education Planning supervises the organizations concerned such as the Education Division Offices and Education District Offices regarding the work borne by the Malawian side, such as land development and electricity and public water extension, to implement the work and obtain necessary licenses and agreements. For the E/N to be concluded between the two Governments implementing this Project, the Ministry of Foreign Affairs and International Cooperation in Malawi will be in charge.

(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 organizations 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, summarize 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

According to the project implementation contract to be concluded with the Procurement Agent, the Supervision Consultant will be in charge of the following items:

- To provide assistance for the tender operations performed by the Procurement Agent.
- To visit and inspect the sites according to the content and frequency specified in the project implementation contract, ensure the construction quality and confirm the schedule control and safety management, and report the results to the Procurement Agent periodically.
- To confirm each contractor's construction progress and workmanship in response to request for payment made by the contractor, and report the result to the Procurement Agent.
- To conduct work inspections and defect inspections, and report the results to the Procurement Agent.

(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 and procurement within the due date for implementation.

(7) Implementation System

The figure below shows the implementation system in this Project:

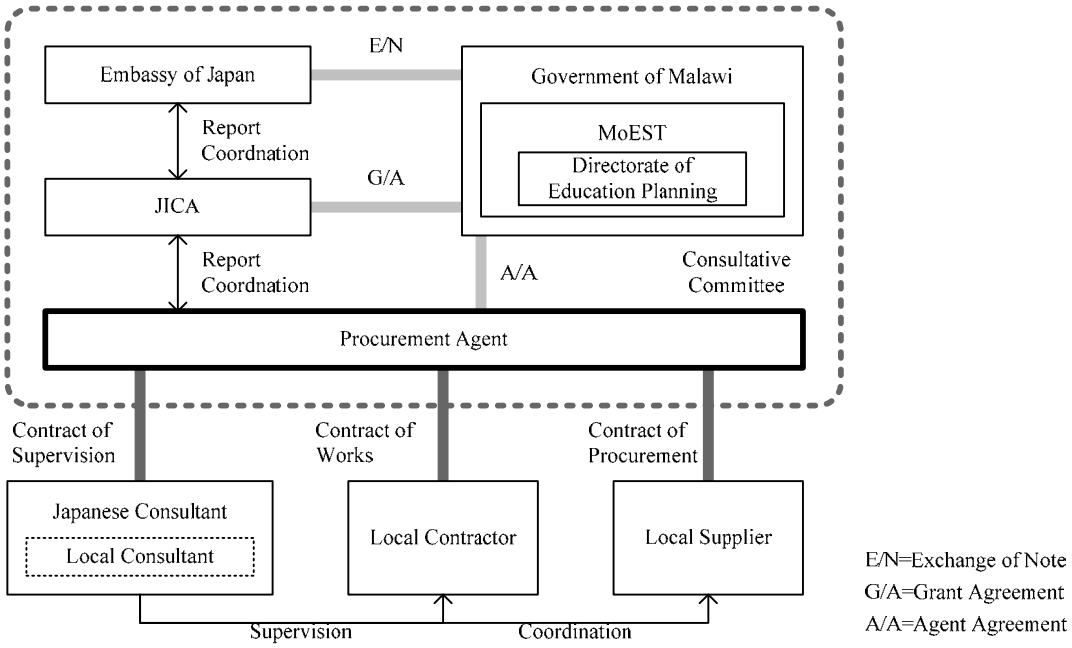


Figure 2-5 Conceptual Diagram of Implementation System

2-2-4-2 Implementation Conditions

(1) Laborers' Skill Levels

General labor can be procured at all the planned sites in this Project. On the whole, however, since there is a shortage of skilled laborers, it will be difficult to procure skilled labor at rural sites. Major contractors that perform construction all over the country have established a system whereby they employ many skilled laborers on a regular basis and dispatch them to various regions for each project. Therefore, overhead costs such as laborers' 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, caution is required with regard to traffic in the rainy season as most of the sites are connected from trunk roads through unpaved roads.

(3) Contractors

1) Definition of Registration Systems and Contractors of Recipient Country

In Malawi, Contractors, suppliers, and consultants need to be registered under the following three systems before performing construction or other operations:

▪ Registered Contractor System 1: Under the Companies Act

In Malawi, the Companies Act 1984 issued by the Ministry of Justice specifies the registration procedures required to obtain corporate status. Normally, with the assistance of a lawyer, a

company must draw up two documents which are (1) Memorandum of Association and (2) Articles of Association, and submit an application to the Registrar General in Blantyre to obtain a Certificate of Incorporation. Under this law, foreign and domestic contractors are not distinguished by definition.

- Registered Contractor System 2: Under the National Construction Industry Council (NCIC)

The National Construction Industry Council (NCIC) was formed by law and is run by staff of private companies dispatched from the Malawi Institute of Construction, Malawi Institute of Architects, and Malawi Institute of Engineers that are members of the Council. To obtain the qualifications for implementing construction work in Malawi, consultants, contractors, and suppliers should register with the NCIC. After the registration, they are obliged to renew their registration once every year (with payment of renewal charges). If a registered contractor continues to respond inappropriately to warnings from the NCIC based on complaints from a third party, they may be deregistered or downgraded.

The contractors are included in the list of registered members, categorized 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.

Additionally, foreign contractors and recipient-country contractors are defined in the "Procedures for Registration of Persons Engaged in the Construction Industry" published by the NCIC as the three types shown below.

Table 2-22 List of Definitions of Firm Classifications (Source: NCIC)

Firm	Definition	Remarks
Malawian firm	Malawian firms are those owned by indigenous Malawians and having more than 51 percent of their capital originating from within 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 percent 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 percent of their capital originating from outside Malawi.	Non-Malawian owner and more than 51% of capital from outside Malawi

When the nominated tenderers were chosen in CDSS Phase 1, 19 contractors were selected in consideration of the planned contract amount from the top two categories (acceptable contract

amount: unlimited or 500 million Mkw) excluding foreign firms based on the registration list showing firm classifications exhibited in the newspapers and official gazette dated October 21, 2009 just before the E/N conclusion. As a result, tendering was successfully completed with the participation of contractors with past record of generally similar large projects. This range of selection seems effective for examining the tenderers to be nominated in this Project.

- Registered Contractor System 3: Under the Malawi Revenue Authority (MRA)

  After completing registration under the two registration systems described above, contractors should register with the Malawi Revenue Authority (MRA) to obtain a Tax Payer Identification Number (TPIN) required for paying tax. Note that foreign and recipient-country contractors are not distinguished in the registration conditions nor in the registration procedures.

2) Information on Contractors Capable of Submitting Tenders

- Number of Contractors Capable of Submitting Tenders When the Project is limited to Recipient-Country Contractors

  When the Project is limited to recipient-country contractors, only Malawian firms will be able to submit tenders. Thus the number of contractors will be 14 when the acceptable contract amount is unlimited or five when it is 500 million Mkw at the maximum (see the table below). However, as only a very few of these contractors own construction records on an equivalent scale or with similar facilities to this Project, it is necessary to consider a way to include local firms with past record as in the CDSS Phase 1 plan.

Table 2-23 Excerpt from NCIC List of Registered Contractors (as of November 30, 2010)

Category for the acceptable contract amount	Construction type	Number of Contractors (Only Malawian/local firms, excluding foreign firms)
Unlimited	Entire construction	27 = Malawian 14 + Local 13
Max. 500 million MKw (about 280 million JPY)	Entire construction	6 = Malawian 5 + Local 1

*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.

- List of Contractors Capable of Submitting Tenders

  When local firms are included in the recipient-country contractors, there will be 33 contractors capable of submitting tenders, which is considered to be the necessary range to enable successful tendering including contractors with past record.

- Country of Registration, Capital Ratio, Technological Level, Past Records, etc.

From the breakdown of the above-mentioned 33 companies, there are 13 companies of registration classified as local firms, covering four countries. Regarding the capital ratio, according to NCIC regulations, 51% or more of the Malawian and local firms have capital originating from within Malawi.

Site surveys and hearing surveys of consultants were conducted regarding facilities constructed in 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.

(4) Construction Delays

The hearing survey to MoEST as well as local consultants and contractors with past records in similar projects found that construction delays frequently occur. The table below shows the major causes of construction delay:

Table 2-24 Major Causes of Construction Delay

Cause of Construction Delay	Remarks
a. Delay at construction start due to inadequate surveying	In this Project, site surveys and ground surveys are conducted by local subcontracting. Since test drilling for well drilling will also be conducted before the start of construction, such delays as stated in the left column are not likely to occur.
b. Shortage in supply of locally procured materials	Major construction materials that can be procured domestically are cement, aggregate, and fittings. There are two cement manufacturers in the country. Schedule control is required for aggregate in order to obtain the required amounts in advance as some of them are expected to be crushed manually. Procurement control for fittings is required in order to allow ample manufacturing time as fittings are required in large quantities.
c. Delay in payment by orderer	Regardless of the NCIC class, contractors that are in a poor financial state cannot prepare for the next process, causing construction delays.
d. Abrupt design changes by orderer	Details of such changes are unknown.
e. Interference of rainy season	It is advisable to start construction in or after April when the rainy season is over.

Of the causes listed above, the major cause is the excessively long time-lag from billing to receipt of payment. In many cases, it takes around three months from billing to payment, putting contractors in a poor financial state regardless of NCIC class registration, and unable to prepare

for the next process, thus causing frequent construction delays. It is also necessary to pay attention to measures for preventing construction delays, such as (1) Close investigation of the financial state of contractors at the time of PQ, (2) Improvement for efficient approval operations from billing to payment, and (3) Increased ratio of advance payment.

(5) 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. Discussions with the Ministry of Finance and the Malawi Revenue Authority (MRA) confirmed that the application of tax exemption measures to this Project would be enabled on the assumption that a Grant Agreement (G/A) is signed by the Finance Minister. The tax exemption methods and procedures vary depending on the target. The table below shows the details of tax exemption measures and precautions with a focus on the different target items.

Table 2-25 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	MRA reviews and	MRA reviews and approves

	approves the application.	approves the application.	the 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	Labor 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.		

(6) 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 organization specified in the contract and (c) Settlement in the court, in that order. In Malawi, there are following three organizations 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.

All the three organizations perform arbitration/mediation procedures according to the Arbitration Rules 2009 Edition issued by NCIC. The ruling procedures have not yet been established and are performed according to the Arbitration Rules 2009 Edition as there are no other such guidelines. Note that the actual ruling and arbitration/mediation procedures are only performed by NCIC and that the other two organizations, after accepting an application, entrust any further procedures to NCIC.

The persons who perform the process of ruling or arbitration/mediation are selected from the list of registered arbitrators (about 20 persons) managed by NCIC. The registered persons are arbitrators approved by the Institute of Arbitration in Tanzania (there are no organizations with similar functions in Malawi). NCIC provides applicants including registered persons with training for about one week twice a year.

None of the projects implemented by EIMU has ever encountered dispute settlement. NCIC handles disputes about twice a year through rulings and three or four times a year through arbitration/mediation. During these procedures, ODPP served as liaison about once in two years. The costs required for dispute settlement are about 40,000Mkw/5 days (the precise amount is

being checked by NCIC). A hearing survey of the local law firms revealed that few actual disputes escalate into court trials. However, past cases include a motion for complaint against contract termination by the owner and refusal of final payment by the owner because of failure to meet the required quality.

2-2-4-3 Scope of Work

(1) Lot Division of Contract

Lot division should be planned in consideration of the priorities of the sites and facilities, enabling a response to variations in the project costs, based on the basic policies shown below:

Facility Construction

Lot division for facility construction should be performed at each site in consideration of the scope of work, efficiency of implementation, and cost effectiveness. The educational facilities required for school operation should be the first-priority group, and the teachers' houses should be the second-priority group. The tender conditions should include the provision that "the order quantity of the second-priority component may vary due to differences between the tender price and the planned price", thereby ensuring that the contractors respond to the final adjustment of project costs that vary according to tender results. Specifically, the submitted tender prices should be evaluated and assessed in the tender evaluation. When the successful tenderer candidates are selected, adjustment should be made to keep the remaining amount, to which consideration is given so that it could be allotted to the planned procurement amount of the second batch, within the range where reimbursement is possible (3% or less of the E/N amount).

- First-Priority Group: Cooperation components-: Administration block, classroom block, laboratory block, toilet block, hostel, kitchen/multipurpose hall block, guard's block and external work: A total of six lots (sites)
- Second-Priority Group: Teachers' houses (included in the above five of the six lots/sites)

Equipment Procurement

Equipment procurement in this Project is roughly classified into two categories depending on the different procurement sources-: educational furniture and teaching materials for experiments. In view of the procurements implemented by other donors, local suppliers are considered capable of procuring both furniture and educational equipment for all of the six sites. In this Project, equipment should be procured for all the sites as one lot, in pursuit of cost reduction at the time of the tender according to the procurement scale.

The following table shows the overview of lot division described above:

Table 2-24 Lot Division

	Priority	First Priority	Second Priority

Lot №	Site Name	Classroom Block	Administration Block Type A,B,C	Laboratory Block	Toilet Block Male Female Teachers Flush Toilets	Hostel	Toilets for Hostel	Kitchen / Hall	Guard Station	Teachers' Houses	Toilets for Houses
1	Mkwichi	3	1	1	1	0	0	0	1	0	0
2	Matenje	2	1	1	5	2	2	1	0	2	4
3	Liwaladzi	2	1	1	5	2	2	1	0	2	4
4	Zolozolo	3	1	0	5	2	2	1	1	1	2
5	Mpamba	2	1	1	5	2	2	1	0	2	4
6	Ezondweni	2	1	1	5	2	2	1	0	2	4
7	Educational furniture required for the above six schools										
8	Educational equipment for experiments required for the above six schools										

* Figures represent the number of blocks.

(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 confirm them as the final tender documents.

In this Project, the policy is to implement simultaneous tendering for multiple lots for which the upper contractors registered with NCIC are expected to submit tenders in order to ensure the required construction management system and construction quality while paying attention to establishing the qualification conditions to ensure competitiveness in tendering and guarantee construction capabilities.

Selection of Contractors

Based on objective information obtained from the tender results during CDSS Phase 1 (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 classified in the registration list of NCIC as Malawian or local firms who have been registered continuously for a required certain period with adequate capabilities ("Building" branch contractors classified as "Unlimited" or "500 million Mkw") 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 as construction delays are often caused by time-lags from billing to payment, affecting the work schedule.

The selection criteria for contractors are that they meet the requirements for the contractors registration rank (classified in the registration list of NCIC) , the total price of orders received for

construction work in Malawi in the past five years (which must be higher than the price equivalent to that of the target tender every year), past records in similar equal-scale construction in Malawi in the past five years, qualifications and personal history of the engineering staff, ownership of the required equipment, financial state, and amount of current assets regarding this Project. Additionally, the capacity of tenders should be specified as a required condition in evaluating qualification as an index indicating the contractors' capability of implementing the contracted work.

Selection of Furniture/Equipment Suppliers

For local procurement of educational furniture and equipment, the suppliers are selected by general competitive tender with limitations on qualification for participation in the tender. This Project should also conform to the local practices and use general competitive tendering with limitations on qualifications for participation in the tender. However, based on the tender conditions in CDSS Phase 1, consideration should be given to suppliers with past records of procurement in projects of similar or equivalent scale in terms of manufacturing, procurement and financial capabilities.

2-2-4-4 Construction Supervision Plan/Procurement Supervision Plan

The Consultant in charge of supervision in this Project should conclude a contract with the Procurement Agent and perform operations under the guidance of the Procurement Agent. The specific operations of the Consultant at each stage are described below:

Tender Stage

- Support for creating tender documents: Review the tender reference documents including implementation 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.

Supervision Stage

- Creation of standard documents for supervision: To standardize construction supervision operations performed at different sites, create a check list summarizing 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 Consultant should implement the construction supervision system shown below:

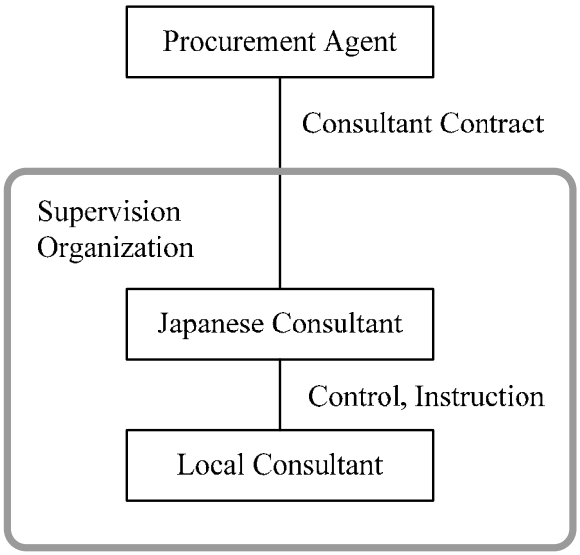


Figure 2-6 Conceptual Diagram of Construction Supervision System

2-2-4-5 Quality Control Plan

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 2-27 Parameters for Quality Control

Items	Method
Ground condition at	・Condition of foundation beds should be confirmed by visual inspection and compared with the test results.

site	・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.
Rebars, steel beams	・A mill sheet shall be submitted for confirmation of the material quality by delivery site and type, and a tensile test should be carried out for each steel beam diameter in an authorized laboratory.
Inspection of rebar work	・Rebar 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 rebars, 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 authorized 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 authorized 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 compressed strength test should be conducted to confirm that the average 28-day strength of three specimens is higher than the design standard strength.
SSB	・A compression test should be carried out by an authorized 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 authorized 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.

The major control items listed above should be summarized 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 filed for storage.

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

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. 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 2-28 Sources of Procurement of Materials

Construction Materials	Country of Procurement		Remarks
	Malawi	Third Country	
Building materials			
Cement	○		Domestic product available in Malawi
Sand (fine aggregate)	○		River sand near the site
Crushed stone (aggregate)	○		Procured from a crusher plant near the site
Reinforcement steel bars	○		Marketed materials made in South Africa in accordance with SABS standards
SSBs	○		Produced at each site
Wooden trusses	○		Produced at each site
Roofing (iron sheets)	○		Marketed material made in South Africa in accordance with SABS standards
Wooden timber	○		Domestic material from Northern Province
Plywood forms	○		Domestic product available in Malawi
Concrete blocks	○		Produced at each site
Wooden/steel fittings	○		Produced at a domestic factory with technical/production capabilities
Hardware	○		Marketed materials made in Europe or South Africa
Glass	○		Ditto
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 imported equipment which is easy to maintain
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 in Maputo
Others			
Kitchen equipment	○		Products made in South Africa can be procured

2-2-4-7 Implementation Schedule

The following describes the plan for implementation schedule after the exchange of documents between the two Governments, such as the Exchange of Notes (E/N), Grant Agreement (G/A),

Agent Agreement (A/A) and supervision consultant contracts, on the assumption that this Project will be implemented by Grant Aid for Community Empowerment of the Japanese Government.

Order of Tender

Construction should be implemented sequentially in order to improve the efficiency of project implementation and reduce the project costs, starting from sites with longer construction periods expected due to difficulties in procurement of materials and equipment. Tendering should be performed in the three rounds shown below, each consisting of multiple lots according to differences in timing of order. To identify the remaining amount in advance, however, Tendering Orders 2 and 3 may be performed simultaneously.

- Tendering Order 1: Construction at six sites corresponding to the first-priority group essential for the operation of secondary schools, and construction of teachers' houses corresponding to the second-priority group whose volume can be adjusted within the lot.
- Tendering Order 2: Procurement of furniture (educational furniture) required for secondary school facilities at the above six sites.
- Tendering Order 3: Procurement of materials and equipment (for experiments) required for secondary school facilities at the above six sites.

The following table shows the overview of the tender order:

Table 2-29 Overview of Tendering Order

Tendering Order	Lot №	Site Name	Construction Work		
			Total Floor Area of Priority 1	Total Floor Area of Priority 2	Total
1	1	Mkwichi	1,172.14m^2	—	1,172.14m^2
	2	Matenje	2,127.93m^2	441.92m^2	2,569.85m^2
	3	Liwaladzi	2,127.93m^2	441.92m^2	2,569.85m^2
	4	Zolozolo	2,046.82m^2	220.96m^2	2,267.78m^2
	5	Mpamba	2,127.93m^2	441.92m^2	2,569.85m^2
	6	Ezondweni	2,051.07m^2	441.92m^2	2,492.99m^2
	Total floor area		11,653.82m^2	1,988.64m^2	13,642.46m^2
2	7	Furniture required for 6 sites			
3	8	Educational equipment for experiments required for 6 sites			

Tendering Method

The tendering method, based on past examples of community empowerment projects and the tender results in CDSS Phase 1, should be as shown below in principle:

- Tendering orders (hereinafter referred to as batches) should be defined as (1) First batch: facilities in the first-priority group and teachers' houses in the second-priority group, and (2) Second batch: educational furniture and educational equipment for experiments.
- The facility component within the range that can be procured by the planned procurement amount of furniture and educational equipment for experiments as well as a fund with 3% or more of E/N amount remaining (reserve funds for construction and procurement of furniture and educational equipment for experiments) (which is fixed after fund transfer) should be subject to tender in the first batch.
- Of the lots in the first batch, those including facilities for teachers' houses in the second-priority group should be subject to conditional tender on the condition that "the quantity may vary depending on the tender price."
- If a surplus amount remains as a result of the tender for the first batch, some of the facilities that were reduced from the teachers' houses at the cutback stage of the preparatory survey should be added in the quantity corresponding to the surplus amount, and the contractors at the relevant site should be given additional orders or contracted for increased amounts at the time of tender evaluation. Conversely, if the planned amount is exceeded, the quantity of teachers' houses should be further reduced, and a contract should be concluded for the reduced amount.
- If a surplus amount remains in the procurement budget for furniture and educational equipment for experiments as a result of the tender for the second batch (particularly, if the remaining amount exceeds the reimbursable amount of 3% of the E/N amount), contracts should be concluded for an increased quantity of furniture at the time of tender evaluation (e.g. to procure additional furniture to make up for shortages in the existing classrooms, etc.). This procedure makes it possible to keep the remaining amount within 3% of the E/N amount at least. Conversely, if the planned amount is exceeded due to rising costs or any other reasons and the planned quantity cannot be procured, the shortfall should be procured at the expense of the Malawian side.

Construction Schedule

The construction period, based on the tender conditions in CDSS Phase 1, past records of construction of secondary school facilities, 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.

The period for procuring furniture and educational equipment can be set as 10 months including creation and confirmation of working drawings, ordering, production, delivery and acceptance inspections, but it should be estimated at 12 months in consideration of the timing of Tendering Order 4 for the adjustment of project costs. In compliance with the construction and procurement policies, tenders should be performed in turn while ensuring the minimum required time for fund management and preparation/adjustment between each tender.

The project implementation period is expected to be 27.5 months if the overview project schedule is set by including the period required by the local Procurement Agent for preparation, etc. before and after the project implementation. The overview of the project implementation schedule is shown in the following figure.

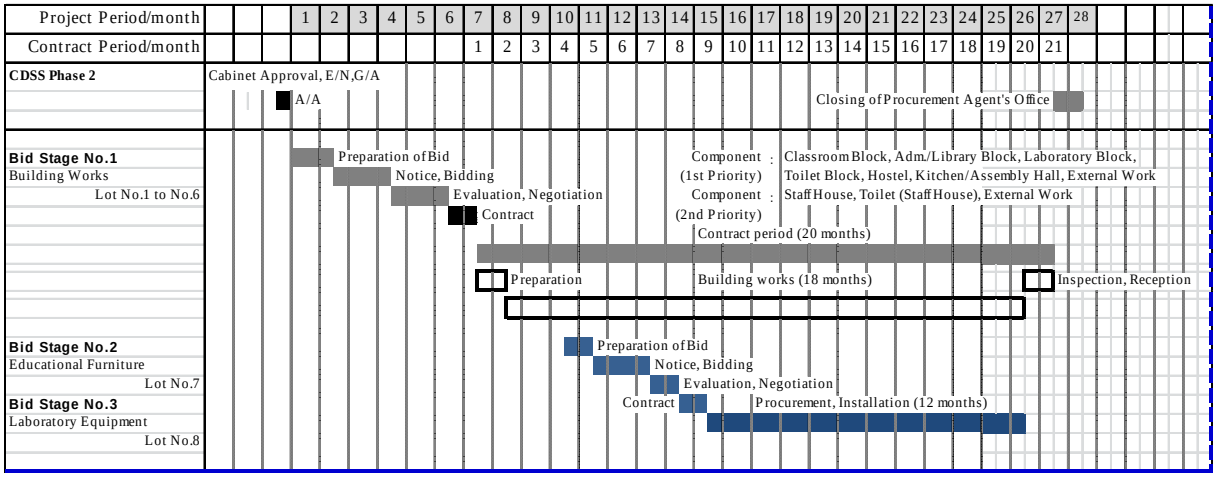


Figure 2-7 Implementation Schedule

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 school yards, planting, gates and boundary walls, 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 government.
- To pay the handling charge for payments to Japanese banks according to the bank regulations.
- 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 2-30 Details of Work to be Borne by the Malawian Side

	Work required before the start of construction		Work required after the start of construction	
	Acquisition of building permits	Removal of trees and roots, and ground leveling	Extension of electricity	Extension of public water
1. Mkwichi CDSS	○	○	○ (for additional capacity)	○
2. Matenje CDSS	―	○	○	―
3. Liwaladzi CDSS	―	―	○	―
4. Zolozolo CDSS	○	○	○ (for additional capacity)	○
5. Mpamba CDSS	―	○	○	―
6. Ezondweni CDSS	―	―	○	―

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 Plan

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 principal 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 principal, 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.

After the completion of this Project, the planned schools with additional classrooms, science laboratories, libraries, etc. to be used to implement the secondary education curriculum are likely to be designated as cluster core secondary schools. The number of teachers needs to be increased to 16 for two-stream schools and 24 for three-stream schools, according to the staff assignment criteria of the MoEST.

For the five schools except for Mkwichi CDSS, housemasters and cooks should be assigned to the newly constructed girls' hostels and halls/kitchens. The current number of assigned teachers needs to be increased as shown in the table below after the implementation of this Project.

Table 2-31 Planned Number of Personnel

Name of School (Planned number of students)	Personnel Plan	Number of Teachers (Qualified)	General Staff							
			Accountant	Assistant	Assistant librarian	House master	Cook	Janitor	Security guard	Total
Mkwichi	Current	21 (20)	1	0	1	0	0	3	3	8
CDSS	Planned	24 (23)	1	1	1	0	0	3	3	2
(480)	Needed	3	0	1	0	0	0	0	0	1
Matenje	Current	7 (2)	1	0	0	0	2	1	1	5
CDSS	Planned	16 (11)	1	1	1	1	3	1	3	9
(320)	Needed	9	0	1	1	1	1	0	2	6
Liwaladzi	Current	7 (1)	1	0	0	0	0	1	2	4
CDSS	Planned	16 (10)	1	1	1	1	3	1	3	11
(320)	Needed	9	0	1	1	1	3	0	1	7
Zolozolo	Current	17 (12)	1	0	0	0	0	1	3	5
CDSS	Planned	24 (19)	1	1	1	1	3	1	3	11
(480)	Needed	7	0	1	1	1	3	0	0	6
Mpamba	Current	9 (2)	1	0	0	0	0	0	1	2
CDSS	Planned	16 (9)	1	1	1	1	3	1	3	11
(320)	Needed	7	0	1	1	1	3	1	2	9
Ezondweni	Current	7 (2)	1	0	0	0	0	0	1	2
CDSS	Planned	16 (11)	1	1	1	1	3	1	3	11
(320)	Needed	9	0	1	1	1	3	1	2	9
Newly needed total		44 (44)	0	6	5	5	13	0	7	38

(2) 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 principal. At the schools where girls' hostels are planned, daily life management and guidance should be provided by the housemaster. 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 grids must be inspected and cleaned.

The public schools (CDSSs, CSSs, and OSs) receive funding from the Government's ordinary budget for maintenance/management of facilities according to the regulations by school type. The schools also collect school fees specified by the Government (tuition fees of 1,500 Kw/year, Text Revolving Fund (TRF) of 250 Kw/year, and hostel fees of 4,500 Kw/year) and school-defined donations and funds (General Purpose Fund (GPF) of 500 Kw or less per semester, School Development Fund (SDF), and PTA fund). At present, two of the planned schools, Mkwichi CDSS and Matenje CDSS, are accredited as Cost Centers. These two schools receive a designated budget, but the budget allocated by the Education Division Offices to the other four non-accredited schools accounts for 7% to 17% of the total revenue of each school, meaning that the fees collected from students' parents account for a large portion.

By upgrading the planned schools to accredited schools through implementation of this Project, the amounts shown in the table below from the ordinary budget of the Government will be allocated.

Table 2-32 Regulations for Allocation of Ordinary Expenses of the Government by School Type

School Type	Evaluation Target for Allocation of Ordinary Budget	Ordinary Expenses
1. CSS	Determined by specified evaluation (scale, curriculum, auxiliary body)	Evaluation result for the application from a school
2. CDSS accredited school /cost center	Same as the above	Evaluation result for the application from a school
3. CDSS non-accredited school /cost center	When composed of junior secondary F1+F2 When composed of all forms F1+F2+F3+F4	300,000 MKw/year 500,000 MKw/year
4. CDSS non-accredited school/non-cost center	Allocated by the competent Education Division Office	10,000 MKw/month
5. Grant-aided school	School with 1 class per Form School with 2 classes per Form School with 3 classes per Form	42,500 MKw/month 82,500 MKw/month 122,500 MKw/month

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 8,577,000 MKw Approx. 4.8 million JPY

Item	Estimated Cost
Public water extension	209,000 MKw (Approx. 118,000 JPY)
Electricity extension	5,653,000 MKw (Approx. 3,178,000 JPY)
Site preparation, removal of existing trees and roots	328,000 MKw (Approx. 185,000 JPY)
Application for building permits	330,000 MKw (Approx. 186,000 JPY)
Handling fees regarding the bank regulations and payments, etc.	2,057,000 MKw (Approx. 1,156,000 JPY)
Total	8,577,000 MKw (Approx. 4,822,000 JPY)

(3) Conditions for Estimate of Accumulation

- Estimated as of: March 2011
- Exchange rate: 1US$ = 83.93 JPY、1US$ = 149.31Kw、1Kw = 0.56211 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 six existing CDSSs covered in this Project needs to be increased as described in Section 2-4 (1) Operation Plan. The personnel emoluments of the planned schools according to the salary categories by service type of MoEST in 2009 are shown in the table below. The personnel emoluments are estimated at 23,851,584 Kw for the six schools in total, which accounts for 0.137% of the budget for personnel emoluments in November 2010 (17,458 million MKw). Since the MoEST budget in the past three years increased on average by 16% over the previous fiscal year, or by 27% or more in terms of ordinary expenses, no problems are likely to be expected in this increase of amount.

Table 2-33 Estimation of Personnel Emoluments for Teachers and School Staff Required for Personnel Increase (Unit: MKw)

Name of School	Personnel	Number of Teachers	General Staff							Total
			Accountant	Assistant	Assistant librarian	House master	Cook	Janitor	Security guard	
Mkwichi CDSS	New	3	0	1	0	0	0	0	0	1
	Cost	1,206,756	0	140,640	0	0	0	0	0	1,347,396
Matenje CDSS	New	9	0	1	1	1	1	0	2	6
	Cost	3,620,268	0	140,640	140,640	338,844	140,640	0	240,648	4,621,680
Liwaladzi CDSS	New	9	0	1	1	1	3	0	1	7
	Cost	3,620,268	0	140,640	140,640	338,844	421,920	0	120,324	4,782,636
Zolozolo CDSS	New	7	0	1	1	1	3	0	0	6
	Cost	2,815,764	0	140,640	140,640	338,844	421,920	0	0	3,857,808
Mpamba CDSS	New	7	0	1	1	1	3	1	2	9
	Cost	2,815,764	0	140,640	140,640	338,844	421,920	120,324	240,648	4,218,780
Ezondweni CDSS	New	9	0	1	1	1	3	1	2	9
	Cost	3,620,268	0	140,640	140,640	338,844	421,920	120,324	240,648	5,023,284
New Personnel		44	0	6	5	5	13	2	7	38
Personnel Emolument		17,699,088	0	843,840	703,200	1,694,220	1,828,320	240,648	842,268	23,851,584

In the table above, the employment grades are estimated for each service type by referring the annual salaries based on the specifications for the salaries of civil servants as of July 2009 shown in the table below:

Table 2-34 Assumed Annual Income of Personnel

Service type	Annual salary, Unit: MKw	Remarks (Regulations on

		salaries of civil servants)
General teacher	402,252	Grade J1 level or so
Dean/Accountant	439,092	Grade J3 level or so
Housemaster	338,844	Grade K5 level or so
Laboratory assistant, assistant librarian, cook	149,640	Grade M1 level or so
Security guard, school yard manager, janitor	120,324	Grade R1 level or so

Source: Schedule of Established Offices/With Effect from 1st July 2009: MoEST

2) Facility Operation Costs

The costs required for facility operations are estimated as shown below. Tables 5-3 and 5-4 show the calculation results respectively.

- Water charges: Should be paid by two of the six planned schools (Mkwichi CDSS and Zolozolo CDSS) where public water extension will be provided. The other four sites which will use well water (Matenje CDSS, Liwalazi CDSS, Mpamba CDSS, and Ezondweni CDSS) should pay the electricity charges required for operation of the well pumps.
- Fuel charges: Basically, the fuel for cooking at boarding schools is assumed as electricity. LPG gas to be used in the science 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: The minimum amount required for general operation of the school facilities at the planned six schools is 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. However, the hostels and kitchens/halls are assumed to be in operation for 280 days per year.
- 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.

Table 2-35 Calculation of Annual Water Consumption and Water Charges

□Conditions for calculating water consumption

Consumption per person/day: 8 ℓ for staff,
5 ℓ for students,
80 ℓ for boarding students,
80 ℓ for staff families

Maximum daily consumption = Consumption per day × Number of persons

Average daily consumption = Maximum daily consumption × 0.7

Number of days of use per year: 220 days for school staff and students, 280 days for boarding students, and 365 days for staff families

	Number of School Staff Members	Consumption on 220 days	Number of Students	Consumption on 220 Days	Number of Persons in Hostels	Consumption on 220 Days	Number of Staff Family Members	Consumption on 365 Days	Total (m³)	(MKW) Monthly Average Charges (MKW)	Annual Water Charges (MKW)
Mkwichi CDSS	33	203	480	2,956	0	0	4	82	3,159	35,079	420,952
Matenje CDSS	27	21	320	246	112	1,756	28	572	2,596	Appropriated in electricity charges	
Liwaladzi CDSS	27	21	320	246	112	1,756	24	491	2,514	Appropriated in electricity charges	
Zolozolo CDSS	35	27	480	369	112	1,756	8	164	2,153	23,667	284,000
Mpamba CDSS	27	21	320	246	112	1,756	24	491	2,514	Appropriated in electricity charges	
Ezondweni CDSS	27	21	320	246	112	1,756	32	654	2,677	Appropriated in electricity charges	

Table 2-36 Estimation of Electricity Consumption

Calculation of Electricity Consumption by Facility	Daily Electricity Consumption (kWh/day)	Number of Operation Days per Year	Annual Electricity Consumption (kWh/year)	Calculation Conditions
2-classroom block × 2	6.04	220	1,329	・Average demand factor:
2-classroom block × 3	9.06	220	1,993	-Lighting fixtures, etc.: 0.85
Administration/library block	11.32	220	2,490	-Wall outlet circuits: 0.1
Laboratory block	5.02	220	1,104	・Assumed power usage time:
Guard station	0.83	220	183	-Classrooms: 2.0 h/day
Hostel x 2	24.54	280	6,871	-Hostels, kitchens, and houses: 6.0 h/day
Multipurpose hall	3.10	280	868	
Kitchen	28.71	280	8,039	
Teachers' houses	6.3	365	2,300	
Lifting pump for well				・Pump consumption: 0.75kW 100ℓ/min

Table 2-37 Annual Electricity Charges

Annual Electricity Charge Calculation by Site	Annual Electricity Consumption (kWh/year)			Annual Electricity Charges (MKw) [A]x4.09 Mkw/kWh
	Facility Consumption	Lifting Pump Consumption	Total [A]	
Mkwichi CDSS	5,7	0	5,771	23,602
Matenje CDSS	29,9	324	30,224	123,616
Liwaladzi CDSS	28,5	314	28,885	118,140
Zolozolo CDSS	25,0	0	25,043	102,427
Mpamba CDSS	29,9	314	30,214	123,575
Ezondweni CDSS	29,9	335	30,234	123,658

(2) Operation and Maintenance Costs

The costs required for operation and maintenance of the facilities, furniture, laboratory teaching materials, and equipment to be procured in this Project are estimated as shown below. These costs should be appropriated for routine operation and maintenance such as partial repainting of the exterior walls, inner/outer iron and wooden parts, partial repair of the roofs, etc., replacement of broken metallic materials, replacement of valves in the lighting fixtures, partial replacement of sanitary equipment parts, and replacement of broken furniture or laboratory instruments. The costs of large-scale repairs that will be needed over the long term should be covered by the investment budget of MoEST.

Table 2-38 Annual Operation and Maintenance Costs by Site (Unit: MKw)

Annual electricity charge estimation by site	Annual operation and maintenance costs				
	Building maintenance costs	Facility maintenance costs	Furniture maintenance costs	Equipment maintenance costs	Total
Mkwichi CDSS	49,000	47,000	65,000	10,000	171,000
Matenje CDSS	155,000	168,000	130,000	10,000	463,000
Liwaladzi CDSS	155,000	168,000	130,000	10,000	463,000
Zolozolo CDSS	153,000	151,000	140,000	10,000	454,000
Mpamba CDSS	172,000	186,000	130,000	10,000	498,000
Ezondweni CDSS	169,000	185,000	125,000	10,000	489,000

* Based on the data for construction operation and maintenance costs in Japan, the costs for routine maintenance of facilities and fittings were assumed from the details and specifications of the facilities.

(3) Summary of Operation and Maintenance Costs

Summarizing the above estimation results, the annual operation and maintenance costs except for the government-paid personnel emoluments which will be required for the implementation of this Project are as shown below:

Table 2-39 Results of Estimation on Annual Operation and Maintenance Costs (MKw)

Name of school	Water charges	Electricity charges	Operation and maintenance costs	Total
Mkwichi CDSS	420,951	23,602	171,000	615,553
Matenje CDSS	-	123,616	463,000	586,616
Liwaladzi CDSS	-	118,140	463,000	581,140
Zolozolo CDSS	284,000	102,427	454,000	840,427
Mpamba CDSS	-	123,575	498,000	621,575
Ezondweni CDSS	-	123,658	489,000	612,658

Regarding the two types of government-run schools (CDSS non-accredited schools and CDSS non-accredited and cost center schools) among the planned schools in this Project, the burden ratio of the estimated annual operation and maintenance costs to the assumed annual ordinary budget is shown in the table below:

Table 2-40 Ratio of Required Operation and Maintenance Costs to Assumed Ordinary Budget (thousand MKw)

School Name	Revenue from Students' Parents							Addition of Government ORT (2 cases)		Operation and Maintenance Costs (water/utilities + other maintenance costs)				Burden Ratio of Estimated Annual Maintenance Cost		
	Item	Tuition Fee	Textbook Revolving Fund (TRF)	Boarding Fee	General Revenue Fund (GRF)	School Development Fund (SDF)	Total Revenue from Students' Parents 【F】	Budget 【A】 CDSS NC	Budget 【B】 CDSS CC	Public Water Charges	Electricity Charges	Facilities/ Equipment	【M】	【M】／【F】	【M】／【A】	【M】／【B】
	1,000 MKw/student	1.5	0.25	4.5	1.5	1.5	9.25	120	500							
Mkwichi	No. of students	480	480	0	480	480										
CDSS	Budget	720	120	0	720	720	2,280	2,400	2780	420.9	23.6	171	615.5	27.0%	25.6%	22.1%
Matenje	No. of students	320	320	112	320	320										
CDSS	Budget	480	80	504	480	480	2,024	2,144	2,524	0.0	123.6	463	586.6	29.0%	27.4%	23.2%
Liwalazi	No. of students	320	320	112	320	320										
CDSS	Budget	480	80	504	480	480	2,024	2,144	2,524	0.0	118.1	463	581.1	28.7%	27.1%	23.0%
Zolozolo	No. of students	480	480	112	480	480										
CDSS	Budget	720	120	504	720	720	2,784	2,904	3,284	284.0	102.4	454	840.4	30.2%	28.9%	25.6%
Mpamba	No. of students	320	320	112	320	320										
CDSS	Budget	480	80	504	480	480	2,024	2,144	2,524	0.0	123.5	498	621.5	30.7%	29.0%	24.6%
Ezondweni	No. of students	320	320	112	320	320										
CDSS	Budget	480	80	504	480	480	2,024	2,144	2,524	0.0	123.6	489	612.6	30.3%	28.6%	24.3%

Note: For CDSS NCs, CDSS non-accredited and non-cost-center schools, the allocation of the Government's ordinary budget is 120,000 Kw per year. For CDSS CCs, CDSS non-accredited and cost-center schools, the allocation of the Government's ordinary budget is 500,000 Kw. Source: Malawi Education Country Status Report (CSR2008/09).

For Budget [A] for the existing CDSSs (with a government allocation of 120,000 Kw per year to non-accredited schools), the burden ratio is 25.6% to 29.0%, and for Budget [B] for non-accredited and cost center schools, the burden ratio is 22.1% to 25.6%. For the total revenue from students' parents [F], the burden ratio is 27.0% to 30.7%. Although School Development Fund (SDF) revenue from students' parents was assumed to be 1,500 MKw uniformly in the estimation, many of the surveyed schools set the SDF at 3,000 to 4,250 MKw. Therefore, operation and maintenance are basically considered to be possible within the range of the conventional school operation budget scale. If the planned schools in this Project are accredited as cost centers, the burden ratio of operation and maintenance costs will further decrease.

Chapter 3 Project Evaluation

Chapter 3 Project Evaluation

3-1 Preconditions

The Malawian side is expected to carry out the following work to ensure 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 and uprooting of trees within the sites and leveling of 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 administrative areas. As the Malawian side had completed site development and acquired the building permit prior to the implementation of CDSS Phase 1, it is expected that they will carry out the same procedure in CDSS Phase 2.

(2) Tax Exemption

This Project is to be implemented with assistance from Grant Aid for Community Empowerment. Therefore, implementation of this Project will require the conclusion of an E/N between the two Governments. Conclusion of the E/N will ensure the exemption from taxes of goods and services to be procured in this Project. Therefore, 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 CDSS Phase 1 that is currently in progress, it is expected that they will carry out the same procedure for CDSS Phase 2.

3-2 Necessary Inputs by Recipient Country

The Malawian side has already taken appropriate measures for each of the preconditions set out below which they should address for the realization 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 classrooms, laboratories and libraries will be constructed at the target schools in this Project in order to run the schools with two- or three-streams. 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 immediately after their

completion. 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 44 new qualified teachers at the six 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 44 new qualified teachers to the six 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 libraries to be constructed in this Project 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." 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") 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 two of the target schools are accredited cost centers. during the implementation of this Project, the other four target schools are also expected to be awarded a budget as accredited cost center schools.

3-3 Important Assumptions

(1) Implementation of the Overall Development Plan in Education Sector by the Government of Malawi

In its overall development plan for education, NESP (2008 - 2017), the GOM recognizes as priority issues in the secondary education subsector the expansion of equitable access, the improvement of the quality of education and the improvement of governance management capacity, and states as its goal the achievement of a gross secondary education enrollment rate of 30.5%. The GOM is planning to upgrade CDSSs and construct girls' hostels and teachers' houses

as an action plan under the NESP. In the "National Strategies for Teacher Education and Development (hereinafter referred to as "NSTED") 2007 – 2017", the GOM recognizes the following five strategies for the improvement of the quality of education and teachers: 1) teacher training in secondary education; 2) the development of a curriculum for secondary school teachers; 3) the implementation of a distance-learning upgrading course for under-qualified teachers; 4) the implementation of research in the education sector; and 5) the implementation of in-service teacher training and implementation of the Continuing Professional Development (CPD) program. At present, practical measures based on these strategies are being taken in the ESIP (2009 – 2013). This Project is considered to support the overall development plan and the action plan directly, by expanding and improving the facilities of the six target CDSSs and by constructing girls' hostels and teachers' houses in five schools among the six target schools. Since 2007, the GOM has expanded and improved the facilities of the three universities in Malawi involved in secondary school teacher education; repaired and improved facilities, including classrooms and hostels, in the four Conventional Secondary Schools, with support from WB; expanded and improved facilities in 18 CDSSs throughout the country and provided equipment for science experiments to the cluster core schools throughout the country, with support from AfDB; provided training for new qualified secondary school teachers and training for under-qualified teachers in service through DCE and the Department of Education, Mzuzu University; and provided in-service teacher training led by the Department of Teacher Education and Development.

One of the important assumptions of this Project is that the GOM will continue to promote the above-mentioned overall development plan for the realization and maintenance of the outputs of this Project.

(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

(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 enrollment 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) Objective and Urgency of the Project

In Malawi, because of the introduction of the “Free Primary Education” policy, the number of enrollments in secondary education tripled in 2004 over the previous year. Since then, the demand for secondary education has been growing. However, since the gross enrollment rate has not improved significantly since 2008 as facility construction has failed to keep up with the increase in the number of children who hope to enroll at secondary school, the gross enrollment rate remained at 20.5% as of 2010 while the target is to achieve a gross enrollment rate of 30.5% by 2017. As the shortage of secondary education facilities has been a hindrance to the expansion of access to secondary education, expansion and improvement of the facilities has become an urgent issue. The implementation of this Project is urgently required as it aims to expand access to secondary education in the project areas by constructing new classrooms, girls’ hostels, etc. in the six target CDSSs.

(3) Consistency with the Overall Development Plan

The GOM recognizes education as a priority sector in its national development strategy, “Vision 2020”, and in its medium-term development strategy, MGDS, and states that the expansion of equitable access and improvement of the quality of education are priority issues in the secondary education subsector of NESP. This Project, which aims to expand equitable access to secondary education in the project areas by expanding and improving the facilities of six CDSSs, is consistent with the overall development plan.

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

The GOJ provides assistance to Malawi in the form of Grant Aid and technical cooperation in line with Malawi’s long-term national development plan, Vision 2020, its medium-term development strategy, MGDS, and activities for economic and social development aimed at achieving the goals of MGDS, such as NESP (2008 – 2017), and also taking into consideration the TICAD process, one of the GOJ’s most important frameworks for African development. The priority areas of assistance by the GOJ to Malawi are: a) sustainable economic growth (agriculture and rural development); b) social development (improvement of education, water resource development and health/medical services); and c) infrastructure development (promotion of the construction of transport infrastructure and rural electrification). Therefore, this Project is consistent with the assistance policy and strategies of the GOJ with regard to Malawi. 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 23.8 million MKw per year, which corresponds to 0.14% of the budget for personnel salaries of the entire MoEST (17,458 million MKw) for the fiscal year 2010 and 2011. Since the MoEST budget for personnel salaries has increased at an average annual rate of 21.9% 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 centers and provided with the budgetary allocation accorded to cost center 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 of the facilities and equipment to be provided.

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

The methods for the procurement of facilities and equipment to be used in this Project are equivalent to those adopted in similar facility construction projects supported by other donors. Therefore, the implementing agency of this Project, MoEST, has sufficient experience in competitive bidding among local companies. 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 with assistance from Grant Aid for Community Empowerment.

3-4-2 Effectiveness

(1) Quantitative Effects

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

- The total of 56 classrooms (existing 24 classrooms and use 4 other rooms as classrooms, 28 new classrooms) in the six target schools will enable the increase of capacity of enrollments from 1,014 students (in 2011) to 2,240 students (capacity of 40 students x 56 classrooms). This increase in enrollment will expand the opportunity to attend secondary school to those students in the project areas who were previously not able to do so.

- The construction of girls' hostels (accommodation capacity 560 girls: 112 girls×5sites) at each of in the five project sites will enable girls in the project areas to attend secondary schools who were unable to attend secondary school due to difficulty of commuting for long distances. The proportion of girl students in the total enrollment (1,760 students: capacity of 40 students x 22 existing classrooms with 22 new classrooms) of the five project schools will be possibly improved up to 50% (the proportion of girls to boys is one to one) which is the target of national education policy of the government of Malawi.

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

Table3-1 Expected Quantitative Effects

Output Indicator	Current Figure (in 2011)	Design Figure (in 2018[1])
Increase in the number of students attending the target schools	1,014 students[2]	2,240 students[3]
Increase in the proportion of girls enrolled at the five schools where girls' hostels are to be constructed	45.2 %	50 %

(2) Qualitative Effects

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

- The expansion of access to secondary education as a result of the construction of new classrooms in the target schools is expected to increase the ratio of promotion to secondary schools from primary schools and raise the enrollment rate in secondary schools in the project areas.

- The improvement of the educational environment and quality in education through the construction of the facilities and provision of the equipment required for the implementation of the secondary education curriculum is expected to improve the passing rate of the Junior Certificate Examination (JCE) and Malawi School Certificate Examination (MSCE) (JCE: 60.5% and MSCE: 52.99% in 2010).

- The construction of girls' hostels is expected to increase the proportion of girls enrolled in schools and improve internal efficiency (*i.e.* reduction in the proportion of students repeating a grade and the percentage of students leaving school before the end of the course) by reducing the number of female students who are forced to leave school due to long commuting distances or other difficulties in commuting to and from school.

[1] The Project is assumed to complete in 2014, and the target year shall be four years after the completion when the students entered F1 in 2014 will attain the final year of F4.
[2] Total enrollment in the target schools surveyed in February 2011
[3] Designed figure is based on that 40 students per classroom enrolled in the total of 56 classrooms (existing 24 classrooms and use 4 other rooms as classrooms, 28 new classrooms).

- The construction of teachers' houses in the target schools is expected to improve the quality of secondary education at the schools to increase the percentage of qualified teachers among the assigned teachers, as it will create more favourable conditions for qualified teachers to be employed and assigned to the schools and to work for a long period of time.

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