

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
CONSTRUCTION OF ADDITIONAL
CLASSROOMS
FOR PRIMARY SCHOOLS
IN
THE FEDERAL REPUBLIC OF NIGERIA**

MAY, 2004

**JAPAN INTERNATIONAL COOPERATION AGENCY
YACHIYO ENGINEERING CO., LTD.**

PREFACE

In response to a request from the Government of the Federal Republic of Nigeria, the Government of Japan decided to conduct a basic design study on the Project for Construction of Additional Classrooms for Primary Schools in the Federal Republic of Nigeria and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Nigeria a study team from November 14, 2003 to December 27, 2003.

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

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Federal Republic of Nigeria for their close cooperation extended to the teams.

May, 2004

Yasuo Matsui

Vice-President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

March, 2004

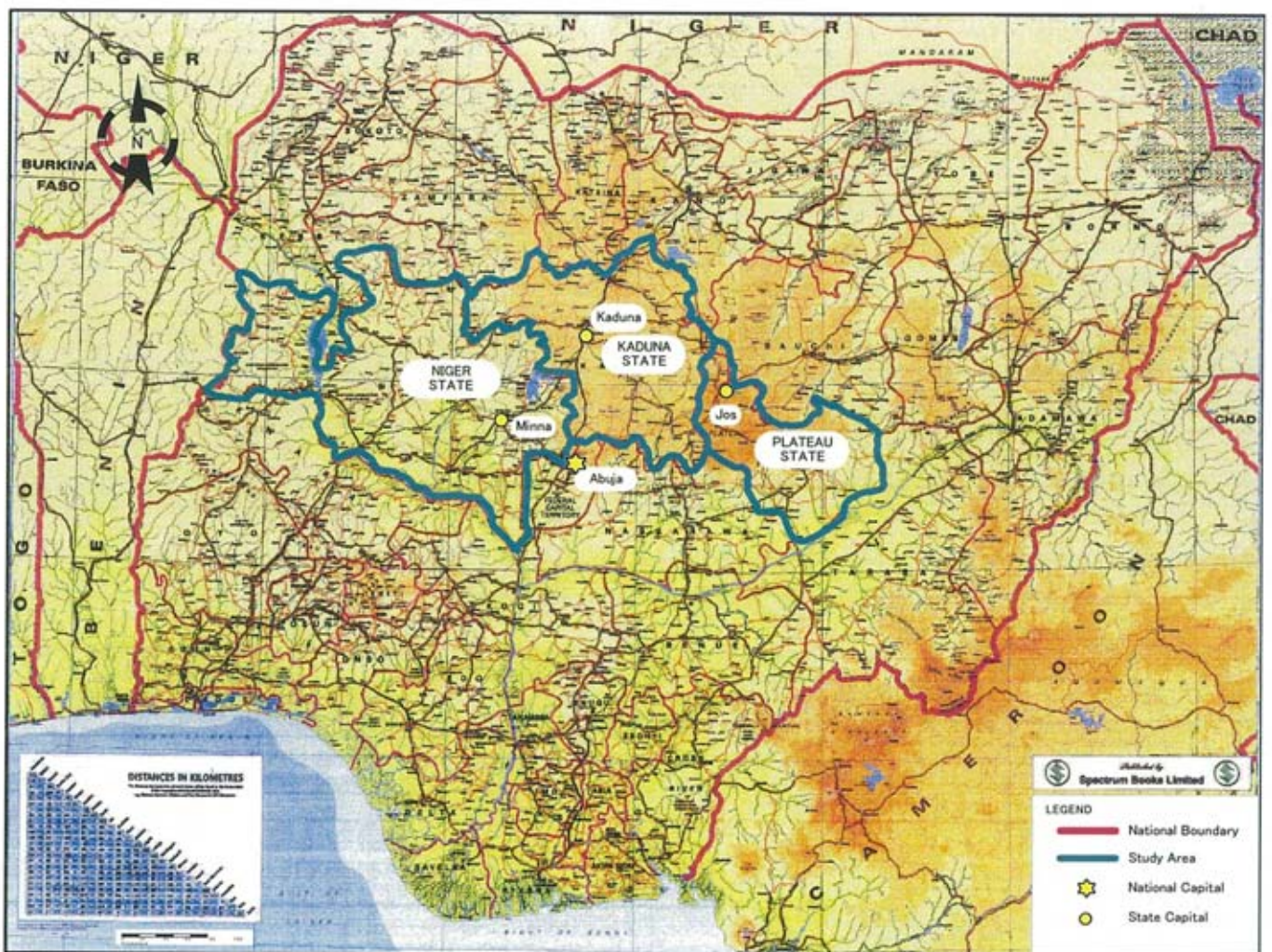
We are pleased to submit to you the basic design study report on the Project for Construction of Additional Classrooms for Primary Schools in the Federal Republic of Nigeria.

This study was conducted by Yachiyo Engineering Co., Ltd., under a contract to JICA, during the period from November, 2003 to March, 2004. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Nigeria and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,

Masatsugu Komiya
Chief Consultant,
Basic design study team on the Project for
Construction of Additional Classrooms for
Primary Schools
in the Federal Republic of Nigeria
Yachiyo Engineering Co., Ltd.



Location Map of the Federal Republic of Nigeria and Study Area

7



THE PROJECT FOR
CONSTRUCTION OF ADDITIONAL CLASSROOMS FOR PRIMARY SCHOOLS
IN THE FEDERAL REPUBLIC OF NIGERIA

CONTENTS

Preface

Letter of Transmittal

Location Map / Perspective

List of Figures & Tables

Abbreviations

Summary

Summary i

Chapter 1	Background of the Project.....	1
Chapter 2	Contents of the Project	3
2.1	Basic Concept of the Project	3
2.2	Basic Design of the Requested Japanese Assistance.....	4
2.2.1	Design Policies.....	4
2.2.1.1	Basic Policies	4
2.2.1.2	Natural Conditions	4
2.2.1.3	Social Conditions	5
2.2.1.4	Construction Conditions.....	5
2.2.1.5	Use of Local Construction Companies and Local Materials.....	6
2.2.1.6	Operation and Maintenance Capability of the Project Implementation Body.....	6
2.2.1.7	Scope and Grade of Facilities and Materials.....	7
2.2.1.8	Construction Schedule.....	7
2.2.2	Basic Plan.....	8
2.2.2.1	Selection of Target Schools for the Project	8
2.2.2.2	Scale of Assistance for Classrooms, etc.	18
2.2.2.3	Planning of Classroom Buildings.....	23
2.2.2.4	Water Supply Facility Plan.....	36
2.2.3	Basic Design Drawings	47
2.2.4	Implementation Plan	51
2.2.4.1	Implementation Policy	51
2.2.4.2	Implementation Conditions	52
2.2.4.3	Scope of Work	55
2.2.4.4	Work Supervision Plan/Procurement Supervision Plan	56

2.2.4.5	Quality Control Plan.....	59
2.2.4.6	Procurement Plan	59
2.2.4.7	Soft Component Plan	60
2.2.4.8	Implementation Schedule.....	73
2.3	Obligations of Recipient Country	75
2.4	Operation and Maintenance Plan	76
2.5	Estimated Project Cost	78
2.5.1	Estimated Cost of Requested Japanese Assistance	78
2.5.2	Operation and Maintenance Cost	80
2.6	Important Points for Implementation of the Project.....	80
Chapter 3	Project Evaluation and Recommendations.....	81
3.1	Project Effects	81
3.2	Recommendations	82

APPENDICES

1. Member List of the Study Team
2. Study Schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions (M/D)
5. Cost Estimation Borne by the Recipient Country
6. References
7. Location Map of the Study Schools
8. Number of Required Additional Teachers of the Project
9. Water Supply Condition in the Study Area
10. Location Plan of the Additional Classrooms and Toilets of the Project
11. Results of Corn Penetration Test and Vertical Electrical Sounding

LIST OF FIGURES & TABLES LIST OF FIGURES & TABLES

[FIGURES]

Fig. 2-2-1	Judgement Criteria for Repairable and Irrepairable Classroom Buildings	20
Fig. 2-2-2	Basic Modules for Classroom Buildings.....	27
Fig. 2-2-3	Drawings for Standard Classroom Building (Two Classrooms With Headmaster's Office and Store Room).....	29
Fig. 2-2-4	Standard Design Drawings for Toilet Building (Case of Two Booths for Boys and Two Booths for Girls)	33
Fig. 2-2-5	Different Types of Toilet Buildings.....	34
Fig. 2-2-6	Structural Drawing of Deep Well	37
Fig. 2-2-7	Auxiliary Facilities for Deep Wells	38
Fig. 2-2-8	Location Map of Project Schools [Niger State]	44
Fig. 2-2-9	Location Map of Project Schools [Plateau State].....	45
Fig. 2-2-10	Location Map of Project Schools [Kaduna State].....	46
Fig. 2-2-11	Project Implementation Regime	58
Fig. 2-2-12	Project Implementation Schedule.....	73-74

[TABLES]

Table 2-2-1	Outline of the Current Situation of Primary Education in The Three States.....	8
Table 2-2-2	Outline of 121 Subject Schools of the Study at the Time of the Basic Design Study	10
Table 2-2-3	Schools Adopting Combined Classes or Two Shift System Among 121 Schools Subject to the Study	16
Table 2-2-4	Regularity of Class Composition at 121 Schools Subject to the Study.....	16
Table 2-2-5	Schools Failing to Meet Selection Criteria	17
Table 2-2-6	Outline of 70 Target Schools of the Project	18
Table 2-2-7	Number of Required New Classrooms and Headmaster's Units	21
Table 2-2-8	Number of Toilet Booths to be Constructed.....	22
Table 2-2-9	Evaluation Criteria for Necessity for New Water Supply Facilities at Target School Sites	23
Table 2-2-10	UBE Specifications and Project Specifications for Classroom Buildings	30
Table 2-2-11	Scale of New Facilities and Quantity of Furniture.....	35
Table 2-2-12	Outline of Subject Schools of the Study and Selection of Target Schools of the Project.....	39
Table 2-2-13	Outline of Facilities to be Introduced at Target Schools	42

Table 2-2-14 List of Facilities to be Constructed	43
Table 2-2-15 Scope of Work for Japanese Side and Nigerian Side	55
Table 2-2-16 Engineers to be Dispatched by Contractor	59
Table 2-2-17 Activity Plan of the Soft Component.....	66-71
Table 2-2-18 Guidance Schedule by the Japanese Consultant in the Soft Component.....	71
Table 2-2-19 Logical Framework for the Soft Component of the Project.....	72
Table 2-3-1 Obligations of Nigerian Side.....	75
Table 2-4-1 Number of Required Teachers in the Project Schools.....	76
Table 2-4-2 Planned Rehabilitation and Repair Budget for Primary Schools in The Three States	77
Table 2-4-3 Example of Composition of EXCO (Kaduna K49 Kushell P.S.).....	77
Table 2-5-1 Maintenance Cost of Facilities Constructed Under the Project	79

ABBREVIATIONS

B/D	Basic Design
CFS	Child Friendly School
CPT	Corn Penetration Test
DFID	Department for International Development (UK)
EFA	Education for All
E/N	Exchange of Notes
ETF	Education Tax Fund
FME	Federal Ministry of Education
JICA	Japan International Cooperation Agency
LEAP	Literacy Enhancement Assistance Program (USAID)
LGA	Local Government Area
LGEA	Local Government Education Authority
M/D	Minutes of Discussion
NCE	National Certificate of Education
NERDC	Nigerian Educational Research & Development Center
NPC	National Planning Commission
NPEC	National Primary Education Commission
NTI	National Teachers' Institute
PEP	Primary Education Project
PTA	Parents and Teachers Association
PTF	Petroleum Trust Fund
PTTP	Pivotal Teacher Training Programme
SPEB	State Primary Education Board
SME	State Ministry of Education
UBE	Universal Basic Education (Plan)
	UBE Programme
	UBE (FME) (Secretariat, Office)
UNICEF	United Nations Children's Fund
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPE	Universal Primary Education (Programme)
USAID	United States Agency for International Development
VES	Vertical Electrical Sounding

SUMMARY

SUMMARY

The Federal Republic of Nigeria (hereinafter referred to as “Nigeria”) is located in the central part of Africa between 4° and 13°N and between 3° and 14°E, bordering Cameroon to the east, Niger to the north and Benin to the east and facing the Gulf of Guinea to the south. The total national land area is 924,000 km² (approximately 2.5 times larger than Japan) which mostly consists of the drainage basins of Niger River and its tributaries, such as Benue River, Kaduna River and Sokoto River. Nigeria has a tropical climate and it is hot throughout the year. The mean annual temperature is 18° - 35°C in the north where there is a large temperature difference between the morning and evening and 23° - 31°C in the south. Sandstorms called hamatan originating from the Sahara Desert are observed from December to February which can affect the entire country. The total population is approximately 132.8 million (World Bank estimate in 2002).

Since its independence in 1960, Nigeria has experienced civil war as well as a series of military coup d'états. The oil resources discovered in southern Nigeria in the 1960's brought about a brief period of economic development but the excessive dependence of the national economy on oil and lax economic management have resulted in a chronic fiscal deficit and the accumulation of huge debts while damaging agriculture and other traditional industries. Moreover, the development and operation of important public infrastructure have been facing serious difficulties.

The Obasanjo administration, a civilian administration established in May, 1999 with the transition of power from the military, has adopted the control of inflation, promotion of a private sector-led economy, development of education and agriculture and poverty reduction, including measures to reduce unemployment, as key issues for the new government and has accordingly been implementing the necessary measures. In the educational sector, the new government has formulated the UBE Plan under which the necessary measures are being continually implemented to achieve such objectives as free and compulsory primary and junior secondary education, a qualitative improvement of such education and the improvement of teacher training, etc. to eradicate illiteracy.

Many of the primary school facilities in Nigeria were constructed in the 1970's when government investment in education increased against the background of rapidly increasing oil revenues. However, the poor quality of the classrooms constructed means that they are now in a state of advanced deterioration. As it is difficult to the existing school facilities to cope with the sharp increase of the number of pupils following the implementation of the

UBE Plan, improvement of the educational infrastructure is an urgent task for the government.

Meanwhile, the budget share of the educational sector in Nigeria of 6.9% (2002 budget) is quite low. A large proportion of this budget is used to cover teachers' wages and the maintenance cost, etc., leaving insufficient budget available for the construction of new facilities which are essential for the implementation of the UBE Plan.

Under these circumstances, there is a severe shortage of classrooms throughout the country to the extent that the UBE (FME) estimates some 540,000 new classrooms are required (Year 2002). Taking into account the fact that no Japanese assistance has been provided for Nigeria's educational sector in the past, the Government of Nigeria has requested the Government of Japan's provision of grant aid for the construction of new classrooms in three central states (Plateau, Niger and Kaduna States) in the northern province. These states were selected because of their proximity to the capital which would allow easy monitoring of the construction sites. In November, 2002, the Government of Japan dispatched the Preliminary Study Team to Nigeria to gather basic data for the requested assistance for the educational sector in Nigeria. The Preliminary Study Team conducted a detailed study on the background of the request and verified the necessity for and relevance of the proposed project.

Based on the affirmative report of the Preliminary Study Team, the Government of Japan decided to conduct the Basic Design Study and the Japan International Cooperation Agency (JICA) dispatched the Basic Design Study Team to Nigeria for the period from 14th November to 27th December, 2003 to confirm the contents of the request and to conduct a site survey, etc. On its return to Japan, the Basic Design Study Team compiled the draft Basic Design based on analysis of the gathered data and information. The said Study Team returned to Nigeria for the period from 7th to 16th March, 2004 to explain the contents of the Basic Design to the Nigerian side. The purposes of the Basic Design Study are to clarify the current situation of the primary schools of which the improvement has been requested by Nigeria, to examine the contents and expected effects of the Project and to determine the suitability of the Project for the grant aid scheme of the Government of Japan.

The Project aims at alleviating the classroom shortage in the project areas to improve the access of local children to education. With the implementation of the requested assistance, i.e. the Project, the facilities of the Project schools will be improved. As technical guidance on construction and maintenance will also be provided under the Project, the learning environment at the Project schools will also be improved with operation and maintenance by

the project implementation body, schools and PTAs on the Nigerian side. An increase of the school enrolment rate is anticipated as a result of such improvement.

Several criteria have been adopted for the selection of the target schools in the Project (Project schools), including the necessity and urgency for the construction of classrooms, schools requiring three or more new classrooms, securing of the necessary number of teachers and funding by the Nigerian side, cooperation of the local community in school operation and maintenance and ownership of the school site in addition to schools where the number of pupils is not more than 1,440, i.e. the official maximum size of a primary school in Nigeria. The number of classrooms to be constructed at each Project school site has been calculated to achieve the policy of halving the average number of pupils per classroom in the three states from the current 90 (a congestion rate of 225% compared to the standard number of pupils per classroom of 40 pupils in Nigeria) to 45 (a congestion rate of 112.5%). The introduction of a headmaster's office and store room at those target schools which currently lack such facilities has also been decided. Moreover, separate toilet booths for boys and girls will be introduced at all of the target schools and a deep well will be constructed at those target schools which currently find it difficult to obtain clean water on either the school site or from the area around it. The outline of the Basic Design compiled by the Basic Design Study team on its return to Japan based on the field survey findings and results of discussions with the Nigerian side are shown in the table below.

Outline of the Basic Design

Item		Niger	Plateau	Kaduna	Total
Project Schools	Number of Schools	12	26	32	70
	Classroom	78	147	265	490
Number of Facilities	Headmaster's Office and Store Room (units)	5	4	4	13
	Number of Toilet Booths	68	144	170	382
	Booths for Boys	(34)	(72)	(85)	(191)
	Booths for Girls	(34)	(72)	(85)	(191)
Floor Area	Classroom (m ²)	4,368	8,232	14,840	27,440
	Headmaster's Office and Store Room (m ²)	140	112	112	364
	Side Corridor (m ²)	1,288	2,384	4,272	7,944
	Toilets (m ²)	115	243	287	646
	Total Floor Area (m ²)	5,911	10,971	19,511	36,394
Furniture/ Fixtures	Integral Desk-Bench (Two Seater) (sets)	1,794	3,381	6,095	11,270
	Blackboard	78	147	265	490
Deep Well	Deep Well with Hand Pump	4	10	5	19

The organization responsible for the implementation of the Project on the Nigerian side is the UBE (FME). The SPEB and LGEA in each state will be in charge of the operation and maintenance of the new facilities while the actual daily operation and maintenance of the new school facilities will mainly be conducted by each school and its PTA. As all of the organizations and persons involved in the Project have experience of the construction, operation and management of the existing schools, no problems are anticipated in regard to the implementation of the Project in terms of these aspects.

In the case of the Project's implementation with grant aid provided by the Government of Japan, the total project cost is estimated to be ¥1,660 million (Japanese portion: ¥1,659 million; Nigerian portion: ¥1 million). The principal work to be conducted by the Nigerian side is the preparation of the construction sites and the required work period, including the detailed design and construction work period, is estimated to be approximately 15 months for Phase 1 (Niger State), 15 months for Phase 2 (Plateau State) and 17 months for Phase 3 (Kaduna State).

As primary schools in Nigeria have a PTA, the PTA of the Project schools will play a principal role in the maintenance of the new facilities constructed under the Project. The current maintenance situation of existing primary schools in Nigeria suggests a lack of sufficient care for facilities, making the provision of guidance on wide-ranging issues, including awareness of the importance of public facilities, routine cleaning, disposal of sludge from toilet pits and hand pump maintenance at those schools where a deep well is newly constructed, necessary. For this reason, the guidance of maintenance skills (soft component) to mainly teachers, pupils and PTA members of the Project schools and officials of the SPEBs and LGEAs will be attempted. It is believed that the maintenance capability of the above will improve given a sense of ownership of the facilities and the opportunity to learn the importance of and know-how on maintenance and cleaning activities. The officials of the SPEBs and LGEAs can be expected to convey their newly acquired skills to the other schools.

The implementation of the Project is expected to have the following direct effects.

- The construction of 490 new classrooms equipped with pupils' desks and benches to serve some 40,000 pupils at the 70 target schools will reduce the number of pupils per classroom to 45 pupils, thereby improving the learning environment. At the same time, the alleviation of the classroom shortage in the three states in question will improve the access of local children to education.
- The introduction of a headmaster's office and a store room at those schools which currently lack such facilities is expected to improve the efficiency of school operation.

- At present, the 70 Project schools have only a total of 95 toilet booths, including those under construction. A total of 382 new booths to separately serve boys and girls will be constructed at these schools under the Project, improving the sanitation conditions in general and the basic school facilities for female pupils and the working environment for female teachers in particular.
- The construction of a deep well equipped with a hand pump at 19 Project schools which currently find it difficult to obtain clean water nearby will improve the health environment at the school and also that of the surrounding community.

The Project is also expected to have the following indirect effect.

- As the new classrooms to be constructed under the Project will be highly durable, the overall maintenance cost of school facilities will be reduced.

The improvement of school facilities in the three states (Niger, Plateau and Kaduna) can be expected to increase the school enrolment rate. Moreover, the provision of technical guidance on maintenance and other matters for various people, including officials of the UBE (FME) and SPEBs, is expected to improve the educational environment in the three states.

As the Project is expected to have the significant effects described above, the provision of Japanese grant aid for the Project is deemed to be relevant. No problems are anticipated in terms of manpower and funding for the operation and maintenance of the new facilities after the completion of the Project. Nevertheless, the prompt recruitment and adequate deployment of a total of 143 new teachers to ensure proper teaching at the new classrooms of the target schools following their handing over to the Nigerian side and strengthening of the maintenance system at the SPEBs, LGEAs and Project schools to ensure the proper maintenance of the new facilities constructed under the Project will be extremely important.

CHAPTER 1

BACKGROUND OF THE PROJECT

CHAPTER 1

BACKGROUND OF THE PROJECT

Since independence, Nigeria has experienced civil war as well as a series of military coup d'états. While the oil resources discovered in southern Nigeria in the 1960's brought about a brief period of economic development, the excessive dependence on oil and lax economic management have resulted in a chronic fiscal deficit and huge accumulated debts while damaging agriculture and other traditional industries. Moreover, the development as well as operation of important public infrastructure has been facing serious difficulties.

In the educational sector, while active efforts have been made to tackle such issues as the expansion of educational facilities and the qualitative as well as quantitative improvement of teachers through the Universal Primary Education (UPE) Programme and others, these efforts have not been successful due to insufficient preparation, in turn caused by insufficient statistical and other data, lack of sufficient funding and delay of teacher training. One positive result, however, is that the importance of primary education has been fully recognised by the people of Nigeria. The Obasanjo administration, a civilian administration established in 1999 with the transition of power from the military, has adopted the control of inflation, promotion of a private sector-led economy, development of education and agriculture and poverty reduction, including measures to reduce unemployment, as key issues for the new government and has accordingly been implementing the necessary measures. Based on the lessons learned from the UPE Programme, the new government has formulated the Universal Basic Education (UBE) Plan under which the necessary measures are being continually implemented to achieve such objectives as free and compulsory primary and junior secondary education, a qualitative improvement of such education and the improvement of teacher training, etc.

The facilities of many primary schools in Nigeria are in a state of advanced deterioration. As the government is finding it difficult to respond to the sharp increase of pupils following the implementation of the UBE Plan, it is facing the urgent task of improving the educational infrastructure. Meanwhile, the budget share of the educational sector in Nigeria of 6.9% (2002 budget) is quite low. To make matters worse, a large proportion of this budget is used to cover teachers' wages and the maintenance cost, etc. and insufficient budget is allocated to the construction of new facilities which are essential for the successful implementation of the UBE Plan.

Under these circumstances, there is a very acute classroom shortage nationwide and the Government of Nigeria has requested the Government of Japan's provision of grant aid for

the construction of new classrooms in three central states (Plateau, Niger and Kaduna) in the northern province. These states were selected because of their proximity to the capital which would allow easy monitoring of the construction sites. In November, 2002, the Government of Japan dispatched the Preliminary Study Team to Nigeria to gather basic data for the requested assistance for the educational sector in Nigeria. The Preliminary Study Team conducted a detailed study on the background of the request and verified the necessity for and relevance of the proposed project. The contents of the original request for Japanese assistance are described below, covering 121 primary schools (542 new classrooms) (hereinafter referred to as “the Study schools” or the requested schools, or the subject schools of the Study). The locations of the Study schools (the requested schools) for which the Japanese assistance are shown in Appendix 7 - Location Map of the Study Schools.

[Contents of the Request]

Niger State	:	21 schools	(192 new classrooms requested)
Plateau State	:	50 schools	(150 new classrooms requested)
<u>Kaduna State</u>	:	<u>50 schools</u>	<u>(200 new classrooms requested)</u>
Total		121 schools	(542 new classrooms requested)

CHAPTER 2

CONTENTS OF THE PROJECT

CHAPTER 2

CONTENTS OF THE PROJECT

2.1 Basic Concept of the Project

(1) Higher Goal and Project Goal

Despite its difficult fiscal situation, the Government of Nigeria has been continually implementing the necessary measures to achieve such objectives as free and compulsory primary and junior secondary education, a qualitative improvement of such education and the improvement of teacher training, etc. through the UPE Programme which commenced in 1976 and the current UBE Plan which incorporates the lessons learned from the preceding UPE Programme. However, many of the primary school facilities in Nigeria were constructed in the 1970's when government investment in education increased against the background of rapidly increasing oil revenues and are now in a state of advanced deterioration. Given the rapid increase of pupils following the implementation of the UBE Plan, improvement of the educational infrastructure is now an urgent task for the government. The classroom shortage is particularly severe with some 49,000 primary schools in Nigeria said to be facing a combined shortage of 540,000 classrooms.

Meanwhile, a large proportion of this budget is used to cover teachers' wages and the maintenance cost, etc., leaving insufficient budget available for the construction of new facilities which are essential for the implementation of the UBE Plan. The SPEBs and LGEAs are making efforts for repair of the existing school buildings in cooperation with the PTA and community; however it is hard for them to provide funds for construction of new classrooms with financial difficulties.

In these circumstances, the Government of Nigeria requested grant aid for the project on construction of additional classrooms in the three states (Niger state, Plateau state and Kaduna state) to the Government of Japan. As part of the government efforts to improve primary education, the higher goal of the Project is improvement of the environment for primary education in the three target states. The intended goal of the Project is to alleviate the classroom shortage and to improve access to education in the three states through the construction of new classrooms, toilets and water supply facility etc., contributing to the above higher goal. The construction of new classrooms is expected to improve the primary school enrolment rate in the three states.

(2) Outline of the Project

The Project intends the construction of additional classrooms, the procurement of classroom furniture and fixtures (blackboards and desks and benches for pupils), the construction of toilet facilities and the construction of a deep well at those sites where new water supply facilities are judged to be necessary in the Project schools.

2.2 Basic Design of the Requested Japanese Assistance

2.2.1 Design Policies

2.2.1.1 Basic Policies

The components of the Project are the construction of the evaluated number of classrooms, the introduction of a headmaster's room (office) as well as a store room of the minimum necessity, the procurement of furniture and fixtures for the new classrooms (blackboards and desks and benches for pupils), the construction of toilet facilities and the construction of a deep well at those sites where new water supply facilities are judged to be necessary for those schools which satisfy the site selection criteria and of which the number of pupils will not exceed the upper threshold in Nigeria of 1,440 among the 121 schools for which Japanese assistance has been requested by the Government of Nigeria.

At present, the average number of pupils per classroom in the target three states is 90. Given the standard classroom size of 56 m² for 40 pupils under the UBE Plan, the congestion rate is 225%. The guideline of the Project is to reduce the present congestion rate by half (to 112.5%) with the number of pupils per classroom to 45, aiming an urgent improvement of the present overcrowded condition as much as possible. Therefore the design of the Project has been made based on accommodation of 45 pupils per classroom of which area is 56 m² as is the standard of UBE Plan.

2.2.1.2 Natural Conditions

(1) Temperature

The temperature at the project sites is almost constantly high at approximately 30°C to 40°C throughout the year except for northern Plateau. The solar radiation is particularly strong during the dry season, causing much radiant heat. The insulation of the roofs and walls of the classroom buildings shall be high and natural ventilation shall be good so that a temperature increase due to solar radiation does not cause an intense rise of the temperature inside the classrooms.

(2) Humidity and Rainfall

As the humidity range is 60% - 90% throughout the year, it is fairly pleasant. As there can be periods of heavy rain during the rainy season, the roof structure shall secure no leakage of rainwater and the drainage of storm water shall be properly prepared.

(3) Sand Storms

As the project sites may be affected by the hamatan which is a strong wind due to the influence of the Sahara Desert, the roof structure and the openings shall be strong enough against the storm wind. The shorter side of the buildings with no opening shall front the storm wind direction if possible.

2.2.1.3 Social Conditions

While a relatively high level of convenience can be found in such large cities in Nigeria as Abuja and Lagos, improvement of the social infrastructure has been slow in rural areas such as those in which the project sites are located, resulting in very inferior living conditions compared to those in urban areas. In some rural areas, the lack of hotel accommodation and medical facilities, etc. makes the long stay of foreign engineers and others inconvenient. The poor security situation in Nigeria makes it necessary to request the Government of Nigeria's provision of protection as well as policing in the construction period so that people working for the Project can safely conduct their assigned work in an appropriate manner. Moreover, the common temporary work, including temporary equipment, must consider the inclusion of security measures to prevent theft of the equipment and materials and also of communication equipment to secure a communication system for emergencies in reflection of the local situation. Careful attention must also be paid to the potential existence of powerful ethnic chiefs who are not part of the official administrative hierarchy because of the complexity of the country's ethnic composition.

2.2.1.4 Construction Conditions

The delayed improvement of infrastructure in rural areas where the project sites are located means poor construction conditions. Branch roads leading to the sites which are far away from trunks roads are mainly unpaved and the road surface conditions are poor. For this reason, careful attention must be paid to the transportation method for the materials and construction equipment and also to the locationing of on-site offices.

2.2.1.5 Use of Local Construction Companies and Local Materials

(1) Use of Local Construction Companies

The large-scale construction of office buildings, etc. is highly visible in Abuja after the relocation of the capital to the city. As a result, several foreign general contractors have established subsidiaries in the city, providing construction services of a high level. Meanwhile, the three northern states in which the project sites are located have few construction companies which are capable of undertaking large-scale construction work. Nevertheless, each state has many local companies which are capable of constructing small buildings on the scale of the planned primary school buildings under the Project and it will be possible to subcontract these companies for the Project. However, the use of a general local contractor (or consultant) with blanket responsibility for schedule control, quality control and safety control for the entire Project is essential in view of the need for (i) the smooth implementation of the construction work under the Project which involves many sites scattered over a wide area and which is a Japanese grant aid project demanding strict compliance with the set schedule and (ii) the smooth procurement of local materials and checking of their quality.

There are a lot of locally produced materials of poor quality in the market. The utmost care is, therefore, required in regard to quality control at the time of procurement and it will be necessary for the Japanese consultant to provide technical guidance on the manufacture of certain building materials as part of the quality control when local construction materials are procured.

(2) Use of Local Materials

The building materials to be used under the Project will be those which can be procured locally.

2.2.1.6 Operation and Maintenance Capability of the Project Implementation Body

The SPEB of each of the three target states of the Project will be responsible for the monitoring and supervision of the planned school facilities after the commencement of their use under the guidance of the UBE (FME). The SPEBs will also be responsible for the operation and maintenance of the schools in collaboration with each local government (LGA).

The practical maintenance of primary school facilities is mainly conducted by PTA or the community of each school. The maintenance conditions of the existing school facilities are

not very good. In view of this situation, guidance will be provided under the Project to give PTAs or local communities a sense of ownership and understanding of the importance of maintenance work in order to foster a local habit of carefully using school facilities.

2.2.1.7 Scope and Grade of Facilities and Materials

In consideration of the various conditions described above, the scope and technical level of the facilities and materials to be procured and/or constructed are formulated based on the following policies.

(1) Policy Regarding Scope of Facilities and Materials

The minimum number of the necessary classrooms is adopted to ensure the provision of the required number of classrooms for the adequate school life of the pupils at the Project schools, taking the effective use of the existing facilities into consideration. To ensure an economical design, all of the material specifications correspond to those of locally procurable materials. The variety of combinations of classrooms (blocks) at the sites is kept to a minimum with a view to increasing the construction work efficiency and to facilitate maintenance through the small variety of block patterns.

(2) Policy Regarding Grade

The standard specifications under the UBE form the basis for the decision on the grade of the planned school facilities with careful consideration given to partial revision of the said specifications where improvement of the quality is judged necessary in order to reduce the maintenance work burden of the new facilities after their completion on local communities. In regard to the selection of materials, local materials of good quality and a reasonable price are to be selected to make appropriate maintenance by local communities feasible.

2.2.1.8 Construction Schedule

The construction work will be conducted in three phases as described below in view of the scale, efficiency, smooth implementation of the work and the required number of new teachers, reflecting the careful approach adopted for the Project which constitutes the first Japanese ODA for the educational sector in Nigeria. The order was decided in accordance with the above smaller work scale and the smaller number of required additional teachers.

Phase I : Niger State

Phase II : Plateau State

Phase III : Kaduna State

2.2.2 Basic Plan

2.2.2.1 Selection of Project Schools

(1) General situation of primary education in the three states

The state of Kaduna is the most populous among the three states. The primary school age population of Kaduna State accounts for 1.2 million and occupies the largest share, followed by Plateau and Niger State. (The sum of the three states accounts for 2.37 million as of Academic Year 2002/03.) That results in the fact that Kaduna State suffers most seriously in the aspect of classroom shortage. The pupil-classroom ratio of Kaduna State is 100 pupils per classroom(2002/2003). The average number of pupils per class in Kaduna accounts for 60, which is 50% higher than the criteria of FME: 40 pupils per class. Namely, Niger's pupil-classroom ratio and pupil-class ratio are 73 and 45 respectively. Plateau's those ratios are 89 and 39 respectively.

Table 2-2-1 Outline of the current situation of primary education in the three states

Item	Niger	Plateau	Kaduna	Total
1. Number of pupils	447,038 (19%)	708,093 (30%)	1,205,720 (51%)	2,360,851 (100%)
2. Primary education age (6-11) population	628,081 (19%)	962,879 (29%)	1,744,716 (52%)	3,335,676 (100%)
3. Number of gross enrolment rate	71%	74%	69%	71%
4. Number of primary schools	1,919	1,570	2,819	6,308
5. Number of teachers	15,030	16,401	17,430	48,861
6. Number of classes	9,939	18,114	20,018	48,071
7. Pupil-teacher ratio (pupils/teacher)	30	43	69	48
8. Number of classrooms	6,114	7,978	12,039	26,131
9. Pupil-school ratio (pupils/school)	428	241	447	376
10. Pupil-classroom ratio (pupils/classroom)	73	89	100	90
11. Floor space of usable classroom per pupil (m ² /pupil) 56 m ² x (4) ÷ (2)	0.77	0.63	0.56	0.61
12. Pupil-class ratio (pupils/class)	45	39	60	49

(Source of information: SPEB statistics of the three states, academic year of 2002/2003)

*1: Primary education age population are the projected numbers by each SPEB, on the basis of the state population projection by National Population Commission.

*2: The numbers of schools and teachers of Niger are as of academic year 2000/2001, not as of 2002/2003.

*3: The classroom statistics classification category varies among the three states. The classroom numbers of Kaduna and Niger states are a sum of "usable classroom" and "bad-conditioned but usable

classroom”, while the number of classrooms of Plateau state is “available classroom”.

*4: The way to calculate floor area of usable classroom per pupil is that 56 m² are multiplied by the number of classrooms divided by the number of pupils.

The number of teachers for the primary schools is not sufficient. In particular the shortage of the teachers in Kaduna State is prominent in the three states. The National Teachers’ Institute (NIT) introduced Pivotal Teacher Training Programme (PTTP) from the year 2000 in order to improve the shortage of the teachers. The numbers of qualified teachers passing the programme in the Niger, Plateau and Kaduna States was 177, 397 and 346 respectively by the year 2002.

(2) General Situation of Study Schools

The general situation of the 121 schools studied in the three states is outlined in Table 2-2-1. The locations of the schools are indicated in Appendix 7 – Location Map of the Study Schools. As the table shows, the total number of pupils, classes and teachers is 73,413 pupils, 1,660 classes and 1,754 teachers respectively, resulting in an average class size of 44 pupils. Meanwhile, the number of usable classrooms based on the judgement made by the site survey is 674. The resulting number of pupils per usable classroom of 109 clearly indicates the overcrowding situation at the Study schools even worse than the average of the whole three states.

As the size of the existing classrooms varies according to the site survey results, the number of existing classrooms here is based on the conversion of the varying classroom sizes to the UBE design standard (56 m² per classroom) [For example when a school has four 28 m² classrooms, the converted number of classroom is two.]. Based on this figure, the total area of existing usable classrooms is 37,744 m² (56 m² x number of usable classrooms). The resulting average floor area per pupil at the 121 Study schools is 0.51 m² (UBE standard: 1.4 m²/pupil), clearly indicating the situation of a classroom shortage.

Table 2-2-2 Outline of 121 Study Schools

Item	Niger	Plateau	Kaduna	Total
1. Number of Study schools	21	50	50	121
2. Number of pupils	13,567	21,532	38,314	73,413
3. Number of teachers	457	503	794	1,754
4. Number of usable classrooms at present	118	224	332	674
5. Number of classrooms under construction or planned	19	22	22	63
6. Number of usable classrooms after repair	9	30	24	63
7. Number of unusable classrooms to be abandoned	5	22	16	43
8. Number of classes	278	630	278	1,660
9. Pupil-classroom ratio (pupils/classroom)	115	96	115	109
10. Pupil-teacher ratio (pupils/teacher)	48	43	30	42
11. Pupil-class ratio (pupils/class)	51	34	49	44
12. Floor space of usable classroom per pupil (m ² /pupil) 56 m ² x (4) ÷ (2)	0.49	0.58	0.49	0.51

The introduction of the UBE Plan in Nigeria has prompted parents to send their children to primary school and, as a result, many primary schools have been experiencing a sharp increase of enrolment since 1999. Meanwhile, some primary schools have experienced an actual decline of the number of pupils because of the establishment of satellite schools in response to the sharp increase of enrolment. The sudden movement of people between regions due to ethnic or religious conflict is not unusual and the resulting sharp increase of decrease of the number of pupils makes it difficult for some schools to accurately predict the enrolment trend. As the absence of a school catchment area system means freedom of choice for parents for their children, a sudden increase or decrease of the enrolment is more likely to occur at schools in urban areas where a choice of school can be made from among more than one school. In general, the lower grades at most schools have a higher number of pupils compared to higher grades because of drop-outs of higher grades due to resignation on the part of pupils or parents before completing the course or child labour.

(3) Selection Criteria for Project Schools

All of the 121 Study schools are existing schools and the following criteria are applied for the selection of the Project schools for Japanese assistance (see Appendix 4 – Minutes of Discussions).

- ① Urgency and necessity for construction of additional classrooms shall be identified.

- ② Number of additional classrooms to be constructed shall exceed two (2) additional classrooms.
- ③ Sufficient number of teachers, staff and funds shall be secured by the Nigerian Side to maintain the school properly.
- ④ Cooperation from a community shall be obtained in order to operate and maintain the school properly.
- ⑤ Accessibility to the project site shall be taken into consideration.
- ⑥ The land for the project site shall be secured.
- ⑦ Sufficient size of the land for construction of additional classrooms shall be secured.
- ⑧ Topography and shape of the project site shall be appropriate for construction.
- ⑨ The school shall not have any classroom construction or similar project either by the National/State/Local Government, NGOs, or others.
- ⑩ Safety condition in the project site shall be secured.

1) Calculation of Required Number of Classrooms

A detailed description of criteria ① and ② above is given in (3) – Calculation of Scale of Classroom Shortage.

2) Required Number of Teachers and Funding

In regard to criterion ③ above, the required number of teachers after the completion of the new classrooms under the Project is calculated for each school and a pledge by the UBE (FME) and SPEB of each state for provision of necessary teachers in the Project schools will be obtained.

3) Cooperation of Local Community

In regard to criterion ④ above, cooperation for and the participation of the local community in school operation and management, albeit in varying degrees from one school to another, has been confirmed as the PTA of each school has an EXCO (executive committee) which is chaired by the community leader and which comprises representatives of both the local community and the school as a system to ensure the cooperation for and participation in school operation and management by the local community.

However, it is essential to encourage the self-reliant development of each school by establishing a framework to strengthen the operation and maintenance of the new

facilities after their completion and providing the relevant guidance in the course of implementing the soft component during the construction period.

4) Transport Access

In regard to the transport access to each site, a survey was conducted on the distance from the trunk road, the road surface conditions and the types of vehicles which can use the access road to verify the accessibility of construction vehicles to the site. This survey found a major transport access problem at three sites in Niger State (Study School Numbers N4, N10 and N18), six sites in Plateau State (Study School Nos. P3, P4, P19, P30, P31 and P41) and two sites in Kaduna State (Study School Nos. K19 and K40). As the selection of these schools is likely to result in a substantial decline of the construction work efficiency, it has been decided to drop these 11 sites from the prospective project sites.

5) Right for Land

Nigeria adopts a land system which is similar to that in the United Kingdom. While all land essentially belongs to the government, individual plots are leased for a long period of 99 years, 60 years or other periods of time. Accordingly, each school should have a land certificate for the site but it has been found that many schools in Nigeria have not registered their ownership or boundary lines.

At the time of the visit survey, none of the 121 Study schools had a official land certificate. The interviews conducted with officials of the state SPEB and LGA found that the land of every single public primary school has been donated by the local community etc. and that the LGA currently possesses ownership (or right of use) of the land in question. During the visit to these 121 schools, a signed document by the headmaster or community leader certifying that the school site is possessed by the relevant LGA was prepared.

The implementation of the Basic Design Study has prompted the SPEB of Plateau State and Kaduna State to register the land (Certificate of Occupancy) of each primary school and it has now been confirmed that the land registration procedure has been completed for most of the Project schools in the two states, remaining two schools in Plateau and three schools in Kaduna State. In Niger State, no result has been made yet as of March 2004. Following this move, the UBE (FME) has started an initiative to urge all primary schools, not only in the three states in question but also in every state in the country, to complete the land registration procedure. One precondition for the Project should be the completion of land registration prior to the

commencement of the construction work at all the Project schools in the three target states. As such registration procedure has not been fully completed, the UBE (FME) has requested the completion of the land registration procedure for all the Project schools in the three states through the respective SPEBs by March, 2004.

6) Securing of Sufficiently Large Land

In connection with selection criterion ⑦ above, one school site in Plateau State (School No. P44) has been found to be too small to secure the land for additional facilities, and has been dropped from the Project schools.

7) Topography

In regard to criterion ⑧ above, most of the sites at flat and several sloping sites are not steep enough to make the construction work difficult and can be dealt with by the careful layout of the facilities and minor land preparation work. At one site (Study School No. P39), however, more intensive land preparation work is required as outcrops of bedrock are observed in several places. Given the fact that the site is not sufficiently large enough to accommodate the required new facilities, this school has been dropped from the scope of the Project.

8) Overlapping with Similar Projects of Other Donors to Assist Construction of New Classrooms

As the initial request of the Government of Nigeria took selection criterion ⑨ above into careful consideration, none of the requested 121 primary schools have previously received cooperation for the construction of classrooms as planned under the Project. One possible exception is Bakin Iku Primary School in Niger State (School No. N9) which has received assistance from the World Bank for the repair of the school building constructed by the LGA using World Bank funds. As this was repair work, however, it is judged that there is no overlapping with the Project at this school.

In addition, some schools have received technical cooperation from the UNICEF and the World Bank in regard to the soft aspect, including the supply of teaching aids and others. As such assistance is of a completely different category from the Project, it is judged that the Project does not overlap with the assistance of other donors.

9) Securing of Safety and Security

The field reconnaissance for the Basic Design Study was completed at all of the 121 school sites without encountering any problems of poor public order. However, the actual construction work must be backed by sufficient security measures in view of the occasional outbreak of ethnic conflict and occurrence of robbery and other crimes. Those sites where there is strong concern in regard to security, including on the school premises control, which were not eliminated during the field reconnaissance have been dropped from the scope of the Project.

10) Upper Limit for Primary School Size

In Kaduna State where the population concentration is particularly high, there are eight exceptionally large schools with more than 1,440 pupils. The inclusion of these schools in the scope of the Project creates a problem of reducing the number of schools for which assistance is to be provided. The Minimum Standards for Primary Education stipulated in 1997 that the maximum primary school size should be 1,440 pupils.

For the purpose of selecting the schools for the Project, it has been judged that the desirable educational policy is the achievement of an appropriate school size by means of creating satellite schools or other measures in accordance with the guidance of the state government and, therefore, it has been decided to avoid a further expansion of already excessively large schools. Extension of these excessively large schools will go against the policy for appropriate school size. Accordingly, primary schools with more than 1,440 pupils at present have been dropped from the scope of assistance under the Project.

(4) Calculation of Necessary Number of Classroom

1) Present Conditions

The Basic Design Study Team visited the 121 Study schools and established the following points through interviews with headmasters and UBE/SPEB officials to clarify the situation of school management and the composition of classes.

- ① These schools have made their own decision to opt for a combined class system and/or a two shift system. There is no firmly established policy regarding this point in any of the states concerned.
- ② Only a small number of schools have the same number of classes for each grade.

- ③ The minimum standards set by the government favour a double streaming system (i.e. 6 grades x 2 classes each) and stipulate a maximum school size of 1,440 pupils.
- ④ There is a wide variety of school sizes, ranging from schools with some 100 pupils solely managed by the headmaster, to schools with more than 2,000 pupils.
- ⑤ The pattern of fluctuation of the number of pupils varies from one school to another. The freedom of choice to select a school or to change to another school due to the absence of school catchment areas makes the movement of pupils between schools easy.

In some areas, a sharp increase or decrease of the number of pupils occurs in a short period of time due to local families becoming refugees moving out of the area as a result of ethnic conflict or religious conflict or the return of refugees. It is practically impossible for each school to accurately forecast the number of pupils.

Moreover the difficulty of reliably forecasting demographic trends due to the insufficient reliability of the rather old census data (the latest available census is the 1990 census) makes it extremely difficult to properly forecast the future enrolment trend for each school.

- ⑥ While the maximum number of pupils per class in primary education in Nigeria is officially set at 40, the current number of pupils per classroom in the three target states of the Project is 90. The improvement target for the learning environment under the Project is set at halving this figure and, therefore, those schools where the number of pupils per classroom exceeds 45 are considered to be schools with a classroom shortage.
- ⑦ As shown in Table 2-2-3, 25 schools, i.e. approximately 20% of the 121 schools subject to the Study, currently adopt a two-shift system while 71 schools or some 60% adopt compiled classes to teach pupils. All in all, schools which adopt a two-shift system and/or combined classes due to a classroom shortage or teacher shortage account for some 71% (86 schools) of the schools studied.

Based on the composition of the classes for each grade shown in Table 2-2-3, while some small schools with 200 – 300 pupils have an orderly single stream system, some medium size schools with 400 – 500 pupils have an orderly double stream system. However, the composition of classes by grade are irregular at 97 schools, i.e. some 80% of the Study schools. Even at those schools with a streamlined class composition, the large fluctuation of the number of pupils means that they find it difficult to plan the class composition based on statistics which is a common problem currently faced by public primary schools in Nigeria.

Table 2-2-3 Schools Adopting Combined Classes or Two Shift System
Among 121 Study Schools

Item	Schools With Combined Classes	Schools With Two Shift System	Schools With Combined Classes and/or Two Shift System
21 Schools in Niger State	6	9	12
50 Schools in Plateau State	6	41	41
50 Schools in Kaduna State	13	21	33
Total: 121 Schools	25	71	86

Table 2-2-4 Regularity of Class Composition at 121 Schools Subject to the Study

Item	One Class per Grade	Two Classes per Grade	Three Classes per Grade	Four Classes per Grade	Irregular
21 Schools in Niger State	2	1	1	0	17
50 Schools in Plateau State	2	2	2	0	44
50 Schools in Kaduna State	7	6	0	1	36
Total: 121 Schools	11	9	3	1	97

2) Calculation Principle

Given the circumstances described above, it has been decided to calculate the necessary number of classrooms based on the following principles.

1	A multiple of three (3) is used to determine the future number of classes as part of the efforts to streamline the class composition in the future.
2	The present number of pupils is used for the calculation.
3	The number of classrooms is calculated based on the condition that every school uses a single shift system without combined classes.

- 1) In principle, it is desirable for the total number of classes to be a multiple of six for primary schools with six grades. When determining the total number of classes for each school, a multiple of six (6) appears to be too large to provide flexibility. A multiple of six tends to create larger facilities than necessary and a multiple of three following the construction of the new classrooms is adopted for the design of the Project.
- 2) It is difficult to forecast future number of pupils by grade by school with the diverse condition of the existing schools and the unpredictable large population movement and fluctuation of number of pupils due to crisis or unrest. Given the significant shortage of classrooms at present, the number of required new classrooms is calculated based on the present number of pupils and a class size of 45 pupils.

3) The condition of adapting two-shift system or combined classes is diverse and the calculation under this disparity will lack fairness. On the other hand, it is preferable that the pupils should have education in single shift system without combined classes for normal school life. After the Project, 45 pupils per classroom will enable school operation in single shift system without combined classes, even though that is a little larger than the UBE standard of 40 pupils per classroom. The density of 45 pupils per classroom is considered adequate and not overcrowded.

(5) Schools Dropped From the Project Due to Failure to Meet Selection Criteria

Those schools shown in Table 2-2-5 have been dropped from the Project due to their failure to meet the selection criteria.

Table 2-2-5 Schools Failing to Meet Selection Criteria

Selection Criteria	Schools Failing to Meet Selection Criteria		
	Niger State	Plateau State	Kaduna State
① Three or more classrooms required	N6, N9, N16, N21 (4 in total)	P4, P7, P9, P10, P18, P24, P25, P26, P27, P29, P31, P33, P40, P41, P42, P43, P47, P48 (18 in total)	K1, K5, K14, K18, K25, K31, K35, K36, K50 (9 in total)
② Secured teachers and funding	None	None	None
③ Cooperation of the local community	None	None	None
④ Transport access	N4, N10, N18 (3 in total)	P3, P4, P19, P30, P31, P41 (6 in total)	K19, K40 (2 in total)
⑤ Land Ownership	None	None	None
⑥ Sufficiently large land	None	P44 (one in total)	None
⑦ Topography	None	P39 (1 in total)	None
⑧ Overlapping with another donor	None	None	None
⑨ Secured safety and public order	None	P38 (1 in total)*	None
⑩ Upper limit of school size (1,440 pupils)	N1, N6, N7 (3 in total)	None	K8, K21, K22, K27, K40, K43, K45, K48 (8 in total)

* At School No. P38 (Ang. Mallam Adama) in Plateau State, a group of youngsters was observed loitering on the school premises at the time of the site survey, indicating insufficient security control to the school premises. For this reason, this school has been dropped from the Project.

(6) Selection and Outline of Project Schools

Seventy (70) schools have finally been selected as the Project schools based on the considerations given in (1) through (4) above. The total number of classrooms to be constructed at these 70 schools is 490. By state, 12 schools (78 new classrooms to be

constructed under the Project) are located in Niger State, 26 schools (147 new classrooms) are located in Plateau State and 32 schools (265 new classrooms) are located in Kaduna State. The outline of the 70 schools selected as the Project schools is given in Table 2-2-6 while their locations are shown in Fig. 2-2-8 through Fig. 2-2-10. As shown in Table 2-2-6, the total number of pupils, classes and teachers at these 70 schools is 39,144 pupils, 871 classes and 761 teachers respectively with an average class size of 45 pupils. The site survey found that 324 existing classrooms are still usable, resulting in a pupil-classroom ratio of 121 pupils per classroom (0.46 m² per pupil). This figure is higher than the average pupil-classroom ratio of 109 pupils per classroom (0.51 m² per pupil) for the 121 Study schools. A major improvement of the pupil-classroom ratio of 45 pupils per classroom (1.24 m²) will be achieved following the completion of the Project.

Table 2-2-6 Outline of 70 Project Schools

Item	Niger	Plateau	Kaduna	Total
1. Number of Project schools	12	26	32	70
2. Number of pupils	6,864	12,200	20,080	39,144
3. Number of teachers	247	269	429	761
4. Number of usable classrooms at present	63	104	155	322
5. Number of classrooms under construction	9	12	9	30
6. Number of usable classrooms after repair	0	7	15	22
7. Number of unusable classrooms	2	13	7	22
8. Number of classes	154	303	414	871
9. Pupil-classroom ratio (pupils/classroom)	109	117	128	121
10. Pupil-teacher ratio (pupils/teacher)	28	45	47	51
11. Pupil-class ratio (pupils/class)	45	40	49	45
12. Floor space of usable classroom per pupil (m ² /pupil) 56 m ² x (4) ÷ (2)	0.51	0.48	0.43	0.46

2.2.2.2 Scale of Assistance for Classrooms, etc.

(1) Classrooms

Having undergone the processes of analysing the field survey findings and selecting the Project schools, the scale of assistance under the Project has been determined in accordance with the principles described in 2.2.2.1.

The existing classrooms have been classified into four categories, i.e. “usable classroom”, “classroom under construction or planned”, “usable classroom with repair”

and “unusable classroom (demolition required)”, by the field survey and classrooms of the first three categories are considered to be usable classrooms in the future. The number of such classrooms is subtracted from the required number of classrooms to obtain the number of new classrooms to be constructed.

The formula to calculate the scale of the Project to achieve the required number of classrooms is described below.

$$\begin{aligned}
 \text{Desirable number of classes based on the standard class size (M)} &= \text{Round (G/140)} \\
 \text{Desirable number of classes based on a multiple of 3 (N)} &= 3 \times \text{Round (M/3)} \\
 \text{Number of usable classrooms in the future (S)} &= \text{(i) + (ii) + (iii)} \\
 \text{Number of classrooms to be constructed (K)} &= N - S
 \end{aligned}$$

Where,

- G : present number of pupils
- (i) : number of usable classrooms at present
- (ii) : number of classrooms under construction
- (iii) : number of usable classrooms with repair
- (iv) : number of unusable classrooms
- H : number of required classrooms

For example, if a school currently has 350 pupils and 5 classrooms, the required number of classrooms in the future is 9 ($350 \div 45 = 7.78 \rightarrow 8 \rightarrow 9$). As there are currently five classrooms, there is a shortage of four classrooms ($9 - 5 = 4$).

1) Classification of Classrooms and Calculation of Classroom Shortage

As described earlier, the existing classrooms at the target schools were classified in four categories, i.e. “usable classroom at present”, “classroom under construction or planned”, “usable classroom with repair” and “unusable classroom” which requires demolition as there is no viable prospect of its repair to make it usable. The distinction between a “usable classroom with repair” and an “unusable (irreparable) classroom” is explained in Fig. 2-2-1. Based on this classification of the existing classrooms, classrooms of the first three categories (“usable classroom”, “classroom under construction” and “usable classroom with repair”) are regarded as viable classrooms for use under the Project and their number is subtracted from the number of required classrooms to calculate the classroom shortage (number of classrooms to be newly constructed).



Example of Repairable Classroom Building (1)
 The roof of half of the building (left-hand side) has been restored by the local community.
 The right-hand side of the building still lacks a roof but can be repaired.



Example of Repairable Classroom Building (2)
 Despite general deterioration, the sound structure means that this building can be repaired.



Example of Irreparable Classroom Building (1)
 Even though this building is currently in use, the roof and the walls have collapsed.
 Repair work cannot guarantee structural safety.



Example of Irreparable Classroom Building (2)
 Even though the building is currently in use, parts of the walls have collapsed.
 Repair work cannot guarantee structural safety.



Example of Irreparable Classroom Building (3)
 The building is not currently used. As the walls and roof have mostly collapsed,
 repair work cannot guarantee structural safety.

Fig. 2-2-1 Judgement Criteria for Repairable and Irreparable Classroom Buildings

The current situation of classrooms is that classrooms are still used even if a wall(s) and/or the roof has collapsed. Given the severe classroom shortage at the Study schools, the primary consideration from the viewpoint of the requested assistance is for Japan to provide assistance for the construction of new classrooms to solve the classroom shortage while urging the Nigerian side to repair those classrooms which are classified as repairable classrooms.

Those classrooms of which the construction by the UBE (FME) or SPEB is in progress or with construction plan even though the work has not yet commenced are classified in the category of “classroom under construction or planned”.

(2) Calculation of Required Headmaster’s Rooms and Store Rooms

A headmaster’s room in Nigeria generally accompanies a store room in the form of a front space and back space respectively. The store room provides space for the storage of distributed textbooks, teaching aids and books. This unit constitutes essential space in terms of school management. While most schools have such a unit, some of the Project schools lack such a unit. Accordingly, the introduction of this unit comprising a headmaster’s office and storage is planned under the Project for those schools currently lacking such a unit. The schools in question are five schools in Niger State (Study School Nos: N3, N13, N15, N17 and N19), four schools in Plateau State (Study School Nos: P1, P2, P13 and P22) and four schools in Kaduna State (Study School Nos: K7, K32, K33 and K39). Table 2-2-7 shows the calculation results of the number of required new classrooms and the number of required headmaster’s units for the Project schools.

Table 2-2-7 Number of Required New Classrooms and Headmaster’s Units

State	Niger	Plateau	Kaduna	Total
Number of Project schools	12	26	32	70
Number of required new classrooms	78	147	265	490
Number of required headmaster’s units	5	3	3	13

(3) Calculation of Required Toilet Facilities

According to the Nigerian standards for primary school facilities, one or two toilet booth(s) should be provided for each class of 40 pupils. However, the reality falls very short of this requirement and most of the schools visited for the Study have no toilet facilities at all. In the case of the 70 Project schools, only three schools in Niger State, one school in Plateau State and 15 schools in Kaduna State, totalling 19 schools, have

usable toilet facilities and planned toilet facilities. The remaining 51 schools have no toilet facilities or have facilities which are so damaged that they cannot be used by the pupils. Under these circumstances, pupils have no alternative but to use the bushes around the schools, making the construction of toilet facilities an urgent task. The lack of toilet facilities is said to be one major factor for the decline of the enrolment rate of female pupils in higher grades. At interviews with other aid organizations, such as the UNICEF and the World Bank, it is suggested that toilet and water facilities are primary issues for primary school improvement projects in Nigeria.

In view of such urgency, the number of toilet booths to be constructed under the Project is based on the standard number of one booth per two classes (90 pupils). The number of existing usable booths is subtracted from the required number of booths at each school to establish the number of new booths to be constructed. The same number of booths is planned for boys and girls, taking gender into consideration.

The formula to calculate the required number of toilet booths is given below. Table 2-2-8 shows the number of new toilet booths to be constructed under the Project.

$$\begin{aligned} \text{Total number of required booths (X)} &= \text{Round (G/90)} \\ \text{Number of booths to be constructed (V)} &= X - Y \\ \text{Number of booths to be constructed for female pupils (XF)} &= \text{Round (V/2)} \\ \text{Number of booths to be constructed for male pupils (XM)} &= \text{Round (V/2)} \\ \text{Number of booths to be actually constructed TM} &= XF + XM \end{aligned}$$

Where,

- Y : number of existing usable booths
- G : current number of pupils

Table 2-2-8 Number of Toilet Booths to be Constructed

State	Number of New Booths for Male Pupils	Number of New Booths for Female Pupils	Total Number of New Booths
Niger	34	34	68
Plateau	72	72	144
Kaduna	85	85	170
Total	191	191	382

(4) Selection of Schools Requiring Water Supply Facilities

The necessity for new water supply facilities at each Project school site is evaluated using the criteria shown in Table 2-2-9.

Table 2-2-9 Evaluation Criteria for Necessity for New Water Supply Facilities at Project School Sites

Category	Degree of Necessity	Situation/Conditions
A	Very High	The school currently has no water supply facilities and the local community uses a river as the water supply source; or Most local water supply facilities dry up during the dry season, making the use of river water or water from distant water supply facilities necessary.
B	High	The school currently has no water supply facilities and more than half of the shallow wells providing the local community with water dry up during the dry season; or Although the existing water supply facilities seldom dry up, the water quality is poor.
C	Low	The school currently has such water supply facilities as a shallow well which does not dry up during the dry season; or The water supply facilities of the local community do not dry up during the dry season. Even if shallow wells do dry up, water supply is secured from a deep well which is communally used.
D	Unnecessary	The school currently has a water supply system from outside; or A water supply system is available nearby and its extension to the school is possible.
E	High but Drilling of Deep Well is Difficult	Reliance on a deep well appears to be difficult because of the poor water quality of the existing deep wells or inhibiting geological conditions; or The poor water quality means that water supply from a deep well to be newly constructed will not improve the existing water supply.

The evaluation results are shown in Appendix 9 – Water Supply Conditions in the Study Area. A deep well equipped with a hand pump will be constructed at those schools in either Category A or B in Table 2-2-9. The number of such schools by state is four in Niger State, 10 in Plateau State and five in Kaduna State, totalling 19 schools.

2.2.2.3 Planning of Classroom Buildings

(1) Planning of Layout

As the Project intends the construction of additional classrooms at existing schools, there is, in principle, an existing building at each site. At those sites with no existing classroom building, there is the site of former classroom buildings. The ground is generally firm and flat and most sites although some sites are sloping.

The layout of the new facilities is planned in a rational manner, taking the following points and the opinions of the people concerned which were expressed during the site survey into consideration.

- Special attention is paid to the access, school yard and path of flow to and from the existing classrooms so that the layout ensures the convenient use of the new facilities and does not leave any wasted space.
- A reasonable distance between neighbouring buildings is planned.
- In view of possible sand storms and strong wind, the shorter side of the building with no opening will face the likely wind direction where possible so that the side corridor does not face the direction from which a strong wind blows.
- Adverse impacts of the setting sun will be avoided.
- Existing trees and bedrock will be avoided and the layout will incorporate the existing trees (for shading and wind break purposes).
- While the land preparation work will be conducted by the Nigerian side, the location of the new classroom building will be determined so as to make the foundation height as low as possible and to prevent soil erosion.
- There will be an adequate distance between the toilet building and the classroom building.
- At the time of OJT, guidance will be provided for people concerned on the necessity and importance of tree planting for wind break, shading and landscaping purposes.

(2) Planning of Building Construction

1) Basic Principles

- While the UBE guidelines and standard design will be used as the basis, improvements will be made under the Project to propose a new model(s).
- While paying attention to easy maintenance and durability, conscious efforts will be made to reduce the construction cost.
- The design will be compatible with local materials, construction methods and technologies.
- Careful consideration will be given to the heat insulation performance of the roof and walls and also to the ventilation of the classrooms.
- While considering the use of natural lighting, measures to block out strong solar radiation will be employed.

- A standardised as well as moduled design will be attempted to shorten the construction period and to reduce the construction cost.

In addition, the following points are also taken into consideration.

- Ground conditions: The ground is generally good. Ordinary continuous foundations will be laid while securing earth cover of not less than 30 cm without soil erosion.
- Wind: Careful attention will be paid to the roof structure and structural joints in view of strong wind.
- Earthquakes: No significant earthquake has been recorded in Nigeria, presumably because of widely spread solid rock mass of the Precambrian era. Accordingly, an aseismic design is unnecessary.

2) Calculation of Required Facility Size

① Classrooms

The classroom size is 56 m² (8 m x 7 m) in accordance with the UBE standard. The density is 1.24 m²/pupil with 45 pupils/classroom. Many of the existing classrooms are smaller than this. The planned floor area is large enough to locate 23 sets of two seater desks and benches to accommodate 45 - 46 pupils.

② Headmaster's Rooms

At most of the existing schools, a headmaster's office and store room of 7 – 12 m² each are located side by side. A floor area of 14 m² (4 m x 3.5 m) is planned for each of the headmaster's office and store room with consideration of the priority of constructing classrooms and the small quantity of current office furniture and teaching aids.

③ Width of Side Corridor

As the corridor will be used for not only movement between classrooms, etc. but also for various activities by pupils, the width planned is a generous 2.0 m.

3) Basic Modules

The required number of new classrooms varies from one target school to another. For the purpose of standardisation, several basic modules are set up for the type of building containing only classrooms and also for the type of building containing

classrooms as well as a headmaster's office and store room. These modules shown in Fig. 2-2-2 are based on the required number of new classrooms and the actual new building is made up of a combination of these modules if necessary. In every module, the headmaster's office and store room are located together at one end of the building.

4) Outline of Classroom Building Plan

The following improvement measures are added to the basic specifications under the UBE Plan to prepare the classroom building construction plan.

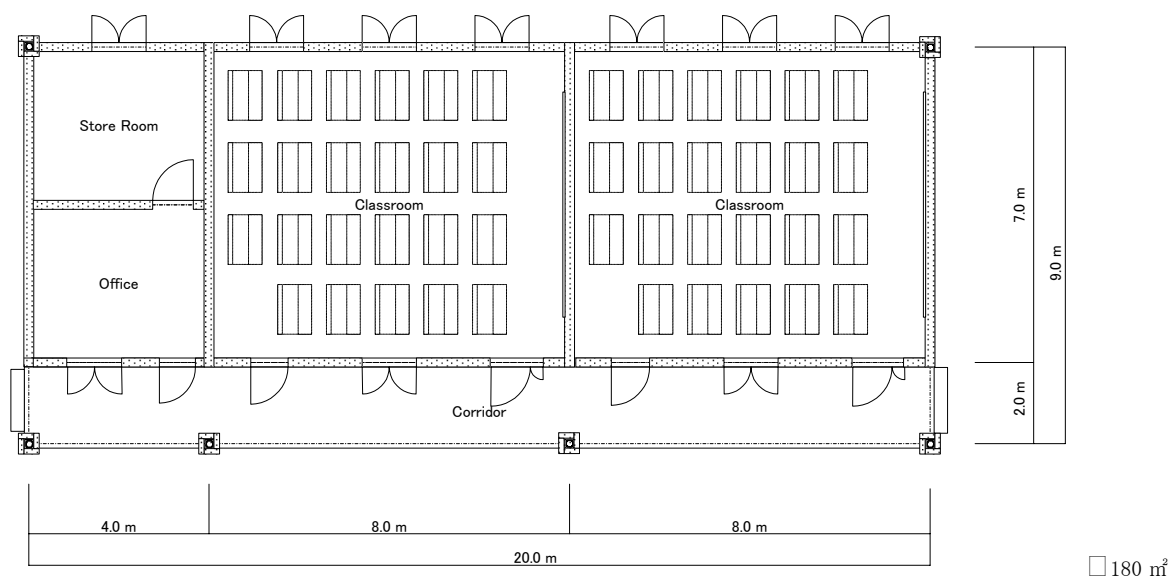
- Roof : Long aluminium roofing sheets with wood roof board and waterproof sheet to improve roof performance for strength, waterproofing and heat insulation
- Ceiling : The roof frame and roof boards will be coated with an insect repellent to avoid termite damage. (The roof board will play a role for ceiling.)
- Walls : Bricks walls which do not require finishing work and which are easy to maintain with decent appearance.
- Windows and doors : Steel window and door frames which can be opened to 180° to avoid interference due to the movement of pupils, etc. as they are often kept open during school hours; the door width of 1.2 m will make it easy to move in the two seater desks and benches and will also allow pupils to pass each other when fully opened.
High side glass windows on the corridor side will be provided to light the classrooms even closing all the doors and windows.
- Floor : Durable reinforced concrete floor with trowel finish with joints

The drawings for a standard two classroom building with a headmaster's office and store room are given in Fig. 2-2-3.

Type	No. of Class-rooms	Basic Module	
Classrooms Only	A3	3	<p>216 m²</p>
	A4	4	<p>288 m²</p>
	A5	5	<p>360 m²</p>
	A6	6	<p>432 m²</p>
Classrooms, Headmaster's Room and Store Room	B3	3	<p>252 m²</p>
	B4	4	<p>324 m²</p>
	B5	5	<p>396 m²</p>
	B6	6	<p>468 m²</p>

Fig. 2-2-2 Basic Modules for Classroom Buildings

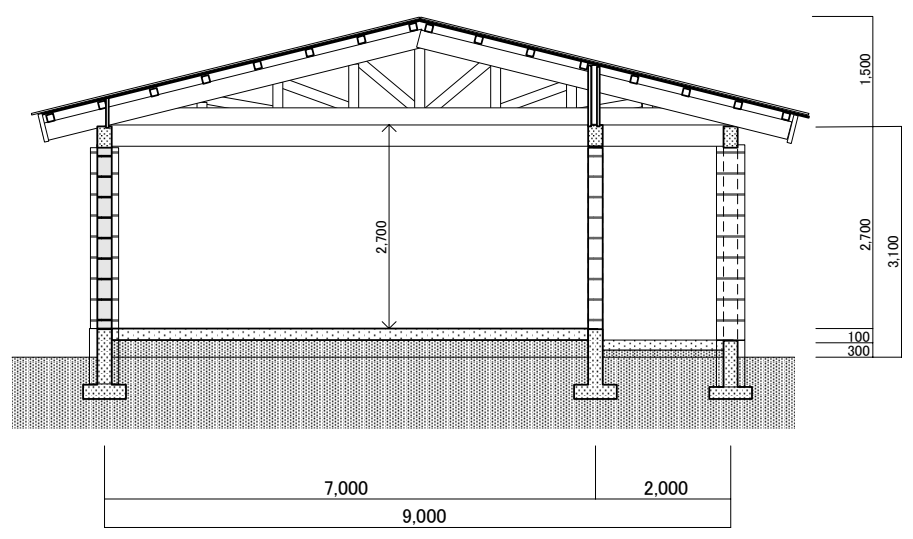
Plan



Elevation: Side Corridor Side



Cross-Section



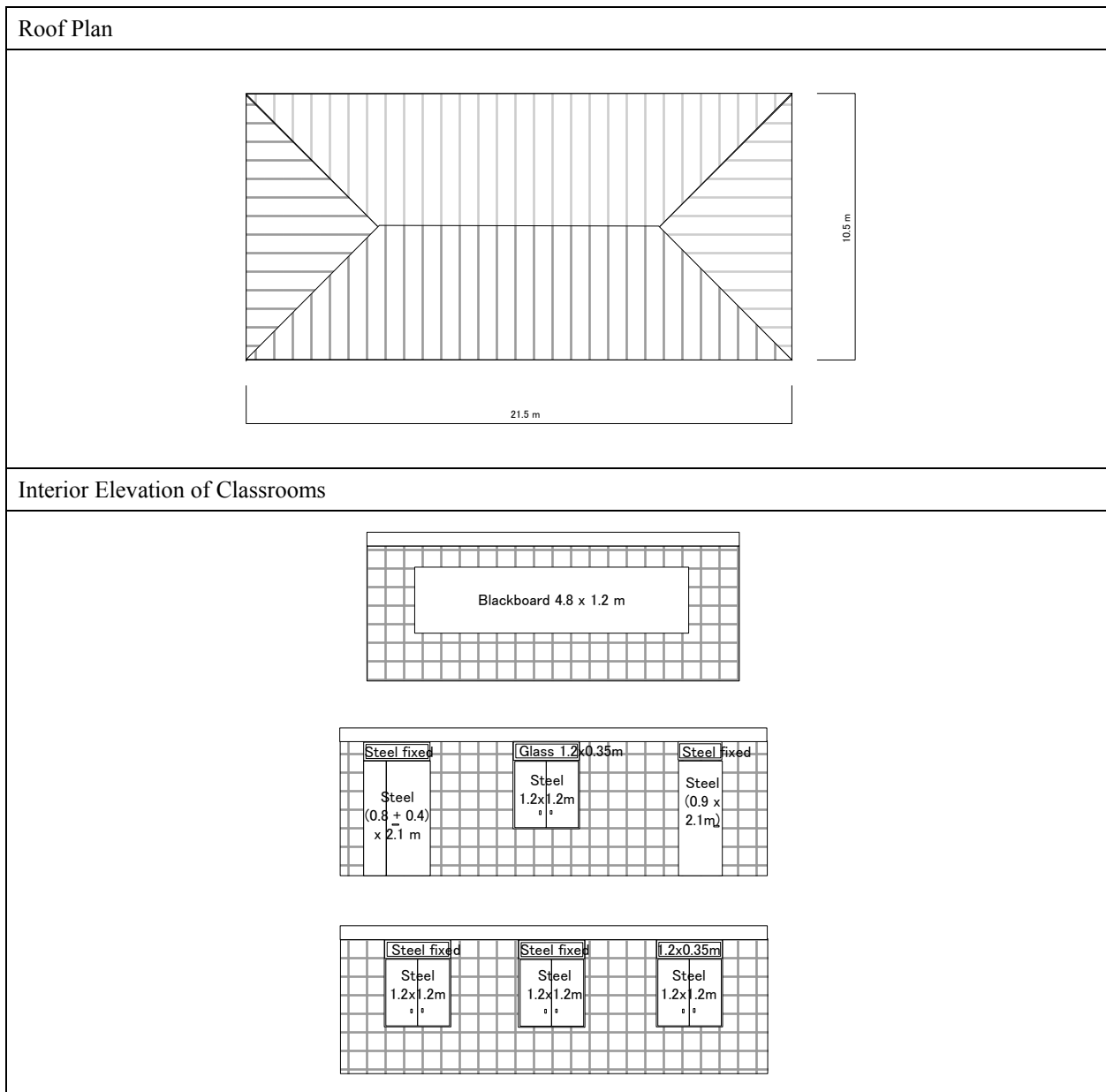


Fig. 2-2-3 Drawings for Standard Classroom Building
(Two Classrooms With Headmaster's Office and Store Room)

Table 2-2-10 UBE Specifications and Project Specifications for Classroom Buildings

Section/Item		UBE Specifications	Project Specifications	
Structure	Foundations	RC continuous foundations (d ≥ 1m)	RC footings conforms to the bearing strength	
	Floor	RC (t = 150mm) or concrete only	RC (t = 150mm)	
	Walls	Concrete blocks (t = 225mm)	Burnt bricks (t = 225mm)	
	Beams (Upper Wall)	RC (225mm x 225mm)	RC	
	Side Corridor Pillars	RC (225mm x 225mm)	RC with burnt brick enclosure	
	Roof Frame	Wooden frame @ 1,800mm	Wooden truss @ 4m	
Finishing	Exterior	Corridor Floor	Mortar with trowel finish (t = 25mm)	Reinforced concrete with trowel finish
		Walls	Mortar (t = 12mm) + EP	Burnt bricks exposed
		Roof	Long aluminium sheets (t = 0.55 mm)	Long aluminium sheets on waterproof sheet and wooden board
	Interior	Floor	Mortar with trowel finish (t = 18mm)	Reinforced concrete with trowel finish
		Walls	Mortar (t = 12mm) + EP	Burnt Bricks exposed
		Ceiling	Hardboard (t = 6mm) + EP	Roof board applied with insect repellent
Windows and Doors	Doors	Classroom	Steel (1.2m x 2.1m uneven double swing doors) x 2	Steel (1.2m x 2.1 m uneven double swing doors and 0.9m x 2.1m single swinging doors)
		Headmaster's Office	Steel (0.9m x 2.1m single swing door)	Steel (0.9m x 2.1m single swing door)
		Storage Room	Steel (0.9m x 2.1m single swing door)	Steel (0.9m x 2.1m single swing door)
	Windows	Classroom	Steel frame (1.2m x 1.2m, outswinging casement windows)	Steel frame (1.2m x 1.2m, outswinging casement windows) with small fixed window (1.2m x 0.35m) above [corridor side: glass; outside: steel plate]
		Headmaster's Office	Steel frame (1.8m x 1.2m, outswinging casement windows)	As above with steel fixed to high window
		Store Room	Steel (1.8m x 0.6m, outswinging casement windows)	As above with steel fixed to high window
Building Services	Electricity	None	None	
	Water Supply	None	Separate burnt brick toilets of pit type; deep well at the relevant schools	

① Cross-Sectional Plan

In view of the fairly high rainfall during the rainy season, the floor height for the side corridor and classrooms is set at GL +300 mm and GL +400 mm respectively (GL here means the highest point for the ground to contact the building). While the UBE specifications set a ceiling height of 2,700 mm, the height of the upper surface of the beams from the classroom floor is set at 2,700 mm (GL +3,100 mm) because of the absence of a ceiling (false ceiling) in the planned classroom building.

② Building Services Plan

Water supply system : See the water supply facility plan (2.2.2.4)

Storm water drainage : Side ditches will be used to guide storm water if necessary to lowland or a stream for natural drainage so that standing water on the premises or soil erosion does not occur.

Electrical installations : No electrical installations are planned for the Project schools as electricity supply is only available in parts of urban areas and only special model schools are provided with electrical installations.

Sanitation system : See 5) – Outline of Toilet Facility Plan

Ventilation system : Wide doorways and windows will be introduced on both sides of the classrooms to facilitate natural ventilation. It will be possible to tightly close the doors and windows to block out strong wind. Small slits will be mounted to the window sheets for minimum ventilation.

Lighting system : Natural lighting through the doorways and windows will be employed. Fixed glass windows on the corridor side will be placed above the windows. (Even though glass windows are hardly seen at the existing schools, their height of FL +2,100 mm or higher makes it unlikely that they will be damaged while the corridor will protect the glass windows.)

③ Structural Plan

The building structure will be a type which offers economic and durability. All materials will be those which can be locally procured. The construction method is selected to match the capability of local subcontractors and to ensure easy maintenance. The main structure will be a reinforced brick structure with reinforced concrete beams at the top. The roof structure will be a wooden truss structure. As all of the new classroom buildings to be constructed under the Project are planned to be single story buildings, continuous foundations placed directly on the ground should be sufficient. A bearing strength of 5.0 tons/m² or higher will be adopted. The floors will be concrete slab-on-earth with wire mesh.

< Structural Materials >

Reinforcing Bars	Local material conforming to BS4449 $f_y = 410 \text{ N/mm}^2$
Concrete	Ordinary concrete $F_c = 21 \text{ N/mm}^2$ (4 week strength)

< Design Load >

Dead Load	Actual weight of the structural members and finishing materials
Live Load	Roof = 100 kg/m ²
Wind Load	Neither the wind load nor the seismic load is considered in view of the brick masonry single story building and absence of earthquakes in the past.
Seismic Load	

5) Outline of Toilet Facility Plan

The type of the toilets is ventilated improved pit (VIP) latrines which are adopted as the standard toilet type by the UBE Plan and the UNICEF. According to the standard specifications, the number of pits is one more than the number of booths. To start with, alternative pits will be used. When these pits are full, the other pits will start to be used. While the second group of pits is in use, water in the first group naturally infiltrates with the solids having been decomposed by bacteria for removal. A sufficient distance must be maintained from any nearby well to prevent the contamination of groundwater. A ventilation pipe will be attached to each pit. The planned pits cover the entire depth of the booths above them with the introduction of a sloping bottom. The pit depth is set at approximately 1.2 – 1.5 m while the overall capacity is maintained by enlarging the area. A large external opening for the removal of solids is made for easy maintenance. The size of the booth of 1.3 m x 1.3 m (wall center to center) are adopted for the Project in view of the presence of two