



MINISTRY OF EDUCATION
Lao PDR

LAO PEOPLE'S DEMOCRATIC REPUBLIC
MINISTRY OF EDUCATION

SCHOOL CONSTRUCTION GUIDELINES

Developed by the
Division of Design and Construction
Management (ECDM)
Department of Finance
Ministry of Education
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Lao PDR is vulnerable to a number of hazards, particularly floods, drought, and windstorms. The country is also affected by landslides, fires, earthquakes, and unexploded ordinance (UXO). Different areas are prone to different hazards; floods along the Mekong River and its tributaries mostly affect the central and southern regions while drought impacts the western provinces and some elevated areas in the southern provinces.

The Ministry of Education (MOE) recognizes the significant impacts of these hazards to the population, specifically to students and teachers, and to the contribution of the education sector to the country's economy. As such, the MOE under the leadership of the Division of Design and Construction Management (ECDM) has embarked on the critical task of developing this National School Construction Guidelines in Lao PDR. This undertaking is part of the MOE's program on mainstreaming disaster risk reduction (DRR) into the education sector which started in 2007 in partnership with the NDMO and with the assistance of the Asian Disaster Preparedness Center and the United Nations Development Programme, with support from the European Commission Humanitarian Aid department (ECHO).

This National School Construction Guidelines is MOE's concretization of its commitment to make schools safe from disasters and child-friendly for students in Lao PDR. School construction in Lao has been guided by standards and guidelines of donor and development agencies such as the WB, ADB, JICA, AusAID, and UNICEF. It is high time for the government of Lao to have its own official school construction guideline with due consideration to the natural hazards that beset the country.

This School Construction Guidelines covers all future school construction undertaken by the MOE from the national, provincial and district levels, and by any donor or development partner. The guidelines set the minimum standards that have to be met by anyone engaged in school construction in Lao PDR. Donor and development partners may use their own standards and guidelines in addition to and not in replacement of this national school construction guideline. Furthermore, this set of guidelines is not for the past. It is intended to meet international standards and is therefore applicable to all school construction that shall take place as this guideline becomes an official Decree.

The guidelines cover the entire school construction process from site planning, design, construction, and maintenance. It provides guidance on safety from natural hazards and child-friendly considerations bearing in mind the context of Lao PDR and its vision towards an education for all its citizens. This set of guidelines do not articulate specific school styles or typologies for different kinds of locations but it does identify principles and standards that should be followed to ensure safety with regard to planning, designing, and constructing school buildings in any given location in the country, whether urban or rural, and whether in the plains or in mountainous areas.

With the effective implementation of this National School Construction Guidelines, the MOE hopes to contribute to the national and global vision of providing safe schools to ensure education for all its children.



H.E. Somkot Mangnormek, Minister
Ministry of Education

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The Ministry of Education would like to express appreciation to those who have contributed to the development of this National School Construction Guidelines of Lao PDR. This set of guidelines is a product of a collaborative work among the MOE led by the director of the Division of Design and Construction Management (ECDM) and the Asian Disaster Preparedness Center (ADPC).

Our appreciation also goes to those who have attended the two national workshops to review the initial drafts the guidelines. Among those who provided their comments and inputs to enhance the drafts are the Provincial Education Services (PES) in 16 provinces of the country, the representatives from the Provincial Unit for Construction and Development Assistance (PUCDA), and our development and donor partners, particularly the UNICEF, the AUSAID, WB, ADB, and JICA. The contribution of these partners extended beyond the workshops; they also provided us documents and information through interviews and email correspondences.

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ACRONYMS

ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
AusAID	Australian Agency for International Development
BEGP	Basic Education Girls Project
DEB	District Education Bureau
DESIA	Department of Environment and Social Impact Assessment
EA	Environmental Assessment
ECDM	Education Construction and Development Management
ECHO	European Commission on Humanitarian Aid
ESDF	Education Sector Development Framework
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organization (United Nations)
GoL	Government of Lao PDR
IEE	Initial Environment Examination
JICA	Japan International Cooperation Agency
JICS	Japan International Cooperation System
MOE	Ministry of Education, Lao PDR
NDMO	National Disaster Management Office
OCHA	Office for the Coordination of Humanitarian Affairs (United Nations)
PES	Provincial Education Services
PUCDA	Provincial Unit for Construction and Development Assistance
UNDP	United Nations Development Programme
UXO	Unexploded Ordinance

PART 1.

INTRODUCTION

1.1 About this guideline

The Ministry of Education (MoE) and other stakeholders who are engaged in school construction in Lao PDR have recognized the need for an official school construction guidelines in the country. Project proposers and implementers have started drafting guidelines governing school construction in Lao, yet none of these documents has become official.

In view of the disaster vulnerability of schools and in line with the MoE's program on Mainstreaming Disaster Risk Reduction in the Education Sector in Lao PDR, the ministry with the assistance of ADPC, UNDP, and ECHO developed this set of guidelines which incorporates the experiences and lessons learned by different actors involved in the construction of schools in Lao in the past years.

This is an easy handbook for building schools which was developed by MoE, bearing in mind the Lao context and making reference to existing building specifications in the country. It is a binding document which aims to ensure that future schools are built in a way that minimizes harm and risk, including those brought about by natural hazards, to students, teacher, staff and other inhabitants.

1.2 Target group

This set of guidelines is designed for the use of all stakeholders involved in the construction of school facilities in rural and urban areas in Lao PDR, including technical and non-technical staff. It governs all stakeholders, from the community level up to the Ministry level, including the District Education Bureau (DEB), the Provincial Education Services (PES), the Provincial Unit for Construction and Development Assistance (PUCDA), and all involved agencies and donors.

1.3 How to use this manual

Users of this manual will find orientation on what aspects to pay attention to, in each stage of the school construction planning, design and construction. The complete version of the guidelines includes annexes with checklists and forms needed in the process. However, this does not replace the need to engage professionals such as Architects and Engineers, who have the technical knowledge needed to guarantee school safety.

1.4 Building “good” schools

The final objective of school building activities is to provide adequate spaces for “good” schools, which are child-friendly and inclusive, and have the additional objectives of:

- Attracting students (increase access);
- improve attendance rates;
- improve retention and completion rates;
- improve learning achievement;
- Provide safe, inclusive, welcoming environments for all children;
- Provide enabling learning environments, including accommodating children with physical and mental/learning disabilities ;
- Cultivate harmony between the school and its community.

This set of guidelines is a comprehensive document that provides guidance and standards towards meeting the objectives of a good, inclusive, child-friendly, and safe school for our children in Lao PDR.

PART 2.

SAFETY AND RISK REDUCTION MEASURES

2.1 Location

Lao PDR is a mountainous country, with elevations above 500 meters, characterized by steep terrain and narrow valleys.

Though the geographical location of the country provides protection against typhoons and windstorms, the country is exposed to various hazards, of which river floods and droughts are the most damaging.

Other important hazards include fires, landslides, erosion and earthquakes. Additionally, rodent infestations, human and animal epidemics, as well as Unexploded Ordinance (UXO) affect the communities. Urban fires, floods, windstorms and earthquakes strike the country on regular basis.

Main hazards.

Floods mostly occur in the alluvial plains of the Mekong River and its tributaries during the May-September monsoon season. The most affected areas are the central and southern regions, which account for the zones of greatest economic activities in the country, home to 53% of the population.

Typhoons that enter the country from the East can compound the rainfall pattern and cause additional flooding. The areas most prone to drought are the western provinces and some of the higher elevations of the southern provinces.

Moreover, since the last decade the changing climate and environment in the region and within the country, along with human made factors have worsened the situation. Environmental degradation due to over-logging, opening more spaces, slash and burn cultivation practices, using chemicals and fertilizers, etc. made people more vulnerable and increased losses due to disasters.

Most people inhabit the floodplain areas, making them more vulnerable to the annual flooding. The high population growth rate puts additional strain on the environmental condition.

Though it is not officially registered, records from neighbouring countries show that several minor earthquakes hit Lao PDR during the previous years.

2.1.1 Climatic zones

Laos has two distinct climatic zones: tropical monsoon in the plain areas and subtropical climate in the mountainous areas above 1,000 meters altitude.

2.1.2 Natural hazard zones

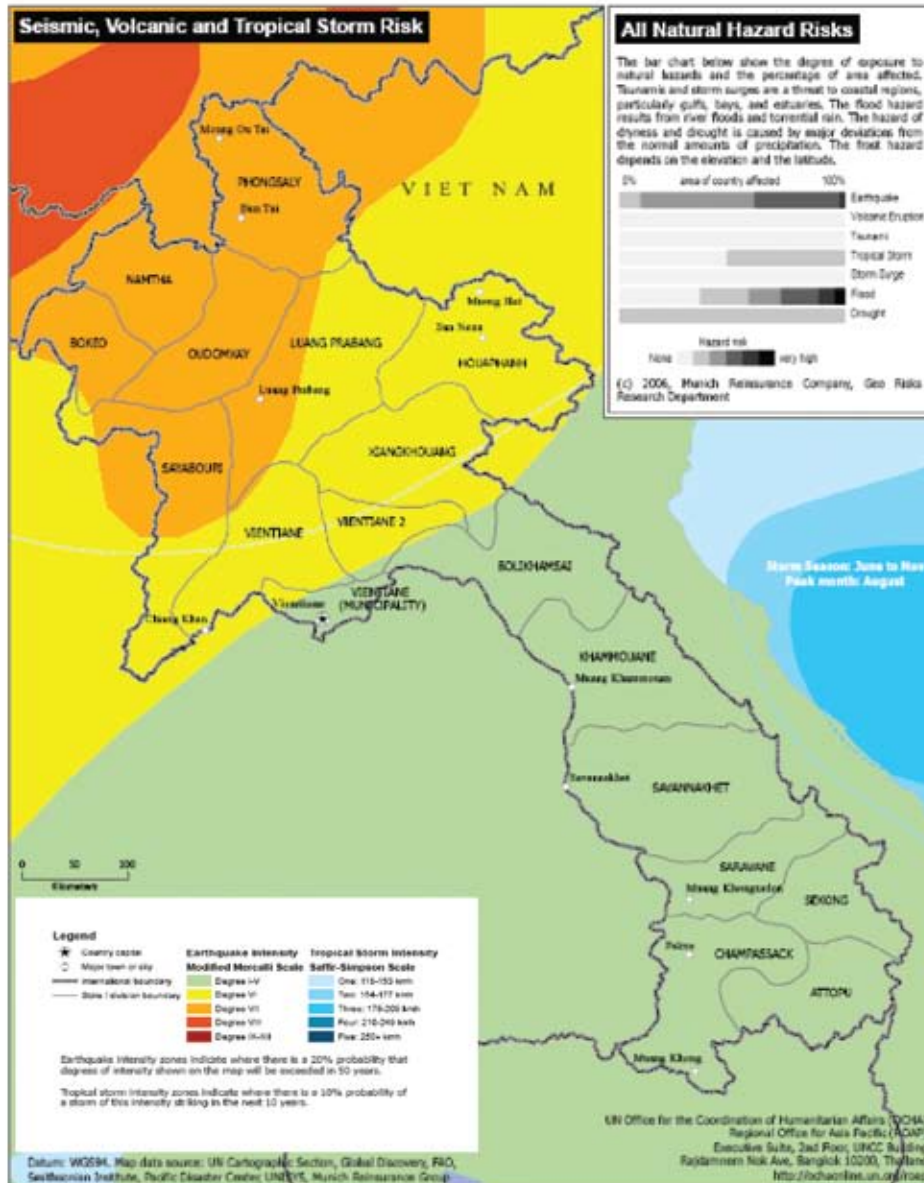


Figure 1. Lao PDR: Natural hazard risks. OCHA Regional Office for Asia Pacific.



Figure 2. Mekong River Basin Flooding. OCHA Regional Office for Asia Pacific. <http://www.reliefweb.int>

2.1.3 Physical impact of disasters on the education sector.

From 2002 to 2005, 103 schools were affected by floods and 60 schools by windstorms, whereby the most affected parts are the roofs, walls and floors . From 2000 to 2007, records show that two school buildings were affected by fire incidents in Vientiane and one classroom in Houaphan province.

2.2 Site

Communities are the driving force to plan for future schools. The processes of school mapping and micro-planning are the basis for the provision of school buildings (See Chapter 6. *Planning and Implementation Steps*) and they need to include the following criteria:

2.2.1 Site selection criteria

Careful site selection is a key step in sustainable school construction. Physical facilities in hazardous areas are vulnerable to floods, landslides, cyclones, etc. An assessment of potential risks at the site is, therefore, crucial in terms of disaster

risk reduction. Another challenge is that villagers may not accept particular school locations for various reasons, including the site's history or other socio-cultural reasons. In order to select a suitable school site, a number of issues must be considered and discussed with the local authorities and the community.

The key factors to consider when choosing a site include:

Social:

- Ensure community's acceptance of site locations.
- Consider whether neighbouring settlements of different ethnic groups are an issue; e.g. PES or DEB, depending on the case, must verify that neighbouring settlements of different ethnic groups will not hamper the construction of the school).
- Schools should be sited near the villages it serves, so that pupils have a shortest possible way to the school and the compound becomes an integrated part of the village.
- The school should be located within walking distance for all children. The maximum distance between children's houses and school should be equivalent to a 45-minute walk .

Institutional:

- Make sure that land titles are available.
- The Village Committee verifies that ownership of land and school premises are clearly established. Clarify who will be the landowner in order to avoid future conflicts and even the eviction of residents.
- Clarify with local authorities the building permits.
- For a primary school to be approved, it must have at least 32 pupils.
- A complete school should have all the levels, i.e. 5 levels in primary schools, 4 in lower secondary (as of 2009) and 3 in upper secondary.

Technical:

- PUCDA must confirm that conditions and technical requirements for water supply, sanitation, waste management, and power supply (if applicable) are in place; and provide a report.
- Builder must check for existing connections to municipal/community water mains. Assess their conditions and the measures needed to connect the site to the municipal mains.
- Make sure the selected site is big enough for further extensions and outdoor facilities.
- In mountainous areas, the buildings should not be cut too deep into the slope, as the flanking wall might collapse due storm water and horizontal forces.

- If a sloped area cannot be avoided, a platform should be built first and the building should be placed at a secure distance from the adjacent slopes.
- The school should not be located close to steep slopes or cliffs or it might collapse due to falling rocks or landslides.

Economic:

- Identify any financial provisions or support schemes that the GoL (or other institutions) may have made available for the school.
- The GoL should ensure that land prices are kept to a minimum.
- Include in the budget costs the required land filling and other ground preparation.
- Consider expenses for the provision of infrastructure on the site (e.g. roads, connection to water, sewage, electricity networks, etc.).
- Assess the site's existing buildings and infrastructure. Determine whether demolition works will be needed or whether, alternatively, existing buildings can be recycled or integrated, include this in the initial budget.

Safety:

- Identify potential evacuation routes and access routes for emergency services.
- Consider the proximity of structures in surrounding areas that may serve as a shelter for those displaced in emergencies.
- Place buildings at least 10 meters away from stagnant water, as this may be a breeding location for mosquitoes and vector-borne diseases. Consider whether there may be seasonal sources of stagnant water, e.g. dried out rivers or ponds.
- Assess risks from natural hazards (e.g. storm surges, landslides, heavy rainfall, earthquakes and cyclones) and avoid building in hazards zones (*See 2.1.2. Natural hazard zones*). As part of the assessment, check municipal flood records, and official data. Also ask members of the community about the frequency of heavy rains, storm winds and bush fires. Any hazard assessments carried out in previous stages should also be considered.
- Determine whether additional works are required to render the site viable for development or whether land use should be restricted to reduce vulnerability to natural hazards.
- If the area is at high risk, consider whether re-sitting to a location of reduced risk is an option. This will be defined by the local government based on availability and economic criteria .
- Assess site topography, e.g. use shallow bedrock conditions for seismic protection.
- In areas at risk from flooding the school should be placed on an elevated site. If an elevated site is not available, individual buildings should be raised.

- In mountainous areas, check the slope stability (angle, soil type, drainage, etc.). Assess soil characteristics. This will provide important information for determining foundation type (strip or slab); depth for drilling water wells; and digging holes for septic tanks (rocky ground is not very suitable). Have a soil analysis made.
- Consider whether land filling is needed to elevate new structures above likely flooding levels; identify the groundwater tables' depth. This will be important information for purposes of establishing foundation depth and size as well as the depth and distance between latrine system/septic and water tanks.
- Whenever possible, avoid building on water-logged soil. It can become liquefied and no longer able to sustain the building.
- In conflict and post-conflict regions, avoid areas that may contain mines or unexploded ordinance (UXO). Seek the help of specialists if you suspect that mines or UXO are present in the area.
- In earthquake-prone areas (Northern region) try to build on sites that are open and on flat land.
- Select a site composed of the firmest sub-soil available. Softer sub-soils amplify ground motion which will be transferred to foundations and school structures. Weak sub-soils are susceptible to soil liquefaction, which can damage foundations and even cause collapse of the foundation and the building.

Environmental

- Ensure that there is adequate site drainage.
- Assess the site's existing vegetation. Check whether it is necessary to clear trees or bushes from the site or, alternatively, to reforest the site to create a cooler micro-climate or to stabilize soils.
- The site should be away from sources of pollution and toxic or hazardous materials that may impact the inhabitants' health or safety. Recommended is a background noise level of 35 decibels (dBA) or lower .
- The school should be separated from sources of excessive noise, such as aircrafts, car traffic, railroads, sirens, factory machinery, etc. so that noise levels do not have detrimental impact on children.
- Identify and protect existing natural features and ecosystems.
- Respect and incorporate historic, cultural and artistic resources.

2.2.2 Develop a Site Plan

After having selected a suitable site location, a Site Plan needs to be developed. Usually made by the community, the plan has to be based on the site assessments done under chapter 2.2.1. It contains all necessary information about further potential risks, arrangements of facilities, later extensions, roads, vegetation, and access to infrastructure.

It is recommendable to draw a community map during the planning stage, whereby

the members of the community can show the location of the school site in relation to the community resources, land use, structures, institutions, relationships and interactions within the community. *(See Chapter 6. Planning and Implementation Steps)*

Careful planning is required to establish the schools' orientation on the compound where infrastructure (piping and other services) is laid, and the arrangements of outdoor facilities and the integration of suitable vegetation. Before developing the Site Plan, check the District Development Plan, if any, to ensure compliance with its requirements. The following aspects need to be considered:

- Check whether you need to develop a new layout plan or if a former plan is still useable or valid.
- Use natural topography: Place new schools at the highest level of the compound.
- In order to protect natural resources and scarce land for agriculture, buildings should be situated on plots in a manner that minimises land use impact and optimises the land's value, e.g. degraded land is used for building construction and indoor sports courts. Second-quality land is used for outdoor sports courts and prime farmland is used for other outdoor activities or left undeveloped. Pathways can be shared by different buildings in order to minimize paved areas, etc.
- The school should be oriented in a way that its long side is parallel to the direction of the slope in order to minimize the damages from landslides or falling debris.
- Orient buildings on the land to optimise the use of sun and wind, i.e. in lowland areas, the east and west facades should be shaded in order to minimise 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; e.g. use the east and west ends of the buildings as buffer zones, placing porches at these locations.
- Make the layout plans flexible for future extensions, new accesses and necessary adjustments due to changes in the users' needs and habits;
- Identify ways to overcome potential barriers to the access of all children (including children with disabilities) to the school and indicate them in the site plan.
- The site should be accessed from the public roads without crossing another property boundary.
- Reduce the impact of exterior noise by locating classrooms away from noise producers, like roadways.
- Consider minimum distance between water wells and septic tanks. The minimum distance is 15 to 20m. *(See also section on Water supply and Sanitation);*
- Assess communication needs (i.e. telephone);
- Protect existing vegetation, such as trees, bushes, etc. Plan to replant additional

- 2) Make sure that the school buildings are at least 60 cm elevated from ground level. If the plot is swampy and prone to high flood levels, buildings must be built at least 30 cm higher than the maximum flood-water height.
- 3) Use infrastructure that mitigates flooding: culverts, bridges, drainage canals can be used to regulate seasonal monsoon flooding.
- 4) Simplify the schools' form to minimise obstruction to the wind *(See 3.1 Architectural design aspects)*.
- 5) Pitch the roof between 30° and 45° to lower wind suction, also avoid wide roof overhangs.
- 6) Separate the structure of the verandas from the schools' main structure.
- 7) Tie the structural frame together firmly (including roof trusses), use diagonal bracing.
- 8) Attach the roof covering securely.
- 9) Pay attention to the size and positioning of openings. Minimize openings in bearing wall constructions. Avoid placing large windows and doors on the walls facing the strongest winds. Protect the windows and doors with shutters. Anchor door and window frames to the walls of the buildings. Provide an opening on the side opposite to the strongest wind direction.
- 10) The orientation of the buildings is very important. To minimize the damage caused by disasters, orient the shortest sides of the buildings towards the direction of the strongest winds and flood stream.

Key principles of earthquake-resistant construction

- 1) Separate adjacent buildings at least 3 meters in order to avoid multiple collapses, also known as the “domino effect”.
- 2) Reinforce corners and joints by adding bracings to the sections where the structure are most likely to weaken in case of earthquake, e.g. “dragon ties”.
- 3) Ensure structure coherence, i.e. properly anchoring floor beams, columns, ring beams and roof structure.
- 4) Strengthen openings for doors and windows too.
- 5) Design structural elements to be symmetrical and evenly spread over the plan of the building.
- 6) Design building to be vertically regular with respect to lateral stiffness and weight distribution.
- 7) Design and build to resist lateral loads from all direction, e.g. brace face-loaded walls with shear walls, and “tie” all the walls with a ring beam.
- 8) Minimize openings in bearing wall construction.
- 9) Design all elements to transfer loads directly to the ground.

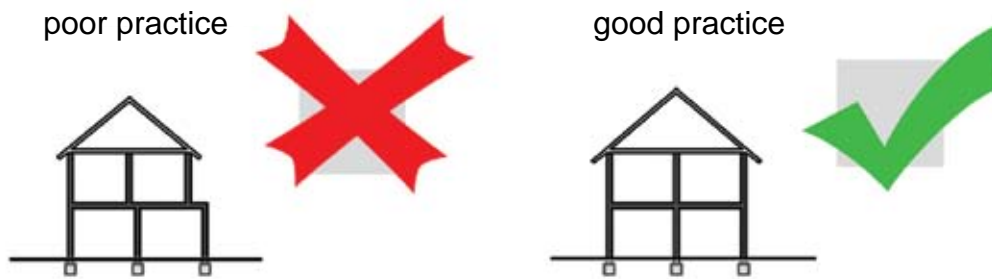


Figure 4. Vertical framing must continue to the foundation, otherwise is a critical weak spot

As regards fire hazards, it is advisable to build separate buildings, instead of a large continuous building in order to prevent the rapid spread of fire.

2.3.2 Materials

Schools built with low quality building materials, low quality concrete, inadequate steel reinforcement or unseasoned timber are often badly damaged by floods or strong winds. Site supervisors should give special attention to using high quality building materials. Try to ensure that the delivered material is of good quality by regular material testing of the aggregates (sand and stone), and the water and cement used. In order to safeguard the health of the children:

- Do not use toxic materials.
- Do not use materials containing chlorofluorocarbons (CFC), e.g. in refrigerators or air conditioners.
- Do not use asbestos.
- Use local materials whenever it is possible. This lowers construction costs and facilitates construction.

Building materials used for school construction must comply with the official Technical Specifications used in Lao PDR . In Lao PDR the following international standards are being used:

ASTM: American Society for Testing and Materials
(http://www.astm.org/DIGITAL_LIBRARY/index.shtml)

TIS: Thai Industrial Standard

If the materials used cannot be found in this list, always follow the specifications of the material manufacturer.

Environmental specifications

If built by private contractors, hardwood must come from a certified provider, i.e. it is harvested wood.

Use water-borne preservatives. If using oil-borne preservatives, avoid products containing pentachlorophenol, as it is highly toxic.

Give preference to materials that are locally extracted or harvested, and locally

manufactured to eliminate potential air pollution due to petroleum-based transportation.

Avoid using products that pollute water, air or other natural resources where they are extracted, manufactured, used or disposed of .

It is recommended to use light-coloured materials for walls and roofs to reflect, rather than absorb, solar energy.

Use materials efficiently. Avoid the waste of construction material. Try to reuse construction material from demolished buildings, whenever it is still in good condition.

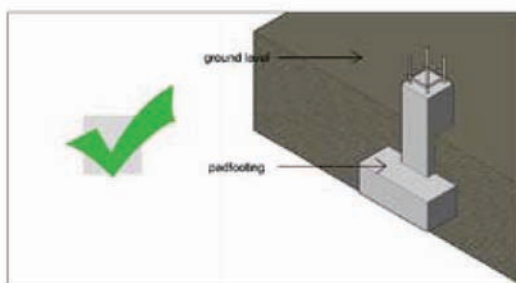
2.3.3 Building Technologies

Sustainable construction practices are cost-efficient, practical and environmentally appropriate. When selecting the most appropriate construction system, builders should choose one that best suits local conditions, such as the availability of building material and skilled workers. Depending on local conditions school architects may want to choose from among the following sustainable building systems:

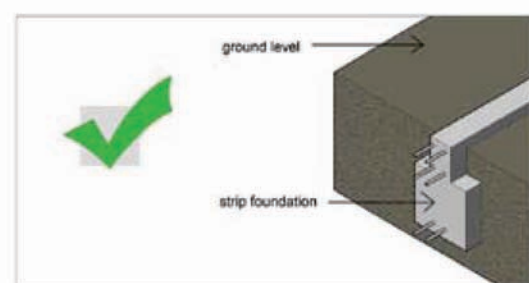
Foundations:

The quality and life span of a building depends to a great extent on how the foundation is made. A poor foundation can soon lead to damage and deterioration that is difficult to repair. The type of foundation to be used should be selected early in the planning process, because it will influence the building's overall design. Key criteria for consideration when selecting a foundation include ground quality, which can be determined through a soil investigation; the building's anticipated load, i.e., its weight when fully occupied; and the availability of equipment and skilled workers.

Padfooting



Strip foundation



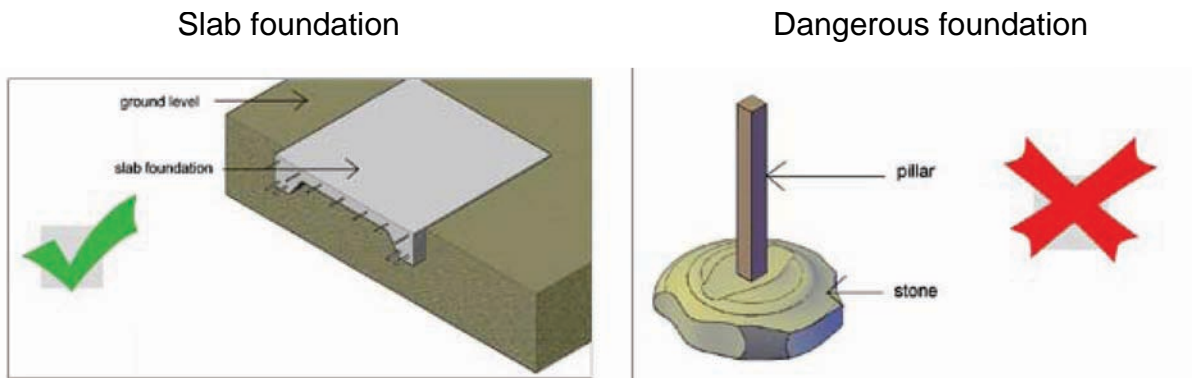


Figure 5. Good and Bad Foundations

Design rules for earthquake and flood-safe foundations:

- Check soil type and flood water level.

Assess soil strength for seismic design of foundations (See Thai Engineering standards used by the Ministry of Public Works).

- Avoid using isolated footings with no ground beams.
- Use reinforced concrete strip foundations under load-bearing walls.
- Soft clays and loose-to-medium dense sand which is water-logged may liquefy during an earthquake. Avoid building in such areas or seek expert advice on pile or slab foundations and structural design.

Supporting frame:

The supporting frame (skeleton) of a building is often subject to local traditions and preferences. In situations where access to projected materials may be restricted, alternative frame systems may need to be considered.

There are at least three basic frame systems:

Concrete frames:

Concrete frames are widely used in school construction. Columns and beams are cast together into a structural frame. Gaps (filling elements) are not load bearing and filled with timber, bricks or bamboo. In order to withstand earthquakes and other natural hazards, strong connections are required between vertical steel reinforced concrete columns, ground beams and ring beams. (A ring beam is a horizontal beam that follows the shape of the school, so named because it would look like a ring if it were round. The roof often rests directly resting on a ring beam.) Also crucially important for earthquake resistance are robust connections between supporting frame and non-load bearing filling elements. Unsecured wall parts may fall outwards.

Timber frames:

Timber frames are often more resistant to earthquakes and other natural hazards than concrete frames and are easier to put up. Adequate carpentry skills, however, are required. In a situation where timber is scarce or likely to come from illegal

logging, timber framing is not recommended.

Do not use wood that is severely cracked or shows signs of termites.

It is important to use adequate bolts. Do not use bolts that have rust.

Steel frames:

Steel frames are primarily used for constructing larger schools. The material is very strong but is difficult to work with without specialised tools and expert knowledge. Also, steel frames are imported and typically quite expensive; therefore they are not often used for schools.

It is important to use adequate bolts. Do not use bolts that have rust.

Floors:

The choice of floor (both the technology used and the surface) depends on its intended use. Consider the expected load, wear and tear, cleaning manner, slipperiness and resistance to moisture and insects. Ground floors must be laid on a layer of 50 cm thick compacted sand.

Walls:

The construction technique used for walls depends on the number of floors, the anticipated loads, and the risk of cyclones or earthquakes. The choice is also influenced by the building material to be used and the availability of skilled workers. Walls should require as little maintenance as possible. Walls play a crucial role in a schools' resistance to earthquakes. Earthquakes affect buildings mainly with horizontal forces. The main danger due to the horizontal movements of the earth is that building walls will collapse and consequently roofs might collapse as well. The main aim of constructing earthquake-resistant buildings is to avoid walls prone to collapse and to ensure that the roof is well secured to these walls. In order to make buildings as resistant to earthquakes, storms and floods as possible, the following measures must be considered:

- Ensure that walls are sufficiently reinforced. Have a qualified engineer calculate the required armouring and control regularly the quality of installation on site.
- Make sure that ring beams are well connected to the reinforcement of walls and columns.
- Walls made of cement or fired bricks resist floods much better than mud walls. The length of walls between openings must be at least 1/3 of their height and must not be less than 1m.
- Walls must be well connected to the structure. If the school will be built with bricks, wall ties protruding from the structure must be hooked into the wall structure.

Roof:

The quality and state of the roof is extremely important. The roof protects against weather, wind, heat and cold. To some extent, roofs also protect external walls from sun and rain. Avoid building flat roofs in areas with heavy rains. Highly skilled workers, excellent quality building materials and regular maintenance are required to keep flat roofs watertight.

For climate reasons, consider insulating the roof or provide well ventilated false ceilings. Insulation reduces heat gain through the roof, keeping temperatures inside to a minimum. Overhanging roofs provide shade to walls and windows and are particularly useful to minimise the heating of sun-exposed walls. To achieve the best earthquake and wind resistance, roofs should be well connected to all walls and columns. In cyclone-prone areas, roof slopes of around 30° reduce wind suction forces. Strong connections of all roof components to the roof structure are required.

Asbestos containing roofing or ceiling materials are banned from school construction. Exposure to asbestos can cause lung disease and cancer, depending on the concentration in the air and the length of exposure.

Openings and windows:

Openings are important elements for natural lighting and the regulation of the indoor climate. They should be large and fully open able, with inlets of a similar size on both sides of the room allowing proper cross-ventilation. Windows for primary schools are preferably equipped with grills, for secondary schools with flexible louvers. Windows with fixed glass panes are of no advantage and should be avoided. In windy and cold areas, transparent wind shielding should be provided. Generally, doors must open towards the outside so that students can escape more easily in case of earthquake or fire.

The following is recommended with regard to window orientation:

- Minimise direct exposure to sunlight and rain.
- If possible, use trees to create additional shade in hot areas or wind shelter in mountainous areas.
- Locate windows toward prevailing winds and breezes for good cross-ventilation and circulation.



Figure 7. Good window

Figure 6. Door must open to the outside

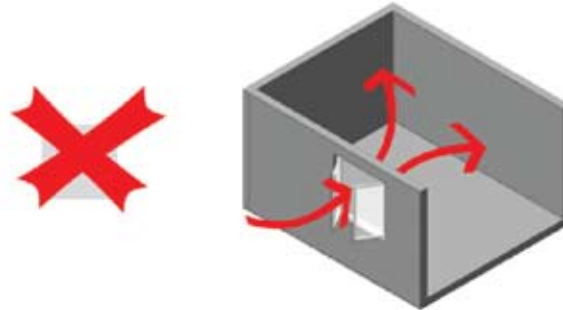


Figure 8. Wrong window location. Not allowing for cross-ventilation

2.3.4 Safety measures for existing schools

For existing schools, a safety audit has to be carried out every five years by the PES. The buildings have to meet the following minimal requirements:

- Roofing materials are correctly fastened to purlines.
- Roofing is properly built to avoid leaking.
- All wooden parts, including roof frames, structure and cladding, are properly treated to resist decay and insect attack.
- The wood used in all construction areas has been adequately dried, is not severely cracked and does not present deformations.
- The ceiling support structure is safely fixed to roof beams.
- All columns are intact and not breaking up or crumbling.
- All walls are secured to columns and not in danger of falling.
- Holes and unused wells are properly closed.
- Fences are complete and clearly delimit the school area.
- “Grey” and “black” waters are properly drained.
- Storm water management is in place.

Existing schools may need repairs and retrofitting, in order to comply with minimum safety requirements. If the buildings have been severely damaged by floods or any other hazard, a specialized engineering evaluation needs to be conducted.

(See Annex 1. Safety Audit Checklist)

(See Repair works in Primary Buildings. ECDM Ministry of Education)

2.3.5 Quality assurance of construction

- Test the experience of the skilled laborers and the contractor-engineers
- Check the quality of construction materials (following section 2.3.2)
- Ensure proper storage of construction materials, e.g.
 - Cement should be kept in a dry store, not exposed to heat and placed on a platform to avoid direct contact with the ground.
 - Timber sheets should not be exposed to damp or sunlight.
 - Roof tiles and zinc sheets should be placed along its length, no other materials should be placed on top and no walking on them is allowed.
 - Gravel and sand should be in separate piles, should be stored in a clean area free from leaves, roots, mud or residual oil.
 - No furniture should be stored in a building under construction. Coordinate the time for furniture delivery in order to avoid this.
- Make sure that the builder (contractor or community) follow safety measures during construction works, as per Lao PDR Construction Law, safety regulations.

(See Annex 2. Site supervision manual)

PART 3.

ARCHITECTURAL DESIGN AND PLANNING STANDARDS

3.1 Architectural design aspects

Key aspects of good schools are inclusiveness and children-friendliness. In remote villages of Laos, the school will often remain as the only permanent building of the settlement. For this reason there is a need for flexibility. The basic design must be flexible enough to allow for various configurations. Rural schools are mainly used as multi grade schools and utilized intensively during school hours. In addition - and to give them even increased public importance and make them more economically viable - the buildings can be used for various purposes such as:

Daily: Adult education (night school)

Periodically: Social work, community meetings

Occasionally: Storm shelter, voting centre, vaccination campaigns, etc.

The children's safety is of utmost importance and must be considered in each stage of the school design.

The school premises should be accessible to all students, including those confined to a wheelchair, using crutches and/or with any form of disability.

The shape of a school is crucial to ensuring that it is built sustainably. Certain building shapes can better minimize or withstand the impact of earthquakes, floods, storm surges, cyclones and climate conditions.

Design structural element to be symmetrical and evenly spread over the plan of the building

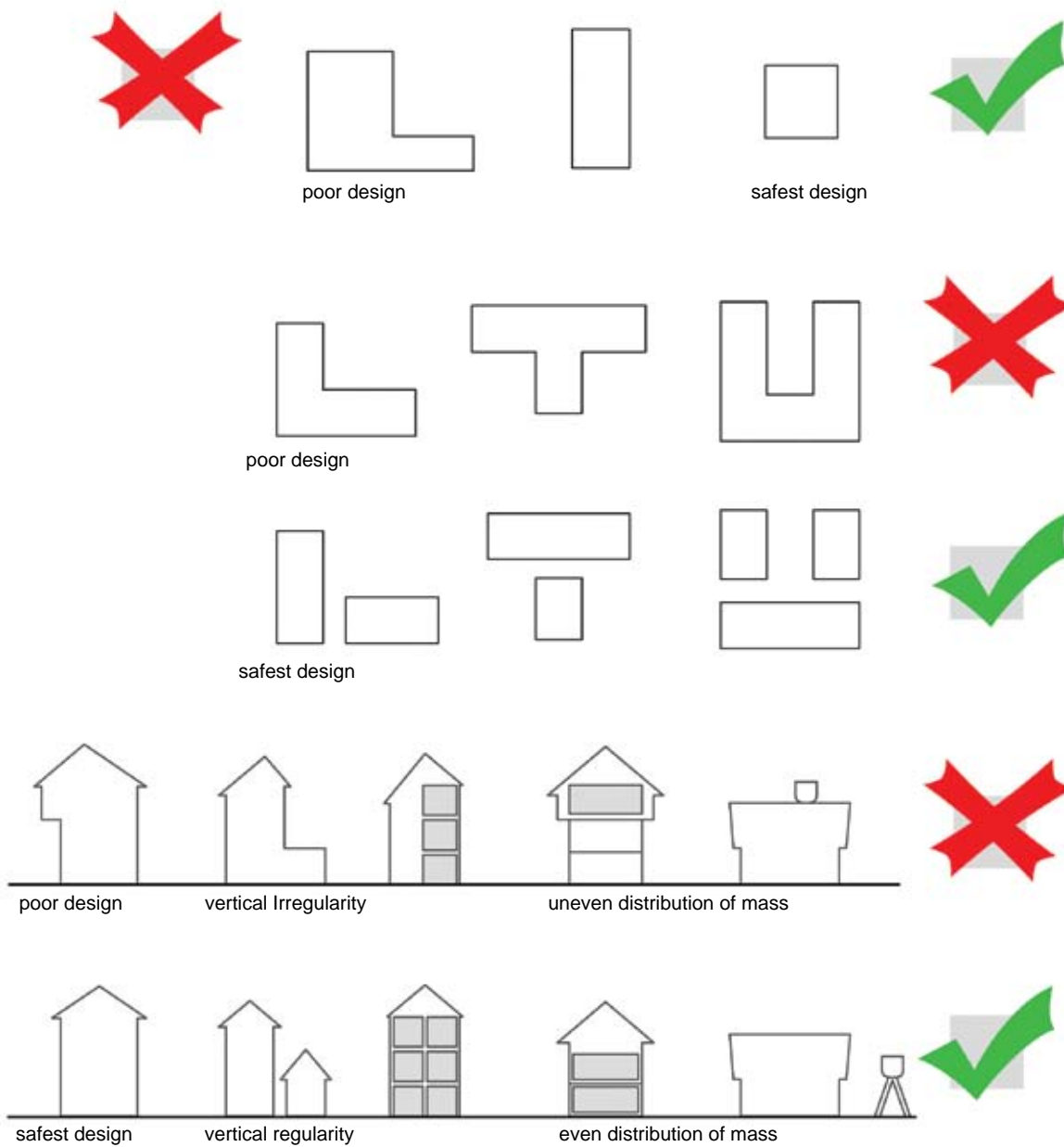


Figure 9. Symmetrical structural elements

3.1.1 Elements of a school and size of rooms

School elements	Spatial requirements
Indoor facilities	
Classroom	<p>Minimum area is 1.60 m² / pupil . Include 10% extra space as provision for population growth. I.e. [(No. Of students) * 1.6] + 10%</p> <p>E.g. [(32 * 1.6)+10%] = 56.32</p> <p>Maximum 36 pupils for single grade teaching are recommended. Max. 40 pupils for multi grade teaching</p> <p>Minimum height of room 3.3 m.</p> <p>The basic classroom module has a rectangular or square ground floor shape.</p> <p>Note that even in mountainous areas where land is scarce, pupils still need the same amount of space. Thus the smaller the classroom, the fewer pupils it can accommodate.</p>
Teacher's room	Minimum area is 12 m ² . 25 m ² for 5-classroom buildings and above
Store room	3 – 4 m ² / classroom
Ceilings	Needed to provide uniform light and protection from noise and heat
Floors	Dry and clean concrete floor
Furniture	<p>Stackable, to avoid chaos in emergency cases.</p> <p>Light, so that it can be easily moved.</p> <p>Dimensions and design should allow working in groups and/or individually.</p>
Additional roofed area	25 m ² / classroom
Toilet (external)	<p>Pour flush, min. 2 units, one for boys and another one for girls.</p> <p>Each toilet/latrine should serve from 45 to a maximum of 75 pupils.</p> <p>For each additional classroom 1 additional unit.</p>
Water supply	Gravity fed system, or roof water harvesting including storage facilities, or shallow well
Outdoor facilities:	
Playground	Same area as the one occupied by the school building
Access road	To guarantee safe and proper access also in the wet season
Ramp	To provide easy access for elderly and people with disabilities 12% gradient recommended (approx. 0,5 m height every 4 m length)
Fencing and Gate	To protect compound from domestic animals
Flag post	To respond to the country's traditional morning assembly of students
Trees	To provide shade in the hot season
Information board	To display announcements and information for students and teachers
"Kila"	To provide protection for livestock (for high risk areas only)

Additional space requirements for storm shelters during emergency use:

Toilets internal: 1 for males, 1 for females.

Water tank: min. 500 l

Villager shelter area: 1 m² / person

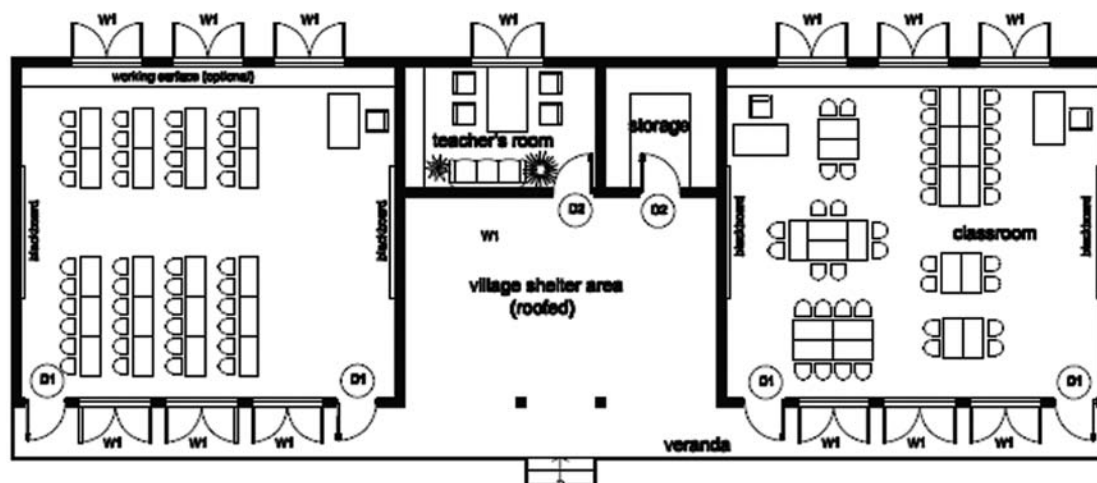


Figure 10. Example of ground plan with flexible classrooms, teachers' room and storage area

3.1.2 Access and emergency exits.

The passageway leading to an exit should be as direct as possible, be unobstructed with projections such as open door and be well lit.

Exits should be clearly marked.

The maximum direct distance from the classrooms to the emergency exit is 9 m in one direction and 18 m in more than one.

Schools must have at least one escape route. If the number of people (including pupils, teachers and staff) exceeds 500, then two exits are required .

Schools must have an entrance that is accessible to people with disabilities. Classroom doors must have a minimal width of 90 cm. For buildings with two and more storeys, a second stair case for emergency situations must be considered.

The minimum width of an escape stair is 1.2m for 150 people; 1.5 m for 220 people.

The sum of the dimensions of two risers and a tread should be 63 cm, and the minimum dimension for the tread is 27 cm. Open risers and projecting nosings are not acceptable for students on crutches.

All exits must discharge to a safe place of refuge outside of the building at ground level.

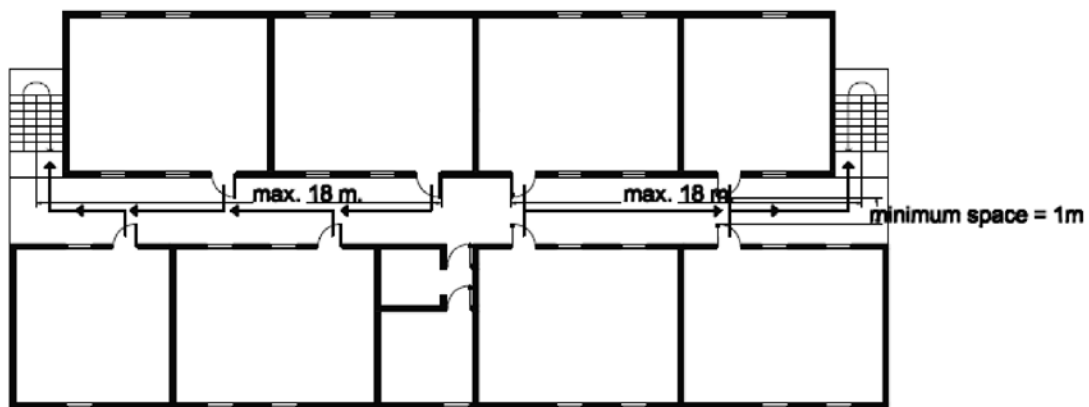
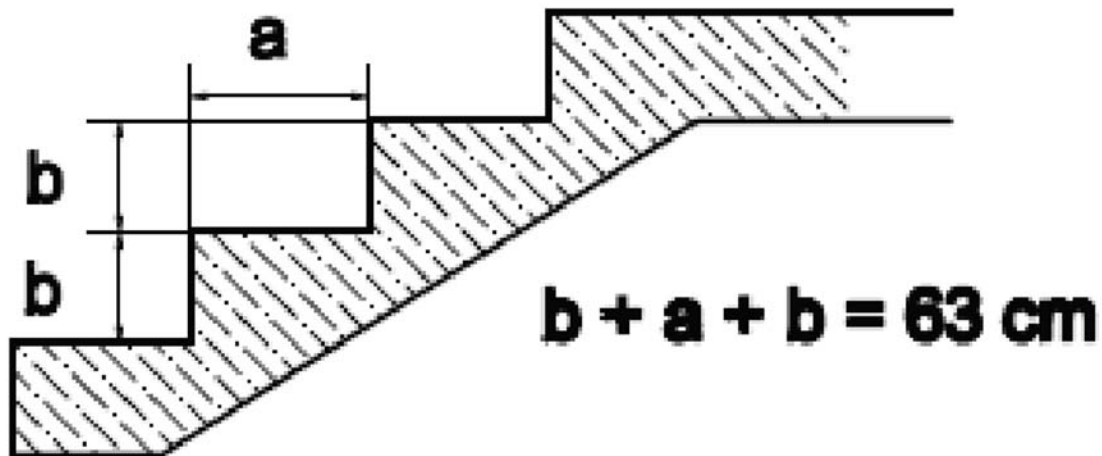
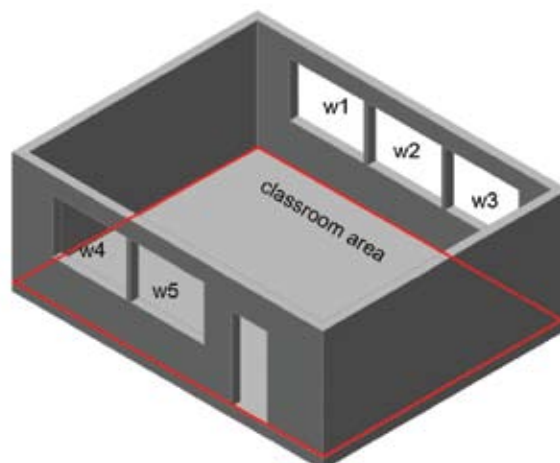


Figure 11. Example of location of fire stairs and door openings

3.1.3 Natural lighting

Classrooms must be designed in a way that artificial lighting is not necessary. Windows should be of a maximum size with openings on opposite walls. Main light source should come from the left classroom wall. On the front and backside of a classroom no windows may be situated. The net window area of a classroom must be min. 25% of the floor area (for a 50 m² classroom min. 12,5 m² net window area is required)

Figure 12. Net window area compared to floor area



$$[\text{window area}] = [w1 + w2 + w3 + w4 + w5] = [\text{classroom area} \times 25\%]$$

3.1.4 Natural ventilation

For basic education facilities artificial cooling or heating devices have to be avoided. Protection against cold winds during the dry season should be balanced by proper ventilation during the hot and humid period. Therefore, regulated air movement is a primary requirement. This can be achieved by well planned openings in the lowlands, and the provision of window shutters or wind screens in the mountainous areas. The warmer the climate and the higher the humidity, the more important it is to provide cross-ventilation.

For planning purposes, it is important to distinguish between regular wind patterns and winds that occur occasionally like storms or cyclones. To design optimal ventilation, the following information is required:

- What is the pattern of existing winds (speed, direction, temperature)?
- How do these wind characteristics change during the course of the day and the seasons?
- When is increased air circulation desired for cooling or heating, when is it not?
- When is air circulation required, in which rooms; and in which zone and at what level in the room?

3.1.5 Water

Each school must be provided with a water supply and a water tank. Water is normally provided through pipes (Gravity Fed System) from the communal water supply. There are three types of water sources that can be tapped: Surface water, groundwater, and rainwater.

Surface waters include lakes, rivers, ponds and other open fresh water sources. Surface water is often the easiest water source to access. Surface water, however, is vulnerable to pollution, thus it must be protected or treated if used for drinking water. It can also be affected by wide seasonal variations in turbidity and flow.

Groundwater is found underground in aquifers, making it better protected from pollution than surface water but still susceptible to bacterial contamination from ineffective or disrupted sanitation systems and chemical pollution, e.g. arsenic.

Rainwater collected from roof-top catchments should not be considered a primary school water supply but merely a temporary supply. The operation of rainwater collection systems requires specific education so that somebody will take responsibility for maintaining the quality of their supply by, e.g. cleaning gutters and sealing of tanks.

If the water is for drinking, the quality should be verified by proper testing.

3.1.6 Sanitation

For hygienic reasons schools must be provided with toilets. Pour-flush systems are to be favoured.

In extreme cases when the community has no access to water, the excreta disposal has to be conducted in such a manner that danger of carriage of disease from the excreta by surface washings, soil and water pollution, fowls, animals, and flies will be eliminated or minimized. Alternative options for toilets are pit privy, vault toilets or composting toilets. *(See Annex 3. Excreta Disposal without Water Carriage)*

Separate toilets or latrines should be available for girls and boys. Privacy, cleanliness and safety are major considerations when planning location and design of facilities.

Sewerage (black water) is collected in septic tanks or - in developed areas – in communal sewerage plants. Septic tanks are usually a combination of small-scale pre-sedimentation tanks and soak pits from which sewage migrates freely onto the ground. The most widely used small-scale sedimentation tanks can typically hold 1 to 2 m³ of black water, providing one classroom with suitable capacity for approximately 6-10 months, after which it requires maintenance and sludge removal.

When designing sanitation facilities, the following considerations should be kept in mind:

- Geography: Are soil conditions and groundwater levels acceptable for septic tanks?
- Plot size: Is the plot large enough to support an on-site system (at least 0.1 hectares)?
- Avoid placing sanitation systems upstream from fresh water sources.
- Latrines must be constructed behind the line of buildings, so that if additional buildings are added later they can be constructed in line with existing buildings without the need to move the latrines.
- Teachers need to have separate facilities for men and women.
- Toilet/latrines can also be designed and located so that they are shared among clusters of classrooms to protect younger children.
- Toilets/latrines must be at least 20m away from the closest school building.
- Toilet areas and latrines should have a minimum source of fresh air via opening or ventilation shaft. Never connect them to food preparation areas.
- Septic tanks need to be placed at least 30 m away from the nearest river , 5 m away from the nearest water outlet, 3 m from the nearest house, and 3 m from any property line.
- The base of any soak pit should be at least 1.5 m above the water table.
- Disposal sites should be downhill of groundwater sources.

- Untreated sewage must not be discharged into any fresh water source (lake, river, and groundwater).
- Ensure that septic tanks are easy to access for sludge removal and maintenance.
- It is important to ensure the storm water drainage is adequate. The lack of adequate or properly maintained storm water drainage systems can result in flooding and associated side effects.
- Wastewater may not flow into public drains.

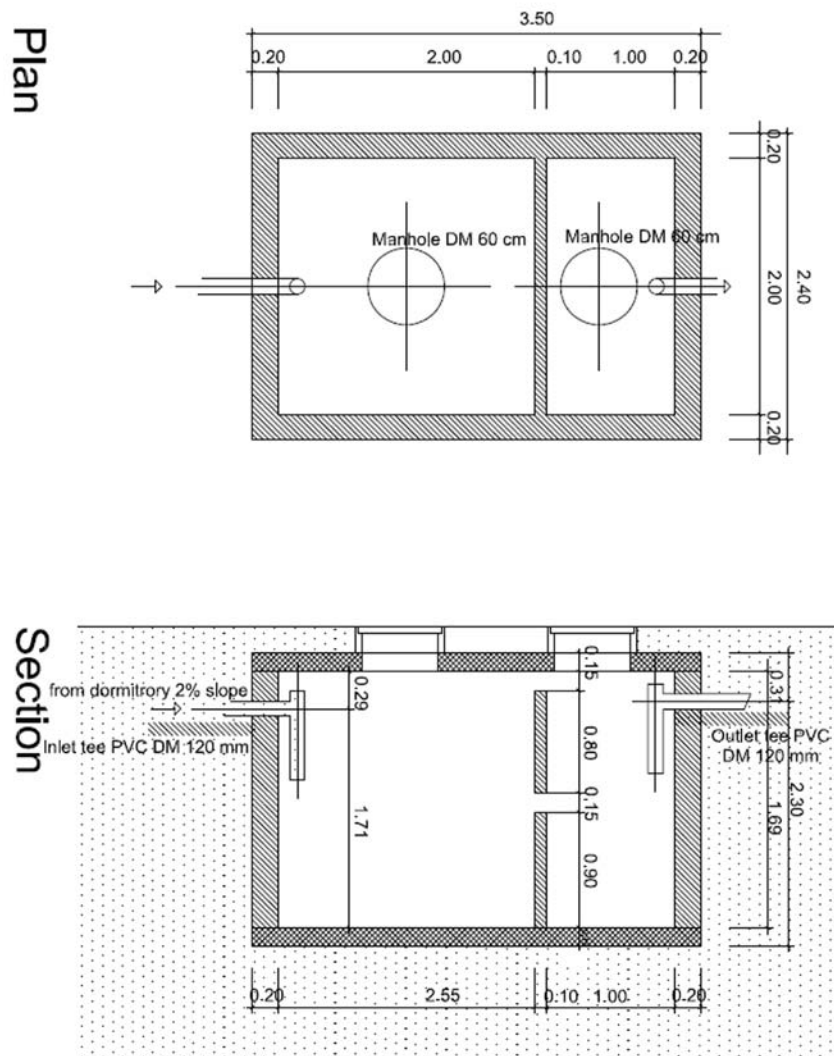


Figure 13. Example of septic tank for 64 students. College Dormitory in Luang Prabang.

3.2 Furnishing and equipment

3.2.1 Primary schools

Furniture for students must be out of solid local hardwood. Height of stools should

be adapted to the age of the pupils. Working surfaces have to be smooth and clean. Minimal requirements are:

Classrooms:

Bench for two students, size 45 cm x 90 cm, height 55 cm, 20 nos

Stools for students 30 cm x 30 cm, height 35 cm, 40 nos

Desk for teacher 70 cm x 120 cm, 1 no

Chair for teacher 1, no

Working surface inbuilt along windows (optional)

Cupboard, maximum height is 1.50 m

Blackboard. Movable blackboards are recommended for multi-level classrooms.

Teachers' room:

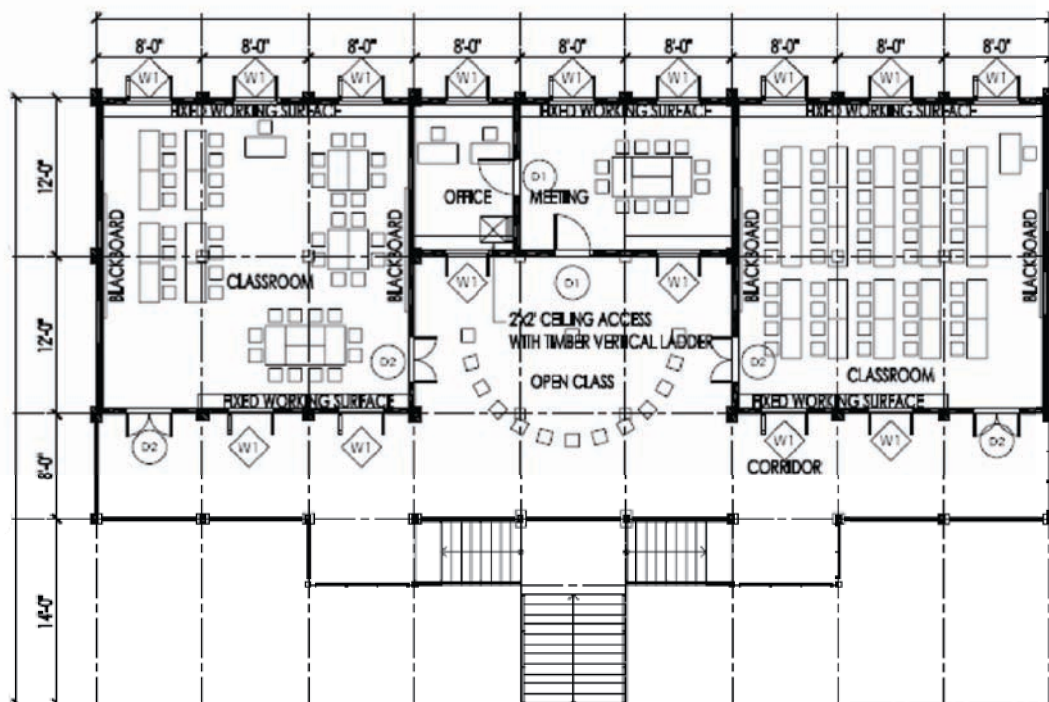
Cupboard, lockable, size 1,2 m x 0.60 m x 2.0 m (w x d x h) per classroom

Table (for each classroom 2 persons)

Chairs (for each classroom 2 persons)

Store:

Shelf, for each classroom min. 3.6 m (3 bodies of 1.2 m wide each).



FLOOR LAYOUT PLAN

3/32" = 1'-0"

Figure 14. Example of furnished primary classrooms. Single and multi-grade. Project of Primary Schools in Ayeyarwaddy Division, Myanmar

3.2.2 Secondary schools

- a) Bench for 2 students, size 50 cm x 100 cm, height 62 cm, 20 nos
- b) Stools for students, height 40 cm x 40 cm, height 41 cm, 40 nos
- c) Desk for teacher size 70 cm x 120 cm, 1 no
- d) Chair for teacher 1, no
- e) Suspension arrangement for posters and maps, 1 no
- f) Power sockets
- g) Display cabinet, size 180 cm x 60 cm x 200 cm (w x d x h)
- h) Blackboard fixed 180 cm x 120 cm, 1 no

Teachers' room:

- a) Cupboard, lockable, size 120 cm x 60 cm x 200 cm (w x d x h) per classroom
- b) Table (for each classroom 2 persons)
- c) Chairs (for each classroom 2 persons)

Store:

- a) Shelf, for each classroom min. 3.6 m.

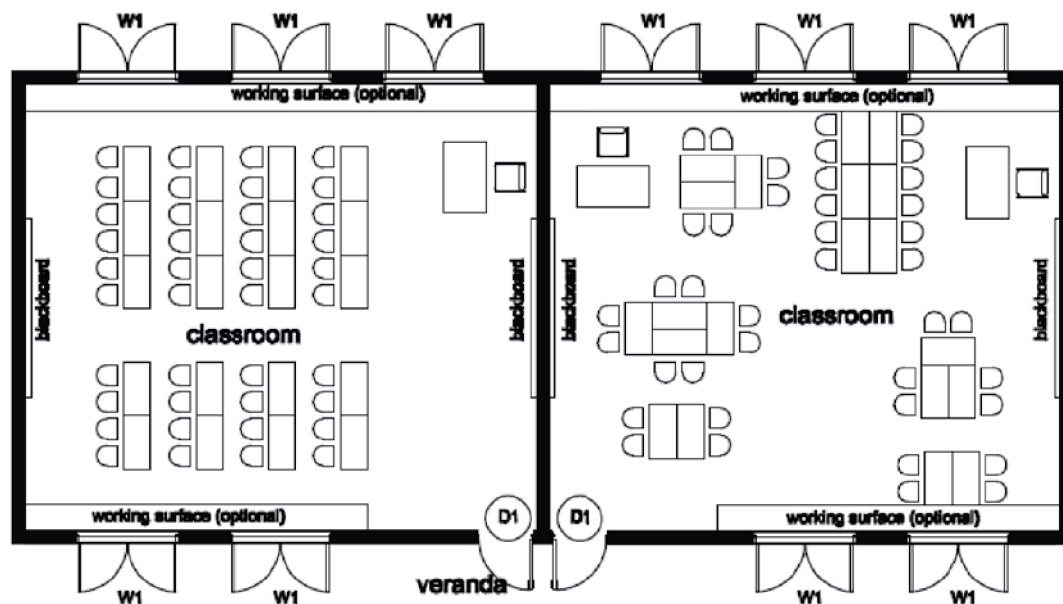


Figure 15. Example of furnished classrooms.

3.3 Outdoor facilities

3.3.1 Sports and recreation

For functional, organizational, safety, and economic reasons, the outdoor facilities should be directly attached to the school. If the opportunity to locate sports facilities close to the school is not provided, they shouldn't be more than 5-10 walking minutes away.

The minimal requirement with regards to sports and recreation is the provision of a general playground with an area equivalent to the area covered by the school buildings.

Recommended are fields for football, volleyball and gymnastic facilities.

The international standard dimension for a double hall flexible to accommodate basketball, football, handball and volley ball is:

22 x 44 x 7 [m] divided into 2 sections:

22 x 28 + 22 x 16

3.3.2 Fencing

A complete and solid fencing for school compounds is a must. It protects playground and buildings from domestic and wild animals. At the same time, it does not allow encroaching on land by trespassers, neighbours, etc.

The school building should be separated from the fence at least by 2m; the front at least by 10m; and there must be at least 4m distance between the school building and a hillside

3.3.3 Landscaping

Restore damaged natural areas.

Use native plant species for landscaping.

PART 4.

STRUCTURAL DESIGN STANDARDS

4.1 Design parameters

4.1.1 Engineering standards

(See Thai engineering standards used by the Ministry of Public Works)

4.1.2 Structural design

Load presumptions for the structural design

Wind load estimations based on wind speed data, year 2008

(See Annex 4a. Wind 17 Provinces)

Station Name	Maximum wind speed (m/s)	Wind load (Kg/m ²)	Direction
Vientiane Cap	49 (April)	80	North
Phongsaly	12 (March, May and September)	9.9	West, East
Bokeo	25 (May)	39	Northeast
Luangnamtha	22 (January)	32	Southeast
Oudomxai	13 (February and April)	10.8	West
Luangprabang	32 (August)	67	West
Xamneua	20 (July)	26	West
Xayabouly	28 (April)	51.1	Southwest
Xiengkhouang	30 (May)	58	South
Phonhong	25 (April)	39	Southeast
Paksane	11 (May)	8	East
Thakhek	19 (September)	23.4	West
Savannakhet	27 (April)	46.3	North-Northeast
Saravane	36 (February)	73	North
Pakse	25 (March and April)	39	Southeast and Southwest
Sekong	20 (October)	26	North-Northwest
Attapeu	25 (December)	39	North- Northeast

Earthquake: Zone 2

Flooding: Depending on the area, min. elevation of finish floor level above ground level is 0.60 m

(See Annex 4b. Flood above ground level. 17 Provinces)

Soil bearing capacity: 200 KN/m² for normal soils, for critical soils verification of soil bearing capacity by a civil engineer is required.

PART 5.

PLANNING AND IMPLEMENTATION STEPS

One of the activities of the Education Sector Development Framework in Lao PDR, is to “Prepare and endorse guidelines on the design and equipping of inclusive education schools and criteria for opening an inclusive education school; increase the number of inclusive education schools according to the number of disadvantaged children in a district and across a province”

Targeted Education Facilities Development	
Provision of new and additional classrooms with multi-grade teaching in villages and village clusters without a complete primary school with all 5 grades ³⁵ .	Target: 85% coverage by 2015.
Introduce basic education cycle schools of Grades 1-9 through the provision of additional classrooms in selected locations without a Grade 6-9 school facility.	Target: 85% coverage by 2015. Additional Grade 6-9 facility based on 1 lower secondary school for every 4 primary schools.
Provision of additional classrooms and facilities for upper secondary education, IVET centres and transformation of TEIs into full degree award bearing institutions possibly co-located on one site.	Target: Completion of additional facilities by 2015.

Figure 16. ESDF. Ministry of Education. Lao PDR

5.1 General proceedings.

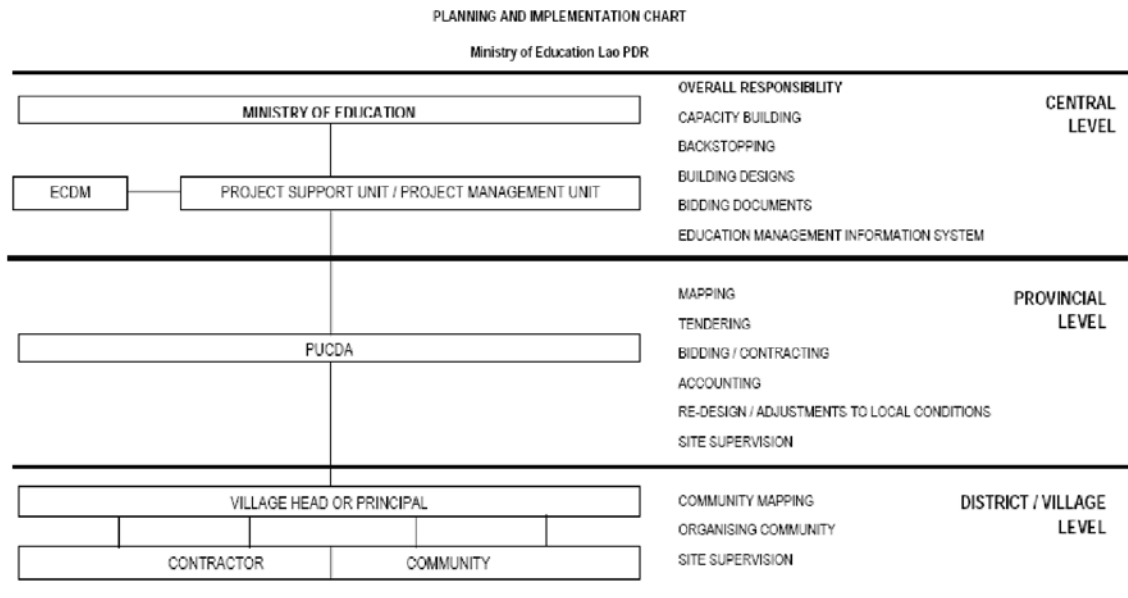
The proceedings are structured into a) planning and b) construction implementation phase:

a) The planning phase consists of the following steps:

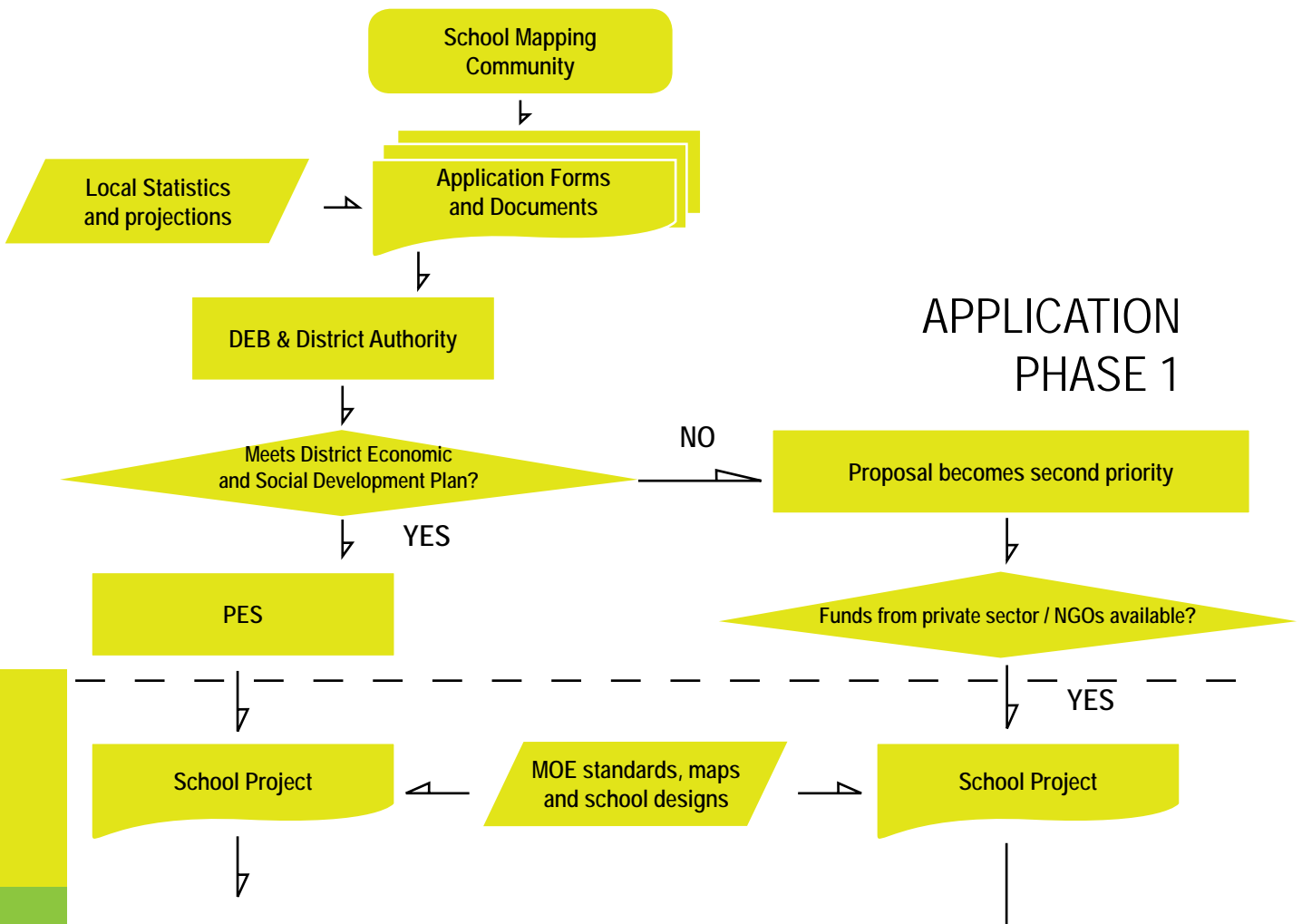
- Step 1: Application Phase 1. Submission of application forms by community/DES to PES (ref Chapter 5.2)
- Step 2: Approval of Phase 1 by PES
- Step 3: Application Phase 2. Submission of project proposal by community/DES/PES to MoE (ref. Chapter 5.2)
(See Annex 5. Management Forms and Procedures).
- Step 4: Approval of phase 2 by MoE
- Step 5: Bidding by PES
- Step 6: Contracting by PES

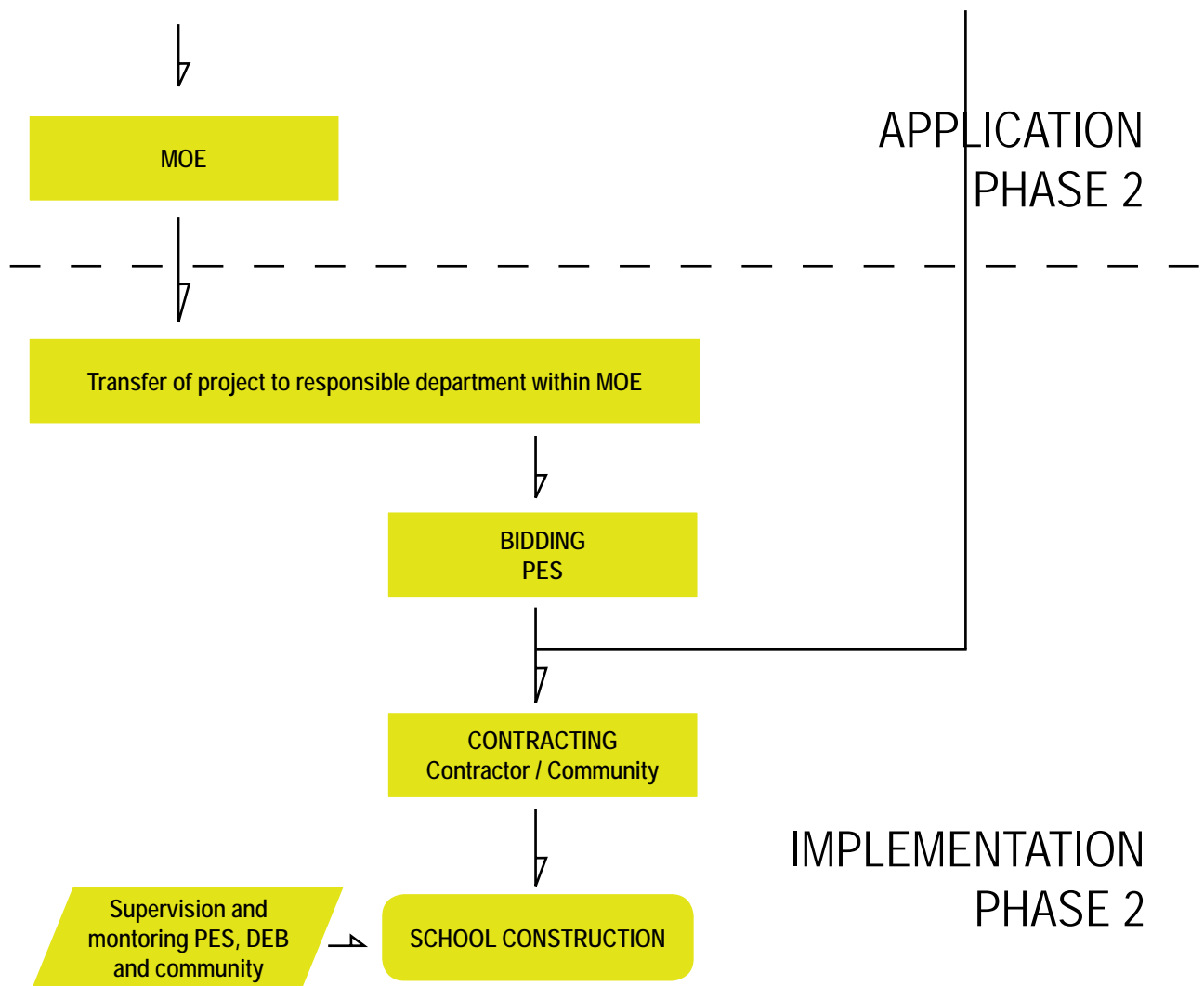
- b) Construction Implementation by contractor/community, supervised by DEB and PES

Planning structure:



Planning and implementation flowchart:





5.2 Formulation of Request

The MoE will approve only simple, functional, and safe applications. Basis for approval of requests are the present School Construction Guidelines.

Application Phase 1

The application from the community has to be submitted to the DEB of the responsible district containing:

- a) Statistics about pupils
- b) Statistics about teachers
- c) Data and projections on demographic growth of population and students
- d) Details about existing school facilities
- e) Information about planned schedule of rooms
- f) School mapping (follow ECDM Manual for School Mapping)
- g) Land title

Forms for the above verification are available from the PES and ECDM.

Application Phase 2

- a) **Cadastral Map** including risk zones with indicated location of the school (as a general rule in scale 1 : 1000)

- b) **Risk Map**
- c) **Site Plan** of the school compound, including planned and existing buildings, access, outdoor facilities, potential for future extensions (as a general rule in scale 1 : 500)
- d) **Ground Plans** with room indications, room sizes, furnishing (as a general rule in scale 1 : 100)
- e) **Sections** with indications about height of rooms (as a general rule in scale 1 : 100)
- f) **Elevations**, original and new ground level (as a general rule in scale 1 : 100)
- g) **Cost estimate**
- h) **Specification** of building construction with general indications about technologies and materials

Environmental Assessment

Once the school project is developed the responsible agency (usually a department of MoE) needs to perform a project environment screening to be submitted to the Department of Environment and Social Impact Assessment (DESIA) for the issuance of the environmental compliance certificate.

According to the size of the project, DESIA will determine whether the project requires an Environmental Assessment (EA). In general school projects are exempt from Environmental Impact Assessment (EIA); however, if it is identified that the project disturbs water resources, forestry and/or cultural and social heritage, the appropriate division from DESIA can request the responsible agency to conduct a complete EA, including an Initial Environment Examination (IEE) and possibly an Environmental Impact Assessment (EIA) in order to obtain the environmental compliance certificate. No construction shall be undertaken at a project site until that certificate has been issued.

It is recommended to carry out the project screening during the project application phases.

(Follow the Regulation on Environmental Assessment in Lao PDR)

5.3 Implementation.

The Provincial Education Services (PES) and the community are the direct implementers of the school project, regardless of the contracting system. The technical support comes from ECDM, which is in charge of providing guidelines, capacity building, conducting training and strengthening the capacity of PUCDA.

The District Education Bureau (DEB) and community provide supervision and monitoring.

(Follow bidding practices, contracting and supervising manuals by ECDM. See Annex 5 for checklists and forms)

PART 6.

OPERATIONAL AND MAINTENANCE POLICIES

The routine maintenance of school buildings in Lao PDR are considered “minor works”, and are tasks usually assigned to local communities.

In each province or district, PUCDA at the MoE must give proper training in maintenance packages. The DEB explains the requirements for community participation.

6.1 Policy of Maintenance

Authoritative for the operational and maintenance policy is the “Decision Decree of Minister on Primary school maintenance No 1241/MOE/DGE/06” dated 30 June 2006.

6.2 Maintenance responsibilities

Ministry:

Role: Overall Responsibility, Budget, Inspection, Monitoring CENTRAL LEVEL

Provincial Education Service (PES):

Role: Inspection / Provincial Budget / technical Support PROVINCIAL LEVEL

District Education Service (DES):

Role: Inspection / District Budget / Corrective Maintenance DISTRICT LEVEL

Village, School-teachers:

Role: Preventive and Routine Maintenance / Reporting SCHOOL LEVEL

6.3 Maintenance activities

a) **Routine Maintenance includes:** proper use of buildings, daily and weekly care, involves sweeping, locking of doors, checking of fencing, collection of rubbish, etc.

b) **Preventive Maintenance includes:** storm water drainage, emptying toilet tanks, painting wooden walls, etc.

Deterioration slows down significantly by carrying out regular preventive maintenance

c) **Corrective Maintenance includes:** Activities carried out after a breakdown has occurred, e.g. replacement of defect parts like roofing tiles, rotten ceilings, locks, damaged furniture, etc.

COMMUNITY

DEB, PUCDA
PES, MOE

The maintenance activities are laid down in the “School Maintenance Manual” of the MoE which is annexed to these Guidelines. The manual contains: i) Implementation Responsibility Chart, ii) Maintenance Checklist at central, provincial, district and school level iii) Training Guidelines, and iv) Budgeting.

6.4 Maintenance budget

Responsible for maintenance budget are the PES. The easy availability of adequate financial sources is imperative to implement a maintenance program successfully. Maintenance costs have to be documented properly to allow easy budget planning for the coming years. Training and site inspection have to be included in the budget.

Communities also contribute with funds for routine maintenance.

For the routine and preventive costs, a budget form available at the DEB has to be used.

For corrective maintenance, a special proceeding has to be applied by using a separate budget form since a contractor has to be involved.

(See Annex 6. Maintenance Checklist)

PART 7.

NOTES AND REFERENCES

ⁱ On January 15th, 2009 Lao PDR signed the Convention on the Rights of the Persons with Disabilities and ratified it on September 25th of 2009. The Convention mandates inter alia that children with disabilities are not excluded from free and compulsory primary education, or from secondary education.

<http://www.un.org/disabilities/>

ⁱⁱ Brief on National Forests Inventory NFI. Forest Resource Development Service. Lao PDR. FAO

ⁱⁱⁱ Extracted from Lao case study “Mainstreaming Disaster Risk Reduction in the Education Sector in Lao PDR.

NDMO, MOE, ECHO, UNDP, ADPC

^{iv} Based on the „Child-friendly Schools Manual“ Chapter 3. UNICEF. Note that at average children walking speed (about 3 Km/hour) this distance may be equivalent to 3 Km. in flat lands and approximately 2 Km. in mountainous areas.

^v Construction Design, Building Construction and Site Selection. ProVention Consortium Secretariat. www.proventionconsortium.org

^{vi} Guidance Notes on safer school construction. Global Facility for Disaster Reduction and Recovery

^{vii} High Performance Schools. Best practices manual. 2006 edition. www.chps.net

^{viii} Standards for design of classrooms, yard, furniture for Primary Schools, developed by ECDM (Lao language)

^{ix} The Building Code of Lao PDR is under preparation by the Ministry of Transport and Public Works, at the time of approval of this guideline,

^x According to the New Lao PDR Construction Law (under review by the National Assembly as of December 2009), construction materials should not damage the environment.

^{xi} Including Standards for design of classrooms, yard, furniture for Primary Schools, developed by ECDM (Lao language)

^{xii} Based on Education Sector Development Framework (ESDF) target pupil-classroom ratios of 31:1 for primary and 45:1 for secondary. Ministry of Education. Lao PDR

^{xiii} Standards for design of classrooms, yard, furniture for Primary Schools, developed by ECDM (Lao language)

^{xiv} Neufert. Architect's Data. 7th Edition

^{xv} Standards for design of classrooms, yard, furniture for Primary Schools, developed by ECDM (Lao language)

^{xvi} Including Standards for design of classrooms, yard, furniture for Primary Schools, developed by ECDM (Lao language)

^{xvii} Neufert. Architect's Data. 7th Edition.

^{xviii} Standards for design of classrooms, yard, furniture for Primary Schools, developed by ECDM (Lao language)

^{xix} Education Sector Development Framework. Ministry of Education. Lao PDR

^{xx} According to the Regulation on Environment Assessment in the Lao PDR. 2009

Annex 1: Safety Audit Checklist *

ITEM	Yes	No	Recommended action to make safe	Inspected by	Date of Inspection
Roof sheets					
Roof tiles are correctly fastened to purlines with individual fixings for each tile					
Leading edge of roof tiles are fixed with screws					
Roof sheets are correct size and quality					
Solar panels (if existing) are securely anchored to the roof					
Roof Framing					
Correct number of purlines					
Correct structure of roof truss					
Correct number of bolts in roof truss					
Correct size of wood in roof truss					
Adequate anti-termite treatment of roof truss					
Roof truss is adequately secured to columns					
Ceiling					
Ceiling support structure is fixed to roof beams					
Wood of ceiling has adequate anti-termite treatment applied					
Ceiling matting is fixed to ceiling structure					
Building structure					
All columns and beams are intact and not breaking up or crumbling					
Walling					
All walls are secured to columns and foundations, not in danger of falling					
Non-structural Walls and Partitions					
Non structural walls are reinforced vertically and/or horizontally					
They are detailed to allow sliding at the top and movement at the sides					
They are restrained at the top and the sides against falling					
Windows					
Windows have louvres with provisions for excluding the rain during storm conditions					
Windows are secured to the walls, slabs, beams or columns near all corners of each panel					

ITEM	Yes	No	Recommended action to make safe	Inspected by	Date of Inspection
Doors					
The direction of door swing allows for rapid evacuation in case of emergency					
The door frames are secured to the walls, slabs, beams or columns by bolting.					
The tracks of the top and bottom rails are deep enough to prevent the moving doors from being dislodged in severe hurricanes					
Timber doors have a solid core or are made up from solid timber members					
Each door leaf is fixed by hinges or bolts in at least four locations adjacent to all corners					
External works					
Fences and Garden Walls resist lateral forces					
Non-structural Components in earthquake-prone areas					
Electricity					
Emergency generator is adequately secured					
Batteries are securely attached to the battery rack					
Battery rack is cross-braced in both directions					
The battery rack has bolts secured to a concrete pad					
The diesel fuel tank is securely attached to the supports					
The diesel fuel tank supports are cross-braced in both directions					
The diesel fuel tank bracing is attached with anchor bolts secured to a concrete pad					
Fuel lines and pipes are attached with flexible connections					
Fuel lines and pipes are able to accommodate relative movement across joints					
The transformers, Controls, Switchgear are properly attached to the floor or wall					
Bus Ducts and Cables are able to distort at their connections to equipment without rupture					
They are able to accommodate relative movement across joints					
Bus ducts and cables are laterally braced					
Fire Fighting					
Smoke Detectors and Alarms are properly mounted					
The fire control system and fire doors are securely anchored					

ITEM	Yes	No	Recommended action to make safe	Inspected by	Date of Inspection
Fire Extinguishers and Hose-reel Cabinets are securely mounted					
Fire extinguishers are secured with quick-release straps					
The emergency Water Tank is securely anchored to its supports					
The supports of the emergency water tank are braced in both directions					
The supports or braces are anchored to a concrete foundation					
Plumbing					
The water tank is securely anchored to its supports					
The supports are braced in both directions					
Supports or braces are anchored to a concrete foundation					
Water Pipes and Wastewater Pipes are laterally braced at reasonable intervals					
Pipes have flexible connections to boilers and tanks					
Pipe connections can accommodate movement across joints					
"Free" pipe penetrations through walls large enough to for seismic movement					
Air Conditioning					
Chillers, Fans, Blowers, Filters, Air Compressors are securely mounted					
Ducts are laterally braced?					
Ducts can accommodate movement at locations where they cross separation joints					
Ceilings and Lights					
Suspended ceilings have diagonal bracing wires					
For plaster ceilings, the wire mesh or wood lath is securely attached to the structure above					
Light fixtures (eg lay-in fluorescent fixtures) have supports independent of the ceiling grid					
Pendant light fixtures have safety restraints (eg cables) to limit sway					
Emergency lights are mounted to prevent them falling off shelf supports					
Appendages and Sundries					
Parapets are reinforced and braced					
Veneers and decorative elements have positive anchorage to the building					
Signs and Sculptures are adequately anchored					

ITEM	Yes	No	Recommended action to make safe	Inspected by	Date of Inspection
Movable Equipment					
Radio equipment is restrained from sliding off shelves					
Telephones are placed away from edges of desks and counters					
Elevated loud speakers and CCTV are anchored to the structure					
Vital computer information is backed up regularly and stored off site					
Desktop items are prevented from sliding off tables					
Access floors are braced diagonally					
Storage areas					
Shelving units are anchored to walls					
Shelves are fitted with edge restraints or cords to prevent items from falling					
Heavier items are located on the lower shelves					
Filing cabinet drawers latch securely					
Heavily-loaded racks are braced in both directions					
Fragile or valuable items are restrained from tipping over					
Chemical supplies are secured or stored in "egg crate" containers					
Hazardous items					
Gas cylinders are tightly secured with chains at top and bottom (or otherwise)					
Chains are anchored to walls					
Chemicals are stored in accordance with manufacturers recommendations					
Furniture					
Heavy potted plants are restrained from falling or located away from people					
Tables and equipment with wheels have locks or other restraints to prevent them rolling unintentionally					

* Includes recommendations from "Vulnerability Assessment of Shelters in the Eastern Caribbean" prepared by Tony Gibbs of Consulting Engineers Partnership Ltd. October 1998

Annex 2: Site Supervision Manual

General remarks:

This Site Supervision manual is structured into three parts:

Part1 Site Supervision Checklist

Part 2: Reference Book

Part 3: Monitoring and Reporting Form

The material presented in this checklist is based on general knowledge and universal practice. It is up to the particular province / district to develop and apply for some particular steps corresponding solutions which are adapted to local practice and circumstances. The PUCDAs are directed to keep a Site Supervision Checklist for each school updated. Whenever site visits are carried out, the supervisor should fill in date and signature. Three implementation steps (1.2, 4.3, 10) are highlighted in Grey. These steps have to be reported to ECS by using the "Monitoring and Reporting Form" (Part 3 of this guide) before construction process is continued.

Part 1: Checklist

No	Item / building part	Activity / to do	responsible unit	Checked: (Date and signature)	Progress Report sent to ECDM by fax ✓
1		Preparation Work			
1.1	Masterplan	Get Site Plan signed by PUCDA, DEB, Village head.	PUCDA		
1.2		Important: Do not allow the contractor to start preparation- and construction work at site unless the Site Plan is signed and report to PES and ECDM			Date: Sent by:
1.3	Preliminaries on site	Prepare the site before construction works can be started	PUCDA DEB Villagers		
1.4	Work program	Elaborate a Working Plan	PUCDA Contractor		
1.5	Fencing	Build a strong Fence and gate all around the compound	Villagers		
1.6	Setting out of building	Approve setting out	PUCDA		

1.7	Setting out of floor level	Appoint floor level together with contractor	PUCDA		
No	Item / building part	Activity / to do	responsible unit	Checked: (Date and signature)	Progress Report sent to ECDM by fax ✓
2		Earth Work			
2.1	Top soil	Removal of top soil, check whether: <ul style="list-style-type: none"> The roots and debris are disposed. The storage of topsoil is separated from excavation material. 	DEB/villagers		
2.2	Excavation and backfilling	Check: <ul style="list-style-type: none"> foundation and excavation level, backfilling around footing and building 	PUCDA		
3		Concrete Structure Work			
3.1	Footings and ground beams	<ul style="list-style-type: none"> Make sure that the lean concrete layer of 5 cm thickness is placed before any casting is started Check casting (measurements, alignments) of footings and beams Check reinforcement of footings and beams Check mixing, placing, and compacting of concrete 	PUCDA		
3.2	Brick walls underneath ground beams	Check workmanship (bonding and laying) of masonry walls before plastering	PUCDA		
3.3	Columns	<ul style="list-style-type: none"> Make sure that the covering of concrete is min. 2.5 cm Ensure that the reinforcement at the top of the columns is long enough to fix the roof trusses 	PUCDA		
3.4	Slabs	<ul style="list-style-type: none"> Make sure that the backfilling underneath the slab is of well compacted sand Check reinforcement and thickness of slab (at least 10 cm) Arrange curing of slabs Remind contractor to introduce joints along walls 	PUCDA		

No	Item / building part	Activity / to do	responsible unit	Checked: (Date and signature)	Progress Report sent to ECDM by fax ✓
4		Roofing Structure			
4.1	Woodwork general	<ul style="list-style-type: none"> Remind the contractor to supply the timber for the roof structure and the walls in due time Check type and quality of wood thoroughly (accept only hardwood) Make sure that the timber is properly stacked at the site and not being exposed to rain and dirt. 	PUCDA		
4.2	Sample roof truss	<p>Advise the contractor to execute a "sample roof truss" exactly in line with the respective drawings. This truss has to be carefully checked by the PUCDA engineer together with the site engineer. Special attention has to be paid to:</p> <ul style="list-style-type: none"> Quality and type of timber used Completeness (are all the members existing?) Sizing of truss members (do all the members have the size as prescribed in the drawing?) Number and diameter of required bolts Number and diameter of required nails Cracks (no cracks allowed) Fixing of truss on the concrete pillars Anti termite treatment (is the timber completely coated?) 	PUCDA/ Site engineer		
4.3	Roof trusses	<ul style="list-style-type: none"> Important: Do not allow the contractor to continue work on the trusses unless point 4.2 are carefully checked and found absolutely in line with the drawings Report to PES and ECDM 	PUCDA PES	Date: Sent by	

No	Item / building part	Activity / to do	responsible unit	Checked: (Date and signature)	Progress Report sent to ECDM by fax ✓
4.4	Purlines,	<p>Check the following:</p> <ul style="list-style-type: none"> • Size • Number of lines at each roof side) • Fixing of purlines on the trusses • Anti termite treatment (is the purline on all the 4 sides completely coated?) 	PUCDA		
4.5	Fascia and eave boards	<ul style="list-style-type: none"> • Are they using hardwood? • Is the thickness of the used boards min 2.5 cm? • Are the boards coated on all the 4 sides with anti termite treatment? 	PUCDA		
4.6	Roof covering	<p>If Corrugated Iron sheets are chosen:</p> <ul style="list-style-type: none"> • Is the sheet min. 0.42 mm thick? • Is it properly fixed (3 nails on each purline)? • Are there holes in the sheets? • Is the overlap at least 20 cm (length) and 2 valleys (with)? <p>If Fibre Cement Sheets are chosen:</p> <ul style="list-style-type: none"> • Is "elephant brand" quality supplied? (5mm thick)? • Are original clips and screws used? (2 per sheet)? • Are the original ridge tiles installed? 	PUCDA		

No	Item / building part	Activity / to do	responsible unit	Checked: (Date and signature)	Progress Report sent to ECDM by fax ✓
5		Wood Wall Work			
5.1	Framing	Partition walls: <ul style="list-style-type: none"> • Check quality and type of wood (accept hardwood only) • Check quality and type of wood (accept hardwood only) • Make sure that the vertical battens on the concrete pillars painted with anti termite treatment prior to fixing! • Is a supporting frame (5 x 5 cm) underneath and above the window introduced? 	PUCDA		
5.2	Boarding and battens for external walls	Make sure that all the planks used for any boarding are out of well seasoned hardwood. <ul style="list-style-type: none"> • Do not accept any gaps between the planks • Are the louvers for the ventilation of the roof inserted? • Is the "secret nailing system" applied? • Are the vertical window battens at sill and lintel on both sides fixed with a horizontal framing plank? • Are the horizontal battens (above windowsill level) nicely jointed (with a half lap joint on the pillars)? • Is the internal boarding in the teachers and the store room installed? 	PUCDA		
5.3	Working surface	The working surface is regarded as an additional student table. Make sure that the height is corresponding with the height of the furniture. Check the fixing of the working surface on the concrete pillars and on the supporting frame underneath the window sill.	PUCDA		

No	Item / building part	Activity / to do	responsible unit	Checked: (Date and signature)	Progress Report sent to ECDM by fax ✓
6		Ceilings			
6.1	Bamboo mats	Check quality and size of the mats. Make sure that the mats are: <ul style="list-style-type: none"> • well seasoned • on both sides coated with anti termite treatment before fixing 	PUCDA		
6.2	Sub structure	<ul style="list-style-type: none"> • Is the substructure made out of hardwood? (size 5 x 5 cm) • Is the substructure coated with anti termite treatment? (3 coats) • Is the entrance door to the roof installed? • Is the arrangement of the substructure according to plan? 	PUCDA		
6.3	Finishing	<ul style="list-style-type: none"> • Are the fixing battens painted on both sides before nailing? • Is the alignment of the fixing battens acceptable? 	PUCDA		
7		Windows and Doors			
7.1	Frames	Frames must be fabricated out of well seasoned hardwood. Check. <ul style="list-style-type: none"> • Size of frames (5 x 15cm) • Fixing of frames to the wall • Accuracy of fixing (horizontally and vertically) 	PUCDA		
7.2	Shutters	Door and window shutters should be manufactured in a workshop. To ensure accuracy and uniformity a template should be used. Check: <ul style="list-style-type: none"> • Type and quality of wood • Finishing of woodwork • Accuracy of fixing of shutters(3 mm space between frame and shutter) • Functioning of shutter 	PUCDA		
7.3	Hinges and locks	<ul style="list-style-type: none"> • Brand of hinges • Fixing with the required number of screws (do not accept nails for fixing of hinges)! • Brand of cylindrical lock • Functioning of lock • Make sure that you have 3 keys from each lock 	PUCDA		

No	Item / building part	Activity / to do	responsible unit	Checked: (Date and signature)	Progress Report sent to ECDM by fax ✓
8		Painting Works			
8.1	Material	Distinguish between anti termite treatment and paint. Anti termite treatment is mainly applied for preservation reasons on the structural parts of the building (roof trusses, purlines, etc.) and on parts that are not visible anymore after installation. Painting is mainly applied for esthetical reasons and cleanliness. Ensure that the contractor applies the quality and brand that is described in the bill of quantity.			
8.2	Application	Check that: <ul style="list-style-type: none"> The building part to be painted is dry and free from mortar, dirt and dust Parts of timber construction that are not accessible anymore after fixing e.g. battens that are directly fixed on concrete pillars, are painted on all sides prior to fixing Paints are applied in 3 coats 			

9		Furniture			
9.1	General	Furniture should be manufactured in a workshop and not at the site. Wood used for the furniture production has to be well seasoned and of best quality. Furniture should not be supplied to the site before the handing over of the building.			
9.2	Chairs and tables for students and teachers	Check: <ul style="list-style-type: none"> Number of tables and chairs supplied Size of furniture (chairs in two heights for short and tall students) Workmanship (finishing) acceptable? Cracks in tables Varnishing neatly done? 			
9.3	Cupboards and shelves	<ul style="list-style-type: none"> Workmanship (finishing) acceptable? Locks and keys handed over to headmaster? Shelves sturdy and properly fixed? 			

10		<h3>Final inspection</h3> <p>Final inspection is done after all the works of the contractor are completed. For each school a Completion Certificate has to be issued by the PUCDA. This document is very important and has to be signed by the headmaster, the DEB- and PUCDA representatives and the contractor. Before the final payment to the contractor is approved and forwarded, the following has to be ensured:</p> <ul style="list-style-type: none"> • Toilets completed and functioning • Classrooms cleaned • Site cleaned (all surplus materials removed) • Keys of doors and cupboards handed over to the headmaster • Report to ECDM and PES 	<p>PUCDA / DEB / Head-master / contractor</p>	<p>Date. Sent by:</p>	
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Part 2: Reference Book

1. Masterplan

A Master Plan showing the layout of the school compound has to be established in scale 1: 200. The plan has to contain the following elements:

- new schools;
- existing schools;
- possible extensions of classroom buildings;
- toilets, type and number (to be located min. 20 m away from the school);
- waterpoint (location and type of watersupply);
- outdoor facilities (Sport fields);
- fencing.

The Masterplan has to be discussed by the PUCDA with the District Education Office and the Village Head. **Start of construction works by the contractor is only allowed once the plan is truly signed by the DEB Director, the Village Head and the PUCDA. A progress report has to be forwarded by the DES to PES and ECDM by fax accordingly (ref. part 1, checklist tem 1.2).**

2. Preliminaries on site

Site engineer: Each construction site must be one person in charge of the work (site engineer). This person is representing the contractor. He needs to have the technical know how and professional ability, as well as a disciplined personal behavior (authority) towards his workers, supervisors and villagers. He is authorized by contractor and supervised by PUCDA.

Construction start: Before the construction of a project starts the following things need to be organized, implemented and checked:

- the involved villagers have to be informed about the ongoing activities, as well as the proposed work program;
- the confirmation that the locally prepared material fulfills the required quality standards,
- if necessary, the accommodations for the skilled labour are prepared;
- the required building material for the first phase (that is not available in the village) is transported to the site.

When the construction of the project has started, the site engineer representing the contractor has to organize and coordinate daily the ongoing work. This is, as mentioned before, a very important part of the construction. The following points have to be checked by him daily:

- organize and supervise the work on the site;
- explain the job to the workers, and make clear the daily target that is expected from them;
- check the work, and if necessary correct it, or adapt it to the situation;
- plan the work for the next day, and inform the workers;
- organize in time the ordering and delivery of the required building materials;
- keep the administration like daily reports, store book, orders for materials and transport up to date, as well as the controlling of material at the site.

•
Material storage: Before any building materials are brought to the construction site the arrangements for proper storing needs to be organized. On a large construction site the required building material should be stored close to the structures where it will be needed to reduce the transportation within the construction site. All these places have to be shown to the villagers, so that when material arrives at the site before the construction crew is present the villagers can show the proper places to store the various materials.

Storage of cement:

In general cement should not be stored over long periods of time (more than two months). Moisture destroys cement, therefore it must be stored dry. If the cement contains lumps it is a clear sign that it has been exposed to moisture. **A storing place with a secure roof and good ventilation is required.** It is recommended to use a separate store room. To avoid rising damp do not store the cement directly on the floor, but for instance on timber pallets. Avoid contact of the cement bags with outer walls and floor. Walls and floors could be a source of moisture. In addition proper ventilation is prevented when the cement bags lay directly on the floor or against a wall. The cement stack should not be more than 10 bags high. The old stock should always be used before the new one. Cement can be expected to lose from its potential strength because of storage time as follows:

- ~ 20 % after 3 months
- ~ 30 % after 6 months
- ~ 40 % after 12 months (1 year)
- ~ 50 % after 24 months (2 years)

Proper storage, as well as handling with care is very important when working with cement. **If the cement has lumps, the bags are hard, or the quality of cement is doubtful in any way, it should not be used anymore.** Cement with only a few lumps may still contain some quantities which can be used. In this case it should be sieved through a 0.5mm sieve and used for less sophisticated construction work like foundation or lean concrete work.

3. Work planning

Before starting with the construction there should first be a clear understanding of which parts of the school are to be built first and the actual construction procedure. Therefore, a work programme should be developed which includes the phases and sequences of the construction. Such a work programme is normally designed by the site engineer, and subsequently discussed and agreed upon with the PUCDA / DEB and villagers concerned.

The advantages of a work program are:

- to know the amount of time needed for construction;
- to know the required material needed, as well as at what time it has to be at the site;
- to optimize the work procedures;
- to plan for the following school.

4. Setting out of buildings

Permanent buildings require an exact setting out. According to the measurement on the site plan the building is set out with batter boards. The following steps should be taken for the construction of batter boards:

1. Install batter boards at all corners, approx. 1.5 m away from the proposed outside wall of the building. Use poles of approx. 12 cm diameter, and planks of about 4 cm thickness.
2. Make sure that all batter boards are approx. at the same level using the water hose leveling method
3. Mark the outer wall using strong thread line and tape measurement. Tighten the layout, thread by stones.
4. Check that the layout thread lines are in right angle. Use the 3 : 4 : 5 string or wooden square.
5. Check the diagonal, (to be of equal length) for perfect layout.
6. Mark the building lines on slopped terrain with the help of the plump line.

Remark:

The procedure described above is one possible method for setting out for school buildings. For toilets it is not necessary to use stakes and boards. The required accuracy can be achieved with spirit level and plump. When the setting out is made it is important to build a durable strong batter board construction which can stand and remain stable throughout the construction time.

1. Setting out of levels (fixing of floor level)

The levels on a construction site are related to fix points, where the level is known. Therefore, a temporary bench mark should be set next to each structure. This bench mark has to be surveyed by the engineer or technician in charge. The specified level of the structure can be found by using a straightedge and spirit level.

Important: Make sure that the floor level of the classrooms is fixed minimum 30 cm above ground level

2. Excavation and Backfilling

Choosing sites for proposed schools requires careful consideration in regard to the soil bearing capacity. Therefore the choosing of the location is of greatest importance, before any earth work is undertaken. Another important point is to avoid as much as possible damage to the surrounding nature, like the unnecessary cutting of trees and subsequent creation of erosion problems due to large disturbance of the overgrowth. If possible no excavation should be foreseen in rocky areas, because it is extremely difficult and labor intensive. Special attention is also necessary to guarantee the security of laborers working on deep excavations for wells and deep trenches in rocky areas.

Trenches not deeper than 1.2 meters can be excavated normally with vertical walls, as collapsing of the walls at this depth should not be dangerous for the working person inside the excavation. Trenches or excavations of more than 1.2 meters depth require a careful consideration of the soil stability on which the necessary "safe slope" depends. Special attention is required near houses, rivers or roads to prevent sliding of large areas.

Make sure that no water may enter the excavation area, as wet soil can not be used for a foundation bed. This can also occur when rainwater softens the foundation bed, therefore it is recommended to excavate the last 10cm just before the foundation is cast. For the safety of workers, villagers, and animals, a deep well excavation should be fenced during construction. The backfilling has to be done in layers of about 30cm that are properly compacted.

General rules for foundation construction:

- The soil of the foundation bed must be uniform. If not so, it is better to shift the building to a place where the ground is uniform;
- The foundation bed must always be leveled;
- On steep hills the leveling is achieved by means of steps;
- The depth of the foundation below the ground depends on the nature of the ground. Topsoil like humus always has to be removed.
- Erosion of the foundation has to be carefully considered and precautionary measures have to be foreseen to drain the rainwater around the school building;
- All the loose material which may fall into the foundation has to be secured or removed before casting the foundation;
- If the excavation is dug too deeply, don't fill in soil to save concrete, use lean concrete or compacted gravel;
- If the excavation is finished, the foundation should be built as quickly as possible, especially during the rainy season (to prevent swelling of the ground due to rain water).

3. Concrete work

Concrete means a mixture of cement, water, fine and coarse aggregates (sand and gravel). The quality of concrete depends on the requirements being maintained for the aggregate. Additionally important are mixing, water cement ratio, transporting, placing and compacting as well as curing.

Aggregates:

Sand and gravel need to be clean. If there is too much sand or silt the surface of the aggregates is increased and the cement has to bind this larger surface together. Therefore, with too much sand or silt more cement is required or the strength of the concrete is reduced. Too much gravel causes spaces inside the concrete, the workability is reduced, and proper compacting is not possible. If possible use coarse grained sand and never the fine sieved sand used for masonry work. Remainders of coarse sand from sieved masonry sand can be added to the aggregates when mixed with coarse grained sand.

Too much sand: Enlarges the surface and therefore causes porosity, resulting in reduced compressive strength and density (not waterproof).

Too much gravel: Causes large spaces and therefore reduces the compressive strength and density (not waterproof).

Water-cement ratio: Only half of the water in the mixture is required for the chemical reaction. The rest will remain or evaporate gradually as the concrete hardens, leaving small holes. Not surprisingly holes weaken the concrete and so the more excess water there is in a mixture, the weaker will be the concrete.

The best results for strength and density are achieved by using a stiff plastic mixture with a water-cement ratio of 0.5 (1:2) or less.

Hand Mixing:

Hand mixing does not require much equipment, but a lot of man power. A batch to be hand mixed should not be larger than about 0.5 m³. Concrete should never be mixed on soil because of the proved danger of contamination by organic matters. A leveled platform has to be prepared to prevent water or fluid material from flowing out of the mixture. The following points must be kept in mind when hand mixed concrete is foreseen:

- Concrete should always be mixed on a level and clean platform, which is sprinkled with water before mixing starts. Suitable platforms are: Concrete slabs / rock / moulds / or iron sheets. It is recommended that for a large construction site perhaps a concrete slab should be made
- Spread the first layer (sand) and the second layer (stones) on the platform, and then spread the cement on top.
- Mix the material dry until there is a uniform appearance. Therefore, at least three times of mixing necessary.
- The material is then shoveled into a flat heap with a hollow in the centre into which about half the required water is poured.
- Then the final step of the mixing procedure starts by shoveling the material from the edges to the centre, emptying each full shovel and then turning it over again. Add water as necessary to obtain required consistency as the material is turned over again.

Setting time can start half an hour after pouring water into the mixture. Therefore, do not mix more than 0.5 m³ at once (10 wheelbarrows). If the concrete mixture is disturbed during setting time (if setting time has already started before the concrete is put in place and rammed or vibrated) it will cause loss of strength.

Machine Mixing:

There are a variety of mixing machines available. It is important to maintain these machines daily (including cleaning). Before the aggregates are put into the drum, the drum has to be sprinkled with water. The batch is to first mix dry, and after about 45 seconds the water should be poured in. The mixing procedure continues for about another 45 seconds. Mixing more than about 1 and a half minutes does not improve the quality of the concrete, but is a waste of energy.

Placing and casting:

Before any concrete is placed, the form work needs to be checked for cleanliness, strength, tightness and alignment. It is essential to keep the form work wet and sprinkle with water before the casting starts. If the form work is not sprinkled the boards will absorb a large amount of water. This will negatively influence the chemical reaction during setting and cause a rough surface and a reduction in strength. **The concrete should be placed in layers. Each layer must be compacted before the next one is put down.** The following layer should be put down before the setting of the previous one has started.

Compacting:

After concrete is placed it contains entrapped air in the form of voids. The object of compacting is to get rid of as much as possible of this entrapped air. Voids reduce strength, waterproofness, and proper binding to the reinforcement. Insufficient compacting is visible on the concrete surface by the presence of large numbers of air bubbles and rock pockets. Compacting can be done by hand or with a vibrator. The vibrator should be operated by skilled people. The needle of the vibrator should not be brought too close to the formwork or the reinforcement, to avoid vibration on the formwork or reinforcement. The vibration can cause holes and therefore weaken the structure. **Any reinforced concrete has to be vibrated with a vibrator.**

Curing:

Curing is necessary to provide sufficient moisture to enable the process of cement hydration. **Direct exposure of freshly placed concrete to sun and rain has to be avoided. Curing should be started at the very beginning of setting.** The longer the period of curing, the better the quality of concrete. Therefore the minimum period of curing should be at least 7 to

14 days, depending also on the weather influences. Methods of curing are sprinkling or flooding of water, covering with sand, or empty cement bags or plastic sheets.

Reinforcement:

There are two main categories of reinforcement by steel. The main reinforcement to take over the tension and the distribution reinforcement to spread the loads and to keep the main reinforcement in position during casting. The main reinforcement should always be at the site where tension occurs. It should not be closer than 3.0 cm to the shuttering or the top, to avoid corrosion of the reinforcement. Steel bars of plain surface (mild steel) need to be hooked at the ends to obtain better adhesion, and therefore create a greater strength for the structure. Hooking is not necessary for steel bars with ripped surface (Thor steel).

A proper bond between the steel rods and the concrete is the most important supposition for reinforced concrete. **The surface of the rod has to be clean and not to rusty. In order to provide a proper bond the rods have to be surrounded completely by the concrete. The reinforced concrete has to be vibrated with a vibrator.** Plain bars must have ends with hooks which should be anchored in the pressure zone. Deformed bars with ripped projections can have straight ends but then the anchorage has to be in the pressure zone of the structure. If rods have to be overlapped the following rules show the minimum overlap length:

rod with hook: 45 times diameter of the rod

straight: 65 times diameter of the rod can be extended by using plastic or metal sheets.

4. Brick walls

The rules required for construction in brick masonry work are:

- Lay out exactly the proposed structure by marking the external side of the walls on the foundation;
- Clean the foundation with a steel brush, wet it properly, if necessary rough it by chiselling;
- For testing purpose lay the first two courses without mortar to check that the correct bond is achieved;
- Burned bricks are soaked in water for 1minute before using them. This is important so that the water of the mortar is not soaked away by the bricks or blocks, which would reduce quality and strength. If the brick is not clean, it will reduce the strength of binding with the mortar, as well as producing cracks caused by swelling and shrinking;
- Check every brick for its brittleness (sound test) before using it for construction;
- Lay the corners exactly with mortar and stretch a line from one corner to the other. There after build the first course in between these marked lines;
- In order that all courses have the same height, use a baton (straight edge) marking all courses on it.

Bonding:

The building procedure for bricks or blocks is the same. Bricks and blocks must be bonded to give maximum strength and adequate distribution of loads over the wall. **Only buildings with bonded walls guarantee that the building is safe for the assigned purpose, and will not collapse during the construction.** The term bonding means the arrangements of bricks in which no vertical joint of one course is exactly over the one below. That means the brick is laid in such a way that it overlaps and breaks the joint below. The amount of lap is generally half of the length of a brick. The minimum lap is 1/4 of the length of a brick. Unbonded or insufficient bonding produces vertical joints with the accompanying risk of failure as shown below. Bonded walls provide stability and resistance to the side thrust, as seen in the figure above. The bond can be selected to give an attractive appearance to the wall face.

For horizontal joints (mortar bed) the thickness of 12mm is recommended for brick work to ensure:

- levelling of the mortar bed
- placing of bricks completely in mortar
- no uneven or incomplete support of the bricks due to stones in the mortar

If the horizontal joints are too thick (more then 12mm) it is a waste of expensive mortar (cement), as well as a weakening of the structure, because the joints are the weakest part of the masonry structure.

For vertical joints (buttering) a thickness of 10mm is recommended for brick work because of the reasons in the list mentioned above. The reduction of 2mm to the horizontal joints is possible because the contact area is much smaller at the side than at the bottom.

5. Topping on slabs

Topping is a cement mortar in a stiff consistency. It is applied mostly as a coat on floors, slabs, walls etc. to protect, give level, and cleanliness to the surface. **The best connection to concrete slabs is achieved if stiff topping is floated on concrete which has just started to set.** This is the so-called "wet into wet method" and should be used whenever possible. The application of topping on old concrete requires more work steps: chiseling and cleaning of surface, and watering and curing before and after topping. When additional cement paste is required, apply the cement paste immediately after screeding and floating the topping.

6. Timber

Timber categories:

Timber for building construction can be divided into two or more categories according to the mechanical strength. Often one distinguishes between hardwood and softwood. Hardwoods are generally slow-grown, aesthetically appealing with considerable natural resistance to biological attack, moisture, movement and distortion. **For roofing structures, pillars and wall boarding's, doors and windows allow the use of hardwood only.** Softwoods are mainly fast-grown species with low natural durability, however, with appropriate seasoning and preservative treatment, their physical properties and durability can be greatly improved. With the rising costs and diminishing supplies of primary timbers, the importance of using softwoods rapidly increasing.

High quality boards are used for heavily stressed structural members, e.g. purlins and in trusses. Low quality boards are used for temporary constructions such as castings, scaffoldings, wall plates etc.

Selection of timber:

For structural members which are under high stress, such as purlins and rafters and in trusses, the selection of timber is of great importance. **Timber with cracks, knots or with grains that are not longitudinal should not be used.** Such timber should only be used in situations with reduced stress, such as wall plates.

Cracks:

During harvesting and transport cracks may occur. **Such timber should be rejected.** Cracks may also occur due to shrinkage which is unavoidable. Such timber should be tolerated to a certain extent, but not used for heavily stressed parts of the structure. Hidden cracks are also possible but very difficult to detect. This risk is considered within the safety factor in the sizing calculations. **The strength of beams can be greatly reduced by knots,** especially when located in the area of the greatest bending moment and in situations with tensile stress. For example, a knot in the upper third of the beam height situated between the supporting points, reduces the strength of the beam by up to 35%. If the knot is situated at the lower side of the beam, the reduction is even up to 56%.

Seasoning:

Prior to the manufacturing of timber components the timber has to be properly seasoned. One reason is that during drying timber shrinks. The shrinkage varies according to the direction of the grain: radial shrinkage is about 8% from the green to the dry state; the tangential shrinkage is about 14 to 16%; in the longitudinal direction shrinkage can be neglected (0.1 to 0.2%). The use of unseasoned timber results in cracks and warping parts.

Stacking: Stacking timber is done in such that air can pass around every piece. **Protection from rain and avoidance of contact with the ground are essential.** The ground usually contains moisture that rises along any hygroscopic material such as timber that is in direct contact with it. It also harbors different kinds of insects such as termites that can quickly destroy timber. **Timber must therefore not come into contact with the ground.**

7. Erection of roof structure

Laying of trusses and bracing

Trusses should be assembled in a workshop or at the site on the ground. The ground must be perfectly even. The classroom floors are excellent for this purpose. To ensure accuracy and uniformity a template should be used. If the roof is not erected

immediately, trusses must be stored in a dry and shady place. The trusses are erected by first hanging them upside down across the span of the building. Then they are turned over and fixed with temporary bracing. Next the trusses are mounted on bearing pieces and brought into line and levelled with the help of strings and a spirit level or a theodolite. Where necessary they are wedged at the supporting points. They are then secured at the bottom with anchor rods and the permanent bracing.

8. Preservative treatment

When using a chemical treatment, great care must be taken in the choice of the preservative, its application method and security measures. No chemical preservative should be used without the full knowledge of its composition. Those containing DDT (dichlor-diphenyl-trichlorethane), PCP (pentachlorophenol), lindane (gamma-hexa-chloro-cyclohexane), arsenic, quicksilver, lead, fluorine and cadmium **should be avoided**. Research on non-poisonous preservatives is still underway and full clarity on the toxicity of the recommended and currently available chemicals has not yet been attained. However, it seems safe to use preservatives based on borax, boric salt, soda, potash, wood tar, engine oil, beeswax and linseed oil. Their resistance to biological agents is less than that of the poisonous chemicals mentioned above, but can be equally effective in conjunction with a good building design. There are several methods of applying chemical treatment to timber. Some examples are: Brushing, Pump-spraying, Immersing in a preservative solution. **Before applying any treatment of paint, timber has to be dry, free of dirt, mortar and dust. Building parts that are not accessible anymore after installation, have to be treated prior to fixing on all sides.**

Part3: Monitoring and Reporting Form

PROJECT:

DONOR:

Project Information

Project data		Milestones	Date planned	Date achieved
Province:		Contract signed.		
District:		Start of construction:		
Village:		Foundations completed:		
School Code:		Roof up:		
Type of school:	<input type="checkbox"/> 2 Clr. <input type="checkbox"/> 3 Clr. <input type="checkbox"/> 5 Clr	Walls completed:		
Stage:		Ceilings completed:		
Contractor's name:		Furniture delivered:		
Origin of contractor:		Sanitation completed:		
Contract number:		Completion expected:		
Costs:		Warranty settled:		

Compulsary Site Inspections by PUCDA and EDB

No	Inspected item	Date	DEB representative		PUCDA representative		Forwarded to ECDM by fax on:
			Name	Signature	Name	Signature	
1*	Masterplan signed / Contract signed						
2	Setting out checked / Construction started						
3	Reinforcement of ground beams checked						
4	Castings of pillars checked						
5*	Sample roof truss erected and approved						
6	Flooring works approved						
7	Wall woodwork checked (incl. treatment)						
8	Ceiling inspected (incl. termite treatment)						
9	Furniture checked and approved						
10*	Final inspection carried out						

* to be reported to ECDM by using this reporting sheet

Part4: Final Inspection Form

1 PROJECT INFORMATION

Project data		Representatives	
Province:		PES (PUCDA Engineer):	
District:		DEB (District Engineer):	
Village:		Village (Village Head):	
School Code:		Supervisor in-charge:	
Type of school:	<input type="checkbox"/> 2 Clr. <input type="checkbox"/> 3 Clr. <input type="checkbox"/> 5 Clr	Contractor/Community:	
Stage:		Costs:	US\$
Company's name (if any):		Contract number:	

2 INSPECTION AFTER COMPLETION

- | | | | |
|--------------------------|--|--------------------------|----------------------------------|
| <input type="checkbox"/> | of civil works (classroom construction and toilet) | <input type="checkbox"/> | no faults |
| | | <input type="checkbox"/> | minor faults (minutes required) |
| | | <input type="checkbox"/> | major faults (minutes required) |
| <input type="checkbox"/> | of furniture supply | <input type="checkbox"/> | no faults |
| | | <input type="checkbox"/> | minor faults (minutes required) |
| | | <input type="checkbox"/> | major faults (minutes required) |
| <input type="checkbox"/> | of water supply | <input type="checkbox"/> | no faults |
| | | <input type="checkbox"/> | minor faults (minutes required) |
| | | <input type="checkbox"/> | major faults (minutes required)§ |

ref. section 3.5 *Approval*, section 3.6 *Approval with minor faults*, section 3.7 *Refusal*, and Tender Documents Section II chapter 6.2 *General Conditions of Contract*

2.1 The final inspection was:

- carried out
 documented by the attached inspection minutes (compulsory in cases of minor and major faults)
 not carried out
 The functioning of the toilet and the water supply has been checked by putting it into operation

2.2 Acceptance:

- "The Works" or "The Goods" do not show any faults and are accepted
 "The Works" or "The Goods" are accepted, but require the removal of **minor faults**. These faults shall be corrected before:
 date: dd mm yy
 "The Works" or "The Goods" are not acceptable since they show **major faults**. The security of users is not ensured. A further inspection/meeting with representatives of the MoE is required.

2.3 Signatures for Final Inspection:

The representatives listed below verify that the final inspection was carried out according to the overleaf instructions and the "General Conditions of Contract"

Place: Date: dd mm yy.....
 PES (PUCDA Engineer): Construction Supervision Firm: (if any).....
 DEB (District Engineer): Contractor/ Community Representative:
 Village Head:

2.4 Signatures for Post Final Inspection:

Post Final Inspection after correction of minor faults as specified in the minutes of the Final Inspection was carried out. "The Works" or "The Goods" are now regarded as completed:

Place: Date: dd mm yy.....
 PES (PUCDA Engineer): Construction Supervision Firm:
 DEB (District Engineer): Contractor/Community Representative:
 Village Head:

3 ACCEPTANCE OF WORKS OR GOODS

- 3.1 Significance of acceptance:
With the acceptance the works are considered completed or the furniture is considered supplied. They are placed into the care of the owner. The warranty period starts.
- 3.2 Announcement of completion:
After completion of the works or the delivery of the furniture, the contractor is to submit a written request for the final inspection.
- 3.3 Final Inspection:
Following the request placed by the contractor, the final inspection has to be carried out. The final inspection team consists of official representatives of: PUCDA, DEB, Village Authorities, Site Supervision Firm and Contractor.
- 3.4 Final Inspection Protocol:
The results of the final inspection are laid down in a detailed protocol, signed by all members of the inspection team. This protocol should be submitted to the MoE together with the Final Inspection Form
- 3.5 Approval:
If the final inspection does not show faults, the works/furniture are regarded as accepted with the signing of the section 2.4 (Signatures for Final Inspection) by all inspection team members. The form shall be submitted to the MoE immediately after signing.
- 3.6 Approval with minor faults:
If the final inspection shows minor faults, the works/ furniture can be accepted provided the contractor agrees to correct the faults within one month. The minor faults shall be listed up in the minutes of the Final Inspection. After one month, the Final Inspection Team shall carry out a *Post Final Inspection*. If by then the faults are corrected, the works are regarded as accepted by signing the section 2.5 (Signatures for Post Final Inspection) The form shall be submitted to the MoE immediately after signing.

Examples of minor faults:

- a) incomplete anti-termite treatment
- b) surface of concrete slab flaking off
- c) doors and windows of insufficient quality
- d) items of furniture with cracks that necessitate replacement
- e) incorrect numbers of furniture items

3.7 Refusal

If the works/furniture show major faults, they cannot be accepted.

Major faults are faults that cannot be repaired. The works/goods need to be replaced. The security of users is not ensured.

Examples of major faults:

- a) the works are incomplete
- b) structural parts of the building such as foundation, columns, roof trusses, roof covering, etc. do not conform to drawings and/or specifications
- b) wrong materials are used, e.g. softwood instead of hardwood for walls and roof, etc.
- c) insufficient quality of walls and ceiling
- d) incorrect reinforcement of R.C.C. parts

3.8 Compulsory checks at Final Inspection

- a) **Water supply:** well functioning and executed according to plans
- b) **Toilets:** functioning, location at least min. 20m away from the school building, septic tank correctly placed, ventilation pipe installed, internal water tank installed.
- c) **Classroom construction:** (Quality of workmanship equivalent to the selected model schools)
Concrete and masonry work: Concrete slab done in one go. Columns and walls nicely plastered.
Roof structure and ceiling: Roof trusses from local hardwood, executed exactly according to plan. Anti-termite treatment applied in three coats. Brand and type of roofing material as specified in the Bill of Quantities and the Specifications. Loft inspection hatch in ceiling of teacher's room fitted.
Wood walling work: Executed according to plan. All wood selected from local hardwood. Number and size of supports OK. Working surface and battens for movable blackboards installed. Brand, type and application of Anti-termite treatment as specified in the Bill of quantities (three coats).
Doors and windows: Brand and type of hinges and locks as specified. Keys handed over to the head master.
Painting works: Brand and color of paints according to Bill of Quantities. Application of three coats verified.
- d) **Yard:** Surplus construction materials disposed and remaining topsoil distributed. Roof water drain around building done.

Annex 3: Excreta Disposal Without Water Carriage

Excreta Disposal Without Water Carriage¹

While disposal with water is desirable, it is not practical under many conditions. It is possible; however, to dispose of body wastes in such a manner that danger of carriage of disease from the excreta by surface washings, soil and water pollution, fowls, animals, and flies will be eliminated or minimized.

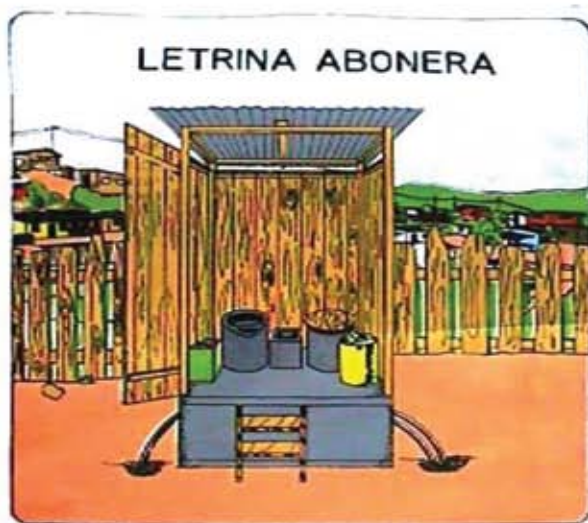
Pit Privy: The pit privy consists of a hole dug in the ground over which the toilet seat is placed and in which the excreta are deposited and dried out, provided the pit is above the ground-water level and that flooding, surface washings and rain are excluded. This type of disposal is not suitable for flood-prone areas.

The "improved" pit privy consists of concrete for slab and riser. A four inch vent is used from the riser to above the roof. Pit privies require little maintenance. The ventilation should keep the pit materials dry and small in bulk, consequently a pit should serve for 10 years or more, particularly if toilet paper is used, and no garbage or other refuse is thrown in. Water should be prevented from entering so far as possible, and mosquito breeding can be a problem. Screening the ventilator and keeping the seat cover down can discourage mosquito breeding. Disinfectants should not be used in the pit. Addition of ash or lime can help keep the contents dry.

Vault Toilet: Devised to prevent the possibility of pollution of soil and ground water, the vault toilet consists of a watertight concrete vault over which the seat and house are placed. There is a cleaning door on top of the vault. The vault is vented through the roof. The vault contents will become liquid rather than dry. As a rule the cleaning door and the seats are not well maintained, resulting in proliferation of flies that are potential disease vectors. The vaults must be periodically emptied, which can be a dangerous nuisance, especially if they overflow.

Composting Toilet: The composting toilet is a variation of the vault toilet, however, a separate provision must be made for urine disposal. Details from a World Bank project in water supply and sanitation are shown below.

¹ Extracted from the Environmental Management Plan. Education Sector Support Scale Up Action Program (ESSUAP). World Bank. Cambodia 2009.



- Features:** Raised level base with access steps
 Two chambers to alternate usage with composting
 Chambers must be maintained completely dry, so urine must be separated from feces in toilet bowl
 Users must add frequent layers of ash to dry feces
 When chamber is full, left to compost for > 6 months
- Conditions:** Must be used in flood-free areas
 Requires training for entire family
 Requires significant labor input (stirring contents, rotating chambers)
 Preferably for areas where there is a need for cheap compost
- Benefits:** Reduced odor and fly problems
 Free source of organic compost
 Long life if well-maintained
 Separated urine can be captured and used as insecticide
- Problems:** High maintenance required (to stir and mix ash frequently)
 Urine separation impractical/unacceptable (especially women)
 Inadequate composting can present serious health hazard
 Liquids can destroy the 'dry composting' process²

Septic Privy: There are variations of this concept, which are a bucket flushed toilet fixture connected to a septic tank via a 4 inch PVC pipe (a water carriage system discussed below), or the earlier version, which was a privy seat located directly above a septic tank. Only small amounts of water are required to maintain the older version of the septic toilet, since water is not used to carry the excreta to the septic tank.

In the older version, small amounts of water are added to aid the digestion process. The tank is constructed of concrete with a capacity of 26 cubic feet (200 gallons), for 5 people. For each additional person an extra 3 cubic feet of capacity is added. The tank overflows to a filter, such

² Source: Steve Maber, Water for Sanitation and Health Project, World Bank

as a leachfield (discussed below). A baffle is placed within the tank to prevent travel of waste directly from the place of deposit to the outlet. The digestion is anaerobic, so the tank should be vented through a stack so odorous gases can escape.

Maintenance of the older version is simple but absolutely necessary to ensure proper operation. When first constructed the tank should be filled with water. Two buckets of water should be added to the tank daily (5-person size), or serious clogging will result. Use of newspaper will also cause clogging, only toilet paper should be used. No disinfectants can be added to the tank, since they will kill the bacteria digesting the waste. Sludge must be bailed or pumped out after several years of operation. A heavy scum may form on the surface of the tank contents upon which feces may accumulate, with consequent production of odors. This scum layer must be thoroughly broken up. Flies must be excluded from the tank by tight covers, and mosquitoes may breed in the tank and must be controlled.

EXCRETA DISPOSAL WITHOUT WATER CARRIAGE

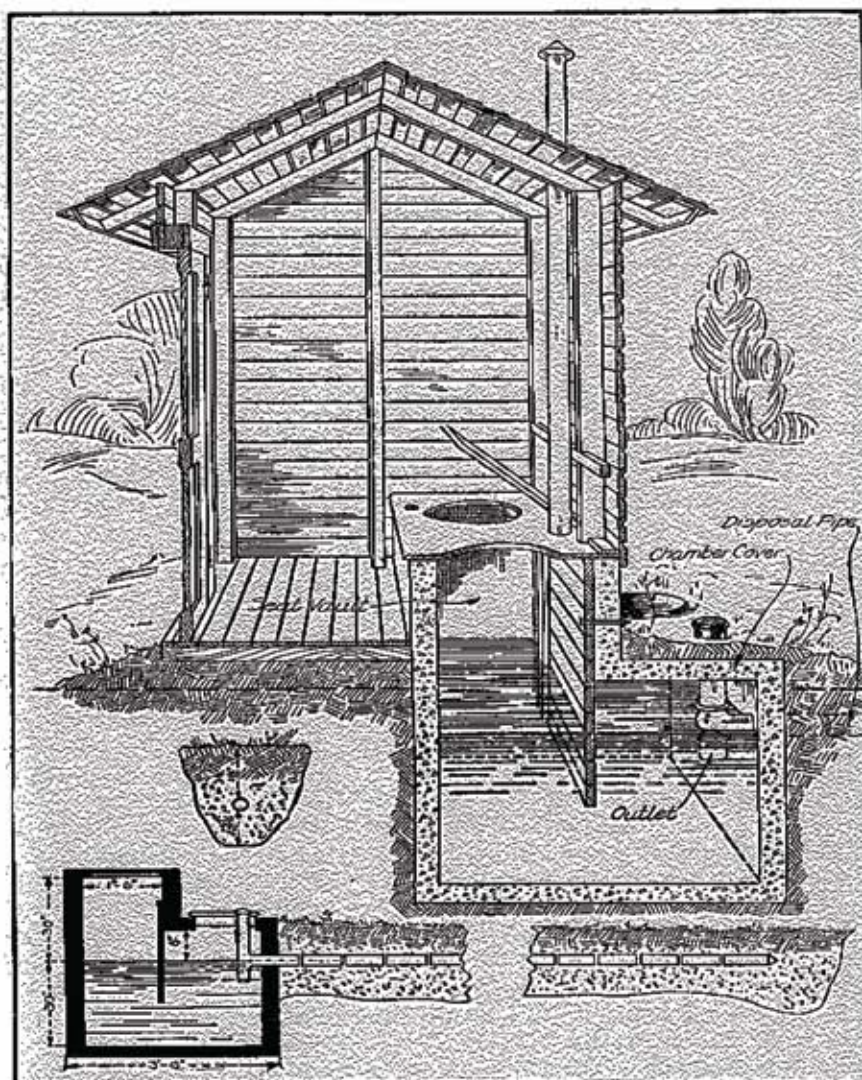


FIG. 13. -The septic privy. (Courtesy of Missouri State Board of Health.)

The Septic Privy: Note This System Does Not Use Water to Flush.

Annex 4: Flood and Wind data for Lao PDR

Maxi Wind Velocity in 24 Hours (m/s)
ff=Speed
dd=Direction

Station Name	Jan		Feb		Mar		Apr		May		Jun		July		Aug		Sept		Oct		Nov		Dec		
	dd	ff	dd	ff	dd	ff	dd	ff	dd	ff	dd	ff	dd	ff	dd	ff	dd	ff	dd	ff	dd	ff	dd	ff	
Vientiane Cap	E	10 W	35 SE	9 W	12 S	15 WSW	18 NE	15 W	17 N	13 W	12 W	28 SW	14 SW	20 SW	25 W	28 S	20 NW	30 NW	11 E	10 E	12 SE	9 SW	15 E	20 N	28
Phongsaly	S	10 S	9 W	19 SW	15 WSW	18 NE	15 W	17 N	13 W	12 W	28 SW	14 SW	20 SW	25 W	28 S	20 NW	30 NW	11 E	10 E	12 SE	9 SW	15 E	20 N	28	
Bokeo	SW	9 NW	19 SW	15 WSW	18 NE	15 W	17 N	13 W	12 W	28 SW	14 SW	20 SW	25 W	28 S	20 NW	30 NW	11 E	10 E	12 SE	9 SW	15 E	20 N	28		
Luangnamtha	SE	22 SW	16 S	17 N	15 W	18 S	15 W	17 N	13 W	12 W	28 SW	14 SW	20 SW	25 W	28 S	20 NW	30 NW	11 E	10 E	12 SE	9 SW	15 E	20 N	28	
Oudomxai	NE	6 W	13 W	12 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13 W	13
Luangprabang	W	15 SW	30 E	28 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	29 SW	15
Xamneua	E	12 E	12 W	14 SW	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	15 E	8
Xayabouly	NE	8 W	20 NW	20 SW	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	28 S	10
Xiengkhouang	SW	20 NW	25 W	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	20 N	18
Phonhong	S	8 W	9 S	17 SE	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	25 S	6
Paksane	N	6 NE	6 N	5 NE	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	8 E	7
Thakhek	E	10 E	14 W	16 S	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	16 W	14
Savannakhet	NE	18 NW	18 S	20 NNE	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	27 N	24
Saravane	E	17 N	36 S	15 NE	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	35 W	13
Pakse	NE	18 N	18 SE	25 SW	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	25 W	21
Sekong	N	13 N	15 NE	15 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	10 W	16
Attapeu	NE	10 NNE	12 E	10 NNE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	12 SSE	25

Remark: N = North
E = East
S = South
W = West
NE = Northeast
SE = Southeast
SW = Southwest
NW = Northwest
ENE = East-North-East
ESE = East-South-East
WSW = West-South-West
WNW = West-North-West
NNE = North-North-East
SSE = South-South-East
SSW = South-South-West
NNW = North-North-West

Annex 5: Management Forms and Procedures

Step 4: Complete Land Acquisition Report

Lao People's Democratic Republic Ministry of Education

Second Education Development Project (EDPII)

World Bank Project IDA Credit Number: 3886-LA, Grant Number: H0840-LA

Declaration form for Land Acquisition

Province:

District:

Village:

I. Land acquisition:

1. Site for new school building:

The old site of school

The new site

◆ Land belong to the village:

for housing construction

for agriculture production

free forest land

◆ Land belong to private:

For housing construction, market cost amount:Kip

for agriculture production, market cost amount:Kip

free forest land , market cost amount:Kip

(For Privately owned land, the owners must be entitled to compensation before the construction of school building. For land used for agriculture production, the users must be given new land to cultivate.)

I. Land for School Construction:

◆ Description of School Construction Area:

- Location of School Construction Site in relation to Village

.....

- Shape of School Construction Site

with surface of: m²

- Owners of Land bordering School Compound

- Eastern

- Western

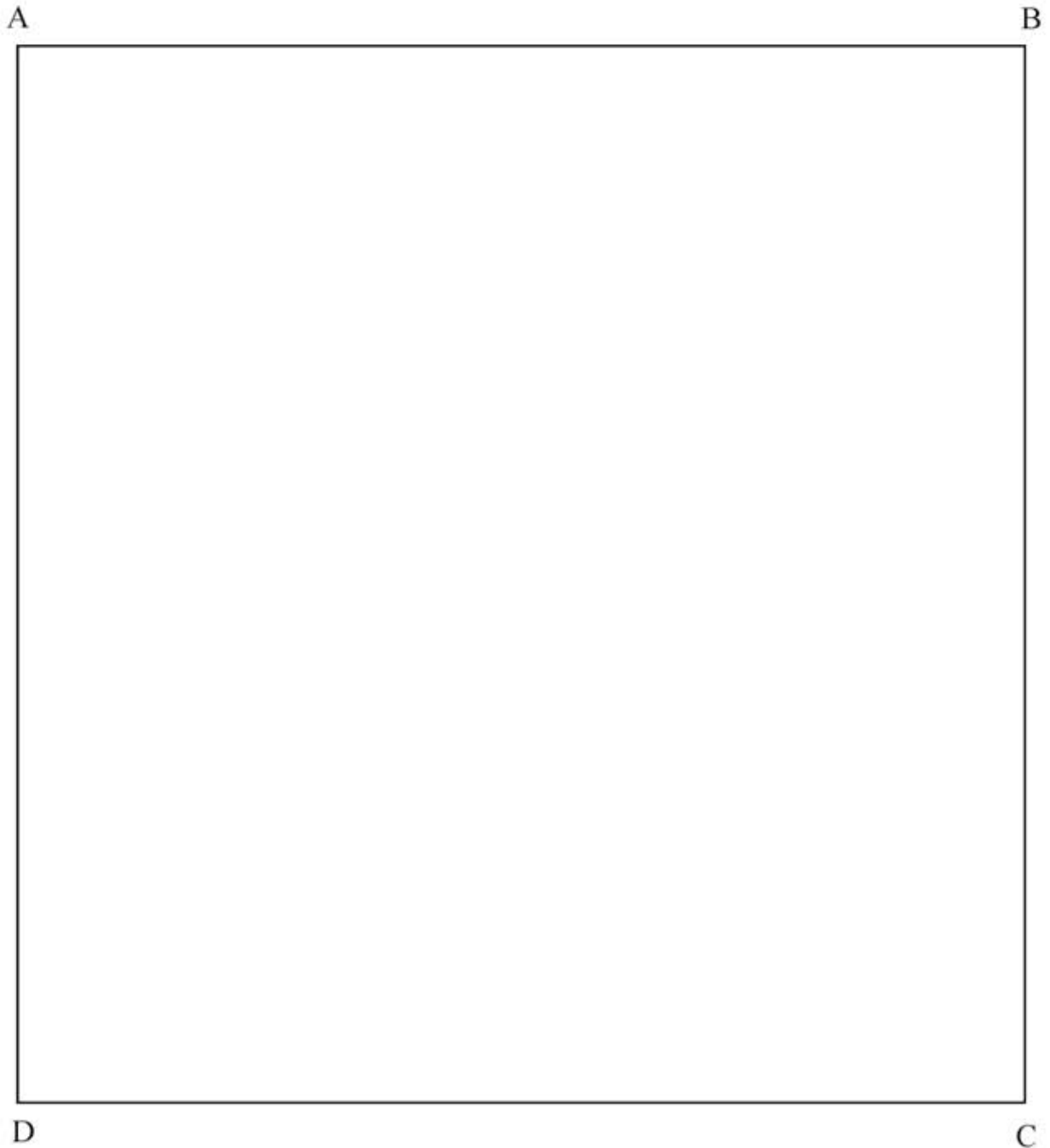
- Northern

◆ - Southern.....Distance from village to school m

◆ Existing way from village to school

Land Acquisition Plan for School Construction:

- Distance AB =m, BC =m, BC =m, BC =m



Signed and stamp of chief
of District Education Bureau

Signed and stamp of chief
of village.....

Lao People's Democratic Republic
Ministry of Education

Second Education Development Project (EDPII)

World Bank Project IDA Credit Number: 3886-LA, Grant Number: H0840-LA

Province:

District:

No.

.....

Village:

Date

.....

Request form

To: Director of District Education
Bureau.....

Subject: to construction of school in the village
of Second Education Development Project (EDP II)

- According to the necessary need for the children to close primary school in the village
- According to the school construction of EDP II,

Chief of village has request to the Director of District Education Bureau for approval of school construction size 6x8 m amount: **two class rooms/ three class rooms/ four class rooms** to replacement of old school building, that temporarily school building, that constructed by Villagers

So that, I would like inform you to considerate our request to Provincial Construction Committee with the kind.

Request with other document:

- | | |
|---|------------------------------|
| 1. Data of people of village village | Signed and stamp of chief of |
| 2. Number of school-age from 6-12 years old and Children form 0 - 5 years old | Village |
| 3. Site for school construction | |
| 4. Land acquisition | |

Data form
Of target villages of EDP II

Date: _____
Name of Enumerator: _____

Name of village: _____ District: _____ Province: _____

A. Village Data

- i) How long has the village been established in its present location? < 1 year , 1-2 years , 2-3 years , >3 years .
- ii) Is there another village a maximum of 30 minutes or 1.5 km from the village? Yes , No
- iii) If yes, please give the name of the village: _____
- iv) Where is the village located?
(Remoteness is on a scale of 1-5, with 1 being the least remote, and 5 being the most remote. Please circle below)
On the road/ accessible by car all year = 1 ; On the road/ accessible by car only in the dry season = 2;
Off the road/ accessible by boat all year = 3 ; Off the road/ accessible by boat in the rainy season only = 4;
Off the road/ accessible by walking only all year = 5;

1 ● 2 ● 3 ● 4 ● 5 ●

v) Village statistics

Ethnicity of Village	Number of Houses	Number of Families	Number of People in the village		Number of Children aged 0-5 years		Number of Children aged 6-12 years		Number of Children aged 13-14 years	
			Total	Female	Total	Female	Total	Female	Total	Female

B. School Data

- i) Does the village have a school? Yes , No .
 - ii) If yes, how long has the school been established? < 1 year , 1-2 years , 2-3 years , > 3 years .
 - iii) If yes, was the school built with support from an outside agency (donor or NGO)? Yes No
 - iv) If no, how far away is the nearest school? 20 min walk , >20 min walk , 1 km , >1 km .
- The next questions apply to either the village school or the nearest school.
- v) How many classrooms does the school have? _____ vi) Does the school have suitable furniture? Yes , No
 - vii) Does the school have a usable latrine? Yes , No viii) Is the school bright enough? Yes , No
 - ix) Does the school have storage room? Yes , No x) Is the school properly insulated for the cold? Yes No

xi) Condition of the school building (Please check the appropriate box)

Floor materials	Room 1	Room 2	Room 3	Wall Materials	Room 1	Room 2	Room 3	Roof Materials	Room 1	Room 2	Room 3
Dirt				Bamboo				Grass/ Thatch			
Bamboo				Round wood				Bamboo			
Wood				Timber board				Wood			
Cement				Cement/ Brick				Galvanized metal			

C. Student Data

i) Students enrolled

Ethnicity of Student	Number of Children Enrolled 6-12 years		Number of Children Enrolled 13-14 years	
	Total	Female	Total	Female

Chief of Village: _____

Director of the District Education Bureau: _____

At: _____

BID FORM (main page)

Company Name and Address:

.....
.....
.....

Telephone:.....
Fax:
E-mail.....

Authorised Representative:

.....
.....
.....

Telephone:.....
Fax:
E-mail.....

The undersigned, having studied the Bidding Documents and the requirements of the specified services we hereby offer to provide the construction services, including supply of the specified construction materials, to UNICEF as per the following details:

Civil work Package No.:

1. Name of the School: District:..... Province:.....
2. Name of the School: District:..... Province:.....
3. Name of the School: District:..... Province:.....
4. Name of the School: District:..... Province:.....

Offered Price in Lao Kips

In figures:
.....

In words:
.....

This offer of Bid Price is valid in combination with the attached **Detail Estimate and the Unit Rates** for 60 days from the date of Bid Opening.

Remarks / Discounts / Concessions

.....
.....
.....



Signature of authorised Representative of the Company:
Date

Please attach copy of:

- 1. Valid business registration certificate, as applicable
- 2. Valid trade registration certificate, as applicable
- 3. Current tax registration / clearance certificate

BID FORM (Detail Estimate and Unit Rates)

Detail breakdown and the Unit Rates:

The following is presented tentative estimates of the quantities for major items of works for one unit of school building and Toilet-water unit. This bill of quantity is for reference only. The bidder may come up with different bill of quantity. The bidder may come across additional items of works or some of the listed ones may appear to be irrelevant. For making their estimates of the bid offer the bidder may use the items listed below and in addition the ones they like to add with their unit rates. The Contractors shall fill in its unit rates for the items to be undertaken in accordance with the Technical Specifications and Design Drawings. (This form may be reproduced for using it in case of more than one unit of school)

Bill of quantities					
Item	Description	Unit	Quantity	Unit price	Amount
Stage - I					
1	Earth Works (School Building)				
1.1	Excavation for foundation (footing)	m3	33.36		
1.2	Excavation ditch for brick masonry wall 20cm thickness	m3	7.36		
1.3	Back filling for footing with suitable material (laterite) or mixed materials which included of sand, clay and aggregate, in layers not more than 20cm thickness including compacting and watering	m3	41		
1.4	Back filling for floor embankment with suitable material (laterite) or mixed materials which included of sand, clay and aggregate, in layers not more than 20cm thickness Including compacting and watering	m3	248		
1.5	Sand filling for floor embankment 10cm thickness Including compacting and watering to make smooth surface before concrete placing	m3	42		
1.6	Earth works (Toilet-Water Unit)				
1.6.1	Excavation for footing and ditch for brick wall 20cm thickness	m3	12		
1.6.2	Back filling for footing and floor embankment with suitable material	m3	11.9		
1.6.3	Excavation for septic tank	m3	9.6		
2	Concrete Works (School Building)				
2.1	Lean concrete 5cm thickness for footing, class 150kg/m3 using Lao Cement P-525 with mix proportion of 1 part Cement, 3 parts Sand and 5 parts Aggregate	m3	1.51		
2.2	Lean concrete 5cm thickness under brick masonry wall 20cm thick. class 150kg/m3 using Lao Cement P-525 with mix proportion 1 part cement, 3 parts Sand and 5 parts Aggregate	m3	1.84		
2.3	RCC concrete for footing, class 350kg/m3 using Lao Cement P-525 with mix proportion 1 part Cement, 2 parts Sand and 3 parts Aggregate, including VSI steel approved by Engineer	m3	4.4		
2.4	RCC concrete for tie beam, class 350kg/m3 using Lao Cement P-525 with mix proportion 1 part Cement, 2 parts Sand and 3 parts Aggregate, including VSI steel approved by Engineer	m3	6.9		
2.5	Plain concrete for slab 8cm thickness, class 350kg/m3 using Lao Cement P-525 with mix proportion 1 part Cement, 2 parts Sand and 3 parts Aggregate	m3	28.5		
2.6	Plain concrete for footpath and stair 5cm, class 350kg/m3 using Lao Cement P-525 with mix proportion 1 part Cement, 2 parts Sand and 3 parts Aggregate	m3	4.58		

2.7	RCC concrete for column, class 350kg/m ³ using Lao Cement P-525 with mix proportion 1 part Cement, 2 parts Sand and 3 parts Aggregate, including VSI steel approved by Engineer	m ³	6.73		
2.8	RCC concrete for roof beam, class 350kg/m ³ using Lao Cement P-525 with mix proportion 1 part Cement, 2 parts Sand and 3 parts Aggregate, including VSI steel approved by Engineer	m ³	9.925		
2.9	RCC concrete for Ridge beam and its support, class 350kg/m ³ using Lao Cement P-525 with mix proportion 1 part Cement, 2 parts Sand and 3 parts Aggregate, including VSI steel approved by Engineer	m ³	10.77		
2.10	RCC concrete lintel beam at top of handrail 10x15cm, class 350 kg/m ³ using Lao Cement P-525 with mix proportion 1 part Cement, 2 parts Sand and 3 parts Aggregate, including VSI steel dia.6mm & dia.10mm, approved by Engineer	m ³	0.55		
2.11	Concrete works (Toilet-Water Unit)				
2.11.1	Lean concrete 5cm thickness for footing, Septic and for brick wall 20cm thk, class 150kg/m ³	m ³	0.46		
2.11.2	RCC concrete for footing, class 350kg/m ³	m ³	0.6		
2.11.3	RCC concrete for tie beam, class 350kg/m ³	m ³	1		
2.11.4	Plain concrete for slab 8cm thickness, class 350kg/m ³	m ³	1.2		
2.11.5	Plain concrete for footpath 5cm thickness, class 350kg/m ³	m ³	0.9		
2.11.6	RCC concrete for column, class 350kg/m ³	m ³	0.4		
2.11.7	Plain concrete slab 12cm thickness for septic tank, class 350kg/m ³	m ³	1		
2.11.8	RCC concrete slab on top of septic tank 8cm thickness, class 350kg/m ³	m ³	0.64		
2.11.9	Construction RC water tank 1.5x0.6m as shown on the drawing including drainage system and all accessories (piping, tap, valve...)	Ls	1		
Stage-II					
3	Masonry and Plastering Works (School Building)				
3.1	Brick masonry wall 20cm thickness under ground beam, laying with mortar approximately 1cm thk. Using Lao Cement P-425 with mix proportion 1 part Cement and 3 parts Sand	m ²	138		
3.2	Brick masonry wall 20cm thickness for stair & ram, laying with mortar approximately 1cm thickness Using Lao Cement P-425 with mix proportion 1 part Cement and 3 parts Sand	m ²	9		
3.3	Brick masonry wall 10cm thickness and plastering 1.2cm both side including for beam. For partition wall and handrail along the corridor laying with mortar approximately 1cm thickness (including lintel and stud where it is deemed necessary). Using Lao Cement P-425 with mix proportion 1 part Cement and 3 parts Sand	m ^l	530		
3.4	Installation ventilation block 20x40cm including plastering, laying with mortar approximately 1cm thickness using Lao Cement P-425 with mix proportion 1 part Cement and 3 parts Sand	m ²	19.2		
3.5	Masonry and Plastering Works (Toilet-Water Unit)				
3.5.1	Brick masonry wall 20cm thk. under ground beam	m ²	6.7		
3.5.2	Brick masonry wall 10cm thk and plastering 1.2cm thickness for both side. For rooms partition	m ²	77.5		
3.5.3	Brick wall 20cm thickness for septic tank and plastering 1.2cm thickness for both side	m ²	16		
3.5.4	Brick wall 10cm thickness for septic tank and plastering 1.2cm thickness for both side	m ²	6.6		
3.5.5	Installation ventilation block 20x40cm including plastering	m ²	8.64		
4	Installation Works (School Building)				
4.1	Supply and installation Door "D1: 2.1x1m" frame & panel Mai Khen or Mai Phao including safety lock, hinges, latches and handles as specified on drawings or approved by Engineer	set	14		

4.2	Supply and installation window "W1: 1.2x1.75m" frame & panel including safety lock, hinges, latches, handles and hooks as specified on drawings or approved by Engineer	set	15		
4.3	Supply and installation window "W2: 1.2x0.9m" frame & panel including safety lock, hinges, latches, handles and hooks as specified on drawings or approved by Engineer	set	11		
4.4	Installation works (Toilet-Water Unit)				
4.4.1	Supply and installation Door "D2: 1.8x0.7m" frame & panel Mai Khen or Mai Phao including safety lock, hinges, latches and handles as specified on drawings or approved by Engineer	set	4		
4.4.2	Supply and installation Water Closed, American standard brand including PVC air vent pipe, waste drain pipe, etc. as necessary or approved by Engineer	set	4		
4.4.3	Supply and install water supply including all accessories (pipe, tap, valve...) manufactured from Thailand for toilet room and washing area.	set	10		
4.4.4	Supply and install floor drain including all accessories (pipe, tap, valve...) manufactured from Thailand as shown on drawings	set	2		
Stage-III					
5	Roofing Structure and Ceiling (School Building)				
5.1	Supply and install wooden roof frame with medium wood Mai Khen or Mai Phao, Rafter 5x10cm, Purlin 4x8cm and applied with termite protection chemical	m2	602.4		
5.2	Supply and install corrugate galvanize roof sheet VXP Zincalume 0.35 mm thk., including ridge capping flashing and roof drain	m2	602.4		
5.3	Supply and installation of Eave board 2x(15+20)cm Medium wood Mai Khen or Mai Phao, and shall be plained before installation	ml	125		
5.4	Supply and install plankwood ceiling 1.5x10cm Mai Sack dried and shall be plained before installation, including frame 4x8cm Mai Khen or Mai Phao with termite protection paint as shown on drawing or approved by engineer.	m2	443		
5.5	Roofing Structure and Ceiling (Toilet-Water Unit)				
5.5.1	Supply and install wooden roof frame Mai Khen or Mai Phao Tie beam 5x10cm, Rafter 5x10cm, Purlin 4x8cm and applied with termite protection chemical	m2	31.5		
5.5.2	Supply and install corrugate galvanize roof sheet VXP Zincalume 0.35 mm thickness, including ridge capping flashing	m2	31.5		
5.5.3	Supply and installation of Eave board 2x(15+20)cm Medium wood Mai Khen or Mai Phao, and shall be plained before installation	ml	24		
5.5.4	Supply and install plankwood ceiling 1.5x10cm Mai Sack dried and shall be plained before installation, including frame 4x8cm Mai Khen or Mai Phao as shown on drawing or approved by engineer.	m2	23.23		
5.5.5	Supply and install plywood 4mm thickness ceiling inside including wood frame 4x8cm	m2	18.72		
6	Painting Works (School Building)				
6.1	Painting wall inside building with Matt paint U-90 for interior or equivalent, 3 coats	m2	540		
6.2	Painting wall and handrail outside building with Matt paint U-90 for exterior or equivalent, 3 coats	m2	460		
6.3	Painting column outside with Matt paint U-90 for exterior or equivalent, 3 coats	nos	10		
6.4	Painting ceiling inside & outside building with Gloss paint U-90 or equivalent, 3 coats	m2	443		
6.5	Painting eave board with Gloss paint U-90 or equivalent, 3 coats	ml	125		
6.6	Painting foot wall outside and inside building for 20cm high with Gloss paint U-90 for exterior or equivalent, 3 coats	m2	92		
6.7	Painting door frame & panel "D1" with Gloss paint U-90 or equivalent, 3 coats	set	14		
6.8	Painting door frame & panel "W1" with Gloss paint U-90 or equivalent, 3 coats	set	15		
6.9	Painting door frame & panel "W2" with Gloss paint U-90 or equivalent, 3 coats	set	11		
6.11	Painting Works (Toilet-Water Unit)				
6.11.1	Painting wall inside building with Matt paint U-90 for interior or equivalent, 3 coats	m2	111.6		

6.11.2	Painting wall outside building with Matt paint U-90 for exterior or equivalent, 3 coats	m2	49.2		
6.11.3	Painting ceiling inside building with Matt paint U-90, 3 coats	m2	18.72		
6.11.4	Painting ceiling outside building with Gloss paint U-90, 3 coats	m2	23.23		
6.11.5	Painting eave board with Gloss paint U-90 or equivalent, 3 coats	m1	26.8		
6.11.6	Painting foot wall outside building with Gloss paint U-90 for exterior or equivalent, 3 coats for 80cm high	m2	39.36		
6.11.7	Painting door frame & panel "D1: 1.8x0.7m" with Gloss paint U-90 or equivalent, 3 coats	set	4		
Other likely items					
7.1	Rock excavation (hard)	m3			
7.2	Rock excavation (soft)	m3			
8	Electrical work				
8.1	Supply double fluorescence lighting 2x40W with all accessories (electrical wire, switch, capping....) Philip brand as shown on drawing or approved by engineer	set	60		
8.2	Supply single fluorescence lighting 1x40W with all accessories (electrical wire, switch, capping....) Philip brand as shown on drawing or approved by engineer	set	8		
8.3	Supply single fluorescence lighting 1x20W with all accessories (electrical wire, switch, capping....) Philip brand as shown on drawing or approved by engineer	set	9		
8.4	Supply socket with 3 plugs with all accessories (electrical wire, PVC board, capping....) Philip brand as shown on drawing or approved by engineer	set	8		
9.1	Brick Soling: On a graded and compacted soil surface add a 2-3 cm thick layer of sand. Lay bricks packed together over this sand layer to result into a uniform plain surface. Brick soling may be used for placing concrete footing or for concreting a floor. This may be used in place of plain concrete or to reduce the magnitude of concrete.	m2			

Total=

CONDITIONS OF CONTRACT

**(Sample provided by UNICEF)
Contract Agreement
with
Civil works Contractors
for
Construction of BFC School Buildings**

(Sample) Contract for BFC School Construction

THIS CONTRACT FOR construction ofxxxx (nos)..... school buildings inxxxxxx (districts of) xxxxx (provinces)..... as specified herein (together with the annexes hereto, this "Agreement") is made onxxxxxx [date].....

BETWEEN: UNICEF, THE UNITED NATIONS CHILDREN'S FUND ("UNICEF"), an international inter-governmental organisation established by the General Assembly of the United Nations by resolution No. 57(1) of 11 December 1946 as a subsidiary organ of the United Nations, having its headquarters at UNICEF House, Three United Nations Plaza, New York, New York, 10017, U.S.A. and having an office at

UNICEF
KM3 Thadeua Road, Watnak Quarter
P. O. Box 1080, Vientiane, Lao PDR
Telephone: 315200-04; Fax: 314852;

AND: Xxxxx [name of contractor]....., a corporation organised and existing under the laws of Lao PDR and having its principal offices atxxxxxx [address].... (the "Contractor");

UNICEF and the Contractor are hereinafter collectively referred to as the "Parties".

WHEREAS:

- A. UNICEF, in accordance with its Charter and Mission Statement, works with governments, civil society organisations and other partners in more than one hundred and sixty countries to advance children's rights to survival, protection, development and participation, and in doing so is guided by the Convention on the Rights of the Child.
- B. The Government of Lao PDR has adopted Education for All (EFA) policy objectives in promoting education in the country.
- C. UNICEF Vientiane office intends, in support of the EFA policy objectives of the Lao PDR, by providing financial and technical assistance, to implement 100 primary school development packages in Luang Prabang and Xieng Khouang provinces between 2006/07 to 2008/09 period.
- D. By Invitation to Bid, a copy of which is attached as ANNEX – III UNICEF invited bids for the provision of civil works construction services for constructing in full, including supply of construction materials, ...xxx (number) of School Buildings and xxxx (number) of Toilet-Water Units.
- E. The Contractor by responding to the Invitation to Bid represents that it is qualified, capable and willing to provide the sought construction services in its totality.
- F. UNICEF wishes to engage the Contractor to undertake the work, all on the terms and conditions set forth in this Contract ; and the Contractor represents that it is qualified, ready, able and willing to carry out the work on the same terms and conditions;

NOW, THEREFORE, the Parties hereto mutually agree as follows:

1. CONTRACT DOCUMENTS

1.1 This document and all annexes hereto, together with the following named documents, which are incorporated herein by reference, constitute the entire Contract (herein referred to as the "Contract" or this "Contract") between UNICEF and the Contractor:

- (a) Annex I – **Scope of the civil works**
- (b) Annex II – **Design Drawings, Bill of Quantity and Technical Specifications**
- (c) Annex III – **The Invitation to Bid (letter inviting the bid)**

(d) Annex IV – The, duly filled and authenticated by signing and stamping by the Contractor, **Bid Form**.

- 1.2 The Contract documents are to be taken as complementary of one another, but in case of ambiguities, discrepancies or inconsistencies among them, the Contract shall be interpreted on the basis of the following order of priority:
- (a) this document;
 - (b) Annexes I and II;
 - (c) Annex IV; and
 - (d) Annex III.
- 1.3 The Contract represents the entire and integrated agreement of the Parties with regard to the subject matter hereof and supersedes all prior agreements, negotiations and representations, either written or oral.

2. DEFINITIONS

- 2.1 In this Agreement, the following terms shall have the following meaning:
- 2.1.1 **Defects.** Any part of the Works that is not completed in accordance with this Agreement.
 - 2.1.2 **Drawings.** Drawings of the Works, as included in this Agreement, and any additional and modified drawings issued by (or on behalf of) UNICEF in accordance with this Agreement.
 - 2.1.3 **Equipment.** The Contractor's apparatus, machinery and vehicles for use in the execution of the Works.
 - 2.1.4 **Laws.** All national legislation, statutes, ordinances and other laws and regulations of any legally constituted public authority.
 - 2.1.5 **Materials.** Things of all kinds intended to form or forming part of the Works, including the supply-only materials.
 - 2.1.6 **Site or Sites.** The place or places where the Works are to be executed and any other place defined as such in the Drawings and Contract Documents.
 - 2.1.7 **Specifications.** The Technical Specifications of the Works included in this Agreement and any modifications or additions approved and communicated to concerned party by UNICEF.
 - 2.1.8 **Suppliers.** Persons or entities that entered into an agreement directly with the Contractor to supply materials and equipment fabricated specifically for the Works.
 - 2.1.9 **Works.** Permanent and/or temporary Works required by the Contract Documents as set forth in this Agreement.

3. GENERAL OBLIGATIONS OF THE CONTRACTOR

- 3.1 The Contractor shall, with due care and diligence, execute and maintain the Works and provide all labour, materials, equipment, transportation and other facilities necessary to substantially complete the Works by the Substantial Completion Date, and in accordance with the Contract Documents and the standards defined by this Agreement.
- 3.2 The Contractor shall take full responsibility for the adequacy, stability and safety of all Site operations and methods of construction and for security of the Site itself, including the security of all Materials stored or being used on the Site.
- 3.3 All materials used in the course of these Works shall be new and proper for their use. No reusable materials coming from the Site shall be used unless permitted by UNICEF. Other materials shall be stored on Site until the end of the Works. All materials, equipment and products shall be installed in accordance with the written recommendations of the manufacturer.
- 3.4 The Contractor shall not permit any labourer's, materialperson's, mechanic's or other similar lien (hereinafter, referred collectively, as "Lien") to be filed or otherwise imposed on any

part of the Works, or the premises of UNICEF. If any Lien is filed or otherwise imposed, and if the Contractor does not cause such Lien to be released and discharged forthwith, or file a bond in lieu thereof, UNICEF shall have the right, but not the obligation, to pay all sums necessary to obtain such release and discharge, and to deduct all amounts so paid from moneys otherwise due the Contractor.

- 3.5 When required, the Contractor shall cooperate and share the Site with other contractors and public authorities.

4. GENERAL RIGHTS AND OBLIGATIONS OF UNICEF

- 4.1 The Contractor must allow unlimited access to the **designated representative**, or to her/his **authorised representatives**, to supervise the Works. The Designated Representative is entitled to review the type, quantity and quality of materials and workmanship used in the Works and to render necessary instruction to the Contractor and its personnel in the site for ensuring compliance with the Contract Documents and the standards defined by this Agreement.
- 4.2 UNICEF will issue all certificates upon satisfaction of conditions necessary for the issuance of such certificates, supply all necessary information and written and/or verbal instructions, as appropriate, for the Contractor to carry out the Works properly.
- 4.3 To the extent it is able, UNICEF shall give to the Contractor right of access to, and possession of, the Site within such times as is required to enable the Contractor to proceed in accordance with this Agreement.
- 4.4 UNICEF shall have the right to review samples of construction materials and fixtures to be incorporated in the Works. The Contractor shall submit such samples, and relevant information, in sufficient time for UNICEF to complete review of samples. Each sample shall be labelled as to origin and intended use in the Works.
- 4.5 UNICEF shall have the right to issue, and the Contractor shall comply with, additional instructions. Such additional instructions shall complement and/or clarify the Contract Documents and shall have no effect on the definition of the Works, the Prices and/or the Substantial Completion Dates. Such instructions may take the form of technical specifications, drawings, samples, models or instructions. All such instructions shall be in written or in verbal form as appropriate and practical.
- 4.6 For the purpose of construction supervision and related functions within the scope of this Agreement, UNICEF designates one of its officials, to be notified in writing to the contractors, to undertake regular activities as authorised representative. The designated official may be assisted by other officials as deemed necessary.
- 4.7 UNICEF or its designated representative, if consider necessary, may share the rights and obligations as outlined in Article 4.2, 4.3, 4.4 and 4.5 with concerned Provincial Education Services Office, the government line agency collaborating for implementation of the project.

5. SCOPE OF WORK

- 5.1 The Contractor shall complete the following Works:
- 5.1.1 Full construction, starting from site clearance to final finishing of
- i)xxx (name) of School Buildings and Toilet-Water Units inxxx (district) of ...xxx (province) of Lao PDR as described in detail in Annex I and II.
 - ii)xxx (name) of School Buildings and Toilet-Water Units inxxx (district) of ...xxx (province) of Lao PDR as described in detail in Annex I and II.
 - iii)xxx (name) of School Buildings and Toilet-Water Units inxxx (district) of ...xxx (province) of Lao PDR as described in detail in Annex I and II.

iv)xxx (name) of School Buildings and Toilet-Water Units inxxx (district) of ...xxx (province) of Lao PDR as described in detail in Annex I and II.

5.2 The Contractor shall comply with the norms and technical standards applicable to the construction of buildings as defined by the Government of Lao PDR or its appropriate line agencies.

6. SCHEDULE FOR COMPLETION OF WORKS

6.1 The Contractor shall commence and complete the Works in accordance with the following schedule:

Sr. No.	Site: Name and No.	Commencement of the construction after mobilisation of the crew, equipments and construction materials to the site	Stage I: Sub-ground level works including foundation, plinth level tie beam casting, and casting of RCC columns	Stage II: Brick masonry work, placing of doors and windows frames, casting of all the beams and roof construction, concreting the floor	Stage III: Construction of ceiling, floor finish, fitting of doors and windows, plastering, whitewash and painting and clearing the site of surplus materials and any equipment.
1	I	First week November, 2007	Second week December 2007 (5 Weeks)	End of January 2008 (6 weeks)	March first week 2008 (5 weeks)
2	II	First week November, 2007	Second week December 2007 (5 Weeks)	End of January 2008 (6 weeks)	March first week 2008 (5 weeks)
3	III	First week November, 2007	Second week December 2007 (5 Weeks)	End of January 2008 (6 weeks)	March first week 2008 (5 weeks)
4	IV	First week November, 2007	Second week December 2007 (5 Weeks)	End of January 2008 (6 weeks)	March first week 2008 (5 weeks)

6.2 A building diary shall be kept at the Site and maintained daily by the Contractor. This diary shall describe all works started and completed each day and shall be checked periodically by UNICEF.

7. SUBSTANTIAL AND FINAL COMPLETION

7.1 The Works will be deemed **substantially completed** when they are completed the Stage III as per Article 6.1 and in accordance with the Contract Documents and the standards defined by this Agreement or when they are effectively used for the purpose for which they are intended.

7.2 UNICEF shall inspect the Works at the Site on the date they are substantially completed and UNICEF will issue a certificate of substantial completion (the "**Certificate of Substantial Completion**"), provided that the Works are satisfactory according to the Contract Documents and the standards defined by this Agreement. The Certificate of Substantial Completion shall list all Defects that must be remedied by the Contractor prior to a final inspection by UNICEF.

7.3 UNICEF will carry out a final inspection at each Site (the "**Final Inspection**") six (6) months after the issuance of the Certificate of Substantial Completion for the Site. The Works shall be deemed to be completed when all Defects listed on the Certificate of Substantial Completion, and all Defects that have become apparent after the issuance of the Certificate of Substantial Completion, have been remedied by the Contractor and UNICEF considers the Works to be satisfactory according to the Contract Documents and the standards defined by this Agreement. UNICEF will then issue a **Certificate of Final Completion**, which will be equivalent to defect liability certificate and then the Contractor is considered to have been relieved from any construction liabilities.

- 7.4 Upon signing of the Certificate of Final Completion at each Site, the Site and Works shall be taken over by UNICEF from the Contractor indicating that the Contractor is relieved of its obligation as defined by the agreement.

8. STRUCTURAL INTEGRITY

- 8.1 The Contractor shall provide a written guarantee of the integrity of the structure of the building, which shall remain valid for a period of at least ten (10) years. The guarantee shall be submitted to UNICEF prior to issuance of the Certificate of Substantial Completion.

9. CONTRACT PRICE

- 9.1 In full and final consideration of the complete and satisfactory performance of its obligations hereunder, UNICEF shall pay the Contractor the following amounts in respect of the completion of the Works (the "Contract Price"):

Contract Package: No. and Name	Civil works details	District / Province	Price in Kip
...xxxx (Number): ...xxxx (name if any)	..xxxx (name) School Building and Toilet-Water Unit	...xxxx (name of district) /xxx (name of the Province)	...xxxxx (in figures and words)
	..xxxx (name) School Building and Toilet-Water Unit	...xxxx (name of district) /xxx (name of the Province)	...xxxxx (in figures and words)
	..xxxx (name) School Building and Toilet-Water Unit	...xxxx (name of district) /xxx (name of the Province)	...xxxxx (in figures and words)
	..xxxx (name) School Building and Toilet-Water Unit	...xxxx (name of district) /xxx (name of the Province)	...xxxxx (in figures and words)
...xxxx (Number): ...xxxx (name if any)	..xxxx (name) School Building and Toilet-Water Unit	...xxxx (name of district) /xxx (name of the Province)	...xxxxx (in figures and words)
	..xxxx (name) School Building and Toilet-Water Unit	...xxxx (name of district) /xxx (name of the Province)	...xxxxx (in figures and words)
	..xxxx (name) School Building and Toilet-Water Unit	...xxxx (name of district) /xxx (name of the Province)	...xxxxx (in figures and words)
	..xxxx (name) School Building and Toilet-Water Unit	...xxxx (name of district) /xxx (name of the Province)	...xxxxx (in figures and words)

- 9.2 The price is not subject to any adjustment or revision because of price or currency fluctuations, the actual costs incurred by the Contractor in the performance of its obligations hereunder or modifications to this Agreement or the Contract Documents without a duly signed amendment in accordance with Article 35.

10. PAYMENT

- 10.1 The Price for the Works shall become payable as follows:
- 10.1.1 twenty per cent (20%) of the Price will be paid to the Contractor as Mobilisation Advance, in response to written request for it, upon i) signing of the Contract, ii) receipt by UNICEF of the **Performance Guarantee Certificate** (sample copy of this annexed herewith) required under Article 11 of this Agreement and iii) commencement of the Works.
- 10.1.2 about twenty five per cent (25%) of the Price, with actual amount depending upon the Bill of Payment, will be paid to the Contractor upon completion by the Contractor, and acceptance by UNICEF, of the Stage I civil works.
- 10.1.3 about twenty five per cent (25%) of the Price, with actual amount depending upon the Bill of Payment, will be paid to the contractor upon completion by the Contractor, and acceptance by UNICEF, of the Stage II civil works.
- 10.1.4 about twenty per cent (20%) of the Price or about forty per cent (40%) of the price in case Mobilisation Advance as per the Article 10.1.1 is not paid, will be paid to the Contractor upon Substantial Completion of the Works (completion of Stage III civil works) and issuance by UNICEF of the Certificate of Substantial Completion of the Works for the Site.
- 10.1.5 ten per cent (10%) of the Price will be paid to the Contractor upon issuance of the Certificate of Final Completion or six (6) months following the date of issuance of the Certificate of Substantial Completion, whichever occurs later, provided that the Contractor has remedied

all defects that have become known to UNICEF and the Contractor during the said six (6) month period.

- 10.2 UNICEF shall make payment within thirty (30) days of receipt of the Contractor's invoice. Payments effected by UNICEF to the Contractor shall be deemed neither to relieve the Contractor of its obligations in part or full under this Agreement nor as acceptance by UNICEF of the Contractor's performance in connection with the Works.
- 10.3 All payments shall be made by UNICEF to the following address of the Contractor:
...XXXX (name of the contractor company)
.....XXXX (address)

11. PERFORMANCE GUARANTEE

- 11.1 The Contractor shall, no later than seven (7) working days following the effective date of this Agreement as set forth in Article 37 of this Agreement, at its own expense furnish a performance guarantee substantially in the form set forth in Annex V, and with such Surety or Sureties as shall be approved by UNICEF.
- 11.2 The value of performance guarantee will be in the amount of Thirty per cent (10%) or more of the Contract Price, if the contractor wishes to be paid the Mobilisation Advance as per Article 10.1.1. If the contractor does not require Mobilisation Advance then the value of performance guarantee will be in the amount of Ten per cent (10%) or more of the Contract Price.

12. LIQUIDATED DAMAGES

- 12.1 If the Contractor fails to complete the Works in accordance with the dates stipulated in Article 6 above, UNICEF shall have the right to deduct from any payment due the Contractor the amount of one Million Lao Kips (Kip 1,000,000.00) per day of delay up to a maximum of ten per cent (10%) of the Contract Price. These liquidated damages shall not relieve the Contractor of his obligations or responsibilities that it may have under the Agreement.

13. SITE INSPECTION BY THE CONTRACTOR

- 13.1 The Contractor shall have inspected and examined the Site, its surroundings, data on sub-surface and hydrological conditions and environmental aspects. The Contractor shall be responsible for the correct positioning of the Works and shall rectify any error in the positions, levels, dimensions or alignment of the Works.

14. FIRE PREVENTION AND SAFETY

- 14.1 The Contractor shall be responsible for fire prevention on the Site where the Works are being performed. Fire fighting equipment shall be kept on Site and under the control of the Contractor at all times during the period when Works are taking place on the Site and during rest breaks. The Contractor shall ensure that his employees and sub-contractors can operate the fire fighting equipment. All fire fighting equipment must be in good working condition. The Contractor's employees and sub-contractors shall carry out any operations requiring exposed flame or welding in a careful and safe manner.
- 14.2 The Contractor is responsible for ensuring the safety of all and any, including the construction worker, spectators and children reaching the construction site or its effective zone of construction influence.

15. SITE CLEANLINESS

- 15.1 The Site shall be kept clean of debris at all times. Progressively and at the end of the Works, the Contractor shall, according to the instruction of UNICEF, clean and keep clean the building and the Site.

16. CARE OF THE ENVIRONMENT

- 16.1 The Contractor shall ensure that minimal damage occurs to the environment, the vegetation, existing structures and utilities as a result of the Works. The Contractor shall be responsible to remedy damage, other than minimal damage, to the environment, the vegetation, existing structures and utilities at no cost to UNICEF.

17. REPORTING AND RECORDS

- 17.1 The Contractor shall provide regular reports detailing the progress of the Works, costs incurred and estimate of time and costs to completion. Reports shall be submitted on a monthly basis in a format to be mutually agreed upon by the Parties within ten (10) days after signing of this Agreement.
- 17.2 The Contractor shall maintain records and receipts for the purchase of all Materials and remuneration of labour used in the Works and shall make such records and receipts available for inspection by UNICEF upon request.

18. LEGAL STATUS

- 18.1 The Contractor shall be considered as having the legal status of an independent contractor vis-à-vis UNICEF. The Contractor's personnel and sub-contractors shall not be considered in any respect as being the employees or agents of UNICEF.

19. CONTRACTOR'S PERSONNEL AND SUB-CONTRACTOR

- 19.1 The Contractor shall be responsible for the professional and technical competence of its employees and will select, for work under this Agreement, reliable individuals who will perform effectively in the implementation of the Agreement, respect the local customs, and conform to a high standard of moral and ethical conduct.
- 19.2 In the event the Contractor requires the services of sub-contractors, the Contractor shall obtain the prior written approval and clearance of UNICEF for all sub-contractors. The approval of UNICEF of a sub-contractor shall not relieve the Contractor of any of its obligations under this Contract. The terms of any sub-contract shall be subject to and in conformity with the provisions of this Agreement.

20. CONTRACTOR'S LIABILITY

- 20.1 The Contractor shall be liable against all risks in respect of its property and any equipment used for the execution of this Agreement.
- 20.2 The Contractor shall be liable under the legal provisions of the country for all appropriate workmen's compensation with respect to its employees to cover claims for death, bodily injury or damage to property arising from the execution of this Agreement. Such liability shall include sub-contractors.
- 20.3 The Contractor shall be liable to cover third party claims under the legal provisions of the country for death or bodily injury, or loss of or damage to property, arising from or in connection with the provision of work under this Agreement or the operation of any vehicles, boats, aeroplanes or other equipment owned or leased by the Contractor, its employees or sub-contractors performing work or services in connection with this Agreement.

21. FORCE MAJEURE

- 21.1 In the event of and as soon as possible after the occurrence of any cause constituting force majeure, the Contractor shall give notice and full particulars in writing to UNICEF of such occurrence or change if the Contractor is thereby rendered unable, wholly or in part, to perform its obligations and meet its responsibilities under this Agreement. The Contractor shall also notify UNICEF of any other changes in conditions or the occurrence of any event that interferes or threatens to interfere with its performance of this Agreement. On receipt of the notice required under this Article, UNICEF shall take, in its sole discretion, such action as it considers to be appropriate or necessary in the circumstances, including the granting to

the Contractor of a reasonable extension of time in which to perform its obligations under this Agreement.

- 21.2 If the Contractor is rendered permanently unable, wholly, or in part, by reason of force majeure to perform its obligations and meet its responsibilities under this Agreement, UNICEF shall have the right to suspend or terminate this Agreement on the same terms and conditions as are provided for in Article 24.2, "Termination by UNICEF", except that the period of notice shall be seven (7) days instead of fourteen (14) days.
- 21.3 Force majeure as used in this Article means acts of God, war (whether declared or not), invasion, revolution, insurrection, or other acts of a similar nature or force.

22. SUSPENSION BY UNICEF

- 22.1 Without prejudice to any other rights and remedies available to it, UNICEF may by written notice to the Contractor suspend for a specified period, in whole or in part, payments to the Contractor or the Contractor's obligation to continue performance under this Agreement, if in UNICEF's judgement:
 - 22.1.1 Any conditions arise which interfere, or threaten to interfere, with the successful completion of the services under this Agreement, the execution of the Works or the accomplishment of the purpose thereof; or,
 - 22.1.2 The Contractor shall have failed, in whole or in part, to perform any of the terms and conditions of this Agreement.
- 22.2 After suspension under Article 22.1 above, the Contractor shall be entitled to reimbursement by UNICEF of actual and substantiated costs resulting from commitments entered into in accordance with this Agreement prior to the commencement period of such suspension. The Contractor undertakes to use best efforts to minimise any such costs and shall include a provision in its contracts with sub-contractors which entitles it to suspend such sub-contracts during any suspension period under this Agreement.

23. TERMS AND TERMINATION

- 23.1 This Agreement will commence on the Commencement Date and terminate upon payment of the final instalment of the Contract Price; provided however that either Party may exercise its right to early termination in accordance with this Agreement.

24. TERMINATION BY UNICEF

- 24.1 UNICEF may terminate this Agreement at any time on thirty (30) days' written notice to the Contractor if, in UNICEF's judgement, it is in UNICEF's interest to do so.
- 24.2 If the Contractor fails, in whole or in part, to fulfil any of its obligations under this Agreement in a timely manner UNICEF may, by notice to the Contractor, demand that the Contractor perform those obligations. If (a) the Contractor fails to perform those obligations within thirty (30) days after receipt of such notice, or (b) the Contractor shall have become insolvent or taken steps to make accommodation with its creditors by reason of an inability to pay its debts as and when they come due, or (c) if control of the Contractor changes for any reason including by reason of insolvency (each an "Event of Default"), then UNICEF may, without prejudice to any other rights or remedies and notwithstanding any suspension under the provisions of Article 22 above, terminate this Agreement upon not less than fourteen (14) days written notice to the Contractor.
- 24.3 Upon termination of this Agreement,
 - 24.3.1 the Contractor shall take immediate steps to terminate its services in a prompt and orderly manner and to reduce losses and to keep further expenditures to a minimum.
 - 24.3.2 the Contractor shall be entitled, except in the case of an Event of Default by the Contractor, to be paid for the work satisfactorily completed on the Works and for the materials delivered

to the Site as of the date of termination, plus maximum of Ninety per cent (90%) of the actual, substantiated costs resulting from commitments entered into prior to the date of termination as well as any reasonable substantiated direct costs incurred by the Contractor as a result of the termination. But the Contractor shall not be entitled to receive any other or further payment, or any damages for the termination hereunder. In the case of disagreement between the Parties as to the existence of an Event of Default, the matter shall be resolved in accordance with the provision of Article 27 hereof.

25. TERMINATION BY THE CONTRACTOR

- 25.1 If UNICEF fails, in whole or in part, to fulfil any of its obligations under this Agreement in a timely manner the Contractor may, by notice to UNICEF, demand that UNICEF perform those obligations. If UNICEF fails to perform those obligations within thirty (30) days after receipt of such notice the Contractor may terminate this Agreement upon not less than fourteen (14) days' written notice to UNICEF. In the case of disagreement between the Parties as to whether UNICEF has fulfilled such obligations, the matter shall be resolved in accordance with the provision of Article 27 hereof.
- 25.2 Upon termination of this Agreement under this Article, the provisions of Article 24.3.2 hereof shall apply.

26. ASSIGNMENT

- 26.1 The Contractor shall not assign the whole or any part of this Agreement or any benefit or interest in or under this Agreement without the prior written agreement of UNICEF. Failure to obtain such prior written agreement will be considered an Event of Default under this Agreement and UNICEF shall have the right to terminate this Agreement in accordance with Article 24 herein.

27. SETTLEMENT OF DISPUTES

27.1 Amicable Settlement

The Parties shall use their best efforts to settle amicably any dispute, controversy, or claim relating to this Agreement. Where the Parties wish to seek such an amicable settlement through conciliation, the conciliation shall take place in accordance with the UNCITRAL Conciliation Rules then in force, or according to such other procedure as may be agreed between the Parties.

27.2 Arbitration

Any such dispute, controversy or claim which is not settled amicably within sixty (60) days after receipt by one Party of the other Party's request for such amicable settlement, shall be referred by either Party to arbitration in accordance with the UNCITRAL Arbitration rules then in force. The Parties shall be bound by an arbitration award rendered as a result of such arbitration as the final adjudication of such dispute. The costs of the procedure shall be shared equally by the Parties. In no event shall UNICEF be liable for incidental, indirect or consequential damages or for lost revenue or excess revenue. The arbitral tribunal shall have no authority to award no interest in excess of four per cent (4%) and such interest shall be simple interest only. As used herein, the term "UNCITRAL" means the United Nations Commission on International Trade.

28. NO WAIVER OF PRIVILEGES AND IMMUNITIES

- 28.1 Nothing contained in or relating to this Agreement shall be deemed a waiver, express or implied, of any of the privileges and immunities of the United Nations and its subsidiary organs, including UNICEF, whether under the Convention on the Privileges and Immunities of the United Nations, or otherwise, and no provision of this Agreement shall be interpreted or applied in a manner, or to an extent, inconsistent with such privileges and immunities.

29. TAXES AND DUTIES

- 29.1 Section 7 of the Convention on the Privileges and Immunities of the United Nations provides that the United Nations, including its subsidiary organs, including UNICEF, is exempt from all direct taxes and custom duties. Accordingly, the Contractor authorises UNICEF to deduct from the Contractor's invoices any amount representing such taxes or duties charged by the Contractor to UNICEF. Payment of such corrected invoiced amounts shall constitute full payment by UNICEF. In the event any taxing authority refuses to recognise UNICEF's exemption from such taxes, the Contractor shall immediately consult with UNICEF to determine a mutually acceptable procedure.

30. USE OF UNITED NATIONS AND UNICEF NAME AND EMBLEM

- 30.1 The Contractor shall not use the name, emblem or official seal of the United Nations or UNICEF or any abbreviation of these names for any purpose.

31. OFFICIALS NO TO BENEFIT

- 31.1 The Contractor warrants that no official of UNICEF or the United Nations has received or will receive or will be offered by the Contractor any direct or indirect benefit arising from this Agreement or the award of this contract. The Contractor agrees that breach of this provision is a breach of an essential term of this Agreement.

32. PROHIBITION ON ADVERTISING

- 32.1 The Contractor shall not advertise or otherwise make public that the Contractor is furnishing goods or services to UNICEF without specific permission of UNICEF.

33. CHILD LABOUR AND SEXUAL HARASSMENT

- 33.1 UNICEF fully subscribes to the Convention on the Rights of the Child and draws the attention of potential suppliers and contractors to Article 32 of the Convention which inter alia requires that a child shall be protected from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, spiritual, moral or social development. The Contractor represents and warrants that it does make use of child labour and that child labour will not be used in the performance of its obligations under this Agreement.
- 33.2 The Contractor or its personnel shall not tolerate, and shall not promote, by any means, sexual exploitation and sexual abuse of the local population (including the construction workers, refugees and other beneficiaries of assistance). The Contractor shall represent and warrant that it will take all necessary actions to avoid such activities and behaviour of persons involved in construction activities.

34. ANTI-PERSONNEL MINES

- 34.1 UNICEF supports an international ban on the manufacture of anti-personnel mines. UNICEF has decided not to purchase products from companies that sell or manufacture anti-personnel mines or their components. The Contractor represents and warrants that neither the Contractor nor any entity associated or affiliated with the Contractor is involved in the manufacture, distribution, or supply of anti-personnel mines.

35. AMENDMENT TO THE CONTRACT

- 35.1 No change, amendment or modification to the Works, Contract Price or time to completion will be accepted, or paid for, unless it has been agreed in writing between the Parties and has been incorporated in this Agreement through an amendment to this Agreement duly signed by the authorised representative of each Party.

36. NOTICES

- 36.1 Notices will be deemed to be effective as follows: in the case of personal delivery, on delivery; in the case of registered mail, seven (07) days; in the case of facsimiles, twenty four (24) hours following confirmed transmission.

36.2 Any notice, request or consent required or permitted to be given or made pursuant to this Agreement will be in writing, and addressed and sent by registered mail or facsimile to such Party as follows.

(a) **If to UNICEF:**

UNICEF, the United Nations Children's Fund
Km 3 Thadeua Road, Watnak Quarter
P. O. Box 1080, Vientiane, Lao PDR
Telephone: 315200 – 04; Fax: 314852;
Attn.: The Representative
with a copy to:

UNICEF, the United Nations Children's Fund
Copenhagen
tel: +45 35 27 35 27
fax: +45 35 26 94 21
Att: Director

(b) If to the Contractor:

...xxxxx (name and address of the Contractor)

.....

.....

.....

Telephone: Fax:

37. EFFECTIVE DATE

37.1 The effective date of this Agreement shall be the date both Parties have signed the same.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be signed in their respective names on the date written below.

FOR AND ON BEHALF OFxxxxx (the
Contractor)

FOR AND ON BEHALF OF UNICEF, the
United Nations Children's Fund

.....

Signature

Name of Official:

.....

Date:

.....

Signature

Name of Official:

.....

Date:

.....xxxx...(Bank letter head).....

Date:...../...../.....

To: UNICEF Vientiane
P. O. Box 1080;
Km 3, Thadeua Road, Vientiane
Lao PDR.

Performance Guarantee No:...xxx...(by the concerned Bank)

We have been informed thatxxxx...(Name of the Contractor)... (Hereinafter called the "Contractor") has entered into a contract agreement datedxxxx...(Date of signing the Contract) with you for the construction ofxxxx (number of)... **School Buildings andxxx (number of)... Toilet-Water Units Contract Package Numberxxxx (the Contract number).. inxxxx.. (district) of ...xxx(Province)...** (Hereinafter called the "Contract").

Furthermore, we understand that, according to the condition of the Contract, a performance guarantee is required from the Contractor.

At the request of the Contractor, wexxxx (Bank's name) hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount ofxxxx (Amount of 30% or more / Amount of 10% or more of Contract price).... (...Amount in word...)... , such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This Guarantee will remain in force fromxxxx (Date of issued the Guarantee) toxxxx (Date of completion of the Contract) (both date inclusive). Any demand in respect of this Guarantee should reach the Bank not later than the above date.

This Guarantee shall be returned to us upon its expiry or sooner determination.

For and on behalf ofxxxx (Bank's name and address)

Authorised Signatories:

Signature:
Name:
Position:



Signature:
Name:
Position:

Annex 6: Maintenance Checklist		DAILY	WEEKLY	MONTHLY	½ YEAR	1 YEAR	3 YEAR	5 YEAR	Checked by
TO DO	BUILDING								
Floors	sweeping	X							
	washing		X						
	Inspect for bad cracking			X					
Walls & Pillars									
	Cleaning/washing		X				X	X	
	Re-painting						X	X	
	Anti-termite treatment						X		
	Pillars cracking						X		
Ceilings									
	Cleaning		X						
	Treatment against termites						X		
	Re-painting							X	
Roof									
	Cleaning					X			
	Check rust on sheets						X		
	Check ties holding roof to truss					X			
Roof truss									
	Anti-termite treatment					X			
	Check for cracking of timber beams						X		
	Check that all joints are strong and secure			X					
Door and window shutters									
	Tightening screws on hinges					X			

TO DO	DAILY	WEEKLY	MONTHLY	½ YEAR	1 YEAR	3 YEAR	5 YEAR	Checked by
Check locks and keys				X				
Check door locks				X				
Furniture								
Chairs - strengthened					X			
Tables strengthened					X			
Re-paint black board						X		
Clean furniture by wiping dust/dirt away								
SANITATION								
Cleaning of ceramic ware	X							
Check water tank			X					
Check water supply				X				
Check door locks			X					
Repaint walls							X	
Clean septic tank						X		
Check buckets	X							
COMPOUND								
Clean rain ditch around building			X					
Check fencing			X					
Empty litter baskets	X							
Burn waste		X						
Cut grass			X					
Check sport facilities					X			

Example

Date:

Repair Request Form

Nr:

Province:

District:

Village:

Stage:

Type of school: 2 Clr. 3 Clr. 5 Clr.

Completion date:

To the maintenance in-charge at:			From The maintenance in-charge at:		
	District Level	Mr.....		Village Level	Mr.....
	Province Level	Mr.....		District Level	Mr.....
Items to be repaired:					
Location:					
Description of Damage:					
Proposed repair:					
Priority:					
Approximate Cost:					

Comments by:					
	District Level	Mr.....		
	Province Level	Mr.....		

Works executed:	
Date:	Signatures of Maintenance in-charge:
	Village: District: Province:

This School Construction Guidelines of Lao PDR was developed by the Division of Design and Construction Management (ECDM), Department of Finance, Ministry of Education with the assistance of the Asian Disaster Preparedness Center (ADPC), the United Nations Development Programme (UNDP), and with support from the European Commission Humanitarian Aid department (ECHO).

