Ministry of Education and Training
Kingdom of Swaziland

PREPARATORY SURVEY REPORT
on
THE PROJECT FOR THE IMPROVEMENT
of
SECONDARY EDUCATION
in
THE KINGDOM OF SWAZILAND

May 2011

Japan International Cooperation Agency

Fukunaga Architects-Engineers

Preface

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey on Improvement of Secondary Education in the Kingdom of Swaziland, and organized a survey team headed by Ichiro Nomura of Fukunaga Architects-Engineers between March,2010 to May, 2011.

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

May, 2011

Nobuko Kayashima
Director General,
Human Development Department
Japan International Cooperation Agency

Summary

1. Country Profile

The Kingdom of Swaziland (hereinafter referred to as Swaziland), bordered by the Republic of South Africa (hereinafter referred to as South Africa) and the Republic of Mozambique (hereinafter referred to as Mozambique), is one of the smallest landlocked countries in Africa. Located on the plateau area along the eastern coast of the southern part of the African continent, at 25-27 degrees south latitude and 31-32 degrees east longitude, this small country of approximately 17,000km^2 is blessed with a temperate climate and fertile land. The capital city is Mbabane and the official languages are English and Siswati. Swaziland is an absolute monarchy with the King as the Head of State. The current constitution was adopted in July 2005 and went into effect in February 2006. The country's total population is approximately 1.18 million, of which 39.4% is under 15 years old. The population growth rate is 1.5% per year. The urban population ratio is 25%, signifying a slower urbanization process in comparison to the Sub-Saharan region as a whole, where 36% of the total population lives in urban areas (World Bank, 2009). Swaziland is divided into four administrative districts, Hhohho, Lubombo, Manzini and Shiselweni.

Swaziland has a relatively gentle terrain. Most of the land area is a hilly region of approximately 400 m to 1200 m in altitude, and the overall land area can be categorized into 4 separate areas determined by altitude: the Highveld, the Middleveld, the Lowveld, and the Lubombo Mountains. The Lubombo Mountains are a relatively small-scale mountain range which runs from north to south along the eastern border with Mozambique. The country enjoys a mild climate during the summer period (October to March) but dry north-easterly winds blow from the inland in winter (April to September) making it a cold and dry period. Climate characteristics are also clearly defined by land features. The annual mean temperature is 19.1°C and the annual mean maximum temperature is 26.4°C (February and March). High altitude areas have heavy rainfall in December and January and while annual precipitation ranges from around 500 mm to more than 2,000 mm in different geographical areas, hilly areas have an annual rainfall of about 760 mm to 1,140 mm.

Twelve project sites have been selected in the 4 districts. All of the sites are in rural areas and although the majority of them (9 sites) are located at an altitude of around 400 m, 3 sites in the western region of the country are located in higher altitude areas, between 900 m and 1,500 m.

This favorable environment has helped pulp, sugar, fruit, canned food, beverage and processed food industries develop into the main industries supporting Swaziland's economy. Approximately 70% of the population are working in agriculture and the forestry sector and are engaged in the production of the above-mentioned goods. Production in agriculture and forestry accounted for 42.3% of the Gross Domestic Product (GDP), which was 2,929 billion US dollars (African Economic Outlook 2008). Swaziland is a country with large income disparities and approximately 63% of the population lives below the poverty line (an income of less than 1.25 US dollars per day). Its Gini coefficient (a measure of inequality of income, where a coefficient closer to 0 signifies less inequality) is 0.61 and a significant income disparity exists between the urban and rural populations (urban area 49%, rural areas 75% -- World Bank 2005)). A Gross National Income (GNI) per capita of 4,580 US dollars (purchasing power parity conversion) classifies Swaziland as a lower middle-income country.

Foreign trade, both import and export, is heavily dependent on South Africa. Moreover, since the national currency (Emalangeni: E) is on par with the South African currency (Rand), Swaziland's foreign trade is significantly affected by the South African economy, both positively and negatively. For example, construction works for the World Cup in South Africa had temporarily raised the inflation rate to a record of 13.9% in 2008, but a continuously declining trend has been observed since (World Bank). Furthermore, South Africa itself has been engulfed by the wave of global economic depression and Swaziland is also experiencing the repercussions.

An example of those repercussions is the fact that the GDP growth rate was 0.4% in 2009, whereas it had remained at around 1% to 2% during the previous 5 years (World Bank). Some effects have also been observed in terms of the refund of customs duties from the Southern African Customs Union (SACU) (consisting of five member states; Botswana, Lesotho, Namibia, South Africa, and Swaziland). In 2008 and 2009, the income from SACU had been 1.2 billion US dollars, constituting approximately 60% of the state revenues or approximately 25% of the GDP. However, according to a speech given by the Minister of Finance at the Parliament in March 2010, revenue based on the refund of customs duties from SACU is expected to be 450 million US dollars for the 2010 budget, which is a 62% decrease from the previous year.

In terms of education and human development, the Government of Swaziland has acknowledged in the National Development Strategy (NDS) "Vision 2022" and in the Poverty Reduction Strategy that human resources are the primary resources in a small country with limited natural resources. Education for the development of

human resource is placed as the top priority for the country in order to achieve economic growth and poverty reduction. The Ministry of Education and Training (MOET) has formulated the Strategic Plan for the Education Sector 2010-2022 (draft) as the implementation strategy for the National Development Plan. Although this Strategic Plan is still under review within the Government, its aim is to provide appropriate educational opportunities to the entire population, in order to improve its productivity.

For secondary school education, the Strategic Plan aims to improve the educational environment and lays out several goals, including: (i) to ensure a 100% progression rate from primary to secondary school by 2015, (ii) to ensure an appropriate distribution of schools to limit the walking commuting distance to less than 5 km, (iii) to achieve an 80% gross enrollment ratio (GER) in secondary education by 2015, and 90% by 2022, and (iv) to promote an efficient curriculum. This Project will be positioned as a project to support the government's efforts in promoting secondary school attendance and improving the secondary education environment.

In Swaziland, there are two major challenges in the secondary school education sector: (i) limited accessibility to secondary school education, and (ii) large regional disparities in terms of school attendance. Regional disparity is also observed in the number of teachers and the quality of facilities, which has a significant effect on the quality of education. For example, while urban schools are staffed with 2.68 teachers per class, rural schools only have 2.17 teachers per class, resulting in an urban-rural disparity.

2. Outline of the Survey Results and Contents of the Project

(1) Outline of the Survey Results

In Swaziland, the number of students attending primary and secondary schools is gradually increasing since 2004. While the increase in the number of primary school students has been slow, with increase rate raging between 1% and 3% since 2004, the number of secondary school students has increased by more than 6% annually, except in 2008. Since 2005, GER in primary education has been exceeding 100% but net enrollment ratio (NER) remains at the level of 80%. In particular, a considerable number of school-aged children in rural areas are unable to attend schools, mainly due to lack of educational facilities. However, the number of enrollments to junior secondary schools is expected to increase in the future, in view of the introduction of free primary school education in January 2010 and the fact that NER is 84% in primary education but only 26% in junior secondary education. Under such circumstances, the Education Policy of Swaziland promotes harmonious development in the Education Sector, addressing the improvement of accessibility

and quality of secondary education as priority issues.

During this field survey, the relevance of the Project and the situation of the project sites were studied in detail. Twelve sites were finally selected from a total of 21 sites, including the original 16 sites requested by the Government of Swaziland and 5 alternative candidate sites which were added later. These sites were selected based on mutually-agreed upon criteria (such as adequate enrollment demand, easy access, no foreseen obstacles in terms of construction, supervision, or infrastructure development, etc.). If problems were found, such as difficulties in accessibility, construction works, delivery of materials, or infrastructure development, the candidate site was eliminated from the list of target sites after thorough discussion. As a result, the selected sites were all in rural areas and emphasized issues such as the enrollment demand within commuting distances, the situation of existing secondary schools in the vicinity, lack of educational facilities, and a potentially high enrollment demand in the future. Regional disparities are found at these sites because secondary schools do not exist within a 5 km radius, resulting in insufficient opportunities for secondary education. The 3 sites in Lubombo district were selected as the top priority sites, since they have the lowest secondary school enrollment ratio and the highest degree of urgency. The remaining sites were prioritized based on the Swazi Government's policy priorities; 3 sites in Manzini, 2 sites in Shiselweni, and 4 sites in Hhohho, in decreasing order. The order of priority was also determined for the sites in each district.

(2) Contents of the Project

In view of the above-mentioned reasons, this Project intends to construct new secondary schools on 12 sites in 4 districts, in order to improve the secondary education opportunities in the target areas. The Project will be designed in line with the following policies, based on the analyses of the survey findings.

(3) Policy on the facility design

The facility shall be designed in line with the standard design for schools, developed by MOET and the Ministry of Public Works and Transport (MPWT). For the design of normal classroom buildings, the standard design will not be modified significantly; however, efforts for cost reduction will be made by adjusting the floor area of the facilities (such as the science laboratory and the administration building) to the scale of the school, and by aggregating 4 special classrooms requested by the Government of Swaziland into 2 multi-purpose rooms. Multi-purpose room A will be designed based on the existing standard design for a similar facility, with a workspace and school kitchen attached to it. Multi-purpose

room B will also be designed based on the existing design for ICT facilities, with the floor area reduced in view of the occupancy capacity. Although teachers' housing generally consists of single-family houses, building semi-detached unit will enable partial cost reduction without making major modifications.

Regarding structural design, the structural strength criteria of the South African Bureau of Standards (SABS) are adopted for the material criteria and strength criteria, etc.

Electrical facilities (incoming panels, lighting facilities, and other electrical facilities on the premises) as well as water supply and drainage facilities (water supply (elevated reservoir) and drainage facilities (septic tanks, infiltration tanks, etc.)) will be installed in all project sites, as the minimum infrastructure requirements for schools.

3. Basic Plan of Each Facility

Normal classrooms, a science laboratory, multi-purpose rooms (2 types), an administration building, a school kitchen, toilets, and teacher's housings will be constructed as the minimum facility requirements for the implementation of secondary education curricula and for the school management.

A normal classroom shall accommodate at least 20 students and a maximum of 40 students. Moreover, each grade shall have at least 1 class. Based on the calculations of the enrollment demand, the school in each project site will have 7, 8 or 9 classrooms, in combinations of 3-classroom buildings and 4-classroom buildings.

For practical science experiments, one science laboratory will be constructed in each school.

Multi-purpose rooms will, as the name suggests, be designed to respond to the needs of diverse curricula, including the subjects which will increase employment opportunities. Each school will have two types of multi-purpose rooms which will allow the implementation of technical education (including agriculture, home economics, ICT, etc.). One type (multi-purpose room A) will be equipped with a workbench with sink so that it can cater to the subjects in which water is used, such as home economics. The building will have a semi-open air workspace in the center and a school kitchen attached to it, thus achieving the convenience of a comprehensive facility. The design policy for multi-purpose room B is mainly to meet the needs of practical subjects using computers.

In rural areas, where the availability of rental houses is extremely limited, teacher's housings are essential facilities to secure the teachers of a certain level of quality. As a minimum requirement, at least 4 teacher's housings (4 households) will be constructed per school. One building will accommodate 2 households; therefore, 2 buildings for teacher's housings will be constructed for each school.

The construction of the housings is planned by calculating 37% of the expected number of teachers. (The national average is 36%).

This Project will procure the desks and chairs for the normal classrooms and the science laboratory, which are minimum furniture requirements for an educational facility (to conduct a class). The Government of Swaziland will bear the costs for the furniture and equipment for the multi-purpose rooms, administration building, and the kitchen, as well as the educational equipment, including the science laboratory equipment.

4. Project Construction Period and Cost Estimation

(1) Project Construction Period (Overall construction schedule)

The period from the drafting of tendering documents to the completion of all work (excluding defect inspection) will be set at 20.5 months. This period is set according to local guidelines and customs. From actual periods of similar-scale construction performed locally and from hearings, etc., this period was set to be the shortest and most appropriate for implementing the Project.

(2) Project Cost Estimation

1) Cost borne by Swaziland: Approximately 79 million yen (6.03 million Emalangeni)
2) Parameters of cost estimation
   A: Time of cost estimate: August 2010
   B: Exchange rate: 1 lilangeni (emalangeni) = 13.11 JPY (average rate for February to July, 2010)
   C: Construction/ Procurement period: As shown in the implementation schedule
   D: Other: Cost estimation is based on the Grant Aid Project Scheme of the Government of Japan.

5. Project Evaluation

(1) Relevance

With the overall goals of this Project being the improvement of accessibility to secondary education and reduction of educational disparity between urban and rural areas, this Project aims to improve the education environment in rural areas by constructing new secondary schools in those areas. In order to make secondary schools available in a commuting distance, particularly for those who are currently obliged to commute long distances to the existing secondary school, and in view of the increasing trend in secondary school enrollment resulting from the free primary education policy, the improvement of secondary education facilities to increase

accessibility is becoming a pressing issue. Therefore, urgency of this Project can be considered very high.

Moreover, the Project will play an extremely important role in the NDS “Vision 2022” and in the National Education Policy 1999.

The operation and maintenance of the facilities developed under this Project will not require advanced skills; therefore, financial and human resources in Swaziland will be sufficient.

Furthermore, in terms of the implementation of the Grant Aid Scheme of the Japanese Government, the following effectiveness confirms the extremely high relevance of the Project.

(2) Effectiveness

1) Quantitative effects

The quantitative effects that can be expected through the implementation of this Project are as follows.

Indicator	Baseline（2010）	Target（2015）
1. Enrollment number at the Target Schools	0	2,708

2) Qualitative effects

① By creating an educational environment in rural areas for which the creation of such an environment may be delayed, it contributes to easing the educational disparity between urban and rural areas.

② By building secondary schools in regions within rural areas where there are no secondary schools, commuting distances and times are shortened, thus improving the educational environment.

③ By building teachers housing, the placement of teachers in rural areas is facilitated, thus contributing to easing the disparity of educational quality between urban and rural areas.

Kingdom of Swaziland
Project for the Improvement of Secondary Education
Preparatory Survey Report

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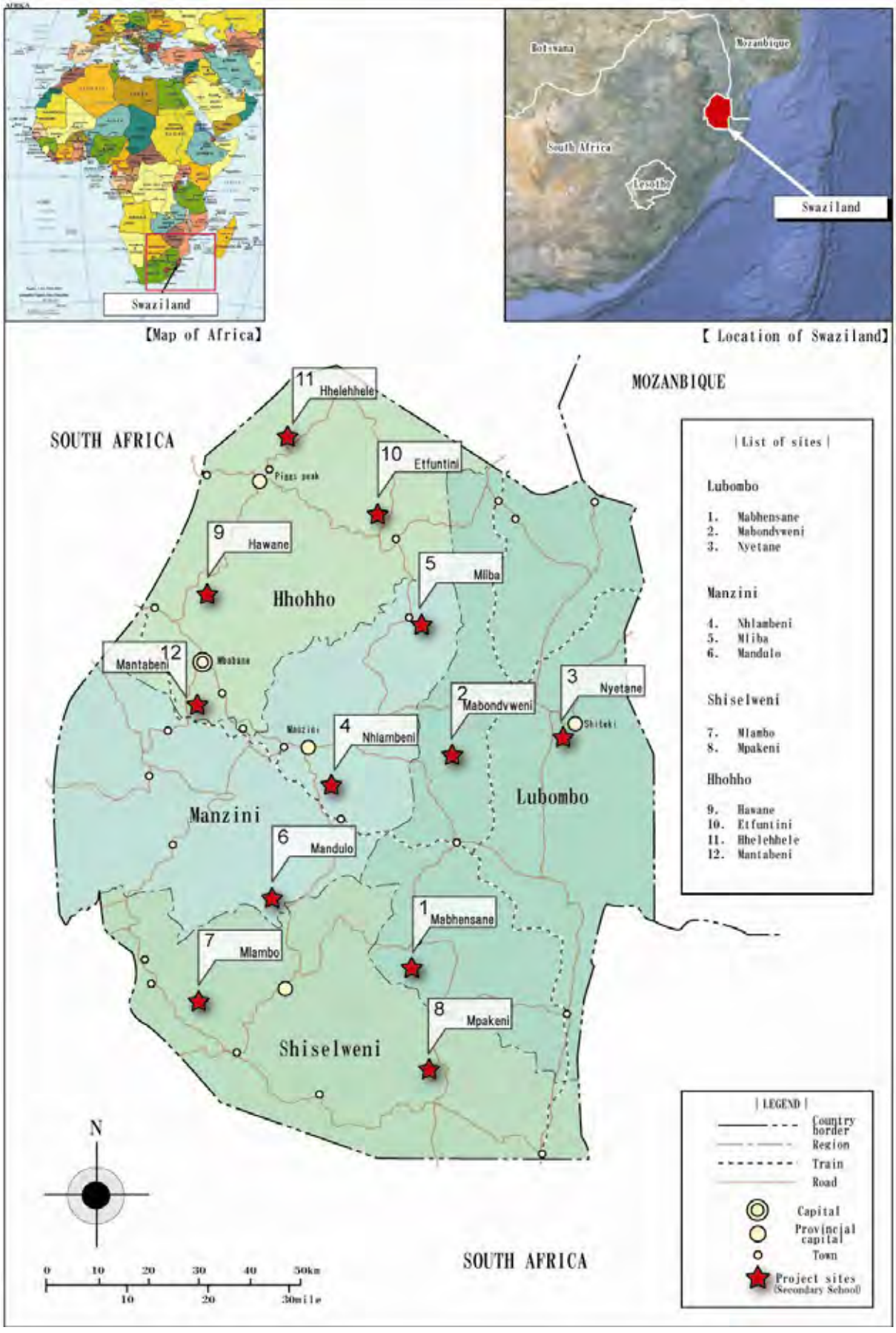

Perspective

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Abbreviations

EMIS	Education Management Information System
GNI	Gross National Income
MOET	Ministry of Education and Training
MPCU	Micro-project Programme Coordination Unit
MPWT	Ministry of Public Works and Transport
MNRE	Ministry of Natural Resource and Energy
MOEPD	Ministry of Economic Planning and Development
NCC	National Curriculum Center
OVC	Orphan and Vulnerable Children
PRSAP	Poverty Reduction Strategy and Action Programme
REO	Regional Education Office/Officer
SDG	Surveyor General's Department (SGD)/Ministry of Natural Resource and Energy
SEC	Swaziland Electricity Company
TSC	Teaching Service Commission
SEA	Swaziland Environmental Authority／Ministry of Tourism and Environmental Affairs
SABS	South African Bureau of Standard

Chapter 1 Background of the Project

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1-1 Background of the Project

(1) Background

The Government of Swaziland has acknowledged in the NDS "Vision 2022" and in the Poverty Reduction Strategy (PRSP) that human resources are the primary resources in a small country with limited natural resources. Education for the development of human resource is positioned as the first priority for the country to achieve economic growth and poverty reduction. MOET has formulated the Strategic Plan for the Education Sector 2010-2022 (draft) as the implementation strategy for the National Development Plan. Although this Strategic Plan is still under review within the Government, its aim is to provide appropriate educational opportunities to the entire population, in order to improve the productivity of the population. For secondary school education, the Strategic Plan aims to improve the educational environment and lays out several goals, including: (i) to ensure a 100% progression rate from primary to secondary school by 2015, (ii) to ensure an appropriate distribution of schools to limit the walking commute distances to less than 5 km, (iii) to achieve 80% GER in secondary education by 2015, and 90% by 2022, and (iv) to promote an efficient curriculum. This Project will be positioned as a programme to support the government's efforts in promoting secondary school attendance and improving the secondary education environment.

Moreover, the lack of secondary education facilities and the existence of urban-rural disparities in educational opportunities were also confirmed through the findings of the "Preparatory Survey for the Education Programmes in the Kingdom of Lesotho and the Kingdom of Swaziland", conducted by JICA in March 2009. Therefore, the provision of equal educational opportunities was identified as an urgent issue.

Under such situation, the Government of Swaziland selected 16 sites across the country (4 sites × 4 districts) as survey sites, developed a plan to improve the secondary education environment in the target area by constructing new secondary schools in 12 (3 sites × 4 districts) of the 16 sites, and submitted a request for Japanese Grant Aid.

(2) Procedures

In response to the above-mentioned request, a 15-month survey was conducted from March 2010 to May 2011, in preparation for the project on the improvement of secondary education. Field surveys were conducted 4 times. During Field Surveys I and II, discussions were held with MOET to confirm the background, purpose, and relevance of the request, each of the candidate sites were visited to conduct further surveys, the final 12 sites were selected, and the components for each site were determined. The activities of Field Survey III and IV were mainly explanation of the outline design and surveys for the preparation of the tender documents.

(3) Outline

The main purpose of this Project is to address the challenges in the secondary education sector of Swaziland, such as insufficient accessibility to secondary education and regional disparities in school attendance and teacher assignment, and to contribute to the improvement of the situation by constructing secondary education facilities. By constructing new secondary education facilities at a total of 12 sites, the Project aims to improve the secondary education environment in the target areas, particularly in the rural areas.

1-2 Environmental Conditions

(1) Weather conditions

Swaziland is located at 25-27 degrees south latitude and 31-32 degrees east longitude, on the plateau area along the east coast of the southern part of the African continent. Although there is a slight difference in the average temperatures and amount of rainfall among regions, the overall climate is moderate. The seasons are broadly divided into the summer and winter periods. Summer is from October to March and is warm, but with occasional strong winds. November to January is the rainy season, in which humid trade winds blow from the southeast to bring rain. The annual rainfall volume is high.

【Table 1-1】 Meteorological Data

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total
Rainfall(mm)	250.5	209.1	171.3	78.3	34.4	18.1	22.1	29.3	63.9	126.6	177.3	210.4	1391.1
Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year
Average(℃)	21.5	22.1	22.2	21.6	19.5	17.5	15.6	15.5	16.6	17.8	18.7	19.8	19.1
Maximum (℃)	26.1	26.4	26.4	26.1	24.1	22.6	21.1	21.1	22.1	22.9	23.4	24.2	23.9
Minimum(℃)	14.1	16.8	17.8	18	17.1	14.8	12.4	9.9	9.9	11	12.7	13.9	15.3

(2) Geological conditions

There have been no problems indicated with the bearing capacity of soil in any area of Swaziland. However, in the eastern lowland regions, there have been reports of areas with expansive soil, in which the soil expands and contracts depending on moisture content. If there is expansive soil, caution is required in the design of the foundation. However, from a survey that was re-contracted locally in September 2010, it was confirmed that there is no expansive soil on the candidate sites for this Project. There have been no discernable earthquakes recorded in the last 50 years.

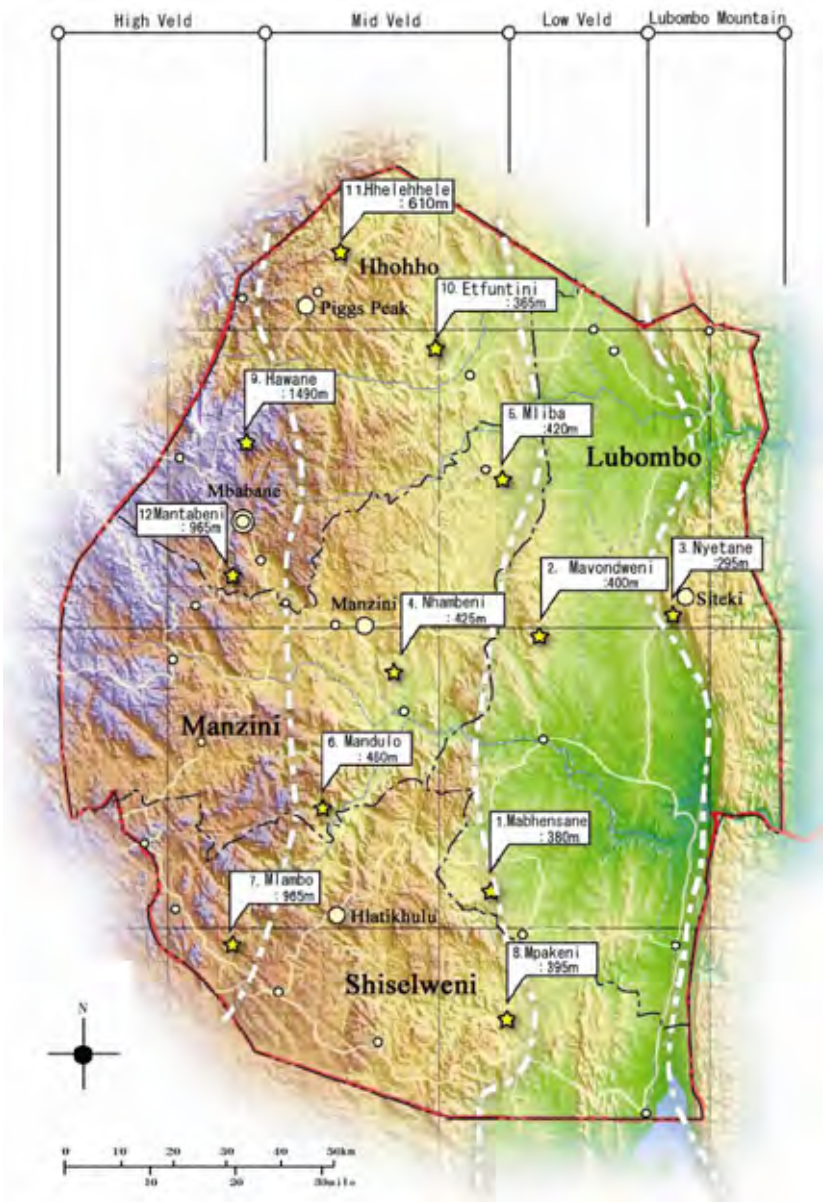
(3) Topographical conditions

Swaziland is located on a plateau area along the eastern coast of the southern part of the African continent and consists basically of hilly terrain. The project sites are

generally flat or gently undulating, although there are some geological variations from site to site. Sites with soft ground or problematic ground are not included as candidate sites. Therefore, the position of the buildings and the form of the foundation will be planned based on the results of locally-commissioned topographical surveys and geological surveys.

(4) Geographical Location

Figure 1-1 below shows the location (altitude) of the project sites. The lowest site is located at an altitude of approximately 300 m and the highest site at an altitude of approximately 1,500 m. but the majority of the sites are located at an altitude of approximately 400 m. Therefore, the climate conditions at the project sites are not expected to vary- significantly, although the amount of rainfall tends to increase with increasing altitude.



【Figure 1-1】Location and Elevation Map

(5) Methods and Findings of Geological Surveys and Topographical Surveys

Geological surveys and topographical surveys were conducted at each candidate site. The methods and the findings are described below. Detailed data will be attached as an Appendix.

1) Geological surveys

Purpose of foundation investigation

The main purpose of the geological survey is to properly determine the condition of the underground foundation, which cannot be confirmed by observation, in order to avoid soft ground or other unsuitable areas, such solid rock strata where excavation is difficult. In addition, appropriate foundation designs can be developed by studying the geological conditions and measuring the strength of the ground. Furthermore, an appropriate foundation investigation will prevent damage and building collapse in the future, which may be caused by uneven settling (different parts of the building sinking unevenly).

Outline of the commissioned work

A local company was commissioned to test the geological conditions and soil-bearing capacity at designated locations on the 12 project sites. At each project site, the company was requested to excavate test pits (1.5 m) at 2 locations and analyze the collected soil property, and also to conduct dynamic penetration testing (DCP) (2 m) on 5 locations. A foundation indicator test was also conducted on 5 locations, in order to detect expansive soil.

Product

1. Analysis of the test pit soil (2 locations per site, total of 24 locations)
2. Result of DCP testing (5 locations per site, total of 60 locations)
3. Foundation indicator test (total of 5 locations)

Findings

The results of the tests did not reveal any problem; therefore, standard foundation engineering was considered to be sufficient which was confirmed with the local structural engineer when planning the detailed design.

2) Topographical surveys

Purpose of topographical survey

The main purpose of the topographical survey is to determine the positioning of building properly, by studying landform, size, orientation, bearing, as well as the surrounding environment such as roads, electricity, water, other infrastructure,

trees and rocks.

Outline of the commissioned work

For the designated areas on 11 sites: preparation of 50 cm contour, confirmation of the position of trees, rocks, roads, water and electricity supplies.

For Etfuntini: based on the result of field inspection, it was decided that a topographical survey was not necessary.

Product

1. Survey drawings of the 11 sites were submitted in the form of DXF data.
2. Requests were reflected in the submitted product.

Findings

The gradient of the premises and the position of trees and large rocks were confirmed. These findings were used as references when planning the position of the facilities.

1-3 Environmental and Social Consideration

(1) Impact on the natural and social environment

Candidate schools for the Project will be constructed in sparsely populated rural areas. These schools will be located at least 500m away from the neighboring residential areas. Large-scale site preparations are unnecessary. Therefore, the risk of affecting the natural environment or the community residents is expected to be extremely low. Furthermore, classes will start upon completion of construction but the possibility of those classes, including science classes, negatively affecting the natural environment or the health and safety of the residents, either through air, water, soil, waste, or the use of water, is considered to be extremely low. Likewise, the risk of the Project adversely affecting the economy, social capital, or the social structure of the neighboring area is also expected to be extremely low.

Therefore, it can be concluded that this Project is categorized into Classification Category C (classification based on JICA's Guidelines on Environmental and Social Considerations) and that any undesirable environmental or social impact of the Project will be minor or close to none.

(2) Environmental Assessment

The survey team has received a notice from MOET that the Swaziland side also considers the classification for this Project adequate. However, according to Swaziland's Environmental Law enacted in 2005, all development projects are required to conduct an environmental assessment. Therefore, the assessment was

conducted by the Swaziland Environmental Authority (SEA) of the Ministry of Tourism and Environmental Affairs based on an environmental assessment application submitted by MOET.

As the result of the assessment, 4 sites (Mabhensane, Mabondweni, Mliba, and Nyetane) were classified as Category 2 and are requested to submit an environmental assessment report. The remaining 8 sites, classified into Category 1, are not required to submit the report.

Regarding the 4 sites that were classified as Category 2, it is planned to submit the report and obtain approval before tendering. Preparations are being made so that obtaining approval is assured before the commencement of the construction work. Both categories confirm the basic environmental considerations of the Project; therefore, the Project schedule, includes tendering and construction permits, will not be greatly affected by such evaluation.

Chapter 2 Contents of the Project

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

2-1-1 Overall Goal and Project Purpose

The Government of Swaziland has described its national development plans in the NDS "Vision 2022" and PRSAP, in which education is positioned as a priority sector, central to national development.

Therefore, in the National Education Policy 1999 and in the Strategic Plan for the Education Sector 2010-2022, which describes the concrete action guidelines, the Government of Swaziland has set a goal to achieve NER of 60% at secondary education by 2022 by improving primary and secondary education environment and providing equal educational opportunity for all pupils of school going age. In particular, the Government has laid out the following goals for the improvement of secondary education.

① To ensure 100% progression rate from primary to secondary school by 2015
② To ensure appropriate distribution of schools to limit the walking commuting distance to less than 5 km
③ To achieve 80% GER in secondary education by 2015, and 90% by 2022
④ To promote efficient curriculum

Twelve new schools will be established in the 4 districts as part of the plan to improve the secondary education environment, and the Project will be positioned as a program to support the Government's efforts in promoting secondary school attendance and improving secondary education environment

2-1-2 Basic Concept of the Project

As part of the Swazi government's plans to improve secondary education facilities to achieve the overall goal described above, this Project will construct 12 new schools in the 4 districts (Hhohho, Manzini, Shiselweni, and Lubombo).

The expansion of secondary education opportunities in the target areas and the construction of secondary schools in rural areas are expected to alleviate the problem of urban-rural disparities in education.

Table 2-1 summarizes the list of candidate sites and the facility components for each school, which have been selected through discussions with the Government of Swaziland. The main facility components are listed below.

① Normal classroom building Type A (4 classrooms)
Type B (3 classrooms)
② Science laboratory
③Multi-purpose room A (Agriculture and Home Economics)(School kitchen attached)

④ Multi-purpose room B (ICT and Elective subjects)

⑤ Administration building

⑥ Student toilet building — Type A (9 toilet bowls); Type B (8 toilet bowls); Type C (7 toilet bowls)

⑦ Teachers' housing — 4 houses per school (1 house for the school principal, 3 houses for the teachers)

⑧ Classroom furniture: — Normal classroom (student desks and chairs, teacher's desk and chair);Science laboratory(student stools, teacher's chair)

(Note: The type and the number of normal class buildings as well as the type of the student toilet building will not be the same for all the schools.)
For details of the facility components by project site, refer to Table 2-1.

【Table 2-1】Candidate Sites & Components of Facilities

	Number of Students／Classrooms						Number of Teachers Required	No. of Facilities							
	F1	F2	F3	F4	F5	Total		Normal ClassroomA	Normal ClassroomB	Science Laboratory	Multi-Purpose Room A (with Kitchen)	Multi-Purpose Room B	Administration Building	Toilets for the Students	Teachers' Housing
1 Mabhensane	45	42	29	32	20	168	13	1	1	1	1	1	1	C	4
	2	2	1	1	1	7									
2 Mabondvweni	49	46	31	34	22	182	13	1	1	1	1	1	1	C	4
	2	2	1	1	1	7									
3 Nyetane	46	43	29	33	20	171	13	1	1	1	1	1	1	C	4
	2	2	1	1	1	7									
4 Nhlambeni	61	57	39	43	28	228	14	2		1	1	1	1	B	4
	2	2	1	2	1	8									
5 Mliba	60	56	38	42	27	223	14	2		1	1	1	1	B	4
	2	2	1	2	1	8									
6 Mandulo	71	67	45	50	32	265	16		3	1	1	1	1	A	4
	2	2	2	2	1	9									
7 Mlambo	78	73	50	55	35	291	16		3	1	1	1	1	A	4
	2	2	2	2	1	9									
8 Mpakeni	66	62	42	46	30	246	16		3	1	1	1	1	A	4
	2	2	2	2	1	9									
9 Hawane - F.R.	70	66	45	49	32	262	16		3	1	1	1	1	A	4
	2	2	2	2	1	9									
10 Etfuntini	67	63	43	47	30	250	16		3	1	1	1	1	A	4
	2	2	2	2	1	9									
11 Hhelehhele	51	48	33	36	23	191	13	1	1	1	1	1	1	C	4
	2	2	1	1	1	7									
12 Mantabeni	62	58	40	43	28	231	14	2		1	1	1	1	B	4
	2	2	1	2	1	8									
	Total Number of Students					2708									
Total of Each Facility								**10**	**19**	**12**	**12**	**12**	**12**	**12**	**48**
Number of Classrooms								**40**	**57**						
Total of Classrooms								**97**							

2-2 Outline Design of Japanese Assistance

2-2-1 Design Policy

This is a project for the construction of secondary schools that makes use of Grant Aid for Community Empowerment. A total of 97 classrooms, 12 science laboratories, 12 student toilet buildings, 12 buildings for multi-purpose room A (including school kitchen), 12 administration buildings, 12 buildings for multi-purpose room B, and 48 teacher housing units will be constructed at 12 sites in 4 districts in order to increase secondary education opportunities. The desks and chairs for the students and the teachers will also be procured. The outline design will be developed based on requests from the Government of Swaziland, the findings from field surveys and discussions, and will respect the following policies.

2-2-1-1 Basic Policy

(1) Selection and Prioritization of the Project Sites

The candidate sites are selected and prioritized base on the following criteria.

1) Site selection method
   - ① There is sufficient enrollment demand. (Verified by the potential number of students who will continue on to secondary school, the situation of existing secondary schools in the vicinity, etc.)
   - ② Land ownership or rights to use the land can be verified by valid documents.
   - ③ There is no duplication with other facility development plans by the Government, other donors, NGOs, etc.
   - ④ There are no obstacles for the construction and supervision, in terms of topology and geology, access to the site, and land areas, etc.

2) The final candidate sites would be prioritized based on the following criteria.
   - ① The enrollment demand in the catchment area is high.
   - ② The enrollment demand in the district is high. (Due to reasons such as an increasing number of students attending school, an increase in secondary school continuation rates, etc.)
   - ③ There are clearly an insufficient number of facilities. (Insufficient number of classrooms and public secondary schools, etc.)
   - ④ The neighboring communities have a need for secondary education and there is a high possibility of obtaining their support.

(2) Policy for Project Components

The facility components will be selected based on the following criteria.

1) Priorities will be placed on facility components that are essential for the management and curriculum implementation of secondary education. (Normal classrooms, administration building, science laboratory, and sanitary facilities)

2) The relevance and the necessity of the complementary components (teachers' housing, student dormitories, dining hall and kitchen, and multi-purpose hall) will be determined by considering various aspects including the intended use, necessity, needs, and expected frequency of use.
3) The facility components should be the standard components that are effectively being used in public secondary schools of the same approximately scale.
4) The operation and maintenance of the facilities and equipment must be sustainable.

(3) Basic Policy for the Design of the Facility

1) Construction methods based on local specifications will be adopted and, as a general rule, local contractors and locally available materials will be utilized in order to achieve both cost reduction and efficiency.
2) The scale of the facility will be determined by comparing the facility components of the existing secondary schools and by confirming the urgency, relevance and necessity. The facility plan and school furniture procurement plan will be formulated based on the minimum requirements.
3) It was requested by the Swaziland side that the standard design developed in Lesotho be followed for the Project. Therefore, the basic concept of the Lesotho standard design, which is to standardize each component, will be adopted. However, while Lesotho projects maximize the use of locally available stones, the procurement of stone is difficult in Swaziland. Since MOET had a strong desire to utilize the standard design of Swaziland, it was decided that the Project will be designed fundamentally based on the Swaziland standard design.

2-2-1-2 Policy for Natural Conditions

(1) Policy for Climate Conditions

Climate conditions in Swaziland are described in section 1-2-2 (1) above. The facilities will be designed and constructed based on the following basic policies which take climate conditions into consideration.

1) In principle, the windowless gable wall be positioned on the east-west axis, but at the same time, care will be taken to avoid excessive earthwork.
2) In order to facilitate movement between classrooms in the rainy season, the classroom buildings will have an open corridor.
3) The overall construction schedule will be planned to minimize earthwork and foundation work in the rainy season.
4) For wind pressure, South African criteria will be adopted.

(2) Policy for Geological Conditions

There has been no indication of problems regarding the bearing capacity of soil in any

areas of Swaziland. However, in the eastern lowland regions, there have been reports of areas with expansive soil, in which the soil expands and contracts depending on the moisture content. If there is expansive soil, caution is required in the design of the foundation. However, the results of a geological survey carried out by a local consultant in September 2010 confirm that there is no expansive soil on the candidate sites for the Project. Furthermore, there have been no discernable earthquakes recorded in the last 50 years. Therefore, it was determined that no particular considerations are needed in designing the foundation.

2-2-1-3 Policy for Socio-economic Conditions

Swaziland is a lower-middle income country with a GNP per capita of 2,610 U.S. dollars (2009). However, according to World Bank estimates, two-thirds of the population falls in the extreme poverty level (daily income of less than one dollar), with an extremely large disparity between the rich and poor (Gini coefficient = 0.61, World Bank, 2008). 76% of the agricultural population is estimated to be living in poverty. Considering the disparity between urban and rural areas, it will be necessary to examine carefully the affordability of school fees for the students' families. Since all of the selected sites are located in rural areas, low-maintenance facilities will be designed in order to minimize the financial burden on the households of potential students.

2-2-1-4 Policy for Construction Environment

(1) Policy for labor conditions

Unskilled laborers can be procured in the rural areas, but the procurement of skilled laborers is limited to urban cities like Mbanane. However, the construction company expected to be contracted for this project is of a level that should have the necessary engineers and skilled workers on staff. Therefore, no major problems are expected to arise regarding the construction schedule.

(2) Policy concerning procurement

Construction products including steel frames, roofing materials, electrical and plumbing-related materials, and furniture are mostly imported from South Africa. These products can also be procured in cities such as Mbanane and Manzini. Concrete aggregate and water can be procured from areas near the sites. It is predicted that materials obtained domestically will come mainly from Mbanane, Manzini, and Nelspruit in South Africa. Swaziland is a member of the South African Customs Union (SACU), and imports from South Africa are exempted from South African domestic VAT and import duties. If it is the same product, there is basically no difference in cost between the two countries. Because of this, materials and equipment will be procured either domestically or imported from South

Africa, based on the discretion of the contracted construction company.

(3) Policy for construction authorization

In Swaziland, construction works in rural areas do not require construction permit, contrary to those in urban areas. Moreover, the Ministry of Public Works and Transport (MPWT) is responsible for designing each primary/secondary school, and the design is finalized with the approval of the MOET. Therefore, construction permit for the Project was confirmed upon receiving MOET's approval for the facility design.

2-2-1-5 Policy for the Use of Local Contractors

(1) Use of local contractors

The contractors for this Project will be selected from local bidders. In Swaziland, 231 construction companies are licensed and registered by MPWT. For this registration, a company needs to have a company register for the office located in Swaziland. Each company is licensed and registered as one of the 6 categories (M, M1, A, B, C, D), which are differentiated based on the scale and work experiences. The registration is renewed every year.

In terms of the scale of the company, their financial condition, work experience, available equipment, and quality of work, the contractors in the top two categories are deemed to have the technical capacity to implement this Project. However, their financial condition must be evaluated carefully, as it is a major factor with the potential to delay the construction schedule.

【Table 2-2】Building Construction Company Categories (2010/2011)

Category	Public Works Contract Limit (per contract)	No. of Companies
M	E25,000,000~E120,000,000	14
M1	E10,000,000~E25,000,000	17
A	E5,000,000~E10,000,000	20
B	E2,000,000~E5,000,000	33
C	E500,000~E2,000,000	39
D	< E500,000	108
	Total	231

2-2-1-6 Policy for Implementation Management Capacity of the Implementing Agency

(1) In Swaziland, secondary education falls under the jurisdiction of MOET. The organization of this ministry is broadly divided into the Primary School Education Bureau, Secondary Education Bureau, and Higher Education Bureau. The construction of new schools falls under the jurisdiction of the Senior Education Planning and Survey Officer, who is placed

outside of each of the above bureaus. The operation and maintenance of secondary education facilities falls under the jurisdiction of the Secondary Education Bureau.

(2) The funds necessary for the operation and maintenance management of secondary education facilities are allocated from MOET's budget and school fees collected from students. MOET bears the costs related to the placement of teachers and their salaries, while general staff salaries (excluding teachers), school lunch costs, utilities, and facility maintenance management costs are allocated from school fees collected from students.

(3) When examining the scale of this Project's planning, it will be necessary to carefully consider the needs at each candidate school, MOET's financial capabilities, and the capability of students to pay school fees. A plan will be formulated so that sustainable operation and maintenance management is possible after completion.

2-2-1-7 Policy for the Use of Construction Supervision Consultants

Construction supervision for this Project is carried out with a Japanese consultant utilizing a local consultant. Public works in Swaziland are mostly supervised by local consultants, and there are many consultants with sufficient construction supervision experience.

In Swaziland, it is customary to charge expenses related to travel distances and times, in addition to the fees for construction supervision during projects in remote regions. In some cases, travel expenses may reach high amounts, therefore, lots will be divided efficiently taking geographical conditions into consideration.

2-2-1-8 Policy for the Use of Lawyers

In Swaziland, a lawyer is generally used to handle trouble involving construction tendering and contracts. Since this is the first project to use Grant Aid for Community Empowerment in Swaziland, a lawyer will be used if an unexpected situation arises. Lawyers will be used on an ad-hoc basis as needed.

2-2-1-9 Policy for Setting the Quality of Facilities and School Furniture

(1) Quality of Facilities

Following the basic policy of Grant Aid for Community Empowerment, the facility plan will be based on the Swaziland standard design. Improvements on the standard design will be set to a level of construction that is in line with the local construction company, as well as quality control for the facilities. Quality and specifications for construction materials will be set based on the South African Bureau of Standard (SABS), which is commonly used in Swaziland.

(2) Quality of School Furniture

In Swaziland, school furniture has also been standardized. A standard student's desk used in the existing secondary schools has steel legs with a plywood top, and a standard chair has steel legs with a plastic seat. This specification is appropriate for the Grant Aid Scheme and equivalent furniture will be procured for the Project.

2-2-1-10 Policy for Construction Method, Procurement Method, and Construction Period

(1) Construction Method

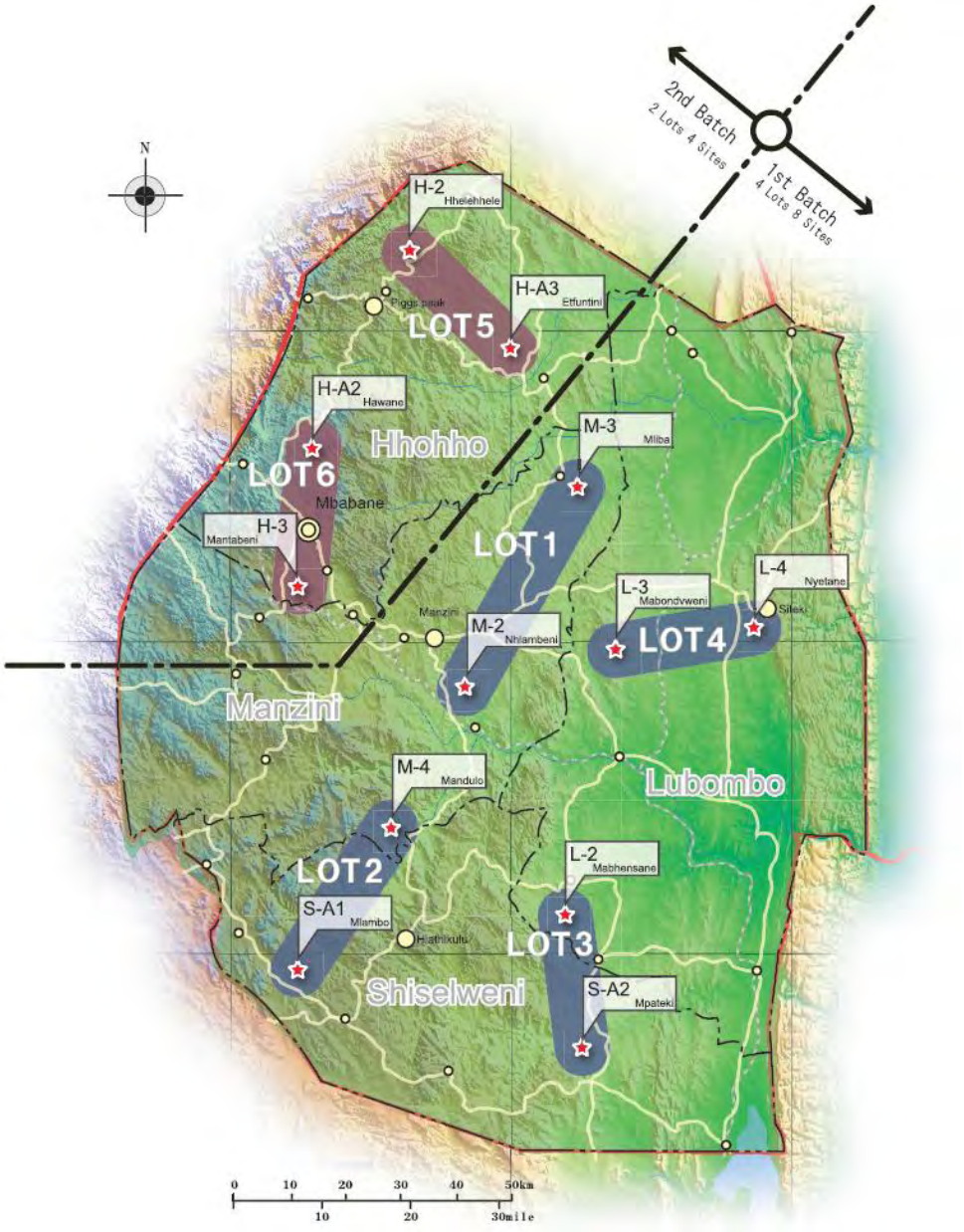
As a general rule, the standard construction method in Swaziland will be adopted. Specification uniformity will be extensively encouraged, particularly for roof structures and other structures without a standard design, in order to achieve construction efficiency, quality improvement and cost reduction.

(2) Procurement of Facilities (splitting into lots and batches)

Basically two project sites will be grouped into one lot, in order to make the scale of construction attractive for higher ranking construction companies. Reducing the number of contractors will also ensure efficient supervision.

Most of the construction companies have the head office located in the capital city of Mbabane or in Manzini, approximately 25 km south from Mbabane. A lot will be formed by grouping the project site furthest away from Mbabane together with another site located along the connecting road, in order to increase efficiency in the flow of materials and workers. Care will also be taken to minimize the travel distance between the two sites.

Eight high-priority schools in Lubombo, Manzini, and Shiselweni will be the first batch, and the 4 lower-priority schools in northern Hhohho will be the second batch.



【Figure 2-1】Concept of Batches and Lots

(3) Furniture Procurement

Furniture for all the sites will be procured as one lot (one batch). The entire process of production and delivery is expected to take approximately 6 months.

(4) Construction Period

The effects of the rainy season will be taken into consideration when planning the overall construction schedule, and the plan will ensure efficient progress in each lot and batch as well as effective quality control.

2-2-2 Basic Plan (Construction Plan/Equipment Plan)

2-2-2-1 Selection of Candidate Sites

(1) Selection of Sites

The 12 candidate sites are selected based on the results of the survey and discussion with the Government of Swaziland. The candidate sites are shown as follows:

【Table 2-3】Candidate Sites and Priority Order

No. (Order of priority)	Region	Site
1	Lubombo	Mabhensane
2	Lubombo	Mabondvweni
3	Lubombo	Nyetane
4	Manzini	Nhlambeni
5	Manzini	Mliba
6	Manzini	Mandulo
7	Shiselweni	Mlambo
8	Shiselweni	Mpakeni
9	Hhohho	Hawane - F.R.
10	Hhohho	Etfuntini
11	Hhohho	Hhelehhele
12	Hhohho	Mantabeni

Note: Order of priority was agreed upon in Field Survey II

(2) Final Selection of the Candidate Sites

During Field Survey I, the survey team conducted discussions with the Government of Swaziland, and then conducted on-site surveys at the 16 original candidate sites. During Analysis Phase I (in Japan), each of the 16 sites were evaluated based on the criteria shown below, in order to select 12 candidate sites.

The selection criteria agreed upon with by both sides are as follows.

1) There is sufficient enrollment demand. (Verified by the potential number of students who will continue on to secondary school, the situation of existing secondary schools in the vicinity, etc.)
2) Land ownership or rights to use the land can be verified by valid documents.
3) There is no duplication with other facility development plans by the Government, other donors, NGOs, etc.
4) Construction and supervision will not be hindered by the site's topology, geology or other physical conditions (accessibility, land areas, etc.)

None of the candidate sites were found to have problems for 2) and 3); however, for 1) and 4), it was decided to evaluate the sites by categorizing them into 4 levels.

① Evaluation I (Field Survey I, Analysis I in Japan)

During Field Survey I, on-site surveys were conducted at 16 sites, which were evaluated as shown in Table 2-4. For the candidate sites ranked B or B', it was decided that additional surveys should be conducted during Field Survey II. At the same time, the Government of Swaziland was requested to select alternative candidate sites.

【Table 2-4】Evaluation I (Analysis I in Japan)

	Criteria	Policy on FSII	Site
A	No problem for either Enrollment Demand on Site Physical Condition.	Continue survey	6
B	No problem for Site Physical Condition. Need further information for Enrollment Demand.	Additional survey for evaluation	5
B'	No problem for Enrollment Demand. Question on Site Physical Condition.	Additional survey for evaluation	1
C	Difficulty on either Enrollment Demand or Site Physical Condition	Request alternative site	4

② Evaluation II

The Government of Swaziland presented 5 additional sites as alternatives to those ranking B or B'. Out of 5 alternative sites and 5 original candidate sites evaluated as B rank, the Government of Swaziland selected priority sites for school development, and supplementary surveys and evaluations were conducted for each of those sites.

【Table 2-5】History of Site Evaluation

Region	Proposed Site	EV I	Additional Site	EV II	Final Candidate Site
Manzini	Magojela	C			
	Nhlambeni	A		A	○
	Mliba	A		A	○
	Mandulo	A		A	○
Lubombo	Sinceni	C			
	Mabhensane	A		A	○
	Mabondweni	A		A	○
	Nyetane	A		A	○
Shiselweni	Kaliba	B		C	
	Nzameya	B		C	
	Maseyisini	B		C	
	Hlengela	C			
			Mlambo	A	○
			Mpakeni	A	○
Hhohho	Enkalangeni	C			
	Hhelehhele	B	additional survey	A	○
	Mantabeni	B	additional survey	A	○
	Mangwaneni	B'		C	
			Eluhlendlweni	C	
			Hawane FR	A	○
			Etfuntini	A	○

Discussions were held with MOET based on the evaluation by the Japanese side. As a result, an agreement was reached by selecting 12 sites as the final candidate sites (Table 2-5). Table 2-3 shows the list of the candidate sites and their order of priority. Although the initial request was for 3 sites in each district, Shiselweni had only 2 sites fulfilling the criteria and 4 sites were selected from Hhohho, where many of the candidate sites were able to meet the criteria.

(3) Project Components

Based on the basic policy for facility component selection mentioned above in section (2-2-1(2)), discussions with Swaziland have resulted in an agreement on the following facility components for the Project and their priority level at the time of Field Survey II.

【Table 2-6】Priority Order (Field survey II)

Priority 1 Components	Priority 2 Components
Determined	To be determined conditionally
Classrooms, Science Laboratory, Administration Block, Kitchen (for school lunch), Toilets, Water and sanitation facility, Teachers' Housing, Furniture	Home Economics Laboratory, ICT Laboratory, Agricultural Laboratory, Multi-purpose room

Based on the agreement of priority level classifications shown above, and in particular for the second priority components, it was proposed that the multi-purpose room building following the standard design be consolidated into two buildings, which was agreed to by MOET. Regarding teachers' housing, four houses per school were agreed upon as the minimum required number.

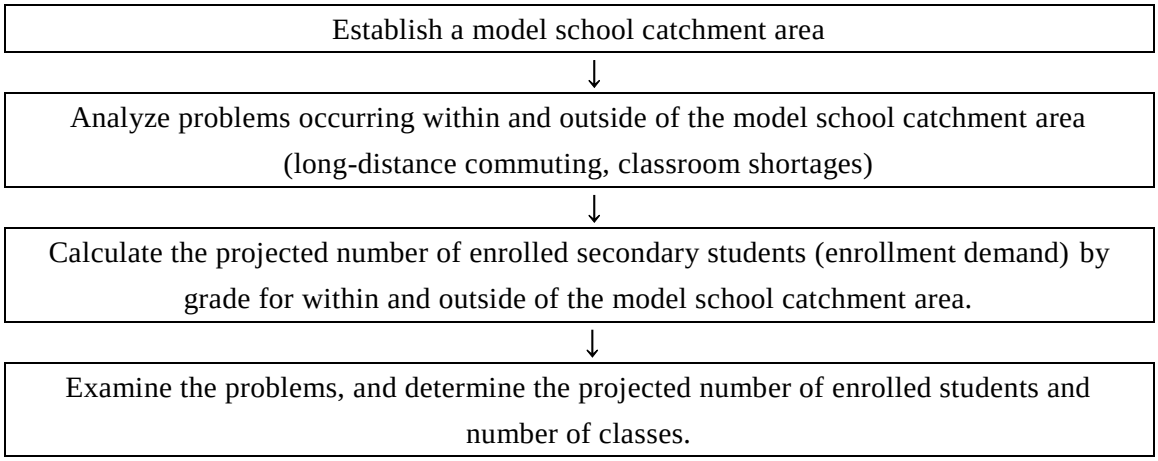
【Table 2-7】History of Components Selection

Original Request	Request on Field Survey II	Final Agreement
Classrooms, Science Laboratory, Multi-purpose Hall, Administration Block, Dining Hall, Kitchen, Toilets, Water and sanitation facility, Teachers' Housing, Dormitory, Furniture	Classrooms, Science Laboratory, Home Economics Laboratory, ICT Laboratory, Agricultural Laboratory, Multi-purpose room, Library, Administration Block, Kitchen, Toilets, Water and sanitation facility, Teachers' Housing, Furniture	Classrooms, Science Laboratory, Multi-purpose room (A&B), Administration Block, Kitchen, Toilets, Water and sanitation facility, Teachers' Housing, Furniture

1) Normal Classroom building

① Calculating the projected number of enrolled secondary school students by grade

To accurately assess the enrollment demand in the candidate sites, it is necessary to plot the locations of the homes of community residents, the existing secondary schools, and the sites on a map and examine their mutual relationships. However, in Swaziland, this type of detailed population distribution map cannot be obtained. Therefore, for this survey, the school catchment area for the new schools planned for the site will be modeled and examined using the following flow chart.



a) Establishment of a model school catchment area

A model school catchment area is a hypothesized school catchment area with the following characteristics, established to examine the scale of the school to be constructed on the site.

(i) The district is the area within the locus of the median points of the straight lines connecting the site with the existing secondary schools interspersed throughout the region surrounding the site. It also includes the area for which the road distance from the site is within walking distance (6 km one way).

(ii) It is assumed that students who have graduated from existing primary schools within the model school catchment area will all advance to the new secondary schools at all sites, and that there will be no students commuting in from or out to other districts.

(iii) It is assumed that the students who will attend the new school constructed on this site will all be commuting from the location of their old school to the secondary school built on the site.

b) Analysis of problems in the model school catchment area and its surrounding area.

(i) Long-distance commuting

If a primary school within the model school catchment area is not within walking distance of an existing secondary school, students graduating from said primary school will be forced to commute long distances. Thus, all of those students will be targets for problem resolution.

(ii) Classroom shortage

If the primary schools within the model school catchment area are within walking

distance of the existing secondary schools, making those secondary schools overcrowded or without the capacity to accept all of the students graduating from those primary schools, there will be a shortage of classrooms in the model school catchment area. Thus, the number of students remaining after subtracting the officially accepted number of students at the existing schools from the enrollment demand figure will be a target for problem resolution.

(iii) Special circumstances outside of the model school catchment area

There are some primary schools located outside of the model school catchment area that are located far away from existing secondary schools. If a new school was constructed at the site, this new school would be the closest school to those primary schools. If there is a high possibility for those graduating primary school students to go to the new school, alleviating long-distance commutes for those students will be a target for problem resolution.

c) Calculation of the projected number of enrolled students (enrollment demand)

Enrollment demand refers to the projected number of enrolled secondary school students from within and outside of the model school catchment area, and is estimated using the following equation.

Projected number of enrolled secondary school students =
(no. of 1st-year secondary school students) X *(1+R2+R3+R4+R5)*
Ri = ratio of students for each grade with the number of 1st-year students as 1 (i=2~5)

The number of 1st-year secondary school students within the model school catchment area can be found with the equation below.

(no. of students graduating from primary schools within the model school catchment area)
X (percentage of students advancing to secondary school)

※1: The number of graduating students will be considered equal to the number of students who have passed the primary school graduation test conducted by the Examinations Council of Swaziland, and the mean value of the number of students passing the graduation test over the past 3 years will be used (since the annual fluctuation is relatively large).

※2: The number of primary schools where most graduating students continue on to secondary school has increased in recent years, and the creation of a system in which all graduating primary school students can go on to secondary school has been sought. Therefore, the percentage is assumed to be 100% (no. of 1st-year secondary school students = no. of students passing the primary school graduation test).

As a result, the ratio of students for each grade (Ri) was calculated from the EMIS Nationwide Number of Students by Grade Level statistics (2009) using the following numerical values.

【Table 2-8】Number and ratio of students for each grade (Ri)

F1	22,624	F2	21,219	F3	14,615	F4	15,876	F5	10,254
	1.00		0.94		0.64		0.70		0.45

d) Setting the scale of the Project

(i) Scale pertaining to long-distance commuting measures

The projected number of enrolled students and classes will be set based on the enrollment demand within the model school catchment area.

(ii) Scale pertaining to classroom shortages

Problem resolution will be applied to the number of students calculated by subtracting the official number of accepted students (no. of classes X 40 people) from the enrollment demand of the entire catchment area of the existing secondary schools. This value will be used as the planned number of students to calculate the number of classes.

(iii) Scale pertaining to special circumstance measures

Using the location of the primary schools located outside of the model school catchment area, the location of existing secondary schools in the surrounding area, and the location of the new schools, the number of students with a high possibility of attending the new schools will be estimated. Using this value as the planned number of students, the number of classes will be calculated.

(iv) Criteria for planned scale calculations

The planned number of classes will be set with the following conditions.

・The maximum number of students per one class will be the capacity assumed in the standard design for classrooms (40 people).

・A limit for the minimum number of students per one class will be not be set.

② Setting the number of normal classrooms

The number of normal classrooms installed will be the same as the number of classes.

The projected number of enrolled students and the number of normal classrooms was calculated using items ① and ② above.

【Table 2-9】 Calculated Number of Students & Classrooms

	Number of students／classrooms						Number of teachers Required
	F1	F2	F3	F4	F5	Total	
1 Mabhensane	45	42	29	32	20	168	13
	2	2	1	1	1	7	
2 Mabondvweni	49	46	31	34	22	182	13
	2	2	1	1	1	7	
3 Nyetane	46	43	29	33	20	171	13
	2	2	1	1	1	7	
4 Nhlambeni	61	57	39	43	28	228	14
	2	2	1	2	1	8	
5 Mliba	60	56	38	42	27	223	14
	2	2	1	2	1	8	
6 Mandulo	71	67	45	50	32	265	16
	2	2	2	2	1	9	
7 Mlambo	78	73	50	55	35	291	16
	2	2	2	2	1	9	
8 Mpakeni	66	62	42	46	30	246	16
	2	2	2	2	1	9	
9 Hawane - F.R.	70	66	45	49	32	262	16
	2	2	2	2	1	9	
10 Etfuntini	67	63	43	47	30	250	16
	2	2	2	2	1	9	
11 Hhelehhele	51	48	33	36	23	191	13
	2	2	1	1	1	7	
12 Mantabeni	62	58	40	43	28	231	14
	2	2	1	2	1	8	
	Number of Student					2708	

Normal classrooms will be constructed so that the number of classrooms will equal the number of classes. A standard classroom design in Swaziland is expected accommodate 40 students and there are 3 types of classroom types; a 2-classroom building, a 3-classroom building, and a 4-classroom building. The construction cost per unit area becomes cheaper for a multiple classroom building; therefore, 3-classroom and 4-classroom buildings will be constructed in this project.

- Schools with 7 classes ＝ 4-classroom building + 3-classroom building
- Schools with 8 classes ＝ 4-classroom buildings x 2
- Schools with 9 classes ＝ 3-classroom buildings x 3

2) Science Laboratory building

A standard science laboratory building consists of a science laboratory room and a preparation room, and there is a large type (accommodate 8 students x 5 rows = 40 students) and a small type (accommodate 8 students x 4 rows = 32 students). Among the target schools, there is only one school where the maximum number of students per class is less than 32, while all the other schools have more than 33 students per class. Therefore, in this Project, the large type will be adopted.

Many of the science lessons do not involve experiments and not all of the lessons need to be conducted in the laboratory. Since it was verified that half of the total lesson hours can be

spent in normal classrooms, only one science laboratory will be necessary even for the school with 9 classes. Therefore, in this Project, only 1 science laboratory will be constructed per school.

3) Multi-purpose Room (Type A: Agriculture Practice/ Home Economics)

The total area for the requested practical room for agriculture and home economics room is 350.02 m^2 (182.18+167.84), but for this Project, multi-purpose classroom type-A will be used. This multi-purpose room has a total area of 250.35 m^2, and has a kitchen and work space installed to accommodate both practical subjects.

① Use as an agriculture practice room

Although agriculture is an elective subject, there are many students who choose to take it. 62% of all students in the 2009 lower secondary education course and 35% of the students in the upper secondary education course chose this subject. (Estimated from the number of students sitting the examination for certification of completion for each education course.) Because of this, of the 145 secondary schools nationwide, 79% have installed agriculture practice rooms. It is assumed that an agriculture course will be established in all grades from Form I to Form V. For agriculture subjects requiring 6 classes from the syllabus, it is estimated that 30 classes per week will be conducted at 7-class schools with 1st and 2nd-grade students in combined classes. Thus for a total of 42 classes per week, there will be a 67% usage rate, thereby recognizing a sufficient need. In the preparatory survey for this Project, it was verified that of the 21 surrounding schools investigated, the agriculture practice rooms installed at 15 of the schools are being used efficiently.

② Use as a home economics rooms

Although home economics is an elective subject, 16% of all students in the 2009 first term and 20% in the second term chose this subject. Because of this, of the 145 secondary schools nationwide, 86% have installed home economics rooms. It is assumed that a home economics course will be established for all grades from Form I to Form V (Form I~III Home Economics, Form IV and V Fashion & Fabrics, and Food & Nutrition). In this case, it is estimated that 30 classes per week will be conducted, for which a sufficient need is recognized. In the preparatory survey for this Project, it was verified by the survey team that of the 21 surrounding schools investigated, the home economics rooms installed in 16 of the schools are being using effectively.

③ Use as a multi-purpose room

Not all of the classes in the agriculture and home economics courses are practical sessions, and for half of the hours needed for both subjects, classes can be held in normal classrooms. Because of this, it will be possible for other elective subjects to be conducted using the multi-purpose room. The installation of a multi-purpose room that also serves as a practical room for both subjects will be considered. The design of the multi-purpose room will be a

facility that improves a portion of the agriculture practice room and home economics room as shown in the standard design.

④ Kitchen for school lunch

A school kitchen is generally a small room of 10~15 m^2, sometimes built as an independent hut or under a roof attached to the classroom building. For this Project, it will be placed facing the covered work space of the multi-purpose room building, taking into consideration the provision of school lunches when raining. The main equipment will include a sink, cooking stove, and a kitchen counter that can also be used as a serving Table.

4) Multi-purpose Room (Type B: ICT laboratory/ Elective Subject classroom)

Although ICT is an elective subject, deliberations for making it compulsory are progressing at MOET, and ICT laboratories are already included in the standard design. Currently, of the 145 secondary schools nationwide, 66% have already installed ICT laboratories and have made it a compulsory subject. ICT education is a trend of the times, and since the need for this is expected to grow in the future, ICT laboratories will be installed. Most of the existing schools at which ICT is a compulsory subject are conducting classes for each grade from Form I to Form IV. It is estimated that approximately 30 classes per week will be implemented.

In the ICT laboratory standard design, an instructor's room is installed in the corner of the room, and it is expected that computers will be used for study at 6-person hexagonal lab tables. For this Project, the classroom area will be reduced from 152.75 m^2 to 108.72 m^2 by using a floor plan corresponding to the size of the computers.

5) Administration building

Standard design for the administration building had been designed for schools with a vice-principal and a total number of students exceeding 400. Therefore, an individual room for the vice-principal is included. Moreover, a general teacher's room can accommodate 23 to 24 teachers. In comparison, the scale of the schools in this project is estimated to contain an average of 220 students and 12 to 15 teachers. Thus, the proposed administration block plan has been reduced. The area for the administration building for the Project will be 123.82 m^2, as opposed to the standard design specification of 156.25 m^2

6) Student Toilets

Students' toilets in the existing schools are often located in the corner of the school yard. Toilets for both female and male students consist of a pit latrine, which is several meter deep. Since it is difficult to secure water in the rural areas of Swaziland, flush toilet using water are not recommendable. Therefore, an original standard type will also be used for this Project.

7) Teachers' housing

In Swaziland, a rental system for residences is not well developed, and it is difficult to

secure lodging or housing, especially in rural areas. Because of this, companies and government agencies often make housing arrangements for their employees.

For new schools in particular, it will be extremely difficult to employ all of the teachers from within the local areas, and most will transfer in from other regions. Teachers' housing is essential for securing licensed teachers in remote locations.

2-2-2-2 Facility Plan

(1) Site and facility layout plan

1) Administration buildings, which are the center of school management, will be constructed near the approach of each classroom.
2) Lines of traffic of teachers and students between classrooms and other facilities will be taken into consideration in the planning.
3) Distances between buildings and the directions of the buildings will be determined so as to guarantee appropriate indoor environment, such as good ventilation and lighting.
4) The buildings will be constructed as closely as possible along the contour lines to minimize the earth works including filling and cutting.
5) Location of the toilet buildings, septic tanks, and infiltration trench will be decided, taking care not to contaminate the neighboring water sources, by assessing and considering their impact on and out of the premises.
6) Privacy of the teachers will be respected and the teachers' housing will be constructed a fair distance away from the school facility.
7) Water tank will be installed in principle on a higher location within the school premises so that the water can be distributed by gravity. However, if that is inappropriate water will be pumped up to an elevated reservoir, from which it can be distributed by gravity.

(2) Construction Plan

1) Floor Plan

Depending on the assumed number of students, there will be differences in the numbers of normal classrooms and student toilets at each site, however, the other facilities will be of the same scale at all of the sites. The scale of each planned facility by candidate school is shown in the following table.

【Table 2-10】Summary of Contents and Sizes of Facility

Region	Site	Number of classes	Normal classroom			Science laboratory		Multi-purpose room			Administration building		Toilets for the students				Teacher's housing	
			Number of buildings by type		Surface Area (㎡)	No. of Builduings	Surface Area (㎡)	Number of buildings by type		Surface Area (㎡)	No. of Builduings	Surface Area (㎡)	Number of buildings by type			Area (㎡)	No. of Builduings	Surface Area (㎡)
			A 4CRs	B 3CRs				A	B				A 9 booths	B 8 booths	C 7 booths			
			272.22	204.17		135.67		250.35	108.72		123.82		31.50	28.00	24.50		61.13	
Lubombo	Mabhensane	7	1	1	476.39	1	135.67	1	1	359.07	1	123.82	0	0	1	24.50	4	244.52
	Mabondvweni	7	1	1	476.39	1	135.67	1	1	359.07	1	123.82	0	0	1	24.50	4	244.52
	Nyetane	7	1	1	476.39	1	135.67	1	1	359.07	1	123.82	0	0	1	24.50	4	244.52
Manzini	Nhlambeni	8	2	0	544.44	1	135.67	1	1	359.07	1	123.82	0	1	0	28.00	4	244.52
	Mliba	8	2	0	544.44	1	135.67	1	1	359.07	1	123.82	0	1	0	28.00	4	244.52
	Mandulo	9	0	3	612.51	1	135.67	1	1	359.07	1	123.82	1	0	0	31.50	4	244.52
Shiselweni	Mlambo	9	0	3	612.51	1	135.67	1	1	359.07	1	123.82	1	0	0	31.50	4	244.52
	Mpakeni	9	0	3	612.51	1	135.67	1	1	359.07	1	123.82	1	0	0	31.50	4	244.52
Hhohho	Hawane - F.R.	9	0	3	612.51	1	135.67	1	1	359.07	1	123.82	1	0	0	31.50	4	244.52
	Etfuntini	9	0	3	612.51	1	135.67	1	1	359.07	1	123.82	1	0	0	31.50	4	244.52
	Hhelehhele	7	1	1	476.39	1	135.67	1	1	359.07	1	123.82	0	0	1	24.50	4	244.52
	Mantabeni	8	2		544.44	1	135.67	1	1	359.07	1	123.82	0	1	0	28.00	4	244.52
Total		97	10	19	6601.43	12	1628.04	12	12	4308.84	12	1485.84	5	3	4	339.5	48	2934.24
unit		classes	buildings	buildings	㎡	buildings	㎡	buildings	buildings	㎡	buildings	㎡	buildings	buildings	buildings	㎡	buildings	㎡

【Table 2-11】Area Analysis of Facility　*Includes kitchen

Component		Area of each building	No. of Buildings	No. of rooms		Area
Normal classroom	A	272.22 ㎡	10	40 CRs	97 CRs	2,722.20 ㎡
	B	204.17 ㎡	19	57 CRs		3,879.23 ㎡
Science laboratory		135.67 ㎡	12	-		1,628.04 ㎡
Multi-purpose room	A	250.35 ㎡	12	-		3,004.20 ㎡
	B	108.72 ㎡	12	-		1,304.64 ㎡
Administration building		123.82 ㎡	12	-		1,485.84 ㎡
For students Toilets	A	31.50 ㎡	5	45 booths	97 booths	157.50 ㎡
	B	28.00 ㎡	3	24 booths		84.00 ㎡
	C	24.50 ㎡	4	28 booths		98.00 ㎡
Teachers' housing		122.26 ㎡	24	48 units		2,934.24 ㎡
Total		-	113			17,297.89 ㎡

① Normal Classroom building

a) Layout measurements and surface area

4-classroom building (A)	Classroom interior = 28,520×8,230 (mm)	234.72 m^2
	Open corridor = 28.520×1.315 (mm)	37.50 m^2
	Total	272.22 m^2
3-classroom building (B)	Classroom interior = 21,390×8,230 (mm)	176.04 m^2
	Open corridor = 21.390×1.315 (mm)	28.13 m^2
	Total	204.17 m^2

b) Major facilities and equipment

- Lighting　40W fluorescent tube×2　6 lights
- Desks and chairs for students　40 sets
- Desks and chairs for teachers　1 set

② Sicence Laboratory building

a) Layout measurements and surface area

- Layout measurements and surface area
- Laboratory = 10,770×8,780 (mm)　94.56 m^2
- Preparation room = 2,670×6,830 (mm)　18.24 m^2

Subtotal　112.26 m^2

- Porch = 2,670×1,950 (mm)　5.21 m^2
- Open corridor = 13.44×1.315 (mm)　17.67 m^2

Total　135.67 m^2

b) Major facilities and equipment

- Lighting　40W fluorescent tube×2　12 lights
- Laboratory:　Lab sinks for students (4 sinks)　2 rows（L＝10,540 mm）
  1 lab table for teacher (L＝3,000 mm), 1 teacher's chair
  8-person tables for students (L＝4,800 mm）5 tables, 40 student stools
- Preparation room: 1 sink (L＝2,400 mm), 1 standard cupboard

③ Multi-purpose Room building (Type A: Agriculture/ Home Economics with kitchen)

a) Layout measurements and surface area

- Experiment/practical room = 10.770x8.780 (mm)　94.56 m^2
- Preparation room = 2.700x8.780 (mm)　23.44 m^2
- Work space = 7.130×8.780 (mm)　62.60 m^2
- Agricultural warehouse = 4.230×5.000 (mm)　21.15 m^2
- School kitchen = 4.230×3.780 (mm)　15.99 m^2
- Open corridor = 24.800 x 1.315 (mm)　32.62 m^2

Total　250.35 m^2

b) Major facilities

Practical room

- Lighting　40W fluorescent tubes ×2　12 lights
- Student sinks (4 sinks) 1 row（L＝10,540 mm）
- Teacher's sink (1 sink)（L＝3,000 mm)

School kitchen

- Cooking stove (for cast-iron pots)× 2 openings
- Sink
- Serving Table

④ Multi-purpose Room building (Type B: ICT laboratory/ Elective Subject room)

a) Layout measurements and surface area

- Indoor laboratory = 10.770x8.780 (mm) 94.56 m^2
- Open corridor =10.770x1.315 (mm) 14.16 m^2

Total 108.72 m^2

b) Major facilities and equipment

- Lighting 40W fluorescent tubes × 2 12 lights

⑤ Administration building

The vice-principal's office and a portion of the teachers' room (an area corresponding to the width of the vice-principal's office) will be eliminated in line with the policy for the facility plan, and the frontage of the building will be reduced by 3.0 meters.

a) Layout measurements and surface area

- Administrative office = 10.620×10.345 (mm) 109.86 m^2
- Open corridor = 10.620×1.315 (mm) 13.96 m^2

Total 123.82 m^2

b) Major facilities and equipment

- Teachers' toilets × 2
- Kitchen

⑥ Student Toilets

Since it is often difficult to secure water in rural areas of Swaziland, flush toilets are unsuitable. Thus, for this project, the toilets will be the customary standard type.

【Table 2-12】Scale of Toilets

	Name of school	Number of students	Number of classes	Standard number of toilet bowls	Number of toilet bowls		Type
					Male/Female toilet	Total	
1	Mabhensane	168	7	7	Male:3, Female:4	7	C
2	Mabondvweni	182	7	7	Male:3, Female:4	7	C
3	Nyetane	171	7	7	Male:3, Female:4	7	C
4	Nhlambeni	228	8	8	Male:4, Female:4	8	B
5	Mliba	223	8	8	Male:4, Female:4	8	B
6	Mandulo	265	9	9	Male:4, Female:5	9	A
7	Mlambo	291	9	9	Male:4, Female:5	9	A
8	Mpateki	246	9	9	Male:4, Female:5	9	A
9	Hawane / FR	262	9	9	Male:4, Female:5	9	A
10	Etfutini	250	9	9	Male:4, Female:5	9	A
11	Hhelehhele	191	7	7	Male:3, Female:4	7	C
12	Mantabeni /	231	8	8	Male:4, Female:4	8	B

⑦ Teachers' housing

For this Project, 4 teachers' housing units (1 for the principal, 3 for teachers) will be

constructed at each site. 37% of the teachers can be accommodated with this planned housing. Each housing unit will generally be a 2DK (2 rooms + dining + kitchen), in accordance with the standard design.

a) Layout measurements and surface area

・Living area	53.86 m^2
・Veranda	7.27 m^2
Total	61.13 m^2

b) Major facilities and equipment

- ・Shower
- ・Toilet
- ・Kitchen

2) Sectional Plan

In the local standard specifications, the floor height is set at approximately 150 mm. However, for this Project, the floor height will be set at 300 mm from the ground level in order to prevent flooding above floor level during localized heavy rainstorms. In addition, the open corridor will be set at approximately FL-20 mm. The ring beams that are normally used locally involve a method of pouring concrete into U-shaped blocks. A plaster board ceiling is installed at the 2800 mm height of the ceiling, with insulation material above the ceiling.

No. of floors:	Single floor
Roof shape:	Gable roof, gradient = ±32%
Sectional measurements:	Floor height = 300 mm (from higher ground level)
	Ceiling height =2,800 mm
	Eave height = 3,180 mm (from higher ground level)
Roof measurements:	
Eave extension =	Span direction: 715 mm (600 mm from wall surface)
	Corridor eave extension: 415 mm (from piller)
	Longitudinal direction：415mm (300 mm from wall surface)

3) Structural Plan

Principle structure:	Block walls + wood truss roof frame
Open corridor structure:	Row of ø75 steel pipe columns + diagonal truss extensions to main building

① Technical standard

Structural design will be conducted adopting the load specified in the South African standard. SABS (South African Bureau of Standards) will be adopted as the standard for construction materials.

② Geological survey

It has been estimated from the condition of the topsoil that there is sufficient soil bearing capacity (5t/m^2) at all of the sites to support concrete-block single floor buildings, and geological surveys were conducted for confirmation. No particular problems were found, and the basic form following the standard design will be used.

③ Earthquake-resistant design

Since there have been no earthquakes recorded in Swaziland, no particular consideration is given to earthquake-resistant design.

④ Wind pressure resistance

The South African standard will be used regarding wind pressure.

⑤ Foundation

The standard design for the foundation is continuous footing in reinforced concrete, which will be followed.

The concrete strength generally specified for public works in Swaziland will be used, thus meeting the South African standard.

4) Electrical, Plumbing Plan

① Electrical plan

Power transmission is possible at all of the sites, and work will be performed for lighting fixtures, outlets, and incoming panels. In principle, this includes everything from the work borne by the recipient country bringing power to the site to the previous work done within the site.

② Water supply and drainage plan

Conforming to the standard design, water supply facilities and drainage facilities (including rainwater, septic tank, and seepage pit) will be designed.

- The water receiving tank and pump will be installed near the border of the site. From the elevated water tank installed in a location maintaining approximately 5.5 m in height, a gravity water distribution system will be set up to supply water to the building facilities (science laboratory building, multi-purpose room building A, administration building, and teachers' housing).
- An exterior washroom will be installed on the side of multi-purpose room building A.
- Septic tanks will be installed near the administration building, science laboratory, and teachers' housing.

③ Other

- Fire extinguishers will be installed in all classrooms, the administration building, and teachers' housing.

・Gas pipes will be installed in the science laboratory.

5) Construction Materials Plan

The construction materials used in the standard design will be used in principle. The materials are distributed domestically, thus no special considerations will be necessary in procurement. The grade and durability of the materials have been determined to be appropriate for construction of schools.

【Table 2-13】Building Materials

Type	Parts		Materials
Structural materials	Foundation		Reinforced concrete W690 x H250mm
	Floor		Reinforced concrete T100mm
	Walls		Concrete blocks（reinforced）T230mm (Toilet Block T150mm)
	Corridor column		φ75 steel pipes
	Roof　Truss		Wood truss
Finishing materials	Roof		Galvanized IBR roof sheet T0.58mm
	Exterior walls		Mortar with painted finish
	Ceiling		Plaster board ceiling
	Interior walls		Mortar with painted finish
	Floor		Mortar with metal trowel finish
	Fittings	Windows	Steel frame + glass
		Doors	Steel frame + wooden door

(3) Classroom Furniture Plan

In this Project, the furniture to be provided by the Japanese side is as follows in the table below. Other furniture and laboratory equipment will be procured by Swaziland.

【Table 2-14】Summary of Furniture Supply

Region	No. (Order of proprity)	Site	Purpose・Name of room・Type	Furniture for classroom					
				Normal classroom				Science laboratory	
				for students		for teachers		for students	for teachers
				Chair A	Desk A	Chair B	Desk B	Chair C	Chair B
			Units/room	40	40	1	1	40	2
Lubombo	1	Mabhensane	7 classrooms	280	280	7	7	40	2
	2	Mabondvweni	7 classrooms	280	280	7	7	40	2
	3	Nyetane	7 classrooms	280	280	7	7	40	2
Manzini	4	Nhlambeni	8 classrooms	320	320	8	8	40	2
	5	Mliba	8 classrooms	320	320	8	8	40	2
	6	Mandulo	9 classrooms	360	360	9	9	40	2
Shiselweni	7	Mlambo	9 classrooms	360	360	9	9	40	2
	8	Mpakeni	9 classrooms	360	360	9	9	40	2
Hhohho	9	Hawane - F.R.	9 classrooms	360	360	9	9	40	2
	10	Etfuntini	9 classrooms	360	360	9	9	40	2
	11	Hhelehhele	7 classrooms	280	280	7	7	40	2
	12	Mantabeni	8 classrooms	320	320	8	8	40	2
Total			97	3,880	3,880	97	97	480	24

(4) Local Specifications and Proposal for Improvement

1) Specifications pertaining to strength and durability

① In the Swaziland standard design, the floor height of the facilities is approximately 150 mm on average. However, in order to prevent flooding above floor level due to sudden heavy rainstorms, the floor height will be set at the ground level + 300 mm.

② The presence of ant-proofing treatment varies widely depending on the school. Although there are no clear guidelines for this in the Swaziland standard design, all sites will have ant-proofing treatments for this Project.

③ In the Swaziland standard design, the roof frame system and materials used for each component are widely varied. For this Project, the sectional plan, frame system, and materials will be made as uniform as possible in order to improve construction efficiency.

2) Natural lighting and windows

① At the older existing schools, high windows were used as the windows facing the open corridor in an attempt to enhance privacy in the classrooms, but in the Swaziland standard designs of recent years, large windows have been placed facing the corridor to improve natural lighting. However, in order to gain privacy, some places have painted the inside surface of the glass. For this Project, the windows facing the open corridor will be the large windows commonly used in recent years, but in order to secure privacy, figured glass will be used at eye level for these windows.

② In the Swaziland standard design, there are no uniform specifications regarding crime prevention at building frontages, and its management differs depending on the school. For

this project, window gratings will be consistently installed at the administration building, teachers' housing, and equipment storage rooms.

3) Support for people with physical disabilities

① In the Swaziland standard design, the floor levels of the open corridor and the classrooms have a difference of approximately 75 mm. For the project, this difference will be reduced to 20 mm to assist people with physical disabilities.

4) Miscellaneous

① In the Swaziland standard design, the open corridor of the classroom building has a framework of steel columns and wooden beams, while the veranda of the teachers' housing uses a reinforced concrete frame, showing that construction methods are widely varied. Reinforced concrete construction for columns and beams is costly, thus for this Project, the frame construction will be made uniform using steel columns and wooden beams. This will improve construction efficiency and reduce costs.

② As was mentioned earlier, in the Swaziland standard design, there are separate standard designs for the practical room for Agriculture and Home Economics. However, for this Project, a multi-purpose room was newly designed that can accommodate either as an elective subject.

③ The administration building in the Swaziland standard design has an attached vice-principal's office for schools that meet the prerequisite of having a vice-principal and 400 or more students. Additionally, the teachers' room can accommodate 23-24 people. The scale of the schools for this Project was calculated to have an average of 220 students and 12-15 teachers. Therefore, the scale was reduced to correspond with the assumed number of teachers.

④ Teachers' housing in the Swaziland standard design is generally constructed with each building being independent. For this project, two housing units will be placed in one building sharing a wall, which will reduce the amount of facility work.

⑤ In the Swaziland standard design, the use of asbestos in window sills and roof fascia has been observed at some schools. For this project, instead of asbestos, an equivalent product made of fiber cement will be used.

2-2-3 Outline Design Drawings

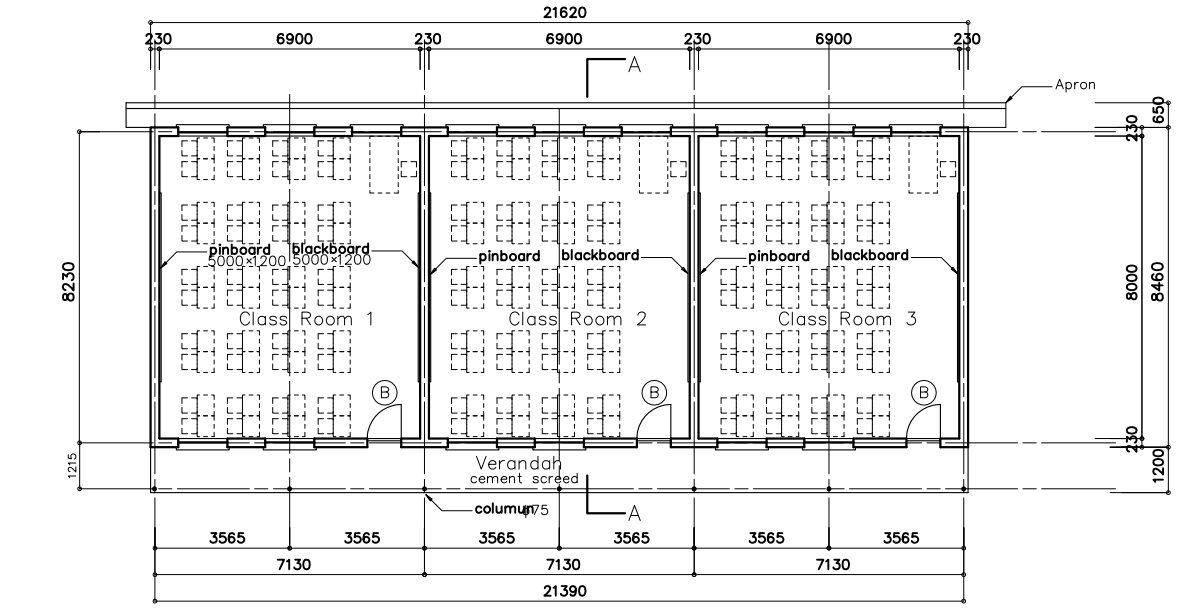
The drawings below are appended on the pages following.

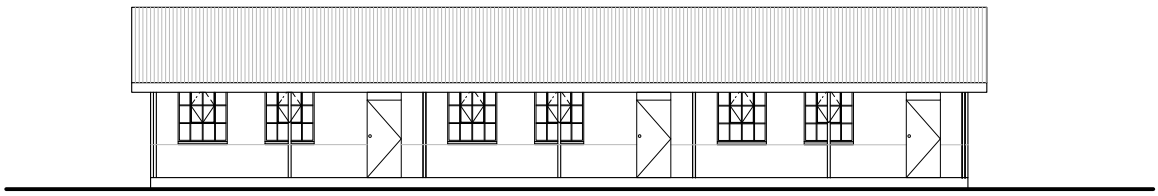
Architectural Drawings

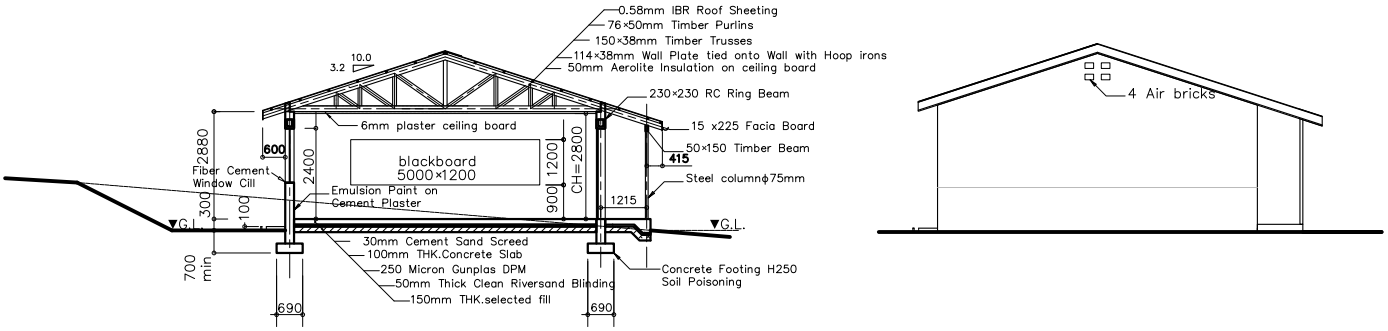
1) Normal Classroom building (3 classrooms) (scale 1/200)
2) Normal Classroom building (4 classrooms) (scale 1/200)
3) Science Laboratory building (scale 1/200)
4) Multi-purpose Room A (scale 1/200)
5) Multi-purpose Rooms B (scale 1/200)
6) Administration building (scale 1/200)
7) Student Toilets (boys/girls) (scale 1/100)
8) Teachers' Housing (scale 1/200)

Site Plans

9) Site plan (1: Mabhensane) (scale 1/2000)
10) Site plan (2: Mavondweni) (scale 1/2000)
11) Site plan (3: Nyetane) (scale 1/2000)
12) Site plan (4: Nhlanbeni) (scale 1/2000)
13) Site plan (5: Mliba) (scale 1/2000)
14) Site plan (6: Mandulo) (scale 1/2000)
15) Site plan (7: Mlambo) (scale 1/2000)
16) Site plan (8: Mpakeni) (scale 1/2000)
17) Site plan (9: Hawane) (scale 1/2000)
18) Site plan (10: Etfuntini) (scale 1/2000)
19) Site plan (11: Hhelehhele) (scale 1/2000)
20) Site plan (12: Mantabeni) (scale 1/2000)

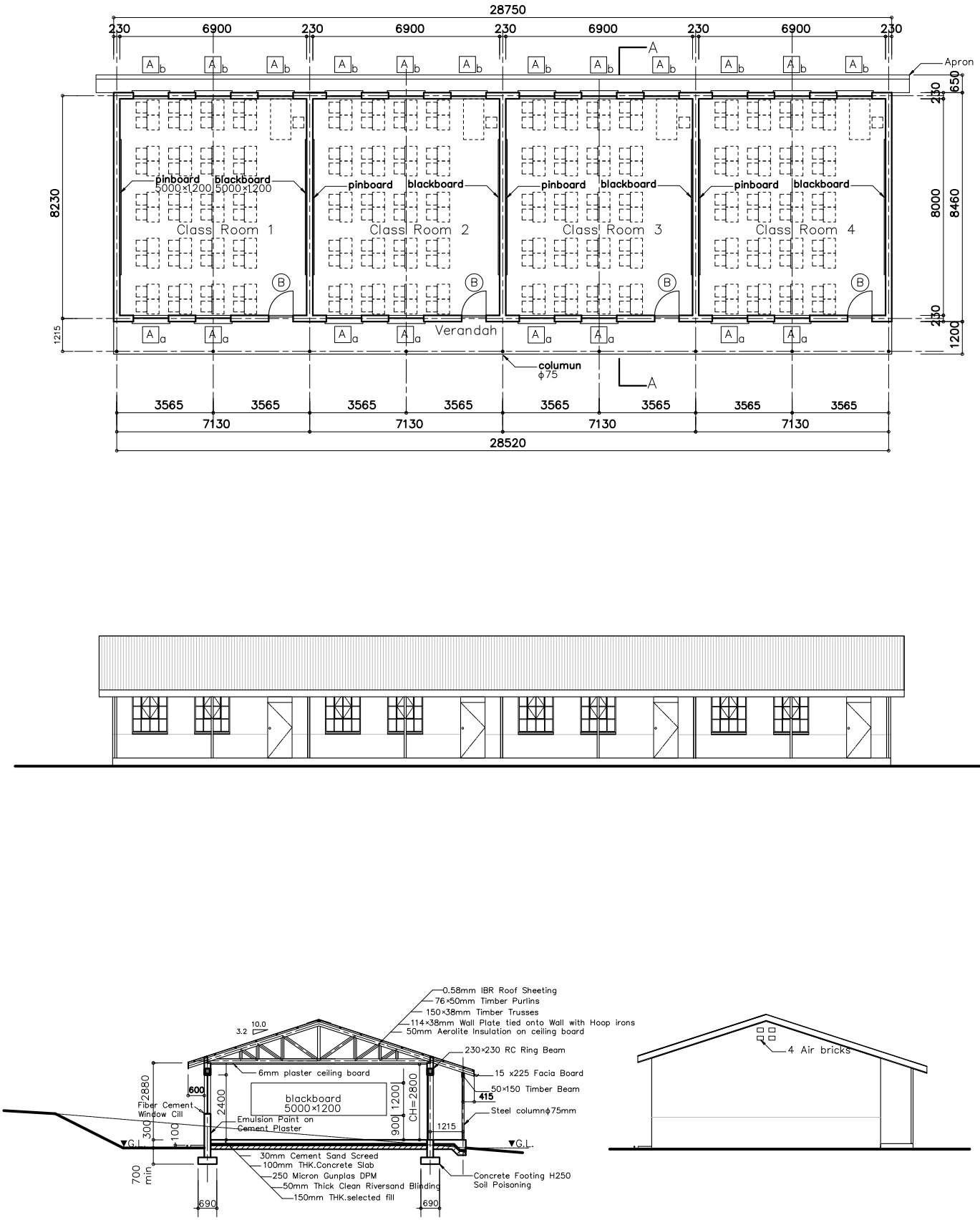






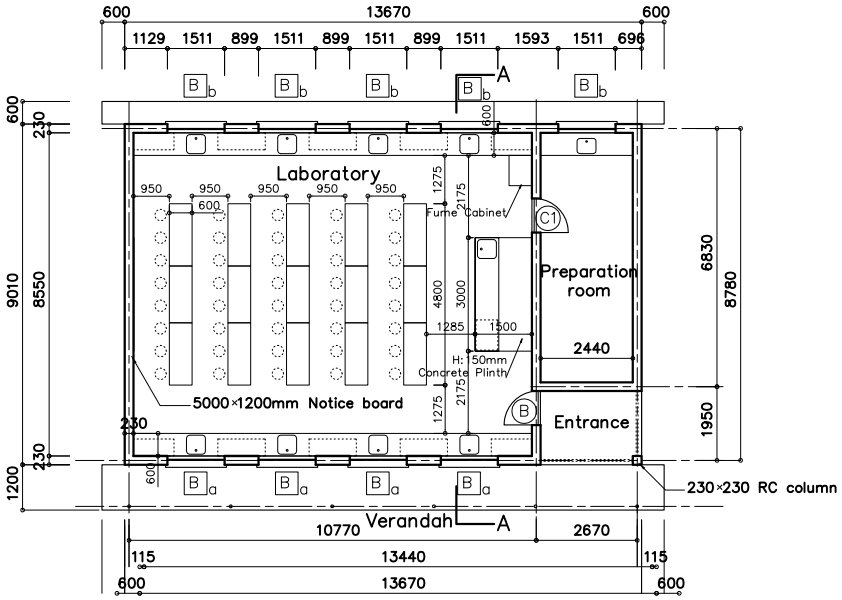
Plan, Section, Elevations 1/200

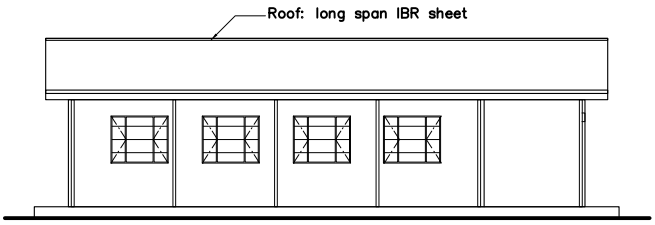
【Figure2-2】Normal Classroom Building (3 Classrooms)

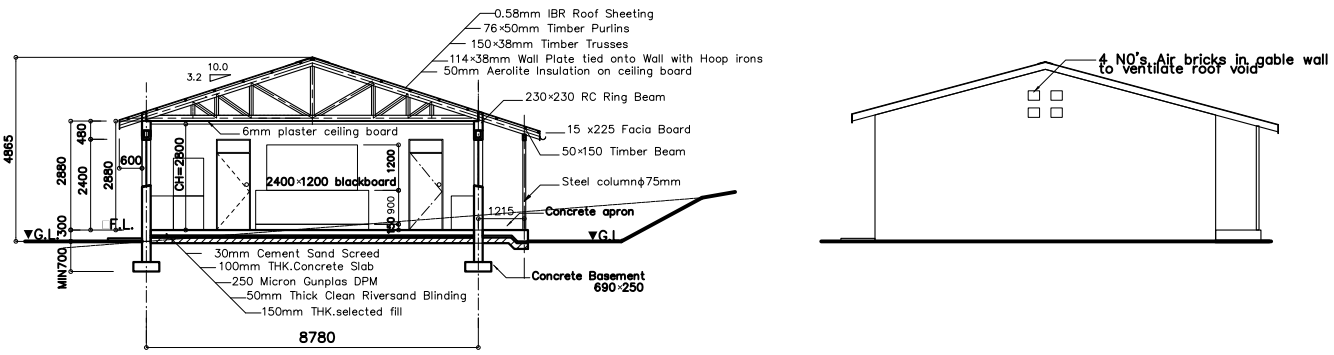


Plan, Section, Elevations 1/200

【Figure2-3】Normal Classroom Building (4 Classrooms)

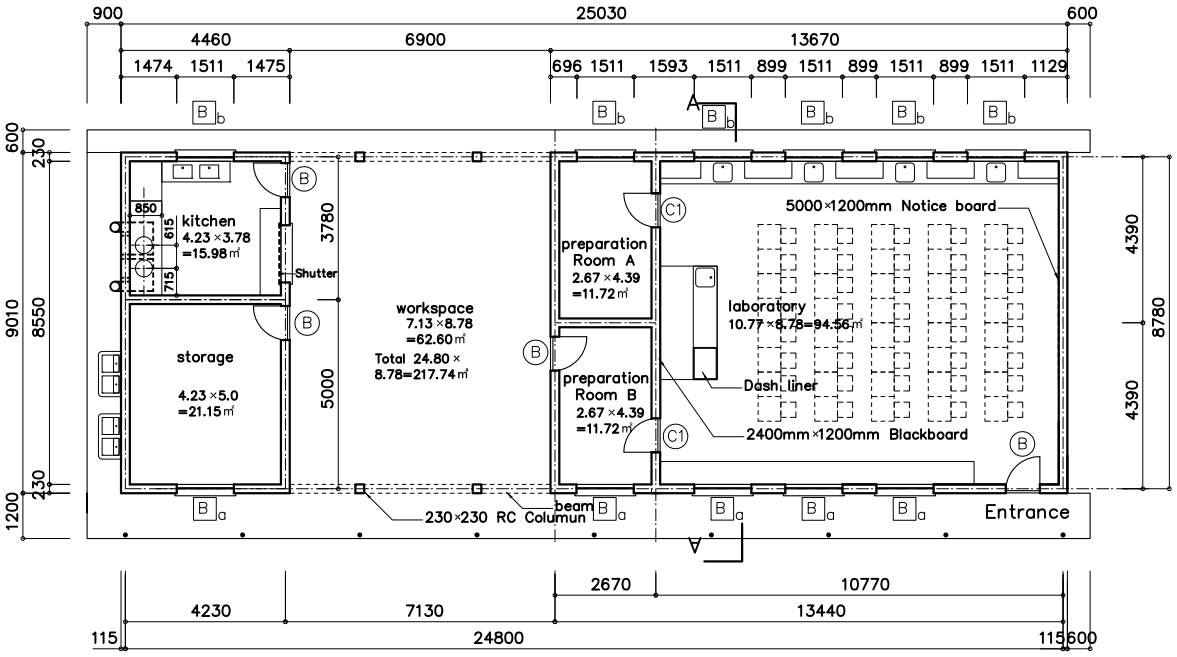


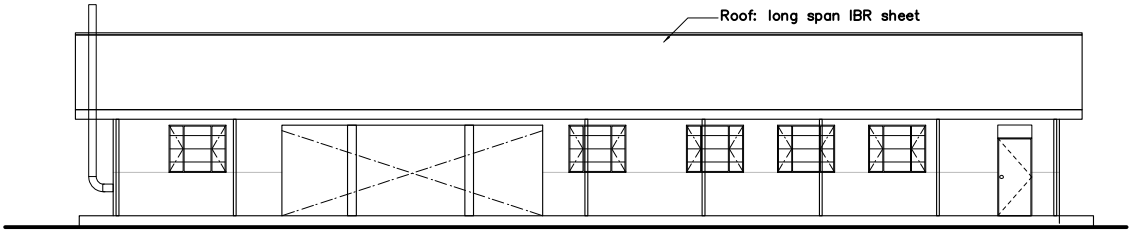


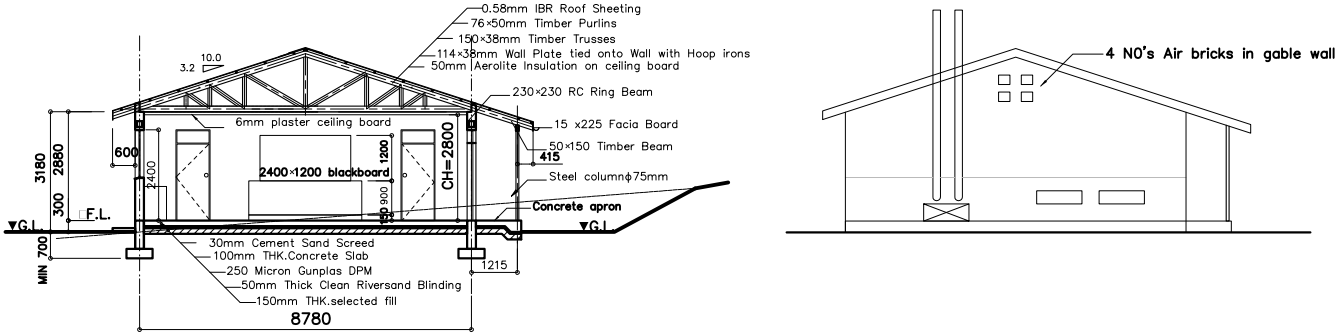


Plan, Section, Elevations 1/200

【Figure2-4】Science Laboratory Building

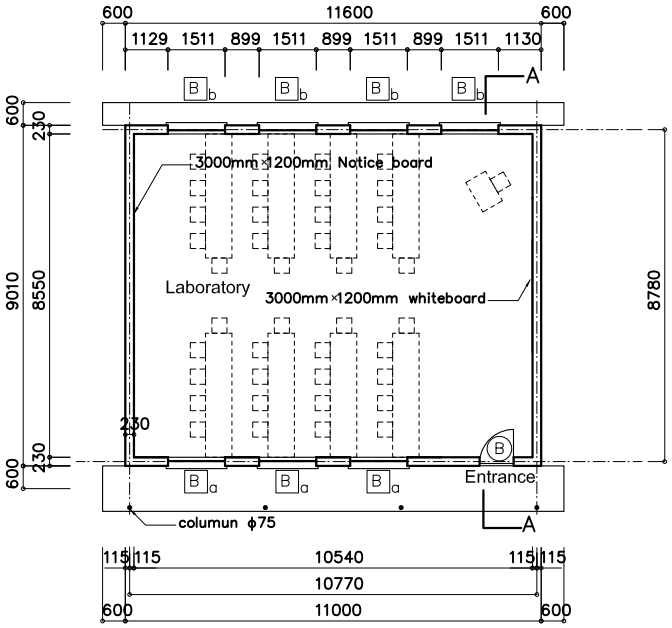


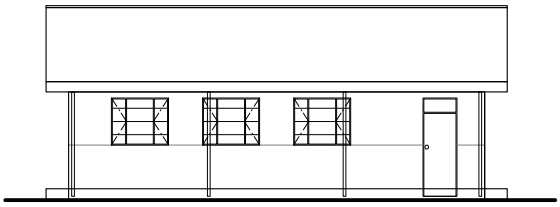


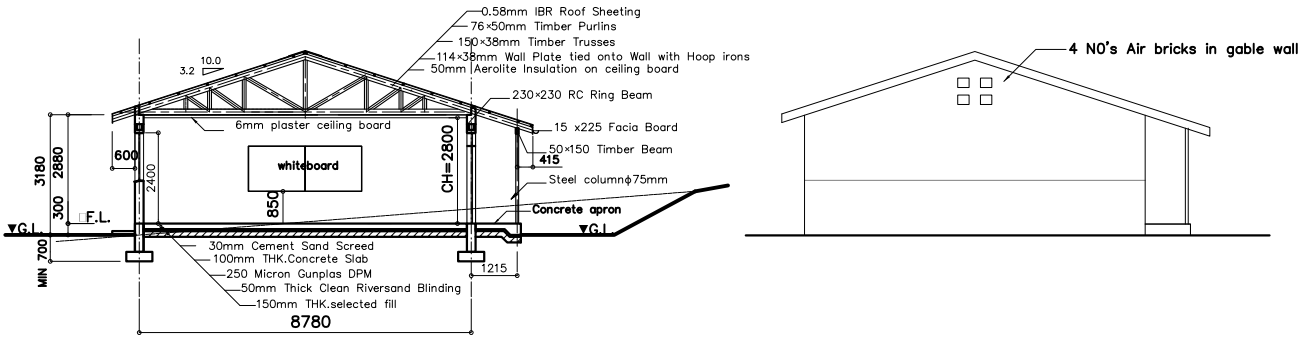


Plan, Section, Elevations 1/200

【Figure2-5】Multi-purpose Room A

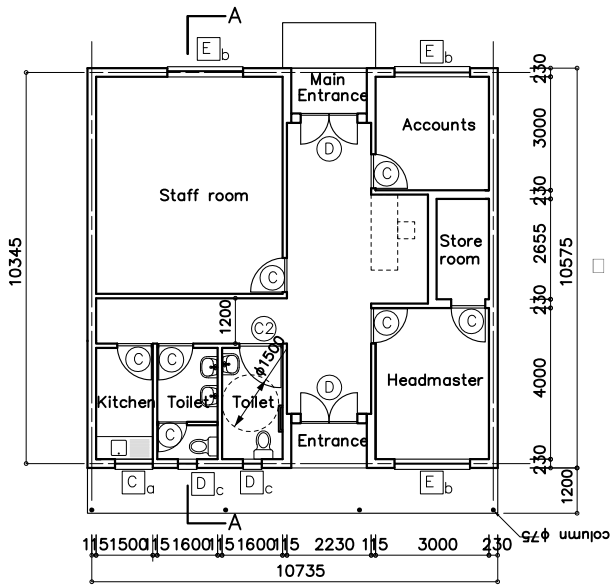


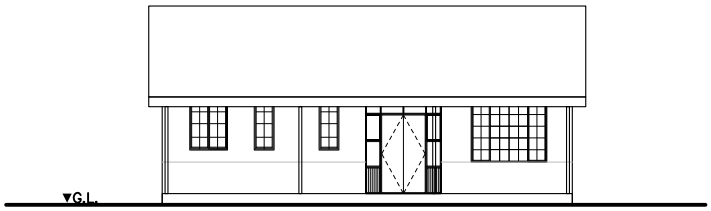


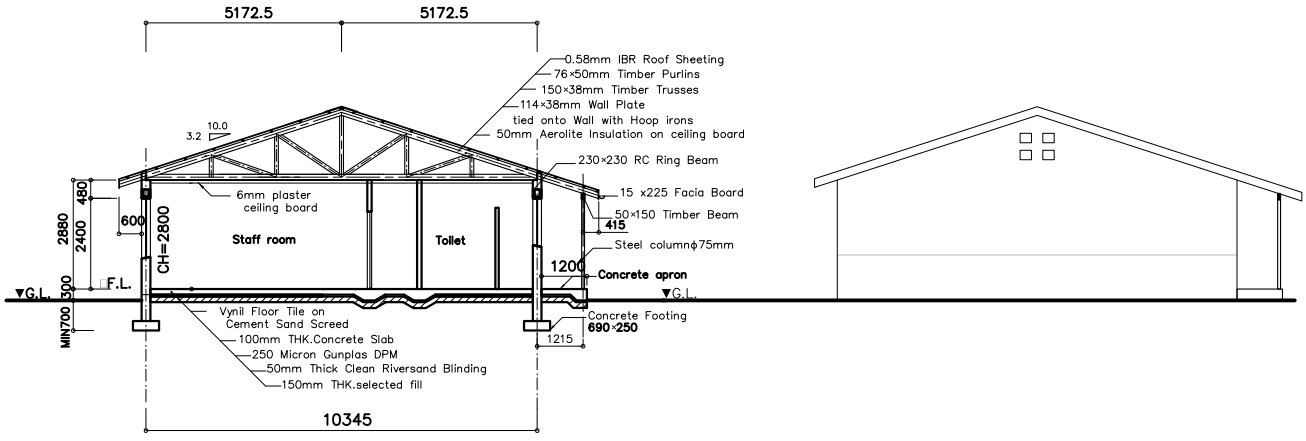


Plan, Section, Elevations 1/200

【Figure2-6】Multi-purpose Room B

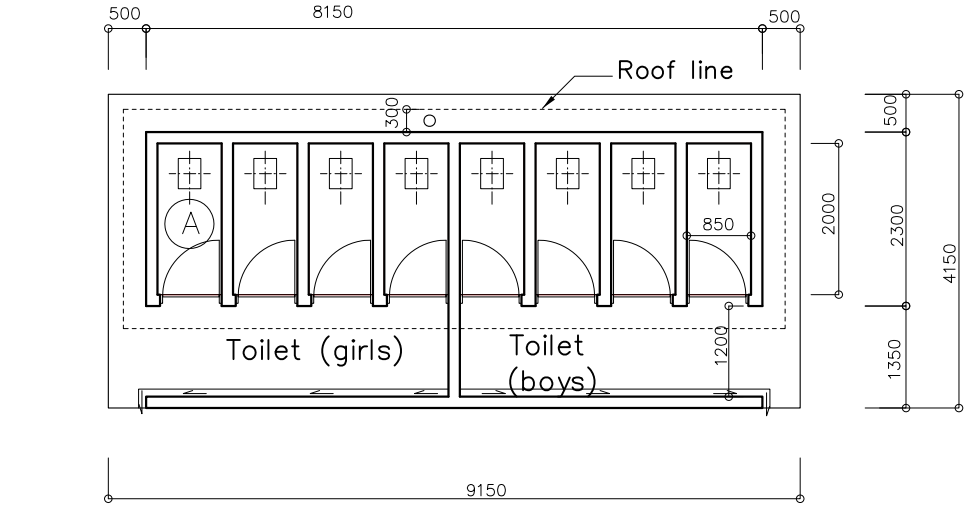


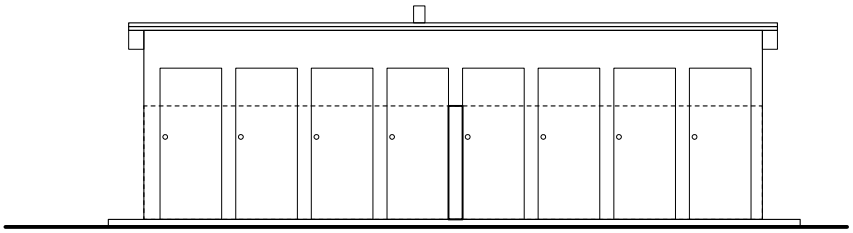


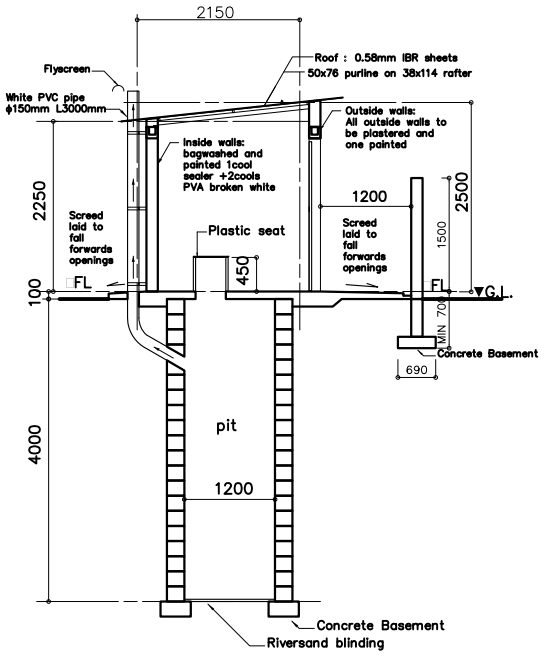


Plan, Section, Elevations 1/200

【Figure2-7】Administration Building

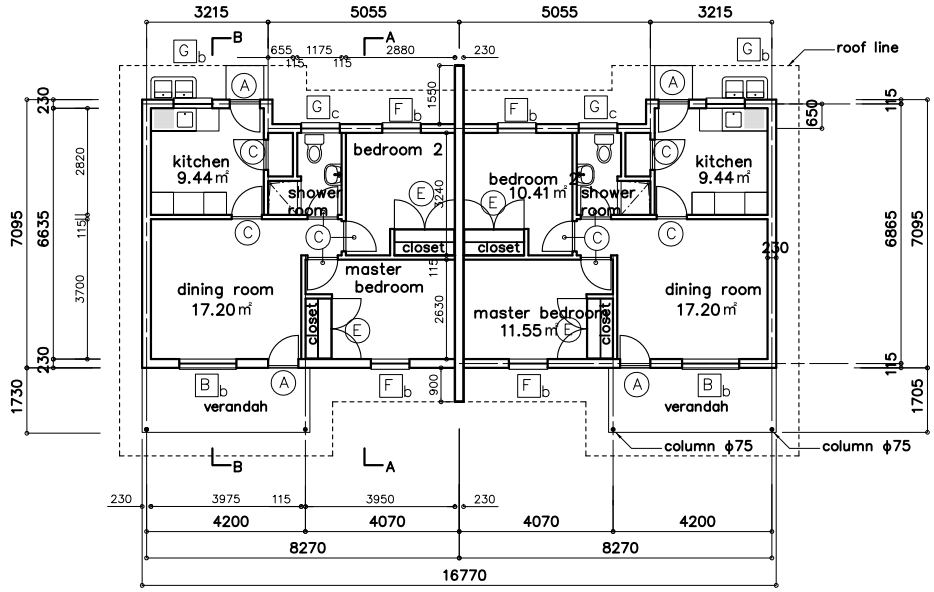


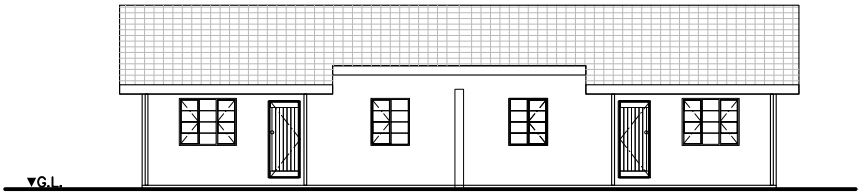


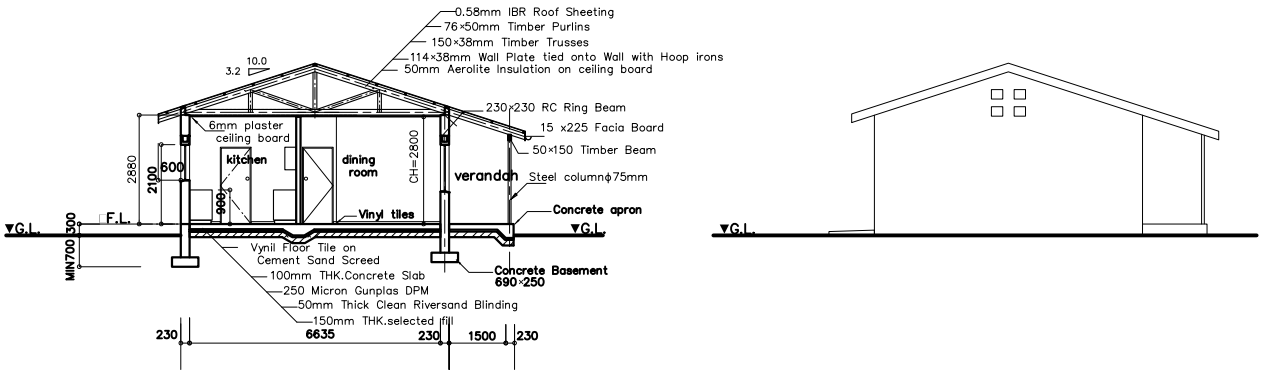


Plan, Section, Elevations 1/200

【Figure2-8】Student Toilets (Boys/ Girls)



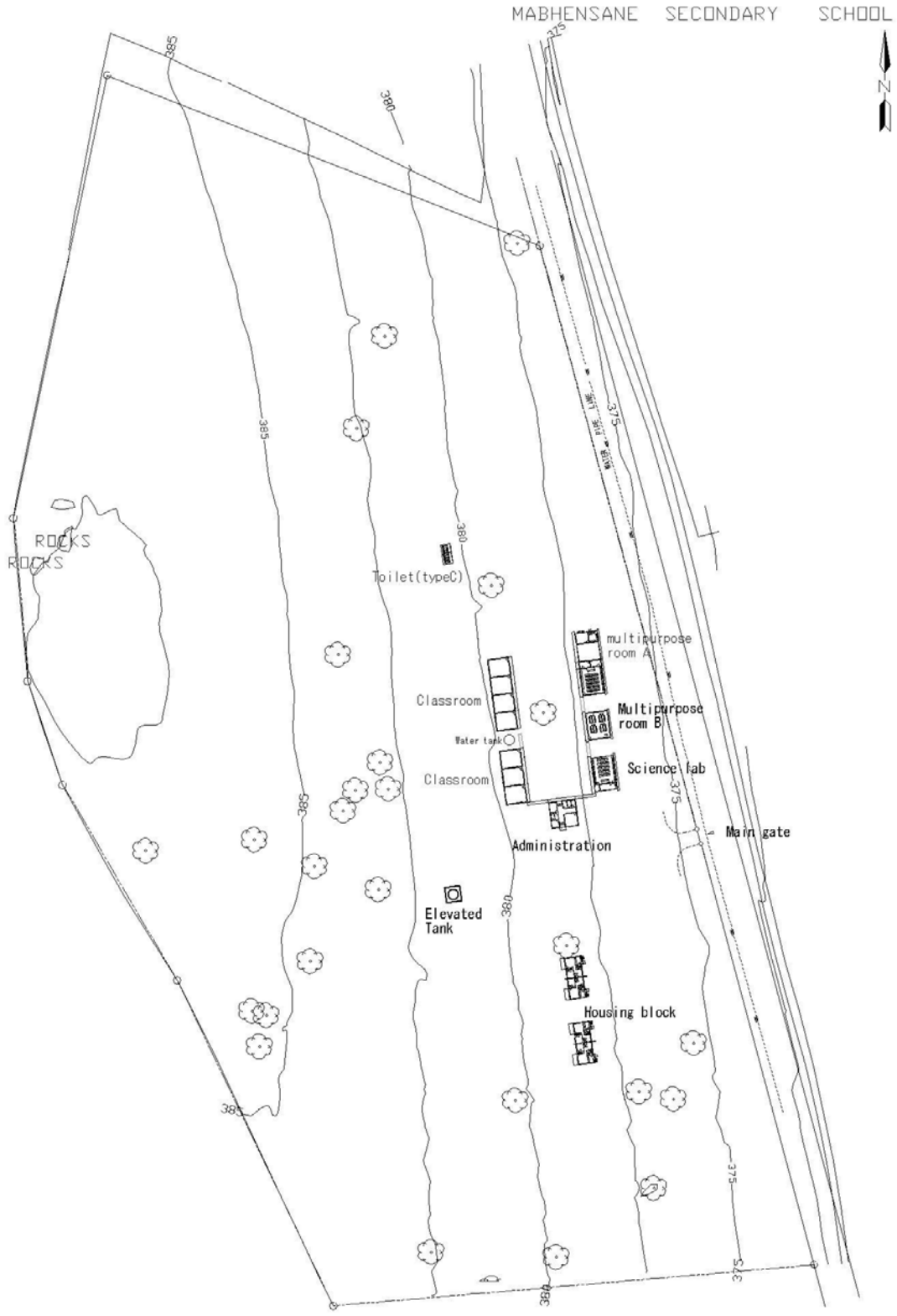




Plan, Section, Elevations 1/200

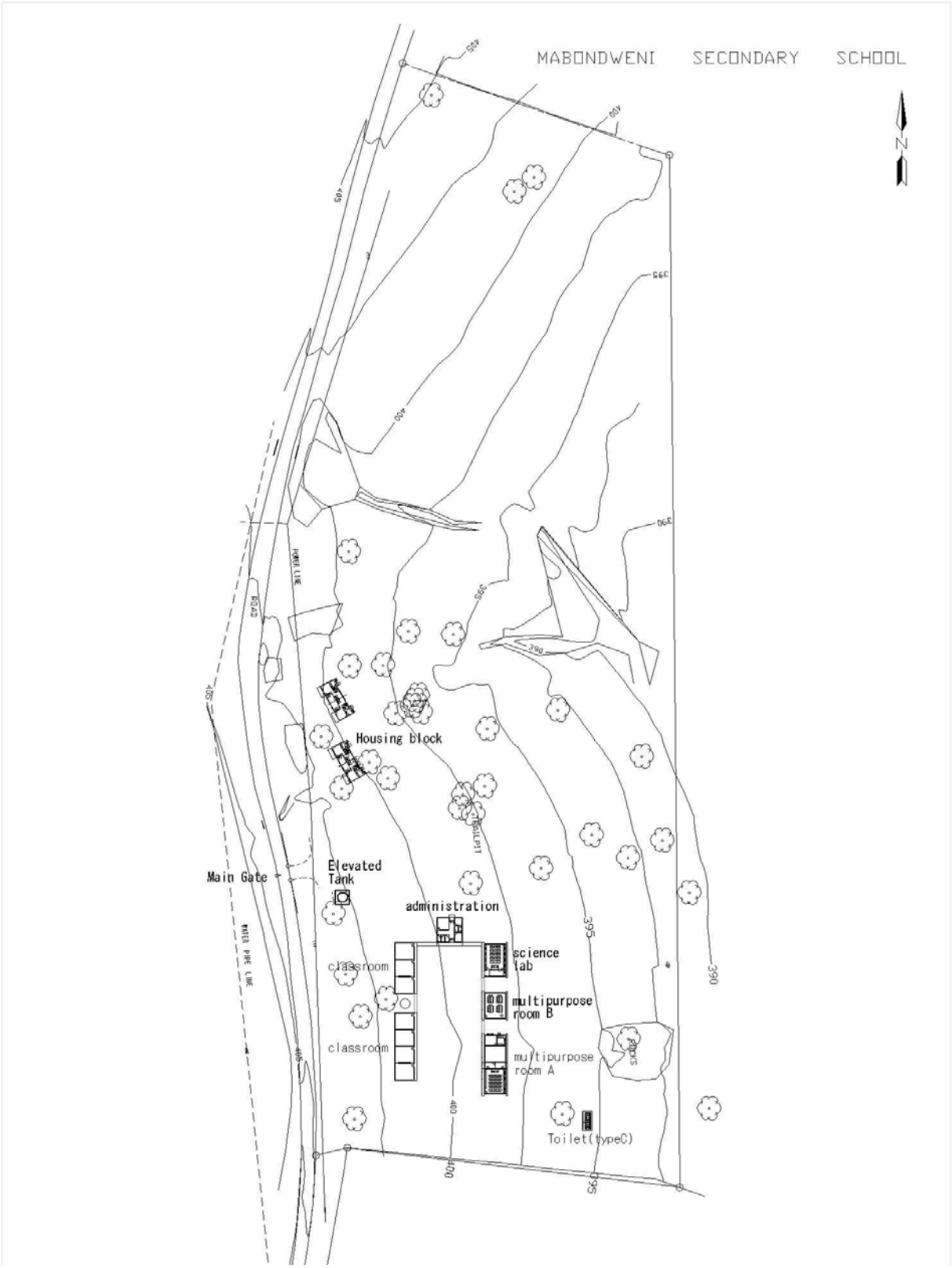
【Figure2-9】Teachers' Housing

9) Site plan (1: Mabhensane)　(scale 1/2000)



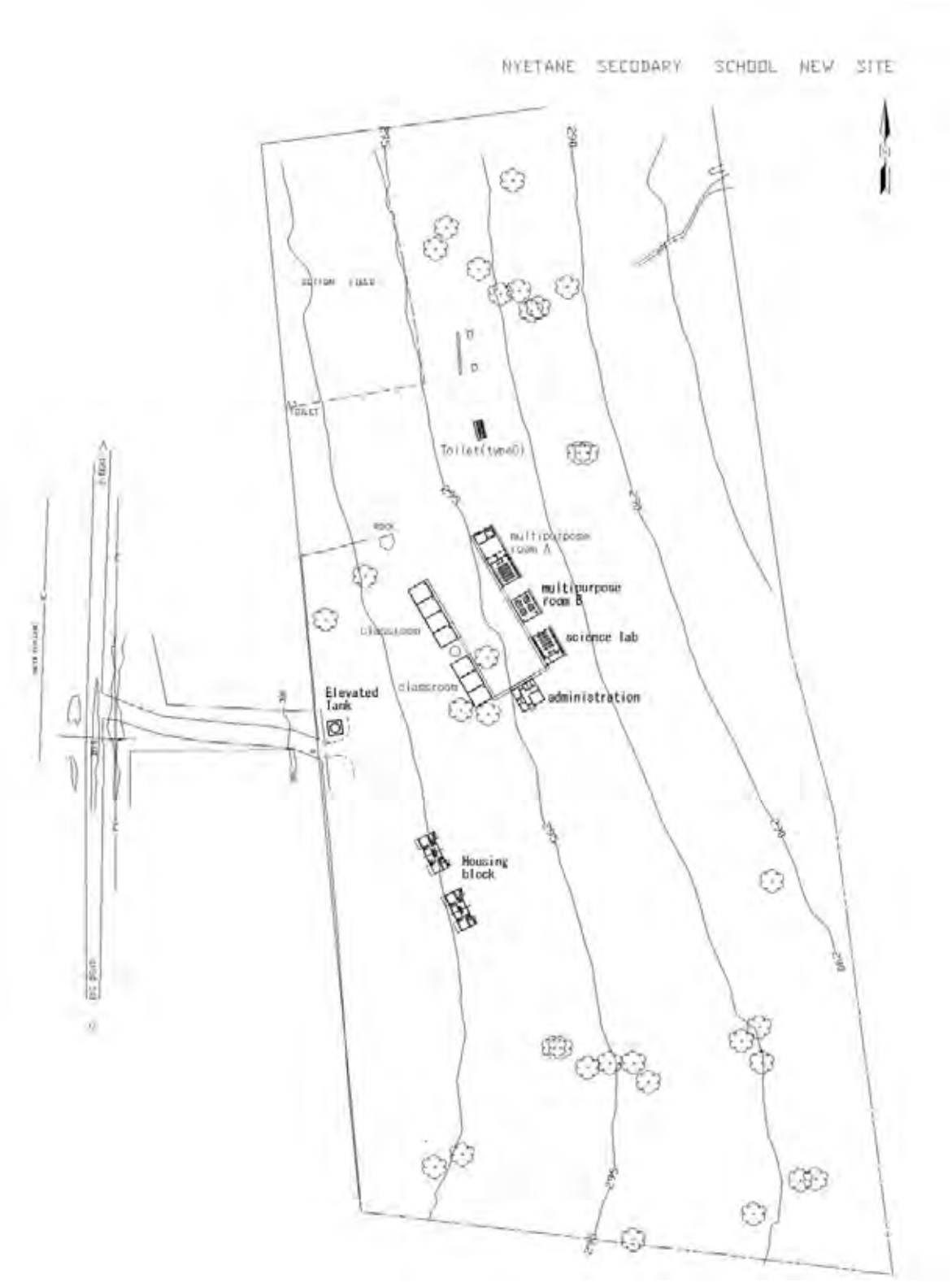
【Figure 2-10】

10) Site plan (2: Mavondweni)　(scale 1/2000)



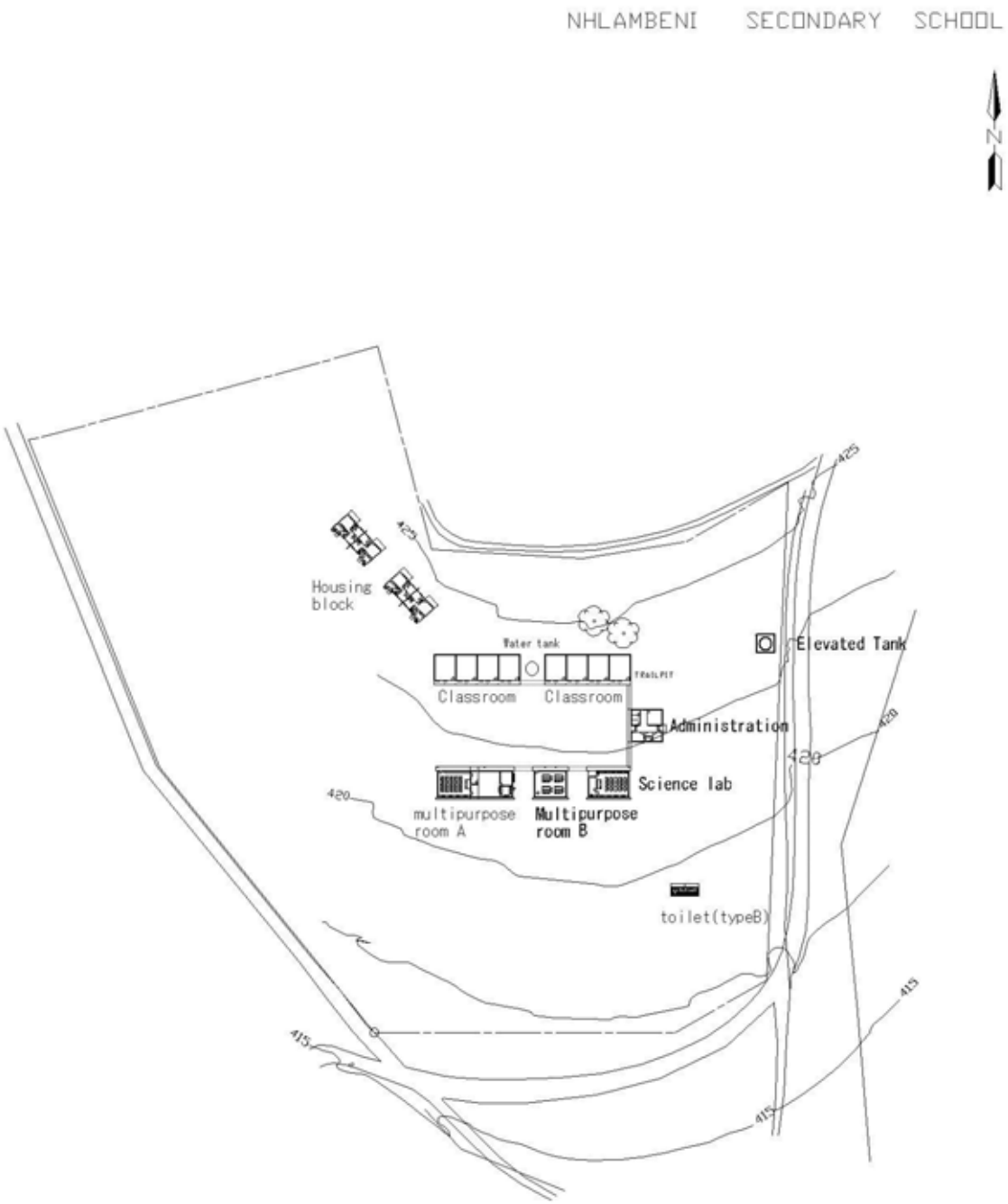
【Figure 2-11】

11) Site plan (3: Nyetane)　(scale 1/2000)



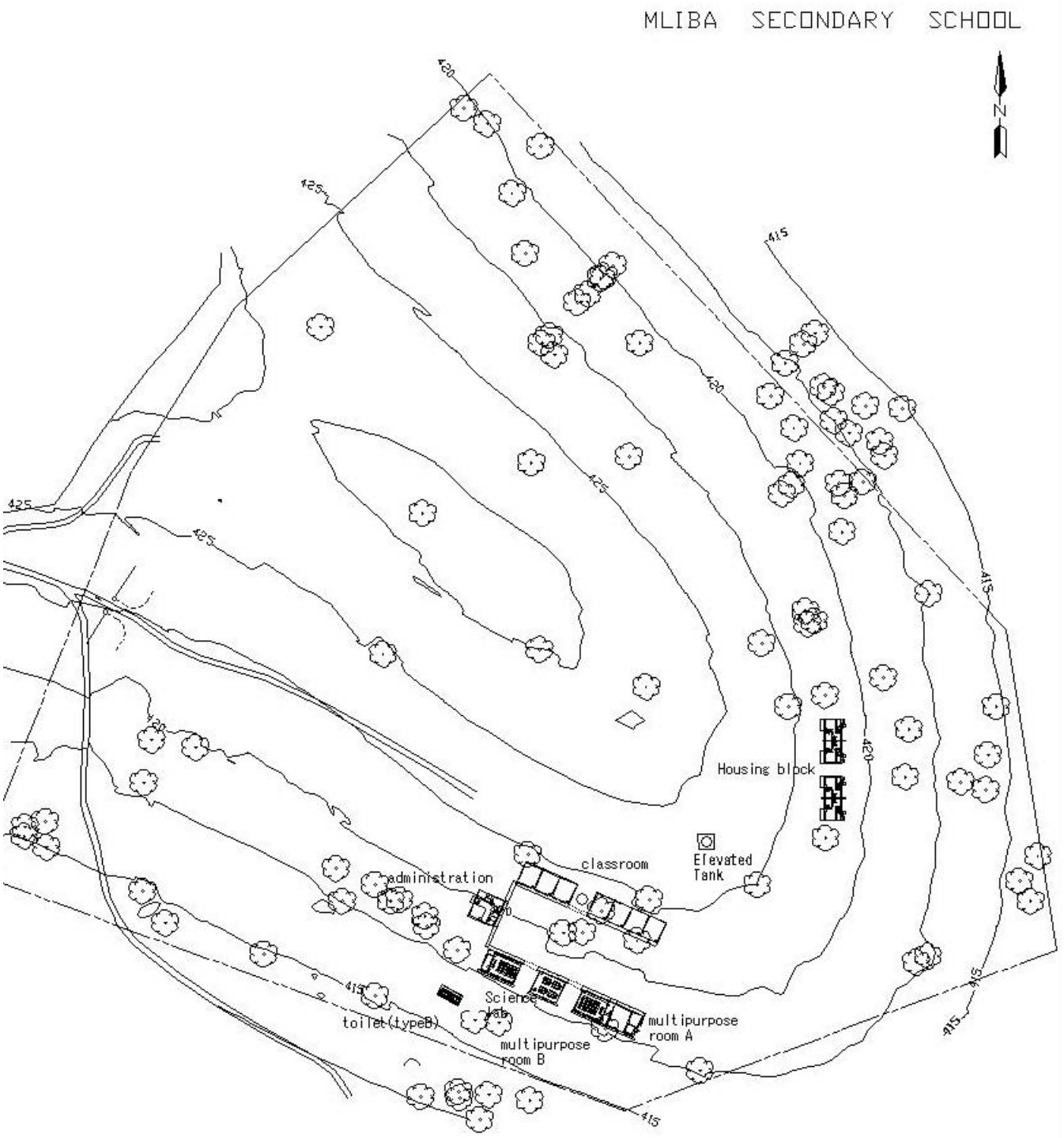
【Figure 2-12】

12) Site plan (4: Nhlambeni)　(scale 1/2000)



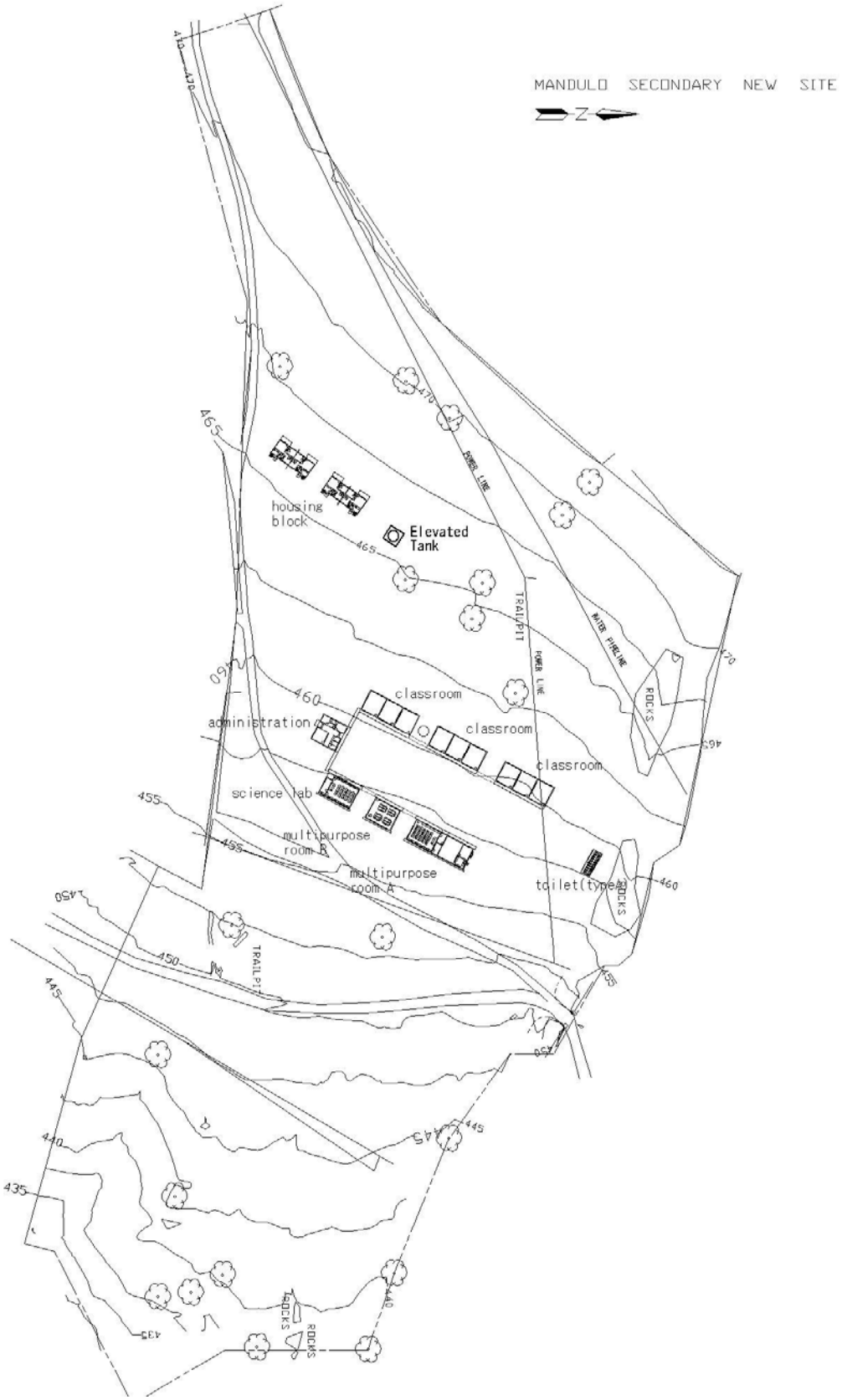
【Figure 2-13】

13) Site plan (5: Mliba)　(scale 1/2000)



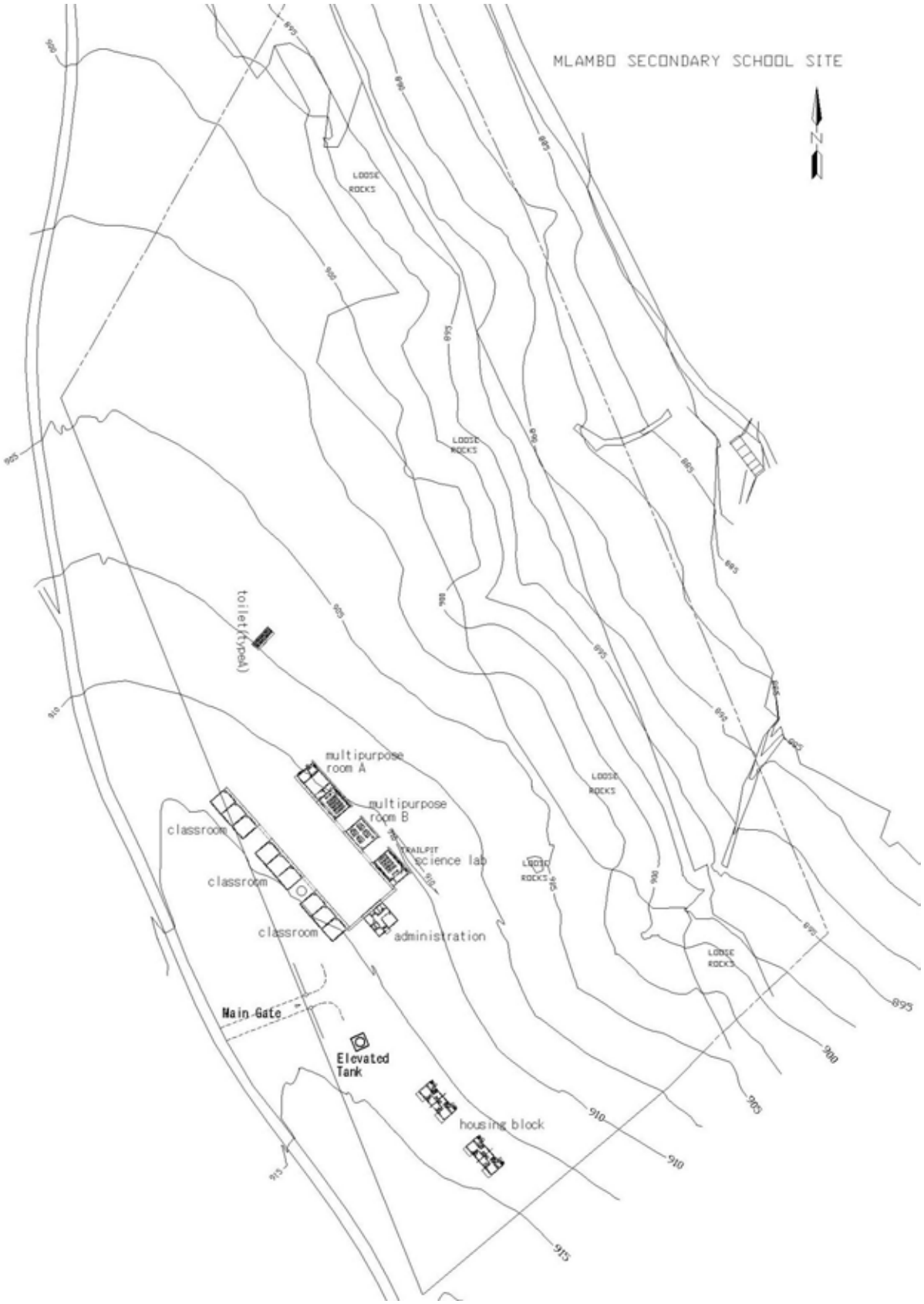
【Figure 2-14】

14) Site plan (6: Mandulo)　(scale 1/2000)



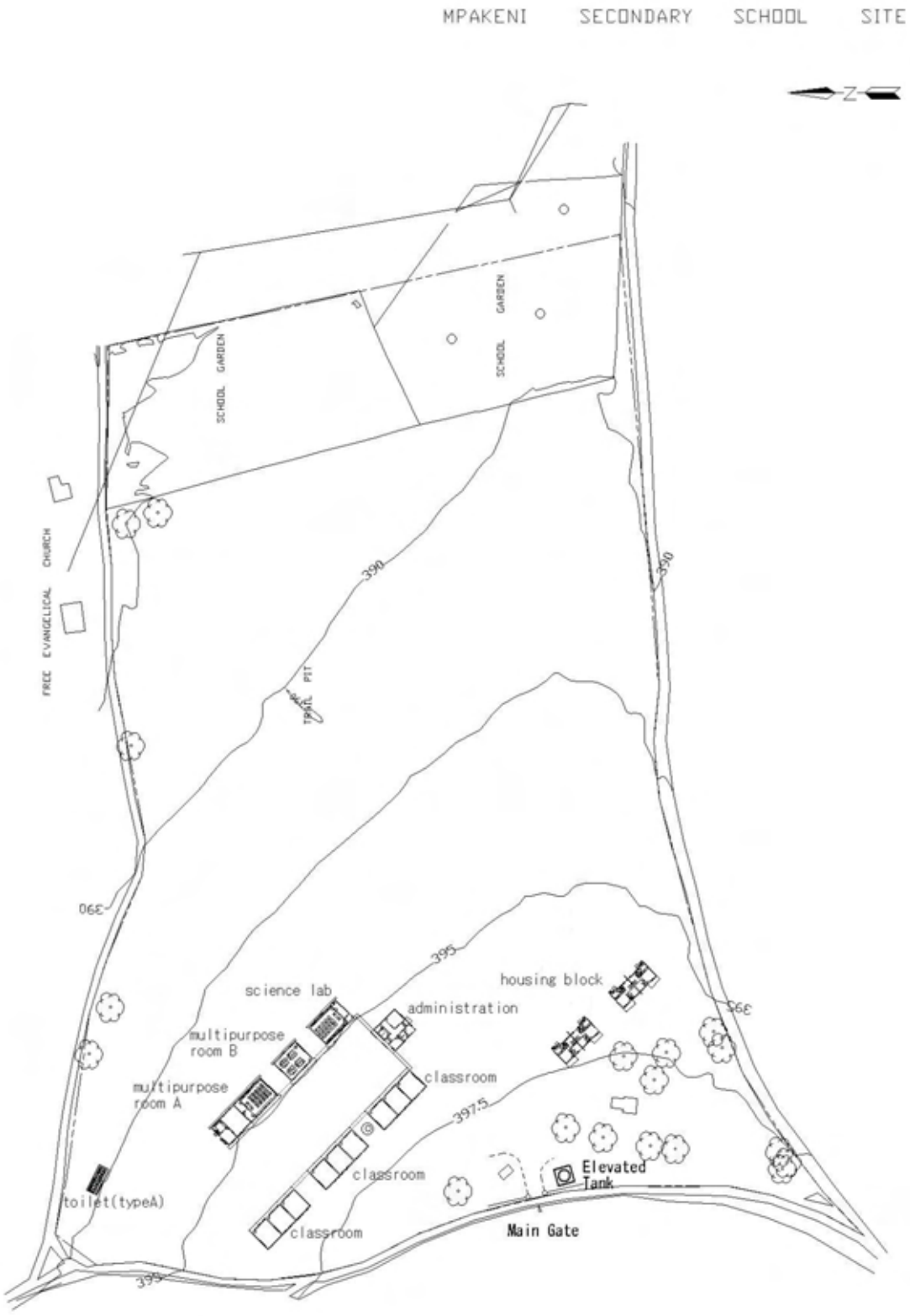
【Figure 2-15】

15) Site plan (7: Mlambo)　(scale 1/2000)



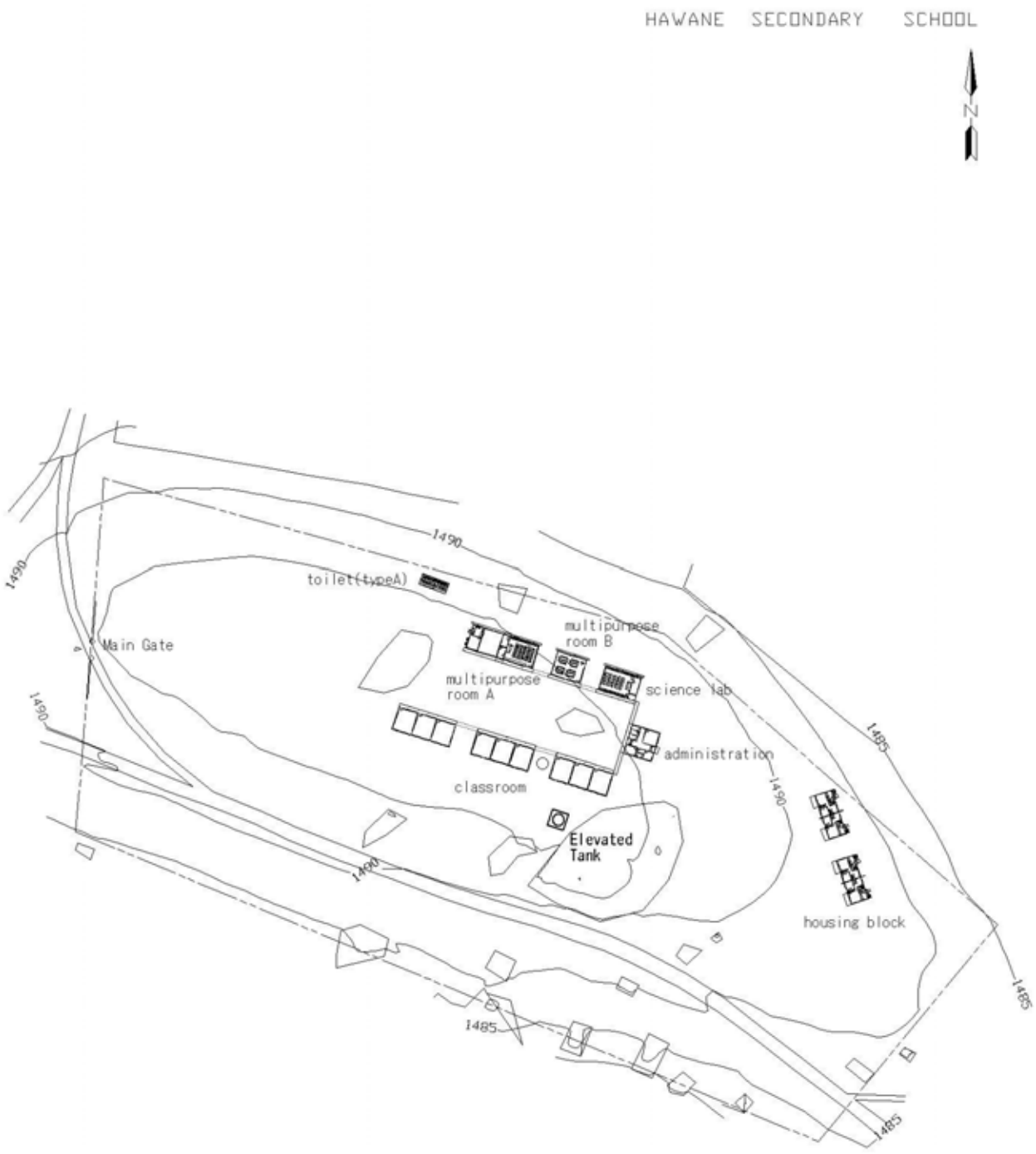
【Figure 2-16】

16) Site plan (8: Mpakeni)　(scale 1/2000)



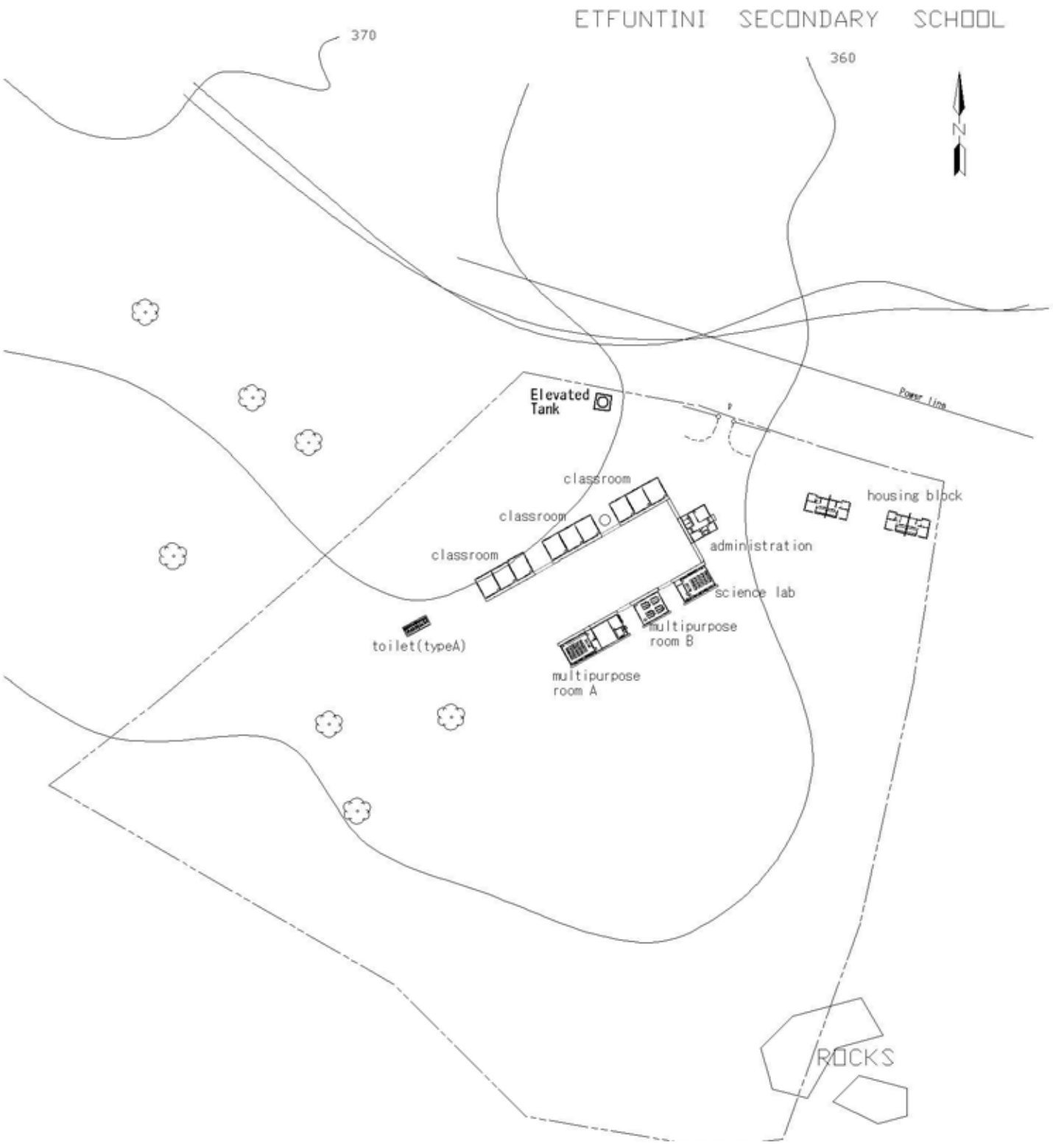
【Figure 2-17】

17) Site plan (9: Hawane)　(scale 1/2000)



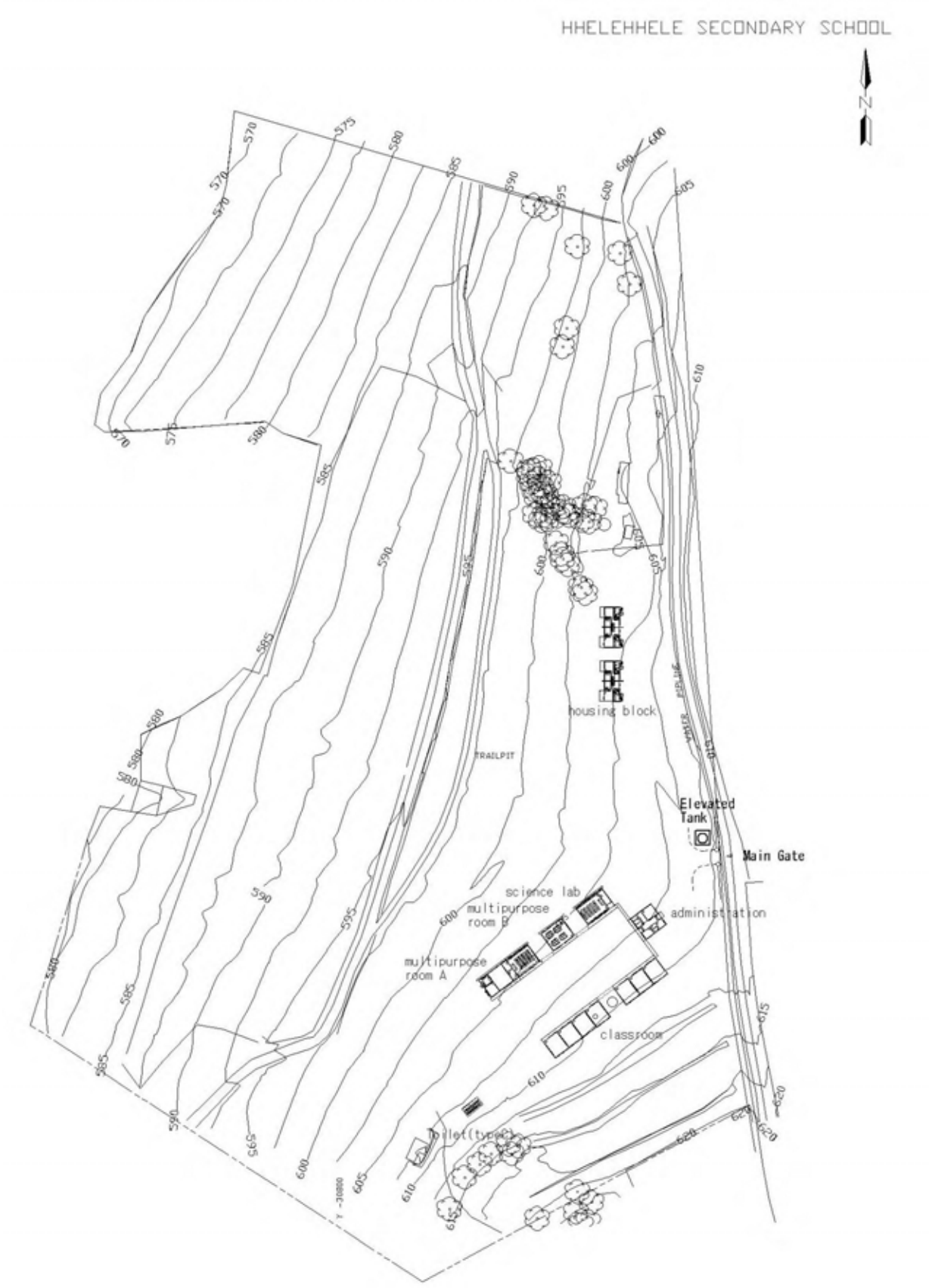
【Figure 2-18】

18) Site plan (10: Etfuntini)　(scale 1/2000)



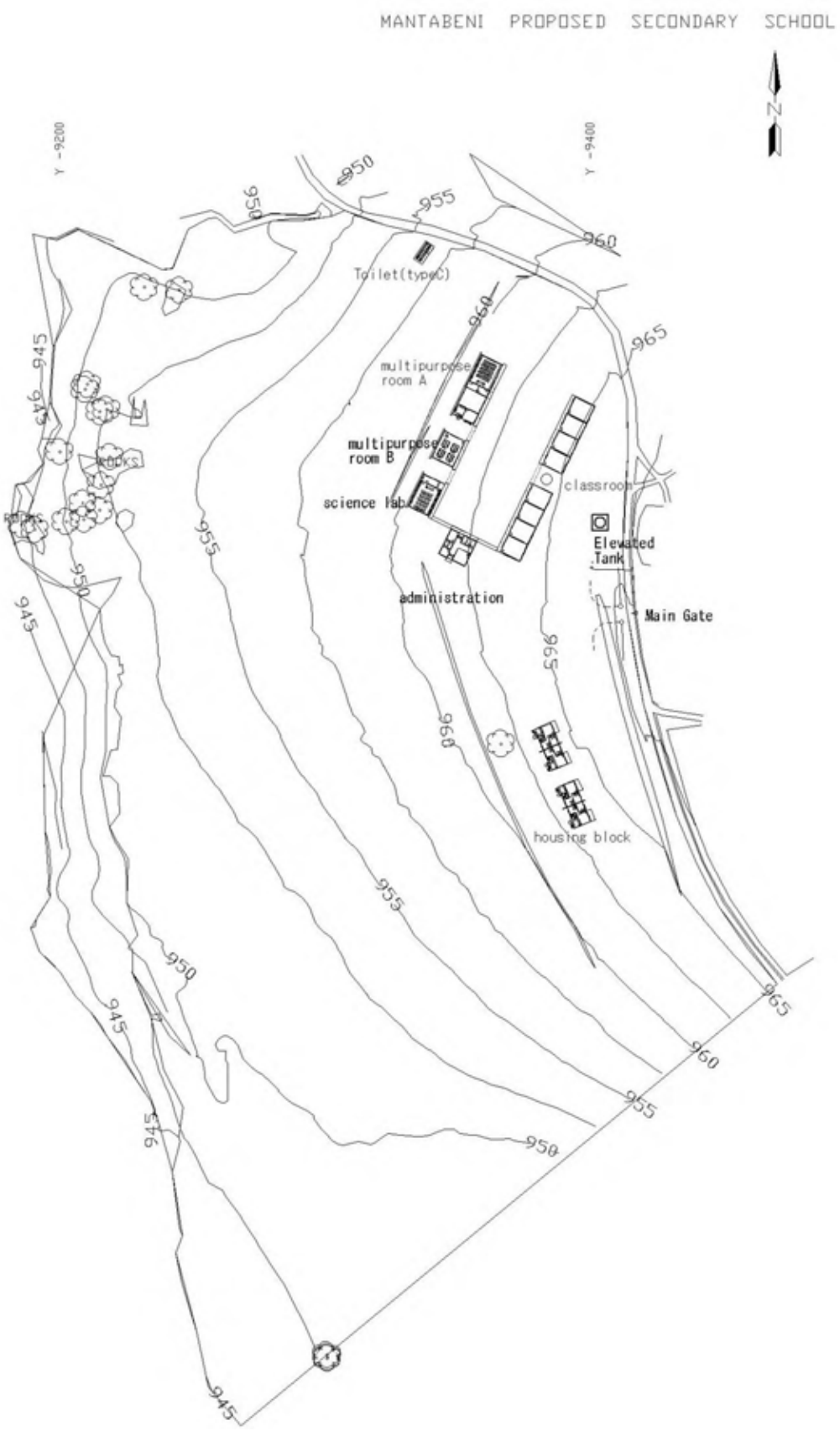
【Figure 2-19】

19) Site plan 11: Hhelehhele)　(scale 1/2000)



【Figure 2-20】

20) Site plan (12: Mantabeni)　(scale 1/2000)



【Figure 2-21】

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Basic policy for project implementation

The Project will be implemented based on Japan's Grant Aid Scheme for Community Empowerment. In the process of the implementation, the relevant agencies will examine the plan, after which Cabinet approval of the Government of Japan is necessary. After Cabinet approval, the Exchange of Notes (E/N) regarding project implementation will be concluded between the governments of both countries. The Project will be implemented after the Grant Agreement (G/A) is concluded between JICA, who is the implementing agency on the Japan side, and the relevant agency on the Swaziland side. As the implementing agent for the Project, the Swaziland Ministry of Education and Training will commission project implementation by concluding a procurement agent contract with a Japanese procurement agency based on the Agreed Minutes (A/M) attached to the E/N.

(2) Implementation/procurement policy under the procurement agent system

The Agent will enter into an Agent Agreement with the Government of Swaziland and procure construction services and school furniture on behalf of the Government of Swaziland. A Japanese architectural consulting firm will be employed by the Agent for administration and technical supervision.

1) Tender management for the Agent

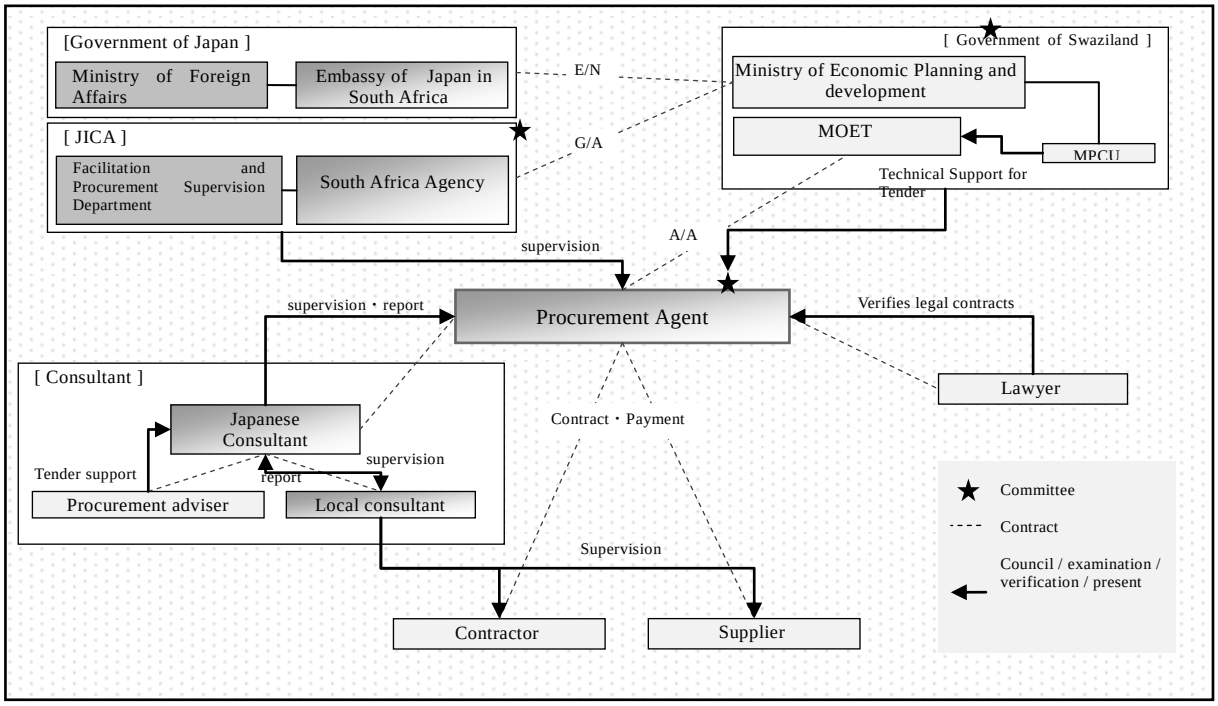
The Agent performs the tender on behalf of the Government of Swaziland. The tender will be carried out in accordance with the local method and the result will be reported to the Government of Swaziland. Further details will be decided after discussion with the Agent.

2) Fund management for the Agent

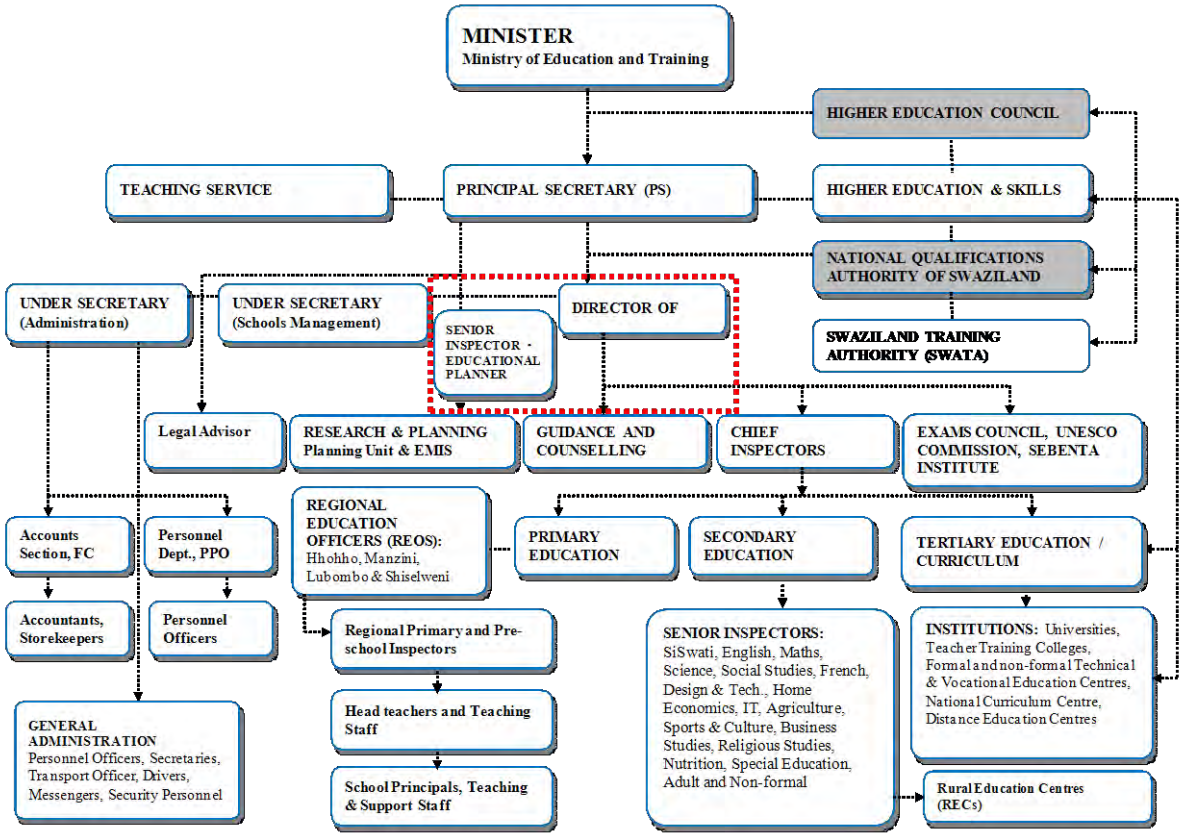
The management of payment for construction work and furniture procurement will be conducted by the Agent with support from Japanese architectural consultant. The Agent will take necessary measures for payments to contractors in accordance with the contract after receiving a report of work progress and assessment from a Japanese architectural consultant.

3) Technical management

Since a main consultant method will be adopted, a Japanese engineer will not be placed within the Agent. The Agent will receive reports from the prime consultant.



【Figure 2-22】 Project Implementation System



【Figure 2-23】 MOET Organization Chart

(3) Swaziland side implementation system

This Project will be implemented under a system with MOET as the implementing organization and MPCU providing technical support. At MOET, jurisdiction for new school construction project falls under the Director of Education and Senior Inspector・Educational Planner. (See Figure 2-23)

MPCU has implementation experience in small-scale school construction, and has engineers for construction, architecture, facilities, and quantity surveying. They will provide appropriate technical advice to MOET.

(4) Roles of organizations concerned

1) Committee

After concluding the E/ N for the Project, a committee will be established. The committee will be comprised of the Government of Swaziland and JICA South Africa Office. The Embassy of Japan in South Africa will participate as needed. Participants from the Swaziland side will be the MOET, MOEPD and MPCU. The committee will discuss any problems regarding the implementation of the Project and rectify them. The Agent will participate in the committee as an advisor.

2) JICA

After signing the E/N, the G/A will be signed between JICA and the Government of Swaziland. As the primary implementation body for the Grant Aid, JICA will supervise the overall implementation of the project and provide appropriate advice to the Agent regarding various problems that may arise while implementing the Project.

3) The Agent

After the G/A is signed, the Agent will sign the Agent Agreement with the Government of Swaziland to perform as the procurement agency on behalf of the Government of Swaziland and implement tendering procedures for facilities construction and furniture procurement. Based on the outcome of this, the Agent will sign a contract with each contractor, and make payment after receiving the assessments of work progress from the Japanese consultant.

4) Japanese consultant

A Japanese architectural consulting firm recommended by JICA enters a service contract with the Agent for the Project. Acting as the main consultant, a Japanese consultant firm will conduct contract administration and technical supervision of construction works in cooperation with local engineers.

5) Construction companies

Construction companies selected by tender process conducted by the Agent will perform construction works through a construction contract with the Agent.

6) Local consultant

The local consultant selected by the Japanese consultant will supervise construction works under instruction by the Japanese consultant.

2-2-4-2 Implementation Conditions

(1) Tenders / contracts

The tender will be carried out by the Agent. Tender documents will be examined in detail by the Japanese main consultant. The result of this examination will be approved by the Agent and MOET before leading to a contract.

(2) Tax exemption measures

In Swaziland, a tax exemption system for foreign aid project implementation has been established, and for this Project as well. The necessary tax exemption measures are based on The Income Tax Order. (Article S12 (1) of The Income Tax Order, 1975)

(3) Legal trouble and pre-emptive measures

In case legal trouble arises in implementing the Project, the Agent will conclude an advisory contract with a lawyer.

(4) Building permits

School construction plan requires building permits granted by MOET. The construction plan for each site and the drawings shall be submitted to MOET to acquire approval as needed.

(5) Environmental assessment

In Swaziland, environmental assessments have been mandatory since 1992. Protocol related to environmental assessments falls under the jurisdiction of the Swaziland Environmental Authority (SEA) of the Ministry of Tourism and Environmental Affairs.

(6) Infrastructure

The infrastructure facilities (water pipes, main electricity line) leading to the border of the project site will be the responsibility of the Government of Swaziland at each applicable site. The Japanese consultant will assure that the following are completed before the start of construction work for the Project: preliminary survey, implementation items and cost calculations, budget measures with the DEP, and whether the infrastructure work will be completed before the start of the main construction work.

(7) Asbestos countermeasures

The buildings planned for the Project will not use materials that contain asbestos. Before procurement of building materials, the local implementation firm shall confirm with the

suppliers that materials planned for use do not contain asbestos. They shall also be directed not to use asbestos.

(8) Eligible local construction companies

Construction companies that are eligible to bid on the Project are limited to those registered at MPWT as a building contractor and for which more than half of the company shares are owned by a person holding Swaziland nationality.

2-2-4-3 Scope of Works

(1)Works targeted for construction

Target works are those that are required as a minimum for secondary schools. In addition to securing land, buildings, and infrastructure, the furniture, equipment, and peripheral facilities necessary for operations will be procured. Details are as follows.

1) Land acquisition (includes securing usage rights)
   Land with confirmed usage rights in writing has already been secured.
2) Site preparation
   The 12 candidate sites are generally flat, thus site clearing/preparation is not necessary.
3) Facility component construction
4) School fence and gate installation
5) Parking area installation
   The necessary land for parking areas at each site has already been secured, thus no particular construction is necessary.
6) Construction of access roads
   The construction of access roads is not necessary at any of the 12 candidate sites.
7) Power supply work
8) Water supply work
9) Drainage work within the site
10) Propane gas line work within science laboratories
11) Telephone lines
   There are no telephone lines installed in the area surrounding any of the 12 candidate sites. Since the use of cellular telephones is possible, regular telephone lines will not be extended.
12) Furniture procurement
13) Procurement of apparatus for experiments/practical training and kitchen equipment
14) Environmental assessment application fee and report creation
15) Bearing the cost of bank fees according to the B/A

(2) Construction Classification / Procurement and Installation Classification

Classifications for the construction, procurement, and installation related to the above are shown in Table 2-15. In addition, a diagram of the construction, procurement and installation classifications is shown in Figure 2-24.

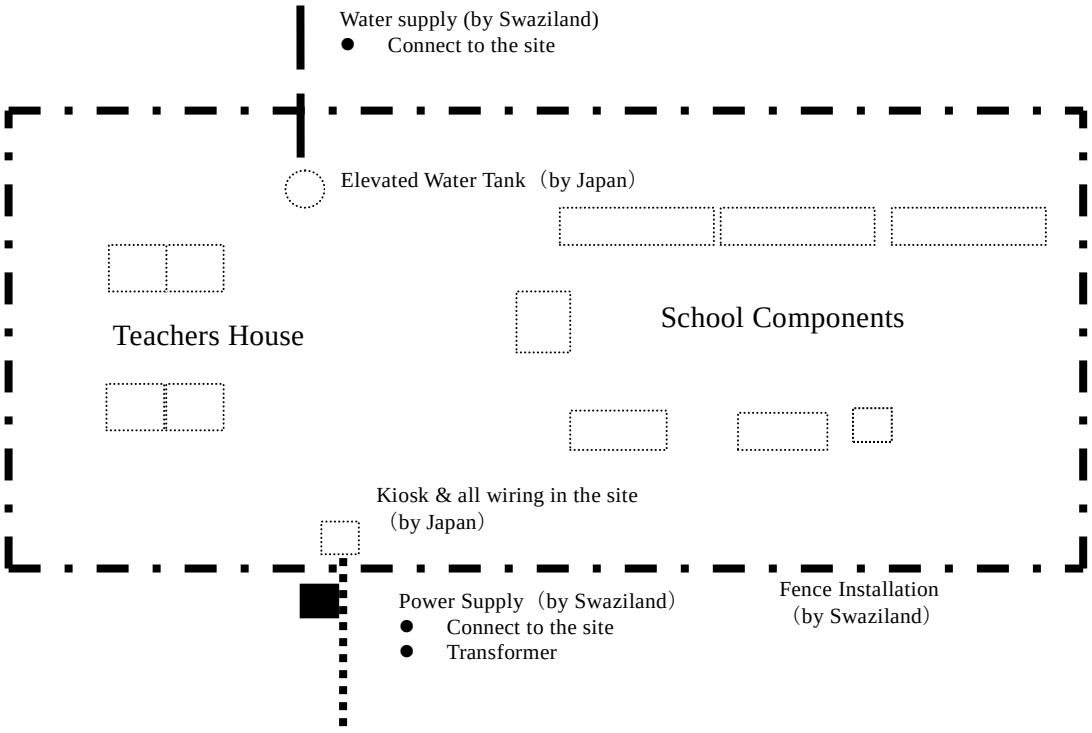
【Table 2-15】 Construction/Procurement Demarcations

Relevant works	Japan	Swaziland
1. Land acquisition		●
2. Site preparation		●
3. Construction of facility components	●	
4. Installation of related facility and equipment		
(1) Site fence and gate installation		●
(2) Power distribution work		
a. Bring power lines to the border of the site with transformer installation.		●
b. Laying power lines within the site	●	
(3) Water supply and Drainage work		
a. Laying pipes from the city water pipe to the site border		●
b. Water supply and drainage facilities within the site	●	
c. Water drainage works outside the site		●
(4) Propane gas line work in science laboratories	●	
5. Procurement of furniture and equipments		
(1) Furniture procurement		
a. Furniture for normal classrooms and science rooms	●	
b. Administration building, multipurpose rooms A & B, teacher housing		●
(2) Equipment and apparatus for experiments/practical training		
a. Equipment and apparatus for science experiments		●
b. Practical training equipment for Agriculture and home economics (for Multi-purpose room A)		●
c. Equipment for kitchen		●
(3) Personal computer for ICT training (for Multi-purpose room B)		●
6. Environmental assessment application fee and report creation		●
7. Bank fees according to B/A		●
8. All expenses needed for project implementation not covered by the Grant Aid		●

In addition to the above, the Swaziland side will take measures to ensure the exemption of customs duties, VAT, and other surcharges for the procurement of equipment, materials, and services pertaining to the implementation of the Project.

1) Conceptual diagram of demarcation.

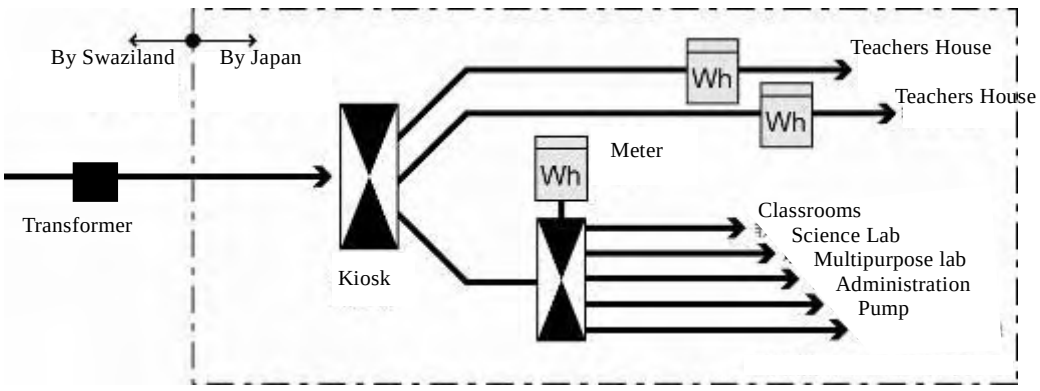
In principle, bringing infrastructure to the border of the site will be the responsibility of Swaziland, and work inside of the site's borders will be within the scope of Japanese side obligations.



【Figure 2-24】 Summary of Construction Demarcations

2) Electrical work demarcation

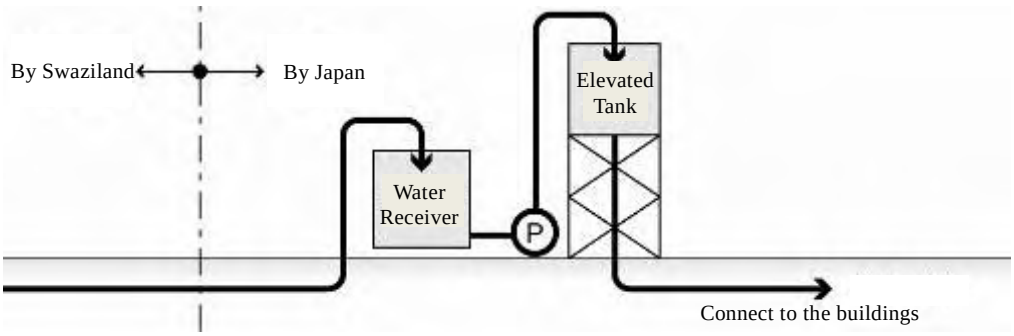
Power line work up to the border of the site will include installation of the transformer as Swaziland side work. Power line work after the transformer within the site and the incoming panel will be Japanese side work. An electrical meter for the teachers' housing will be installed separately from the school.



【Figure 2-25】 Overview of Electrical Work in the Project (within dotted line)

3) Water supply work demarcation

Water supply work up to the site border will be a Swaziland side obligation. Installation of the water receiver, pump, and elevated tank within the site will be Japanese side work.



【Figure 2-26】 Overview of Water Supply Work in the Project

2-2-4-4 Consultant Supervision

(1) Japanese contract work consultant implementation system

- The Japanese engineer in charge of construction supervision will conduct overall technical supervision.
- The person in charge of tendering will confirm the local site, provide tendering evaluations and technical explanations in tendering in cooperation with the Procurement Agent. The Japanese engineer will hold seminars and provide guidance to local supervisors before the start of construction. They will also provide support for monthly work inspections, inspections at the completion of work, and defect inspections.
- Local construction supervisors will conduct touring inspections under the Japanese engineer in charge of construction supervision. In addition to the touring supervisors, QS engineers, civil/structural engineers, and electrical/water facilities engineers will be appropriately dispatched to provide technical support
- From the QS engineers and civil/structural engineers mentioned above, a local head supervisor will be selected to directly assist the Japanese engineer and lead the touring supervisors.

(2) Construction supervision plan

- After the conclusion of construction contracts, the Japanese engineer will confirm the construction schedule and process of materials procurement.
- Construction supervision will be implemented by assigning construction supervisors so that the conditions at the sites can be appropriately assessed. A report with the summarized supervision content will be submitted to the Japanese engineer through the local head supervisor. The local head supervisor will receive instructions and support from the

Japanese engineer to supervise the overall flow from the commencement of construction to its completion. This will be done in cooperation with construction supervisors, structural/civil supervisors, and electrical/water facilities supervisors.

- When it is time for payment of the construction, the Japanese engineer and local supervisor in charge of quantity survey will assess the invoice issued by the construction company and the outputs at the site. After each construction supervisor crosschecks the documents necessary for assessment with the site situation, they will be submitted to the Japanese engineer.
- A regular meeting will be held at least once per month on-site. The local head supervisor will summarize the items approved and confirmed at the meeting and submit them as a monthly report.

2-2-4-5 Quality Control Plan

(1) Engineers for quality control

The Japanese consultant shall provide supervision and direction to ensure that the Japanese engineer is continuing to use the local consultant to review the construction plan and content, confirm construction outputs, as well as make certain that the construction company is conducting appropriate quality control.

(2) Quality control for concrete

The standard building type for local school construction is a single-floor building. The main structural part consists of assembled concrete blocks. Normally, as the structure is simple, strength testing for the concrete may not be implemented. However, for the Project, the strength of sample pieces will be confirmed at a domestic laboratory.

(3) Quality control for miscellaneous work

Control standards should be clearly defined and a quality control system established. Direction will be provided to ensure that the local consultant's construction supervision is conducted appropriately by using the checklist for quality control. Quality control will also be conducted through as-built inspections for each work item.

【Table 2-16】Summary of Materials Testing

Item	Testing method	Testing frequency	Criteria
Concrete strength	Compressed strength test using SABS standard	Per portion	SABS standard
Concrete block strength	Compressed strength test using SABS standard	Once per procurement source	SABS standard
Rebar strength	Inspection certificate verification	Per type	Specification document standard
Rebar size	On-site visual check	Per bar arrangement inspection	Design drawings
Wood truss materials	SABS standard	At the time of materials delivery	Presence of approval stamp
Wood truss shape	On-site measuring	Per building	Design drawings
Water passing (leakage) test	SABS testing standard	At the completion of construction	SABS standard
Power distribution (leakage) test	SABS testing standard	At the completion of construction	SABS standard

2-2-4-6 Procurement Plan

The materials procurement plan for this Project is as shown in the table below.

【Table 2-17】 Procurement Plan for Building Materials

Construction material	Place of procurement		Comments
	Domestically produced product	Domestically distributed imported product	
Cement		○	50 kg bag, imported from S. Africa
Sand	○		For concrete
Gravel	○		For roadbed work
Crushed rock	○		For concrete
Concrete 200kg/cm^3		○	Footing, Slab
Reinforcement 5.6 mmΦ 200x200 mm		○	Floor Slab
Reinforcement 8 mmΦ 200x200 mm		○	Footing
Blocks 150 mm thickness		○	Toilet Block
230 mm thickness		○	Classroom
Structural Timber 38x150mm	○		Truss
Structural Timber 75x50mm	○		
IBR Galvanized roof sheeting T 0.58mm		○	

2-2-4-7 Implementation Schedule

(1) Overall process plan

1) Overall plan policy

The period from the drafting of tendering documents to the completion of all work (excluding defect inspection) will be set at 20.5 months. This period is set according to local

guidelines and customs. From actual periods of similar-scale construction performed locally and from hearings, etc., this period was set to be the shortest and most appropriate for implementing the Project.

2) Tendering process

The period from the time that the Agent is dispatched locally to the start of construction on the first batch will be set at a total of 5.0 months, based on local guidelines, etc. As the 2nd batch and 3rd batch (furniture) have half the amount of lots, and there is the advantage of being able to use the tendering documents from the previous batch as a reference, the period will be set at 4.75 months, 0.25 months shorter than the other. Tendering preparation for the 2nd and 3rd batch will be conducted during the tender evaluation period of the previous batch, and after the tendering for the previous batch has been completely, the public announcement will be made swiftly to make the overall construction time more efficient.

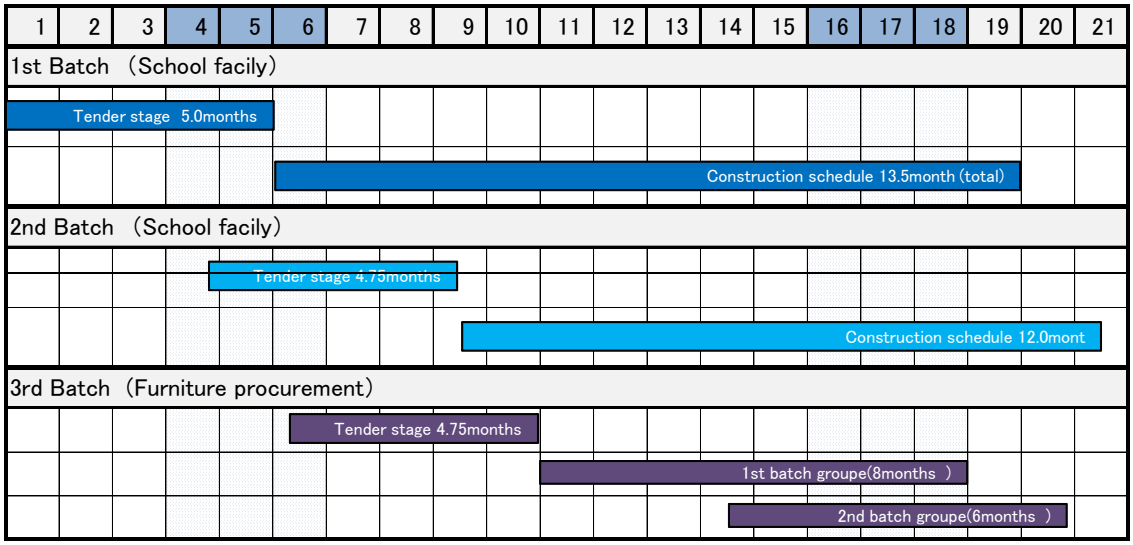
3) Construction process

The actual construction period of one school, consisting of multiple single-floor buildings, is 10 months (including 1 month for preparatory work). An extra 2 months are estimated due to the effects of the rainy season, setting the construction period for each site at 12 months.

From the local supervisors including the Japanese engineer other than the touring supervisor, the structural/civil engineer, QS engineer and electrical/water facilities engineer, one person will oversee 12 sites. Therefore, in order for supervisory operations to progress smoothly, for the first batch, simultaneous progression of multiple sites will be avoided, and will instead be shifted by approximately two weeks per 1 lot (equaling 2 sites). By shifting the construction period, another objective is to subvert problems at subsequent sites that have arisen in preceding site.

1.5 months will be added to the first batch, making its construction period 13.5 months. The second batch will not be shifted and will remain at 12 months.

4) Implementation Schedule



【Figure 2-27】Implementation Schedule

2-3 Obligations of Recipient Country

(1) The obligations for the Swaziland side in project implementation are as follows.

1) Land acquisition (includes securing usage rights)
   Land with confirmed usage rights in writing has already been secured.
2) Site preparation
   The 12 candidate sites are generally flat, thus site clearing/preparation is not necessary.
3) School fence and gate installation
   At each site, the installation of a fence with an average length of 600 m and gate are required. (Concrete posts with a height of 2.5m will be installed every 3 m for a chain-link fence with a height of 1.8m. There should be one main gate and one side gate.)
4) Parking area installation
   The necessary land for parking areas at each site has already been secured, thus no particular construction work is necessary.
5) Construction of access roads
   The construction of access roads is no necessary at any of the 12 candidate sites.
6) Power distribution work
   In Swaziland, the Swaziland Electric Company (SEC) brings power lines from the existing power grid to buildings (including installation of meters for each facility and transformers). Following this method for this Project as well, the Swaziland side will be responsible for bringing power lines from the existing power grid to each facility within the site (including installation of meters for each facility and transformers).
7) Water supply work
   Water pipes will be extended from existing water pipes and existing wells to the site.
8) Telephone lines
   There are no telephone lines installed in the area surrounding any of the 12 candidate sites. Since the use of cellular telephones is possible, regular telephone lines will not be extended.
9) Furniture and apparatus for practical training
   The Swaziland side will be responsible for furniture for the administration buildings, teacher housing, and multipurpose rooms, as well as for science experiment apparatus and agricultural equipment for practical training. (The Japan side will be responsible for procurement of furniture for normal classrooms.) The estimated furniture and practical training equipment items are as follows.

【Table 2-18】Furniture and Equipment by Swaziland

Facility	Contents of furnitures and equipments
Administration	Desks, Chairs, Cabinets and utensils etc.for Principal's office, clerk office and teacher's office.
Science laboratory	Science experimental instrument and teaching materials.
Multi-purpose hall A	If the room is used as Agriculture training room: Goods for agricultural and stockbreeding such as spade, hoe, shovel, etc.
	If the room is used as Home economics training room: Cooking utensils, Machine sewing equipments such as sewing machine, etc. Funiture such as working desk and chair ,etc. ,utensils, teaching
Multi-purpose hall B	If the room is used as ICT training room : Computers, desks and chairs, etc.
Teachers' housing	Household items

10) Hiring teachers

From interviews with the Teaching Service Commission (TSC), one general subject requires the number of classes multiplied by 1.5 teachers. In addition to that, for a secondary school with one class per grade, one teacher is required for each practical subject: ICT, agriculture, and home economics. For the Project, the construction of 2 multi-purpose rooms will allow 2 practical subjects to be conducted at the same time, thus it is assumed that at least 2 teachers are necessary. The minimum required number of teachers will be set as follows. It will be necessary to hire a total of 184 people, including 174 teachers (4 schools with 7 classrooms, 3 schools with 8 classrooms, 5 schools with 9 classrooms) and 12 principals (1 per school).

- 7 classes = （7×1.5）+2＝10.5+2=12.5→13（people） （*rounded up）
- 8 classes = （8×1.5）+2＝12+2=14（people）
- 9 classes =（9×1.5）+2＝13.5+2=15.5→16（people） （*rounded up）

11) Bank fees based on the B/A

12) Environmental assessment application fee and report creation costs

MOET shall bear the costs of the application for environmental assessment implemented by SEA and the costs of creating a report.

In addition to the above, the Swaziland side will take measures to assure the exemption of customs duties, VAT, and other surcharges for the procurement of equipment materials, and services pertaining to the implementation of the Project.

(2) The following outline shows the work by the Swaziland side as noted above.

【Table 2-19】 Outline of Works by Swaziland

ITEMS	DISCRIPTION	TIMING			COST	
		Before Contract	During Construction	After completion	E	¥
1. Infrastructure/ External Work						
(1) Fence & Gate	School Fence(Average 600m/site), Gate installation		●		920,000	¥12,061,000
(2)Power supply	Connection from grid to site	●			2,022,999	¥26,521,000
(3) Water Supply	Connect from existing water source to the		●		500,000	¥6,555,000
2. Procurement for furniture & equipment						
(1) Furniture	Administration Block/ Teachers house/ Multipurpose LAB A&B			●	1,565,000	¥20,517,000
(2) Equipment	① Science Lab Equipment ② Agricultural/ Home Economy Equipment ③ Kitchen Equipment			●	156,000	¥2,045,000
(3) Computer	Total 96 computers (8/school)			●	510,000	¥6,686,000
3. Environmental Impact Assessment	Permit/ Report Fee	●			258,000	¥3,382,000
4. B/A Bank Charge	Bank Charge for account	●			100,000	¥1,311,000
Other cost required for project procurement		●	●	●		
					6,031,999	¥79,078,000

The above fiscal amount is 12% of the E48 million development budget of MOET (FY 2010). The electrical power connection work, which occupies one-third of the total obligated costs, has already been approved and work is also progressing. Thus, they should sufficiently be able to bear the costs.

2-4 Project Operation Plan

2-4-1 Swaziland Jurisdiction System

MOET is broadly divided into the Primary Education Bureau, Secondary Education Bureau, and Higher Education Bureau. Operation and maintenance of secondary school facilities falls under the jurisdiction of the Secondary School Bureau. Specifically, each district education office supervises and monitors the schools.

2-4-2 Facility Operation and Maintenance

Since the budget for MOET is insufficient, it can only bear the costs of teachers' salaries and travel fees for business trips. The costs for operation and maintenance at each secondary school are allocated from the school fee income collected from students. These school fees are used not only for operation and maintenance costs, but also for training, general staff salaries (excluding teachers), lunches, and utilities, etc. A financial report, which includes these school fees, is prepared by the principal every year and approved by the School Operating Committee. The income and expenses are then explained to the parents of the students.

After handing over each school, their operation and maintenance, as well as supply procurement management will be the responsibility of their respective principals. However, differences in financial resources for operation and maintenance may emerge depending on the size of the school. Therefore, a construction plan will be implemented so that operation

and maintenance costs are kept to a minimum.

At the time of handover, a simplified manual regarding operation and maintenance will be distributed. Specifications will be set within a scope so that construction companies and/or agents can handle facility/equipment repairs, etc.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

Cost borne by Swaziland, based on the responsibilities described above, is estimated as follows according to the parameters of cost estimation shown below (1)

(1) Parameters of Cost Estimation

A: Time of cost estimate: August 2010
B: Exchange rate: 1 E (Emalangeni) = 13.11JPY(average rate for February to July, 2010)
C: Construction/ Procurement period: As shown in implementation plan
D: Others: Cost estimation is based on the Grant Aid Project Scheme of the Government of Japan.

(2) Cost borne by Swaziland:

【Table 2-20】Cost borne by Swaziland

ITEMS	COST	
	E	¥
1. Infrastructure/ External Work		
(1) Fence & Gate	920,000	¥12,061,000
(2) Power supply	2,022,999	¥26,521,000
(3) Water Supply	500,000	¥6,555,000
2. Procurement for furniture & equipment		
(1) Furniture	1,565,000	¥20,517,000
(2) Equipment	156,000	¥2,045,000
(3) Computer	510,000	¥6,686,000
3. Environmental Impact Assessment	258,000	¥3,382,000
4. B/A Bank Charge	100,000	¥1,311,000
Other cost required for project procurement		
	6,031,999	¥79,078,000

2-5-2 Operation and Maintenance Cost

(1) The costs necessary for management, operation and maintenance of the project are summarized in Table 2-21

(2) Necessary costs for management, operation and maintenance of secondary schools are borne by both the national budget of MOET and the school fees that each school collects from students.

(3) To implement this Project, the placement of 186 teachers (including 12 principals) is necessary. The average salary of secondary school teachers in Swaziland is E 100,000 per year (FY 2009/2010 estimate). The costs necessary for teacher placement (teacher salaries and travel costs, etc.) that are to be borne by MOET are calculated as a total of E 18,660,000 per year. This amounts to 1.1% of MOET's recurrent expenditure budget (FY 2010/2011) of E 1,697,588,000, and should thereby be feasible.

(4) The total amount of school operation and maintenance management costs (school lunches, staff salaries, utilities, facility maintenance management) that should be allocated from students' school fees is estimated at E 4,704,000 per year. This amount is equivalent to E 1,737 per assumed enrolled student.

According to results of interviews held with MOET, school fees per person in Swaziland secondary education are roughly E 1,000~2,000 per year. The student fees borne per person for this Project are thus equivalent to the average amount for secondary school students in Swaziland. Consequently, the schools constructed for this Project will be facilities for which operation and maintenance can be conducted realistically using an average amount of school fee income. Additionally, these school fees are a reasonable burden for household budgets.

The result of the examination, from the viewpoints of MOET budget and affordability for families, shows that the Project will be feasible and sustainable.

【Table 2-21】Cost for Operation and Maintenance

No	Region	Site	No. of students	No. of teachers (includes principal)	Expenditure by MOET		Expenditure by income from school expences						School expences per a student
					Teacher's salary	Travel cost, etc.	School lunch	Support Staff salary/ travel	Electricity charge	Water charges	Facility maintenance	Total	
1	Lubombo	Mabhensane	168	14	1,400,000	5,000	196,560	150,000	5,000	2,000	17,500	371,060	2,208.69
2		Mabondvweni	182	14	1,400,000	5,000	200,000	150,000	5,000	2,000	17,500	374,500	2,057.69
3		Nyetane	171	14	1,400,000	5,000	200,000	150,000	5,000	2,000	17,500	374,500	2,190.06
4	Manzini	Nhlambeni	228	15	1,500,000	5,000	210,000	150,000	5,000	2,200	17,500	384,700	1,687.28
5		Mliba	223	15	1,500,000	5,000	210,000	150,000	5,000	2,200	17,500	384,700	1,725.11
6		Mandulo	265	17	1,700,000	5,000	230,000	150,000	5,200	2,300	17,500	405,000	1,528.30
7	Shiselweni	Mlambo	291	17	1,700,000	5,000	230,000	150,000	5,200	2,300	17,500	405,000	1,391.75
8		Mpakeni	246	17	1,700,000	5,000	230,000	150,000	5,200	2,300	17,500	405,000	1,646.34
9	Hhohho	Hawane - F.R.	262	17	1,700,000	5,000	230,000	150,000	5,200	2,300	17,500	405,000	1,545.80
10		Etfuntini	250	17	1,700,000	5,000	230,000	150,000	5,200	2,300	17,500	405,000	1,620.00
11		Hhelehhele	191	14	1,400,000	5,000	210,000	150,000	5,000	2,200	17,500	384,700	2,014.14
12		Mantabeni	231	15	1,500,000	5,000	230,000	150,000	5,000	2,200	17,500	404,700	1,751.95
		Total	2,708	186	18,600,000	60,000	2,606,560	1,800,000	61,000	26,300	210,000	4,703,860	1,737.02

An estimate of the costs required for maintenance of the facilities for the Project is as follows in the table below.

【Table 2-22】Maintenance Cost for Facilities (unit: E)

1. lighting and heating and water expenses.(per year)					
Object		Estimation cost			remarks
1) electricity bill		5,000			
2) water bill		2,000			
Total		7,000			
2.building maintenance cost (per year)					
Object	Frequency	point	contents	cost	remarks
1)Purified water tank cleaning	3 months	Medical	E1,000/1 work	4,000	/year
	2 years	Clean	E1,000/2year	500	/year
2)inside painting	15 years	wall	Site painting	3,000	/year
		truss		6,000	/year
		Board		2,000	/year
3)door painting	15 years	door		2,000	/year
Total maintenance cost				17,500	
Total maintenance cost(year) 1.+2.				24,500	

Chapter 3 Project Evaluations

Chapter 3 Project Evaluations

3-1 Preconditions

The following items are given as the main preconditions for the implementation of this project.

① Land acquisition
② Construction permission
③ Recipient country obligations

From this list, for ① land acquisition, ownership or usage rights for land that can be confirmed in writing will be a site selection condition during the field survey. This was agreed upon by the Government of Swaziland, and upon confirming land acquisition, 12 candidate sites were selected.

Regarding ② construction permits, the MOET has authorization rights for construction permits for school construction projects in Swaziland, as written in 2-2-4-2 (4). The procedure for obtaining authorization includes submitting the layout plans and design drawings for each component for each site corresponding to the land that has been confirmed for use according to ①.

Details of the recipient country's obligations are as written in 2-3 Obligations of Recipient Country. For each item, thorough discussions have been held with the Government of Swaziland and an agreement has been reached.

Thorough discussions have been held with the Government of Swaziland and an agreement has been reached regarding the preconditions above. Therefore, it can be determined that there are no problems pertaining to the preconditions for project implementation.

3-2 Necessary Inputs by Recipient Country

Points of consideration regarding the Swaziland side work obligations that will directly affect the smooth implementation of the project and the timing of those works are as follows.

(1) Connecting electrical power and water supply

As a Swaziland side work obligation, bringing electrical power and city water to each candidate site is required. For the timing of the connection work, it should correspond to the progress of the electrical and water supply work within the planned facilities of each site. It is necessary to implement these works at an appropriate time in the overall construction schedule. In order to implement the Project smoothly, reliable connecting procedures and budget provisions will be required of the Swaziland implementing organization.

(2) Environmental assessment

For the environmental assessment, it is necessary for the Swaziland side to complete the required procedures prior to the start of construction work. At all of the candidate sites, the necessary categorization confirmation work has already been completed. However, the submission of reports for four sites that were placed in category 2 has been requested. Applications shall be made steadily in order to obtain approval in time.

3-3 Important Assumptions

As preconditions and assumptions for the overall success of the Project, the following items are presented as issues for the Swaziland side.

(1) Teacher placement plan

With this Project, 12 new secondary education facilities will be constructed, for which it has been calculated that 186 new teachers (including 12 principals) will be required. Consequently, for teacher placement planning, teacher training over the long-term and a placement plan are indispensible for Swaziland. Additionally, it is necessary to keep a constant level of quality among placed teachers so that a large disparity does not occur between regions. Including these items, a teacher placement plan is the most important element for obtaining the maximum effect of this Project.

(2) Operation and **maintenance plan**

In order for the facilities to be maintained appropriately over the long-term and used effectively, school fee income from the students should be appropriately saved as a fund for operation and maintenance costs, and repairs should be made periodically. The Government of Swaziland should formulate a long-term plan for the operation and maintenance of each school, and assist in the creation of plan in which regular inspections, cleaning, etc. can be carried out.

3-4 Project Evaluation

3-4-1 Relevance

From the reasons given below, it can be considered that the relevance of this Project is very high as a Japanese Grant Aid Project.

(1) With this Project, new secondary schools will be built in rural areas, thus promoting enrollment opportunities for approximately 2,700 students in rural areas. This also ties to improving educational disparity.

(2) As one of the six important issues in Swaziland's Poverty Reduction Strategy and Action Programme (PRSAP)(2006), the development of human resource is listed. In particular

for the development of human resource, it is necessary to cultivate high quality human resource in order to achieve the economic growth that will overcome the poverty that exists in Swaziland. To do this, an action plan was created for basic education, health, the population problem, and HIV/AIDS, with the enhancement of basic education placed as the most important item. In addition, since this Project has the objective of reducing educational disparity, it plays an extremely crucial role in the National Development Strategy (NDS): "Vision 2022" and the National Education Policy 1999, as noted in Development Plan.

(3) Since the local standard design is basically used for the construction plan (changes have been made to the layout and size at some facilities), there is no need for special technology or engineers for its implementation.

(4) Since this Project is a school construction project with the main objective of reducing disparity in enrollment opportunities due to regional or income disparity, it is not being done for profit. Consequently, aside from operation and maintenance, profitability is not being considered.

(5) On environmental and social levels, since the Project will not be conducting the large-scale site development that often accompanies facility construction, the possibility of impacting the natural environment or the neighboring residents is extremely low. In addition, in the classes held after completion of the facilities, including science experiments, the possibility of causing a negative effect on the environment or on human health and safety through the air, water, soil, waste materials, or water usage is also extremely low. Furthermore, the possibility of this project causing a negative effect on the regional economy, social capital, and/or the social organization of the region is extremely low.

(6) As shown in Figure 2-22 Conceptual Diagram of Implementation System, with the Japanese Grant Aid system, the Procurement Agent plays a central role in this Project. After the G/A is concluded between JICA and the Government of Swaziland, the Procurement Agent concludes a procurement contract with the Government of Swaziland and implements tendering for works and furniture for the facilities on behalf of the local government. Based on those results, contracts will be concluded with each company, and after receiving a report on construction progress from the Japanese consultant, they will make payment and manage the entire project.

In surveys conducted in Swaziland, no particular problems were found that could interfere with the Japanese Grant Aid system. Consequently, it is presumed that implementation is possible at this stage in the project proposal.

3-4-2 Effectiveness

For this Project, a total of 12 secondary schools (97 normal classroom, 12 science laboratories, 12 student toilet buildings, 12 administration buildings, 12 type-A multi-purpose rooms (includes school kitchen), 12 type-B multi-purpose rooms, and 48 teachers' housing units) will be constructed in addition to the existing 216 secondary schools (including first-term schools and second-term schools) ("EMIS Survey Report: 16th Day Survey 2009") in the four Swaziland districts of Lubombo, Manzini, Shiselweni, and Hhohho to facilitate enrollment for a total of 2,708 students (estimated). The Project also will procure desks and chairs for both students and teachers.

With this, the direct and indirect impacts as shown in the following table can be expected. The Project will also be largely effective in improving and solving the problem areas in Swaziland's educational sector.

(1) Quantitative outputs

The quantitative outputs that can be expected through the implementation of this Project are as follows.

1) Because new schools will be built on 12 candidate sites, 2,708 children (estimated) will be able to enroll in school. Since there are no other existing secondary schools in the catchment area of the candidate sites, enrollment opportunities will increase for children who have completed primary education but have had to commute long distances to school on foot or by bus, or who had to board near the school.

2) With the new construction of 12 secondary schools in rural areas, enrollment will be facilitated for a total of 2,708 students, and the learning environment will be improved.

【Table 3-1】Quantitative Effects

Indicator	Baseline（2010）	Target（2015）
1. Number of Enrollment in the Target Schools	0	2,708

(2) Qualitative outputs

The qualitative outputs that can be expected through the implementation of this Project are as follows.

1) By creating an educational environment in rural areas for which the creation of such an environment may be delayed, it contributes to easing the educational disparity between urban and rural areas.

2) By building secondary schools in regions within rural areas where there are no secondary

schools, commuting distances and times are shortened, thus improving the educational environment.

3) By building teacher's housings, the placement of teachers in rural areas is facilitated, thus contributing to easing the disparity of education quality between urban and rural areas.

From the above, it can be considered that the relevance of this Project is high and it is expected to be effective.