SOUTH SUDAN
BASIC SCHOOL CONSTRUCTION STANDARDS & GUIDELINES

The School Construction standards and guidelines for South Sudan Basic Schools have been developed by the Department of Physical Planning and Construction of the Ministry of General Education and Instruction in partnership with UNICEF South Sudan Country Office, and with support from the Global Partnership for Education Programme and USAID.

These guidelines are intended to provide general guidance only. Every effort has been made to ensure the accuracy of the information. But they must not be used as a substitute for detailed engineering design for a specific project. The Ministry of General Education and Instruction and UNICEF accept no liability.

These standards will be updated whenever new technologies and other considerations arise.

November, 2016

FOREWORD

On behalf of the Ministry of General Education and Instruction (MoGEI), I am pleased to present the first edition of the Basic Schools Construction Standards and Guidelines of the Republic of South Sudan (RSS). The primary purpose of this booklet is to provide guidelines for Basic school construction in South Sudan's education system from pre-primary to primary schools.

According to the Education Management System EMIS (2015) it is estimated that in South Sudan, more than 37% of primary school classrooms are either under trees, open air or temporary learning spaces. Only 36% of the primary schools have permanent classrooms while 27% have semi-permanent classrooms.

The State of Water, Sanitation and Hygiene (WASH) facilities is appalling, with 64% of primary schools having no access to drinking water, while 53% do not have access to latrines. Only 3% have access to electricity, while only 8% have access to health care facilities.

It is noteworthy that since the signing of the Comprehensive Peace Agreement in 2005, school construction interventions have been implemented by the Ministry of General Education and Instruction, and other development partners so as to address the existing shortage of Child Friendly Schools in the country. Unfortunately, in most instances each of the organizations implementing school construction projects introduce different types of school designs and some of the facilities eventually built do not meet basic standards of child friendly schools.

For example some classrooms are very small, while others do not provide for ramps as a means to improve access for children with disabilities, while still other schools are built and commissioned without WASH Facilities. Overall, most schools are not built according to Child Friendly Schools Standards, even where permanent or semi-permanent classrooms exist.

Proper school construction should emphasize child-friendly school interventions that support efforts of ensuring that children attend schools that provide a safe, healthy and comfortable environment where they can grow, learn and prosper.

The establishment of basic schools construction standards and guidelines for South Sudan will ensure that all construction of schools adheres to agreed minimum standards for child friendly and safe learning spaces.

The Ministry of General Education and Instruction at all levels will ensure that these guidelines are used to institutionalize child friendly learning spaces throughout the country.

Sincerely,

Hon. Deng Deng Hoc Yai
Minister of General Education and Instruction

ACKNOWLEDGEMENT

The South Sudan Ministry of General Education and Instruction would like to express appreciation to those who have contributed to the development of these Basic School Construction Standards and Guidelines for the Republic of South Sudan. This set of standards and guidelines is a product of a participatory and consultative process involving various key stakeholders in the public and private domain in the South Sudan school construction sector.

The process of developing these standards started in 2012 with the development of the first draft of the minimum spatial standards for child friendly schools in South Sudan. Thereafter in 2015 target field assessments were carried out in at least Four States of South Sudan (Eastern Equatoria, Central Equatoria, Jonglei and Western Bahr El Ghazel) where various Education actors were consulted and at least 24 basic (primary) schools assessed. During the assessments, parents, head teachers and teachers of public and private schools from all the assessed states were consulted on various aspects of school infrastructure and feedback was obtained.

Following the field assessments and consultations, a national consultative workshop was convened where representatives from each state participated, including Engineers and Planners involved in Education infrastructure from each of the states of South Sudan. These participants were invited to verify the field assessment findings and seek for their contributions and further feedback pertaining the initial case study report and draft as part of the standards and guidelines development process. Feedback from these consultations was incorporated into the final draft document. Subsequently, a validation workshop was convened with participation from key stakeholders from the public and private sector in the school construction sector, so as to finalise the consultative process. Thereafter, the Technical Working Group finalised the development of the standards and guidelines making reference to existing national and international best practices.

The Ministry of General Education and Instruction would like to recognize the following members of the Technical Working Group for the significant amount of work they have done to support the development of these much needed guidelines for the basic schools construction sector in the country. And the partners that have provided the financial support.

Lead Coordination; James Odick, Ag. Director of Physical Planning and Construction, MoGEI
Lead Partner; William Nyamutale, Construction specialist, UNICEF South Sudan
Paolo Cardellino, Consultant Engineer, UNICEF South Sudan
Financial Support from; Global Partnership for Education and USAID

The Ministry also acknowledges the key role played by the following organisations in the guidelines development process: UNICEF, USAID, UNESCO, BRAC, GESS, UNOPS, Room to learn, and LOGOSEED. The contribution of these partners extended beyond the workshops; they also provided key inputs to the development of these standards and guidelines. These standards will provide the much needed guidance for the construction of Basic schools in South Sudan.

Sincerely,

Hon. Michael Lopuke Lotyam
Undersecretary,
Minister of General Education and Instruction

ACRONYMS

CFL	Compact Fluorescent Lamp
CEQ	Central Equatoria
CFS	Child Friendly Schools
EA	Environmental Assessment
EEQ	Eastern Equatoria
EMIS	Education Management Information System
EMMP	Environmental Mitigation & Monitoring Plan
EMP	Environmental Management Plan
FFL	Finished Floor Level
FSC	Forest Stewardship Council
GESS	Girls Education South Sudan
IEE	Initial Environment Examination
JON	Jonglie
LAK	Lakes
MoGEI	Ministry of General Education and Instruction
MoEST	Ministry of Education Science and Technology
MOI&WR	Ministry of Irrigation & Water Resources
NBG	Northern Behr El Ghazal
PSS	Psychological Stress Support
PTA	Parent-Teachers Association
QA	Quality Assurance
SMC	School Management Committee
TLS	Temporary Learning Space
TWG	Technical Working Group
UNESCO	United Nations Education Scientific Cultural Organization
UNI	Unity
UNICEF	United Nations Children's Fund
UPN	Upper Nile
WAR	Warrap
WASH	Water Sanitation and Hygiene
WBG	Western Behr El Ghazal
WEQ	Western Equatoria

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Section 1. INTRODUCTION

1.1 Background

Access to education is a fundamental human right that every child is entitled to. The transitional constitution of the Republic of South Sudan guarantees this right and asserts that every citizen has a right to access to quality education.

"We cherish education for all people of South Sudan equally and aim to provide a lifelong education for all children and adults of South Sudan; an education that is relevant and based on the needs of the people, to enable them to be responsible citizens."

This statement provides the basis for the South Sudan Ministry of General Education and Instruction vision to provide quality education for all.
According to the General Education Strategic plan, 2012-2017, supporting increased enrolment in the formal education system requires increased numbers of permanent school buildings, each built to provide an appropriate safe and secure learning environment according to safe school construction standards.

To address the inadequate physical facilities and infrastructure of schools, the Ministry – with the involvement of the state ministries – is committed to an unprecedented construction in learning and office spaces.

The Ministry is committed to providing equal access to education to learners of all types of special needs. This effort will include the provision of access to physically challenged pupils, through the proper design of buildings that will provide easy access and mobility for all learners.

Policies do not exist to define a safe and secure learning environment for all children in South Sudan. Policy consultations were therefore carried out at all levels of government, to ensure that the requirements of states and students were considered during the development of these standards. These School construction standards and guidelines have been aligned with the definition of Child Friendly Schools that will support the South Sudan context.

Photo 1. Inside a new Child friendly classroom at Ayii central primary school(Source: ©UNICEF/South Sudan-2016/ D.M.Thompson)

Therefore, these school construction standards and guidelines have been developed as part of the national policy for defining a safe and secure learning environment for basic schools in South Sudan. This set of standards and guidelines is a product of a participatory and consultative process involving all levels of government and private sector players in the South Sudan school construction sector and under the leadership of the Ministry of General Education, and Instruction in partnership with UNICEF.

1.2 Justification,

Proper school construction should emphasize child-friendly school interventions that support efforts of ensuring that children attend schools that provide a safe, healthy and comfortable environment where they can grow, learn and thrive.

The establishment of basic school construction standards and guidelines for South Sudan will ensure that school construction adheres to agreed minimum standards for child friendly and safe learning spaces. This will enhance enrolments and attendance and boost education achievements as per the General Education Strategic Plan, 2012 to 2017.

The Ministry of General Education and Instruction at all levels will ensure that these standards and guidelines are used to institutionalize child friendly learning spaces throughout the ***country.***

1.3 Objectives

The Standards will contribute to 'education for all' through the following strategic objectives:

- Increased access to general education and the promotion of equity in participation in education through 'Child Friendly Schools'
- Promotion of inclusive education aspirations by improving access to learning facilities for all chil dren.
- Promotion of education for all through complimentary efforts of different design options for vary ing settings.
- Inculcate child friendly school standards, including hygiene practices and behaviours that may last a life time.

- Improved outreach to underserved communities through the use of complementary approaches such as community schools.
- Overall improved quality of learning environments in South Sudan.
- Increase in general enrolments, attendance and completion rates.
- Improved operation and maintenance of school facilities for enhanced sustainability of structures.
- Enhance the enabling environment for improving the quality of the general education situation in South Sudan.

1.4 Literature Review

A wide literature analysis has guided these standards development. Specific documents on South Sudan were consulted through sources for general data on Primary Schools and basic Education in the country, including:

- The South Sudan General Education Strategic Plan, 2012-2017
- UNESCO - "Country Programming Document, South Sudan 2014-2016"
- GESS-Girls Education South Sudan – "South Sudan Education Statistics"
- UNICEF- Annual Report 2013 – "Republic of South Sudan"
- South Sudan EMIS Statistics Booklet, 2015
- TWG, South Sudan Technical Working Group for Community Schools – "Community School Construction in South Sudan: Complementary Models and Approaches", 2015. South Sudan MoEST – "Draft County level school construction implementation guidelines"
- South Sudan MoEST – "Alternative Education System Policy Summary"
- INEE – "South Sudan Minimum Standards for Education in Emergencies"

Reference was also made to school construction standards and guidelines developed by other countries including:

- Rwanda Ministry of Education – "Child friendly school infrastructure standards and guidelines – Primary and Tronc commune schools"
- Ethiopia Ministry of Health, Education and Water and Energy/UNICEF – "Design Construction Manual for water supply and sanitary facilities in Primary Schools"
- Laos PDR Ministry of Education – "School construction guidelines"

1.5 Overview and justification on school typology grading

As South Sudan continues to develop at a steady and rapid rate, it is acknowledged that increasing the quality of schools is an ongoing process.
Therefore, these Standards seek to establish the minimum standards Categorized as:

MUST: The minimum Spatial Standards for a Child Friendly School

SHOULD: Standards that give guidance on additional school spaces and quality that is encouraged and is in line with best practice

MAY: Standards that give guidance on school spaces and qualities identified as beneficial if resources are available

Categorization of schools will be based on the standards that are outlined in the guidelines. It is a tool conceived to determine the expected performance for future schools and facilitating the promoters' task (at the administration level, community level or private sector level) for an accurate and targeted planning and monitoring process.
Standards grading shall guide every future project in the planning and programming phase. Whilst these standards offer a wider coverage for what concern the construction of a full-cycle, permanent primary school, the general approach and the **MUST** standards shall be taken into consideration in any future primary school construction project, including TLS and community-driven semi-permanent structures.

1.6 Characteristics of Existing School Infrastructure in South Sudan

Photo2. Open air classroom at Ayii central primary school(Source : ©UNICEF/South Sudan-2016/ D.M.Thompson)

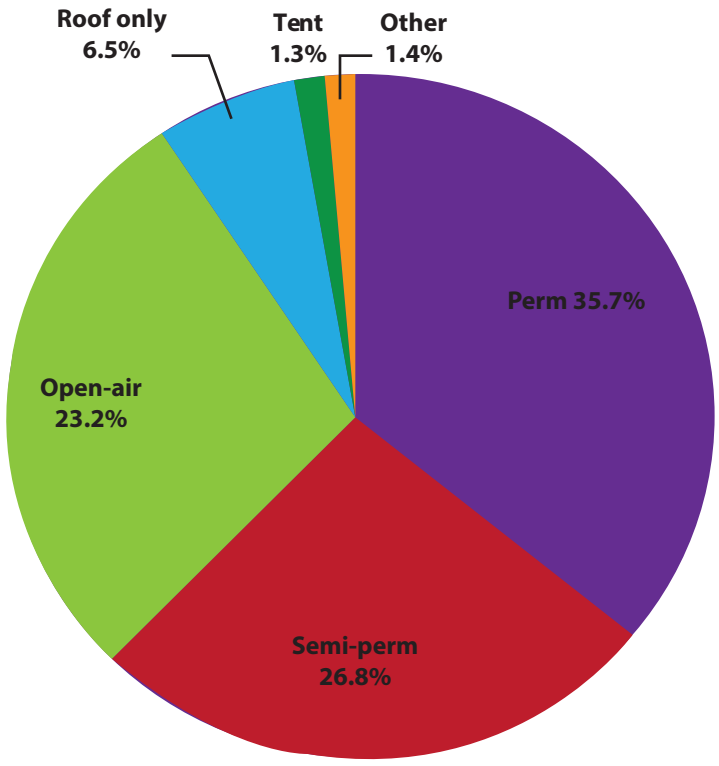
According to EMIS, 2015 (Table 1.0), of the 20,129 primary school classrooms in the country, 5,681 are open-air (28.2%), 1,313 (6.52%) are roof-only, 5,404 (26.85%) are semi-permanent facilities and only 7,184 (35.69%) are permanent classrooms. Table 2.0 further shows the number of primary school classrooms and pupil-classroom ratio (PCR) by state and type, from 2012 till 2015, showing comparative data over the three years. In 2014 there was no data collection. According to Table 2.o, in 2013, the total number of classrooms was 24,390 of which 9,104 (37.3%) were open-air, while 5,334 (21.86%) were semi-permanent facilities and only 7,900 (32.39%) were permanent classrooms.

Table 1.0: Number of primary school classrooms and pupil-classroom ratio (PCR) by state and type, 2015.

State	Total	Perm	Semi-perm	Open-air	Roof only	Tent	Other	PCR
CEQ	3,943	2,010	1,480	217	155	28	53	55.5
EEQ	2,218	918	663	387	207	20	23	70.9
LAK	2,322	558	380	1,122	202	31	29	137.4
NBG	3,399	931	884	1,336	165	26	57	106.0
WAR	3,325	743	863	1,393	242	30	54	126.4
WBG	1,395	747	430	71	95	38	14	70.9
WEQ	2,298	911	370	797	148	27	45	71.3
JON	799	216	223	265	52	36	7	0.0
UNI	430	150	111	93	47	29	0	2.7
UPN	0	0	0	0	0	0	0	
Total	20,129	7,184	5,404	5,681	1,313	265	282	641.0

Source: EMIS, National Statistical Booklet Information 2015

Figure 1.0 Percentage of primary school classrooms by type, 2015



Source: EMIS, National Statistical Booklet Information 2015

Table 2.0: Number of primary school classrooms and pupil-classroom ratio (PCR) by state and type, 2012-2015

State	Year	Total	Perm	Semi-perm	Open-air	Other	PCR
CEQ	2015	3,943	2,010	1,480	217	236	56
	2013	3,449	1,627	906	619	297	61
	2012	2,609	1,310	690	273	336	74
EEQ	2015	2,218	918	663	387	250	71
	2013	1,850	818	262	563	207	88
	2012	1,628	692	245	465	226	110
LAK	2015	2,322	558	380	1,122	262	137
	2013	1,990	531	188	1,085	186	137
	2012	1,590	452	218	789	131	154
NBG	2015	3,399	931	884	1,336	248	106
	2013	4,459	1,152	1,493	1,571	243	62
	2012	2,112	605	388	900	219	148
WAR	2015	3,325	743	863	1,393	326	126
	2013	3,080	631	743	1,470	236	133
	2012	2,228	487	559	847	335	154
WBG	2015	1,395	747	430	71	147	71
	2013	1,181	608	244	197	132	69
	2012	1,067	495	243	194	135	94
WEQ	2015	2,298	911	370	797	220	71
	2013	1,849	808	234	630	177	79
	2012	1,505	519	223	565	198	105
JON	2015	799	216	223	265	95	0
	2013	2,743	514	542	1,407	280	195
	2012	2,493	589	585	936	383	203
UNI	2015	430	150	111	93	76	3
	2013	1,359	270	245	775	69	196
	2012	1,368	332	317	628	91	198
UPN	2015	0	0	0	0	0	
	2013	2,430	941	477	787	225	126
	2012	1,896	883	537	309	167	131
Total	2015	20,129	7,184	5,404	5,681	1,860	79.9
	2013	24,390	7,900	5,334	9,104	2,052	99.8
	2012	18,496	6,364	4,005	5,906	2,221	131.6

Source: EMIS, National Statistical Booklet Information 2015

1.7 Schools assessment and data collection: the Case Study

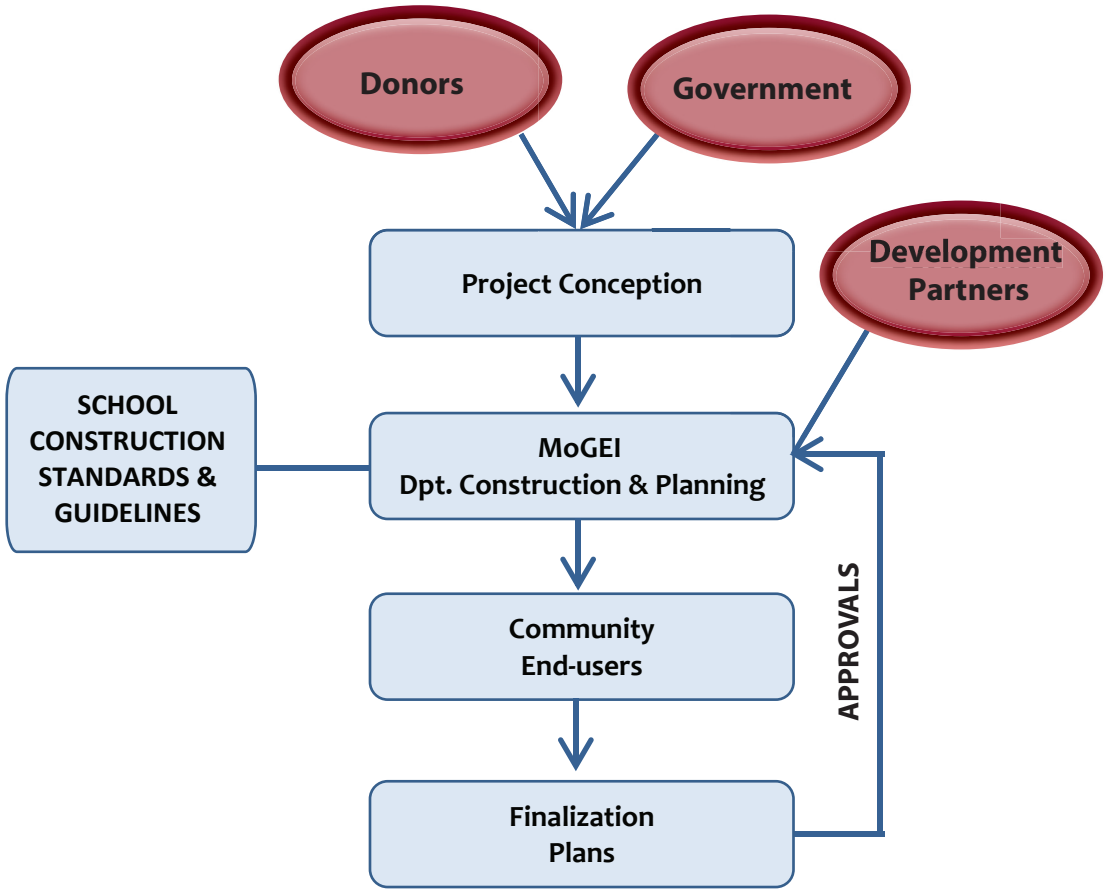
Case study field assessments were undertaken in the early stages of developing these standards and guidelines. Several schools in different States were assessed in partnership with the local authorities (State Ministries of Education). The main findings have been shared as a case study report during the Consultative Workshop and form part of these Guidelines' structure (see Annex for a list of the assessed schools).

Section 2. STANDARD FRAMEWORK

2.1 Targeted use and audience

These standards and guidelines shall be used as a reference by all Stakeholders who are involved in the planning, designing, monitoring, procuring, construction and rehabilitation of school infrastructure in South Sudan.

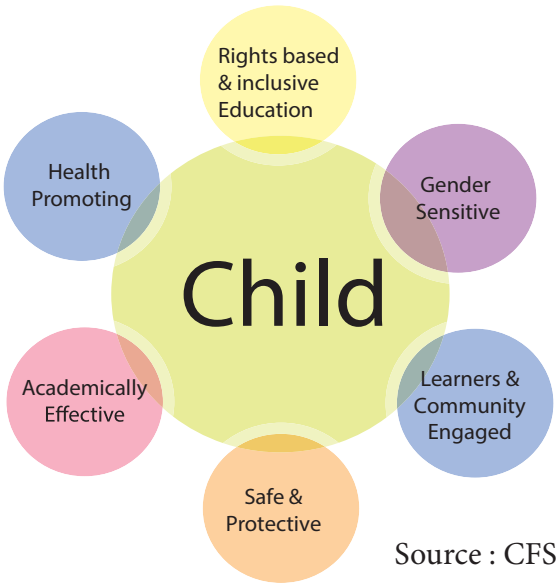
Figure 2.0: Project Approval Flow Chart



2.2 Child Friendly Schools Approach

The concept of "Child Friendly Schools" is a multi-dimensional approach for improving the quality of education, whereas the Child is at the centre.

Figure 3.0: CFS Dimensions



Source : CFS manual

DIMENSION 1: *RIGHTS BASED & INCLUSIVE EDUCATION*

Focused on the Rights of the Child, guaranteeing opportunity and meeting the needs of children.

Indicators: Equal access to and enrolment in school of all children, focus on accessibility for children with disabilities, all children are given opportunities.

DIMENSION 2: *GENDER SENSITIVE AND RESPONSIVE*

Girls and boys have equal access to, enrolment in, and completion of school.

Indicators: Girls and boys have equal access to, enrolment in, and completion of school – provision for menstrual hygiene facilities in school designs, e.g washrooms to encourage completion rates for girls, there is equality in the learning process for boys and girls.

DIMENSION 3: *INVOLVEMENT OF LEARNERS AND COMMUNITY*

Learners, and the Community regularly use opportunities to express their views and to make decisions concerning school work and school life, including participation in the School Sites selection and Improvement Plans

Indicators: parents are full partners in decision-making on issues affecting their children's education; representatives of the community and local organizations participate in the management of school and community resources; learners actively participate in student organizations according to their interests.

DIMENSION 4: *SAFETY AND PROTECTION*

Learners are in a Safe and Protective Environment

Indicators: School environment assures safety and protection-this includes providing for school fencing as part of school construction, there is low occurrence of physical injuries in the school environment-free of safety hazards, there is low occurrence of violent behaviour, disturbance, and abuse of children in the school environment.

DIMENSION 5: *ACADEMIC EFFECTIVENESS*

Improved student achievement – Children achieve to the best of their ability.

Indicators: Use of new innovative methods to enhance student learning – The schools are designed to provide a motivating classroom environment; schools are provided with appropriate Learning materials and resources including school furniture.

DIMENSION 6: *HEALTH PROMOTING*

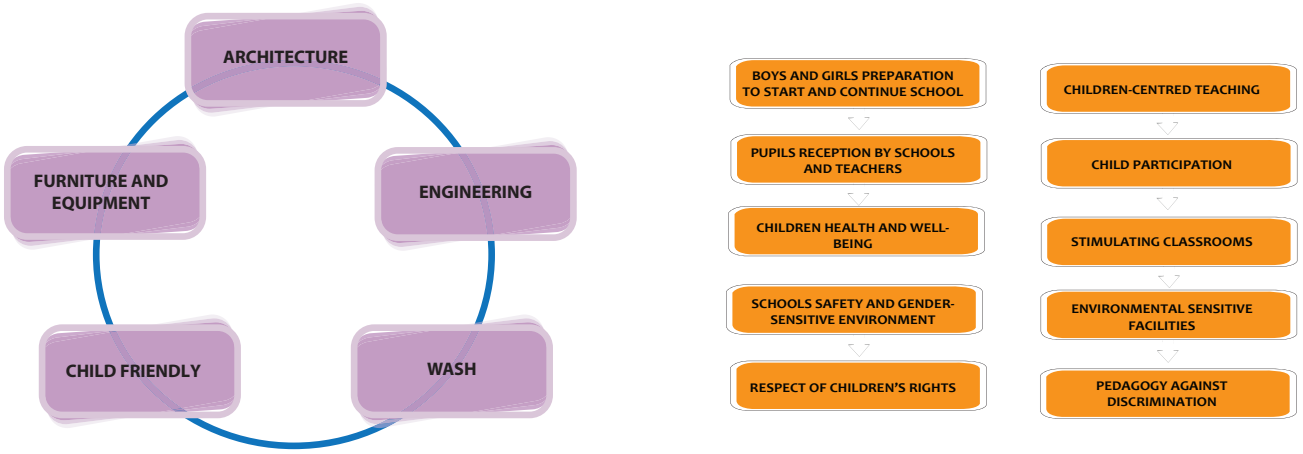
Learners are in a Health-Promoting Environment

Indicators: School environment assures proper hygienic conditions, with adequate water and sanitation facilities, the WASH facilities are gender segregated and make provision for learners with disabilities.

2.3 Standards Grid

The Child Friendly Schools Manual tries to translate the multi-dimension approach into standards guiding the school design as:Architectural,Engineering,WASH,child friendly, furniture and Equipment standards.

Figure 4.0 Standards Grid



For clarity, these standards are subdivided into five different design categories, as per the following table:

Table 3.0: Design Standards Categories

STANDARDS	ARCHITECTURE	ENGINEERING	WASH	CHILD FRIENDLY	FUNRITURE AND EQUIPMENT
	Light, air sun, dust, glare, reflection, humidity, noise and odour	*Structure stability (wind, earthquake, lightning, drainage)*	*Safe water*	*Colours*	*Power (electricity or alternative)*
	Administrative spaces	*Safety provisions (fencing, security)*	*Hygiene facilities*	*Flexible spaces*	*Health provisions*
	Library		*Toilets and latrines*	*Relaxation rooms near learning areas*	
	Landscaping			*Individual spaces*	
	School library and resources room		*Bathrooms*	*Protective environment*	
	Open spaces				
	Kitchen		Waste water disposal		
	Clinic / sick room				

The overall design approach has to remain multi-disciplinary. The different categories of design shall continuously interact in order to achieve a common goal, which is a positive, child-centred learning environment.

Section 3. SCHOOL CONSTRUCTION PLANNING

Planning is a crucial phase in the school construction process.
The goals in terms of deliverables must be aligned with the local context and the funds availability, in order to define an effective, realistic program.

It is important that all the actors participating in the process, including the local communities, are involved from the very first planning stage .

Photo 3. Community consultation
(Source : ©UNICEF/South Sudan-2016/W. Nyamutale)

3.1 Programme definition

Programming is required to define the numbers, sizing and typology of the facilities. This guides the choice of the most optimum intervention.

Numbers: In South Sudan, the Primary School cycle is organized in 8 Grades, from Primary one to Primary Eight. For a Full-Cycle Primary School the minimum requirements in terms of classrooms must therefore be Eight.

The exception can be considered for Community schools where fewer classrooms may be used as an entry level where there exists no school at all. Current statistics show that for Full-Cycle Primary Schools, the first grades have the highest attendance rates, with often more than 100 pupils in a single classroom. During the planning phase, it is therefore recommended considering to increase the classroom number to ten in order to provide for additional spaces for the first two Grades (P1 and P2). This recommendation applies particularly to urban settings.

Typologies: A proper assessment should consider local community consultations in order to address the real needs and propose the most optimum intervention. School infrastructure typology in the context of South Sudan can be grouped into eight macro-families; Permanent structures, Semi-Permanent structures, Permanent Foundation and semi-permanent superstructure, Roof-Only, Open-air, Tents, Damaged existing facilities requiring repair and Using Existing Buildings for multi-purposes.

The local infrastructure typologies are further explained in order to better understand their characteristics:

Photo 4. Child friendly school with permanent structure at Dereto primary school (Source :©UNICEF/South Sudan-2015/ S.Rich)

a) Permanent structures : Permanent structures refer to school infrastructure built with durable materials (those materials with a life-span of at least 10 years), such as reinforced concrete, iron structures, cement blocks, burned clay bricks, corrugated iron roof sheets, etc. Where funds are available, durable materials should be used. Construction costs are high for permanent structures compared to other options, but it provides buildings that can last 20 years and beyond.

b) Semi-permanent structures : Semi-permanent structures refer to those buildings typically constructed with non-durable materials (materials with a life-span of less than 10 years), such as timber, bamboo and unbaked earth for the walls, thatching, tarpaulin and roofing sheets for the roofs, etc. This is a transitional solution between tents and a permanent structure. Its main characteristics include low cost, use of local materials and community involvement in assembling and maintaining the structure. Where the community can provide some locally sourced materials and other partners can provide imported materials to strengthen the structure, semi-permanent facilities should be established.

c) Permanent Foundation and semi-permanent superstructure: This would constitute a permanent foundation type, complete with concrete flooring. However, owing to the limitations in funding, the superstructure can be built using semi-permanent materials, and completed as a shell with a roof and its supporting structure. Such a structure would allow for future adjustments to make the building all permanent, complementing the existing permanent foundation.

Photo 5. Permanent foundation and semi-permanent super structure at Lobonok primary school (Source :©UNICEF/South Sudan-2014/ W. Nyamutale)

d) Roof-Only Structures : Roof-only structures refer to those classrooms that consist only of a roof and its structure. The roof is normally made of corrugated iron sheets or grass thatching sustained by a timber structure. These structures are normally built and maintained by the local community.

Photo 6. Roof only classroom at Ayii primary school (Source :©UNICEF/South Sudan-2015/ W. Nyamutale)

e) Open-Air Structures : Open-air learning spaces are often located under a tree. This is normally the first response of a community in an effort to provide education to their children.

f) Tents : Tents are the first response in an emergency situation. Tents are temporary solutions easy to assemble, but relatively expensive compared to semi-permanent solutions, considering its short lifespan. Their use should be limited to urgently address an identified need, and allow the community or the other stakeholders to provide additional community school facilities while the learning happens in the tents. Due to the hot and humid conditions in the context of South Sudan, their use is not recommended save for absolute emergencies.

g) Damaged existing facilities requiring repair: Where education facilities exist with potential for rehabilitation, this should be prioritized, instead of establishing new facilities. Renovation of existing facilities should always be considered as the first option, in order to optimize available resources. Improvements may include repair works to: the roof, structural deficiencies and enhancements, water source (well, spring) cleaning/sanitizing, plumbing and electrical improvements, painting, replacing/ eliminating window shutters,glazing and screens.

h) Using Existing Buildings for multi-purposes: Following the recommendations of local community leaders, existing facilities can be used by communities as temporary community schools, serving as immediate entry points in the provision of education for all.Such existing buildings may include but not be limited to churches, community centres, etc

Multi-disciplinary approaches: Multi-disciplinary approaches have been defined as part of these standards by a practical tool (Table 4.0) that shall help the involved stakeholders to address the program definition responding to quality standards. These multi-disciplinary approaches include;

Photo 7. Inside a tent classroom at the Bor POC
(Source : ©UNICEF/South Sudan-2014/ W. Nyamutale)

a) Community Involvement: The Complementary Models Approach emphasises the Importance of involving the communities in the School Construction Process through out all the stages of the school construction project.

b) Child Friendly Schools: CFS approaches should be a reference from the planning and program definition phase.

c) Quality Control: The success of a Child Friendly School construction process can only be guaranteed if the quality control starts from the very beginning. Practical tools such as the checklists have been defined to support this approach.

Other factors to be considered during the program definition are:

- Refurbishment / extension; new facilities in an existing compound through new construction.
- Urban / rural area; urban settings typically require space exceeding the minimum of eight classrooms due to congestion. Furthermore, Juba could deserve specific considerations that may include exploring storied school facilities.
- Urgency / socio-political stability.
- Availability of funds / availability of land.
- Expected/future pupils' numbers
- Need and capacity of building and managing staff houses

The following check list is matching the possible programs with the categories grading introduced in the previous section.

Table 4.0: Matching Matrix for possible Programs with categories grading

			STANDARDS									PROPOSED CATEGORIES
			A **ARCHITECTURAL STANDARDS** Appropriate, sufficient secure building		**B** **ENGINEERING STANDARDS** Healthy, clean, secure, learner protective environment		**C** **WASH STANDARDS** Healthy, clean environment		**D** **CHILD FRIENDLY SCHOOLS** Child-friendly, barrier-free environment, inclusive access and equal rights for children		**E** **FURNITURES AND EQUIPMENT** adequate and appropriate equipment that support the level of education	
MUST CATEGORIES	1 - Unfit		Where the minimum requirement for a "Fit for Human Occupancy" School facility cannot be achieved, the project should be AVOIDED. The Construction Program has to be improved and completed to satisfy as a minimum the Basic/Emergency situations requirements.									BASIC / EMERGENCY SITUATIONS
	2 - Fit for Human occupancy	A.1	Classroom design	B.1	Basic security and natural hazard protection	C.1	Toilet and hygiene facilities	D.1	Accessible for all children			
		A.2	Head teachers' room design			C.2	Washing (clean) water access	D.2	Accessibility for disabled infant			
				B.2	TLS - minimum structural design guidelines	C.3	Drinking water access	D.3	Accessible location			
				B.15	Lightning arrester							
	3 - Fit for Basic Education	A.3	Playground	B.3	Solid waste disposal system			D.5	Special needs room's space (PSS)	E.1	Didactical material	
		A.4	Staff room							E.2	School furniture	
										E.3	First aid kit	
										E.4	Sanitary material	
										E.5	Basic sports equipment	
	4 - Fit for Effective Education	A.5	Storage	B.4	Fence	C.4	Suppression of stagnant water	D.6	Barrier-free access			MINIMUM STANDAR
		A.8	Landscaping	B.5	Drainage			D.8	Colours			
		A.11	Kitchen & store	B.6	Semi-permanent structures, materials and technologies							
		A.13	Sign-post									
				B.7	Semi-permanent structures, structural design guidelines							
SHOULD	5 - Above standard	A.9	Outdoor learning area	B.8	Permanent structures, structural design guidelines	C.5	Solar power pump and tank	D.9	Tactile surface	E.6	Energy / Electricity	URBAN / SETTLED AREAS
		A.10	Canteen					D.10	Signage			
		A.7	Library	B.9	Rainwater harvesting system			D.7	Special needs room			
		A.12	Teachers' housing	B.10	Incinerator (see B.6)							
		A.6	Classrooms' flexible spaces	B.11	Compost (see B.6)							
				B.12	Energy-efficient stove							
MAY	6 - Excellent standard	A.14	Multi-purpose hall (Theatre)	B.13	Sustainable construction	C.6	Water networking					
		A.15	Medical sick-room	B.14	Use of sustainable energy (see							
		A.16	Science laboratory									
		A.17	ICT room									

3.2 Climatic considerations

South Sudan has a climate similar to an Equatorial or tropical climate, characterized by a rainy season of high humidity and large amounts of rainfall followed by a drier season. The temperature on average is always high with July being the coolest month with average temperatures falling between 20 and 30 °C and March being the warmest month with average temperatures ranging from 23 to 37 °C).

The most rainfall is seen between May and October, but the rainy season can commence in April and extend until November. On average, May is the wettest month. The season is "influenced by the annual shift of the Inter-Tropical Zone" and the shift to southerly and south-westerly winds leading to slightly lower temperatures, higher humidity and more cloud coverage.

3.3 Geotechnical and Regional considerations

Additional considerations related to regional peculiarities should guide the program design.
They can include:

- Juba area as a strongly urbanized and growing centre, with its specific needs and constraints.
- Black cotton soil regions, flood-prone, with specific needs in terms of foundations.
- Good soil, maroon areas, where building structure can be simplified.
- Areas particularly exposed to strong winds (prevailing wind directions to be assessed).

3.4 Site selection

The architectural design phase as well as funding allocation should not be undertaken prior to the development of the project planning.
This must include Site Selection and a Site Master Plan, or layout that allows for the definition of the program.
The Site Selection process is a major exercise that should address two main topics: Site Location and Site Program, or sizing.
Check lists are provided as part of these standards to verify that all the requirements are properly considered.

MUST Considerations in the selection of the location

Table 5.0 MUST considerations in the selection of location

General requirements:
Walking distance from community housing (max 1,5km)
Accessible by vehicle
School fence line from main highway (road) centre line distance (min 30m)
School fence line from any school buildings (min 4m)
Safety distance of School buildings from main highway (road) centre line (min 100m)
Safety distance of Playground from main highway (road) centre line (min 50m)
Accessibility to clean and drinkable water (max 200m)
Safety distance from Police stations and Army settlements (min 2km)
Site must be cleared of landmines, UXO, livestock or any other contaminants
Community involvement:
Community consultations must take place during the site selection. Optional sites must be visited and their characteristics should be analyzed and compared. A group of key stakeholders (community leaders, teachers, children, representative from the state ministry of education, etc.) must participate in the site selection to enable a thorough understanding of the context and make a more sound selection.
School Land Ownership must be verified and guarantee granted in writing with the local community
Norms and regulations (useable land on the plot) must be verified with the Local Authority
Geography:
Site Profile; The ground should be sufficiently flat, so that no major earthworks are necessary prior to construction. It is advisable to avoid steep slopes, as they typically have increased risks for landslides, land erosion, rock fall, and problems with accessibility especially for the smaller age group children as well as children with physical disabilities
Hazards; The site must not be prone to known adverse natural hazards (disasters), such as landslides and flooding. Areas with risks of landslides, flooding, low lying sites or sites close to rivers must be avoided wherever possible. The building site must be higher than the surrounding terrains.
Minimum safety distance from river banks (min 700m)
Data concerning possible construction techniques and technologies:
Specify and assess availability of any sources of local materials: sand, gravel, stone/rock, water, construction equipment, labour force.
Assess and describe soil type and composition. Show topography with contour lines, and any nearby geological features.

Mitigation measures should be included in the proposal during the planning phase wherever any one of the requirements cannot be met.

ii. Site Program and Surface definition:

The Central Government is in charge of the definition of the reference sizes of School land for urban planning purposes. It is possible to consider two different sizes for urban and rural settings, noting that in urban areas land availability could be restricted and outdoor spaces limited to the minimum.

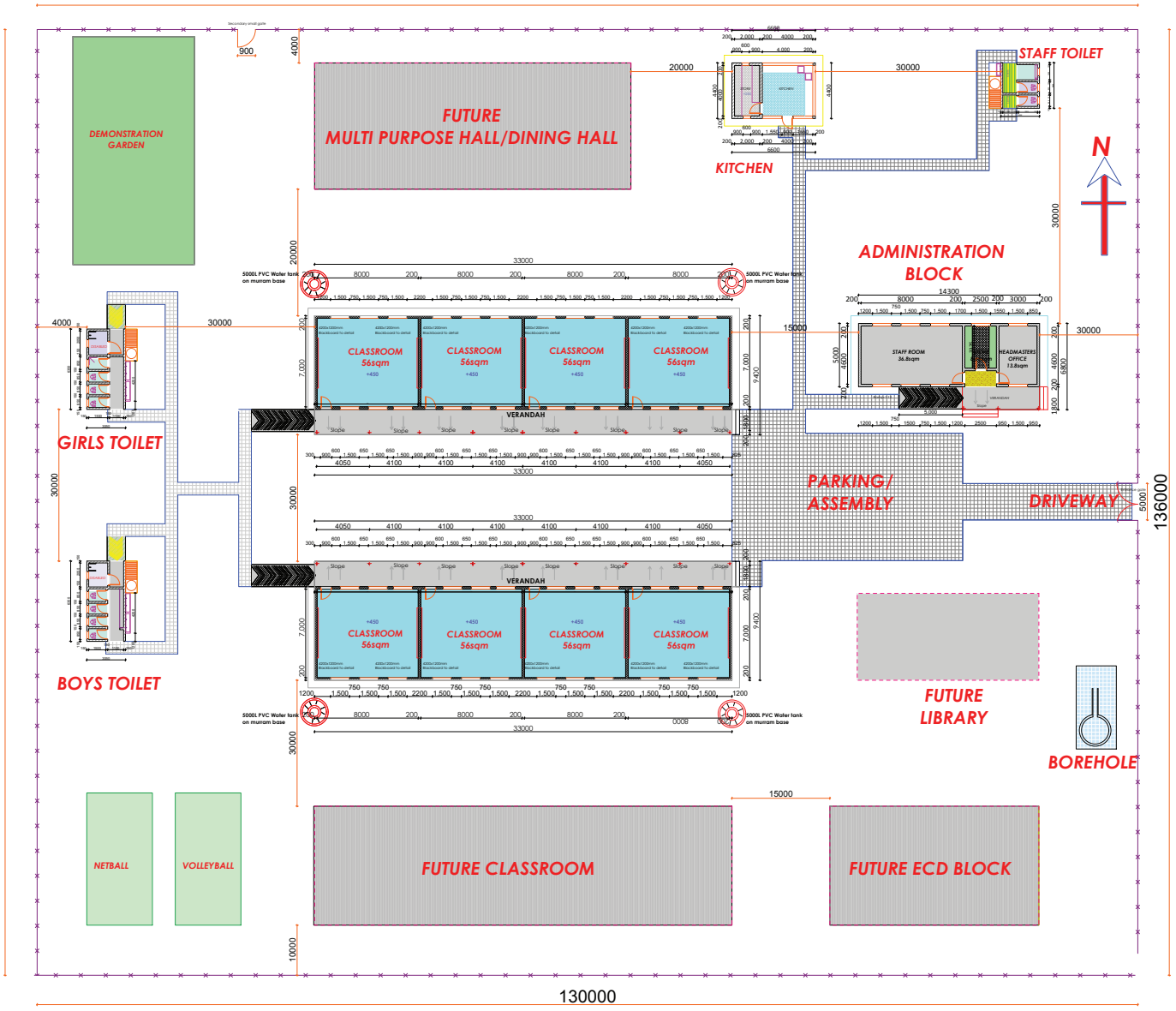
The minimum land size to fit a full-cycle school program is of 130x130m as per the sketch here below. It is nevertheless recommended to consider a minimum of 150x150m when designing the school plot. This figure may be raised up to 400x400m in rural settings.

For budget optimization purposes, whenever a bigger parcel of school land is designed (more than 150x150m) the fenced area MAY only cover the built portion of the whole plot.
The actual parcel size has to be verified during the site selection process, considering all the elements of design included in the program:

- Classrooms (grouped in the required blocks)
- Administration blocks (including offices, staffroom and learning supporting spaces)
- Segregated latrines (separate latrines for boys, girls and teachers)
- Other built facilities (Multi-purpose hall, Dinning Area, Library, others)
- External space (playground, court yard, school garden)

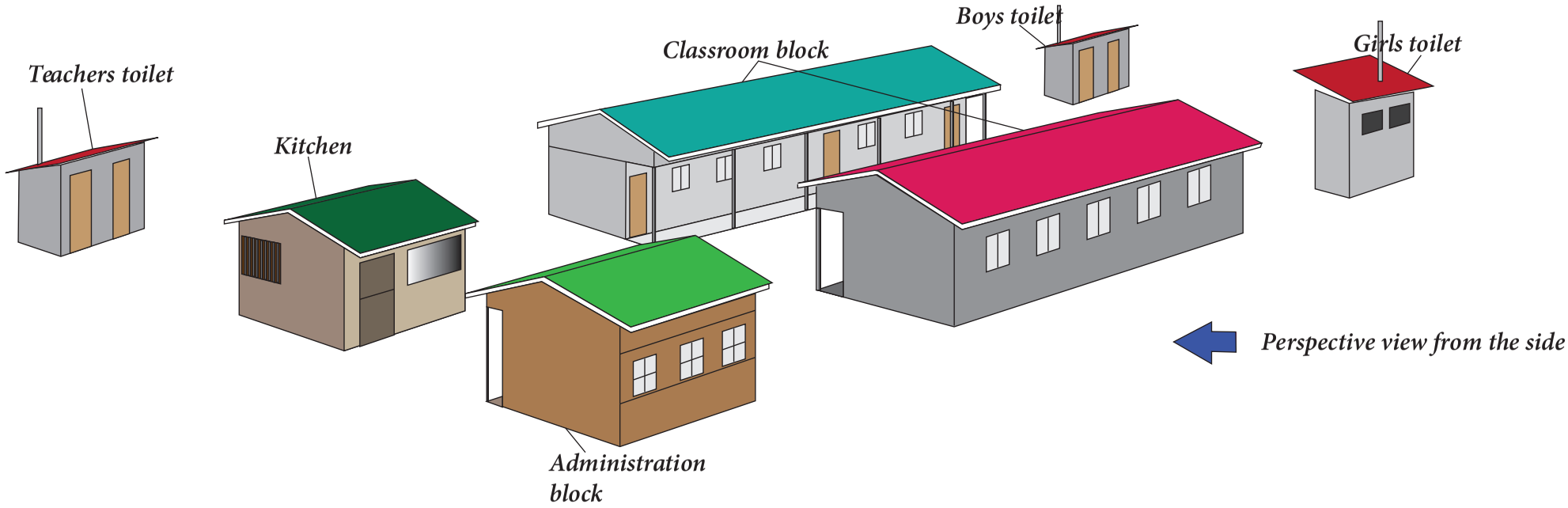
Where possible, space for future growth SHOULD be included, as shown in the site plan below .

Figure 5.0: Typical School Site Layout



MINIMUM PARCEL SIZE
Minimum parcel size of 130x 136 takes into account the building dimensions and the minimum recommended distance between the different elements

Figure 6: Perspective view of the school compound



3.5 Site layout

Establishing the Master Plan is the first step in the design process. No construction activity can take place without a Site Assessment and the Development of a Site Specific Master Plan (layout) defining the functional layout of the school site.
In the first instance, we will consider that all the classroom buildings shall be single storey.

Factors to be considered while designing the site plan layout:

- North/South building orientation: No long facades facing West/East direction. The longest facades with window openings should face north or south in order to minimize solar heating, especially during morning and afternoon hours, and heat gain of external walls, thus minimising indoor temperatures and improving users' comfort by taking advantage of natural ventilation.
- Building orientation can also be influenced by prevailing winds considerations.

- Preservation of Natural Features on Site: Use the landscape and site topography to protect the school. Natural wind breakers such as large trees can decrease a building's exposure to wind, but be sure that these are not so close as to fall and damage the building. Large trees on the site SHOULD not be removed, as they provide shade, wind protection and points of interest around and between the structures.

- Ground slope: Water table contamination must be avoided (a borehole shall be upstream of sanitation blocks), surface storm water management shall also be considered.
- Borehole sufficiently apart from the latrines (the minimum distance shall be assessed through a geological survey). A reference minimum distance is 30m.
- Strategic position for Administration building (optimising sighting and accessibility).
- Physically segregated (separate) toilet blocks for girls, boys and teachers.
- Playground areas
- A secondary gate should be provided (for safety as an emergency exit).

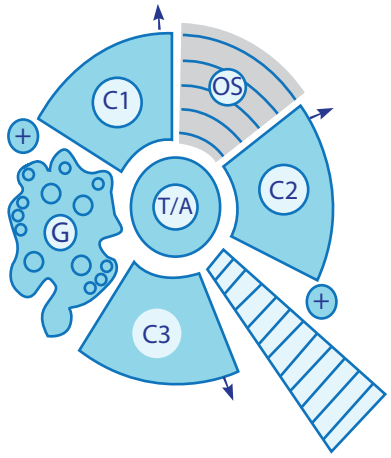
- Flexibility and expandability of land use

The minimum distance between the buildings that guarantees natural ventilation is 10-12m. The optimum distance between two opposite classrooms should be 20 to 30 metres. This distance can be increased for functional reasons in order to create appropriate outdoor spaces.

- Consider possible use of the facilities for double shifts and/or ALP
- Landscaping and school garden

Construction projects in urban settings such as Juba should possibly consider alternative layouts, such as storied school structures where wider programs take place in smaller parcels.

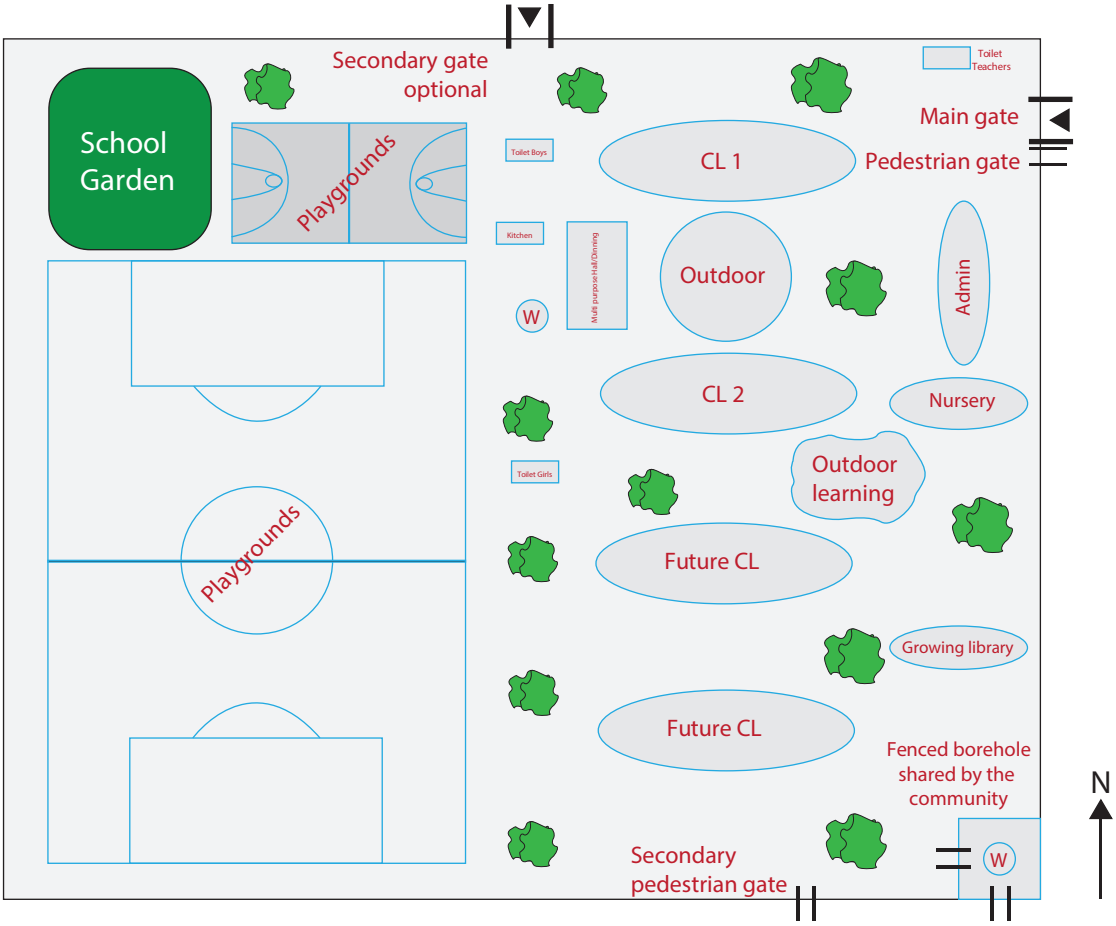
Figure 7.0: Child friendly school's layout diagram



C Classroom
T/A Teachers/Administration
\+ Intermediate spaces
G Garden
OS Open stage

Source: CFS manual

Figure 8.0: Sketch of a site layout master plan



3.6 Participatory Community Involvement

The Community should fully participate in the whole construction process. Its role can include the following steps:

- Providing the land on which the school will be established
- Taking the lead in the school Management
- Establishing strong PTAs to manage the schools
- Own, run and maintain all the school facilities
- Develop and increase the construction program during the years.

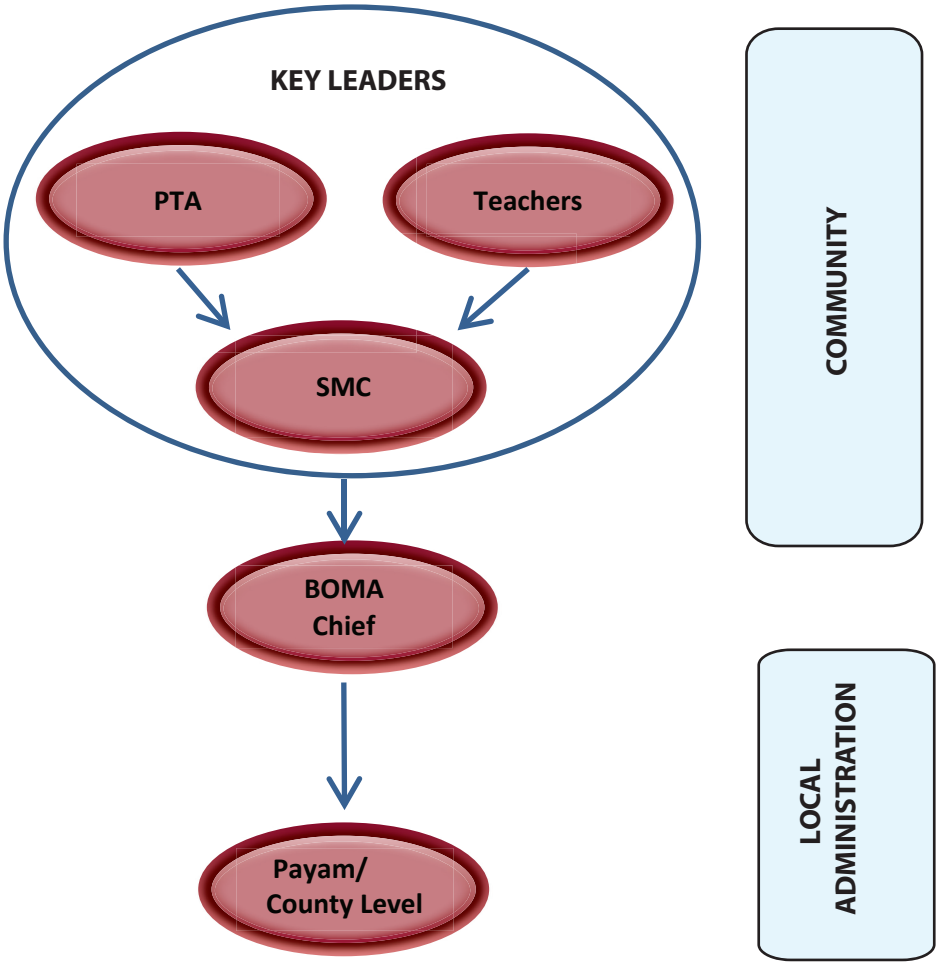
More generally, in a government-driven project, community involvement can still be enhanced by:

- Consultations during the planning and design phases.
- Establishing a "complaints" mechanism.
- Including the community in the bidding process, through publicly posted tenders or community procurement committees wherever possible.
- Informing the community of project progress
- Requesting the community for assistance in preparing the site
- Involving the community in regular site meetings during the construction phase.
- Requesting the community for support in the school maintenance.

Careful planning and clear understanding between the school and the community are essential for successful community support.

MUST considerations for Community Driven School Construction Projects

Figure 9.0: Illustration of Community and Local Administration organigram

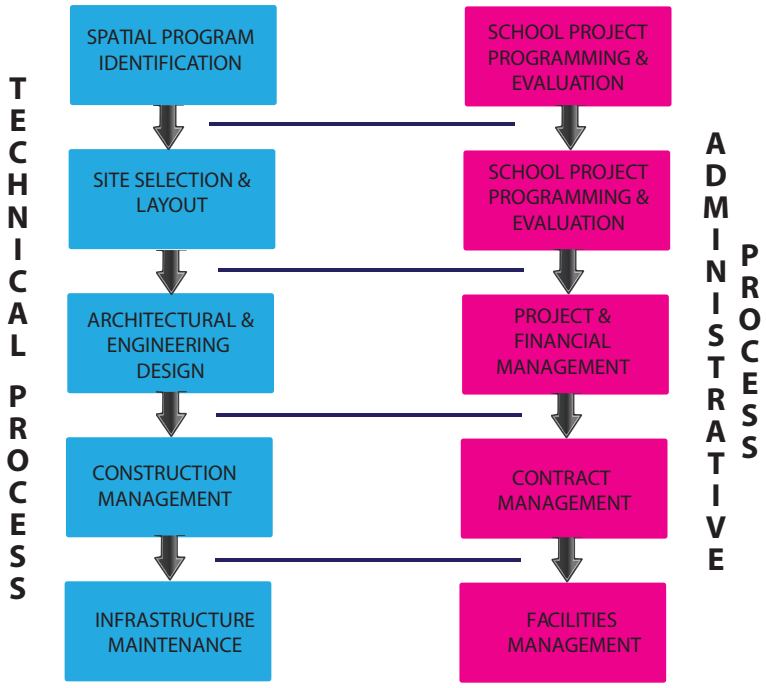


Community involvement shall therefore continue during the construction and maintenance training process, and MAY include the following roles:

- Build and/or provide teachers' accommodation.
- Supply locally sourced materials, where applicable
- As part of the PTA, support the establishment of a school demonstration garden.
- As part of the PTA, support the establishment of a school solid waste management system e.g a rubbish pit composite.
- Organize and maintain rubbish pit and composting system
- Provide food and/or water for workers where applicable
- Provide funds, where applicable.
- Prepare the school play and sports grounds
- Offer paid labour for building
- Plant trees, landscaping works.
- Provide the school land.
- Build the fence using locally available materi als, where applicable
- Other …

Program implementation diagram:
The technical process MUST be accompanied step by step with the administrative process

Figure 10.0: Illustration of a program implementation diagram



The overall project implementation path should follow a logical flow-chart where every stake-holder is playing his role. A sample logical flow chart is provided as part of the Annexes.

3.7 Environmental considerations and Sustainability

Environmental considerations must play a substantial role in the site selection process. They May include the following:

- No big trees are going to be cut during the setting out (landscaping inclusion into the design is encouraged for shading and wind protection)
- If building a TLS, possibly avoid unused land
- How and how far the materials will be sourced

Project sustainability is a key factor to consider in all the project phases, starting from the planning phase, throughout the materials selection and the construction process, including maintenance considerations.

Environmental Management / Environmental Mitigation & Monitoring Plan

Most of the funding Agencies and donors request Implementing Partners to develop an Environmental Mitigation & Monitoring Plan (EMMP), also called an Environmental Management Plan (EMP) for any construction project in South Sudan.

An EMMP is a document that sets out:

i. Mitigation Actions: Actions to be taken to satisfy the Environmental Assessment (EA) or the Initial Environment Examination (IEE).

ii. Monitoring Actions: The criteria that will be used to monitor whether the mitigation actions have been implemented and whether they are effective and sufficient.

iii. Responsibility Schedule for Mitigation, Monitoring and Reporting: The parties responsible for these actions and the schedule for the tasks.

Table 6: The EMMP will be structured as per the following sample schedule:
:

Activity 1			
Description: ***(activity brief description & potential adverse environmental impacts)***			
EA condition 1	Mitigation	Monitoring	Timing & Responsible Party
EA condition n	Mitigation	Monitoring	Timing & Responsible Party
Activity n.			
Description: ***(activity brief description & potential adverse environmental impacts)***			
EA condition 1	Mitigation	Monitoring	Timing & Responsible Party
EA condition n.	Mitigation M	onitoring	Timing & Responsible Party

Most of the small scale construction such as the community schools fall under what is called "Negative determination with conditions" (i.e projects must put together mitigation measures to ensure the impact on the environment is minimum).

It is noteworthy that almost all types of construction activities are very energy intensive and contribute to the depletion of natural resources, such as deforestation, water usage and pollution. Therefore stakeholders for school construction projects MUST conduct an assessment of potential construction materials in regard to their impact on the local environment and avoid adding to the existing environmental concerns, increasing the vulnerabilities of the resident populations.

School Construction Projects SHOULD consider establishing an Environmental Mitigation & Monitoring Plan

Section 4. SPATIAL DESIGN STANDARDS

Once the program has been defined according to the category grading, the selected elements have to be designed. All the possible categories are described through specific "elements of design" for which the standards are set in this section.

For better clarity, the standards have been divided in 5 main families focusing on the main objectives of a Child Friendly School:

Architectural Standards
For an "Appropriate, sufficient and secure building"

Engineering Standards
For a "Healthy, clean, secure, learner protective environment"

Wash Facilities Standards
For a "Healthy, clean environment"

Child Friendly Schools Design Considerations
For "Child-friendly, barrier-free environment, inclusive access and equal rights for children"

School Furniture and Equipment Design Elements
"Adequate and appropriate equipment that support the level of education"

A. Architectural Standards

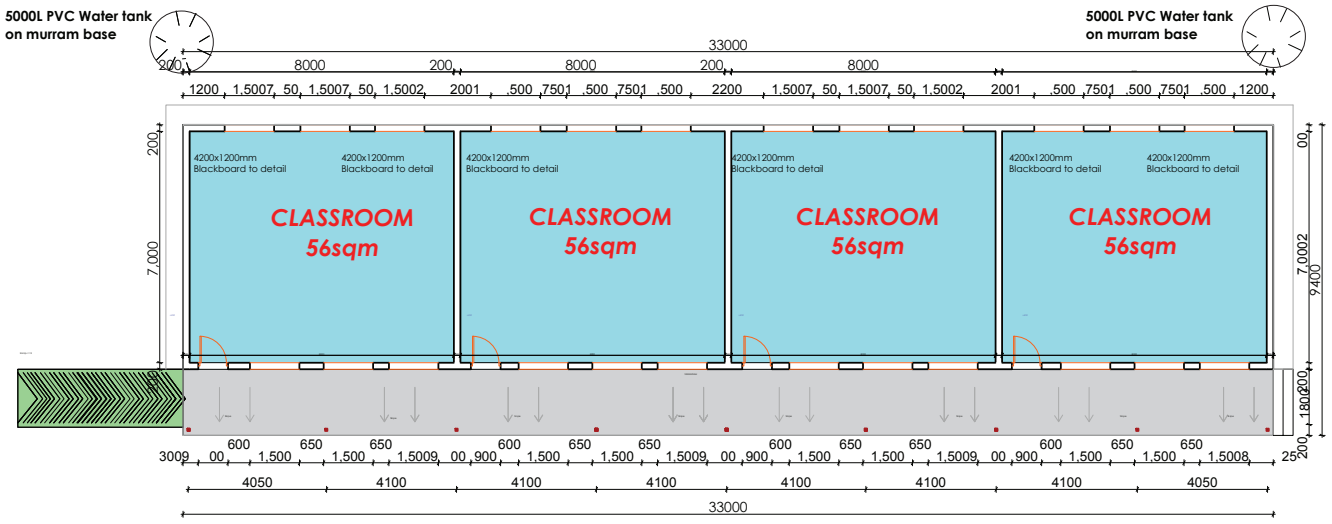
"Appropriate, sufficient and secure building"
Architectural standards set the minimum requirements that guarantee children's dignity and well-being for successful learning, in terms of:

- Space
- Comfort
- Functionality and flexibility
- Healthiness

A.1. Classroom Design

Classroom design is presented as the first standard. A massive literature supports different theories of design. These guidelines are aligned with the actual and current context of South Sudan .

Figure 11.0: Typical classroom block



A.1.1. Appropriate internal floor area

a. South Sudan targets a maximum classroom size of 50 pupils and a pupil/teacher-classroom ratio greater than 1 sqm/pupil.

Reference standards accepted throughout the African continent consider a minimum of 1 sqm/pupil, with a target of 1.2 sqm/pupil. An ordinary classroom shall therefore measure between 50 and 60 sqm.

b. Classroom length shall not exceed the value of 8.5 m, in order to limit the distance between teachers and pupils. Ideally, a length/breadth ratio of 1.2/1 allow for a better and more flexible classroom area.

Length limits: 8 – 8.5m Breadth limits: 6 – 7.5m

Ideal classroom dimensions: 7.0x8.0 m

A.1.2. Appropriate layout

c. Avoid steps inside the classroom. A maximum of flexibility and accessibility shall be guaranteed inside the classroom. (i.e. avoid teacher's stand/ raised platform/podium at the front of the classroom)

d. Allow for clear circulation spaces: 2 m for teaching area in front of the blackboard and at least 1 m between the desks.

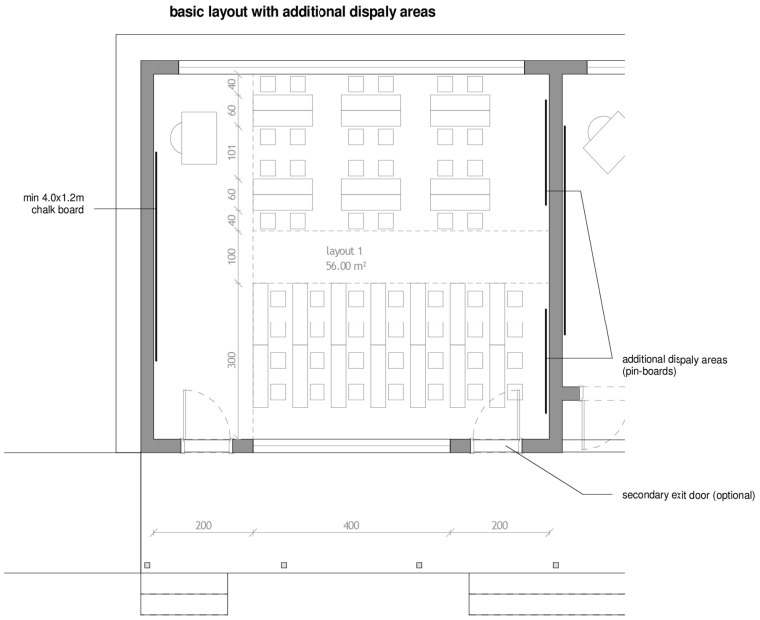
e. A main blackboard shall be installed (or constructed) on one side. Additional display areas, including supplementary blackboard and/or pinboards should be installed on the opposite side, whenever possible.

f. Additional space for fixed furniture (lockable cabinets, small library, and bench) should be designed.

g. Whenever possible, allow for an external veranda on one side of the classroom.

Veranda is a complementary space with multiple important functions, like circulation, wheel chairs manoeuvring space, rain protection, shading and glare reduction, possible external learning space, etc.

Veranda minimum recommended overall width should be 1.8m and preferably wider up to 2.2 m.



A.1.3. Spatial performances and internal comfort

i. Internal passive thermal control:

A classroom shall be designed in order to conserve a comfortable temperature with no use of electrical or mechanical devices. Overheating shall be avoided as it reduces the pupils' and teacher's concentration capacities.

Design guidelines include:

- Building orientation: Main facades shall be oriented on North/South side in order to reduce direct sunshine.
- Shading: Overhang, veranda, louvers increase the shade projection without decreasing the ventilation area. Landscaping can also play an important role.
- Ceiling height: When a ceiling is designed, minimum height is 3.0m. For sloped ceilings or roofs, the minimum wall height shall be 2.7m.
- Roof ventilation: heat tends to accumulate in the upper section of the building. The roof must therefore be well ventilated, no matter whether a ceiling is installed or not. Additional louvers and or vents SHOULD be installed above the ceiling level. A substantial roof pitch of up to 30° is better performing.
- Cross ventilation: In a hot-humid climate like in most of South Sudan, cross ventilation is the only natural means that guarantees a minimum of internal comfort. Openings on both sides are essential .

j. Daylighting

Since electrical lighting is often not part of the program, classrooms shall perform a good illumination level through daylighting.

Design guidelines include:

- Daylighting SHOULD be as much homogeneous as possible, throughout the whole classroom space, including the chalkboard area, without dark corners. Windows SHOULD therefore be equally spaced on both sides of the classroom.
- In general terms, the minimum area of transparent or semi-transparent surfaces SHOULD be equal to 1/5 of the classroom area (i.e. for a 56sqm classroom, at least 11.2 sqm MUST be covered by transparent/open spaces).
- Glare should be avoided. The design of verandas and substantial overhangs is recommended. Additional louvered surfaces above window level are effective in diffusing a pleasant lighting throughout internal spaces.
- Fixed, non-opening plain shutters MUST be avoided.

Figure 12.0; Daylight for a classroom should be 1/5 of the classroom floor area

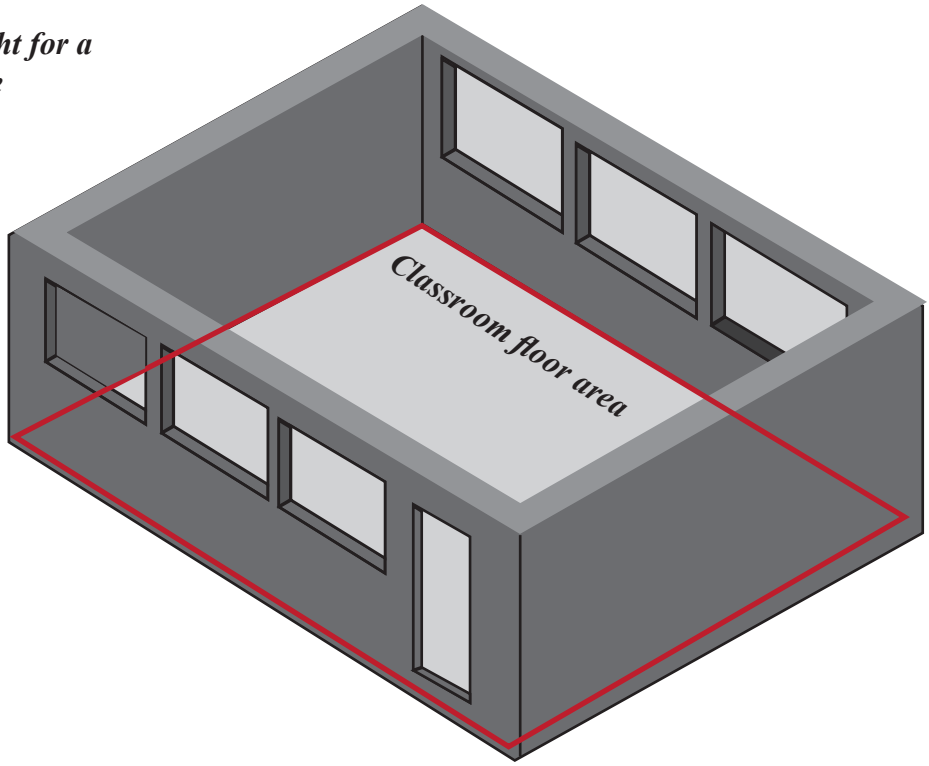
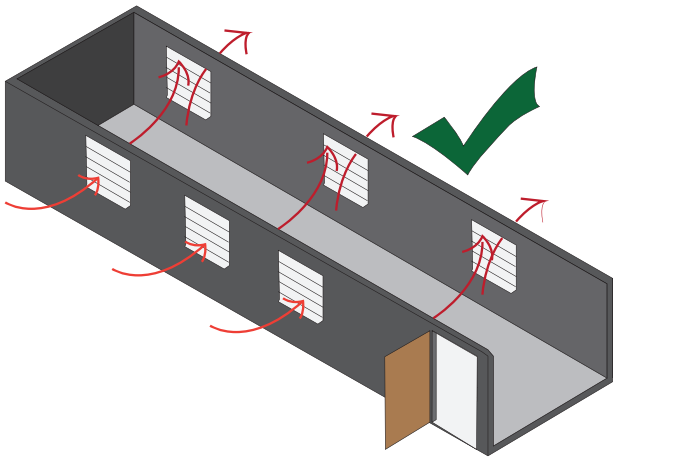
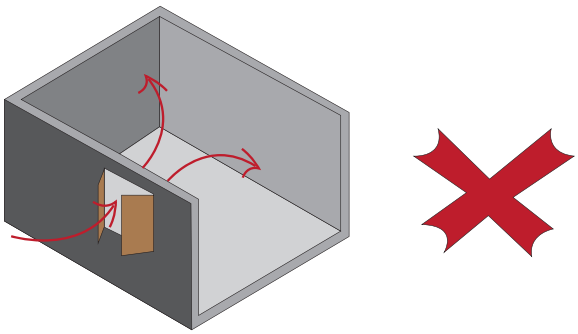


Figure 13.0: Illustration for cross ventilation.





k. Ventilation

Adequate ventilation is necessary to maintain a healthy internal environment. Since the use of glazing is considered as unsuitable, ventilation won't be an issue if adequate daylighting is designed.

Design guidelines include:

- Minimum area of ventilated surfaces shall be equal to 1/10 of the classroom area (i.e. for a 60sqm classroom, 6sqm of this MUST be covered by vents/ voids).

l. Acoustics

Acoustic performance includes insulation from external nuisance and reverberation effect mitigation. External nuisances can be generated by adjacent classrooms, recreational activities in the school compound, external noise penetration (i.e. road traffic) and rain.

Design guidelines include:

- Construction of solid separation walls between adjacent classrooms (possibly also in TLS).
- Consider the construction of portions of solid (concrete) fencing for noise mitigation where necessary (especially in an urban setting.
- Possibly use insulated material for roofing (i.e. concrete or sandwich panels.
- Ceilings may be an option, but requires precautions and must be built with solid quality materials.
- During the planning phase and site layout design, acoustics issues MUST be considered (distance from main roads, location of playgrounds, etc.).

m. Dust control

Dust protection concerns the building performance against outside dust penetration, and the possibility of effective internal cleaning.

Design guidelines include:

- Construct easy to clean surfaces, including a durable smooth flooring finishing.
- Avoid unreachable corners.
- In case of sandy and windy environment, allow for additional protection on windows openings. Landscape can play an effective role.

n. Waterproofing

Water proofing is fundamental for the building durability, no matter which technology will be adopted. Water can enter the building from all the directions (top, bottom, sides) and protective measures shall be put in place for all of them.

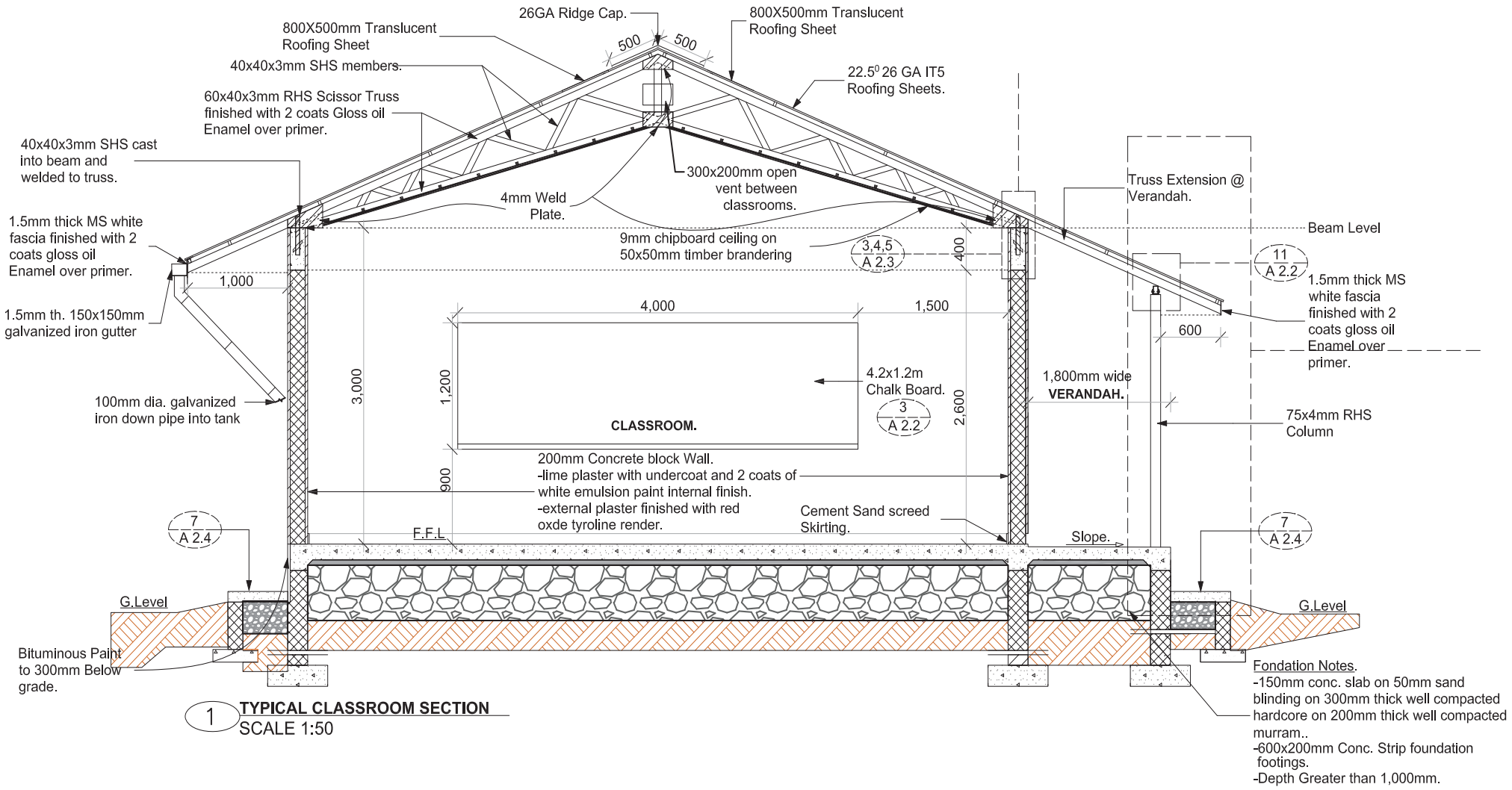
Design guidelines include :

- Finished floor level MUST be substantially raised from the external ground level. Its height can be adjusted according to the specific ground conditions (higher in flood prone areas, lower in permeable ground conditions). On a permanent classroom design, the minimum Finished Floor Level height SHOULD be 0.45m.This figure SHOULD be increased to 0.75m in black cottons soil areas.

- A damp-proof membrane has to be laid on the compacted gravel below the floor slab.
- Splash apron and terraces help to protect the walls from soil erosion and water penetration. They should be executed with a slight outwards slope (2%). The Splash apron should be embedded/ joined to the plinth walling or grade beam by at least 75mm. This is to ensure that there are no cracks along the interface between the splash apron and the main structure.

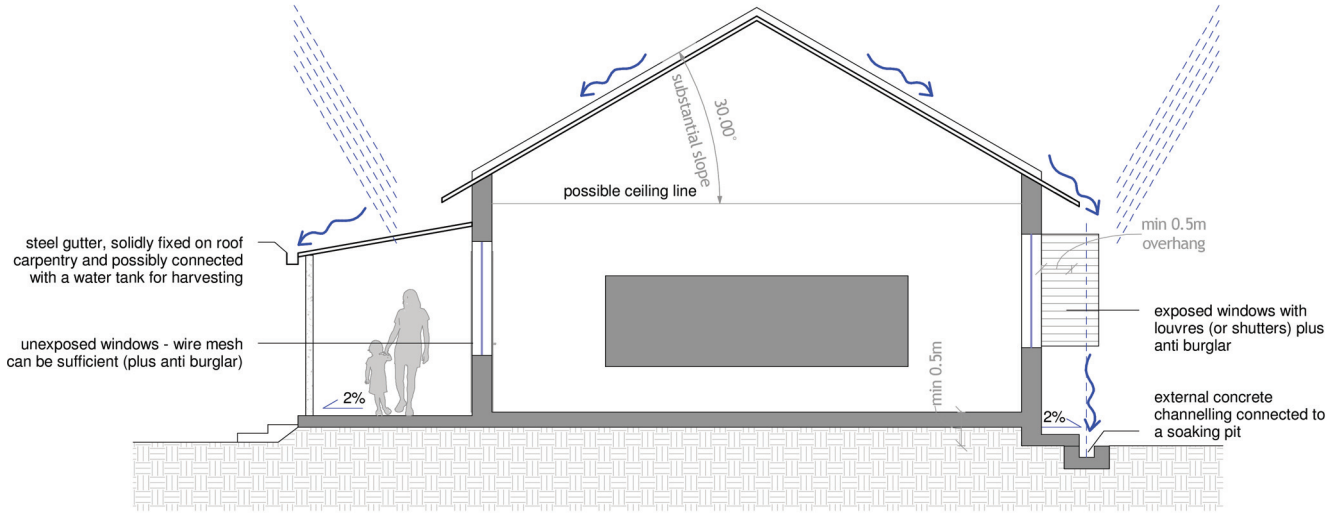
- Roof overhangs MUST be a minimum 0.50m and preferably up to 1m.
- Roofs shall be perfectly water tight, tested with no leakage before handover.
- Exposed openings/windows should be equipped with window sills for transversal rain protection.

Figure 14.0: Typical classroom section



1 **TYPICAL CLASSROOM SECTION**
SCALE 1:50

Figure 15.0: Illustrations of weather effects on the classroomsection



A.2. Head Teacher's Room

The Head Teacher's room is a fundamental supporting space and part of the administration area. A lockable office should be included in a fully fledged school as well as for a Temporary Learning Space design.

Design guidelines include:

- Minimum space requirements shall allow for the equipment of the office with a desk, chair and cupboard. Minimum recommended area is 13sqm.
- The office shall be strategically located, next to the staffroom and permit easy view/surveillance to the main school features (playground, classroom entrances, and toilet blocks).
- It must be lockable, with a functional door.
- The minimum window ventilation/daylight area must be 1/8 of the floor area.
- Windows can be equipped with glazing if a dust proof concern is raised.
- It may be equipped with electricity for laptop connection and fan operation. Sustainable solar power electricity would be recommended.

A.3. Playground

Outdoor spaces shall more generally include playgrounds, leisure areas and sports pitches. The presence of an equipped playground is usually an additional opportunity for the school to play a central role within the community.

Design guidelines include:

- Site selection should allow for levelled and smooth surfaces.
- Shaded outdoor areas shall complement the main playground surface.
- Equipped sports pitches can include a volleyball/basketball/netball and a football pitch .

Fencing is fundamental for the proper management of the outdoors spaces and the safety of the learners and is a MUST consideration for a Child Friendly School

A.4. Staff Room

Staff Room is an important supporting space, part of the administration area. This is where teachers can prepare the lessons, share their views, prepare supporting teaching material and receive the pupils' parents.

The Staff Room shall possibly include a private area for consultations as part of Psychosocial Support.

Design guidelines include:

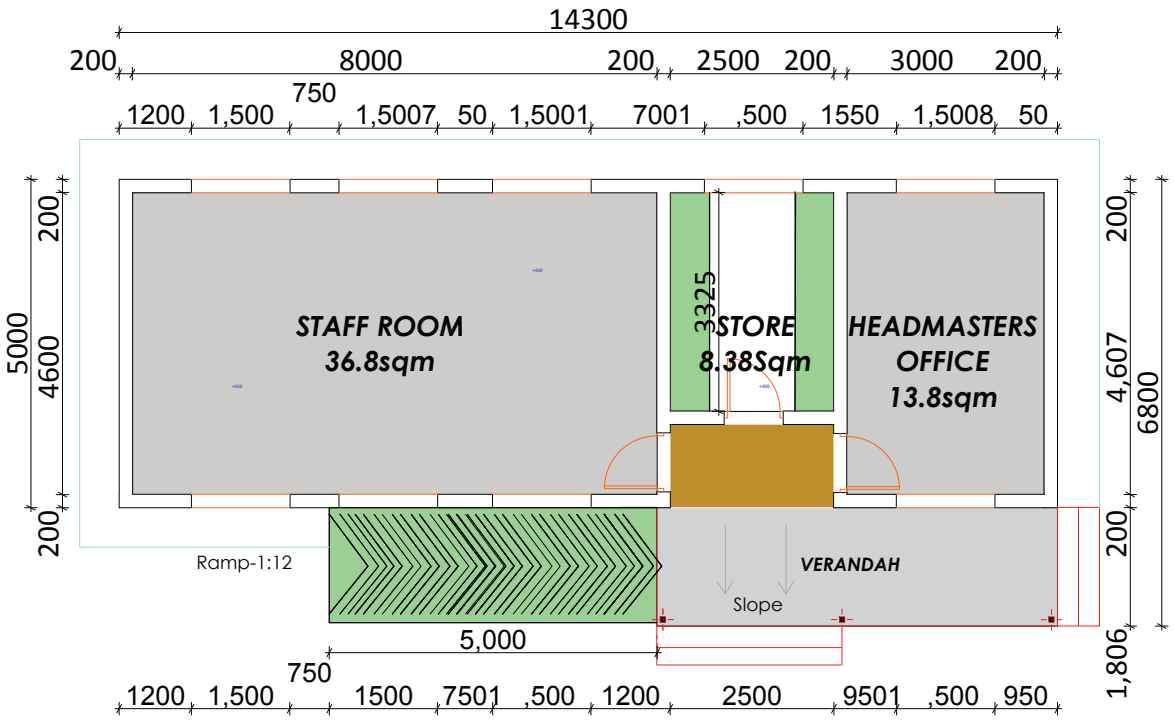
- Minimum space requirements shall allow for the equipment of the room with the required furniture.
- Minimum recommended area is 2.5 to 3sqm/ teacher.

In ordinary full-cycle schools, the minimum area will therefore be 20sqm, but should be increased to 25-30sqm in a 10 classroom school.

- It should possibly be organized with a separate space for private consultations.
- Minimal internal furniture includes desks, chairs, lockable cabinets, shelves and display areas (pin boards).
- The minimum window ventilation/daylight area must be 1/8 of the floor area.
- Windows can be equipped with glazing if a dust proof concern is raised.
- It may be equipped with electricity for laptops connection and fan operation .

Office spaces for the head teacher, the staffroom and storage space shall possibly be grouped in a single administrative block

Figure 16.0: Typical Administration block



A.8. Landscaping

Existing landscaping on a parcel selected for school construction shall always be maintained and possibly enriched. Its function will not only be of "natural ornament", but it enhances land management infrastructure.

Landscaping also plays a fundamental role in the building's performance. These guidelines aim at going beyond the mere building construction standards, and include considerations concerning the real needs and priorities for a positive learning environment. In this perspective, landscaping occupy a prominent place.

Design guidelines include:

- Existing big tress must be conserved when considering the school construction planning.
- Vegetation should be considered for shading, wind mitigation and dust reduction nearby the buildings area.
- Parcel management enhancement: the landscape management must be conceived for
  - soil-erosion control;
  - storm-water management;
  - definition and support of circulation paths;
  - solid fences support and strengthening;
  - Multi-functional spaces definition, including external learning spaces, intimate spaces, external gardening laboratories.
- Newly planted varieties shall be selected for little watering and maintenance qualities.
- Tree planting programs of new big trees should be launched following a master plan.
- The fitting-out of a school garden shall be highly encouraged.
- Buildings must always be set out at a minimum distance of 5m from the trunks of big trees, which might break/fall in extremely wet soil and wind conditions.
- No trees should be allowed closer than 4 metres from any building and this distance should be greater for large trees.

A.9. Outdoor Learning Area

Outdoor learning spaces have been repeatedly mentioned in the previous paragraphs, linked to different elements part of the school design. They can potentially respond to multiple objectives of the Child Friendly School approach and they can be materialised under different shapes.

Design guidelines include:

- Outdoor learning areas can be simple enclosures created with a mixture of vegetation and external furniture (fixed furniture in concrete-bricks).
- Extended verandas can be equipped with basic, fixed furniture and used as external learning spaces.
- A school garden can create learning opportunities.
- Gardening and indigenous shrubs, plants and trees maintenance can be linked to the classroom spaces or the multi-purpose room.
- In emergency or semi-permanent situations, a simple canopy with solid foundations and a compacted, clean floor, can act as a learning space.

A.10. Canteen/Dining

School feeding is acomplex issue in the South Sudan basic education system. While it is well-known that children, especially in the first grades (P1 to P4) cannot stay without eating after 11:00am,School feeding programs remain limited or non existent in South Sudan.

Therefore, a flexible dinning area can be included in a school design to complement the school feeding efforts.

Community involvement can be a key factor in the landscaping and maintenance process

Design guidelines include:

- A water tap with clean water for hand washing must be available in the canteen proximity.
- A drinking water supply shall also be provided.
- The canteen may be a semi-permanent structure.
- Dining can also can be organized in an external learning area.

A semi-permanent structure could be an option for purposes of a canteen, or dining space

A.11. Kitchen

When planning, it's important to consider that often informal food preparation is organized inside the school compound. It would be important to provide the school with a proper kitchen space in order to guarantee a minimum of hygienic conditions.

Design guidelines include:

- Inclusion of facilities for preparing food and a source of drinkable water.
- Areas for washing up from a clean water source.
- It should be located next to the school garden when this exists.
- It should be equipped with energy-saving stoves and enough ventilation (or equipped with an effective chimney) to extract the smoke.
- It should be completed with storage with lockable cabinets to secure dry goods (5-10sqm).
- Approximate surface area 10-15sqm.
- It should have adequate facilities for solid waste disposal (possibly including organic waste).
- It should be conceived with a functional circulation for goods in-waste out and with a serving area.

A.12. Teachers' Housing

Teachers' housing is considered an important aspect in the perspective of School Management. The construction of staff houses should be planned especially in rural areas, where relocated teachers can face difficulties in finding proper accommodation.

Design guidelines include:

- Minimum floor area for a bedroom must be 9sqm.
- Minimum floor area for a living room, when designed, should be 10.5sqm.
- All the rooms must have a minimum windows' daylight/ventilation ratio of 1/8 of the floor area.
- Possibly differentiate the design of junior and senior housing.
- Junior staff housing should be semi-detached house type.
- A program encouraging the long term settlement of teachers in their own accommodation should be put in place.

A.13. Multi-Purpose Hall

A multi-purpose hall, or room may be an indoor space, which can be used as a library, conference room, dining area or as a classroom for special events or exams.

It may be of various sizes, and various degrees of enclosure according to the foreseen uses. The Hall may be used as an additional learning space, and also for physical education, music, drama, and for parents' meetings and social events.

Following the general School construction program, the multi-purpose room function can be combined with the library.

Design guidelines include:

- The overall surface could be similar to a classroom (about 60sqm) and preferably larger, the size of two classrooms (100-120 sqm), with a flexible partition in between the two classrooms.
- It must be easily accessible.
- It must have a flexible layout, which can easily adapt to the different uses.
- Main, flexible space, with little and movable furniture.
- It may also include an area for book shelves, and space for children to read the books or for younger children to relax/rest.
- Possibly a wide veranda or a connection with an outdoor learning space.

A.14. Medical Sick-Room

A Medical Sick room may be an additional space where sick pupils can rest before being picked back by their parents. It may also be used for visiting therapists or other support for pupils with special education needs and disabilities.

A.15. Sign Post

Any school construction project should have an identification panel during construction that will be thereafter replaced by the final school sign post. The template content shall include:

- The County
- Payam
- School
- Donor
- Implementing Partner
- Contractor
- Consultant/Supervisor
- Project Period

Section 5. ENGINEERING STANDARDS

"Healthy,clean, secure,learner protective environment"

Under the "Engineering Standards" are all the categories concerning the safety, stability and sustainability of the school infrastructure, which include:

- Materials and technologies
- Best practices for technical and structural design
- General safety considerations
- Technical specifications for complementary infrastructure

B.1. Safety and natural hazard protection

B.1.1 Safety

Security is the first basic requirement of any learning space.

Design guidelines include:

- Transparency in school design, when people (i.e. administration staff) can look inside the classroom and other school units, this can protect children from abuse by teachers or older students.
- Safety reasons favour the option of single storey classroom typology (easier children circulation and safer structural design).
- Classrooms shall be effectively lockable to secure internal furniture outside school hours.
- Fencing is essential to secure the entire school compound, including the playground and the sanitation blocks, during and after the teaching hours.

B.1.2. Natural hazard protection (fire, wind, floods, storm water, earthquakes, lightning)

Most of the basic requirements concerning the safety and the natural hazard protection shall be considered during the planning phase. Some of them have yet their implication in the building design.

Design guidelines include:

a. General considerations

- Ground and soil conditions to be assessed prior to defining the final foundation design.
- If a sloped building site is selected for the school, extensive site levelling and retaining walls, external drainage and ramped access ways must be provided as part of the construction. And the buildings MUST be placed at a secure distance from the steep slopes.
- Flooding conditions shall be considered before finalizing the design, and mitigation measures should be taken into consideration, such as storm water drainage ditches, protection walls, culverts, etc.

b. Fire mitigation

- Consider fire breaks (solid wall) between classrooms, fire breaks between classroom blocks, escape route out of the buildings (secondary exit doors, outward opening doors, and elimination of burglar proofing from the classroom windows)
- Kitchen and library actually need specific precautions.

c. Wind mitigation

- Potential impact of local winds should be taken into consideration and mitigation measures (like planting trees, additional bracing, use of secure roof connections, etc.) should be installed where necessary.
- Mitigation measures can include: building orientation (according to prevailing winds), landscaping, and other natural protections.
- Construction measures can include: adequate roof connections for roof covering and structure (anchoring), additional bracing, adequately attaching all site external fixtures like windows, doors, shutters, gutters, etc.

d. Earthquake

- Construction in earthquake-prone areas shall include basic and advanced seismic mitigating measures. South Sudan is not considered at risk.

B.2 Temporary Learning spaces considerations

Photo 8: Typical Temporary Learning Spaces using local materials
©UNICEF/South Sudan-2015/ S.Rich

Note: This TLS is not child friendly considering its straw roof which potentially leaks

Temporary Learning Spaces are still covering an important role in the Basic Education system in South Sudan. While tented structures can be employed in real emergency situations, for TLS, semi-permanent structures are preferred.

TLS design shall be inspired by the very same principles guiding a Child Friendly School design. The difference will normally consist in a limited budget and/or a restricted implementation and construction deadline.

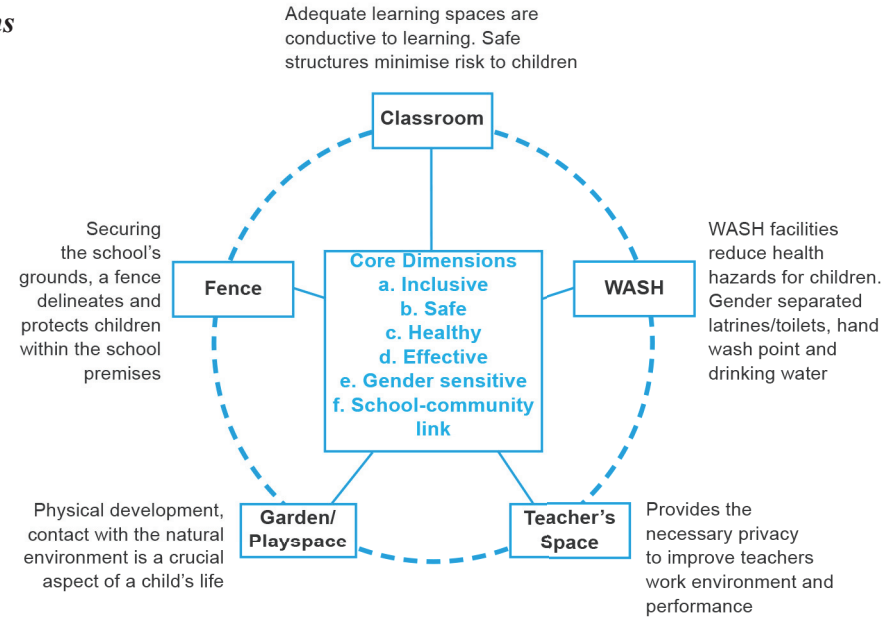
Factors to be considered when planning a TLS include:

- Use following a natural disaster or Conflict leading to the displacement of communities.
- Site planning considerations
- Security and safety considerations
- Issues of psychosocial and emotional impact on children
- Community participation
- Environmental considerations.

Sustainable Hazard Resistant Construction

- Construction materials: The choice and availability of construction materials is one of the key factors that determine the design of the TLS. If it is possible within the emergency context, materials should be locally sourced to reduce cost, delivery times, and support the local/host community's economy.
- Sustainability: Depletion of local natural resources shall be a concern during the TLS planning phase.
- Main building components: Most of the structures are composed of the three main building components, FOUNDATIONS – WALL – STRUCTURE – ROOF.

Figure 18.0: TLS design considerations



Source: unicef Compendium of Transitional Learning Spaces,2013

Design guidelines include:

- Site selection shall give preference to a previously occupied site currently available, rather than an untouched land, in order to minimize the environmental impact of a TLS.
- Local materials and local construction techniques shall be employed to reduce costs, enable community participation in the construction and maintenance of the facilities.
- Large trees in the site should not be removed, as they provide shade, wind protection and points of interest around and between the TLS structures. Neighbouring landforms, structures or vegetation for cool wind protection and summer shading should be considered.
- A minimum storm-water management system should be put in place, in order to maintain the planned structure functioning throughout the year in healthy conditions.
- Lateral bracing and good structural connection materials (like steel poles, steel wire, bolt and nuts, etc.) should be made available during the construction project, in order to enhance local construction techniques.

Table 7: Summary of TLS Considerations

SUMMARY OF TLS CONSIDERATIONS	
Design element / Typology	***Comment / proposal***
Tents	• When supplied as a semi-permanent solution, the performance of tents is very low in the hot and humid conditions of South Sudan. • Limit the use of tents to real emergency response situations Only
TLS with Corrugated Iron Sheets roof	• Has potential for long lasting roof structure and it is recommended. • Has low thermal comfort
TLS with thatched straw roof	• Has a very good thermal and acoustic performance, but roofing structure requires regular maintenance, and cannot be used in regions with high-winds or where the risk of wild fires is high.
Wall typology	• Mixed materials (bamboo frame + mud filling) generally don't give satisfactory results and requires continuous maintenance. Mud-filled walls also tend to collapse easily during the wet season and thus are not safe for the learners. These should be minimised or totally avoided. • Simple bamboo-only cladding on timber or steel framing gives much better average results of lighting; safety; air circulation, as well as easy maintenance.
Steel use	• Steel framing can substantially increase the life span of a semi-permanent structure • Steel framing can be successfully combined with local materials (i.e. straw and bamboo)
Fencing	• Mixed materials fencing (steel posts + bamboo filling) can guarantee a good level of quality – cost effective ratio
Floor Options	• With good ground and soil conditions (maroon, sand, gravel), compacted ground can be a better solution for TLS and semi-permanent structures. • Cement Floor screed should be considered where funding permits, as well as in areas with black cotton soils. • Provision of plastic mats for the floor can complement the aesthetics and functionality of a TLS

B.3 Fence

A well-constructed fence is a minimum requirement to guarantee the security inside a school compound. The presence of a fence also aids in securing the school furniture and enhancing the facilities maintenance capabilities (mostly the WASH facilities).

Design guidelines include:

- Fence shall be programmed as a priority in any school construction plan.
- The minimum distance between the fence and any major building inside the school parcel must be 4m.
- External fencing should be 2.0m high or more. Common spacing between posts in a chain-link fence is 2.5m.
- Vertical posts should be solidly set in stable soil, preferably in durable material, like steel post placement in mass concrete footings .
- Mixed materials fences, with steel posts, steel wiring and bracing and a local material vertical filling (bamboo, woven straw, etc.) can be considered to address budget constraints and enhance community involvement.
- The use of natural vegetation fencing to define the school compound limits or to materialize internal partitions (i.e. for separate program schools) should be encouraged.
- In urban settings, the construction of a solid concrete wall fence can be considered for improved privacy and acoustic insulation.

Provision of a fence is a MUST requirement for a school construction program

Photo 9: Fence made of local materials Source ©UNICEF/South Sudan-2015/ Cardellino

B.4 Solid waste disposal

In a Child Friendly School, solid waste management must be promoted.

Basic facilities, like a basic concrete dump or a rubbish pit should be designed during the planning phase and implemented during the very first stage of school construction.

Design guidelines include:

- The dump should prevent garbage from being spread by wind around the school parcel.
- The solid waste disposal unit should be located not far from the toilets block.
- It should also be easily reachable from the kitchen/canteen when operational. A second unit should be built, if the general school compound layout requires it to satisfy the above requirements.
- The use of a basic concrete design is the most durable and cost-effective solution.
- Unless the dump is complimented with a separate composting facility, the dump floor/bottom should be of permeable materials in order not to accumulate garbage moisture.
- Consultations should be carried out with the local community in order to define the best way of managing used sanitary towels' disposal. Based on the findings of the case study assessment, the use of incinerators is not culturally acceptable in many communities of South Sudan.
- Wherever a solid waste collection system is not available, the dump should also function as an incinerator.
- In some specific cases, the implementation of an open pit to be filled up after use can also be considered. Using a rubbish pit where the solid waste is regularly burnt can also be an option. In this situation, attention should be paid in order not to create hazardous conditions where children could fall into the pit.

B.5. Drainage

Drainage system for storm water management, not only for structures, but in the whole school parcel, is strongly encouraged.

The main objectives of a storm management plan can be summarized as follows:

- Elimination of standing water. Pools of stagnant water can become breeding grounds for mosquitoes.
- Mitigate erosion
- Enhanced circulation inside the compound during the rainy season.
- Storm-water harvesting (from roof runoff)

Storm water management must follow different and related strategies:

a. Employ harvesting runoff, to reduce the amount of water spread on the compound, and possibly reuse it for different purposes

b. Consider storm water channelling and disposal

c. Ground permeability enhancement with dry wells, infiltration pits, and permeable hard surfaces

Design guidelines include:

- Building roofing must be equipped with a storm-water collection system, either rain gutters completed with downpipes, or water channelling beside the splashing aprons.
- Where Rain Gutters are used, preference must be given to steel gutters of sufficient thickness for systems that are much more durable and appropriate for the climatic conditions of South Sudan.
- PVC gutters and downpipes MUST be avoided as these rapidly go rigid in the tropics due to Ultra violet (UV) radiation from the sun and are then easily damaged.
- Possibly, basic earthworks for the management of building platforms, internal footpath, and basic planting buckets/flowerbeds should be included in the program.
- Vegetation should be used to enhance soil permeability and reduce erosion.

B.6. Semi-Permanent Structures Considerations

Semi-permanent structures can be the better response in case of mixed programs, where a rapid response should be combined with a longer term construction.

Permanent foundations and semi-permanent superstructure:

Figure 19.0: Illustration of a solid canopy and roof only structure

This would constitute a permanent foundation type, complete with concrete flooring. However, owing to the limitations in funding, the superstructure can be built using semi-permanent materials such as bamboo , or completed as a shell with a roof and its supporting structure. Such a structure would allow for future adjustments to make the building an all permanent building on the existing permanent foundation.

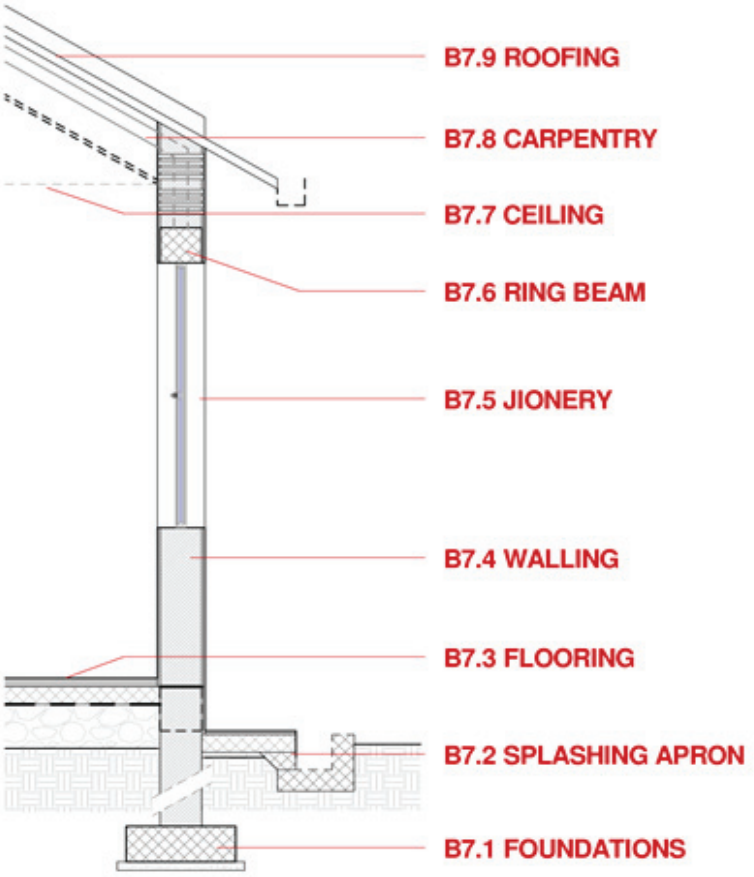
B.7. Permanent structures, structural design guidelines

For a detailed list of technical specifications, please refer to the MoGEI Construction & Planning Department.

These Guidelines intend to address all the possible construction typologies for Basic Education in South Sudan; it is not a reference manual for technical specifications.

Nevertheless, based on the case study and the specific context of South Sudan, specific topics need a particular attention and consideration.

Figure 20.0: Schematic section of a classroom and coresponding guidlines section



Schematic section of a sample classroom block
Some of elements are optional:
Gutter, concrete channelling, ceiling, upper walling.Refer to the highlighted guidelines section for details

B.7.1 Foundations & Special Considerations for Black Cotton Soils

A proper soil assessment (geotechnical) investigation MUST be carried out at all construction sites prior to construction. It will follow and/or integrate the geological survey/inspection undertaken during the site selection phase.

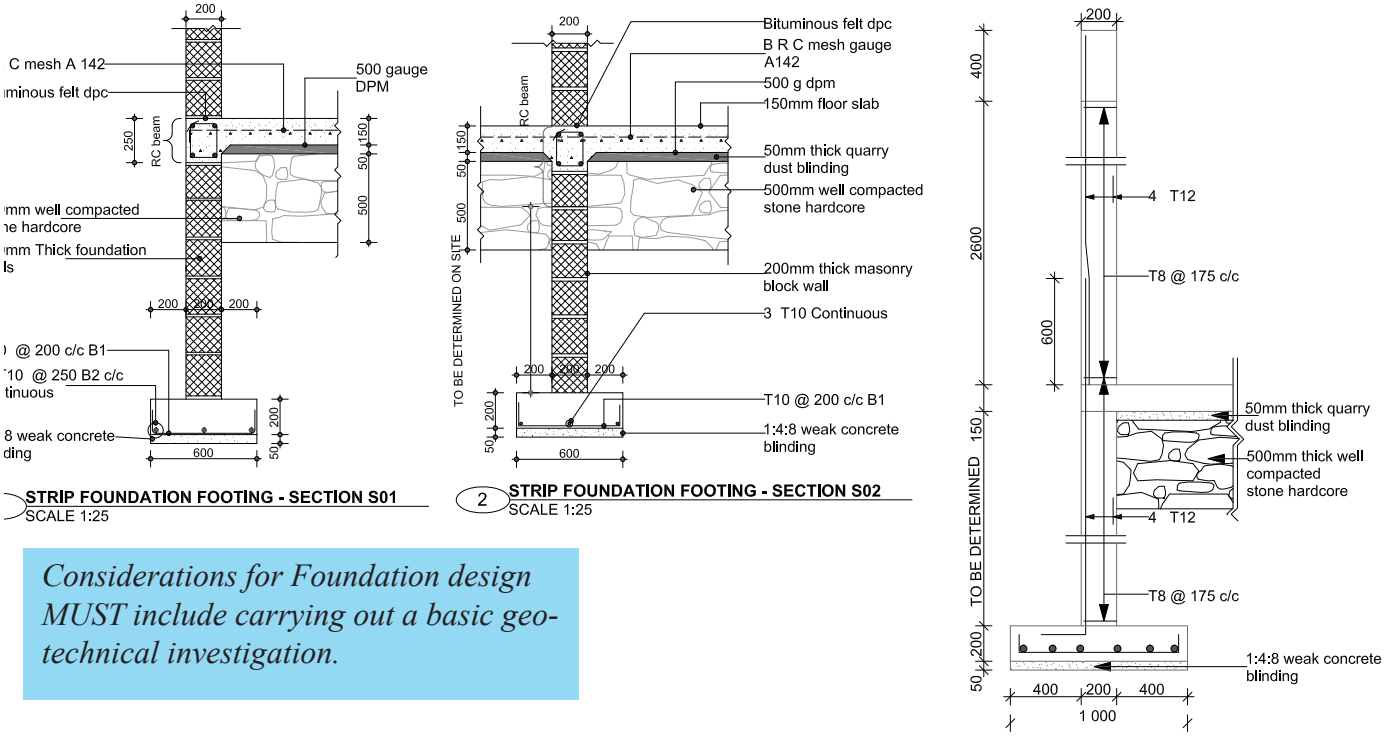
Foundation design shall be based on soil type and soil conditions.
For normal soil conditions, strip/continuous wall foundations shall have the minimum dimensions of 0.6m deep and 0.65m width. Additional plinth can be designed for column foundations according to the overall structural design.

Alternatively, a continuous footing/foundation beam can be designed at the floor slab level.

The use of reinforced concrete foundations is also encouraged even in cases of semi-permanent structures where durable materials are used.

In many South Sudanese regions, ground conditions can be very difficult, loamy soils with bad mechanical and hydro geological behaviour .

Figure 21.0: Illustration of permanent foundation detail and column footing (details in annex)



Considerations for Foundation design MUST include carrying out a basic geotechnical investigation.

Black cotton soils are particularly critical and require specific design considerations for reinforced concrete foundations.

Key Considerations for Black cotton soil specifications

The guidelines' key factors are:

i. Depth: Foundations should be at least 500mm deeper than the "moisture movement" depth (i.e. 1.0m soil cracks' depth requires 1.5m deep foundations)

ii. Contact: Contact between the structure and the black cotton soil should be avoided. Wider trenches must be excavated and foundations completed with a maroon/sand (Murram/Limonite) back filling.

iii. When: Construction must take place during the dry season.

iv. Bearing capacity: A geotechnical assessment is recommended. A reference value for bearing capacity is 5 to 10t/sqm.

v. Water effect mitigation: Storm water management and effective splash aprons must be designed to reduce the effect of dry/wet cycling movements of black cotton soils.

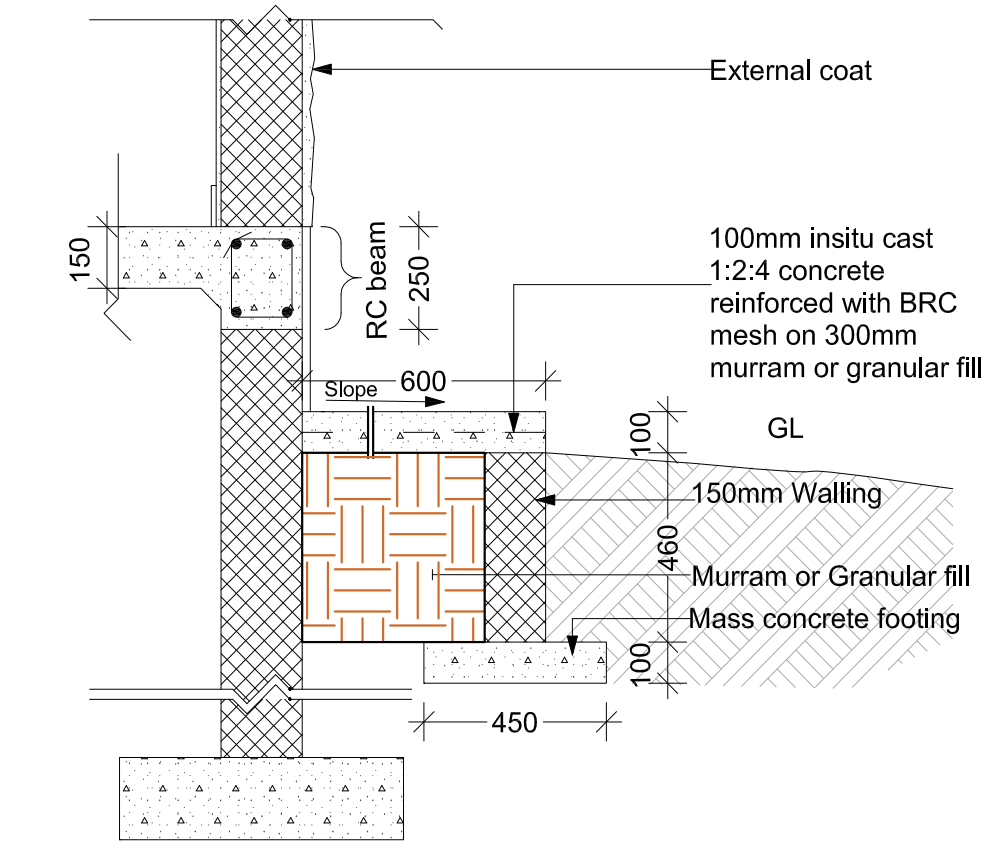
B.7.2 Splash Aprons

Splash aprons are a fundamental element for the protection of the building structure from the negative effects of the storm water (including soil erosion and water penetration).

The Splash apron width is usually equal to the roof overhang, and not less than 0.5m, with an outward slope of 2%. Splash apron MUST be properly secured with the building structure in order to avoid cracking/separation between the wall and itself.

When no rainwater harvesting system is in place, the rain gutter can be eliminated on the back side of the school and the splashing apron must be combined with a concrete channelling system for the storm water management. This shall be connected to a soaking/infiltration system to avoid stagnant water.

Figure 22.0: Typical section for a splash apron



B.7.3. Concrete Flooring

In general terms, these guidelines recommend concrete floor finishing. The flooring must be smooth enough to be easily cleanable. Special attention must be paid to guarantee its durability with care during the next 3-days curing using damp straw, continuous watering, and protection from wet conditions. Care must be taken to avoid cracking and rapid deterioration, generating hazardous and dusty surfaces.

The guidelines include:

- A quality control / site inspection tools that have to be part of the minimum standards, in order to verify cement ratio and curing procedures and guarantee the adequate life-span.
- Community involvement for site control can be a plus if accompanied by technical support.
- Screed elimination can be an option. Monolithically finished floors using power floating or concrete polishing of the concrete floor slab are possible technologies to generate a smooth finished surface.

Remember: A water proof membrane shall always be placed below the concrete floor slab.

B.7.4 Walls

Any wall typology can be considered for the school construction.
Solid blocks should be prioritized for partition walls for a better acoustic performance.

If burnt clay bricks are employed, a proper quality control system should be put in place starting from the brick production phase.

External walls must be raised at a minimum height of 800mm in order to define the internal classroom space. Beam filling above the windows (and ring beam) level is optional. If the filling is designed, ventilating elements such as claustra or louvers must be installed to enhance thermal comfort.
Alternatively, the void above the window level can simply be protected for anti-burglar or animals intrusion by installing wire mesh or louvers.

When concrete blocks are produced on site, a proper levelled and smooth surface shall be prepared for the manufacturing operations, in order for the blocks to have all regular surfaces, including the one lying on the ground during production.

The final wall surface should be levelled and regular, in order to limit the plaster thickness to a maximum of 20mm. Internal walls must be plastered with a skim finishing and protected with washable PVC (vinyl) paint.

B.7.5 Joinery and Glazing

For the window sizing and performance, please refer to the architectural section.

Glazing MUST NOT be considered for Basic Schools as this is prone to easy damage

Additional technical considerations include:

- Steel joinery (easy production and long durability) shall be given preference.
- Avoid plain, fixed shutters since they reduce daylight and ventilation performance.
- Maximise the use of louvers, also installed on swinging shutters.
- Pay attention to the interference between the external opening shutters and circulation on external verandas (consider 180° opening outwards).
- For basic design, the use of fixed mesh-wire can be considered.

The installation of glazing is not considered for the classrooms.

Classrooms should be lockable. A fixed anti-burglar system can be considered in substitution of swinging shutters. The two sides of the classroom can be considered in a different way (i.e. fixed anti-burglar on veranda side and swinging, able to be opened, louvered shutters on the opposite side).

A ring beam is a MUST requirement in most of the soil conditions of South Sudan. A reinforced concrete ring beam can be replaced by a steel profile, provided that it will be securely fixed to the vertical structure.

A ring beam also plays an important role in mixed structures (i.e. vertical steel framing). Always ensure that the required bracing elements are properly securing the main structural frame.

B.7.7 Ceiling

These guidelines consider and question the sustainability and durability of ceiling installation. Maintenance problems related to ceiling installation include providing habitat for bat nesting that often results in an unhealthy smell. These conditions are not compatible with the requirements of a Child Friendly School.

Ceiling installation can be avoided, provided that:

- The roof is well ventilated.
- Additional openings above the window levels are put in place, high cross ventilation is guaranteed.
- Possibly, a ventilated roof ridge system is in place.
- Rain noise mitigation can be addressed by installing alternative roofing materials with insulation (i.e. mixed concrete or sandwich panels).

Wherever ceiling installation is planned, the following guidelines apply:

- Consider higher quality materials for ceilings.
- Consider designing the ceiling section following the roof line (not flat) in order to increase the maximum ceiling height.
- Address bat nesting problem by installing translucent sheeting materials in selected portions of the roof .

Photo 10: Example of a ceiling following the roof line
(Source: ©UNICEF/South Sudan-2015/ S.Rich

B.7.8 Roof carpentry materials

Timber and steel are the current materials used in the region for roof carpentry. Supporting arguments for each of them can be:
Timber:
- Could theoretically be sourced locally.
- Potentially a sustainable material if harvested from a commercial non-natural forest. A typical example of this is in the Greater Western Equatoria region where tree plantations are established, especially for teak trees.
- Lighter and easier to be worked.

Steel:
- Stronger and allows for wider room spans.
- Easier quality control on production.
- More durable.
- Potentially prefabricated for modular constructions.
- Any local contractor can be equipped with a generator for welding on site.

These guidelines recommend the use of steel carpentry. But the use of both technologies can be considered.

The use of concrete roofs for better insulation and acoustic performances can be further explored. Sufficient study of this type of roofs is required if they are to be used.

B.7.9 . Roofing Materials

Galvanized steel sheeting is the most widespread technology currently available in South Sudan and has today an acceptable life-span.

Guidelines for galvanized roof sheeting installation include:

- Possibly avoid glare (silver) galvanized roof sheeting that has a very disturbing glare.
- For Radiation purposes, roofing sheets should be of lighter colours such as Swan Cream
- Heavier Gauges should be used. (i.e. Gauge 26 or Gauge 28) as a minimum for durability. Lower gauges such as gauge 30 and 32 MUST be avoided.

Alternative solutions should be considered and developed in future, considering the envisaged replacement of ceiling installation and these may include:
- Concrete roofs. They have a better general performance, including better thermal insulation, good acoustic response to rain and reduced vulnerability to wind suction effect.

This solution has to be considered remembering technical (increase in weight) and financial implications.
Mixed solutions (mixed roof typology with galvanized sheeting and a light concrete cast) may be developed.
- Prefabricated sandwich panels. They are potentially the best solution for noise reduction and overheating mitigation with little cost increase. If the material becomes readily available on the local market, it is worth exploring an alternative roof design with simplified carpentry and self-bearing sandwich panels for cost optimization.

B.8 Rainwater harvesting system

Rain can be considered as a source of clean and drinkable water if promptly harvested and properly stored. The implementation of rainwater harvesting systems is highly encouraged.

Rainwater harvesting also has a good impact on the school environment since it lowers the quantity of water that has to be discharged during storms, reducing the risks of flooding and stagnant water in the school compound.

Rainwater harvesting system consists of 2 basic elements:
i. Proper, solid, metallic and durable rain gutters with downpipes
ii. A connection to a water tank equipped with a tap.

Design guidelines include:

- Technical specifications for rain gutters: PVC gutters are not durable and should be avoided. Steel gutters are more resistant and can be easily repaired.
- A solid fixing system has to be designed, in order to resist heat expansion/deformation and wind stress. Ideally the rain gutters should be directly fixed to the roof carpentry rather than to the wooden fascia.
- Wooden fascia should be avoided and steel fascia MUST be used where necessary.
- Downpipes shall be solidly fixed to the structure (i.e. steel veranda columns), and connected to the water tank where existing.
- Water tank shall be solidly fixed and provided with an exterior water tap, overflow, by-pass valve, and a concrete apron.
- Concrete water tanks are very durable and their use should be explored when planning.

B.9. Lightning arrestor

In lightening prone areas such as most of the rural settlements, a lightening arrestor must be installed within the school compound.
The lightening arrestor must be securely fixed in order not to become a hazard, and completed with an earthing chamber in a secured manhole. These guidelines recommend that every school MUST have a lightening arrestor system.

B.10. Incinerator

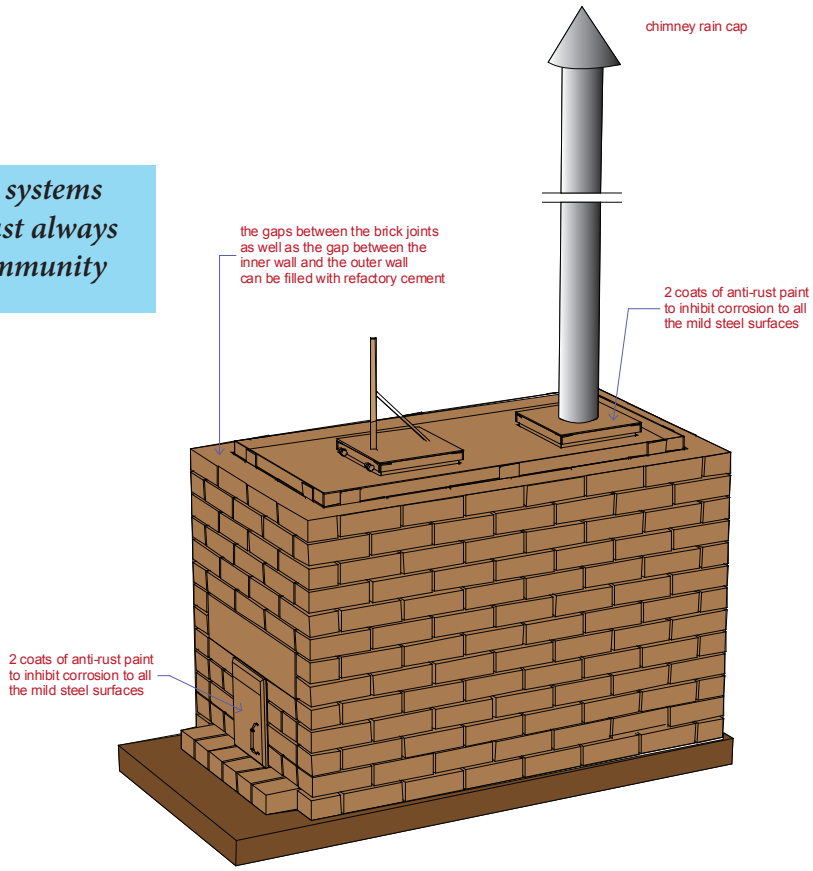
We can refer to standard B4 previously presented for basic considerations on solid waste management. Special consideration of cultural practices should be emphasised when dealing with the disposal of used sanitary materials. In the context of South Sudan, incinerating and the use of dump pits are the best solutions for solid waste disposal. Ideally, a proper incinerator may be available within the school grounds.

Design guidelines include:

- Incinerator location in the school yard must allow it to be operated without interfering with the normal course of classes due to the smoke it is producing. They are to be located away from classrooms and other occupied structures.
- The incinerator should be equipped with a chimney at a height above the roof of the closest buildings.

The acceptance of incinerator systems for sanitary pads disposal must always be validated with the user community

Figure 23.0: Illustration of an incenerator



B.11. Compost

Where possible, a composting facility with two compartments to collect biodegradable waste may also be considered. Composting has a good educational value by introducing the concept of environmentally sensitive waste differentiation. Composting is the process of decomposing organic material into soil which can be used for enhancing plants' growth in the school garden.

Design guidelines include:

- Compost area should be located at convenient distance from the main source (kitchen) and final use (school garden), and away from main pathways.
- Two pits are needed so that each one can be aerated and used alternately.
- Pits for composting must be built on permeable soil in order to allow surface water and compost moisture to seep through easily.
- Reference sizing is 2x1m3 chambers.

B.12. Energy-efficient stoves

Schools that offer meals or boarding facilities should have fuel efficient stoves in order to minimize the energy requirements and pollution.
The efficiency is gained by the good transference of the heat from the fire to the pot by improving thermal insulation surrounding the pot, shortening the fire flow path, enhancing the heat transfer at the pot's base.

Smoke emission must also be managed in order to minimize its presence inside the kitchen. An efficient chimney combined with interior venting can draw the smoke away from the stove, while minimizing the heat loss through itself.

Design guidelines include:

- Design and construction must be fit-for-purpose and structurally stable, considering efficiency and the required movements of pots on the stoves.
- Materials can be baked-clay, steel or stone.
- Fuel type is usually firewood or charcoal.

B.13. Sustainable construction materials

Research in other countries has shown that long lasting, solid permanent buildings can be constructed with sustainable materials and technologies such as:

- Earth-stabilized blocks (i.e. Hydra form)
- Compressed-earth blocks
- Adobe (mud bricks)
- Thatching (straw roofing)
- Mixed structures

The use of such materials should be explored, following a technical review to determine appropriateness to the location of the project and considering weather elements and the geotechnical report.

Building design with alternative materials should particularly address the following:

- Foundation design.
- Source material assessment (for earth-based techniques) and related choice of the most appropriate technology.
- Materials preparation and quality control.
- Protection from water (appropriate foundation, concrete aprons, adequate overhangs).
- Enhanced thatching techniques.

B.14. Sustainable energy production and use

Most of the Basic (Primary) Schools in South Sudan are located where no electric grid is available. We nevertheless outlined the potential importance of equipping the administration block with an electrical supply.
Sustainable energy source, such as photovoltaic installation, is the only possible answer to this specific need, and should be installed wherever possible.

Design guidelines include:

- The selected technology must be simple and durable: easy to install, easy to operate and easy to maintain.
- No additional technical personnel should be demanded for its operation at the school level.
- Adequate technicians for installation and maintenance must be available at the regional level (local level), including spare parts.
- In photovoltaics, "service free" battery quality should be properly assessed.
- The adequate minimum equipment size shall be defined, considering a few reference data:

-	Desktop computer	300W(including monitor)
-	Laptop computer	60-150W
-	Printer/photocopier	120-250W
-	CFL bulb	15W
-	Ceiling fan	50W

C. Wash Facilities

The access to adequate WASH facilities responds to one of the basic Child Friendly School objectives, requiring a "healthy, clean, secure and learner protective environment".
WASH in schools is today a major challenge in South Sudan. WASH facilities in a Primary school include:

- Access to safe, drinkable water
- Access to clean water
- Access to sanitation facilities
- Access to washing facilities and possibly to personal hygiene space

C.1. Water

Access to a reliable source of clean water within a School is a task yet to be accomplished in South Sudan. Moreover, whereas a substantial percentage of the permanent built schools have access to a borehole, in many of them access to clean water is still a problem.

The quality of the borehole, its position, lack of storage facilities are factors that can negatively affect the equal access to water for schools children. As outlined in the planning section, availability of clean water must be addressed with the highest priority during the site selection phase.

Rainwater harvesting systems are encouraged and should be used as a complimentary source of clean water in a school.

C.1.1. Potable Water

A school must give access to safe drinking water. At least one water point must be installed at each school, and it must be equipped with a hygienic way to drink it.

The guidelines include:

- Water quantity: 1 to 2 litres/day per pupil.
- Water quality: odourless, colourless and tasteless.
- A water quality analysis must be carried out for all school borehole installations.
- Testing criteria shall be specified and include turbidity, conductivity, coliforms, and water content limits.
- Mitigation measures such as a water treatment system must be put in place wherever the required limits are not met by the sourced water.
- For cases of arsenic in the borehole water, such a well must be condemned.
- Borehole location must be upstream of the latrines and at a minimum distance of 30m (to be confirmed by a geological survey).

Water analysis reference data:
Max turbidity 5NTU
Max conductivity 200γS/cm
Max fecal coliform colonies 10fc/10oml
After treatment, residual chlorine range 0.2 – 0.5mg/l
Refere to the detailed Drinking Water Quality Monitoring Form attached as part of the annex.

C.1.2 Non Potable (clean) Water

A school must give access to clean water for cleaning and washing. At least 1 washing point with adequate drainage channelling must be available per 100 pupils.

The guidelines include:

- Water quantity: 5 litres/day per pupil
- Water quality: Possibly colourless.
- If necessary, decantation and chlorification can be achieved in a storage tank prior to use.

C.1.3 Water Supply Systems

Clean and drinkable water can be sourced in different ways, provided that the quality of the water and the distance from the classroom area requirements are met.

The guidelines include:

- If a reliable external supply is not guaranteed, a borehole equipped with a manual pump is a MUST.

- The borehole SHOULD be equipped with a solar pump and connected to a storage tank, budget permitting.
- The tank may therefore supply a basic pipe network connected to the main facilities (water taps, sanitation blocks, kitchen, etc.).
- In situations where the water availability depends on an external supply (such as the city council network or water trucking), a water storage system must be provided with a capacity for the equivalent of 2 days' use.
- Leakage and pressure testing of the pipe network should be carried out for an 8-hour period at the completion of the installation works.
- Water tap and basins should possibly be built in concrete for durability reasons.
- Adequate water apron and channelling towards a soaking pit should be put in place in order to eliminate standing water.

For borehole design guidelines, including standards for drilling borehole and quality testing templates, refer to MOI&WR.

C.2. Sanitation Facilities

Sanitation facilities play a key role in the school operation.

First of all for health reasons, since the link between poor sanitation and poor health is evident.

Secondly and not least, the lack of adequate sanitation facilities is a major reason why many children, particularly girls fail to attend school.

Sanitation facilities are a MUST in the Child Friendly Schools approach, they hence have to be considered from the onset of the planning phase.

The role of the child friendly schools is to create learner friendly environments. This is achieved not only through formal classroom education, but also by promoting good practice in daily living and environment. Sanitation is an essential aspect of promoting good practice and schools have a duty to promote its implementation.

C.2.1. Sanitation minimum program requirements

Girls

- 40 girls/1 unit (stance)
- 1 hand wash point with tap and soap / 2 units
- 1 personal hygiene compartment

Boys

- 50 boys/1 unit (stance)
- 1 hand wash point with tap and soap / 2 units
- 1 urinal (50 cm of wall)

Staff

- 25 staff/1 unit (stance), with separate stances for Women and Men
- 1 hand wash point with tap and soap / 2 units

Physically segregated (separate) toilet blocks for girls, boys and teachers are a MUST consideration for a Child Friendly School

Hand washing tap should be conceived in a durable way.
Movable hand washing taps (i.e. small plastic tank on a steel stand) can be accepted as a temporary solution.
Ideally, the hand washing point should be integrated within the sanitation blocks, and solidly built with a concrete, in-situ cast basin.

C.2.2. Separate facilities

Girls and Boys sanitation facilities must be physically separate, including their own washing basins and taps. The separation should be effective, with adequate distance, visual, noise and odour separation.

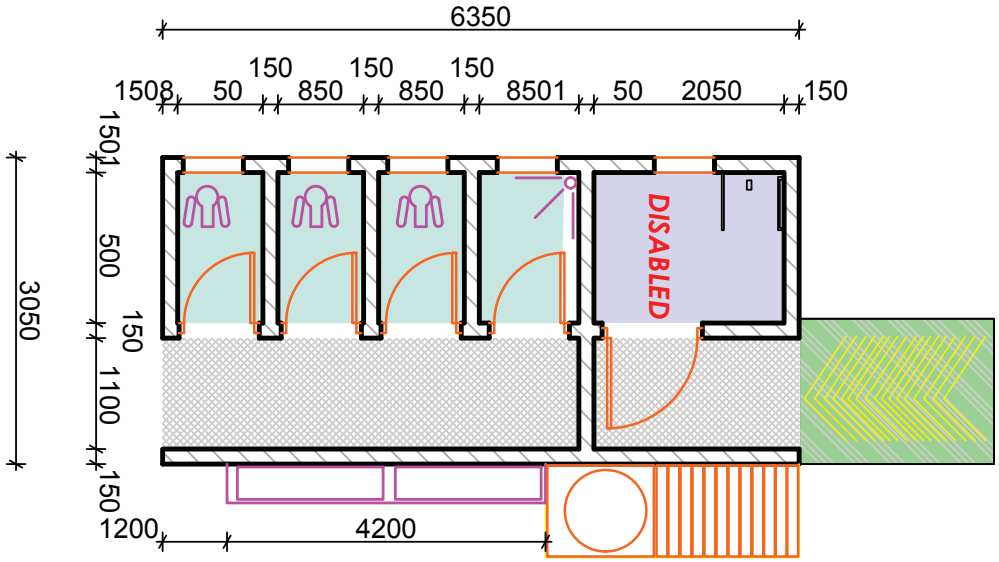
C.2.3 Personal hygiene compartment

A Personal Hygiene compartment where older girls can wash and change during menstruation must be offered. The provision of sanitary towels, hygienic pads and disposal facilities should be made available at schools for older girls. Hygienic and safe disposal practice must be advocated.

Specific requirements for it are:

- Minimum dimensions 1x1.5m.
- Lockable door.
- Equipped with shower drainage and possibly with water.
- A shelf, 30cm min width

Figure 24.0: Typical layout of a girls toilet



Sample layout of an accessible ablution block for girls and children with disabilities, equipped with washing room and annexed basin for hand washing

C.2.4. Sanitation facilities standards

Sanitation facilities should be designed to be safe, easily cleaned and maintained in order to remain decent during the years.

- Safe facilities with no unstable floors or full pits
- Smooth, durable and wide surfaces easy-to-clean
- Slopes must be provided for water running off and avoiding stagnant water

The selection and design of the sanitation facilities typology must take into account multiple factors such as:

- Specific climatic conditions (i.e. rainy season trends)
- Specific ground conditions.
- Regional cultural considerations.

Other critical elements to be considered are:

- Actual funds availability and maintenance capacity.
- The use of water in the sanitation facilities by communities that use water for anal cleansing.
- Whenever water is expected to be stored inside the latrine tank, the tank must be sealed ("U-shape" pipes, latrine cover, etc.) in order to limit insect breeding inside it.
- Maintenance access, including sludge removal, must be provided (manhole, vehicle accessibility, etc.).
- Toilets used by older girls should be lockable.

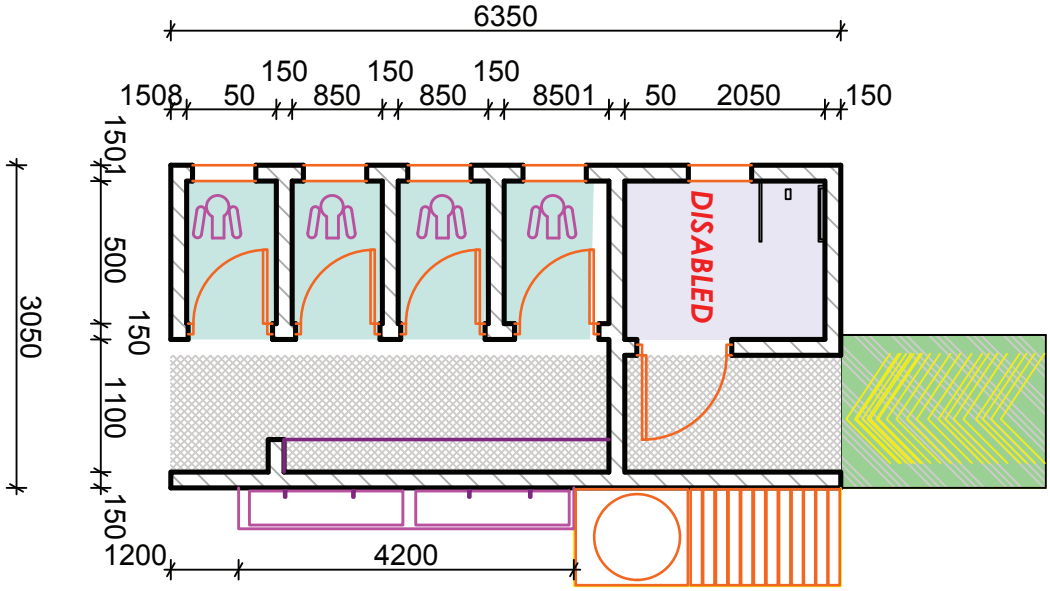
Possible technical solutions for the facilities include:

- Ventilated Improved Pit Latrines (VIP)
- Septic tanks
- Barrel latrines

Remember to consider the following:

- Presence of water
- Soil infiltration capabilities
- Maintenance issues

Figure 25.0: Typical layout of a boys toilet



C.2.5. Sanitation facilities usage considerations

- Facilities location must be considered during the planning phase, also considering local customs and cultural sensitivities.
- Possibly, every toilet block should be easily supervised from the classrooms or the administration block. It must be accessible from the outside.
- The sanitation facilities must be a clear distance away from classrooms to avoid smell. Consider prevailing wind direction when planning.
- Avoid areas with risk of flooding. When a risk persists, design an adequate height for FFL above ground level to avoid water from entering into the facilities.
- Provide access for maintenance vehicles.
- Possibly consider smaller squatting tables for younger children.

D. Child Friendly Schools Design Considerations

"Child-friendly, barrier-free environment, inclusive access and equal rights for children"

Child Friendly Schools' principles should guide the entire design approach for school construction. This section addresses some aspects that should be considered as specific standards for basic education spaces, that include;

- Accessibility
- Inclusiveness
- Children's special needs
- Attractive and child-friendly environment

Age should also be considered in a Child Friendly approach. Needs and activities in each of the age-groups of children served by Primary Schools vary substantially. Physical spaces need to be arranged to fit the specific development stages of the children, while still considering the interaction between groups and gender to help break cultural conventions and practices.

D.1. Accessible for all children

A school must ensure that facilities are reasonably accessible and usable to all, regardless of age, gender and any special needs. The built environment shall encourage the integration of all pupils into the same learning environment and teaching.

Equal Access:

According to the "Education for all" policy paper, inclusive education systems are the key to reaching out to all of those who are excluded within and from education. To promote equal access to all children is to address any discrimination which may be an obstacle to gain access to education opportunities such as: poverty, age, geographical location, linguistic, cultural and social marginalization, disabilities and HIV-AIDS.

As a reference, the following list highlights categories of vulnerable children according to international guidelines (categories of learners with Special Educational Needs):

- Abused children
- Refugees or displaces children
- Child labourers
- Migrants
- Religious minorities
- Poverty-stricken children
- Child domestic workers
- Language minorities
- Street children
- Children in conflict zones/child soldiers
- Children with disabilities
- Nomadic children
- HIV/AIDS orphans

Some of the more common impairments may be categorized as follows:

- Physical impairment Wheel chair users

Partially impaired and temporarily impaired

- Visual impairment Blindness
  Low vision
  Albinos
- Hearing impairment hard of hearing or deaf
- speech impairment the dumb

According to the international design standards, a barrier free environment within a school can be achieved either by:

- Considering special facilities
- Considering adaptable facilities
- Considering adapting facilities which cater for the special needs

These guidelines propose the minimum requirements that MUST always be in place in a school.

All users including visitors, pupils and staff must be able to:

- Gain access to and within the educational facilities
- Use sanitary conveniences

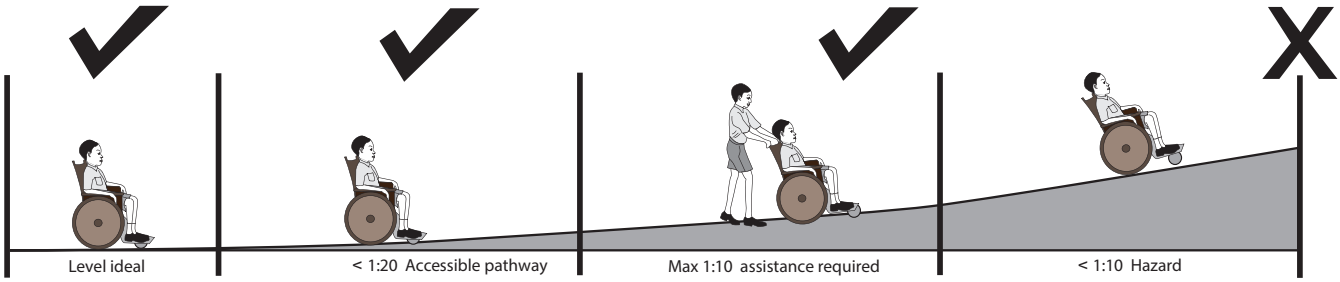
The main architectural requirements are described here below:

D.1.1. Passages

- Walkways and doors must be a minimum of 900mm wide for a wheelchair.
- Minimum manoeuvring space for an ordinary wheelchair requires a 1.5m diameter.

Access for all is a MUST consideration for a Child Friendly School

Figure 26.0: Illustration for ramp consideration



Ramps are not necessarily safe and convenient for ambulant disabled people (i.e. people walking with restricted mobility). Where possible, it is beneficial to have steps as well as ramps.

D.1.2 Ramps

- A ramp must be provided wherever any substantial change of level is greater that 1:20. The ideal ramp slope is 1:12 (80mm in 1m).
- On a steeper ramp, assistance will be required. The actual slope shouldn't exceed 1:10 in order not to become hazardous.
- Ramp surface must be slip resistant also when wet.
- A landing must be provided at the foot and head of the ramp, at least 1.5m long and clear from any obstruction (i.e. door swing).
- A handrail on the ramp side should be installed at 800mm height from the FFL.

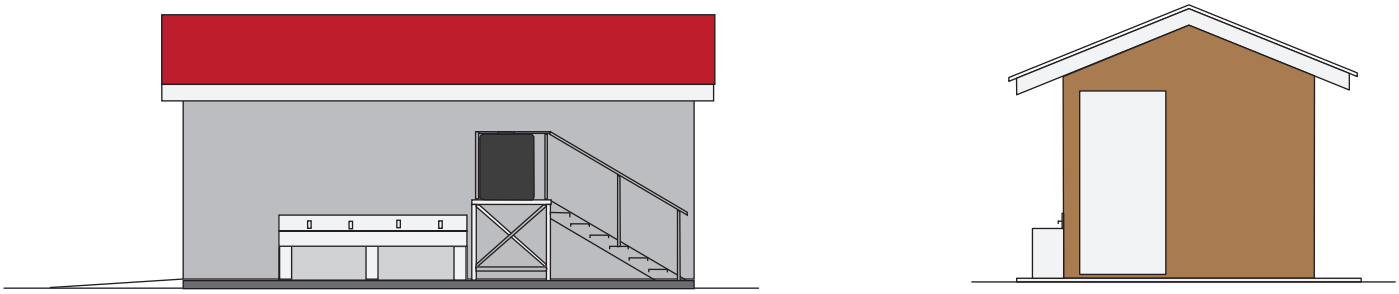
D.1.3. Thresholds

- Any thresholds (i.e. level changes on doorways) should not exceed 15mm height, unless an alternative path equipped with a ramp is provided.

D.1.4. Accessible Hygiene facilities

- The school must make the provision of at least one wheelchair-accessible toilet (and ideally one per sex) in every school .

Figure 27.0:Typical VIP latrine section with hand washing facilities



- Accessibility must provide a safe approach for use of the facilities
- Any elements to be operated, should be accessible to the children while seated on a wheelchair, and therefore at an appropriate height for the handles, taps, basins and other necessary items.

D.1.5. Special requirements assessment

- Accessibility guidelines are provided with the inspiration from the international standards
- Specific consideration concerning regional needs, availability of equipment (wheelchair typology, crutches or other) should be taken into consideration during the design
- Any specific adjustment for learners with special needs must be considered in school design. Community consultation may help assessing the real regional situation.

D.1.6. Handles, Taps and Others

All the equipment inside the accessible toilet must be at the adequate height in order to be accessible by a child using a wheelchair.

Design guidelines include:

- Outward opening door.
- A WC seat is envisaged. Basin and tap positioned at a reduced height.

D.2. Special needs room

Appropriate space for pupil support whether educational, therapeutic, psycho-social or medical care must be provided close to Staff room or connected to a class room.

The integration of pupils with special needs into the class room activities is normally encouraged. However there are instances where it becomes beneficial for a teacher to devote special attention to these groups. A private area connected to the administrative block can also be an important support to organize private parents' interview and to undertake Psychosocial support activities.

The guidelines shall include:

- A multi-purpose, small-group room for specialist teaching and pupil support.
- A medical and therapy room for pupils and staff.
- An interview room next to the entrance or staff room that can be used by parents, carers and social service.
- A small annex room attached to the classroom where pupils with special needs can time to time work independently.
- A storage place for educational and mobility equipment.

D.3. Complementary Elements of Design

Additional and complementary elements of design can contribute to the promotion of a more inclusive, learner-oriented environment.

D.3.1 Colours

Colours can play an important role in generating a child-friendly and attractive environment for pupils and teachers. The use of light colours and painted decorations are encouraged by these guidelines, including internal and external finishes.

D.3.2. Signage

Clear signage is essential for the partially sighted people. The signs should be situated on corridor walls next to doorways 1350 mm high mounted on the side of the handle when the door is closed to identify the room. The signage should have colour and tonal contrast to the background. Signage may include brail plaques.

D.3.3. Tactile surfaces

The floor finishing can be used to indicate the route from the school entrance to each room and sanitary facilities (including indicating change in levels, doorways, etc.). Basic technical solutions such as smooth stones casting in concrete walkways or imprinting can be used.

D.3.4. Talking Schools

The use of illustrations to recall best practices in the everyday life or teaching elements should be widely used.

E. School Furniture and Equipment Design Elements

"Adequate and appropriate equipment that support the level of education"

Adequate school furniture will enable the efficient functioning of activities within the school. Classroom furniture should be strong, durable and child-friendly. The designs should be simple to build, low in cost, and be able to be constructed by local industries, manufacturers or artisans.

E.1. South Sudan School furniture overview

Studies show a direct correlation between comfortable school furniture and increased learning and development. School furniture should be flexible and adaptable for multiple purposes and for a wide range of classroom situations (i.e. lectures, small group work, individual study and testing). The furniture should be relatively lightweight and easy to handle to allow for classroom reconfiguration.

The basic needs in terms for school furniture are summarized in table 8.0:

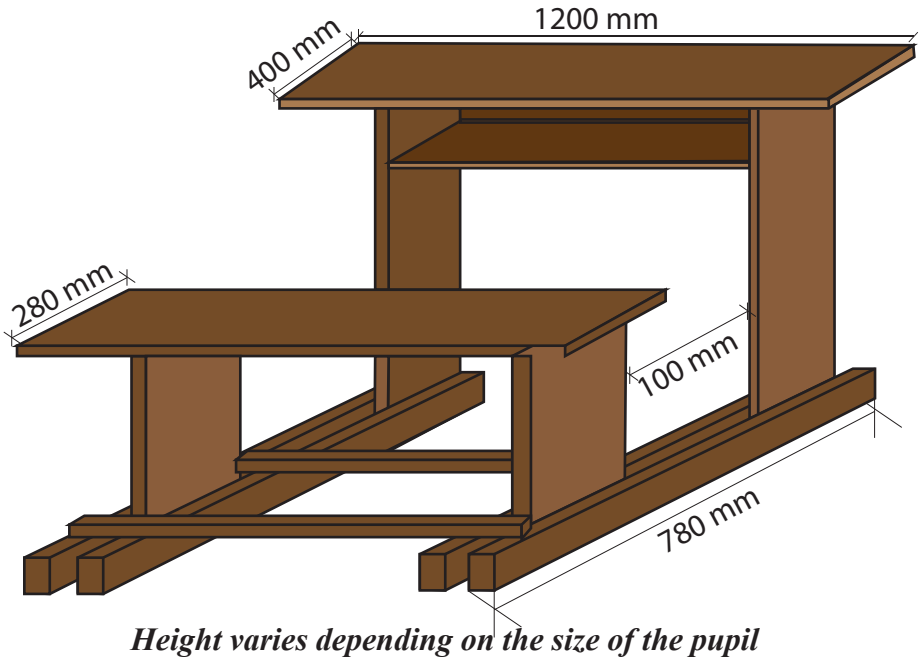
Table 8: Furniture schedule

FURNITURE SCHEDULE	
Location	***Furniture list***
Classroom	∞ Pupils benches (combined desk and chair) ∞ Teachers work station with lockable drawer and chair ∞ Display surfaces ∞ Chalk boards, possibly on two different walls, with good illumination ∞ Cupboards or shelves for books (securely fixed)
Head teacher's room	∞ Desk, chair, lockable cupboard, shelves ∞ Visitors' seats and meeting table
Staff room	∞ Tables, chairs, lockable cupboards/cabinets, shelves ∞ Computer, printer, copying machine
School grounds	∞ Signage, waste bins, notice boards, external furniture
Storage	∞ Shelving
Library – learning resource areas	∞ Tables, chairs, shelves ∞ Computer and printer tables
Special needs room	∞ Desk, chairs. Possibly specialized equipment.
Sanitation facilities	∞ Girls' sanitary bin, sanitary towels, toilet paper, soap.

E.1.1 Classroom Furniture Typology

In South Sudan, it is common to have the desk and bench permanently attached and manufactured as one unit. This design is not recommended, as it does not provide flexibility in adapting to different room settings and such furniture is heavy and difficult to move. However, based on the case study findings, this is the preferred type of furniture for basic schools in South Sudan as it is perceived to be robust, durable, and fit for the context of South Sudan .

Figure 28.0:Typical traditional fixed bench



Height varies depending on the size of the pupil

Traditionally designed to seat 2 pupils, the fixed bench can actually seat up to 3-4 pupils in over-crowded classrooms. The reference module width for a 2 pupil bench should be a minimum of 1.2m. Considering the urgent need in terms of education spaces in South Sudan continued use of the traditional benches may be inevitable.

An evolution in the furniture design should however be envisaged, evolving from the current, fixed typology, towards alternative, lighter and smaller elements.

Research has shown that overall, single desk and single chair sets are the most suitable for classroom situations. However, in the context of South Sudan most classrooms are congested beyond the expected number of 50 pupils per class. Furthermore, the choice of the type of furniture is influenced by the budget and end user experience and context. To accommodate this, space efficient double desks that can accommodate at least two children may be explored as being appropriate for South Sudan .

Figure 29.0:Illustration for single and double desks with movable chairs and benches

Source: unicef school furniture designs.

Sets of triple desks and triple benches SHOULD only be used in conditions where overcrowding of classrooms is so severe that double desks and bench units cannot serve the need.

Back support in chairs and benches should also be recommended for promoting health and comfort and should be incorporated in the furniture design where feasible.

E.1.2 Furniture Materials

Furniture available on the South Sudan market can be in solid timber or mixed with a metallic frame. The characteristics of the 2 systems are summarized in table 9.0:

Table 9 Classroom furniture materials in South Sudan

FURNITURE MATERIALS		
Category P	***ros***	***Cons***
Solid Timber	∞ high durability ∞ easy maintenance	∞ heavy ∞ cumbersome
Steel frame with plywood table and seat	∞ lighter ∞ easier to prefabricate	∞ breakable ∞ Difficult to maintain especially if fixing materials (bolts and nuts) are not available.

E.1.3 School Furniture key considerations

In an evolving perspective, some key considerations must be made when planning for school furniture. Table 10.0 is a summary of performance, design, education, maintenance and production considerations that have to be adopted for school furniture from the unicef Child friendly school furniture designs and procurement guidelines, 2015.

Table 10: Key Considerations for Classroom Furniture.

Performance considerations:	**Design considerations:**
° Be fit for intended purpose;	° Be suitable / adaptable to children of different age and height;
° Achieve a service life of 5 years under heavy use;	° **Take into consideration the needs of children with disabilities;**
° Have smooth surfaces;	° Be replicable across the country, yet using local materials in their construction;
° Perform well against different environments (dry and humid conditions of South Sudan, etc.);	° Be adaptable to the methods of construction used in local industries in different regions of the country;
° Be age sensitive;	° Be adaptable to local conditions;
° Be child-friendly;	° Consider modular concept which can be adapted according to local requirements or conditions;
° Be durable;	° Allow for storage space within the desks for books / stationary, etc.;
° Be strong;	° Avoid generating high noise level when the furniture is being moved around;
° Be inherently simple;	° Avoid split or delaminated boards;
° Be stable;	° Avoid easily deformed shapes.
° Be safe to use;	° Take into consideration ergonomic study results for the country*;
° Not be prone to vandalism.	
° Have adequate back support (for chairs);	
Educational considerations:	**Production considerations:**
° Meet the educational needs of children;	° Have simple production methods;
° Be flexible and adaptable to multiple purposes and a wide range of situations in the classroom, from lectures to small group work, to individual study and testing;	° Use locally available, affordable and sustainable materials;
° Be easy to handle;	° Require little quality control in their production.
° Be convenient for changing room settings.	
Maintenance considerations:	**Packaging, transport and storage considerations:**
° Require little maintenance in their use;	° Be easy to transport;
° Be easy to clean / be kept hygienic;	° Be easy to assemble;
° Be easy to repair with locally available materials;	° Be easy to pack and space efficient for storage.
° Be easy to replace or replicate.	° Consideration may be given to adjustable or flat packed system.
° Spare parts (if any) should be locally available.	
° Low cost tool kit should be made available for maintenance.	
Aesthetic considerations:	**Cost considerations:**
° The design should be aesthetically pleasing.	° The furniture should be cost effective.

*As the size of children of the same age can vary greatly from country to country, and even from different communities within a country, the criteria for choosing the right size of furniture is based on height not age.

(Source: UNICEF Child friendly school furniture guidelines).

E.2 Equipment list

The Table 11, summarizes the list of equipment required as a minimum in a typical school setting.

Table 11: Equipment schedule

EQUIPMENT SCHEDULE	
Category	***Equipment list***
First Aid Kit	∞ Latex gloves (100 box) ∞ Adhesive tapes ∞ Elastic and gauze bandage ∞ Compress gauze ∞ Pin, safety medium size ∞ Soap ∞ Disinfectant (chlorhexidine) ∞ Paracetamol ∞ Eye ointment ∞ First Aid bag
Sanitary Material	∞ General cleaning equipment and products ∞ Hand washing soap ∞ Girls sanitary towels (pads) ∞ Girls sanitary bin
Didactic Material	∞ Chalks ∞ Ruler, triangle and compass for chalkboard ∞ Measuring tape ∞ Series of solids (cube, prism, pyramid, cylinder, etc.) ∞ Globe ∞ Colour maps (South Sudan, Africa, World) ∞ Books ∞ Colours
Sport Equipment	∞ Balls for basketball, volleyball, softball, football ∞ Football net ∞ Volleyball net ∞ Whistle

Section 6. CONSTRUCTION & MAINTENANCE STANDARDS

An appropriate Construction Management Plan is aimed at guaranteeing the completion of the construction works at the expected level of quality.

6.1 Construction Management

Construction management is strictly related to the management of project activities and programming guidelines, as shown in the chart in Section 2.

6.2 Construction Phasing

It is important that the priority checklist that helped us in defining the planning phase will be likewise respected and followed during the construction phase. A school construction process shall be set up and developed like a rational, current, building/construction development project, whereby the infrastructures work plan shall be in place before building construction.

Ideally, the construction phasing shall follow the proposed path:

i. Mobilization
ii. Fencing
iii. Earthworks / site preparation
iv. Landscaping preparation works (planting and existing trees selection and protection)
v. WASH facilities (borehole drilling / drainage system if any / sanitation facilities)
vi. Administration blocks
vii. Classroom blocks
viii. Playground

This should allow for the school to be perfectly functional at the completion of the classroom block construction.

6.3 Construction planning

Seasonal rains have to be taken in serious consideration when planning a construction project in South Sudan.

Some regions become inaccessible during the rainy season. In some areas it also becomes impossible to conduct many of the construction activities for many months a year.

In general terms, construction materials supply to the site must be scheduled with great advance notice and possibly completed before the rain starts.

In order to optimise the dry season, the main construction activities should be executed in the period between December and May.

6.4 Site Supervision Guidelines

The aim of the Construction Standards and Guidelines is to assure a minimum quality level for the construction of all Primary Schools in South Sudan. This must be achieved with an adequate control not only during the planning and design phase, but particularly during the construction.

The Guidelines should provide to the involved actors the necessary tools to guide and control the whole construction process. A Site Construction Matrix, inspired by modern Quality Assurance best practices included as part of the Annex, and is summerized in table 12.0

Table 12: Sample site construction Matrix

CONTROLS	REF TO SPECS	ON AWARD (BEFORE ORD.)	BEFORE DELIVERY TO SITE	BEFORE INSTALLATION/ CONSTRUCTION	DURING INSTALLATION/ CONSTRUCTION	ON COMPLETION OF WORKS	CONTROL DOCUMENT REF. AND DATE
Preparation works	O	O		O	O		O
Earth work	O	O		O	O		O
Concrete structure works	O	O	O	O	O		O
Vertical framing and partitions	O	O	O	O	O		O
Roofing structure	O	O	O	O	O		O
Joinery (doors and windows)	O	O	O	O	O	O	O
Painting	O			O	O		O
Furniture	O	O	O	O	O	O	O
Final Inspection	O					O	O

6.5 School Maintenance Guidelines

School maintenance issues SHOULD guide stakeholders' choices during the school design process. It is noteworthy that often school maintenance activities are not budgeted for as part of the project and thus neither the donors nor the local administration pre-position funds for maintenance activities. Therefore, the school designs should follow simple non-complex design principles as articulated by these guidelines. Such designs should be fit-for purpose, easy to construct and easy to maintain.

6.5.1 Defining Maintenance

Building maintenance refers to any activities, work or tasks undertaken to keep or restore any part of a building, its services and surroundings to an acceptable standard and to sustain the usefulness and value of the building. Maintenance works are distinct from renovation works. Renovation works are usually large-scale, one off and expensive and usually mean that the school buildings are out of use for the duration of the works.

6.5.2 Benefits of School Maintenance

Buildings that are regularly maintained and kept in good condition can be used productively and continuously throughout their life while buildings that are not maintained will gradually deteriorate and become unusable and will then require costly renovations or demolition.

Buildings that are regularly maintained and looked after will also provide a safe, pleasant and healthy environment for staff and learners. Regular maintenance of school buildings will therefore prolong the useful life of the building and avoid the need for costly and disruptive renovations.

6.5.3 Major Types of Maintenance

There are three major types of maintenance:

- Day to day preventive maintenance: includes activities like sweeping floors, cleaning storm drains around the school buildings, collecting rubbish around the school compound, etc.
- Regular planned preventive maintenance; includes activities like re-painting the school buildings every 4 years, etc.
- Unplanned remedial repairs and maintenance; include activities like mending damaged doors and window hinges, etc.

Sample daily, weekly, monthly and annual maintence routines are attached as part of the annexures.

6.5.4 Maintenance Management in a school

The school management committee should take responsibility for school maintenance management. This team is responsible for;

- Developing a maintenance plan for the school
- Ensuring that maintenance and repairs are carried out on a regular basis or whenever necessary
- Budgeting and where possible mobilising funds for maintenance
- Educating staff, the community and pupils on key considerations for proper maintenance of the buildings and the school compound
- Accounting for expenditure of funds designated for maintenance purposes.

6.5.5 General Considerations for promoting proper school Maintenance

Discussing the key considerations for proper school maintenance with the School Management Committee should be one of the key considerations before project handover. Such discussions would go a long way in complementing School maintenance efforts post construction. These considerations can be tailored to a school as rules for the proper use of a school. If adopted, they will complement efforts towards ensuring that the school is clean and well looked after; they will also make the school more inviting for the children and more conducive to effective learning. The school management committee can include additional rules specific to their schools.

The following are proposed;

- Keep all rooms clean and tidy
- Keep all buildings locked when not in use
- Keep animals out of the school grounds and especially away from the buildings and water points
- Do not slam doors and windows; shut them carefully
- Do not write on walls
- Do not throw rubbish on the floor, the compound or around the buildings; all rubbish should be put into rubbish bins, pits, or incinerators and later burned
- Do not throw anything down the toilets/ latrines
- Do not lean on walls
- Keep furniture away from walls
- Do not stack anything against external walls (either inside or outside) as this could encourage dump

- Do not hammer nails into walls; if hooks are required, get a carpenter to fix a length of wood to the wall and screw hooks into this
- Do n0t throw stones or other objects or kick balls onto roofs, as this may lead to roof leakages
- Open and close water taps carefully and do not force them either way
- Always turn water taps off after use
- Wherever applicable, always turn off lights when not needed
- Report all problems with buildings or school grounds to a member of the maintenance committee (School management committee) or the Head Teacher.

The school management committee (maintenance team) should regularly discuss the established school maintenance rules with all key stakeholders in the school, including the teachers and learners, and explain the importance of respecting them

6.5.6 School Maintenance Toolkit

The supply of a basic school maintenance toolkit would complement proper school maintenance efforts. The following is a suggested list of tools that could be provided to a primary school for use in maintaining its buildings:

- 4-meter extendable aluminium ladder
- Hammer and screw driver
- A selection of nails and screws
- Crow-bar
- Wheel barrow
- Shovels (spades)
- Hoes
- Pick-axe
- Slashers
- Buckets
- Hack saw and blades
- 30 metres and 5 metres measuring tapes
- Paint specifications for re-painting
- Large and small adjustable spanners
- Pipe wrenches for tank, pipes, and faucet repairs.

6.6 Conclusions

These guidelines have been developed to practically guide project implementation and design for Primary Schools in South Sudan.

They must be conceived as an evolving document that should be updated whenever new technologies and other considerations arise.

Practical tools such as the checklists quoted throughout the documents have been attached as part of the checklists and annexures for purposes of reference only.

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CHECKLISTS AND ANNEXURES

Sample Site Selection Matrix for a new site

SITE LOCATION AND GEOGRAPHY CHECKLIST		
check	***Description***	***if the requirement cannot be satisfied, specify mitigation measures adopted***
GENERAL REQUIREMENTS		
	walking distance from Community housing <1,5km	
	accessibility by vehicle	
	safety distance from main roads >100m	
	accessibility to clean and drinkable water	
	safety distance from Police station and Army settlements	
	no landmines, UXO, livestock, other	
COMMUNITY INVOLVEMENT		
	community consultation during site selection	
	owner's right verified	
	norms and regulation verified (usable land on the plot)	
GEOGRAPHY		
	ground sufficiently flat, no major earthworks necessary	
	away from slope-movement zone	
	no flooded-prone area (site higher than the surroundings)	
	safety distance from wetlands >2km	
	safety distance from river banks >500m	
ENVIRONMENTAL CONSIDERATIONS (see Environmental Mitigation and Management Plan)		
	no big trees are going to be cut	
	if building a TLS, possibly avoid unused land	
	how, how far, materials will be sourced	
CONSTRUCTION TECHNIQUES DATA COLLECTION		
	possible sourcing of local materials. Specify which ones	
	soil typology and composition: assessment and description	

Sample Site Program Matrix for a new school project

SPATIAL PROGRAM CHECKLIST

check	*description*	*area*
CLASSROOMS		
	classrooms block 1	
	classrooms block 2	
	classrooms block 3	
	classrooms block 4	
	total gross area	
ADMINISTRATIION BLOCKS		
	admin block 1 (head teacher's office, staff room)	
	admin block 2	
	total gross area	
OTHER FACILITIES		
	total gross area	
EXTERNAL SPACES		
	play ground	
	school garden	
	total gross area	
SUMMARY		
	MINIMUM REQUIRED AREA (total gross calculated area)	
	SITE AREA	
	Site Area > Minimum Required Area	
	Space for future growth	

Sample Site Layout Matrix for a new school project

SITE LAYOUT CHECKLIST

check	*description*	*if the requirement cannot be satisfied, specify mitigation measures adopted*
MASTER PLAN DESIGN		
	single storey building typology	
	North/South classroom building orientation	
	consideration of ground slope for layout design	
	possibly secondary gate	
	strategic position for Admin. block	
	playground. Size and location	
	consider noise / disturbance interaction between playground and classrooms	
	flexibility/expandability (ALP/multi-section shifts)	
	landscaping, school garden	
	separate toilets + teachers' toilets	
	borehole - pit latrines safety distance	
	space for future growth	

Sample School Assessment Checklist for an existing school

SCHOOL ASSESSMENT CHECKLIST

SCHOOL IDENTIFICATION	Date of visit:
State and County	
City	
School name	
Type of school	
Contact person	

SITE LOCATION	
Location (town, area – rural, urban, semi-urban)	
Public utility network lines connected/possible connection: • Water • Sewage • Electricity • Road, distance for vehicle access	network
Topography and geology (sloped ground, approximate soil composition)	
Notes on the context (land owner, neighbouring activities within a 200m radius)	
Community involvement (management, teachers' housing, nursery, use of school facilities …)	

SPATIAL PROGRAM ASSESSMENT				
No. of pupils	M	F	TOT	2nd section:
No of classrooms (and pupils/classroom ratio)	Blocks:		Classrooms:	
Offices and administration spaces (specify surfaces)				
Playground				
Food supply facilities (kitchen, store, canteen, …)				
Landscaping (trees, flowerbeds, …)			School garden:	
Fence, gate				
Space for future growth				
Nursery (pre-school classes)				
Staff Houses				
Personnel observations: (special needs, missing spaces …)				

ARCHITECTURAL DESIGN

Building type	YEAR OF CONSTRUCTION: sketch plan/section		
Materials used • Foundations • Floor • Walls • Roof structure • Roof sheeting • Carpentry/joinery (doors and windows) • Glazing • Ceiling	materials		
List main maintenance problems/issues			
Electricity (if available, specify the source)			
Classroom size		Ceiling height	
Daylight level (Area/transparent surfaces)		Notes	
Natural ventilation level (Area/openable surfaces)		Notes	
Colours (internal / external)			
Accessibility (ramps / thresholds / doors width)			
Type of internal furniture			
Outdoor activities' furniture / equipment			
Remarks			

WASH

Water

Source of clean water (improved / unimproved) • Quality • Quantity • Reliability (how many days per week) • Specify the terminal (standing pipe / sink …)	clean water
Source of drinking water • Quality • Quantity • Reliability (how many days per week) • Specify the terminal (standing pipe / sink …) • Treatment program • Vessel used for drinking	drinking water

Sanitation – toilets

Type of toilet and conditions	(functional / partially f. / not f. – clean / not clean)	
No.of toilets / blocks	Blocks:	Stalls:
Urinals (no. / linear meters)		
Separate facilities		Lockable for girls:
Teachers' toilets		
Accessibility for children with disabilities		
Toilets for younger children	(smaller squatting plate / lower door handles / day lighted compartment …)	
Facilities for private menstrual hygiene for girls		
Remarks		

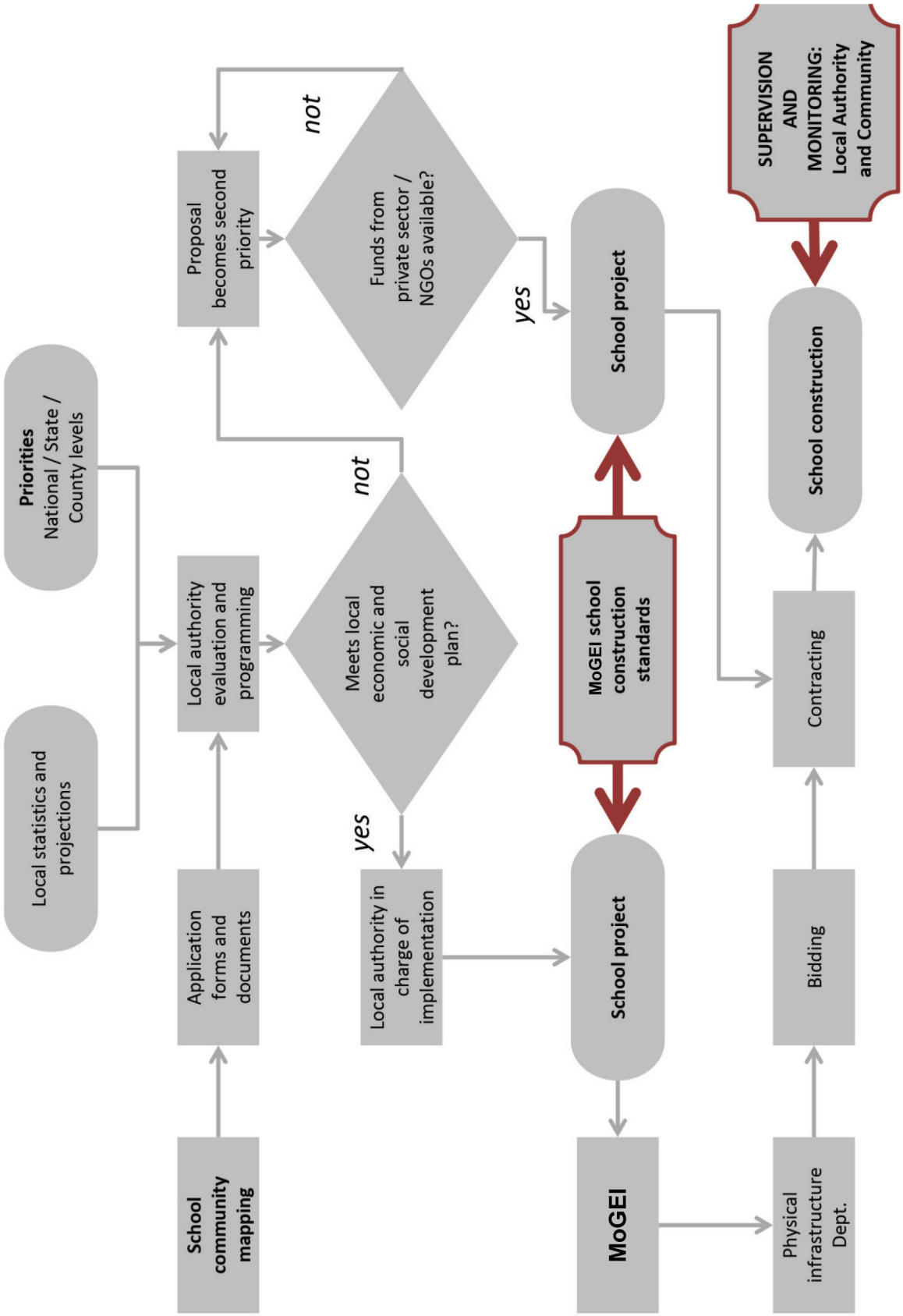
Hygiene

Handwashing facilities: Type and number	
Availability of soap	
Other (accessibility / younger children …)	

Waste disposal

Solid waste disposal system (HOW: garbage dumps / buried / burned / collected by disposal serv. HOW OFTEN)	
Disposal system of sanitary pads (What is currently being practiced? Culturally acceptable incinerator use?)	
Sludge removal system (dry / water pumped), state and accessibility (external movable slabs / manhole)	
Drainage system (storm water management)	(Rain harvest, channelling, …)

School Construction Planning and Implementation Flow Chart



Site Supervision Quality Assurance Manual

SOUTH SUDAN SCHOOL CONSTRUCTION STANDARDS AND GUIDELINES

QUALITY ASSURANCE - SITE INSPECTION CHECKLIST

		ref to spec	on award (before ord)		before delivery to site			before installation or construction				during installation or construction			on completion of works				doc ref and date
			Shop DWG - approved DWG	Certificate or Compliance	Visual Inspection	Contractor's quality assurance	Factory inspection	Statement of Workmanship	Sample	Method Statement	Supervisor's visual Inspection	Supervisor's inspection	Tests	Contractor quality assurance forms	Tests	Operating & Maintenance	Handing over	Inspection	
1	**Preparation work**																		
1.1	Masterplan (signed and accepted by relevant stakeholders)																		
	No construction should start before master plan approval, work plan submittal and																		
1.2	Site preparation, mobilization, site clearance																		
1.3	Work plan (program) submittal																		
1.4	Fencing, including community involvement and communication																		
1.5	Setting out of building																		
1.6	Setting out floor level																		
2	**Earth Work**																		
2.1	Top soil removal and storage for reuse																		
2.2	Excavation and *backfilling* – check levels, verify site dimensions																		
2.3	If Black cotton soil, allow for larger trenches																		
2.4	Compaction tests (locate tests on site plan)																		
3	**Concrete structure work**																		
	Concrete mix																		
3.1	Cement (name & type)																		
3.2	Mix design to use																		
3.3	Fine aggregates – sand (clean, no organic content)																		
3.4	Course aggregates (maximum allowed size, clean, type of stone)																		
3.5	Water quality (no salt)																		
3.6	Water-cement ratio (ref. 1:2, see slump test)																		
3.7	Testing methods (compression test, slump test) if required																		
	Footings and ground beams																		
3.8	Lean concrete layer 5cm thick																		
3.9	Measurement and alignment of casting																		
3.10	Right angles setting out checking (3-4-5 rule)																		
3.11	Reinforcement compliance (size, spacing, quality)																		
3.12	Concrete compliance (mixing, slump, placing, vibrating, compacting, etc.)																		
3.13	If black cotton soil, allow for sand/maroon layer to separate ground from structure																		

	Brick-walls underneath ground level
3.14	Workmanship (bonding and laying)
3.15	Blocks/bricks quality
3.16	Mortar quality
	Slabs
3.17	Backfilling: Material and compaction level
3.18	Concrete final thickness
3.19	Reinforcement spacing and diameter
3.20	Joints (along walls and where necessary expansion joints)
3.21	Curing arrangement and follow-up-immediate starting, lasting at least 7 days
	Columns
3.22	Formwork (clean, plumb alignment, cleanness)
3.23	Concrete covering (min 25mm)
3.24	Reinforcement spacing and diameter
3.25	Connections for roof structure
3.26	Casting quality (maximum 1,5m high and vibrating)
	Ring beams
3.27	Concrete covering (min 25mm)
3.28	Reinforcement spacing and diameter
3.29	Casting quality (vibrating)
4	**Vertical framing and partitions**
	Steel / Timber vertical framing
4.1	Quality and type of timber / steel
4.2	Compliance to design (size and spacing)
4.3	Treatment (anti-termite for timber)
4.4	Base fixing system – connection type used
4.5	Bracing
	Partition solid walls in concrete blocks
4.6	Quality of blocks (ref manufacturing and curing)
4.7	Compressive strength compliance
4.8	Mortar mixing and preparation
4.9	Workmanship (bonding and laying)
4.10	Fair faced if not plastered
	Plastering
4.11	Sand quality (size and cleanness)
4.12	Mix (1:5/1:3)
4.13	Thickness (max 19mm)
4.14	Application on well wetted blocks
4.15	Surface finishing quality and compliance

	Bamboo or timber wall cladding
4.16	Visual quality inspection (split cuts, other …) samples
4.17	Installation compliance: spacing, horizontality, other …
4.18	Fixing method used durability
	Stabilized earth blocks or unbaked earth bricks (adobe) walls
4.19	Sample approval of the agreed technology
4.20	Mix design proportions (earth, sand, cement, straw)
4.21	Molding control (size, straightness, uniformity)
4.22	Workmanship (bonding and laying)
5	**Roofing structure**
	General woodwork
5.1	Timely supply of materials
5.2	Type and quality of timber (treatment where necessary)
5.3	Site storage, protection against weather
	Sample of roof truss
5.4	Timber quality (visual inspection, no cracks allowed, treatment, antirust, etc.)
5.5	Compliance to design (size and completeness)
5.6	Compliance of joints (type, size and number of bolts, nails, steel plates, welding)
5.7	Fixing to ring beam reservation
	Roof trusses
5.8	Sample approval
5.9	Compliance to sample
5.10	Correct fixing to vertical structure, and alignment, spacing verification
	Purlins
5.11	Size, spacing and quality
5.12	Treatment (4 sides)
5.13	Number of lines and horizontality
5.14	Fixing system and quality
	Fascia and eave boards
5.15	verify the design and specifications (could be omitted)
5.16	Type of wood (or steel plate)
5.17	Thickness (25mm for timber)
5.18	Treatment (4 sides)
	Roof covering
5.19	Typology – materials used
5.20	Thickness (22.5° - 0.42mm - 34/100 for iron sheet, 20cm for thatching)
5.21	Coating (galvanized, lacquered, colour specifications)

5.22	Fixing method and spacing
5.23	Overlap (min 20cm for iron sheet)
6	**Joinery (doors and windows)**
	Frames
6.1	Compliance to the design (timber / steel)
6.2	Fixing system (possibly installed during wall construction)
6.3	Accuracy of fixing (horizontal and vertical alignment)
	Shutters and louvers
6.4	Workshop sample approval
6.5	Fixing method (number of hinges / bolts)
6.6	If openable, check the functioning
	Hinges and locks
6.7	Sample of hinges
6.8	Fixing method (screws not nails – welding)
6.9	If locks are installed, keep record of the keys handed over
7	**Painting**
	Material
7.1	Anti-termite treatment (including non-visible portions)
7.2	Paint compliance. Colour sample to be submitted
	Application
7.3	Surface must be dry and clean (from mortar, dirt and dust)
7.4	Non accessible elements painted prior fixing
7.5	Verify the number of coats to be applied (usually 3)
8	**Furniture**
	General
8.1	Workshop samples to be approved
8.2	If timber is used, it shall be well seasoned
8.3	Furniture not to be supplied on site prior practical work completion and locking system installation
	Chairs and tables
8.4	Verify the size are compliant with the students' age
8.5	Total number
8.6	Workmanship and solidity inspection
8.7	Finishing compliance
	Cupboards and shelves
8.8	If locks are installed, keep record of the keys handing over
8.9	Shelves installation: horizontality and solidity

9	**Final inspection**																				
9.1	After practical completion of every constructed block																				
9.2	Completion certificate signed by the relevant stakeholder, and head teacher																				
	Before final payment, check the following:																				
9.3	Whole scope of works executed, including toilet blocks, fencing, signaling, landscaping																				
9.4	Toilet blocks have been completed and are functional																				
9.5	Classroom and internal spaces properly cleaned																				
9.6	The site is clean and all the remains have been removed																				
9.7	Key of doors and cupboard handed over with record to head teacher																				

LIST OF ASSESSED SCHOOLS AND REFERENCE PERSONS INTERVIEWED	
CENTRAL EQUATORIA	
Bilinyang Primary School	(under construction)
Rajaf Secondary School	(under construction)
Gudele East Primary School	Michael Guya (0955 684 874 – 0972 014 474)
Gudele Primary School (by SPCSL construction)	(under construction)
Gudele Secondary Boarding School	(under construction)
Salam "A" Primary School	Yakwe Yuggu Wada (09 211 402 44)
AtlabaraEst Primary School	Benay Soma
Buluk "A" I Primary School	Philip John Kenyi (0955 42 8118) PaolinoGobalu (deputy Head teacher)
Buluk "A" II Primary School	Anthony Ladu
Juba 1 Boys Primary School	James Paul (09 26 29 66 451)
JONGLEY – GPAA	
Langachok Primary School/ALP	-
Kondako Primary School	-
Pibor Boys and Pibor Girls Primary School	-
WESTERN BAHR EL GHAZAL	
Korukanda (Ngongba-A) Primary School	Edward NareUdangala (Head teacher Joseph Kumbaukaja)
Lokoloko Primary School	Fidele Brinjei - Nikola
Tobi Co-Education Primary School	-
Natabo Primary School	William Jerom Anginom
Ngolimbo "A" Primary School	-
St. Michael Catholic Primary School	Evalino Eugenio Risik
EASTERN EQUATORIA	
Torit Model Primary School	Marcello Abondio
Torit East (Torit "1") Primary School	Mr Angelo Gandino (head teacher) – Ross Epo (deputy)
Torit West Primary School	Dominique Otinale
St. Theresa Primary School	-
Memorial Jong Garang Secondary School	-
ASSESSMENT TEAM	
Ministry of Education Science and Technologies	EngOryem Charles Wani
UNICEF	Eng Paolo Cardellino
CENTRAL EQUATORIA	
CE State Ministry of Education	Eng Robert
JONGLEY – GPAA	
GPAA Ministry of Education	Mr ApeeOjuluOchudho
Intersos	MrSidney NicholasKung'u
IOM	Mr Osman Abdiraman
UNICEF	Mr John Yuggu Tileyi
WESTERN BAHR EL GHAZAL	
WBG Ministry of Education	Mr Nicola Gadini
UNICEF	Mrs Lucy Kithoi Lomodong
EASTERN EQUATORIA	
EE Ministry of Education	Eng Alfred Taban

Drinking Water Quality Monitoring Form

AESTHETIC QUALITY/PHYSICAL PARAMETERS		S. Sudan Max Permissible
Taste		Acceptable
Odour		Acceptable
Colour (NTUs)		≤15
Appearance		Clear
§ Turbidity (NTUs)		≤5.0
§ pH		6.5 - 8.5
¥ TDS (mg/l)		≤1000
§ Electrical Conductivity (mS/m)		1500
CHEMICAL PARAMETERS (mg/l)		**S. Sudan Max Permissible Limit (mg/L)**
¥ Arsenic		≤0.05
Cadmium[1]		0.003-0.005
Calcium		80-150
¥ Chloride		200
§ Chlorine (Residual) – For treated water only		0.2-0.6
Copper[1]		1.5
¥ Fluoride		1
¥ Iron (Total)		0.5
Manganese		0.4
¥ Nitrate (NO^3)		30
Nitrite (NO^2)		0.5
Potassium		25-50
Sodium		100
Sulphate		200
Total Hardness as $CaCO^3$		200
Zinc		3
MICROBIOLOGICAL PARAMETERS		
¥ Total Coliforms (counts/100ml)		<10
§ Faecal coliforms (counts/100ml)		0
Heterotrophic Plate Count (counts/ml)		<100
Guinea worm larvae[2]		0
Vibrio cholerae[3]		0

Footnote 1:

1. Complete information and all water tests required for initial monitoring of new water sources
2. § = Testing is compulsory for routine monitoring of existing water sources
3. ¥ = Testing is recommended for routine monitoring of existing water sources

Footnote 2:

4. [1] To be tested at point of use where pH is lower than 6 [2] To be tested in endemic areas only
5. [3] To be tested during outbreaks/epidemics only

CHECKLIST FOR DAILY & WEEKLY MAINTENANCE ROUTINES

DAILY & WEEKLY MAINTENANCE			
Maintenance Item	Week	Responsibility: Class	Action Taken
Sweep and wash all floors and verandas			
Clean and wash all toilets			
Clean wash-basins and sinks			
Lock all doors at the end of the school day			
Move all furniture and clean floors			
Clean dirty marks off walls			
Clean all windows			
Cut grass around the buildings			
Clean out all storm-drains			
Collect and burn all rubbish			

CHECKLISTS FOR MONTHLY MAINTENANCE ROUTINES

MONTHLY MAINTENANCE CHECKS: SCHOOL GROUNDS			
Maintenance Item	Responsibility	Problem	Action Taken
Trim trees and shrubs			
Collect rubbish and burn/bury			
Check for termite tunnels and nests			
Clean storm-drains and outlets			
Check covers to inspection chambers and septic tanks			
Check soakaways are not full			
Check water pipes and standpipes			
Check wells and covers			
Check hand-pumps			
Weed and tidy flowerbeds			

MONTHLY MAINTENANCE CHECKS: BUILDINGS EXTERNAL			
BUILDING:			
Maintenance Item	Responsibility	Problem	Action Taken
Clean off roof			
Check fixings to corrugated steel or fibre-cement roof			
Check external ceilings for damp			
Clean any gutters and down-pipes			
Clean outside walls and undersides of roofs			
Check veranda floors			
Check all roof fixings			
Check external electrical installation			

MONTHLY MAINTENANCE CHECKS: BUILDINGS INTERNAL			
BUILDING:			
Maintenance Item	Responsibility	Problem	Action Taken
Clean off walls and ceilings			
Check ceilings for damp patches			
Check floors			
Check doors			
Check windows			
Check any louvre windows			
Check toilets			
Check water tanks			
Check wash-basins and sinks			
Check electrical installation			
Check furniture			

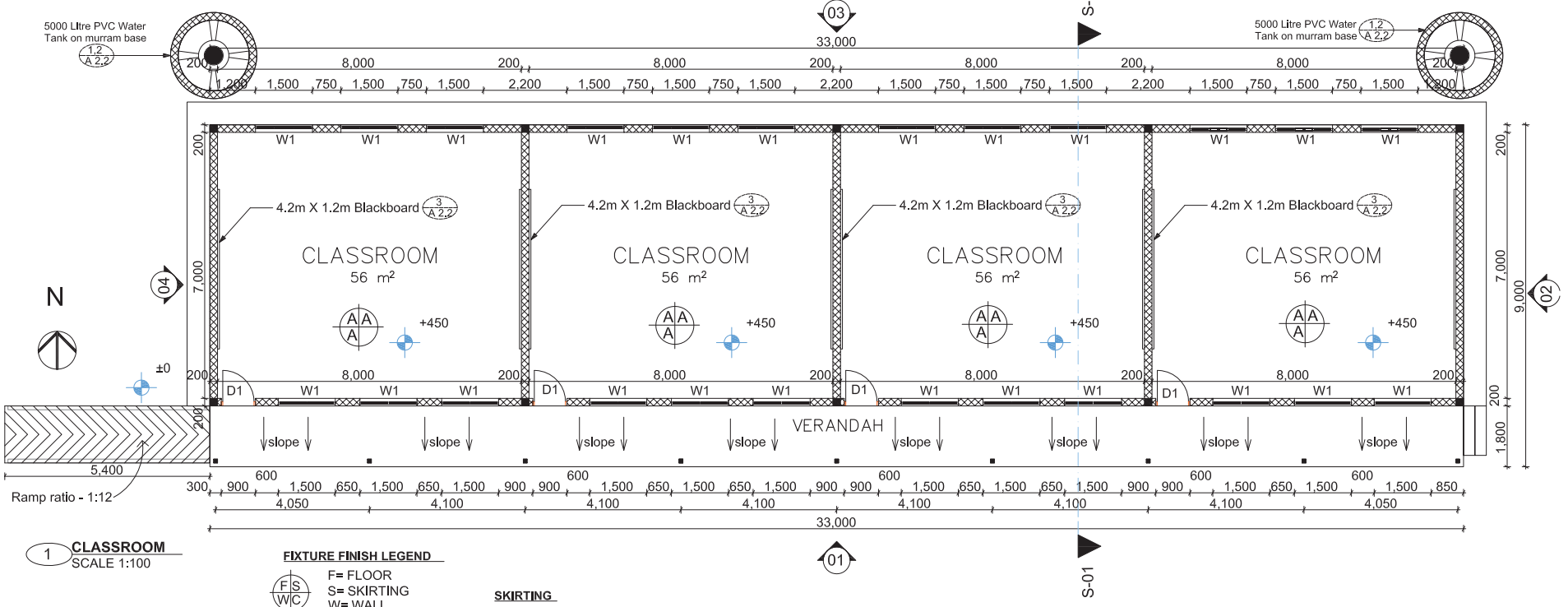
CHECK LISTS FOR ANNUAL MAINTENANCE ROUTINES

ANNUAL MAINTENANCE CHECKS: SCHOOL GROUNDS			
Maintenance Item	Responsibility	Problem	Action Taken
Trim trees and shrubs			
Check for termite nests and remove			
Check storm-drains and outlets for damage			
Check that septic tanks and soakaways are not full			
Check covers to inspection chambers and septic tanks			
Check soil drains for damage			
Check water pipes and stand-pipes			
Check wells for damage			
Check and maintain hand-pumps			
Check water tanks and stands			
Check paving round buildings			
Check paths and roads			
Check walls, fences and gates			

ANNUAL MAINTENANCE CHECKS: BUILDINGS EXTERNAL			
BUILDING:			
Maintenance Item	**Responsibility**	**Problem**	**Action Taken**
(			
Check corrugated steel roof			
Check any gutters and down-pipes			
Check all fascia and barge-boards			
Check all roof fixings			
Check external ceilings			
Check walls for cracks, damage, etc			
Check veranda floors			
Check external electrical installations			
Steel-framed buildings:			
Check all steel frames			
Check any steel cladding			
Timber-framed buildings:			
Check timber cladding			
Check timber frames			
Check veranda floors			

ANNUAL MAINTENANCE CHECKS: BUILDINGS INTERNAL			
BUILDING:			
Maintenance Item	**Responsibility**	**Problem**	**Action Taken**
Check ceilings			
Check roof structure			
Check floors			
Check skirtings			
Check doors, frames and hardware			
Check windows, frames and hardware			
Check any louvre units			
Check any shutters			
Check toilets			
Check floor drains, wash-basins and sinks			
Check water tanks			
Check complete electrical installation			
Check chalkboards and other fittings			
Check furniture			
Timber-framed buildings:			
Check timber walls			
Check timber floors			
Check skirtings			

TYPICAL CLASSROOM FLOOR PLAN AND ELEVATION



1 **CLASSROOM**
SCALE 1:100

FIXTURE FINISH LEGEND

F S WC

F= FLOOR
S= SKIRTING
W= WALL
C= CEILING

FLOOR

A= CONCRETE SLAB FLOATED WITH STEEL TROWEL AND BAYED USING EXPANSION JOINTS

B= CEMENT SCREED

SKIRTING

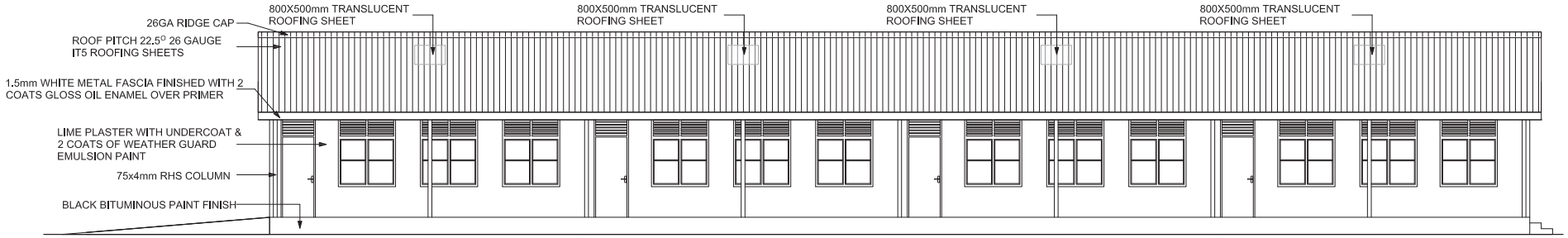
A= CEMENT SCREED

WALL

A = LIME PLASTER FINISHED WITH SILK VINYL EMULSION PAINT

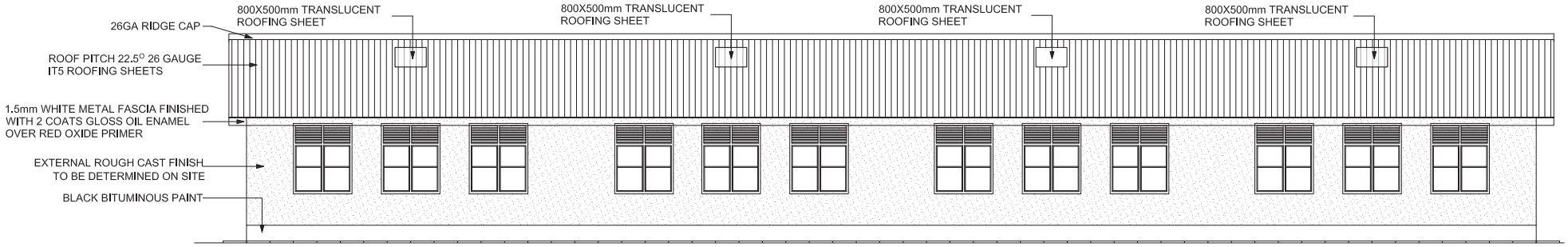
CEILING

A = 9mm CHIPBOARD CEILING

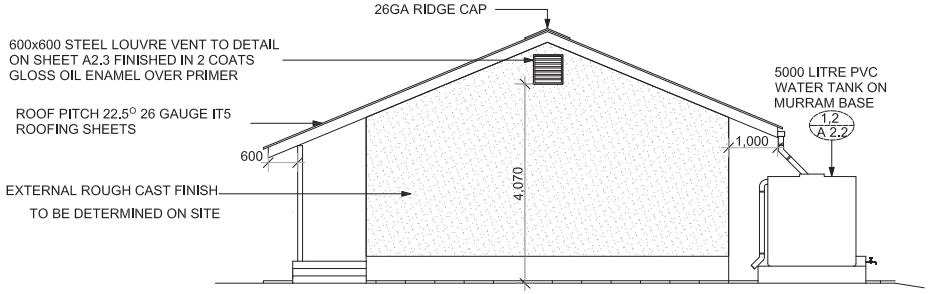


2 **CLASSROOM ELEVATION 01**
SCALE 1:100

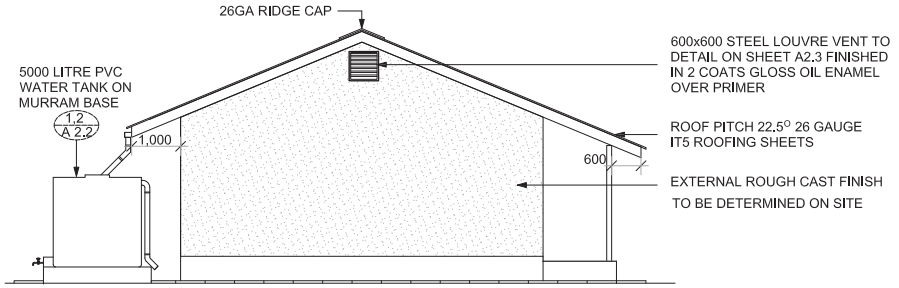
TYPICAL CLASSROOM ELEVATION 2,3,& 4



1 **CLASSROOM - ELEVATION 03**
SCALE 1:100

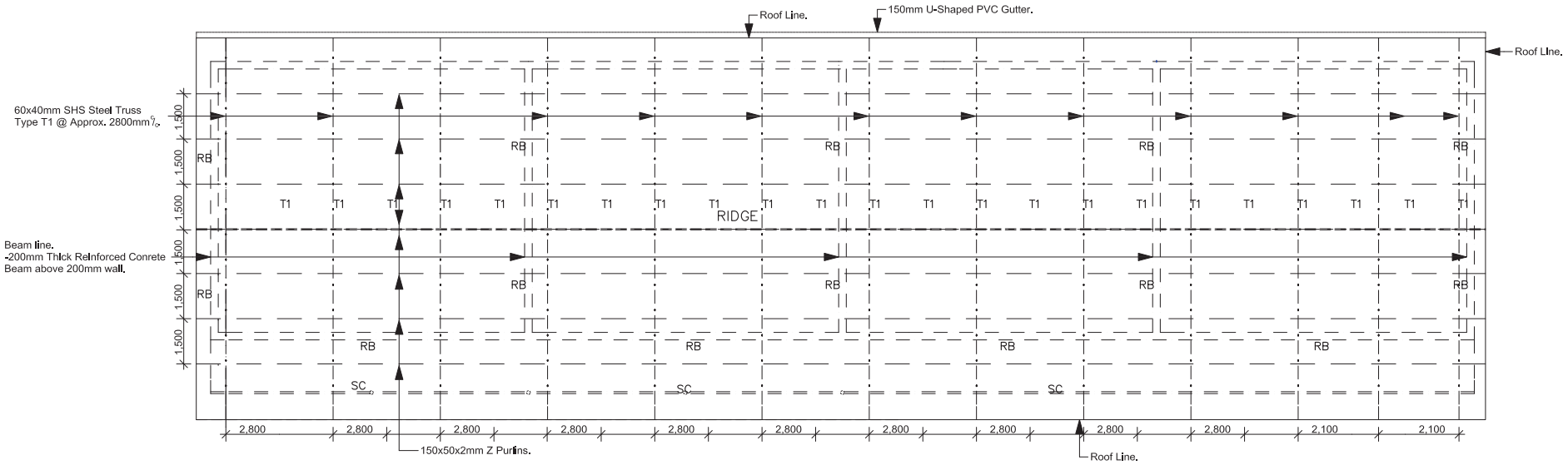


2 **CLASSROOM - ELEVATION 02**
SCALE 1:100

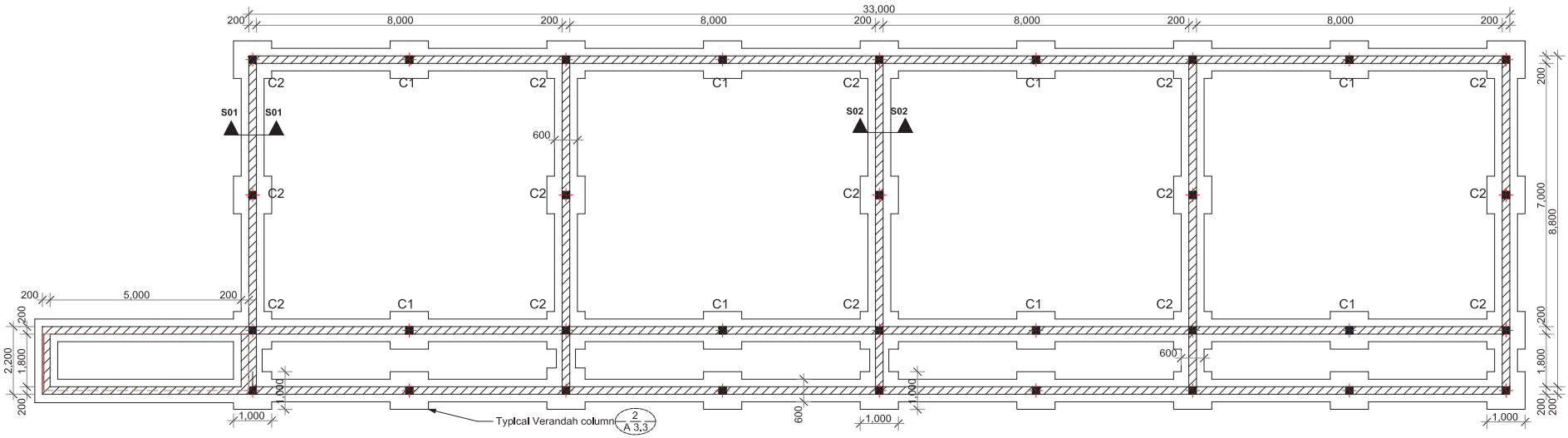


3 **CLASSROOM - ELEVATION 04**
SCALE 1:100

TYPICAL CLASSROOM FOUNDATIONAND ROOF FRAMING

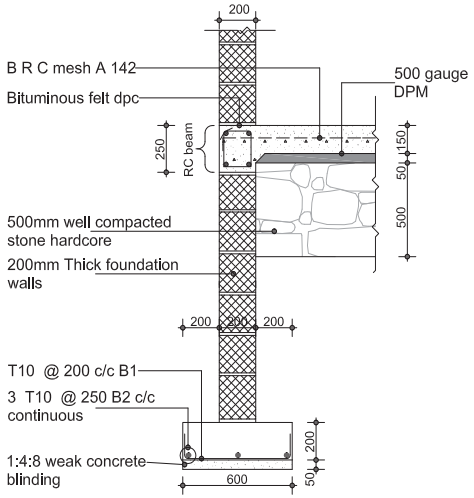


1 **CLASSROOM ROOF FRAMING PLAN**
SCALE 1:100

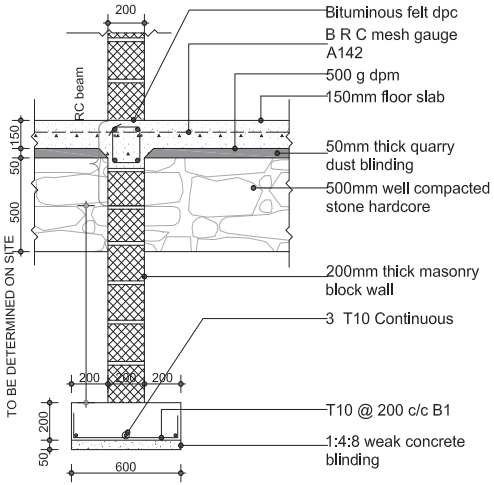


2 **CLASSROOM FOUNDATION PLAN**
SCALE 1:100

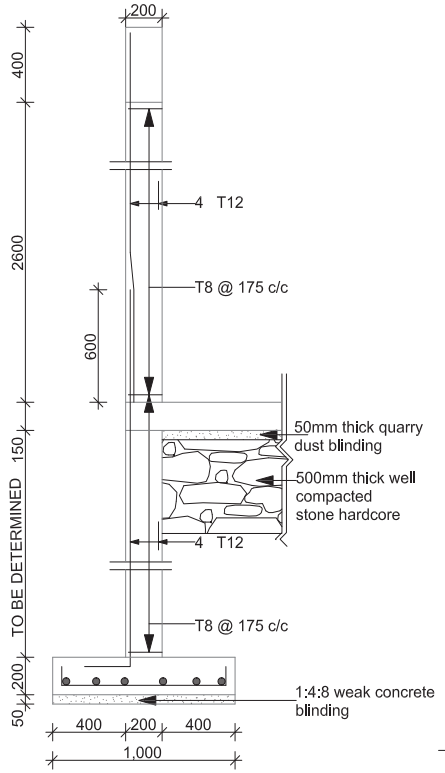
TYPICAL FOUNDATION FOOTING DETAILS



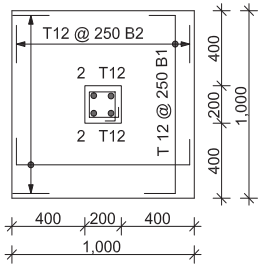
1 **STRIP FOUNDATION FOOTING - SECTION S01**
SCALE 1:25



2 **STRIP FOUNDATION FOOTING - SECTION S02**
SCALE 1:25

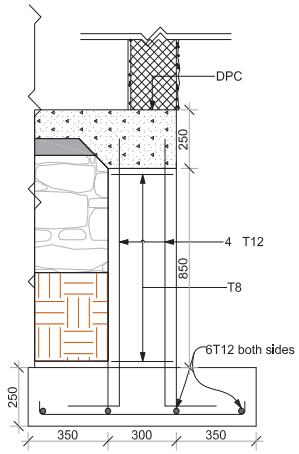


3 **SECTION THROUGH COLUMN (C2)**
SCALE 1:25

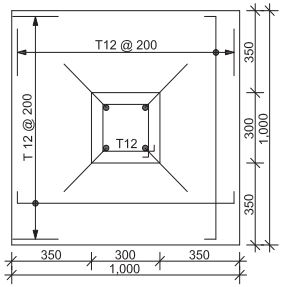


4 **COLUMN BASE (TYPE C1)**
SCALE 1:25

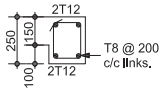
NOTE:
- ALL SLABS SHOULD BE BAYED USING EXPANSION JOINTS
- FOUR (4) BAYES PER FLOOR AREA



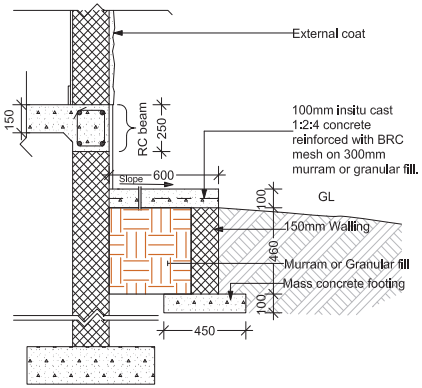
5 **SECTION THROUGH STUB COLUMN (C1)**
SCALE 1:20



6 **COLUMN BASE (TYPE C2)**
SCALE 1:10

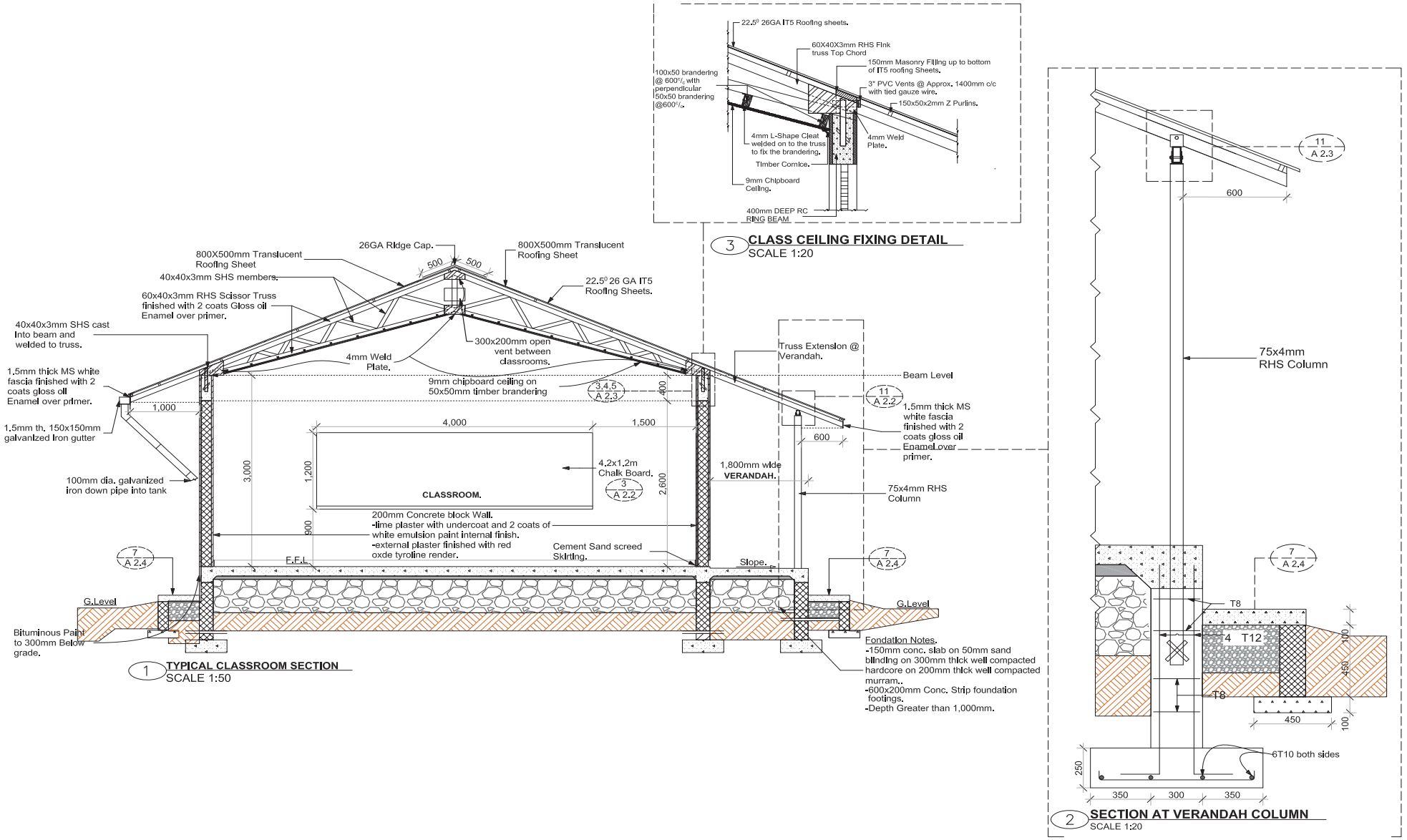


SECTION THROUGH 250x200mm GROUND BEAM
SCALE 1:25

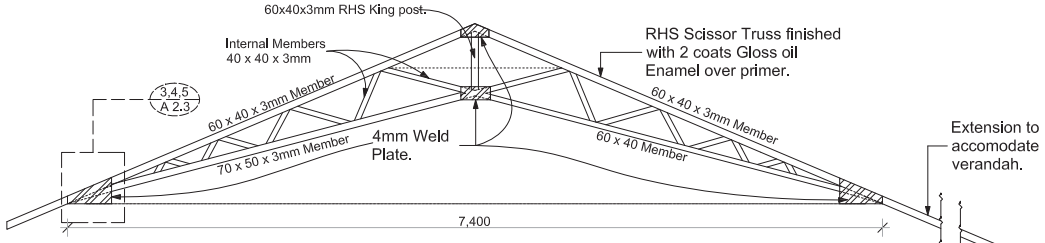


7 **TYPICAL SECTION FOR PAVING SLAB**
SCALE 1:25

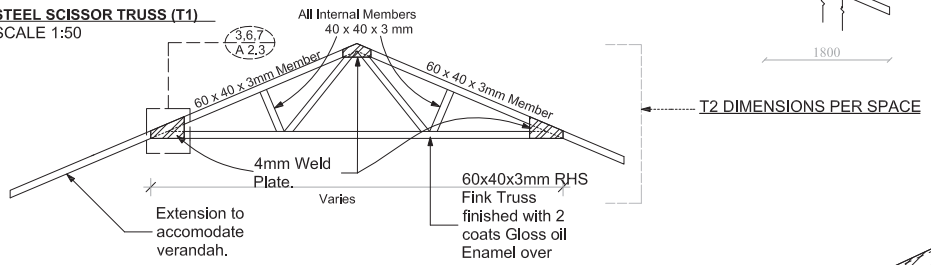
TYPICAL CLASSROOM SECTION



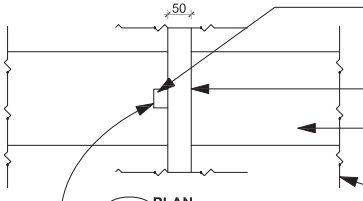
TYPICAL STEEL ROOF DETAILS



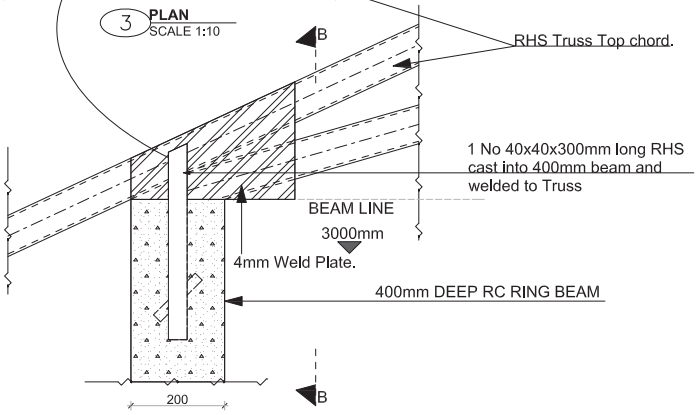
1 **STEEL SCISSOR TRUSS (T1)**
SCALE 1:50



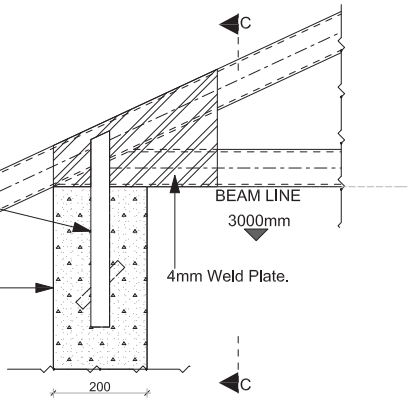
2 **STEEL SCISSOR TRUSS (T2)**
SCALE 1:50



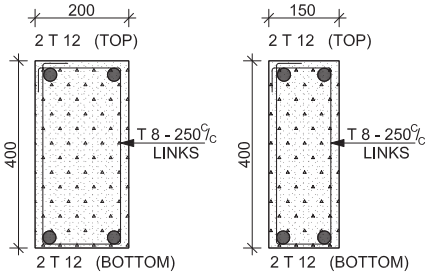
3 **PLAN**
SCALE 1:10



4 **STEEL SCISSOR TRUSS AND BEAM CONNECTION DETAIL**
SCALE 1:10

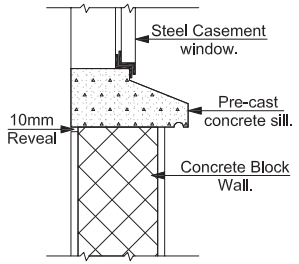


5 **STEEL FINK TRUSS AND BEAM CONNECTION DETAIL**
SCALE 1:10

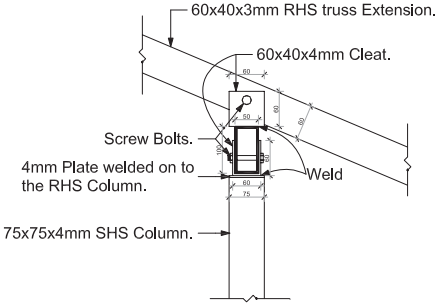


8 **RING BEAM (RB)**
SCALE 1:10

9 **RING BEAM (RB1)**
SCALE 1:10



10 **WINDOW SILL DETAIL.**
SCALE 1:10

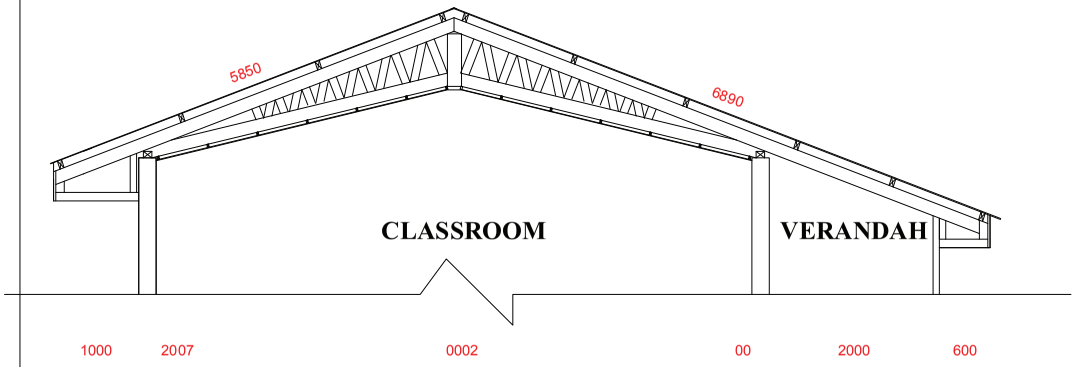


11 **COLUMN & TRUSS CONNECTION DETAIL**
SCALE 1:10

TYPICAL CLASSROOM TIMBER TRUSS DETAILS OPTION 1

ROOF CONSTRUCTION

Pitch-beyond 22.5deg
IT5 G26 Corrugated roof sheets on
100x50mm Purlins on
100x50mm Common rafters on
100x50mm Ties and struts on
150x50mm Tie beams on
100x75mm Wall plates.



CEILING CONSTRUCTION

Chipboard ceiling on
100x50mm ceiling joists @600mm C/C on
75x50mm softwood branderings on
150x50mm Tie beams.

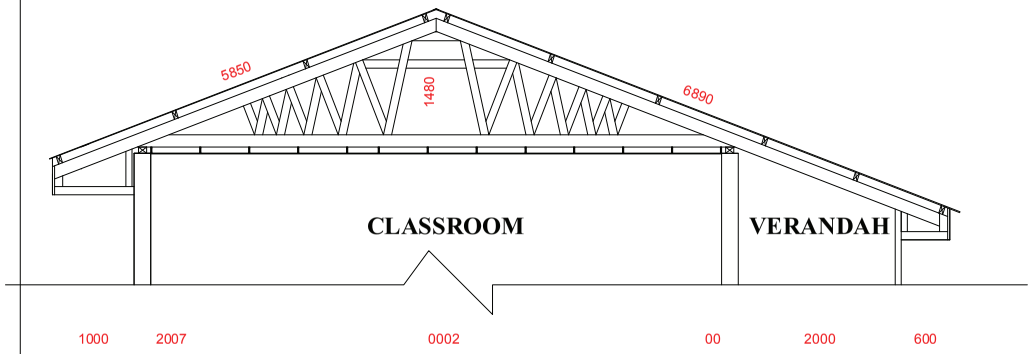
TRUSS STUCTURE-CLASSROOM BLOCK (OPTION 1)

SCALE: 1:25

TYPICAL CLASSROOM TIMBER TRUSS DETAILS OPTION 2

ROOF CONSTRUCTION

Pitch-beyond 22.5deg
IT5 G26 Corrugated roof sheets on
100x50mm Purlins on
100x50mm Common rafters on
100x50mm Ties and struts on
150x50mm Tie beams on
100x75mm Wall plates.



CEILING CONSTRUCTION

Chipboard ceiling on
100x50mm ceiling joists @600mm C/C on
75x50mm softwood branderings on
150x50mm Tie beams.

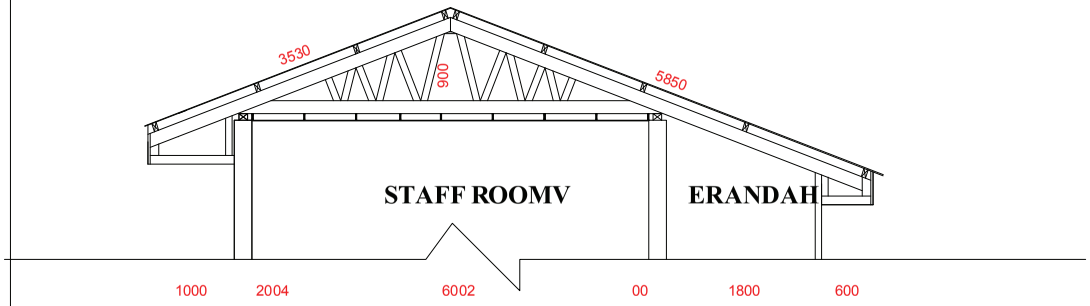
TRUSS STUCTURE-CLASSROOM BLOCK (OPTION 2)

SCALE: 1:25

TYPICAL STAFFROOM TIMBER TRUSS

ROOF CONSTRUCTION

Pitch-beyond 22.5deg
IT5 G26 Corrugated roof sheets on
100x50mm Purlins on
100x50mm Common rafters on
100x50mm Ties and struts on
150x50mm Tie beams on
100x75mm Wall plates.



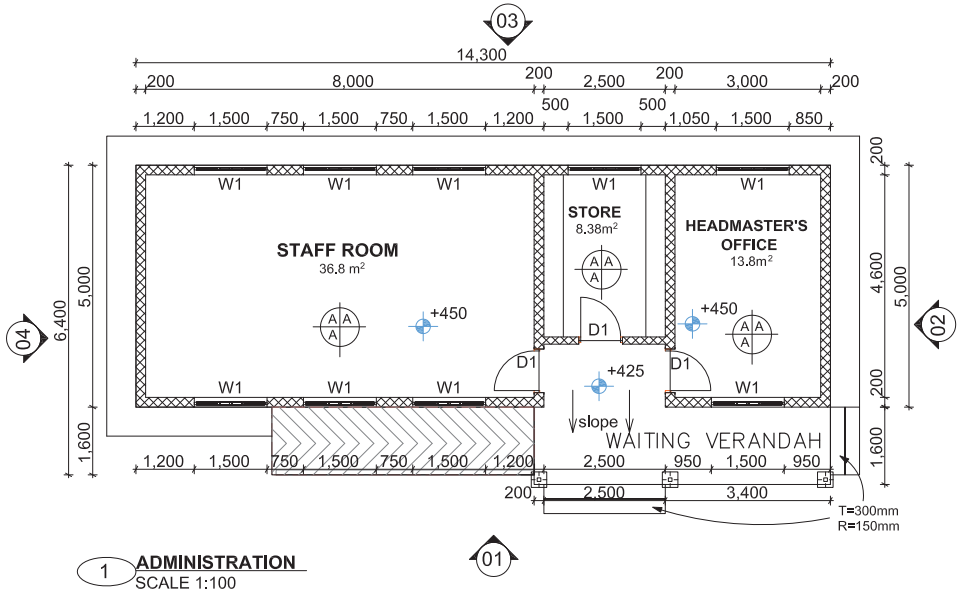
CEILING CONSTRUCTION

Chipboard ceiling on
100x50mm ceiling joists @600mm C/C on
75x50mm softwood branderings on
150x50mm Tie beams.

TRUSS STUCTURE-ADMIN BLOCK

SCALE: 1:25

TYPICAL ADMINISTRATION BLOCK FLOOR PLAN AND ELEVATION



1 **ADMINISTRATION**
SCALE 1:100

FIXTURE FINISH LEGEND

F= FLOOR
S= SKIRTING
W= WALL
C= CEILING

FLOOR

A= CONCRETE SLAB FLOATED WITH STEEL TROWEL

B= CEMENT SCREED BAYED USING EXPANSION JOINTS

SKIRTING

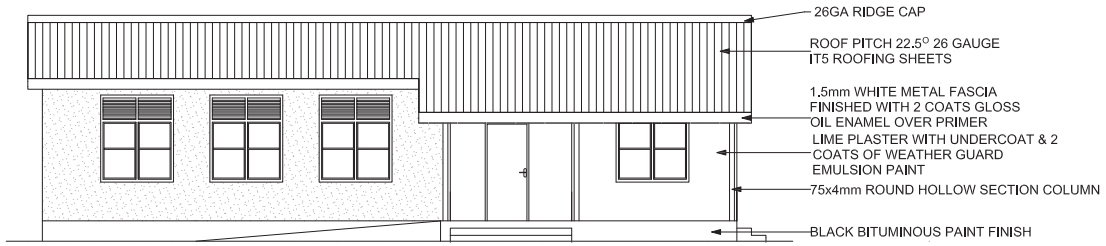
A= CEMENT SCREED

WALL

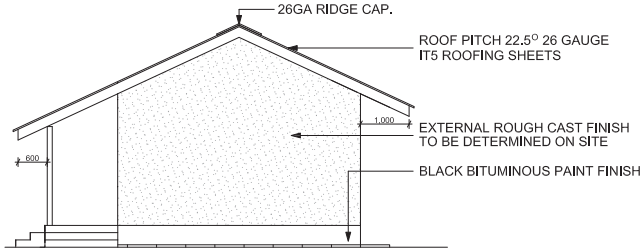
A = LIME PLASTER FINISHED WITH SILK VINYL EMULSION PAINT

CEILING

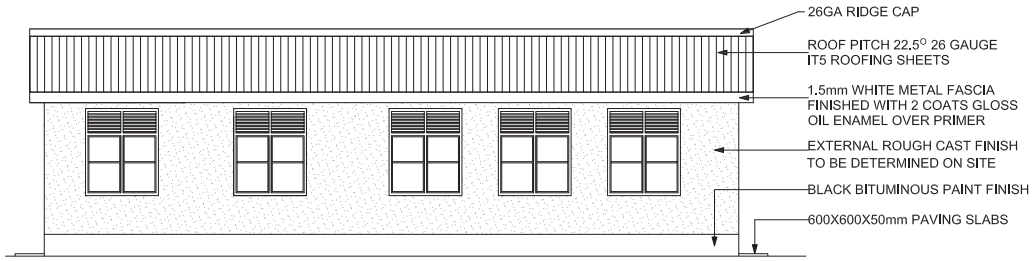
A = 9mm CHIPBOARD CEILING CHAMFERED AT JOINTS



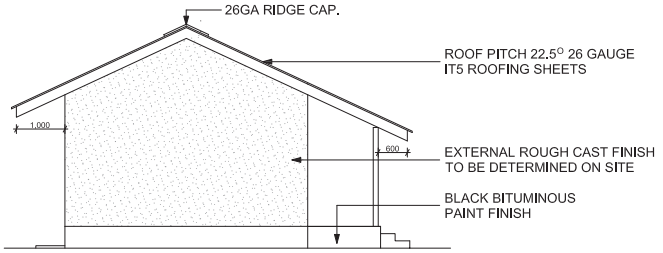
2 **ADMINISTRATION - ELEVATION 01**
SCALE 1:100



4 **ADMINISTRATION - ELEVATION 02**
SCALE 1:100

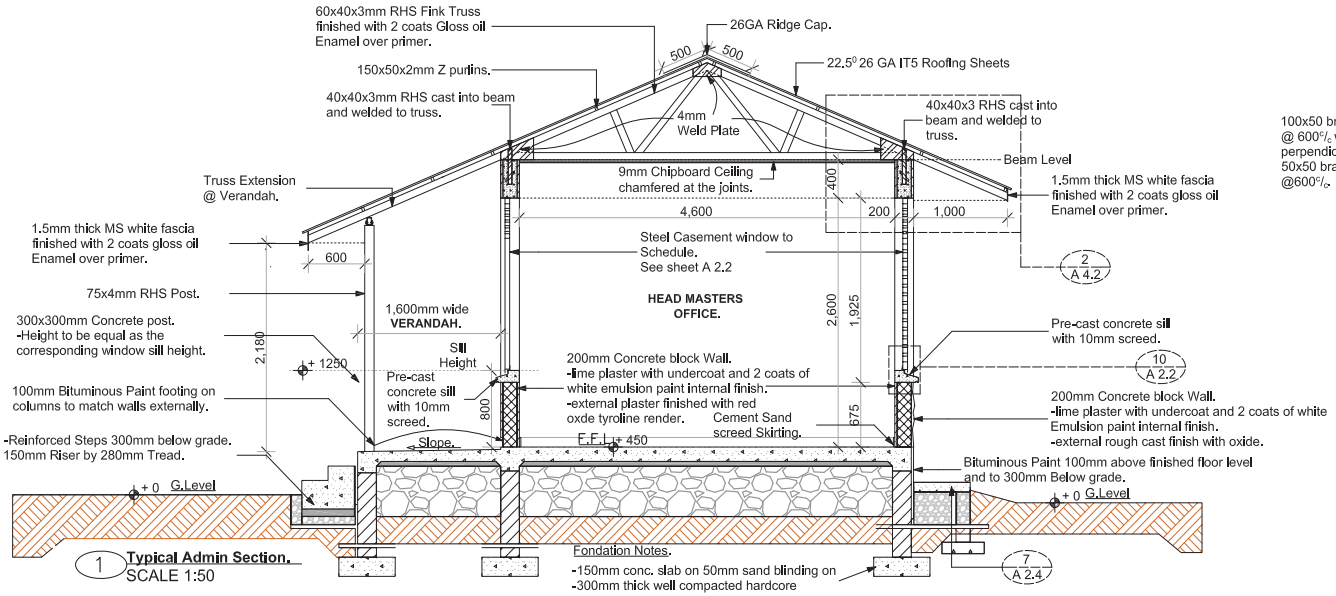


3 **ADMINISTRATION - ELEVATION 03**
SCALE 1:100



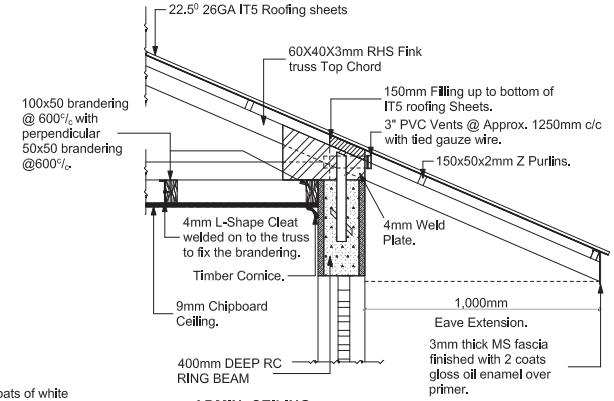
5 **ADMINISTRATION - ELEVATION 04**
SCALE 1:100

TYPICAL ADMINISTRATION BLOCK SECTION, ROOF FRAMING PLAN AND FOUNDATION PLAN

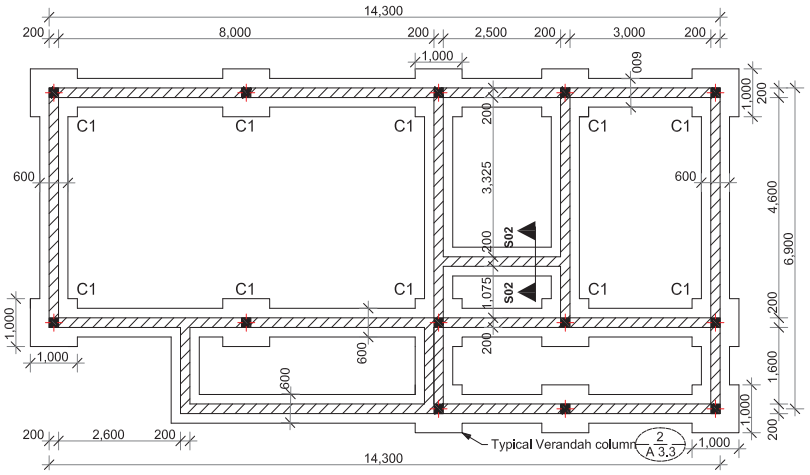


1 **Typical Admin Section,**
SCALE 1:50

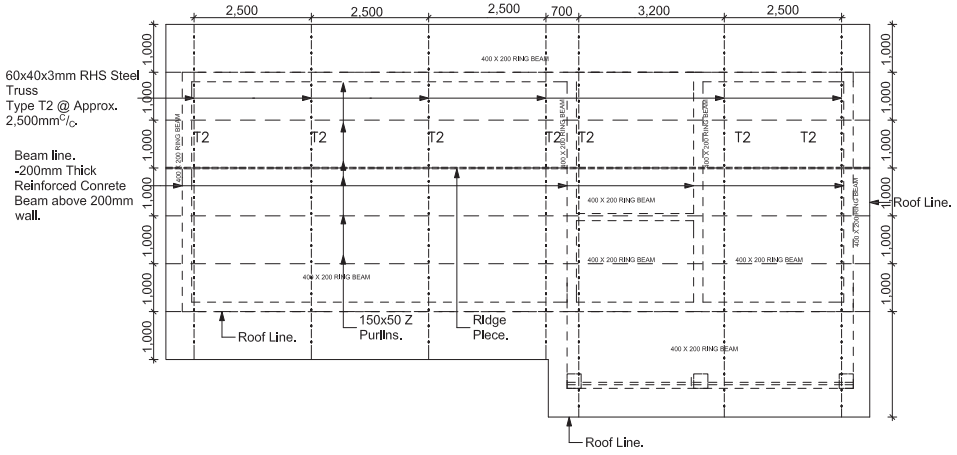
1 **TYPICAL ADMINISTRATION SECTION,**
SCALE 1:100



ADMIN. CEILING FIXING DETAIL,
2 SCALE 1:20

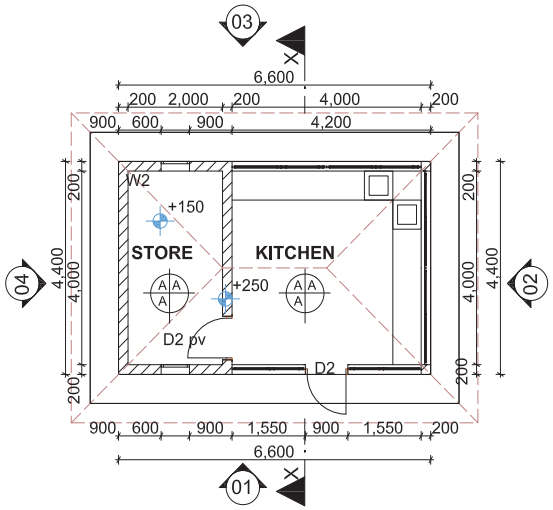


3 **TYPICAL ADMINISTRATION PLAN,**
SCALE 1:100



4 **TYPICAL ADMINISTRATION ROOF FRAMING PLAN,**
SCALE 1:100

TYPICAL KITCHEN PLAN, ELEVATION, SECTION,ROOF FRAMING AND FOUNDATION PLAN



1 **KITCHEN FLOOR PLAN**
SCALE 1:100

FIXTURE FINISH LEGEND

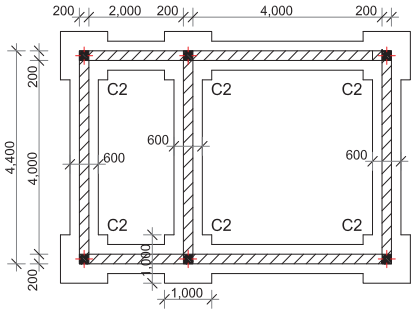
F= FLOOR
S= SKIRTING
W= WALL
C= CEILING

FLOOR
A=CONCRETE SLAB FLOATED WITH STEEL TROWEL
B=CEMENT SCREED

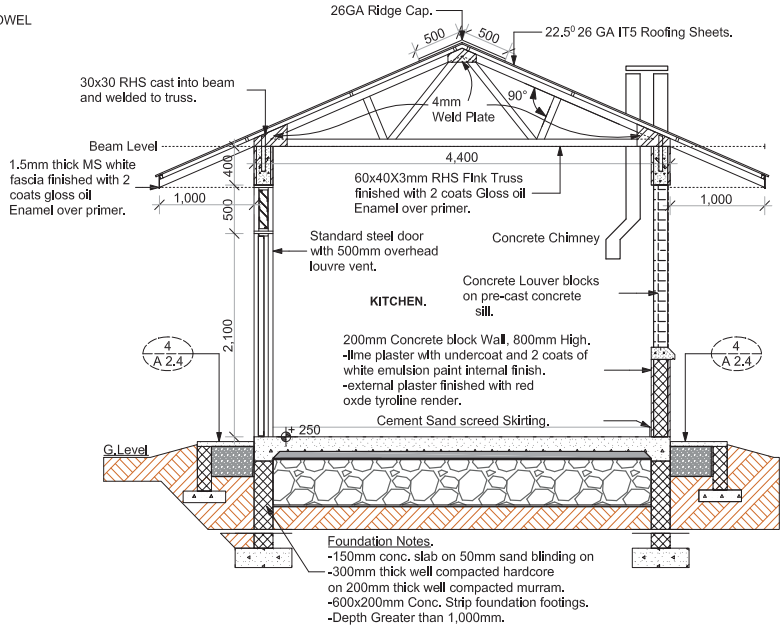
SKIRTING
A= CEMENT SCREED

WALL
A = LIME PLASTER FINISHED WITH SILK VINYL EMULSION PAINT

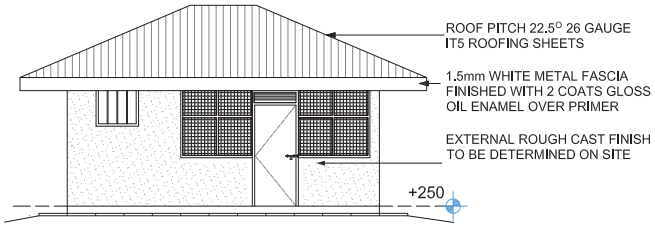
CEILING
A = 9mm CHIPBOARD CEILING JOINTED AT CHAMFERED



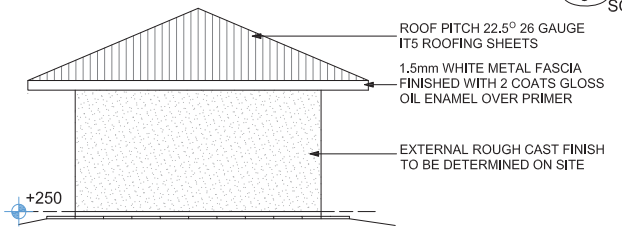
2 **KITCHEN FOUNDATION PLAN**
SCALE 1:100



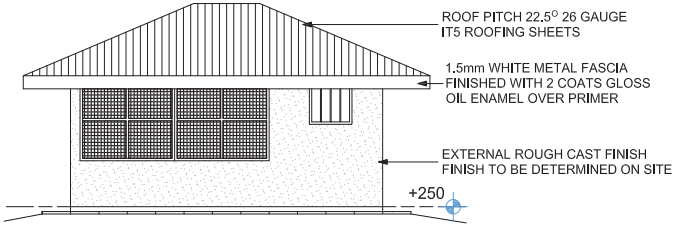
3 **KITCHEN SECTION**
SCALE 1:100



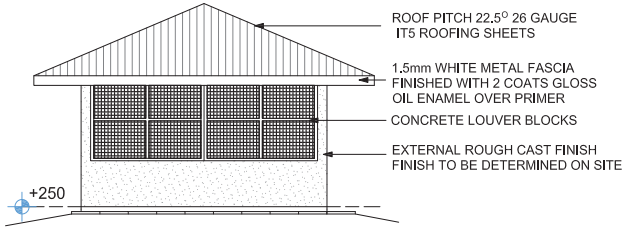
4 **KITCHEN - ELEVATION 01**
SCALE 1:100



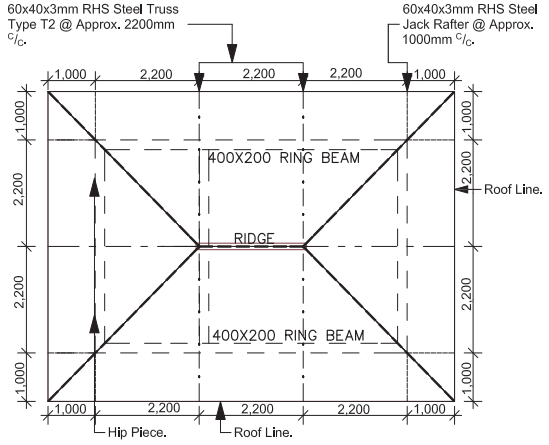
5 **KITCHEN - ELEVATION 02**
SCALE 1:100



6 **KITCHEN - ELEVATION 03**
SCALE 1:100

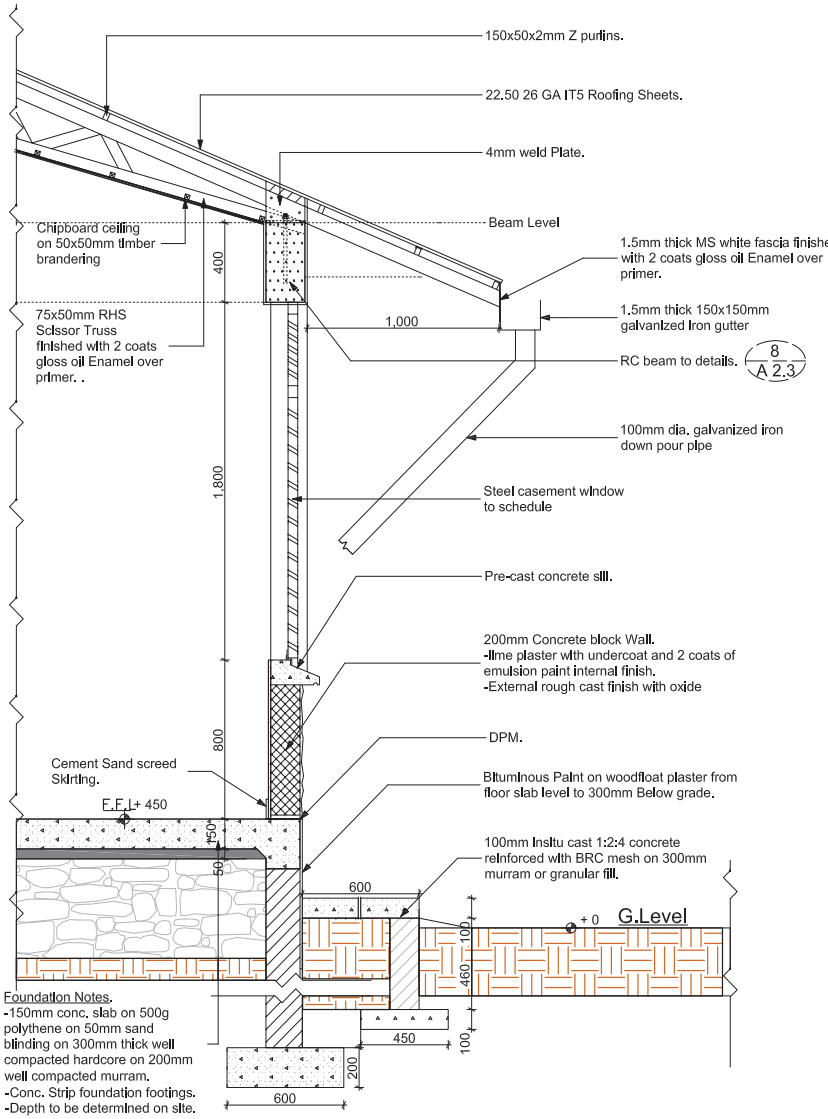


7 **KITCHEN - ELEVATION 04**
SCALE 1:100

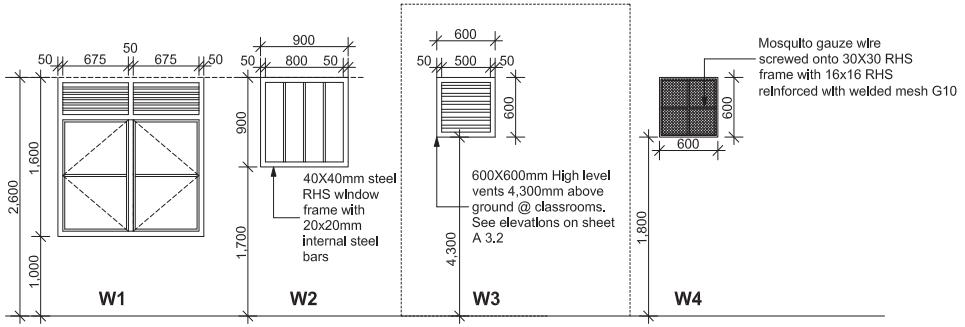


8 **KITCHEN ROOF FRAMING PLAN**
SCALE 1:100

TYPICAL WALL SECTION, DOOR AND WINDOW SCHEDULES



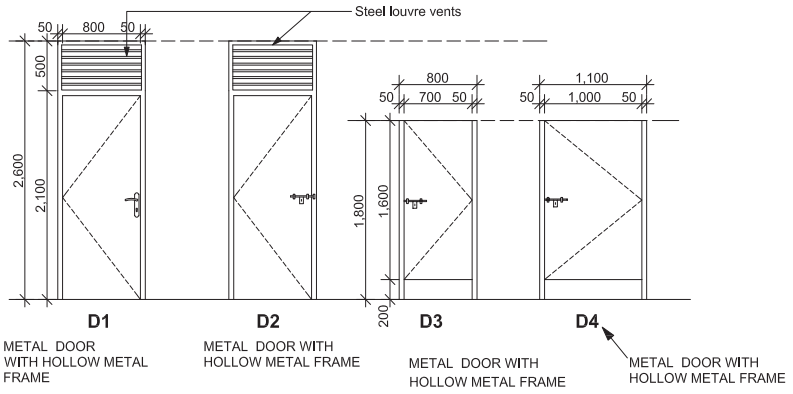
1 **TYPICAL WALL SECTION**
SCALE 1:25



2 **WINDOW SCHEDULE**
SCALE 1:50

NOTE:
- ALL STEEL TO BE FINISHED WITH ZINC CHROMATE PRIMER AND 2 COATS OF WHITE GLOSS PAINT
- ADMINISTRATION WINDOWS TO BE BURGLAR PROOFED
- ALL MOSQUITO NETS TO BE REINFORCED WITH WELDED MESH G10

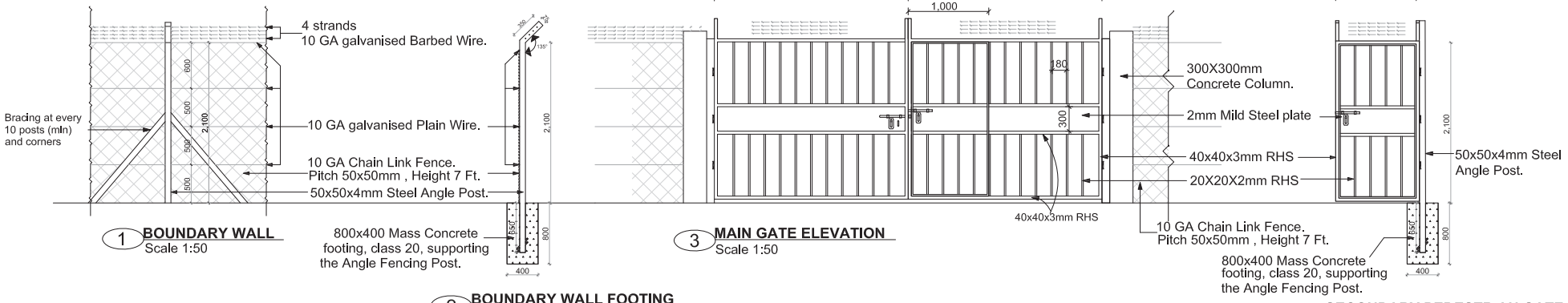
SCALE 1:50



3 **DOOR SCHEDULE**
SCALE 1:50

NOTE:
- ALL METAL DOOR FRAMES TO BE STEEL FRAMES
- ALL STEEL TO BE FINISHED WITH ZINC CHROMATE PRIMER AND 2 COATS OF GLOSS PAINT
- INTERNAL DOOR TO HAVE 2 LEVER LOCK
- PROVIDE CYLINDER LOCK TO THE EXTERNAL DOOR

TYPICAL EXTERNAL WORKS DETAILS

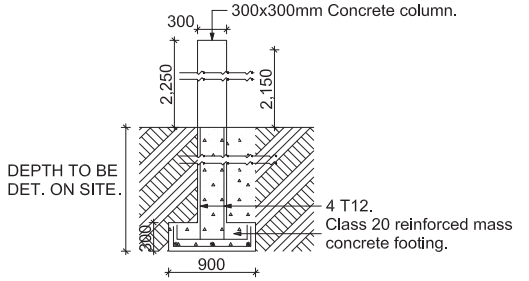


1 **BOUNDARY WALL**
Scale 1:50

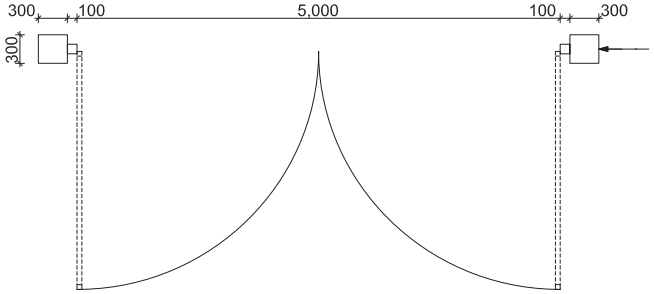
2 **BOUNDARY WALL FOOTING**
Scale 1:50

3 **MAIN GATE ELEVATION**
Scale 1:50

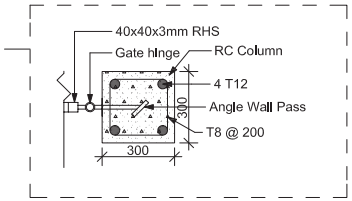
8 **SECONDARY PEDESTRIAN GATE**
Scale 1:50



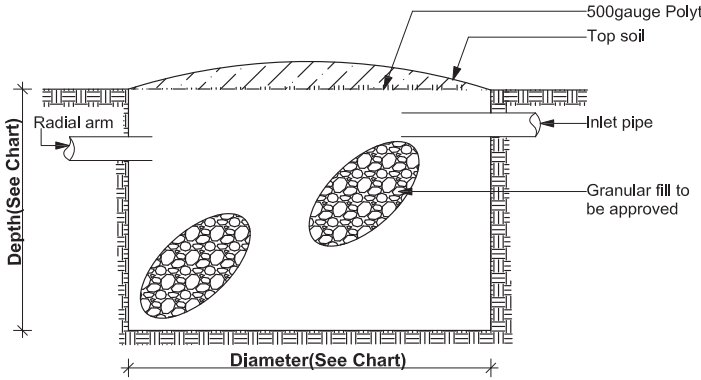
4 **SECTION THROUGH FOUNDATION FOOTING.**
Scale 1:50



5 **MAIN GATE PLAN.**
Scale 1:50



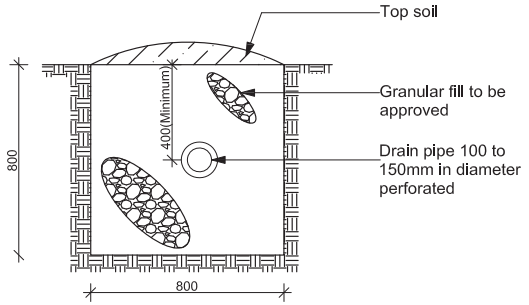
GATE TO RC COLUMN CONNECTION DETAIL
Scale 1:20



6 **SOAK PIT**
SCALE 1:20

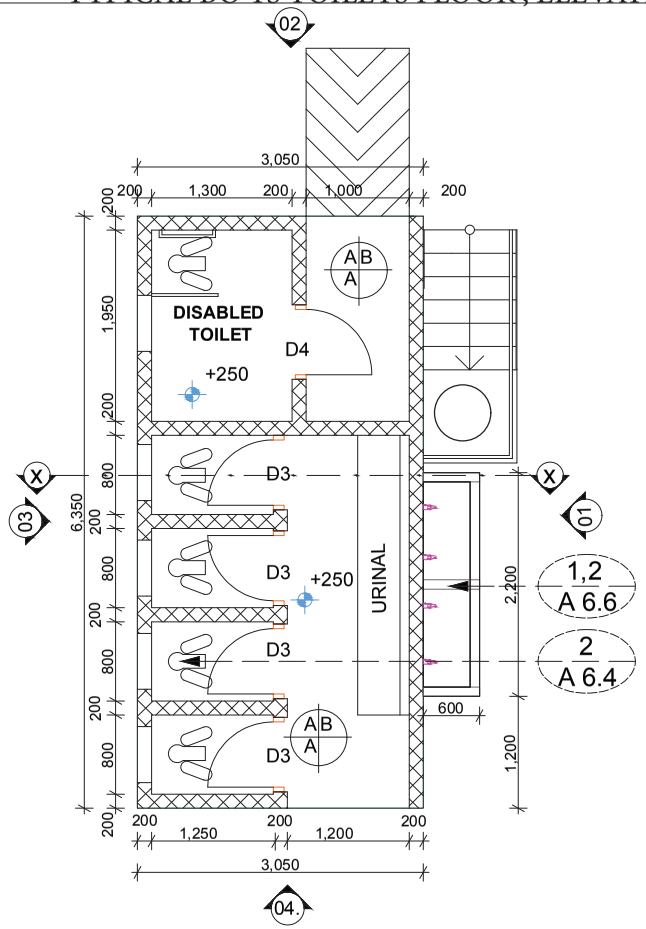
SOAK PIT CHART

Type	Dia.	Depth
A	1.5mts	1.5mts
B	2.0mts	2.0mts
C	2.5mts	2.0mts

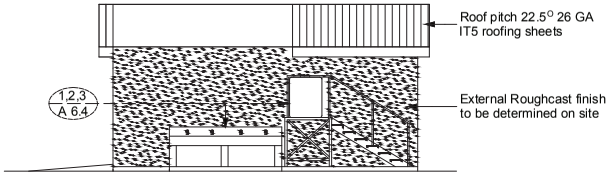


7 **RADIAL ARMS**
SCALE 1:20

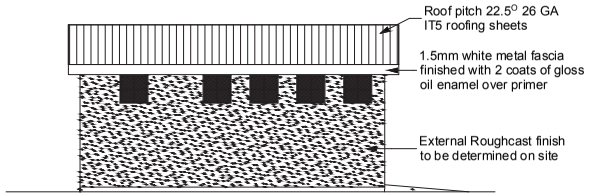
TYPICAL BO'YS TOILETS FLOOR , ELEVATION, ROOF LAYOUT AND FOUNDATION



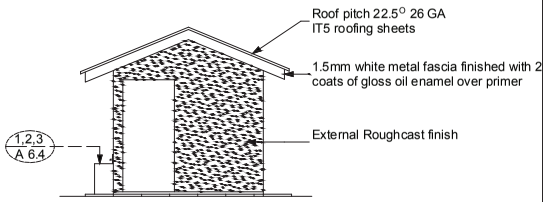
1 BOYS' TOILET
SCALE 1:50



2 BOYS TOILET - FRONT ELEVATION
Scale 1:100



3 BOYS' TOILET - REAR ELEVATION
Scale 1:100



4 BOYS' TOILET - SIDE ELEVATION
Scale 1:100

FIXTURE FINISH LEGEND

F S W C
F= FLOOR
S= SKIRTING
W= WALL
C= CEILING

FLOOR

A= CONCRETE SLAB FLOATED WITH STEEL TROWEL

B= CEMENT SCREED

SKIRTING

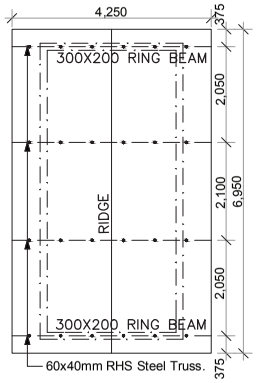
A= CEMENT SCREED

WALL

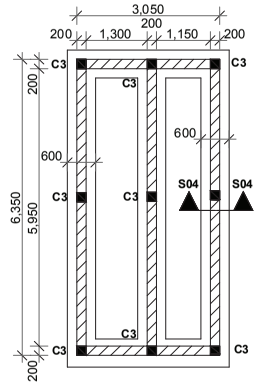
A = LIME PLASTER FINISHED WITH SILK VINYL EMULSION PAINT

CEILING

A = 9mm CHIPBOARD CEILING

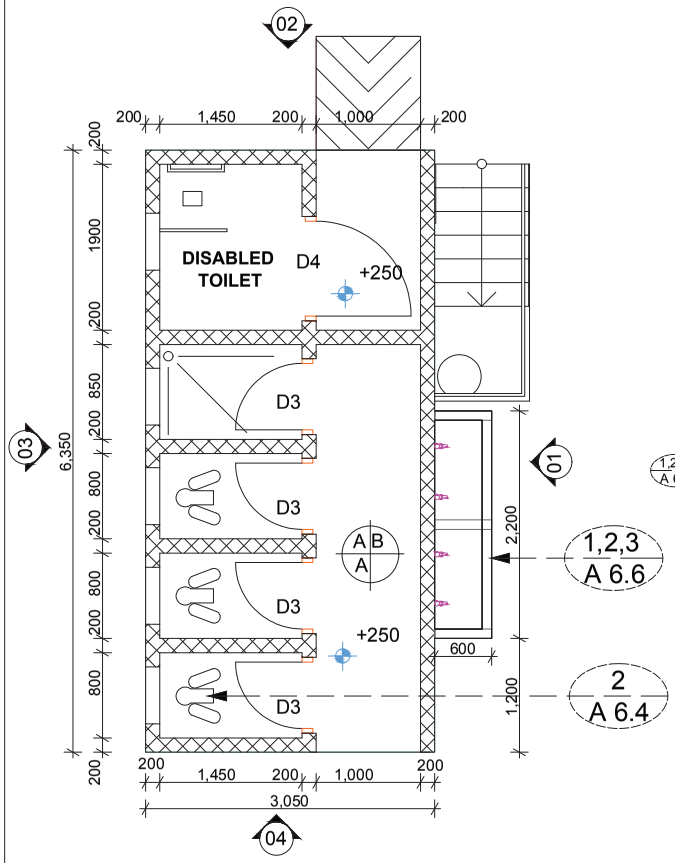


5 BOYS' TOILET ROOF FRAMING PLAN
SCALE 1:100

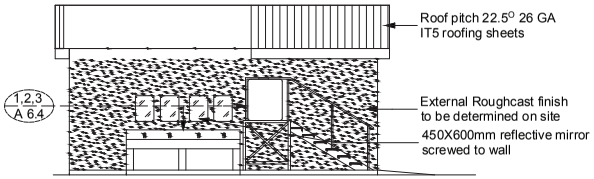


6 BOYS' TOILET FOUNDATION PLAN
SCALE 1:100

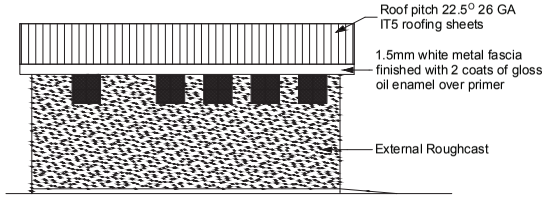
TYPICAL GIRL'S TOILET FLOOR PLAN, ELEVATIONS, ROOF LAYOUT AND FOUNDATION



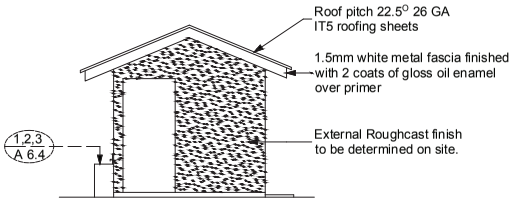
1 GIRLS' TOILET
SCALE 1:50



2 GIRLS' TOILET - FRONT ELEVATION
Scale 1:100



3 GIRLS' TOILET - REAR ELEVATION
Scale 1:100



4 GIRLS' TOILET - SIDE ELEVATION
Scale 1:100

FIXTURE FINISH LEGEND

F S
W C

F= FLOOR
S= SKIRTING
W= WALL
C= CEILING

FLOOR

A= CONCRETE SLAB FLOATED WITH STEEL TROWEL

B= CEMENT SCREED

SKIRTING

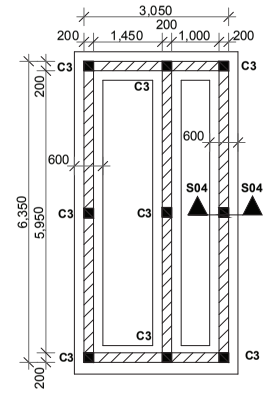
A= CEMENT SCREED

WALL

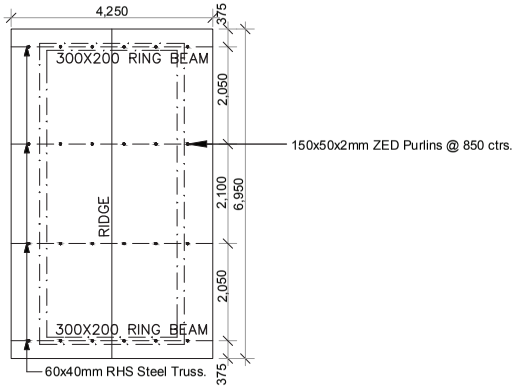
A = LIME PLASTER FINISHED WITH SILK VINYL EMULSION PAINT

CEILING

A = 9mm CHIPBOARD CEILING

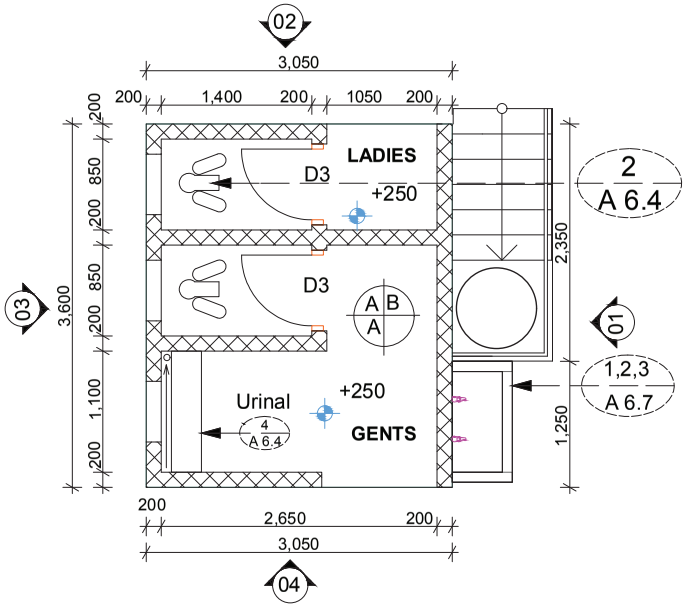


5 GIRLS' TOILET FOUNDATION PLAN
SCALE 1:100

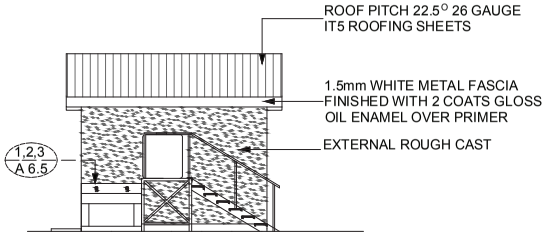


6 GIRLS' TOILET ROOF FRAMING PLAN
SCALE 1:100

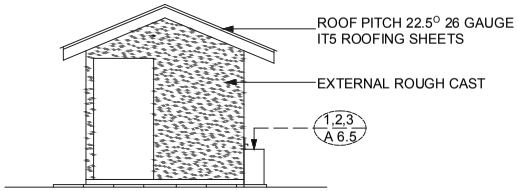
TYPICAL STAFF TOILET FLOOR PLAN,ELEVATION,ROOF LAYOUT AND FOUNDATION PLAN



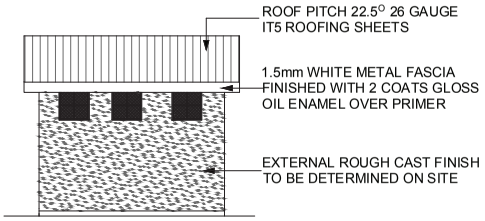
3 TEACHERS' TOILET
SCALE 1:50



4 TEACHERS' TOILET - FRONT ELEVATION
Scale 1:100



5 TEACHERS' TOILET - SIDE ELEVATION
Scale 1:100



6 TEACHERS' TOILET - REAR ELEVATION
Scale 1:100

FIXTURE FINISH LEGEND

F= FLOOR
S= SKIRTING
W= WALL
C= CEILING

FLOOR

A= CONCRETE SLAB FLOATED WITH STEEL TROWEL

B= CEMENT SCREED

SKIRTING

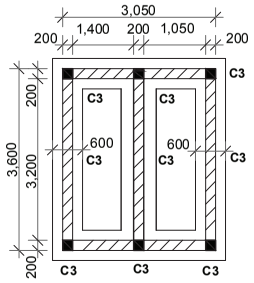
A= CEMENT SCREED

WALL

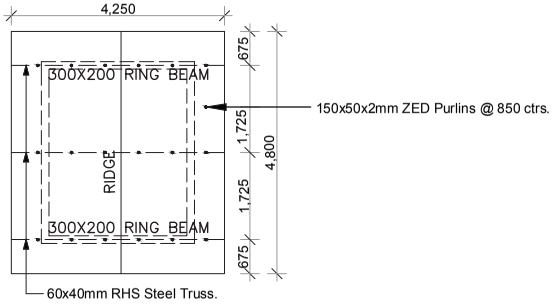
A = LIME PLASTER FINISHED WITH SILK VINYL EMULSION PAINT

CEILING

A = 9mm CHIPBOARD CEILING

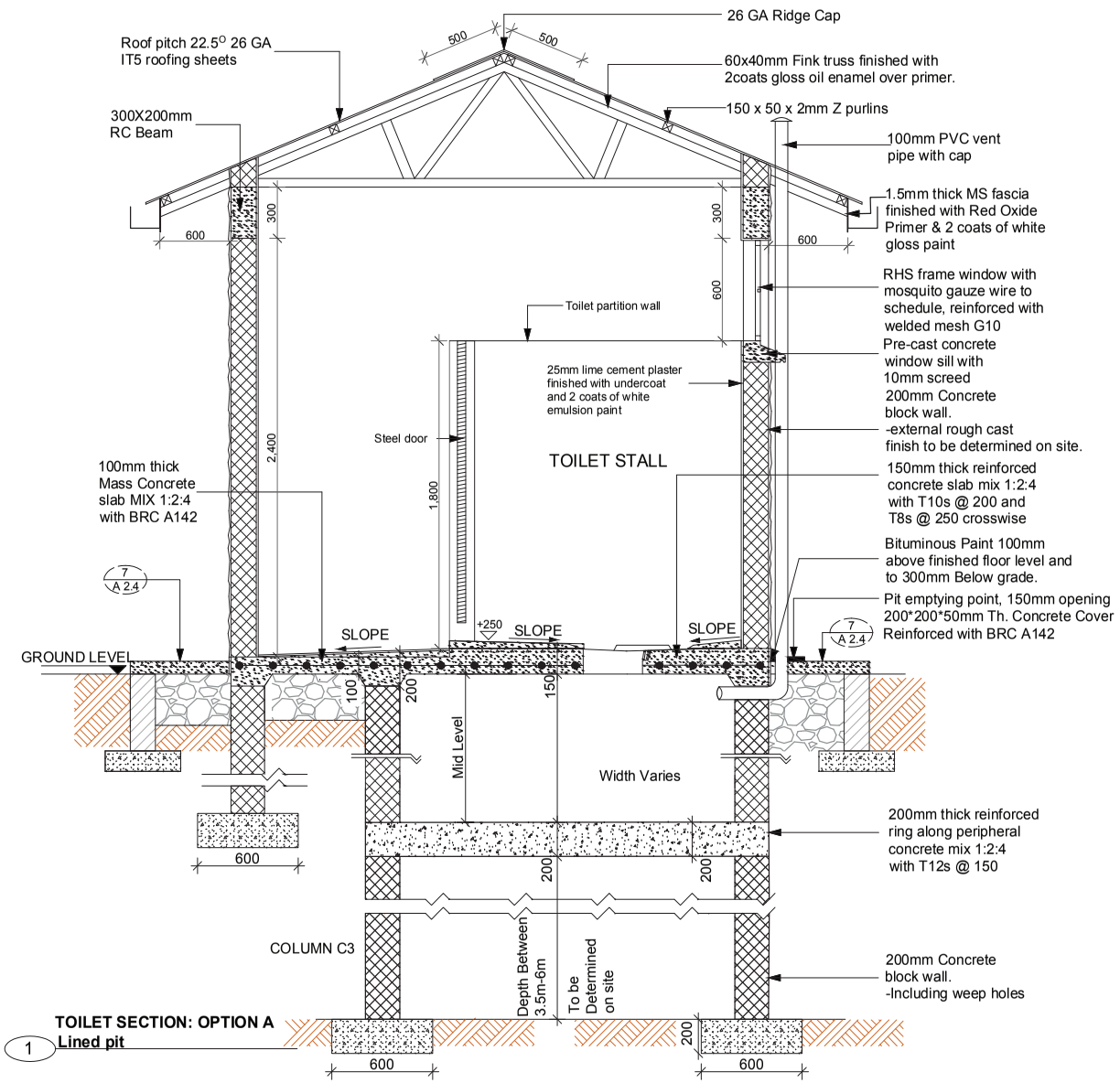


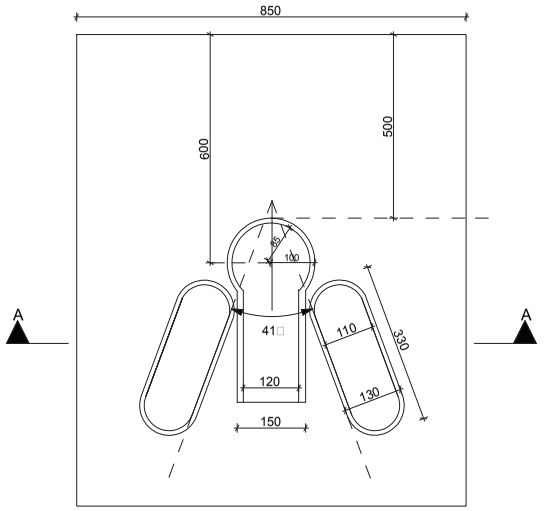
7 TEACHERS' TOILET FOUNDATION PLAN
SCALE 1:100



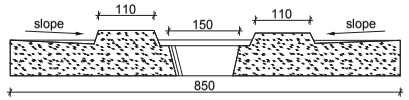
8 TEACHERS' TOILET ROOF FRAMING PLAN
SCALE 1:100

TYPICAL SECTION FOR THE TOILETS

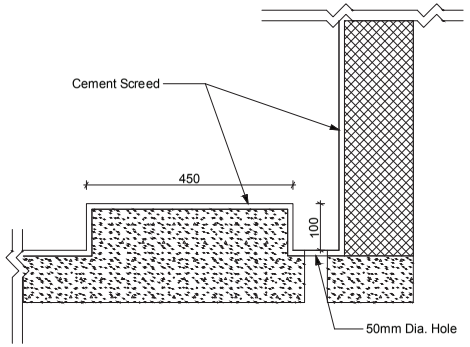




2 **TOILET FLOOR DETAIL**
SCALE 1:10

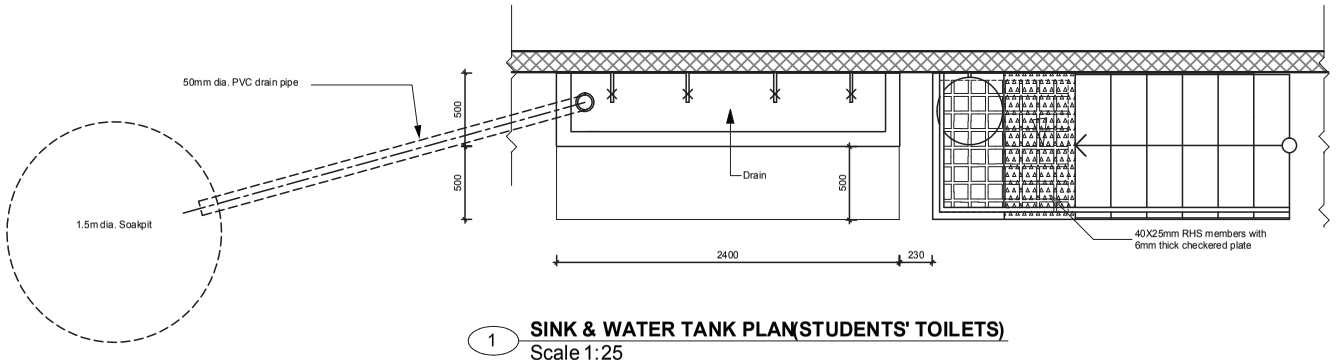


3 **SECTION A-A**
SCALE 1:10

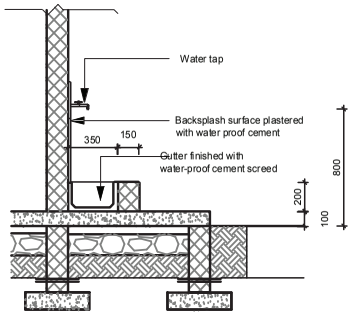


4 **URINAL DETAIL**
SCALE 1:20

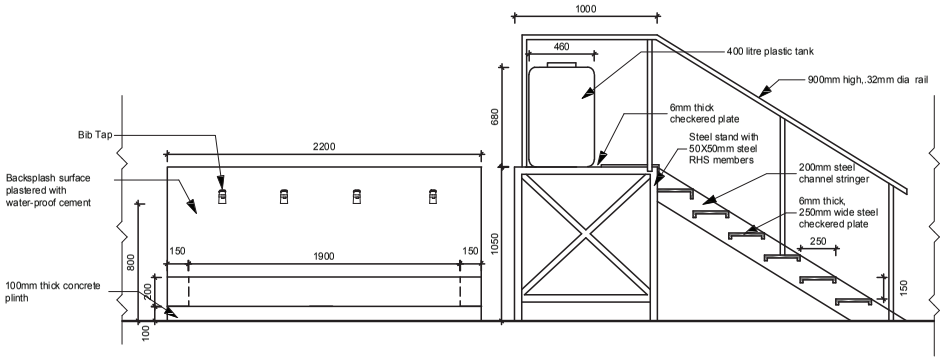
TYPICAL TOILET HAND WASH AND WATER TANK DETAIL-OPTION 1



1 **SINK & WATER TANK PLAN(STUDENTS' TOILETS)**
Scale 1:25

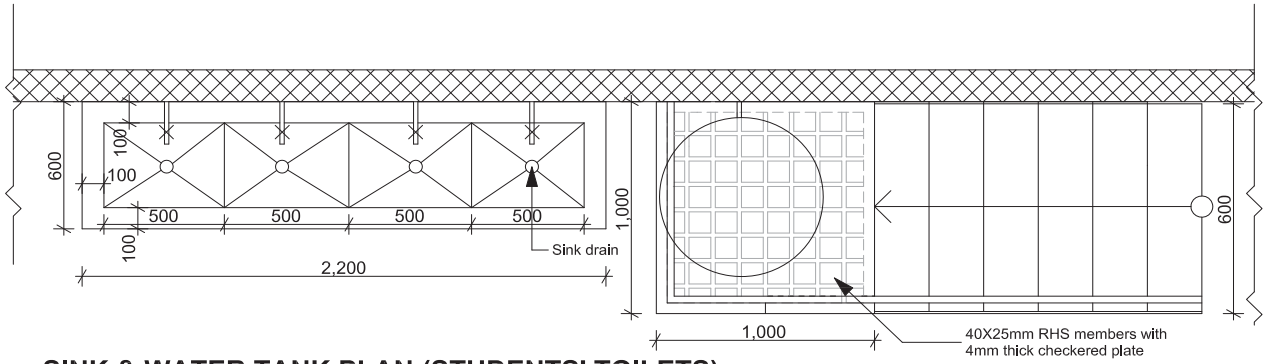


3 **HAND WASH DETAIL**
Scale 1:25

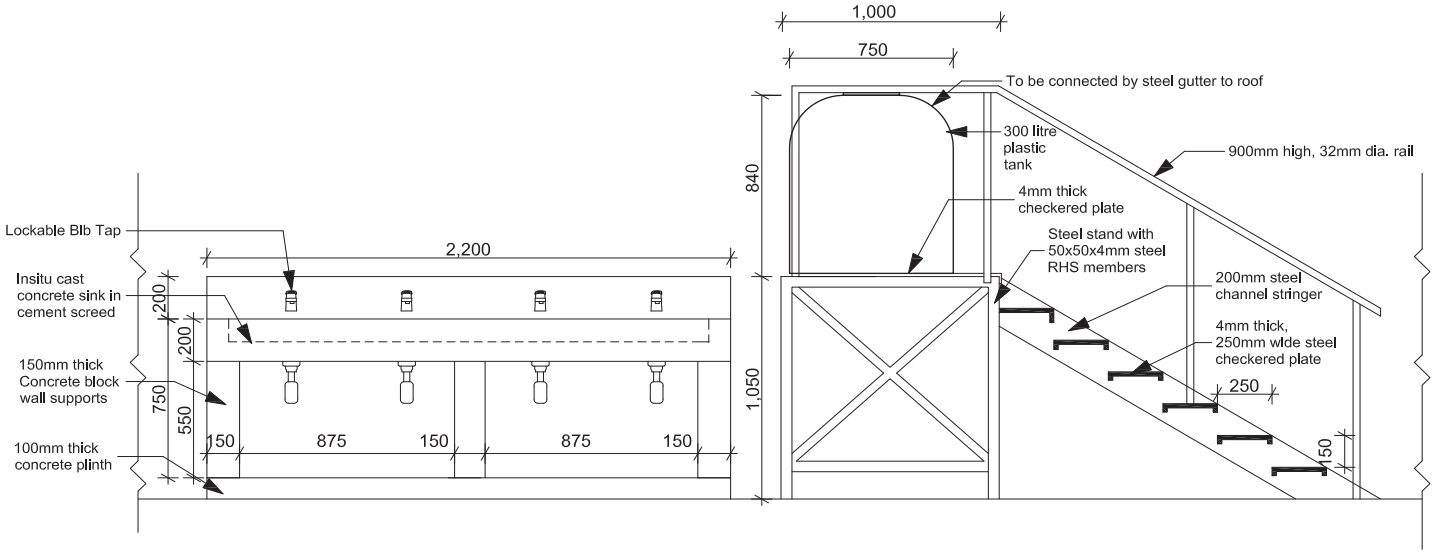


2 **SINK)& WATER TANK ELEVATION(STUDENTS' TOILETS**
Scale 12 5

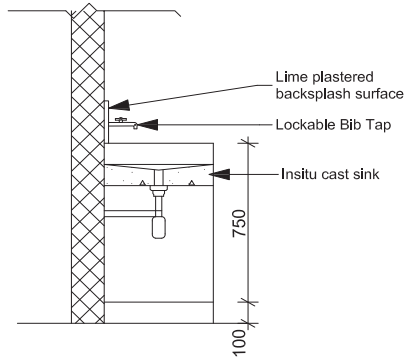
TYPICAL TOILET SINK AND WATER TANK DETAILS OPTION 2



1 **SINK & WATER TANK PLAN (STUDENTS' TOILETS)**
Scale 1:25

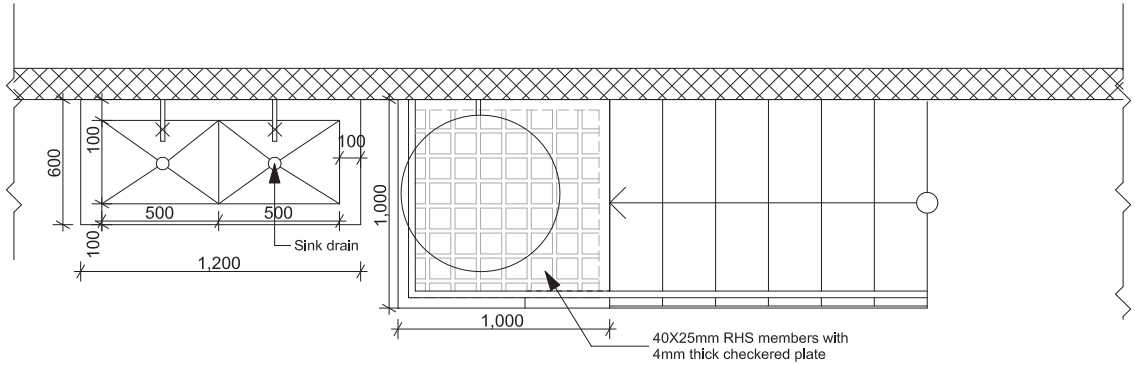


2 **SINK & WATER TANK ELEVATION (STUDENTS' TOILETS)**
Scale 1:25

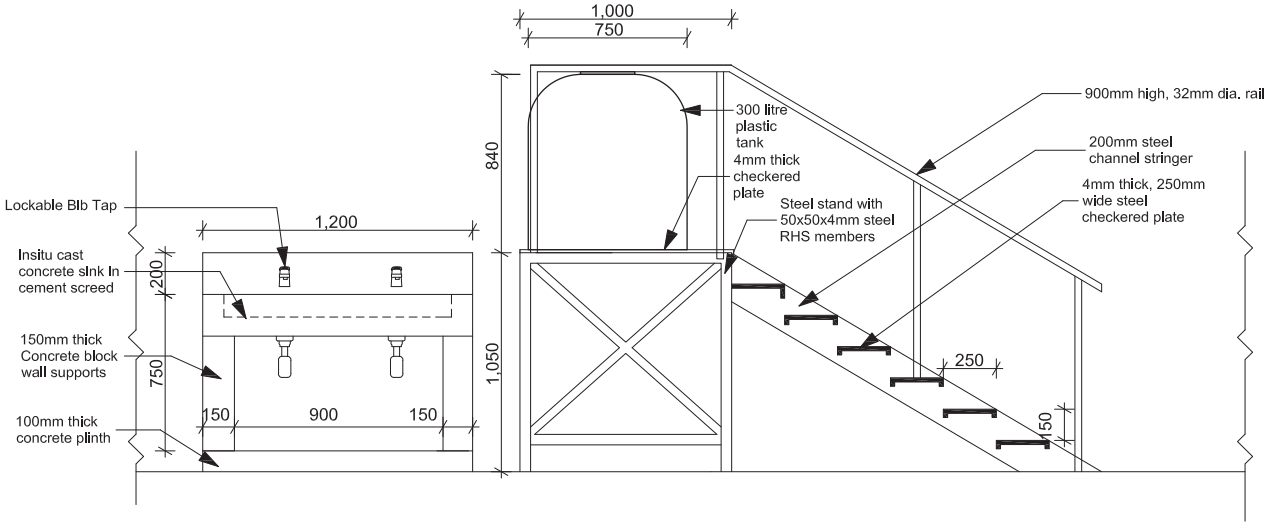


3 **SINK SECTION**
Scale 1:25

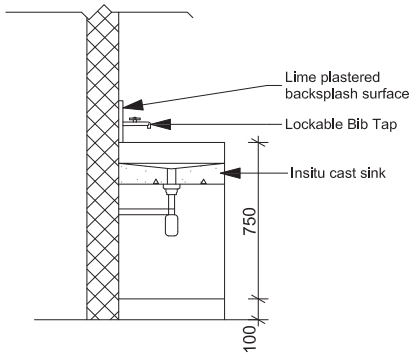
TYPICAL TOILET SINK & WATER TANK DETAILS OPTION 3



1 **SINK & WATER TANK PLAN (TEACHERS' TOILETS)**
Scale 1:25

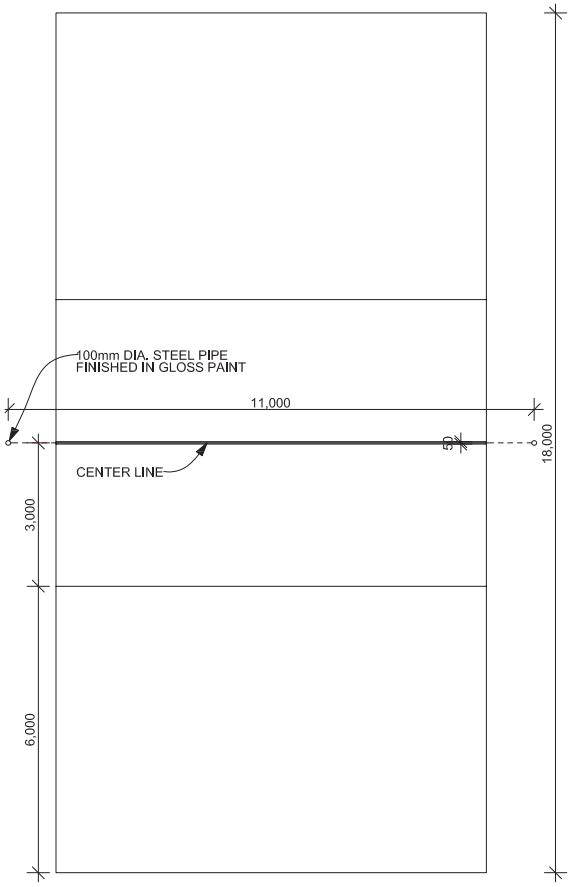


2 **SINK & WATER TANK ELEVATION (TEACHERS' TOILETS)**
Scale 1:25

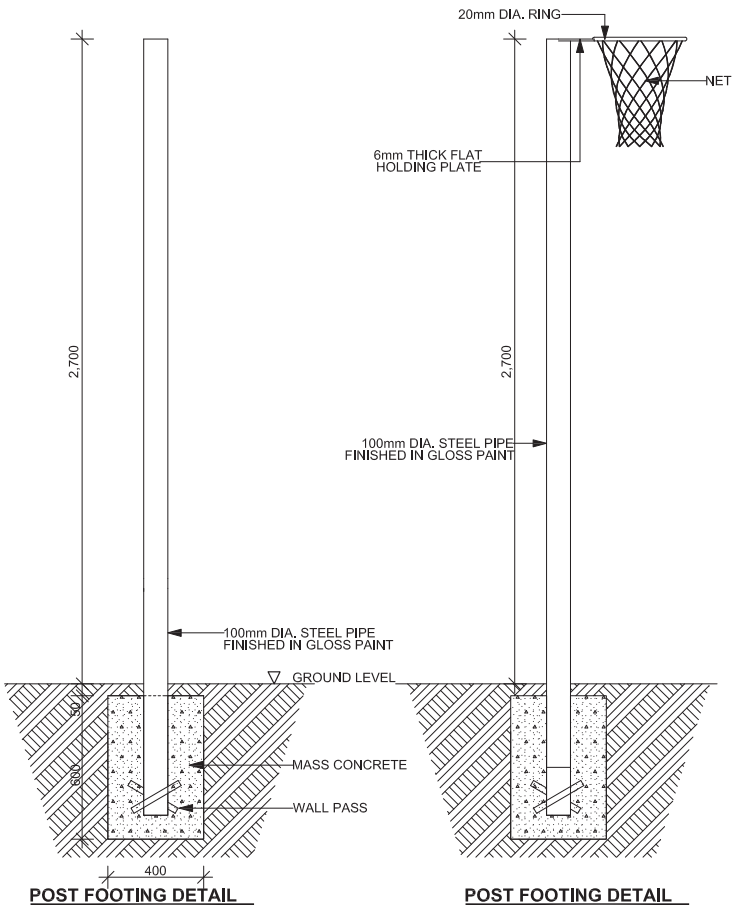


3 **SINK SECTION**
Scale 1:25

TYPICAL VOLLEYBALL & NETBALLDETAILS

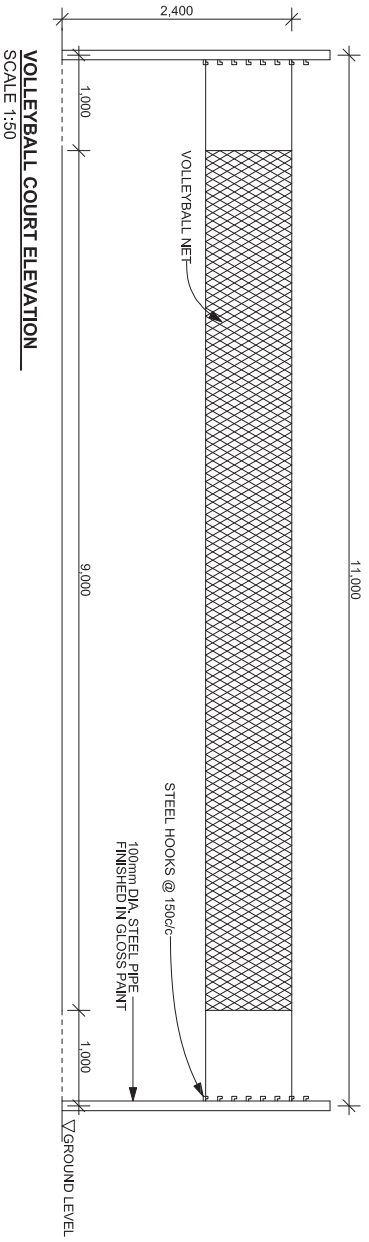


VOLLEYBALL COURT PLAN
SCALE 1:100



POST FOOTING DETAIL FOR VOLLEYBALL
SCALE 1:20

POST FOOTING DETAIL FOR NETBALL
SCALE 1:20



VOLLEYBALL COURT ELEVATION
SCALE 1:50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