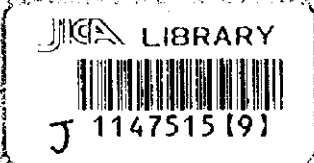


No. 1

DEPARTMENT OF EDUCATION  
THE PROVINCE OF THE EASTERN CAPE

**BASIC DESIGN STUDY REPORT  
ON  
THE PROJECT FOR THE CONSTRUCTION  
OF  
PRIMARY AND JUNIOR SECONDARY SCHOOLS  
IN  
EASTERN CAPE PROVINCE  
IN  
THE REPUBLIC OF SOUTH AFRICA**

BASIC DESIGN STUDY REPORT ON THE PROJECT FOR THE CONSTRUCTION OF PRIMARY AND JUNIOR SECONDARY SCHOOLS IN EASTERN CAPE PROVINCE IN THE REPUBLIC OF SOUTH AFRICA



October 1998

**JAPAN INTERNATIONAL COOPERATION AGENCY  
FUKUNAGA ARCHITECTS-ENGINEERS  
&  
RAYMOND ARCHITECTURAL DESIGN OFFICE INC.**

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## PREFACE

In response to a request from the Government of the Republic of South Africa to the Government of Japan decided to conduct a basic design study on the Project for the Construction of Primary and Secondary Schools in the Eastern Cape Province in the Republic of South Africa and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to South Africa a study team from April 16, 1998 to May 19, 1998.

The team held discussions with the officials concerned of the Government of South Africa 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 South Africa 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 Republic of South Africa for their close cooperation extended to the teams.

October 1998



Kimio Fujita  
President

Japan International Cooperation Agency





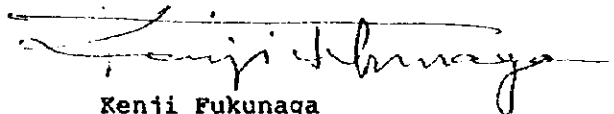
LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for the Construction of Primary and Secondary Schools in Eastern Cape Province in the Republic of South Africa.

This study was conducted by Fukunaga Architects-Engineers and Raymond Architectural Design Office Inc., under a contract to JICA, during the period from March 30, 1998 to October 30, 1998. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of South Africa 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.

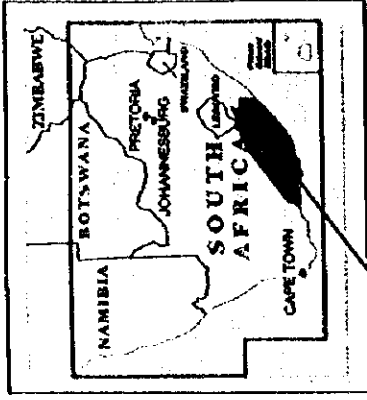
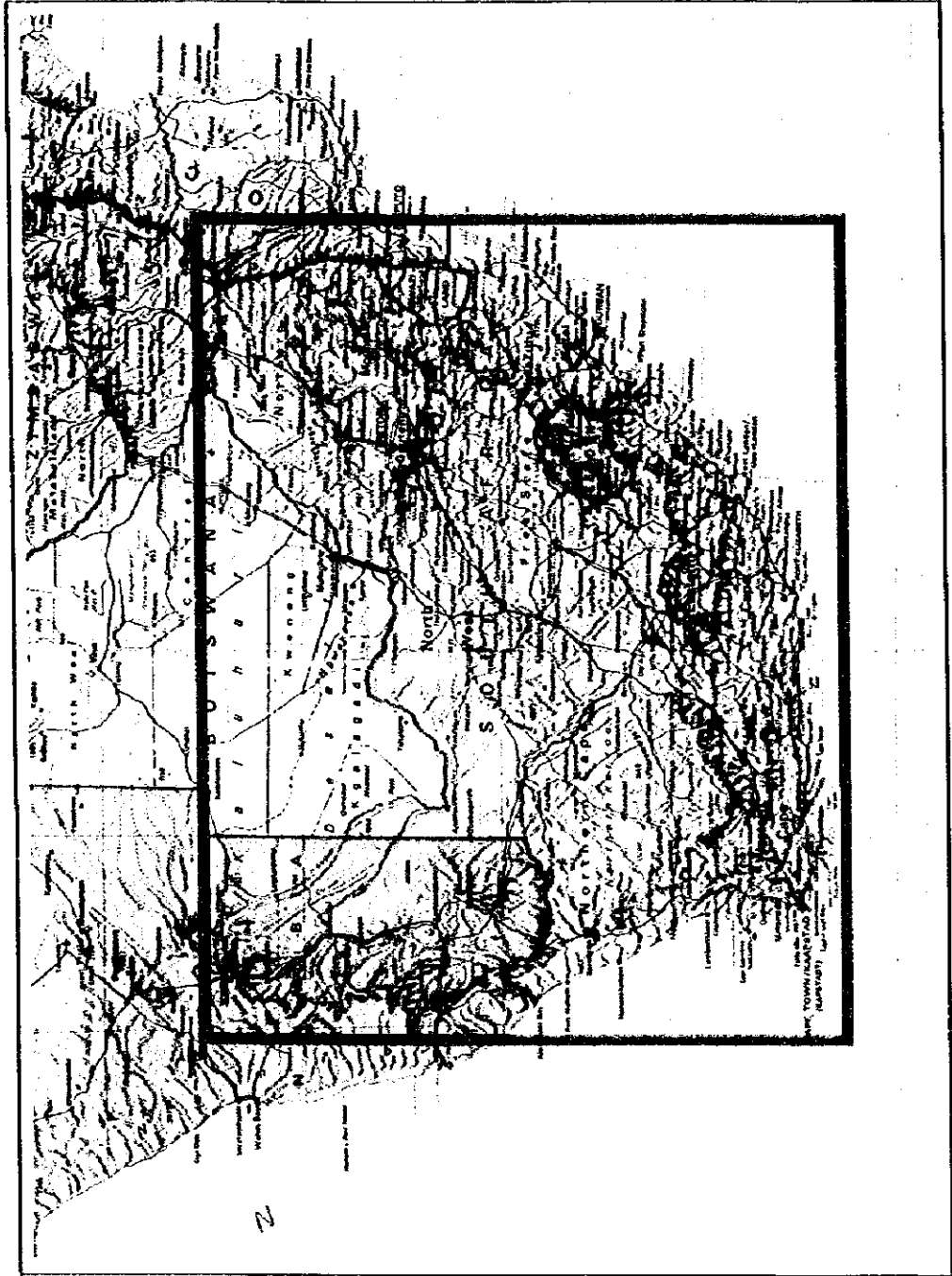
Very truly yours,



Kenji Fukunaga  
Project manager,  
Basic design study team on the Construction  
of Primary and Secondary Schools in  
Eastern Cape Province in the  
Republic of South Africa.

Fukunaga Architects-Engineers &  
Raymond Architectural Design Office Inc.

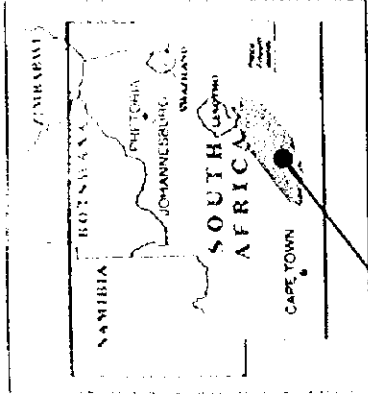
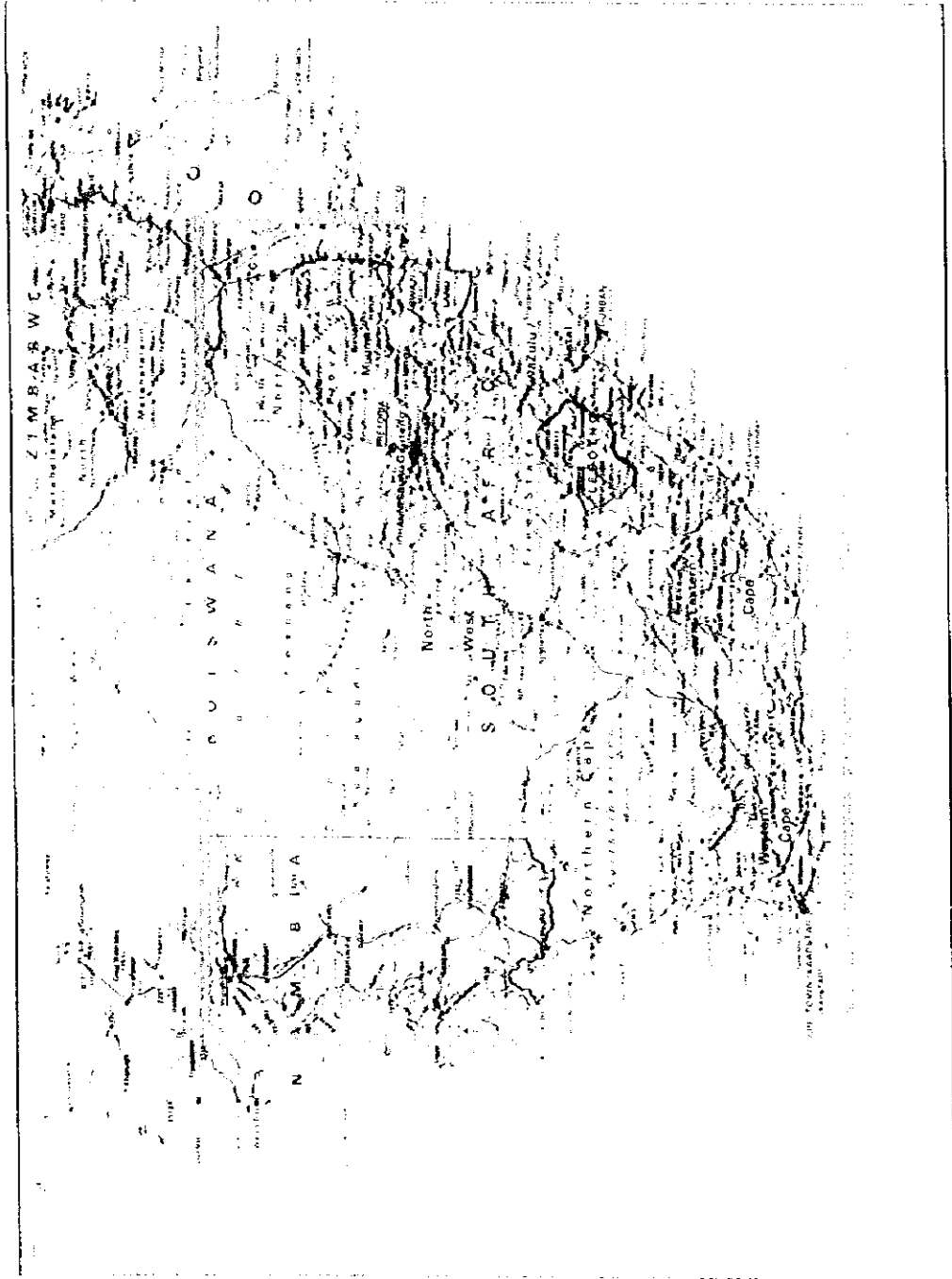
# The Republic of South Africa



Project Site:  
Eastern Cape Province



# The Republic of South Africa

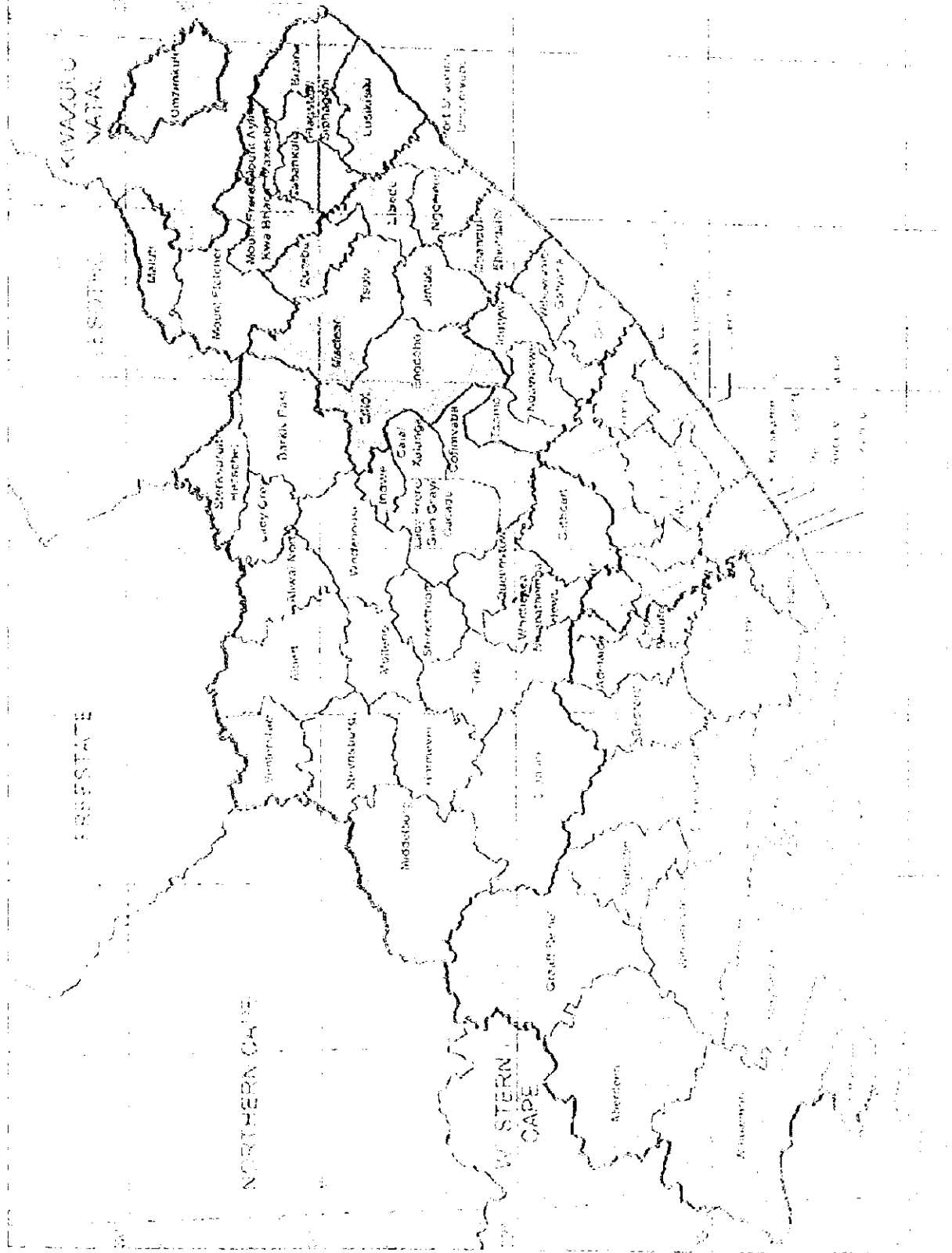


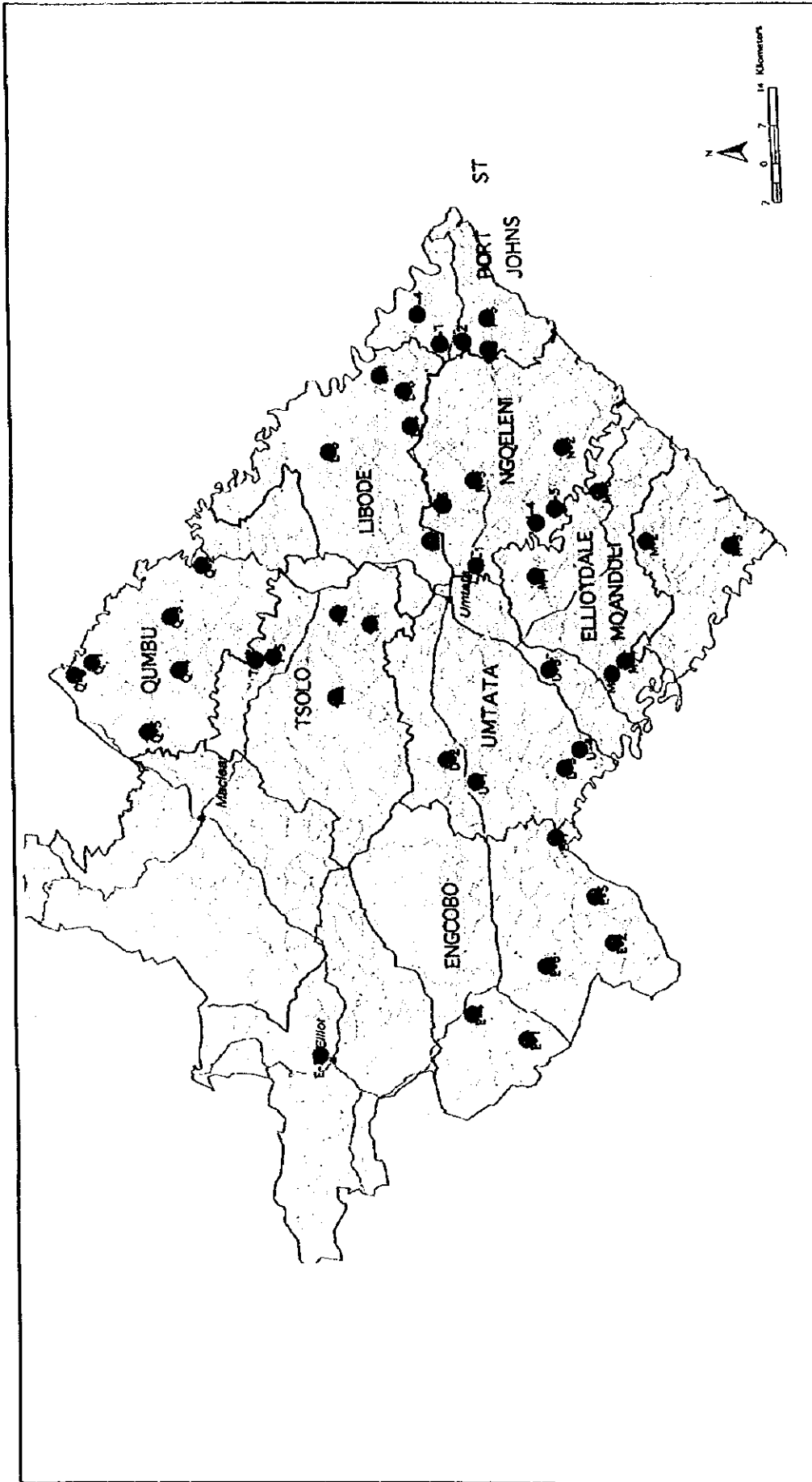
Project Site:  
Eastern Cape Province

# Eastern Cape Province

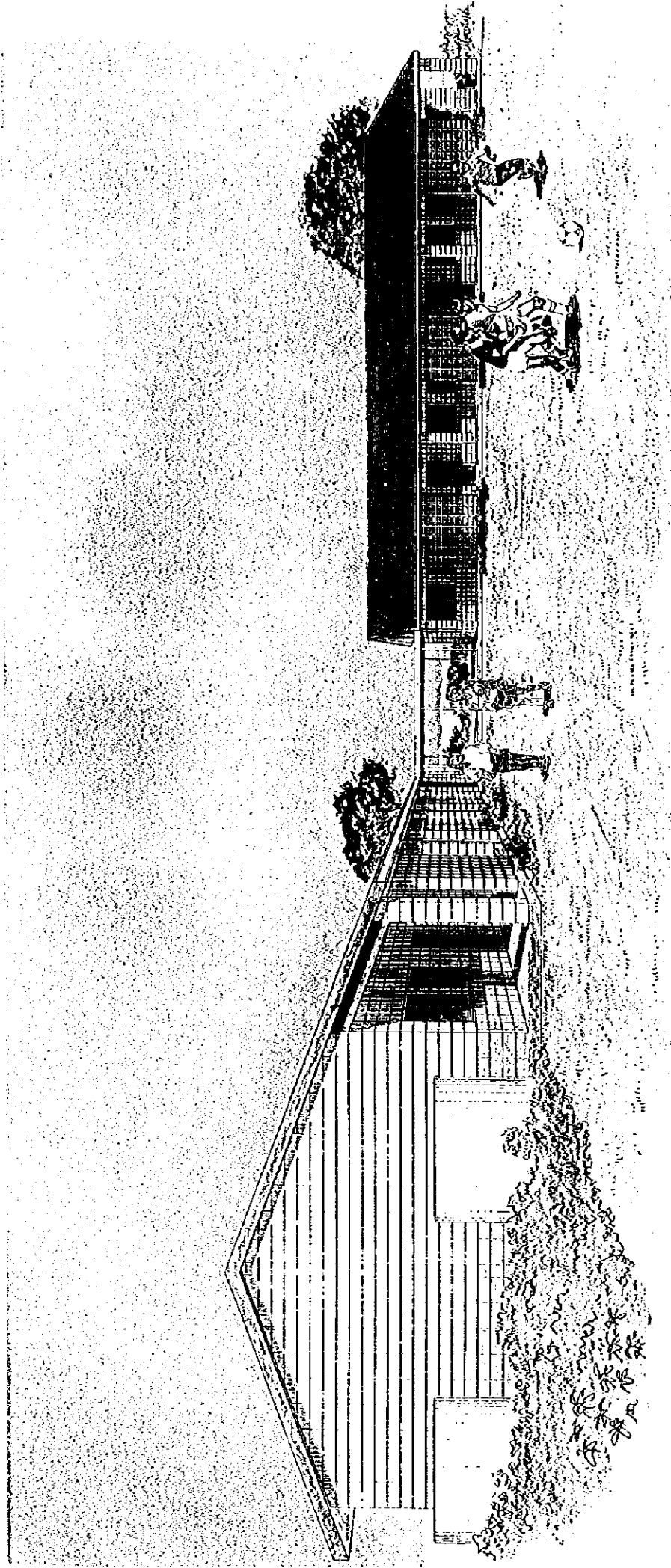
## Regions:

- South Eastern
- Central
- North Eastern
- Northern
- Eastern (The Project Site)
- Western





Site Location Map :



Perspective View of Typical School

## ABBREVIATIONS

A/P	:	Authorization to Pay
B/A	:	Banking Arrangement
DoE	:	Department of Education
DPW	:	Department of Public Works
E/N	:	Exchange of Notes
RDP	:	Reconstruction and Development Programme
R	:	Rand
S.A.	:	South Africa
SBP	:	School Building Programme
US\$	:	U.S. Dollar



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## **CHAPTER 1**

# **BACKGROUND OF THE REQUEST**

## Chapter 1 Background of the Project

The new Government of National Unity, born as the result of the general election held in April of 1994, participated in with all the races constituting the South African Society, advocating the importance of national unity and harmony between the people, formulated the Reconstruction and Development Programme ( RDP ). RDP has hence become the major policy instrument of the new government for eradicating the legacy of apartheid, building a unified democratic nation free of racial inequalities, and revitalizing the economy suffered from the international economic sanction in the previous Apartheid years. In the light of the policy framework of the RDP, the new government focuses its programmes and projects on key issues and areas, i.e. upgrading of infrastructures, improvement of health care (primary health care ), development of education, reallocation of farm land, promotion of housings, etc.

In the education sphere, the previous education systems prevailed during the Apartheid era were abolished by the provisional Constitution in 1994, and 10 years' free education system - one year of preprimary and 9 years of primary and secondary - was established in 1995. In the same year a White Paper on the education and training was drafted based on the rationale of RDP. And on the basis of the White Papers ( inclusive of White Paper 2 published in 1996 ), various educational development plans are currently being implemented.

However, in the areas of the previous homelands where the African natives live not much improvement has occurred in the educational environment; thus, leaving the geographical and racial disparities still unsolved.

Particularly there is a notable delay in the development of school infrastructure; according to the government data, the shortage of classrooms in the country counts approximately 57,000 classrooms, creating a pressing problems that need to be solved urgently. Of the 9 provinces in South Africa, Eastern Cape province in which Transkei District, the largest of the previous homelands, is situated is one of the most underdeveloped of the educational infrastructure. The shortage of classrooms counts some 15,500, the largest number of those of 9 provinces, which equals to 27% of the total in South Africa.

There are still disparities that exist among the regions within the Eastern Cape. In Northeastern, Eastern and Southeastern regions, the shortage of classrooms are especially high, compared with other regions. The provincial Department of Education is currently implementing School Building Programme ( SBP ) in which 4,500 classrooms are to be built in 3 years period starting from 1995. However, given the scarcity of financial resources, it appears to be extremely difficult to accomplish.

Of the three regions, the Northeastern region is the priority area for SBP and the Southeastern region having a plan for building about 400 classrooms with EU fund, no definite school building plan exists in Eastern Region.

With the background described above, the government of the Eastern Cape requested, in line with SBP, to the government of Japan a grant aid cooperation for building classroom facilities ( comprising building, re-building and extension of the schools in such methods as realizing low cost and shortening of work period) and provision of school furniture in Eastern Region.

- (1) The contents of the request confirmed through the discussion with DoE during the basic design study and explanation of the draft report are as follows.

Project Schools: 45 Primary and Junior secondary schools in the 8 districts in Eastern Region.

Eliotdale/Mqanduli District	6 Primary schools
Umtata District	5 Primary
Libode District	5 Primary
Engcobo District	7 Primary
Ngqelini District	6 Primary
Tsolo District	5 Primary
Qumbu District	6 Primary
Port St, Johns District	5 Primary

- (2) Contents of facilities: classrooms, office & stores, toilets, water tanks, fence (provision of materials only)
- (3) Furniture: Pupil's desk & chairs, Teachers' desk & chairs, display boards, cabinets.

Procurement of materials for school buildings, originally included in the Request had been withdrawn due to the lack of fund on the South African side, identified at the discussion between the provincial Department of Education and the Basic

**Design team. Based on the result of survey and confirmation with regards to the executing abilities of local contractors who are undertaking similar projects being implemented by DoE with its budget, the Japan side decided to implement the project, inclusive of construction, at all of the sites selected thereafter.**

## **CHAPTER 2**

### **CONTENTS OF THE PROJECT**

## CHAPTER 2 CONTENTS OF PROJECT

### 2-1 Objectives of the Project

The project aims at upgrading educational environment by providing basic infrastructure at Junior primary ( grade 1~3 ), senior primary ( grade 1~6 ) and junior secondary ( grade 1~9 ) schools in the Eastern Region, the Eastern Cape of South Africa where this is lacking due to insufficient classroom accommodation in the existing school buildings. It is, therefore, expected that by implementing the project, the severe shortage of classrooms in the Region be relieved to a great extent and in consequence the poor educational environment be upgraded extensively.

### 2-2 Basic Concept of the Project

#### 2-2-1 Study on the content of the Request

##### (1) The Project Requested Area

The Eastern Cape Province consists of 6 regions: Central, Eastern, North eastern, South eastern, Northern and Western regions.

Among these 6 regions, needs for school facilities are especially high in North eastern, Eastern and South eastern regions.

It is said in this connection that the lack of classrooms in the North eastern region is 6670, in the Eastern region 4426 and in the South eastern region 2500 and the pupil / classroom ratios of the three regions are 80/1, 73/1 and 66/1 respectively, exceeding drastically the highest of 44/1 in the other 3 regions. From these data it is obvious that the shortages of classrooms in these three regions are very serious. Among these three regions, in the North eastern region the provincial Department of Education is implementing "School Building Program" on priority basis and in the South eastern region a school building project - constructing about 384 classrooms - is scheduled to be implemented by EU in 1998. However, contrary to these two regions, no definite school building project exists in the Eastern region - except for some 50 small scale school projects presently under construction - and because of a lack of fund, continual implementation of school project in this region seems extremely difficult at least for the next three years. In consideration of the above facts the provision of Japanese grant aid cooperation to the Eastern region, therefore, is judged reasonable.

## **(2) Requested Schools**

The requested project had been originally categorized in two types: construction of school buildings by Japanese contractor, and provision of construction materials by Japanese side and construction by South African side. However, the second category had been canceled due to the lack of fund on South Africa side and the first category targeting the construction of 45 priority schools has been agreed upon between the two countries to be the final content of the Request.

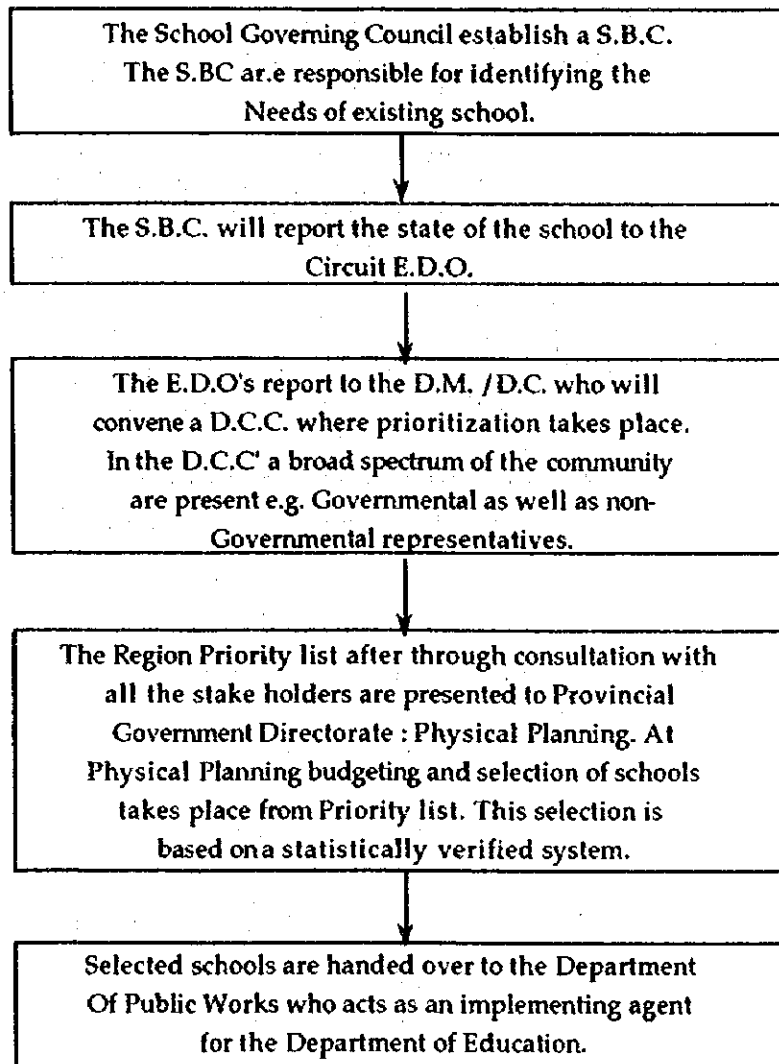
The project sites had been selected, respecting the regional priority list which was authorized by the all districts within the Eastern region, and consulted with all the stake holders; the procedure for selection is shown in the following flow chart.

Criteria for site selection by the South Africa side are as follows.

- Schools extremely lack classrooms.
- Schools destroyed by natural disaster.
- Schools with passable access roads.



SELECTION OF SCHOOLS ONTO SCHOOL BUILDING PROGRAM



**KEY**

S.B.C. School Building Committee	D.C.C. District Co-ordinating Committee
E.D.O. Education Development Officer	R.C.C. Regional Co-ordinating Committee
D.M. District Manager	D.P.W. Department of Public Works
D.C. District Co-ordinator	

Criteria for the site selection agreed upon by both parties are as follows.

- 1) Give priority to the existing schools which are dangerous to continue to use because of physical damages by over aging or had been destroyed by natural disasters, and do not satisfy the basic functions of a primary or junior secondary school.
- 2) Give priority to the sites which will relieve the shortage of classrooms.
- 3) Give priority to the sites which will relieve a long distance journey to attend school and secure the equal access both for boys and girls.

- 4) Give priority to existing schools which are motivated to develop school management and teaching techniques.
- 5) The legal rights for using a project site must be secured by the commencement of the construction work.
- 6) There must exist a minimum required pupil enrollment in the existing school and its school district.
- 7) Any plan for school construction or other projects, by either the DoE/DPW or international / bilateral donors, NGOs should not exist on the same project sites.
- 8) Proper access road must exist in order to carry construction materials and equipment into each project site.
- 9) A project site where the topography is inappropriate for construction (e.g. steep land, swamp, etc.) shall be eliminated.
- 10) On each project site, there shall be no foreseen natural and environmental or social hazards which endangers the workers safety during the construction.

**(3) Requested component**

The components of the project agreed upon are as follows.

**1) Components**

**School buildings**

Classrooms	(50 sq · m / classroom)
1 office with store	(37 sq · m)
Toilets	(pit latrines, 1.5 ~ 2.0pit / classroom)
Rainwater tanks	(2 x 4,500 liters / 3 classrooms)
Water supply facilities	(within the site)
Electric facilities	(within the site)
Drainage facilities	(within the site)
Material for fencing	

## Furniture

Desks

Chairs

Cabinets

The materials for fencing would be provided only when the installation work by the communities be guaranteed within the time frame of the entire project period.

## 2) Requested schools

Below is shown the list of the requested schools finally agreed upon by the two countries.

Table 2-1: List of Requested Schools

1st Phase				2nd Phase			
Marks	District	School name	Grade	Marks	District	School name	Grade
U-1	UMTATA	NTILINI	1-9	M-1	ELLIOTDALE MQANDULI	MTONJENI	1-9
U-2		MEJI	1-7	M-2		ZANGQOLWANE	1-9
U-3		MQENCU	1-9	M-3		DYABHA	1-9
U-4		DALIBANGO	1-6	M-4		LIWALAPHAKADE	1-7
U-5		LOWERMATEKO	1-9	M-5		ZILINYAMA	1-3
E-1	ENGCOBO	QOBA	1-9	M-6	LIBODE	GONYA	1-9
E-2		DABULINGWE	1-7	L-1		GORHA	1-3
E-3		SIYAHLANGULA	1-3	L-2		MZIMKHULU	1-4
E-4		CEFANE HOKE	1-9	L-3		MLAMLI	1-9
E-5		NTSIMBA	1-9	L-4		MSINTSINI	1-9
E-6		JONGIZULU	1-9	L-5		JONGISIZWE	1-9
E-7		GONGQOZAYO	1-9	N-1		NGQELENI	ZOYISILE
T-1	TSOLO	MADWALENI	1-9	N-2	MALIZOLE		1-9
T-2		NDZEBE	1-9	N-3	MANZINI		1-9
T-3		LABRY	1-6	N-4	MLATHA		1-6
T-4		ZIBUNGU	1-9	N-5	LUVELA		1-6
T-5		ZWELAKHE	1-6	N-6	NGONYAMA	1-9	
Q-1	QUMBU	MILANE	1-9	P-1	PORT ST JOHNS	XEZI	1-6
Q-2		MZUZANTO	1-7	P-2		BUTULO	1-8
Q-3		NCOTI	1-8	P-3		MAPIKI	1-8
Q-4		CEKWAYO	1-7	P-4		NDABANKULU	1-7
Q-5		NGQAYI	1-9	P-5		QAMBA	1-6
Q-6		NTIBANE	1-9				

## 2-2-2 Basic Concept of the Project

### (1) Evaluation of Project Sites

#### 1) General Condition of the Sites.

- Condition of the existing Schools.

The actual grade formation of the existing Schools are inconsistent with the 3-6-9 year grade system standards. The number of pupils in each grade is variable with more pupils in the lower grades than in the upper grades. 40% of classroom buildings are private houses or churches borrowed from the communities. Most of the existing school buildings are built of mud with variable sizes (except 2 classrooms at NTILINE School, Umtata, and 5 classrooms at NQEN CU School, Umtata, 5 classrooms at GONGQOZAYO School, Engcobo) and are not suitable for continuous use.

Most of the schools do not have properly built toilets. (about a half of the schools have temporally built toilets with one or two pits and without any sanitary equipment).

- Land for School Sites

Certificates of reservation for the school sites have been acquired so far for 41 sites and certificates for the remaining 4 sites shall be obtained prior to the commencement of construction. Application for demarcation and land survey shall be made subsequent to acquiring of the certificates .

- Access roads

Most of the access roads are not paved and are in poor condition. Especially in hilly areas, the roads become very narrow, steep and some times cross streams, making transportation extremely difficult.

Approximately 1/3 of the access roads are difficult for large trucks to enter and 1/3 can not be used after heavy rainfall, requiring double handling of materials, unloading from a large truck and loading to small trucks or 4wd pick-ups.

- Topography of Construction sites

Most of the school sites are provided with 2 hectares of land per school and have an adequate space for plotting new classrooms. Nine out of the 45 schools are provided with new school sites.

The school sites are mostly located on near the top or at the breast of gently - sloping hilly plains with very few trees. The earth is formed generally of soft and hard rock covered with 10 ~ 30 cm thick of soil. The bearing strength

of the earth is sufficient for supporting one storey classroom building.

• **Infrastructure**

None of the schools ( there are some with solar power supply system, but not in operation ) are provided either electricity or city water. Water is generally being supplied from water sources such as streams near-by the sites (some of the water sources are more than 1km apart from the sites) or from rain water tanks to which rain water is collected from the roofs. Toilets are pit type toilets and have no sewage drain system.

2) **Evaluation of each site in respect of the above stated site condition.**

Evaluation has been made by judging whether the sites comply with the selection criteria described in the preceding clauses ( 2- (2) ) by using priority order marks as follows.

① **Emergency degree for reconstruction**

Most of the existing school buildings are built of mud with thatched roof, old and decrepit, some of them half destructed by natural disaster.

- Buildings partially without wall or roof ..... A
- Temporary buildings built of mud ..... B
- Permanent (good quality) buildings ..... C

② **Shortage of Classrooms**

In order to relieve the shortage of classrooms at many schools, private houses or churches are being used. There are total of 33 combined classes and some open air exterior classes.

- Rented houses, or no. of classes / no. of classrooms  
ratio  $\geq 2$  ..... A
- No. of classes / no. of classrooms  
ratio exceed 1.5 but below 2 ..... B
- No. of classes / no. of classrooms ratio  $\leq 1.5$  ..... C

③ **Site Condition**

- No problem in size, shape and topography ..... A
- Sites with 4~7% slopes ..... B
- Not suitable as school sites ..... X

④ **Access Condition**

- No problem in transporting construction material ..... A
- Difficult in transportation during rainy season,  
and or double handling is required due to steep slopes ..... B
- Passing of construction vehicles impossible ..... X

As evaluated in the table 2-2, all of the 45 sites, although some difficulties exist, meet the criteria for site selection and are judged appropriate for the project sites.

Table 2-2: Site Evaluation table.

NO.	Mark	School Name	Emergency	Shortage of Classroom	Condition for Works	
					Site	Access
1	M-1	MTONJENI	A	A	A	A
2	M-2	ZANGQOLWANE	A	A	A	B
3	M-3	DYABRA	A	A	B	B
4	M-4	LIWALAPAKADE	A	A	A	B
5	M-5	ZILINYAMA	B	A	A	A
6	M-6	GONYA	A	A	A	A
7	U-1	NTILINI	C	A	A	A
8	U-2	MEJI	A	A	B	B
9	U-3	NGENCU	C	C	B	A
10	U-4	DALIBANGO	A	B	B	B
11	U-5	LOWER MATEKO	A	A	B	B
12	L-1	GORHA	A	A	A	B
13	L-2	MZMKH'LU	B	A	A	A
14	L-3	MLAMLI	A	A	A	B
15	L-4	MSINTSINI	A	A	B	B
16	L-5	JONGISIZWE	B	B	A	B
17	E-1	QOBA	B	C	A	A
18	E-2	DABULINGWE	B	A	A	B
19	E-3	SIYARLANGULA	A	A	B	A
20	E-4	CEFANE HOEK	B	C	A	B
21	E-5	NTSIMBA	A	C	A	B
22	E-6	JONGIZULU	A	A	A	B
23	E-7	OONGQOZAYO	B	B	A	A
24	N-1	ZOYISILE	A	A	B	A
25	N-2	MALIZOLE	A	A	A	B
26	N-3	MANZINI	A	A	B	A
27	N-4	MLATHA	A	A	A	B
28	N-5	LUVELA	A	A	A	B
29	N-6	NGONYAMA	A	A	A	B
30	T-1	MADWALENI	A	A	A	B
31	T-2	NDZEBE	A	A	B	B
32	T-3	LABRY	B	A	B	B
33	T-4	ZIBUNGU	A	A	A	B
34	T-5	ZWELAKHE	A	C	B	A
35	Q-1	MILANE	A	C	A	B
36	Q-2	MZUZANTO	B	A	A	A
37	Q-3	NOONTI	B	A	A	B
38	Q-4	CEKWAYA	A	B	A	A
39	Q-5	NGQAYI	A	A	B	A
40	Q-6	NTIBANE	B	A	A	B
41	P-1	KEZI	A	A	A	A
42	P-2	BUTULO	A	A	A	B
43	P-3	MAPIXI	A	A	A	B
44	P-4	NDABANKULU	A	A	A	B
45	P-5	QAMBA	A	A	A	B

## **(2) Scale Composition**

### **1) Projection of Number of Classrooms**

The total number of pupils at the 45 schools is 14,097 as of May, 1998 and each school is composed of the grades ranging between 1-9th. The number of pupils per grade varies from 7 to 177. (Refer to Table 2-3)

While 2/3 of the total classes have less than 40 pupils, most of the schools have more than 50 pupils in grade 1 class except in 7 schools, showing that there are in general more pupils in the lower grades than in the upper grades.

In projecting the number of classrooms to be provided in this project, as the number of pupils & grades in each school vary widely from one another, it is considered at this time rather practical to base our calculation on the number of the existing pupils and the number at the time of completion of the project, assumed by the average enrollment rate of 97.8% and population growth rate of 2.2%. The number of pupils at the time of the completion calculated accordingly is 15,372. and if 40 pupils / classroom ratio is used, the required number of classrooms then will be 384.

In reality because the number of pupils per school and per grade vary in a great range, the number of classrooms required, therefore, when calculated with respect to each grade, increases by 20%. However, assuming that the number of pupils per grade be equalized in the future, this number can be used as a yardstick for determining the required number of classrooms in the project. From these premises described above, the numbers of classrooms required are calculated as follows.

#### **① Basic Criteria**

- The grades existing at each school shall be used as the basis for calculation. However, those schools only with grade 1&2 will be provided with 3 classrooms, thus the minimum classrooms per school being 3.
- The maximum number of pupils per classroom to be 50.



② Calculation of the Minimum number of Required Classrooms

The min. required classrooms per each school will be calculated on the basis of the existing pupils' number.

Then the total min. required classrooms for the project will be calculated summing up the min. required classrooms of each school.

$$\text{Min. required classrooms} = \frac{\text{Total No. of pupils/school}}{40} \div 40 \text{ (pupils/classroom)}$$

The sum of min. required classrooms for 45 schools is 352

③ Calculation of the Maximum number of Required Classrooms

Calculation is made on the basis of the assumed pupils number at the time of the project completion.

$$\text{Max. required classrooms} = \frac{\text{Total No. of pupils}}{40} \div 40$$

The max. required classrooms for 45 schools are 385

④ The number of Planned Classes

(Allowable maximum number of pupils per classroom is set at 50)

$$\text{Planned classes} = \frac{\text{No. of pupils per grade at each school}}{50} \div 50$$

The number of planned classrooms for 45 schools are 429

In order to attain an appropriate number of classrooms for each school, the number of classes calculated in the case of Planned Classes shall be reduced by combining those classes having extremely small numbers of pupils in the range of the minimum and maximum required classroom numbers.

For instance in the case that the planned class number exceeds the max. number of required classrooms, the max. number is used, and if it comes below the min., the min. number is to be adopted.

As a result of the above calculation the number of planned classrooms becomes 382 and, therefore, subtracting those 12 existing classrooms that can be utilized continually, 370 new classrooms are required to be constructed.

Table 2-3 : Calculation for required classrooms

No.	Mark	No. of Pupils at each Grades (Downside : CRs)									Total		School Pupils/40		Calculate	Usable	CRs to be	
		G1	G2	G3	G4	G5	G6	G7	G8	G9	Pupils	CRs	1998	2001	CRs	Ex. CRs	construct ed	
1	M-1	91	36	36	40	35	37	30	28	31	364		9	9.9				
		2	1	1	1	1	1	1	1	1		10		10	10	0	10	
2	M-2	130	40	36	42	40	45	32	29	30	424		11	11.6				
		3	1	1	1	1	1	1	1	1		11		12	11	0	11	
3	M-3	122	63	46	50	45	43	41	46	28	484		12	13.2				
		3	2	1	1	1	1	1	1	1		12		13	12	0	12	
4	M-4	71	71	18	20	10	10	10			210		5	5.7				
		2	2	1	1	1	1	1				9		6	6	0	6	
5	M-5	178	46								224		6	6.1				
		4	1									5		6	6	0	6	
6	M-6	145	60	87	49	45	41	34	24	16	501		13	13.7				
		3	2	2	1	1	1	1	1	1		13		14	13	0	13	
7	U-1	100	85	92	65	59	45	51	44	24	559		14	15.3				
		2	2	2	2	2	1	2	1	1		15		15	15	2	13	
8	U-2	60	27	39	36	41	37	31			271		7	7.4				
		2	1	1	1	1	1	1				8		7	7	0	7	
9	U-3	67	58	46	42	44	41	34	40	30	402		10	11.0				
		2	2	1	1	1	1	1	1	1		11		11	11	5	6	
10	U-4	93	43	48	57	48	26				315		8	8.6				
		2	1	1	2	1	1					8		9	8	0	8	
11	U-5	85	47	69	35	33	24	23	22	27	365		9	10.0				
		2	1	2	1	1	1	1	1	1		11		10	10	0	10	
12	L-1	41	11	14							66		2	1.8				
		1	1	1								3		2	3	0	3	
13	L-2	100	92	80	65						337		8	9.2				
		2	2	2	2							8		9	8	0	8	
14	L-3	55	36	36	45	47	33	23	23	23	321		8	8.8				
		2	1	1	1	1	1	1	1	1		10		9	9	0	9	
15	L-4	85	32	20	21	28	23	15	8	8	240		6	6.6				
		2	1	1	1	1	1	1	1	1		10		7	7	0	7	
16	L-5	85	47	51	59	49	33	57	41	43	465		12	12.7				
		2	1	2	2	1	1	2	1	1		13		13	13	0	13	
17	E-1	141	64	39	42	64	33	34	36	34	497		12	13.3				
		3	2	1	1	2	1	1	1	1		13		13	13	0	13	
18	E-2	85	58	55	34	30	45	30			337		8	9.2				
		2	2	2	1	1	1	1				10		9	9	0	9	
19	E-3	55	29								84		2	2.3				
		2	1									3		2	3	0	3	
20	E-4	62	24	16	27	30	15	14	9	13	210		5	5.7				
		2	1	1	1	1	1	1	1	1		10		6	6	0	6	
21	E-5	108	48	59	39	36	27	23	19	17	376		9	10.3				
		3	1	2	1	1	1	1	1	1		12		10	10	0	10	
22	E-6	49	21	17	36	28	26				177		4	4.8				
		1	1	1	1	1	1					6		5	5	0	5	
23	E-7	68	40	36	47	19	27	20	29	16	392		8	8.3				
		2	1	1	1	1	1	1	1	1		10		8	8	5	3	

Table 2-4 : Calculation for required classrooms

No.	Mark	No. of Pupils at each Grades (Downside : CRs)									Total		School Pupils/40		Calculate Usable		CRs to be constructed
		G1	G2	G3	G4	G5	G6	G7	G8	G9	Pupils	CRs	1998	2001	CRs	Ex. CRs	
23	N-1	29	26	20	22	14	7	11	15	10	154		4	4.2			
		1	1	1	1	1	1	1	1	1		9	4	4	5	0	5
24	N-2	177	124	70	56	36	41	38	29	22	596		15	16.3			
		4	3	2	2	1	1	1	1	1		16	16	16	16	0	16
25	N-3	79	32	30	26	35	32	27	23	27	311		8	8.5			
		2	1	1	1	1	1	1	1	1		10	8	8	8	0	8
26	N-4	65	36	21	16	22	19				179		4	4.9			
		2	1	1	1	1	1					7	5	5	5	0	5
27	N-5	35	32	26	19	25	21				158		4	4.3			
		1	1	1	1	1	1					6	4	4	4	0	4
28	N-6	162	67	52	48	25	22	24	24	21	445		11	12.2			
		4	2	2	1	1	1	1	1	1		14	12	12	12	0	12
29	T-1	108	38	42	46	34	32	23	36	46	405		10	11.1			
		3	1	1	1	1	1	1	1	1		11	11	11	11	0	11
30	T-2	135	42	30	33	36	33	30	35	31	405		10	11.1			
		3	1	1	1	1	1	1	1	1		11	11	11	11	0	11
31	T-3	57	45	37	22	20	24				205		5	5.6			
		2	1	1	1	1	1					7	6	6	6	0	6
32	T-4	41	26	33	36	23	25	28	31	21	267		7	7.3			
		1	1	1	1	1	1	1	1	1		9	7	7	7	0	7
33	T-5	80	36	33	21	20	20				210		5	5.7			
		2	1	1	1	1	1					7	6	6	6	0	6
34	Q-1	65	33	30	36	30	27	29	29	27	306		8	8.4			
		2	1	1	1	1	1	1	1	1		10	8	8	8	0	8
35	Q-2	52	34	31	25	20	35	21			218		5	6.0			
		2	1	1	1	1	1	1				8	6	6	6	0	6
36	Q-3	45	45	23	35	22	18	25	16		229		6	6.3			
		1	1	1	1	1	1	1	1			8	6	6	6	0	6
37	Q-4	117	81	75	45	30	36	26			413		10	11.3			
		3	2	2	1	1	1	1				11	11	11	11	0	11
38	Q-5	28	24	22	15	23	18	19	16	13	178		4	4.9			
		1	1	1	1	1	1	1	1	1		9	5	5	5	0	5
39	Q-6	150	90	36	38	45	40	38	38	28	503		13	13.7			
		3	2	1	1	1	1	1	1	1		12	14	13	13	0	13
40	P-1	80	30	35	30	32	20				227		6	6.2			
		2	1	1	1	1	1					7	6	6	6	0	6
41	P-2	60	50	37	53	35	38	30	20		323		8	8.8			
		2	1	1	2	1	1	1	1			10	9	9	9	0	9
42	P-3	95	50	30	25	28	21	15	15		279		7	7.6			
		2	1	1	1	1	1	1	1			9	8	8	8	0	8
43	P-4	105	71	45	40	44	12	8			325		8	8.9			
		3	2	1	1	1	1	1				10	9	9	9	0	9
44	P-5	86	40	31	24	29	30				240		6	6.6			
		2	1	1	1	1	1					7	7	7	7	0	7
		3930	2133	1729	1552	1353	1185	894	725	586	14097	429	172	377	382	12	370

## 2) Offices · Store

As for the use of office, maintenance of educational materials, preparation of documents, and other administrative works are the main part of the works undertaken. In addition it substitutes staff room where teachers communicate between each other besides doing their routine works. Considering that the small scale schools with 2~3 classrooms are currently not being provided with office · stores; in this project, office · store is to be provided only to those schools with more than 5 classrooms. And also to enable efficient planning and execution of the work, the office · stores are planned in two sizes: 34.6m<sup>3</sup> for 5~9 classroom schools, 43.2m<sup>3</sup> for 10 or more classroom schools.

## 3) Toilet

About a half of the 45 schools have toilets, but very poor in quality and very few in number. In this project the standard numbers of toilets provided per classroom shall be 1.5~2. with male/female ratio of 2 : 5 with urinals provided for males. For teachers two toilets per school, one for male and one for female to be provided.

## 4) Rain Water Tanks

Two numbers of rainwater tanks each with a capacity of 4,500 ℓ are to be installed per 3 class room unit.

Calculation for required water and reservable rain water are as follows.

### Required water

The number of pupils per 3 class rooms (120~144)+ 3 teachers = 147

Monthly consumption is assumed:

$$147 \times 1.5 \ell \times 20 \text{ day} = 4,410 \ell \text{ (4.41m}^3\text{)}$$

### Reservable Water

Roof area of 3 classrooms is 220m<sup>2</sup>, and the average rain fall/year is 650mm. Then, reservable rain water per year is 143m<sup>3</sup> in average and when calculated separately for rainy season and dry season, monthly rainfall and reservable rain water for each season are assumed as follows.

- Rainy season

$$82.5 \text{ mm (monthly rainfall)} \times 220 \text{ m}^2 \times 80\% = 14.5 \text{ m}^3 / \text{mm}$$

- Dry season

$$25.8 \text{ mm (monthly rainfall)} \times 220 \text{ m}^2 \times 50\% = 2.8 \text{ m}^3 / \text{mm}$$

For required water per month is 4.4 m<sup>3</sup>, in rainy season there is more than enough water; therefore, it is has been examined whether the rainfall during the dry season together with the water reserved during the raining season is adequate for the consumption during the dry season.

**Supply**

$$2.8\text{m}^3 \text{ (monthly rainfall)} \times 6\text{months} = 16.8\text{m}^3$$

$$\text{Water reserved in the tanks} = 9.0\text{m}^3$$


---


$$25.8\text{m}^3$$

**Consumption**

$$4.4\text{m}^3 \times 5\text{months (exclude holiday)} = 22\text{m}^3$$

From the above study, 2 numbers of 4.5 m<sup>3</sup> tanks are sufficient for 3 classrooms.

5) Educational Furnitures

The items of the furnitures are as listed below. The desks and chairs for pupils shall be of two different sizes: large size for the pupils of grade 7~9 and small size for 1~6 grades.

Table 2-5:

Classroom	Office
Desk for teacher	Office desk
Chair for teacher	Chair
Desk for pupil	Table
Chair for pupil	Chairs for Table
Display board	Cabinet

6) Fence

As to the construction of stock fence, the materials shall be procured by Japan side, and installation be carried out by South Africa side.

The length of fence per each site will be approximately 600m. The required labor per site is estimated 120 man/day (4 persons as one team install 20m/day, ) The work shall be arranged in consultation with the School Building Council and executed by utilizing the labor force within the community. Of the 45 schools, three schools, U-1, U-3 and Q-6, already have complete fences; M-1, E-5 and Q-1 about 1/2, and N-5, P-1 and T-5 have about 1/4 of the required length. However, the existing fences other than those at U-1, U-3 and Q-6 are not properly built and need to be re-installed. The total length of fences to be installed, thus, will be 600m × 42 = 25,200 m

### **( 3 ) Result of Study**

As a result of the studies on the content of the request, the necessity, emergent need and appropriateness of grant aid cooperation for this project has been confirmed. The scale and content of the project at each school site are as follows.

#### **1) Content of project**

- **Facilities:** Construction of classrooms, office stores, and toilets.  
Installation of rainwater tanks.
- **Furnitures:** Procurement of furnitures for classrooms and offices.
- **Fence:** Procurement of materials only.

## 2) Type of Facilities & Floor Area

Table: 2-6

Phase	Mark	School Name	Combination of Types	No of CRs	Area of CRs	Toilet Type	Area Toilet	Rain Water Tank	Area Office Storage	Area Exterior Corridor	Area(mf)	
1	U-1	NTLUN	Type-3 +Type-4AL +Type-6	13	673.92	W-5	33	8	43.2	199.2	949.32	
	U-2	MEER	Type-3 +Type-4A	7	362.88	W-3	24	4	34.56	110.4	531.84	
	U-3	NGENJU	Type-6A	6	311.04		0	4	34.56	96.0	441.60	
	U-4	DALBANGO	Type-4 +Type-4A	8	414.72	W-4	30	4	34.56	124.8	604.08	
	U-5	LOWERNATEKO	Type-4AL +Type-6	10	518.40	W-4	30	6	43.2	156.0	747.60	
	E-1	GOBA	Type-3 +Type-4AL +Type-6	13	673.92	W-5	33	8	43.2	199.2	949.32	
	E-2	DABULINGWE	Type-4A +Type-5	9	466.56	W-4	30	4	34.56	139.2	670.32	
	E-3	SIYHLANGULA	Type-3	3	155.52	W-2	15	2	0	43.2	213.72	
	E-4	CFANEHOKE	Type-6A	6	311.04	W-3	24	4	34.56	96.0	465.60	
	E-5	NTSIBA	Type-4AL +Type-6	10	518.40	W-4	30	6	43.2	156.0	747.60	
	E-6	JONGZULU	Type-5A	5	259.20	W-3	24	4	34.56	81.6	399.36	
	E-7	GONGQZAYO	Type-3	3	155.52	W-4	30	2	0	43.2	228.72	
	T-1	MADWALENI	Type-3 +Type-4AL +Type-4	11	570.24	W-5	33	6	43.2	170.4	816.84	
	T-2	NDZEBE	Type-3 +Type-4AL +Type-4	11	570.24	W-5	33	6	43.2	170.4	816.84	
	T-3	LABRY	Type-6A	6	311.04	W-3	24	4	34.56	96.0	465.60	
	T-4	ZBUNGU	Type-3 +Type-4A	7	362.88	W-3	24	4	34.56	110.4	531.84	
	T-5	ZWELAOE	Type-6A	6	311.04	W-3	24	4	34.56	96.0	465.60	
	Q-1	MILANE	Type-4 +Type-4A	8	414.72	W-4	30	4	34.56	124.8	604.08	
	Q-2	MUZANTO	Type-6A	6	311.04	W-3	24	4	34.56	96.0	465.60	
	Q-3	NOOTI	Type-6A	6	311.04	W-3	24	4	34.56	96.0	465.60	
	Q-4	CEKWAYO	Type-3 +Type-4AL +Type-4	11	570.24	W-5	33	6	43.2	170.4	816.84	
	Q-5	NGQATI	Type-5A	5	259.20	W-3	24	4	34.56	81.6	399.36	
	Q-6	NTBANE	Type-3 +Type-4AL +Type-6	13	673.92	W-5	33	8	43.2	199.2	949.32	
	Subtotal				183	9486.72		609	110	794.88	2856	13746.60
	2	M-1	NTONJENI	Type-4AL +Type-6	10	518.40	W-4	30	6	43.2	156.0	747.60
		M-2	ZANGQULWANE	Type-3 +Type-4AL +Type-4	11	570.24	W-5	33	6	43.2	170.4	816.84
		M-3	DYABHA	Type-4AL +Type-4 +Type-4	12	622.08	W-5	33	6	43.2	184.8	883.08
		M-4	LWALAPHAKADE	Type-6A	6	311.04	W-3	24	4	34.56	96.0	455.60
		M-5	ZUNYAHA	Type-5A	6	311.04	W-3	24	4	34.56	96.0	465.60
		M-6	GONYA	Type-3 +Type-4AL +Type-6	13	673.92	W-5	33	8	43.2	199.2	949.32
L-1		GORHA	Type-3	3	155.52	W-2	15	2	0	43.2	213.72	
L-2		MZIMKHULU	Type-4 +Type-4A	8	414.72	W-4	30	4	34.56	124.8	604.08	
L-3		MLAMLI	Type-4A +Type-5	9	466.56	W-4	30	4	34.56	139.2	670.32	
L-4		MSINTSINE	Type-3 +Type-4A	7	362.88	W-3	24	4	34.56	110.4	531.84	
L-5		JONGISIZWE	Type-3 +Type-4AL +Type-6	13	673.92	W-5	33	8	43.2	199.2	949.32	
N-1		ZOMSILE	Type-5A	5	259.20	W-3	24	4	34.56	81.6	399.36	
N-2		MALIZOLE	Type-4AL +Type-6 +Type-6	16	829.44	W-6	42	10	43.2	242.4	1157.04	
N-3		MANZINI	Type-4 +Type-4A	8	414.72	W-4	30	4	34.56	124.8	604.08	
N-4		MLATHA	Type-5A	5	259.20	W-3	24	4	34.56	81.6	399.36	
N-5		LLVELA	Type-4	4	207.36	W-2	15	2	0	57.6	279.96	
N-6		NOONYAMA	Type-4AL +Type-4 +Type-4	12	622.08	W-5	33	6	43.2	184.8	883.08	
P-1		XEZI	Type-6A	6	311.04	W-3	24	4	34.56	96.0	465.60	
P-2		BUTLUD	Type-4A +Type-5	9	466.56	W-4	30	4	34.56	139.2	670.32	
P-3		KAPKI	Type-4 +Type-4A	8	414.72	W-4	30	4	34.56	124.8	604.08	
P-4		NDABANGULU	Type-4A +Type-5	9	466.56	W-4	30	4	34.56	139.2	670.32	
P-5		QAMBA	Type-3 +Type-4A	7	362.88	W-3	24	4	34.56	110.4	531.84	
Subtotal				187	9694.0E		615	106	751.68	2801.6	13962.36	
Total				370	19180.7E		1224	216	1546.56	5757.6	27708.96	

## **2-3 Basic Design**

### **2-3-1 Design Concept**

#### **(1) Policies in respect of Natural Condition**

Natural condition that must be considered in the design of the project are topography, wind direction, and rainfall. No consideration for earthquake is necessary. The topography at most of the sites have slight sloping; therefore, the buildings should be plotted along the contour, leaving the natural features of the site ground remain as much as possible, so that enabling to reduce construction cost as a whole and at the same time minimizing the cost born by the South African side. And to cope with the rain water, washing away the earth around the buildings, concrete paved trenches shall be provided along the buildings. Winds usually prevail from North East to South West or opposite and especially strong during the rainy season. To protect the buildings from wind and rain, the projection of eaves shall have adequate depth ( especially at entrance side ) and windows shall not be unnecessarily large.

#### **(2) Policy in respect of Grade of the Facilities and Furnitures**

The grades of the facilities and furniture shall be in principle equal to the standard specification of the Eastern Cape Province and if necessary, improvements shall be made. The portion that need improvement are roofing material containing asbestos, and pit type toilets. In addition the local building situation, particularly situation for procurement of materials, shall be taken into consideration. In this project the maximum consideration is given to the reduction of construction cost and, therefore, concrete block type construction is employed instead of brick wall construction which is common in the area.

#### **(3) Policy for local contractors and use of local materials**

In principle all the construction materials shall be procured locally so that enabling local contractors participate in the work and creating job opportunities within the communities.

#### **(4) Policy in respect of Capacity of Implementing Organization**

Basically the facilities shall be designed free of maintenance to reduce the maintenance expenditure of the South African side. And upon selection of finishing materials, securing of durability at all portions and easy repair in case of damages shall be taken into consideration to enable easy and inexpensive maintenance and operation. Materials for windows and doors, ceilings and



floors which require repair or replacement in future shall be chosen from those complying with locally adopted standard specification. And at the delivery of the facilities the consultant shall prepare a manual explaining maintenance and operation method of the facilities, including maintenance method of septic tank.

**(5) Policy in respect of Work Period**

The work period shall be divided in two phases, requiring total of 19 months because of the following reasons.

- The procedures undertaken by the implementing organization may not be completed within the specified time period.
- The 45 sites are dispersed in a widely spread area with some sites very remote from the center. (Umtata)
- In the rainy season it is extremely difficult to transport construction materials to the sites and also difficult to continue the work at the time of rain when accompanied with strong winds.
- There is a difficulty in selecting quality sub contractors when the 45 schools are implemented at the same time and even more difficult when the EU project be implemented during the period.

Table 2-7: Division for Construction Phases

Phase	District	No. of Schools	No. of Classrooms	
Phase 1	UMTATA	5	44	183
	ENGCOBO/ELLIOT	7	49	
	TSOLO	5	41	
	QUMBU	6	49	
Phase 2	ELLIOTDALE/MQANDULI	6	58	187
	LIBODE	5	40	
	NGQELENI	6	50	
	PORT ST JOHNS	5	39	

## **2-3-2 Basic Design**

### **(1) Plot Plan**

Plotting of new classrooms will be planned in consideration of the following.

- 1) New classrooms to be plotted so as totally functioning with the existing facilities. And also consideration shall be given to activate educational, learning activities.
- 2) Consideration to be given to prevailing winds.
- 3) Orientation in relation to the sun shine to be considered.
- 4) Toilets to be located with an adequate distance from classrooms.
- 5) The foundation to be kept at a minimum height; care shall be taken for smooth rainwater drain so as not causing earth erosion.
- 6) Considering exterior activities, buildings to be plotted to create suitable areas for such activities as community meetings, pupils' exterior activities, etc.

### **(2) Architectural Plan**

#### **1) Basic Policies for Architectural Planning**

- plan a construction method that enables construction of various scales of school buildings executed within a limited work period.
- plan specification of buildings to conform with the local climatic condition and other natural features.
- The arrangement of classroom buildings shall be planned in consideration of wind direction so as to create suitable areas for exterior activities. ( out door lessons or meetings ) The structures shall be designed to withstand strong winds and roofing materials, suitable for resisting wind and rain, ( inclusive of materials for eaves ) shall be selected accordingly.

2) Scale composition of required facilities.

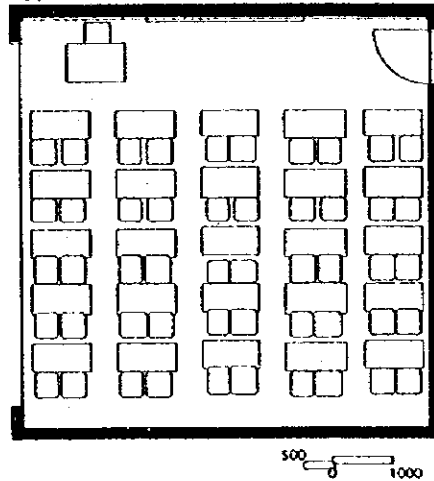
① Classrooms

- The standard number of pupils per classroom shall be set at 40 in this project, and the maximum number at 50 (Layout plan is shown in Drwg. 2-2)

- Size of class room

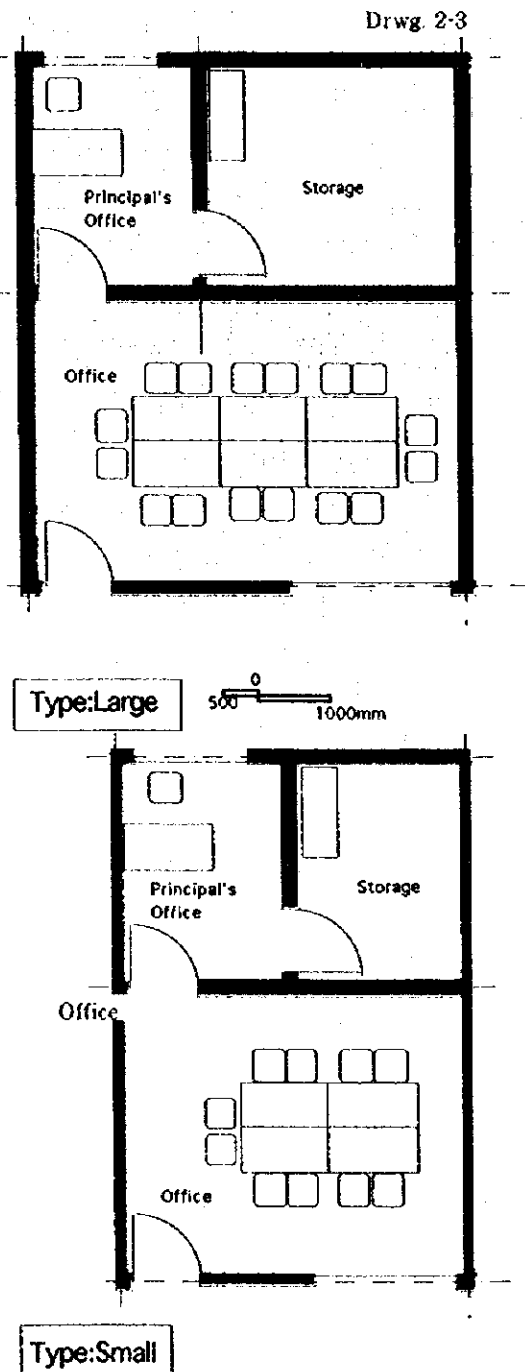
As shown on the Drawing 2-2, 7.2m × 7.2m dimension for a classroom shall be the standard size to accommodate the maximum number of 50 pupils, providing 1.036m<sup>2</sup> per pupil. (1.29m<sup>2</sup>/pupil for 40 pupils)

Drwg. 2-2



## ② Office · Store

In respect to various sizes of schools, two standardized office · store sizes are planned. The small type shall be provided to the schools with 5~9 classrooms and the large type to those with 10~16 classrooms. As shown on the Drawing 2-3 the small type has an floor area of 34.56 m<sup>2</sup> (23.04 m<sup>2</sup> for office 11.5 for store) providing an appropriate space for one principal (calculated on the base of 7 m<sup>2</sup> per principal) and 5~9 teachers. The large type is 43.2 m<sup>2</sup> in size (28.8 m<sup>2</sup> for office & 16.8 m<sup>2</sup> for store) to accommodate one principal and 10~16 teachers. The floor area per teacher (subtracting 7 m<sup>2</sup> from the total) varies from 1.67 m<sup>2</sup> to 3.2 m<sup>2</sup>.



### ③ Toilets

As shown in table 2-8, toilet unit types for pupils are standardized in 5 types and provided to conform with various sizes of schools. In addition one toilet for male and one for female teacher per each school to be incorporated in the toilet units.

Table 2-8: Toilet type

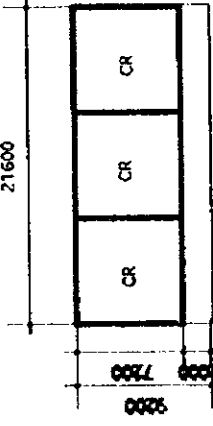
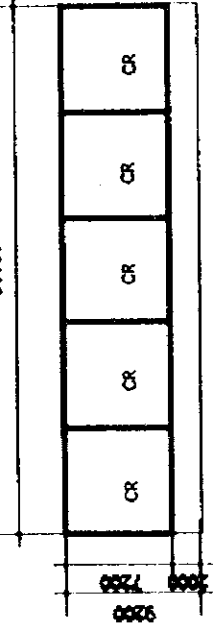
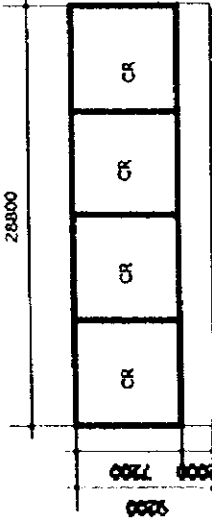
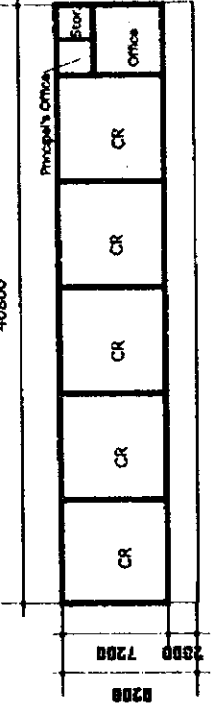
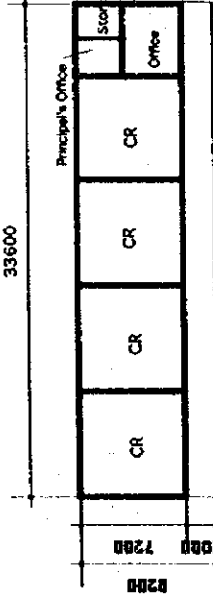
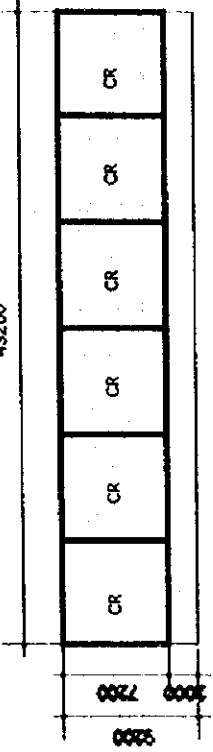
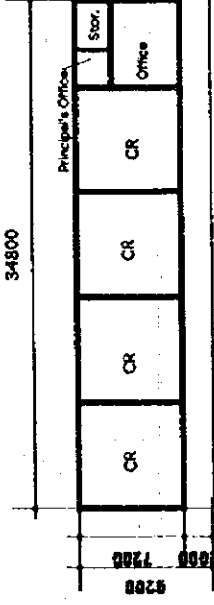
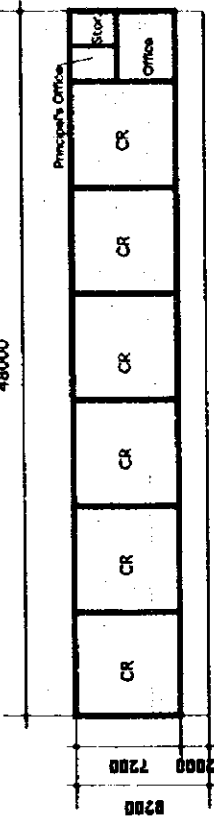
Type	No. of Classrooms	Contents			Area (m <sup>2</sup> )	No. of Schools
		Boy's booths	Urinal length(m)	Girl's booths		
W-2	3, 4 CRs	2	2.0	3	15	3
W-3	5 ~ 7 CRs	3	3.0	6	24	16
W-4	8 ~ 10 CRs	4	4.0	8	30	12
W-5	11 ~ 13 CRs	5	5.0	10	33	11
W-6	16 CRs	6	6.0	12	42	1

### 3) Standardization and Combination of Classroom Buildings

The 45 schools are grouped into 13 types in accordance with the number of classrooms, ranging from 3 to 16. In order to enable efficient implementation of construction and appropriate layout of the sites, classroom buildings are standardized so that the standard combination units can be applied to the 13 different types of school. (Refer to the table 2-8 & 2-9)

Table 2-9: Standard unit types of classroom buildings

Type	No. of Classrooms	Office · Storage	Rainwater tanks (4.5t)
Type-3	3 CRs	×	2
Type-4	4 CRs	×	2
Type-4A	4 CRs	○	2
Type-4AL	4 CRs	○ (For large type)	2
Type-5	5 CRs	×	4
Type-5A	5 CRs	○	4
Type-6	6 CRs	×	4
Type-6A	6 CRs	○	4

<p><b>TYPE-3</b></p> <p>TOTAL FLOOR AREA: 198.72m<sup>2</sup></p>		<p><b>TYPE-5</b></p> <p>TOTAL FLOOR AREA: 331.20m<sup>2</sup></p>	
<p><b>TYPE-4</b></p> <p>TOTAL FLOOR AREA: 264.96m<sup>2</sup></p>		<p><b>TYPE - 5A</b></p> <p>TOTAL FLOOR AREA: 375.36m<sup>2</sup></p>	
<p><b>TYPE - 4A</b></p> <p>TOTAL FLOOR AREA: 309.12m<sup>2</sup></p>		<p><b>TYPE-6</b></p> <p>TOTAL FLOOR AREA: 397.44m<sup>2</sup></p>	
<p><b>TYPE - 4AL</b></p> <p>TOTAL FLOOR AREA: 320.16m<sup>2</sup></p>		<p><b>TYPE - 6A</b></p> <p>TOTAL FLOOR AREA: 441.60m<sup>2</sup></p>	

Drwg. 2-5 Standard types of toilets

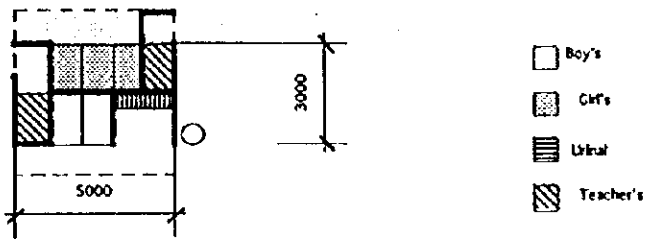
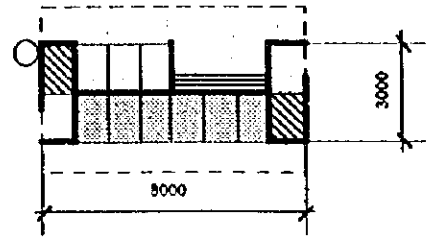
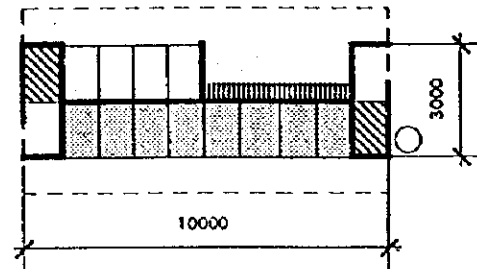
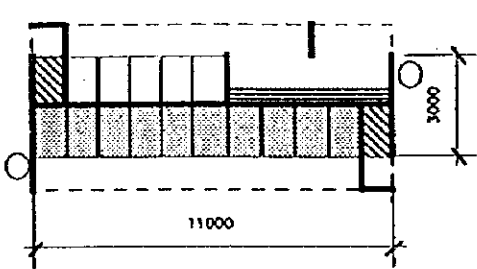
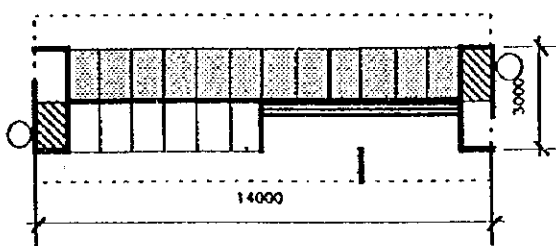
<p>W-2</p> <p>AREA: 15m<sup>2</sup></p>	
<p>W-3</p> <p>AREA: 24m<sup>2</sup></p>	
<p>W-4</p> <p>AREA: 30m<sup>2</sup></p>	
<p>W-5</p> <p>AREA: 33m<sup>2</sup></p>	
<p>W-6</p> <p>AREA: 42m<sup>2</sup></p>	

Table 2-10: Combination of standard units for each school

No. of Class-rooms	Combination	Office Storage	Rain water tanks	No. of school	Floor Area (m <sup>2</sup> )
3 CRs	Type-3	No	2	3	198.72
4 CRs	Type-4		2	1	264.96
5CRs	Type-5A	Small type	4	4	375.36
6CRs	Type-6A		4	9	441.60
7CRs	Type-3 +Type-4A		4	4	507.84
8CRs	Type-4 +Type-4A		4	5	574.08
9CRs	Type-4A +Type-5		4	4	630.32
10CRs	Type-4AL +Type-6	Large type	6	3	717.60
11CRs	Type-3 +Type-4AL +Type-4		6	4	783.84
12CRs	Type-4AL +Type-4 +Type-4		6	2	894.24
13CRs	Type-3 +Type-4AL +Type-6		8	5	916.32
16CRs	Type-4AL +Type-6 +Type-6		10	1	1115.04
Total			216	45	

The types and floor areas of the project schools are shown in the table 2-11.



Table 2-11: Type of Facilities & Floor Area

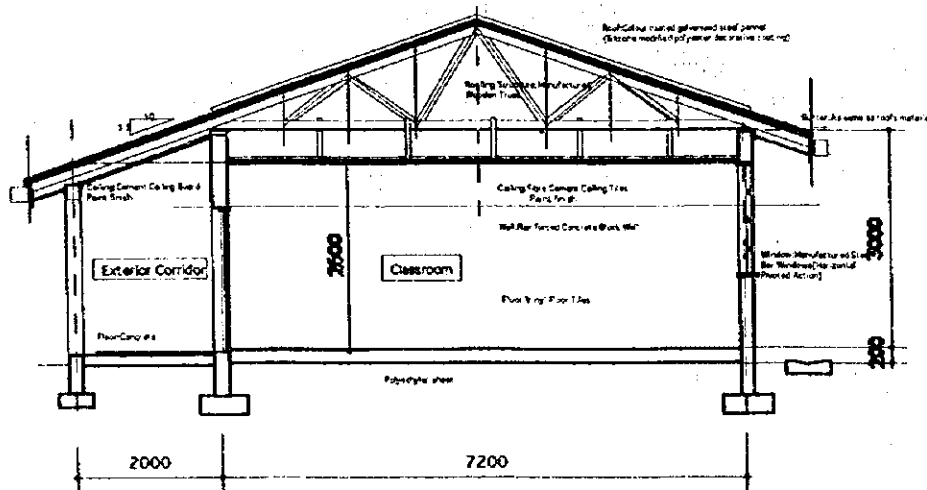
Phase	Mat's	School Name	No. of Classroom	Type of Office & Storage	Teacher's desk & chair Display board	Pupil's Chair (for senior's size)	Pupil's Chair (for Junior's size)	Pupil's Desk (for senior's size)	Pupil's Chair (for Junior's size)	Desk & Chair for Office	Table	Chair for Table	Cabinet	
1	U-1	NTLINI	13	L	13	110	410	55	205	1	6	12	1	
	U-2	MEJI	7	S	7	32	248	16	124	1	3	6	1	
	U-3	NGENOU	6	S	6	62	178	31	89	1	3	6	1	
	U-4	DALIBANCO	8	S	8	0	320	0	160	1	4	8	1	
	U-5	LOWERHATEKO	10	L	10	78	322	39	161	1	5	10	1	
	E-1	QOBA	13	L	13	110	410	55	205	1	6	12	1	
	E-2	DABULINOWE	9	S	9	32	328	16	164	1	4	8	1	
	E-3	SYAHLANGULA	3	no	3	0	120	0	60	0	0	0	0	
	E-4	CEFANE HOKE	6	S	6	40	200	20	100	1	3	6	1	
	E-5	NTSINBA	10	L	10	62	338	31	169	1	5	10	1	
	E-6	JONGZULU	5	S	5	0	200	0	100	1	2	4	1	
	E-7	GONGQOZAYA	3	no	3	0	120	0	60	0	0	0	0	
	T-1	MADWALENI	11	L	11	114	326	57	163	1	5	10	1	
	T-2	NDZEBE	11	L	11	104	336	52	168	1	5	10	1	
	T-3	LABRY	6	S	6	0	240	0	120	1	3	6	1	
	T-4	ZIBUNGU	7	S	7	84	196	42	98	1	3	6	1	
	T-5	ZWELAKHE	6	S	6	0	240	0	120	1	3	6	1	
	Q-1	MILANE	8	S	8	88	232	44	116	1	4	8	1	
	Q-2	MUZANTO	6	S	6	22	218	11	109	1	3	6	1	
	Q-3	NOOTI	6	S	6	42	198	21	99	1	3	6	1	
	Q-4	EDOWAYO	11	L	11	28	412	14	206	1	5	10	1	
	Q-5	NGQAYI	5	S	5	54	146	27	73	1	2	4	1	
	G-6	NTIBANE	13	L	13	108	412	54	206	1	6	12	1	
	Subtotal			183		183	1170	6150	585	3075	21	83	166	21
	2	M-1	MTONJENI	10	L	10	98	302	49	151	1	5	10	1
		M-2	ZANGQOLWANE	11	L	11	94	346	47	173	1	5	10	1
		M-3	DYABHA	12	L	12	114	366	57	183	1	6	12	1
		M-4	LINALAFHAKADE	6	S	6	10	230	5	115	1	3	6	1
		M-5	ZUNYAMA	6	S	6	0	240	0	120	1	3	6	1
		M-6	GONYA	13	L	13	76	444	38	222	1	6	12	1
L-1		GORHA	3	no	3	0	120	0	60	0	0	0	0	
L-2		MZINKHULU	8	S	8	0	320	0	160	1	4	8	1	
L-3		MLAMU	9	S	9	78	282	39	141	1	4	8	1	
L-4		MSANTSINI	7	S	7	36	244	18	122	1	3	6	1	
L-5		JONGISIZWE	13	L	13	158	362	79	181	1	6	12	1	
N-1		ZOYSILE	5	S	5	46	154	23	77	1	2	4	1	
N-2		MALIZOLE	16	L	16	96	544	48	272	1	6	12	1	
N-3		MANZINI	8	S	8	80	240	40	120	1	4	8	1	
N-4		MLATHA	5	S	5	0	200	0	100	1	4	8	1	
N-5		LUVELA	4	no	4	0	160	0	80	0	0	0	0	
N-6		NGONYAMA	12	L	12	74	406	37	203	1	6	12	1	
P-1		XEZI	6	S	6	0	240	0	120	1	3	6	1	
P-2		BUTULO	9	S	9	56	304	28	152	1	4	8	1	
P-3		MAFIKI	8	S	8	34	286	17	143	1	4	8	1	
P-4		NOBANKULU	9	S	9	8	352	4	176	1	4	8	1	
P-5		QAMBA	7	S	7	0	280	0	140	1	3	6	1	
Subtotal			187		187	1058	6422	529	3211	20	85	170	20	
Total			370		370	2228	12572	1114	6286	41	168	336	41	

#### 4) Sectional Planning

Roof shall have a slope of 3.5/10 and consists of wooden roof frames and epoxy coated steel sheeting, and a large attic space is to be secured to enable good air ventilation and heat insulation. The eaves are to be made well protruding to enable protection from the sunlight and rain. Ceiling height shall be made 2.6m high to secure an adequate air space per person and window openings on both sides shall be made sufficiently large to enable natural ventilation and to create pleasant indoor environment.

The floor height shall be set at 20cm above the highest level of ground to absorb height differences in the sites.

Drwg. 2-6 Standard Section



#### 5) Structural Plan

In consideration of the technical level of local sub contractors and also in view of durability and easy maintenance, the structural system shall be of locally adopted system by using concrete blocks for walling and wood frame trusses for roofing.

The calculation standards shall basically comply with the South African Standard (SABS). In addition, with respect to wind force, seismic force and other elements linked to the natural condition, the calculation shall be made based on locally observed data.

The main loads that must be considered in the structural calculation are dead load, live load and wind load. Seismic load will not be considered as no record of earth-quake is observed in the past.

### (3) Equipment Plan

#### 1) Electric equipment

With the prospect of the future electrification plan, all the school buildings are to be provided with conduit piping for future take-in and distribution wiring, and galvanized steel box for future installation of distribution panel, all of which are to be embedded within the wall.

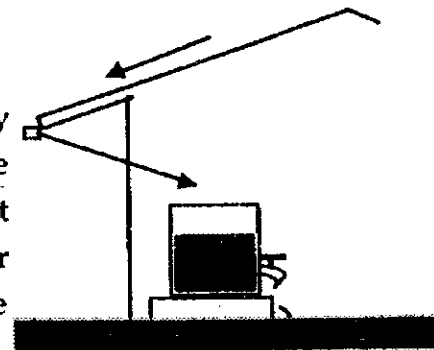
#### 2) Ventilation equipment

The facilities are designed so as to enable smooth natural ventilation and to create a pleasant interior environment. No mechanical ventilation system will be employed.

#### 3) Water Supply, drain and sanitary equipment.

##### ① Water Supply

As the most of the sites have no electricity provided within the premises, water shall be supplied by means of gravity. In this project rainwater will be collected from roofs to water tanks and supplied through faucets fixed at the bottom level of the tanks.



Drwg. 2-7

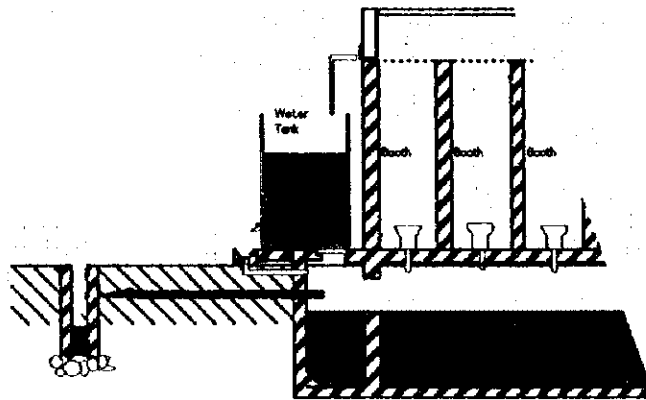
Rain water Collecting  
System

##### ② Drainage

In order to protect the ground from erosion, may be caused by rain water, water drain ridges are to be provided along the exterior walls of buildings with a slope from the upper side of the ground to the down side.

### ③ Toilets

Because of the scarcity of water in the sites, no wash toilet system will be employed. For treatment of sewage, a simplified type of septic tanks to be provided enabling secondary treatment of sewage water before leading to permeation holes. And a water tank per each toilet building (2 tons per each toilet unit) will be provided for washing.



Drwg. 2-8  
Section of Toilet

### (4) Construction materials plan

The materials to be used in the project shall be basically chosen from local products in consideration of durability, easy maintenance, easy procurement, workability and cost.

#### 1) Selection of construction method.

In the Eastern Cape, bricks and concrete blocks are the two major materials used for structuring low rise buildings such as school buildings. In the School Building programme ( SBP ), currently being implemented by the provincial Department of Education, faced brick wall and plastered concrete block wall constructions are the standard construction methods for the school buildings and in the community based construction faced block method is commonly employed. It is generally said that, of these methods, faced brick wall is the most durable but quite expensive and plastered block wall (although cost saving compared to faced brick) has a weakness of cracking on the plastered surface so that creating a maintenance problems.

In the project, the facilities, with the premises of preserving the durability and the quality above a certain satisfactory level, shall be planned so as to enable reduction of construction cost as much as possible and at the same time to alleviate maintenance problems after the completion of the project. In consideration of the above, the material of wall and construction method for the project have been chosen on the basis of:

- ① To be of locally adopted material and method.
- ② To have durability and quality above a satisfactory level.

- ③ To be of low cost
- ④ To be of easy maintenance

As a result of the thorough studies, it was concluded that colored block construction method is appropriate from the point of reducing construction cost and also simplifying the construction process.

## 2) Major materials

- ① Roof: The roof framing will be of wooden trussed, of the type generally used for school buildings in the project area, and the roofing material to be colored (epoxy-coated) steel sheets. (Corrugated cement boards - the standard specification for school buildings-will not be used because of asbestos content.)
- ② Wall: As described above, faced color block wall construction method to be employed. To protect from transmission of dampness, sealer coat shall be applied to the exterior; to the interior side no finishing to be provided.
- ③ Windows & doors: The windows shall be of steel of ordinary school specification, treated with coats of anti-rust material and finished with paint. The doors shall be of hard wood complying with the local standard specification. A security door made of steel to be installed at every office entrance.
- ④ Ceiling: Cement boards to be used for false ceiling and finished with paint, all complying with the local standards.
- ⑤ Floor: The floors of classrooms and office shall be finished with vinyl tiles as specified in the standard specification and floors of exterior corridors, stores and toilets be of concrete.

Below are shown comparison of construction methods in Table 3-12 and materials plan in Table 2-13.

Table 2-12 Comparison of Methods (Construction Types)

	Brick wall Construction	Hollow Conc. Block Construction	Colored Hollow Block Construction
Descriptin	Face Brick for Exterior, Stock Brick Interior	Hollow Block Walling Reinforced with steel Bar, Finished with Plaster	No Plasterng and Painting required
Durability	Good	Good	Good
Transportation	Heavy, but better than blocks because of small size	Lighter than bricks, but breakable	Lighter than bricks, but breakable
Skill	Require skilled lalour	Require plastering & painting	Require skilled labour
Maintenance	Free of maintenance	Require repainting	Free of maintenance
Procurement	No problem	No problem	Manufactured in E.L. depot in Umtata
Cost	1	0.9	0.8

**Evaluation Result:** From the point of high durability, easy maintenance, and low cost, colored block construction is considered the best of the above three construction types.

Table 2-13: Comparison of major materials

Item of Works	Examination	Materials, Specification			Result of adoption
		A (adoptable)	B	C	
Roof		Colored steel pannel roof	corrugated asbest os-cement roof	Cement roof tile	Materials containing asbestos are not adopatable in the project. Cement roofing tiles are fragile and weak against wind. Colored steel panels are advantaged in installation and colletion of rainwater.
	Anti-weathering	⊙	○	○	
	Anti-chloridation	△	⊙	⊙	
	Workability	⊙	○	○	
	Populality	○	○	△	
	Cost	△	⊙	○	
Walls *		Concrete block masonry	Brick masonry	steel rainforced concrete	Brick masonry is expensive and require skilled labor. Reinforced concrete constrution is complicated and require form works. Concrete block masonry when colored blocks are used is the best from the point of easy maintenance & workability.
	Anti-weathering	○	○	○	
	Workability	○	○	△	
	Popularity	○	○	△	
	Maintenance	○	⊙	△	
	Cost	⊙	△	△	
Windows		Steel	Aluminum	Wooden	Steel windows are common and inexpensive compared to Aluminum, and more durable than wooden.
	Water resist	○	○	△	
	Anti-weathering	○	⊙	△	
	Popularity	⊙	△	○	
	Maintenance	○	○	△	
	Cost	⊙	△	○	
Floor		Vinyl floor tile	Cement finish Protection coating	Ceramic tile	Venyl tile is addoped because of low cost and easy installation.
	Out-look	○	△	⊙	
	Endurance	○	○	⊙	
	Popularity	○	○	○	
	Workability	○	△	△	
	Cost	○	⊙	△	

- ⊙ : Best
- : Good
- △ : Fair

## (5) Furnitures

The number of furnitures for pupils (desks & chairs) is calculated on the basis that each classroom accommodates 40 pupils. Two different sizes are adopted for pupils' furnitures to meet the different sizes of pupils. The small size for the pupils under 6th grades and large size for those above 7th grade.

Below are shown the list and the number of furnitures per item (Table 2-14) and per school (Table 2-15).

Table 2-14: Furniture List Per Item

No.	Room Name	Item	Qty
1	Classroom	Teacher's Desk	370
2	Classroom	Teacher's Chair	370
3	Classroom	Pupil's Desk (for Junior)	6,286
4	Classroom	Pupil's Desk (for Senior)	1,114
5	Classroom	Pupil's Chair (for Junior)	12,572
6	Classroom	Pupil's Chair (for Senior)	2,228
7	Classroom	Display board	370
8	Office	Desk for Office	41
9	Office	Chair for Office	41
10	Office	Table	168
11	Office	Chairs for Table	336
12	Office	Cabinet	41

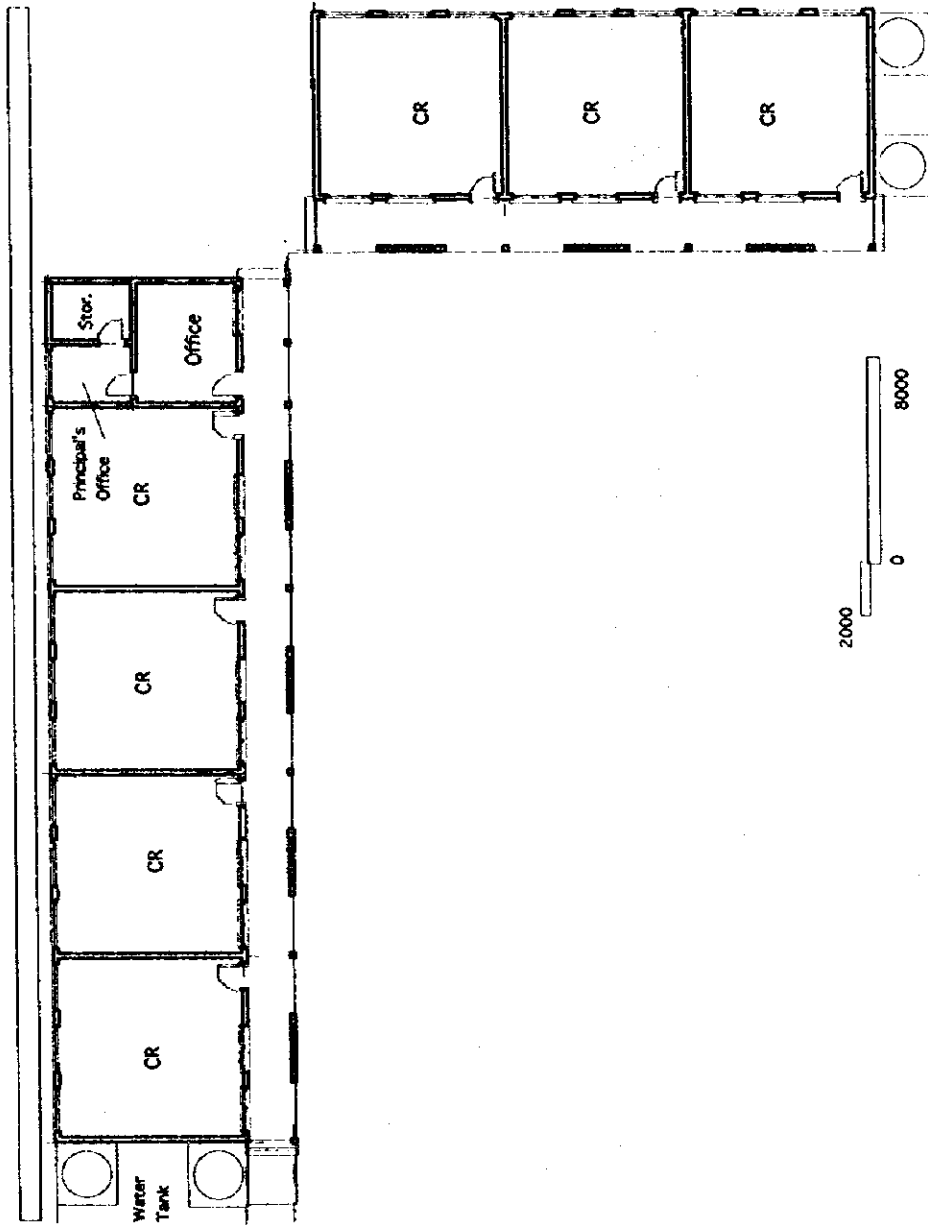


Table 2-15: Furniture List per school

Mark	School Name	No. of Classrooms	Type of Office & Storage	Teacher's desk & chair Display board	Pupils Chair (for senior's size)	Pupils Chair (for Junior's size)	Pupils Desk (for senior's size)	Pupils Chair (for Junior's size)	Desk & Chair for Office	Table	Chair for Table	Cabinet
U-1	NTULINI	13	L	13	110	410	55	205	1	6	12	1
U-2	MEJI	7	S	7	32	248	16	124	1	3	6	1
U-3	NGENU	6	S	6	62	178	31	89	1	3	6	1
U-4	DALBANGO	8	S	8	0	320	0	160	1	4	8	1
U-5	LOWERMATEKO	10	L	10	78	322	39	161	1	5	10	1
E-1	QOBA	13	L	13	110	410	55	205	1	6	12	1
E-2	DABULINDWE	9	S	9	32	328	16	164	1	4	8	1
E-3	SIYANLANGULA	3	no	3	0	120	0	60	0	0	0	0
E-4	DEFANEHORE	6	S	6	40	200	20	100	1	3	6	1
E-5	NTSIMBA	10	L	10	62	338	31	169	1	5	10	1
E-6	JONGZALU	5	S	5	0	200	0	100	1	2	4	1
E-7	GONGQZAYA	3	no	3	0	120	0	60	0	0	0	0
T-1	MADWALENI	11	L	11	114	326	57	163	1	5	10	1
T-2	NOZIBE	11	L	11	104	336	52	168	1	5	10	1
T-3	LABRY	6	S	6	0	240	0	120	1	3	6	1
T-4	ZIBUNGU	7	S	7	84	186	42	88	1	3	6	1
T-5	ZWELACHE	6	S	6	0	240	0	120	1	3	6	1
Q-1	MILANE	8	S	8	88	232	44	116	1	4	8	1
Q-2	MUZANTO	6	S	6	22	218	11	109	1	3	6	1
Q-3	NOOTI	6	S	6	42	198	21	99	1	3	6	1
Q-4	CERWAYO	11	L	11	28	412	14	206	1	5	10	1
Q-5	NOQATI	5	S	5	54	146	27	73	1	2	4	1
G-6	NTBANE	13	L	13	108	412	54	206	1	6	12	1
Sub total		183		183	1170	6150	585	3075	21	83	166	21
M-1	MTONJENI	10	L	10	98	302	49	151	1	5	10	1
M-2	ZANGQOLWANE	11	L	11	94	346	47	173	1	5	10	1
M-3	OYABHA	12	L	12	114	368	57	183	1	6	12	1
M-4	UMALAPHAKADE	6	S	6	10	230	5	115	1	3	6	1
M-5	ZUNYAMA	6	S	6	0	240	0	120	1	3	6	1
M-6	GONYA	13	L	13	76	444	38	222	1	6	12	1
L-1	GORHA	3	no	3	0	120	0	60	0	0	0	0
L-2	KOMKOLU	8	S	8	0	320	0	160	1	4	8	1
L-3	MILAMU	9	S	9	78	282	39	141	1	4	8	1
L-4	MSINTSINI	7	S	7	36	244	18	122	1	3	6	1
L-5	JONGISIZWE	13	L	13	158	362	79	181	1	6	12	1
N-1	ZOYISILE	5	S	5	46	154	23	77	1	2	4	1
N-2	MALIZOLE	16	L	16	96	544	48	272	1	6	12	1
N-3	MANZINI	8	S	8	80	240	40	120	1	4	8	1
N-4	MLATHA	5	S	5	0	200	0	100	1	4	8	1
N-5	LIVELA	4	no	4	0	160	0	80	0	0	0	0
N-6	NGONYAMA	12	L	12	74	408	37	203	1	6	12	1
P-1	XEZI	6	S	6	0	240	0	120	1	3	6	1
P-2	BUTULO	9	S	9	56	304	28	152	1	4	8	1
P-3	MAPHO	8	S	8	34	286	17	143	1	4	8	1
P-4	NDABANKULU	9	S	9	8	352	4	176	1	4	8	1
P-5	QAMBA	7	S	7	0	290	0	140	1	3	6	1
Sub total		187		187	1058	6422	529	3211	20	85	170	20
Total		370		370	2228	12572	1114	6286	41	168	336	41

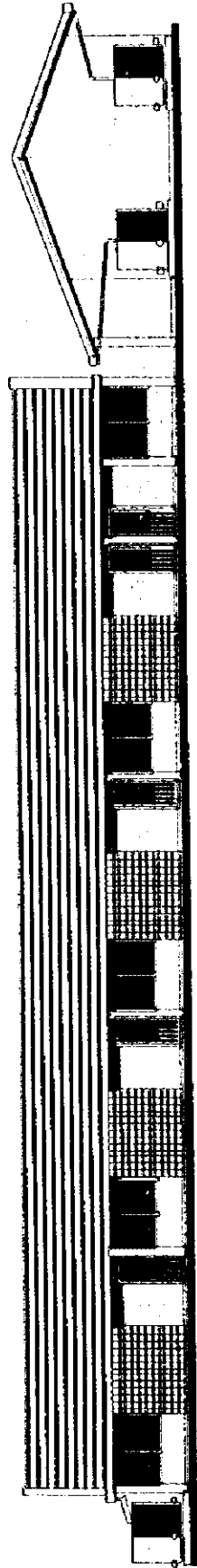
**(6) Basic Design Drawing**

- 1) Typical plan for combination of two standard classroom types.
- 2) Typical elevation for combination of two standard classroom types.
- 3) Typical toilet plan and elevation.



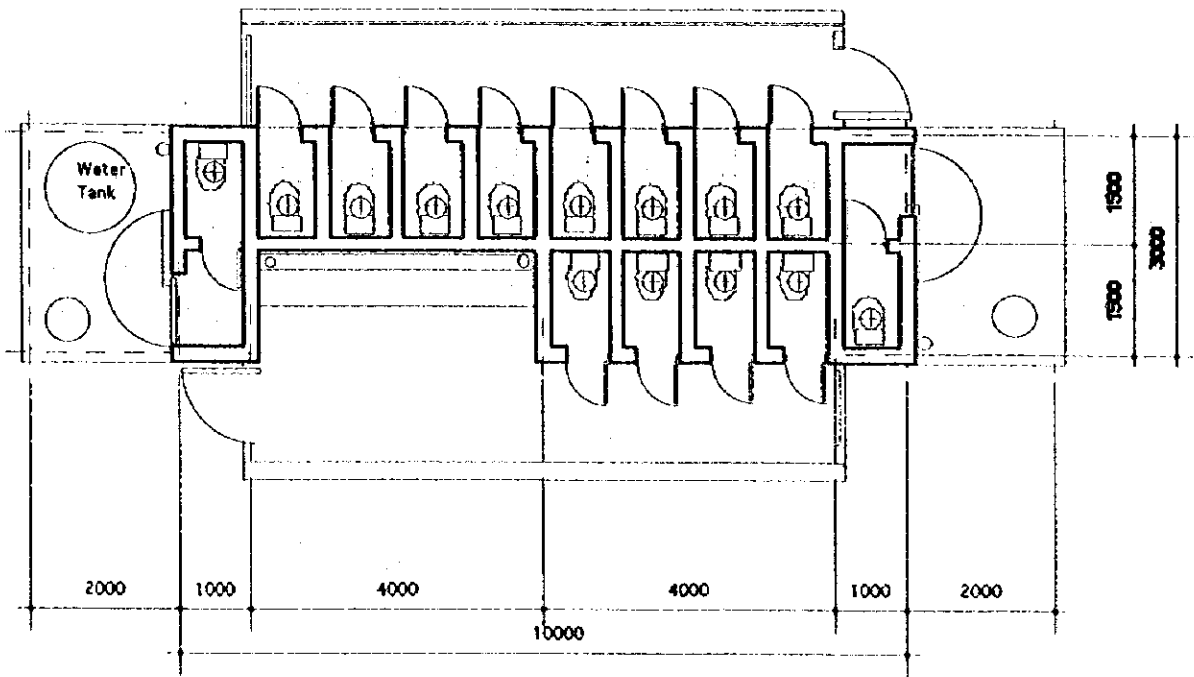
Typical Plan (Type-3+Type-4A)

2) Typical elevation of classrooms.

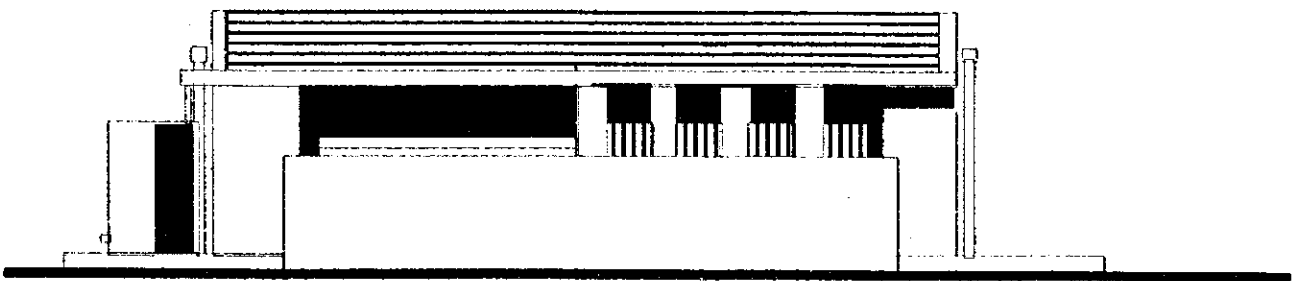


The Project for the Construction of Primary and Junior Secondary Schools in the Eastern Region, Eastern Cape Province in the Republic of South Africa Typical Elevation (Type-3+Type-4A) SCALE=1:200

### 3) Typical Toilet plan and elevation.



Plan S=1:100



Elevation S=1:100

#### TOILET BUILDING TYPICAL DRAWING (TYPE:W-4)

The Project for the Construction of Primary and Junior Secondary Schools in the Eastern Region, Eastern Cape Province in the Republic of South Africa

## 2-4 Implementing Organization of the Project

### 2-4-1 Organization

The Department of Education of the Province of the Eastern Cape shall be the implementing organ and the Department of Public Works acts as the execution agent of the project by supporting DoE in technical matters. The Department of Education of the Central Government is responsible for undertaking the procedures required between the two countries: (South Africa & Japan)

Table 2-16: Role of Departments related to the project

	Role
National Dept. of Finance	Procedures for Banking Arrangement and Authorization for Payment
National Dept. of Education	Conclusion of Exchange of Note and Supervision on the contents of this Project
Provincial Dept. of Education	Implementation Department. Signing of Agreement & Contract
Provincial Dept. of Public Works	Approval & Supervision of the construction
Provincial Dept. of Justice	Confirmation of Agreement and Contract documents

## 2-4-2 Budget

The proportion of the education budget to the total provincial government budget increased by 10% in 1995 from the preceding year and hence showing a slight increase every year both in the proportion and in the actual amount. However, if the price escalation during the periods is taken into account, the amount in real term stays almost the same. And a comparatively high ratio of the budget is being spent for such as related with social reform plans, as vocational training plans aimed at promotion of employment of the people who had been disadvantaged during the Apartheid years.

### Eastern Cape DoE

Table 2-17: Expenditure of Department of Education (96/97 and '97/98)

Items	1995/6 ('000R)	%	1996/7 ('000R)	%	1997/8 ('000R)	%
Administration	70,166	1.55	382,755	7.61	314,112	5.76
Public ordinary school education	4,162,191	92.49	4,091,631	81.43	4,476,642	82.14
Private ordinary school education	20,474	0.45	10,320	0.20	8,450	0.15
Special school education	35,953	0.79	77,090	1.53	88,912	1.63
Teacher training	101,452	2.25	148,807	2.96	131,741	2.41
Technical college education	17,944	0.39	108,243	2.15	126,300	2.31
Non-formal education	38,274	0.85	70,016	1.39	90,311	1.65
Auxiliary and associated service	53,396	1.18	70,170	1.39	120,684	2.21
Museums and heritage resources	0	0.00	21,180	0.42	22,456	0.41
Sports, recreation and youth affairs	0	0.00	14,436	0.28	27,097	0.49
Arts, culture and music	0	0.00	10,293	0.20	21,215	0.38
Libraries and archives	0	0.00	19,372	0.38	21,819	0.40
<b>Total</b>	<b>4,499,850</b>	<b>100</b>	<b>5,024,313</b>	<b>100</b>	<b>5,449,739</b>	<b>100</b>

The budget of the provincial Department of Education is mostly expended for personnel and administration service ( 88.9%, 97/98 ), and the proportion of the budget for education activities, improvement of school facilities and procurement of school furnitures is very small. Since RDP fund was allocated for development of school facilities during the period from 94/95 to 96/97, there has been no visible amount of budget allocated in this respect; in 97/98 the expenditure for school facilities was reduced by 80% from the preceding year.



### 2-4-3 Implementing Structure and local contractors

The Department of Education (DoE) of the Eastern Cape Province is at present implementing the School Building Programme that began in 1995, associated with the Department of Public Work (DPW) acting as the implementing agent.

At the actual implementation of the projects, DPW appoints consultants and the project manager who acts as an agent of the steering committee (formed by DET & DPW) and controls the programme.

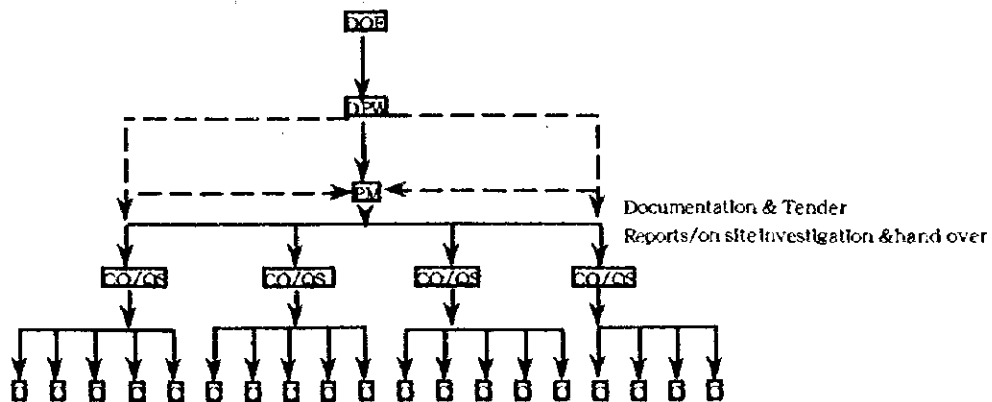
The following is the diagram showing the implementing structure.

Differences with the structure of the project

- ① Open tendering for each school project.
- ② DPW being the implementing agent.
- ③ PM controls consultants who deal with contractors.

Drwg. 2-9

School Building Programme Guide  
to Existing Implementing Structure



P.M. & CO/QS Duties: ① Documentation ② Recommendation ③ Hand over Site  
④ Payment Evaluation ⑤ Site Meetings ⑥ Site Instruction  
⑦ Final Delivery

D.O.E - Department of Education [Government](User Department)

P.W.D. - Department of Public Works[Government](Implementing Agent)

Instructs and Appoints P.M. and Consultants

P.M. - Project Management[Local(Private)]

CO/QS - Consultant/Quantity Surveyor[Local]

C - Contractors[Local]

As for the execution capacity and technical level of local contractors, below are indicated the number of contractors classified in three grades: good, fair and bad. And the selection of qualified sub-contractors shall be made with a full investigation at tender stage or negotiation stage as to their capacity and performance in the past.

Table 2-18: Number of local contractors in respect of grades.

Size	Grade	Good	Fair	Bad	Total
A					12
B					22
C				Over 70	125
Total		64	25	Over 70	Over 159

Source: Monthly work record of school building programme and information from Q.S.

- Notes:
- Number of emerging contractors fluctuates.
  - Contractors ranked "good" have satisfactory work record.

The evaluation of local contractors is made by examining the work records of each contractor, on whether the contractor pursued the work without delay, and whether the quality of the works have been satisfactory. The sub-contractors shall be selected from those graded "good" and preferably from "B" or "C" sizes.

## **CHAPTER 3**

# **IMPLEMENTATION PLAN**

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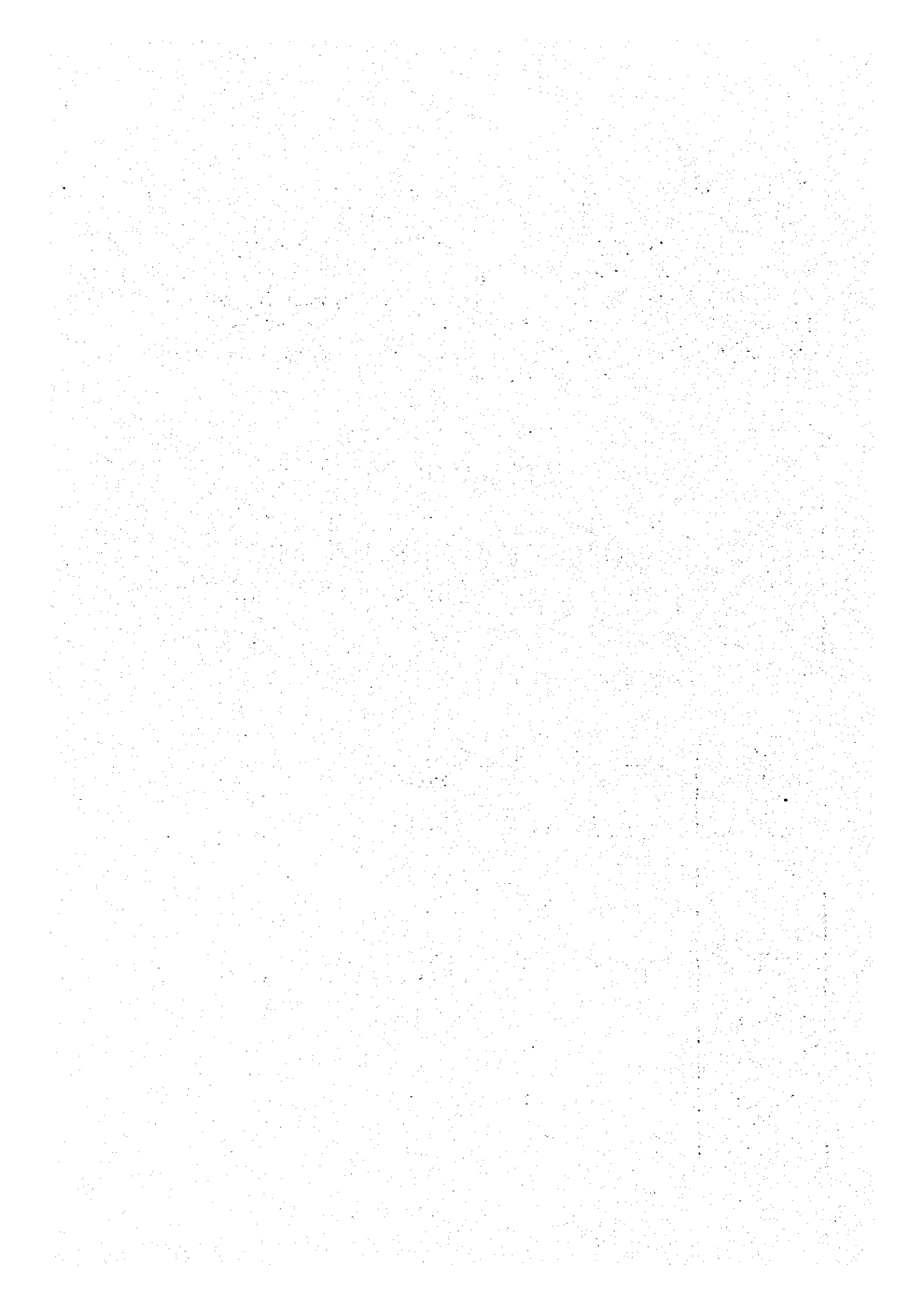
Size	Grade	Good	Fair	Bad	Total
A		12			12
B		22			22
C		30	25	Over 70	125
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**CHAPTER 3**  
**IMPLEMENTATION PLAN**



## CHAPTER 3 IMPLEMENTATION PLAN

### 3-1 Implementation Plan

#### 3-1-1 Implementation Concept

##### (1) Basic procedures for Implementation of the Project.

As for the procedures for the implementation of the project, first, the government of Japan appraises the project, based on the Basic Design Study report, and the results are submitted to the Cabinet for approval. The project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Government of Japan and the Government of South Africa.

The project shall be implemented on the basis of the contracts between the implementing organ of the South African side and a Japanese consultant and contractor that are to be concluded in accordance with the rules of Japan's Grand Aid Schemes. These contracts shall be verified by the Government of Japan.

##### (2) Implementing organization

The responsible organ of the South Africa side for signing the Exchange of Notes shall be the Department of Education in the Central government of the Republic of South Africa.

The implementing organization of the project shall be the Department of Education in the provincial government of Province of Eastern Cape and an implementing committee established with the director of the Physical Resource Planning division as the responsible person will manage the implementation.

As to the signing of the consulting agreement and construction contract, the Provincial Department of Education shall be responsible for the signing. The implementing committee shall be responsible for the works required of undertaking by the South Africa side.

The Department of Public Works (provincial) shall participate in the committee and coordinate the technical matters.

##### (3) Consultant

After the signing of the Exchange of Notes, DoE shall sign an agreement with a Japanese consultant with regard to the detail design and the supervision for the execution of the construction. In order to enable smooth implementation the consultant shall be the same consultant who had undertaken the Basic Design

Study.

After the agreement is verified by the Government of Japan, the consultant shall carry out preparing detail designs and tender document, based on the results of the Basic Design Study and through the consultation with DoE & DPW.

After the detail designs and tender documents are approved by both DoE and DPW, the consultant will carry out on behalf of DoE tendering procedures and assist DoE in signing the construction contract, and after the signing of the construction contract the consultant shall proceed with the supervision of the construction until the completion of the project.

#### **(4) Contractor**

The project comprises construction of facilities and provision of furnitures. The contractor shall be a Japanese construction company and shall be selected through tendering.

At tendering the lowest tenderer shall in principle become a successful tenderer and sign a contract with DoE.

After the contract is verified by the Government of Japan, the contractor shall execute until the completion, and deliver to DoE the completed facilities and furniture within the time limit stipulated in the contract.

#### **(5) Local consultants and contractors**

In the case of "School Building Programme" ( SBP ) being implemented by the provincial Department of Education ( DoE ), many local consultants are involved in the design works, tendering and supervision works. In order to carry out smooth supervision work in this project, it is, therefore, judged quite effective to utilize local staff who are acquainted with the local building situation and the social environment of the sites which are most cases widely dispersed in underdeveloped areas.

There are many local contractors, large, medium and small scale, in the area, and most of them, except some small scale contractors, have considerably high level construction skills. If such contractor were selected carefully by examining their work records, such with the DoE, DPW projects, they can be employed in the project as subcontractors under the Japanese main contractor.

And upon the employment of local sub contractors, Japanese construction management technology shall be brought in to implement a unified construction management.



## 3-1-2 Implementation Conditions

### (1) Local building situation

#### 1) Building industries

The Eastern Region where the project is planned is socially and economically one of the under-developed regions in the Eastern Cape Province.

Except the areas in the proximity of Umtata, social infrastructures are not yet developed and demands for building industry are generally limited to such works as school buildings, clinics, small scale commercial buildings and residential houses.

Consequently, large scale building works are generally undertaken by those contractors who have main offices in East London.

As for the building materials most of the building materials other than bricks, concrete blocks and some roofing materials (which are produced in Umtata) are generally transported from the East London area.

#### 2) Labour

There is a surplus of unskilled labour in the project site areas but skilled labour which must be found in the town areas.

The project shall be executed in a specified time limit at a number of sites by preserving a certain technical level that meets the standard specified in the Contract. Therefore, the utilizing of local sub-contractors in securing, instructing and management of skilled labour is very important as well as transferring of Japanese construction management technology.

#### 3) Construction Materials

In consideration of easy maintenance after the completion of the work and of lowering of the construction costs, Most of the construction materials shall be of local products. The major materials required for the project such as cement, steel bars, blocks, bricks, wood, roofing materials, etc. shall be of the products in the Eastern Cape, provided that the prices of the materials be competitive compared with those procured from Japan or third countries. Only furniture will be procured from some other provinces within South Africa.

#### 4) Transportation

The project sites are located in the areas stretching approximately 100km from Umtata and most of the sites with access roads of 10~40km from the paved main roads. The access roads are not paved, and not maintained well, causing the transportation extremely difficult and as a result raising the transportation cost.

## **(2) Consideration on execution**

The following shall be taken into consideration

- 1) Execution plan shall be so prepared that efficient execution of the work be enabled by maintaining quality of the work at a satisfactory level.
- 2) The condition of access road per each site shall be thoroughly studied and a precise transportation plan shall be prepared to cope with the bad condition by the main contractor.
- 3) As to the construction work at the sites where existing facilities are to be under use during the execution, adequate measures for securing safety of the pupils shall be incorporated in the execution plan, and the schedule of work may be adjusted in consultation with the School Governing Council, Circuit Officers, District Development Officers, school teachers, etc.
- 4) In the case of utilizing the labour force available in the communities, technical training shall be carried out by demonstrating building techniques to help the labourers understand techniques and work procedures, of the work involved there-in, and to facilitate the transferring of Japanese building technology.
- 5) The sub-contractors shall be selected basically from those local contractors who are based in Eastern Cape Province and have sufficient capacities to carry out the work.
- 6) Upon the procurement of local materials, the quality of the materials, together with the supply capacity of the suppliers, shall be thoroughly examined to secure steady supply of materials at all time.

## **(3) Phased Execution Plan**

The work period shall be divided into two phases, taking into account that the 45 sites are widely dispersed in 8 districts and that transportation to the sites are very difficult because of the bad access roads.

1st phase:

Engcobo / Elliot, Tsolo, Qumbu, Umtata District ~ 23 Schools, 183 Classrooms

2nd phase:

Libode, Ngqeleni, Port St. Johns, Mqanduli /

Elliot dale District ~ 22 Schools, 187 Classrooms

Table 3-1: Number of Sites and classrooms in respect of the 2 phases

Scale	Phase1	Area (mf)	Phase2	Area (mf)	Total	Area (mf)
3 classrooms	2 school (3CRs)	442.44	1 school (3CRs)	213.72	2 schools (6CRs)	427.44
4 classrooms			1 school (4CRs)	279.96	1 school (4CRs)	279.96
5 classrooms	2 schools (10CRs)	798.72	2 schools (10CRs)	798.72	4 schools (20CRs)	656.16
6 classrooms	6 schools (36CRs)	2769.60	3 schools (18CRs)	1396.80	9 schools (54CRs)	4166.4
7 classrooms	2 schools (14CRs)	1063.68	2 schools (14CRs)	1063.68	4 schools (28CRs)	2127.36
8 classrooms	2 schools (16CRs)	1208.16	3 schools (24CRs)	1812.24	5 schools (40CRs)	3020.4
9 classrooms	1 school (9CRs)	670.32	3 schools (27CRs)	2010.96	4 schools (36CRs)	2681.28
10 classrooms	2 schools (20CRs)	1495.2	1 school (10CRs)	747.60	3 schools (30CRs)	2242.8
11 classrooms	3 schools (33CRs)	2450.52	1 school (11CRs)	816.84	4 schools (44CRs)	3267.36
12 classrooms			2 schools (24CRs)	1766.16	2 schools (24CRs)	1766.16
13 classrooms	3 schools (39CRs)	2847.96	2 schools (26CRs)	1898.64	5 schools (65CRs)	4746.6
16 classrooms			1 schools (16CRs)	1157.04	1 schools (16CRs)	1157.04
Total	23 schools (183CRs)	13746.6	22schools (187CRs)	13962.36	45schools (370CRs)	27708.96

### **3-1-3 Scope of Works**

The items of the work to be undertaken by each of the two countries are as follows.

#### **(1) The works undertaken by the Government of Japan**

- 1) Construction of facilities
  - Classroom buildings (classrooms, office • stores)
  - Toilets
- 2) Procurement of Furniture
  - Desks and chairs for pupils and teachers
  - Cabinets
  - Display board
- 3) Procurement of fencing materials

#### **(2) The works undertaken by the South African Side**

- 1) Demarcation and survey of the sites.  
( The drawings shall be provided to the Japanese Consultant before the beginning of Detail Design )
- 2) Preparation of site grounds inclusive of leveling of ground and removing of any obstacles (including the existing buildings if necessary) from the sites.  
( As the result of the site survey, all the sites were confirmed no such earth works were necessary. However, in principle the works are to be done by communities under monitoring of DoE if necessary. )
- 3) Improving and maintaining of the access roads.  
( Also all the sites were confirmed that no construction of approach road was necessary. However, if the roads were damaged to the extent inaccessible to the sites, this is to be done by Kei District Council with a request of DoE. )
- 4) All external works other than construction of facilities such as fencing, landscaping, etc.

### **3-1-4 Consultant Supervision**

#### **(1) Detail Design and Supervision Policies**

The consultant shall prepare detail designs and tender documents based on the contents of the Basic Design Study and in consultation with the provincial government of the Eastern Cape.

During the period of the construction and procurement of furnitures the consultant shall dispatch a resident supervisor to the sites for supervising the work, reporting to and liasoning with DoE, DPW and other concerned organs. The duties carried out by the consultant are as follows.

- **Detail Design**  
Prepare detail drawings, specification and tender documents
- **Facilitating of Tendering and Construction Contract**  
Determine contract policy, prepare draft of Contract, examine breakdown of construction cost, assist with selection of contractor, etc.  
(inclusive of tender announcement, examination of P.Q.)
- **Examination and approval of shop drawings.**  
Examine and approve the shop drawings, sample of materials and finishing , and equipment submitted by the contractor.
- **Instruction for works**  
Give necessary instruction to the contractor by examining execution plan, execution schedules submitted by the Contractor.
- **Report on construction progress**  
Submit progress report to the Employer and the concerned organs
- **Approval of Payments**  
Examine and approve the bills submitted by the contractor during and after the construction, and assist the procedures.
- **Inspection**  
Carry out inspection at the time of surveying amount of work completed and quality of work from the beginning of the work through the completion.

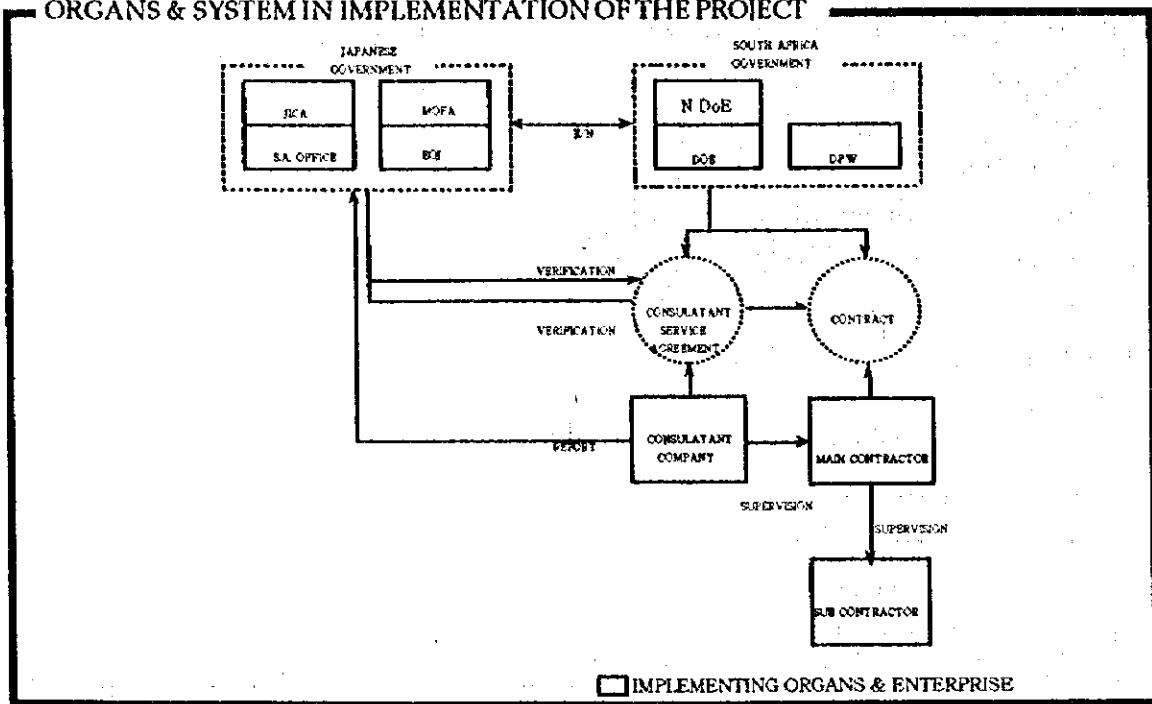
## (2) Organization for Supervision

In order to carry out efficient supervision in a widely spread construction area with regard to quality, schedule and safety of the works - and to enable sufficient communication with the concerned district and provincial officials, a supervising team, consisting of one Japanese and three local staff, shall be stationed in the site area (an office to be stationed in Umtata) through the work period. And when necessary the following specialist shall be dispatched.

Architect (Project Manager):      Dispatched at the time of the commencement and completion of the first and second phase.

Structural engineer:                      At the time of foundation work for the first phase.

**ORGANS & SYSTEM IN IMPLEMENTATION OF THE PROJECT**



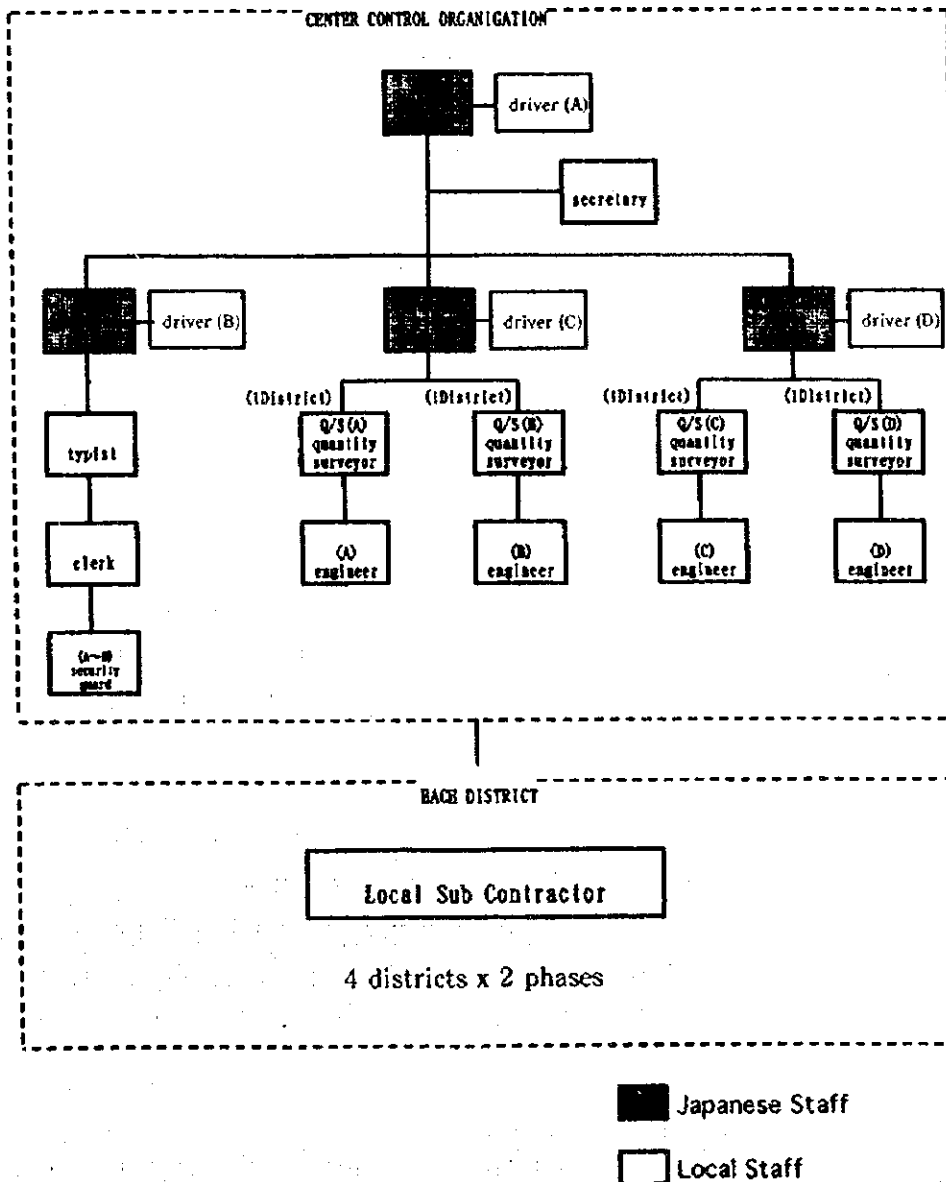
- MOFA: Ministry of Foreign Affairs
- EOJ: Embassy of Japan
- E/N Exchange of Notes
- N DoE: Natinal Department of Education

### (3) Organization for Construction Management

The construction shall be executed by using local sub contractors. Supposing that one sub contractor has a capacity of undertaking 3 to 6 construction sites, the total number of the sub contractors, involved in each phase, will be 4 to 8. The Japanese contractor shall, therefore, organize a suitable management system to maintain equal construction technique and quality among plural number of Sub contractors.

Below is given the organization diagram for construction management system proposed for the project.

Executing Organization:



1.2.2. MAIN GOVERNMENT IMPLEMENTATION OF THE PROJECT



Figure 1.2.2. Main Government Implementation of the Project

- MEST Ministry of Education, Science and Technology
- MOE Ministry of Education
- NCEI National Center for Educational Information
- NCRE National Center for Educational Research and Development

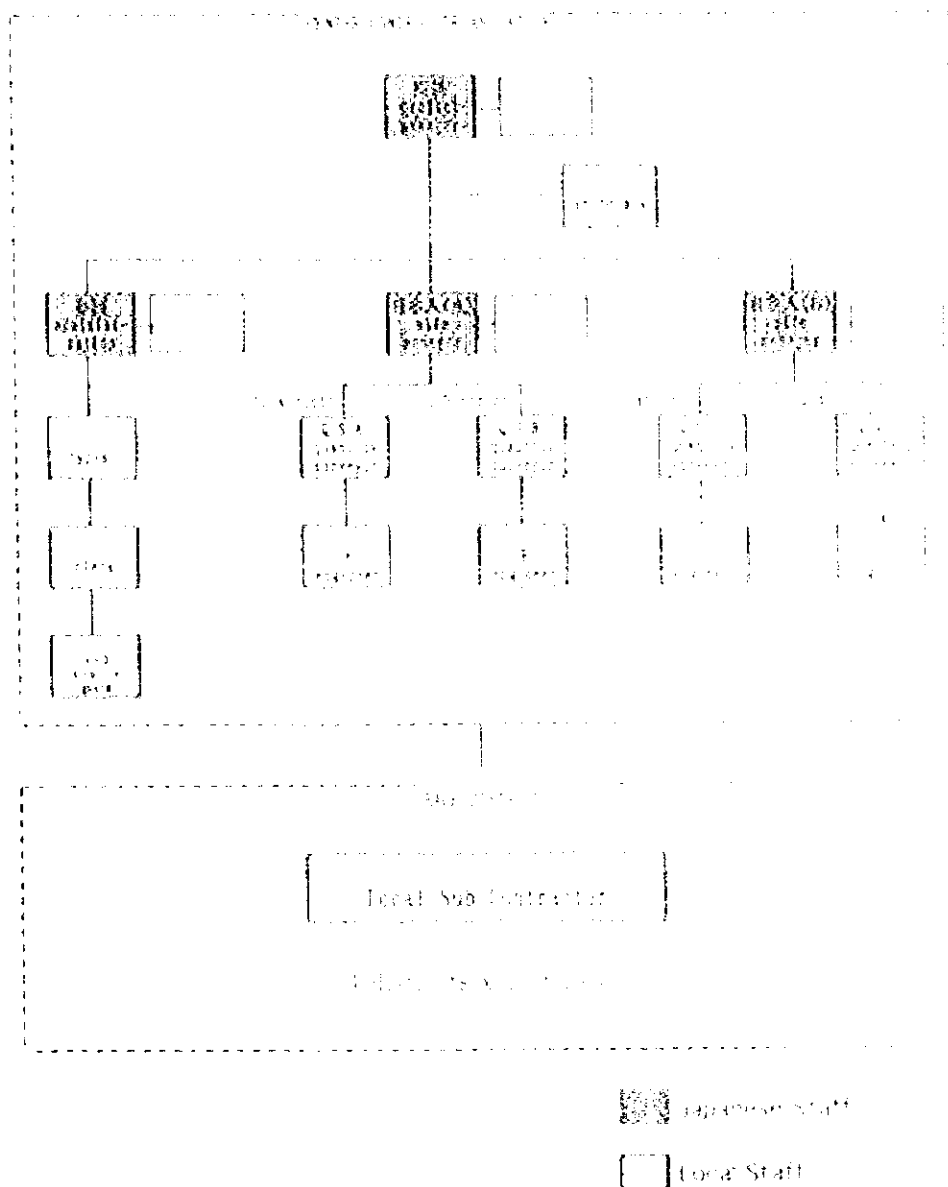


### (3) Organization for Construction Management

The construction shall be executed by using local sub contractor. Supposing that one sub contractor has a capacity of undertaking 3 to 6 construction sites, the total number of the sub contractors, involved in each phase will be 1 to 8. The Japanese contractor shall, therefore, organize a suitable management system to maintain equal construction technique and quality among plural number of sub contractors.

Below is given the organization diagram for construction management system proposed for the project

Executing Organization:



### 3-1-5 Procurement PLAN

In principle all the construction materials shall be procured locally. Upon designating specific suppliers, the supply capacity of the suppliers, durability and quality of the materials shall be thoroughly examined. The procurement plan for major materials is as follows.

#### (1) Building work

Cement	:Product of S.A.
Steel bar	:Product of S.A. / Japan, depends on the cost evaluation
Block	:Local product
Aggregate	:Local product
Concrete	:Made at work sites by using mixer

#### (2) Finishing and window - door work

Flooring material	:Product of S.A.
Plaster	:Made at work sites by mixing cement and sand.
Paint	:Product of S.A.
Wooden door	:Local product
Glass	:Product of S.A.
Roofing Material	:Product of S.A. with anti-salt coating

#### (3) Furnitures

All of the furnitures shall be of S.A. products.

### 3-1-6 Implementing Schedule

After the signing of the Exchange of Notes, consulting agreement shall be signed between DoE and the consultant, and following the three steps - Detail Design, Tender, and Construction Contract - the construction will be implemented.

#### (1) Detail Design

The consultant shall prepare detail design drawings and tender documents on the basis of the contents of the Basic Design Study. The detail design comprises detail drawings, specifications and structural calculation sheets. The consultant shall, in the course of the detail designing, consult with DoE & DPW for their approval and after the approval, proceed with the tender.

#### (2) Tender

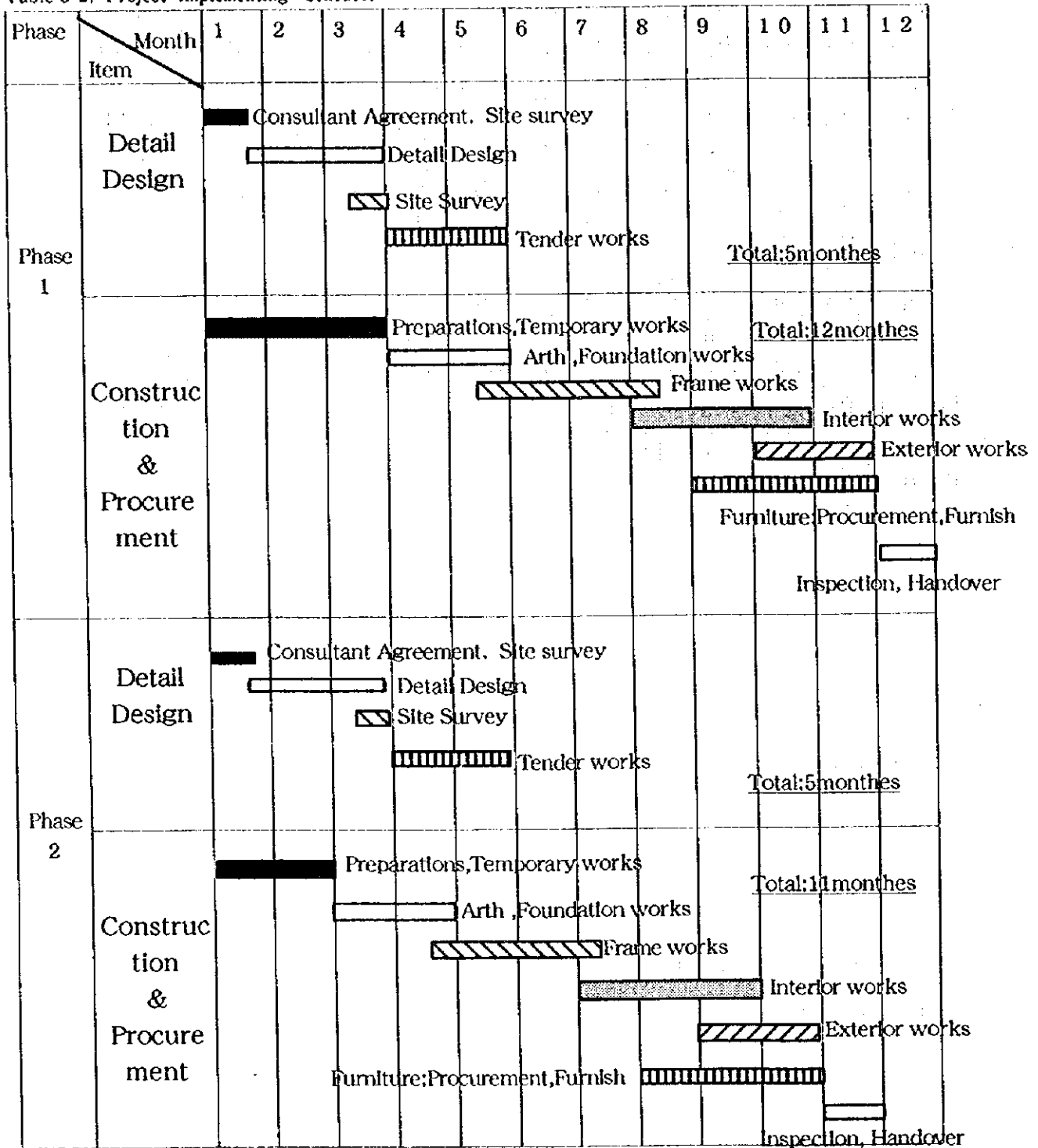
The consultant shall on behalf of the DoE notify on a news paper an announcement for the invitation to Requalification. The tender shall be carried

out in Japan in the presence of the personal concerned. The tenderer who submit the lowest price shall be the successful tenderer, provided that the content of his tender be proper. The Construction contract will be signed between DoE and the Contractor in the Province of Eastern Cape. The contract shall be verified by the Government of Japan to become effective. The time period required from the consultant agreement to the construction contract will take roughly 5 months.

### **(3) Construction**

After the verification of the construction contract the construction shall be commenced. The construction work for 3 ~ 6 classroom buildings will take approximately 7 months, while for 6 ~10 classrooms and for 11 ~ 16 classrooms take 8 ~ 10 months. By adjusting the construction schedules for each site it is therefore, feasible to complete the entire construction work (per each phase) in the time span of 12 months.

Table 3-2: Project Implementing Schedule



### **3-1-7 Obligations of recipient country**

#### **(1) Proper Use**

The recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

#### **(2) Re - export**

The products purchased under the Grant aid should not be re - exported from the recipient country.

#### **(3) Banking Arrangements (B/A)**

- 1) The Government of the recipient country or its designated authority should open an account in name of the Government of the recipient country in a bank in Japan (hereinafter referred to as the Bank) The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- 2) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

#### **(4) Necessary Measures to be taken by the South African Side**

Following necessary measures should be taken by the South African Side on condition that the grant Aid by the Government of Japan is extended to the Project:

- 1) To provide data and information necessary for the Project
- 2) Following items should be secured for the Project sites.
  - To prepare the land for the Project and secure the rights to build a building.
  - To secure reasonably level sites for the Project prior to the Project implementation.
  - To undertake to provide incidental outdoor works, such as landscaping, fencing, exterior lighting, and other incidental facilities in and around the Project site, if necessary and possible.
  - To undertake to provide incidental outdoor works, such as landscaping, fencing, exterior lighting, and other incidental facilities in and around the Project site, if necessary and possible.

- To provide facilities for distribution of electricity, water supply, telephone, drainage, sewage and other incidental facilities into the Project site, if the facilities exist.
- 3) To allocate appropriate budget and teaching and administrative staff members for proper and effective operation and maintenance of buildings provided under the Grant Aid.
- \*4) To bear commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement, namely the advising commission of the Authorization to Pay and payment commission.
- \*5) To ensure prompt unloading, tax exemption, customs clearance at the port of disembarkation and prompt internal transportation therein of the materials and equipment for the Project purchased under the Grant Aid.
- \*6) To exempt Japanese juridical and physical nationals engaged in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in South Africa with respect to the supply of the products and services under the verified contracts.
- \*7) To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the South Africa and stay therein for the performance of their work in accordance with the relevant laws and regulations of the Republic of South Africa.
- \*8) To provide necessary permissions, Licenses and other authorizations for implementing the Project, if necessary.
- 9) To maintain and use properly and effectively the facilities constructed under the Project in responsibility of the DoE.
- 10) To bear all the expenses, other than those to be borne by the Japan's Grant Aid within the scope of the Project.

\*Note: Measures to be taken by the National Department

### 3-2 Project Cost Estimation

#### 3-2-1 Costs born by the South Africa side

##### 1) The cost born by South Africa side

Table 3-3:

Item	Amount
a. Demolition and Site preparation	(R27,500)
b. Provision of Temporary Classrooms	-
Total	(R27,500)

- Demolition and Site Preparation: (To be under taken by communities)  
11 classrooms at 7 schools  
 $R25,00 \times 11 \text{ Classrooms} = R27,500$
- Provision of temporary classrooms  
No cost involved.

### **3-3 Operation and Maintenance Costs**

#### **(1) Operation and Maintenance plan**

The operation and maintenance of the facilities and furnitures provided in this project shall be carried out by the school governing councils consisting of teachers and representatives of communities; that is teachers (under direction of principal) are responsible for the maintenance of the furnitures and parents with the communities carry out daily cleaning and maintenance works of the facilities. Septic tanks must be cleaned twice a year to maintain the function for proper operation. As to the other facilities as long as properly used, no maintenance cost will be required. Wooden doors and hardware may need repair or replacement in a long term, these can be coped with using locally available materials and skills of the people in the communities.

#### **(2) Operation and Maintenance costs**

##### **1) Personnel expense**

the project aims at reconstruction and extension of the existing schools and the scale of the operation is not to be enlarged. However, additional teachers must be provided to meet the increase of classrooms.

Whereas, the increase is 30, a minimum of additional 30 teachers must be newly allocated to the schools.

##### **2) Operation and maintenance expense for facilities.**

As there are no electricity or water supply equipment, no operation expense as required in general cases, will be involved.

The buildings are designed so as to reduce maintenance cost as much as possible, in principle free of maintains. However, as to the doors, windows, and some finishings, repair or replacement may be required in a long run.

The operation and maintenance cost per annum for the 45 schools in the project are estimated all together to be R 99,000 as shown below. Of the costs, the amount born by the provincial DoE is R 54,000, that equals to 0.12% of the budget allocated for school facilities. For the allocation of new teachers be arranged by the current Teachers ' Reallocation Plan, no additional budget is needed in this respect.



Cleaning of septic tanks are expected to be carried out by the communities represented by the school governing council, costing R 1,022 per year and R 3.2 per pupil. This equals to 0.9 % of the average expenditure per pupil (R 365).

In table 3-5 below are shown assumed operation and maintenance costs.

Table 3-5 Operation and maintenance costs per year

Item	Rand	Condition
Painting	R27,000	Doors&Windows : once/5years, R3,000 /8Classrooms Exterior Wall : once/10 years, R5,400/8Classrooms R600/each school at a year
Repair of Roofing	-	Negligible (last 25 years or more)
Misc. repairs	R27,000	Window glass, etc. : 1 0 places/year (R60/pl.) R600 average /school /year
Repair of Water Supply and drain		Negligible Gal. steel tanks : (oast more than 15 years) Pipes : (last 25 years or more)
Total	R54,000	
Cleanings of Septic tank	R44,982.8	Cleaning : once /year (by communities) Sludge: once/2 years (average volume 16.2m) (R0.8 / Km + R 120/ m) x 62.9 Km R 1,022 / school/year
Total	R98,982.08	