Compendium of WASH in Schools Facilities in Emergencies

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Acknowledgements

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Abbreviations and Acronyms

ACLG – Assistant Commissioner Local Government (Sri Lanka)
ACTED – Agence d'Aide à la Coopération Technique Et au Développement (Agency for Technical Cooperation and Development)
BDT – Bangladeshi taka
BWG – Birmingham Wire Gauge
cft – cubic foot
CGI – corrugated galvanized iron
cm – centimetre
cu. – cubic
cwt. – hundredweight
in. – inch
ft. – feet
GI – galvanized iron
HDPE – high-density polyethylene
IDR – Indonesian rupiah
INEE – Inter-Agency Network for Education in Emergencies
kg – kilogram
LRA – Lord's Resistance Army (Uganda)
LKR – Sri Lankan rupee
m – metre
m3 – cubic metre
ml – millilitre
mm – millimetre
MMK – Myanmar kyat
MONUSCO – United Nations Organization Stabilization Mission in the Democratic Republic of the Congo
MS – mild steel
N/A – not available
no. – number
NPR – Nepalese rupee
OCHA – Office for the Coordination of Humanitarian Affairs (United Nations)
PCC – plain cement concrete
PKR – Pakistani rupee
PTFE – polytetrafluoroethylene (a synthetic polymer resin)
PVC – polyvinyl chloride (thermoplastic resin commonly used in construction materials)
RCC – reinforced cement concrete
sq. – square
SWG – Imperial Standard Wire Gauge (British legal standard)
uPVC – unplasticized polyvinyl chloride (rigid PVC, also know as vinyl)
USD – United States dollar
UNHCR – United Nations High Commissioner for Refugees
VIP – ventilated improved pit
WASH – water, sanitation and hygiene
WHO – World Health Organization
x – 'by' in dimensions

PART 1

Introduction

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WASH in Schools – water, sanitation and hygiene education – is a vital part of emergency response and transitional support to fulfil the rights of women and children and to reach those who are most in need. Although there is abundant experience in the sector regarding preparedness and response programming, there is much to be done to strengthen WASH in Schools capacities and interventions during emergencies.

The 'Compendium of WASH in Schools Facilities in Emergencies' has been prepared as a resource for coordination and management of WASH interventions in emergency preparedness, response and early recovery. The primary audience includes those who are implementing interventions in schools being used as emergency shelter and temporary learning spaces established by governments, non-governmental organizations, the International Red Cross and Red Crescent Movement, or United Nations agencies.

Specifications for safe water supplies, hand-washing stations and sanitation facilities are illustrated with diagrams, schematic drawings, photographs and bills of quantities – detailed statements of work, prices and dimensions for construction of the WASH facilities. Where there are gaps in documented material, the compendium draws on solutions that have been adapted from established WASH in Schools good practices in emergencies and ongoing development.

Purpose

The purpose of this compendium is to collate knowledge on emergency interventions that deliver WASH-related health benefits while minimizing disruption to education opportunities. By sharing information on equipment and designs for temporary learning spaces/schools, this compendium will enable WASH and education staff to:

- Enhance preparedness measures for schools and temporary learning spaces before a crisis.
- Base emergency responses on adaptation of previous experience, using this information to help design new facilities.
- Implement early recovery and transitional interventions that complement permanent, long-term development.
- Carry out basic planning to coordinate WASH in Schools activities.

Construction must be linked with 'software', i.e., hygiene promotion and behavioural change. During emergencies, hygiene promotion in schools/temporary learning spaces will be supported by community-based programmes where they exist. In the school or learning environment, teachers and learners are the primary stakeholders who will use and maintain WASH facilities, within limitations due to age and specialized maintenance tasks.

The compendium complements UNICEF's 'Water, Sanitation and Hygiene for Schoolchildren in Emergencies: A Guidebook for Teachers'. The guidebook is designed for those involved in teaching and working with children in emergency preparedness, during an emergency and throughout the recovery period. It provides simple strategies for use and adaptation with all children and families to ensure a smooth transition to a healthy and accessible learning environment.

Scope

Learners and the learning environment are affected by a range of scenarios during an emergency. The compendium describes preparedness activities and responses to past emergencies.

The first month after an emergency is often exclusively or predominantly dedicated to life-saving measures. Providing water, sanitation and hygiene for the general population frequently takes priority over education facilities. Although the focus on meeting general needs might limit opportunities for creating child-friendly spaces with appropriate WASH facilities, there may nonetheless be room for temporary learning spaces from the outset.

When schools are used as emergency housing for internally displaced people or refugees, students are often excluded from the learning environment. Water, sanitation and hygiene in schools are therefore covered in the compendium, along with temporary learning spaces.

After 12–18 months, semi-permanent facilities built during early recovery would ideally be replaced by permanent facilities. It is often the reality, however, that semi-permanent facilities are used for many years after a crisis due to political, financial or other factors. And, thus, the issue of maintenance must be addressed.

Fifteen case studies, from a wide range of countries and emergencies spanning 1992–2011, are presented in this compendium. These studies present real-world scenarios in emergency preparedness, emergency response, and long-term interventions and recovery. The experiences they document can serve as possible examples for those who wish to build effective facilities that: are aligned with local beliefs and practices; use appropriate materials for a given location; and provide access to children of various ages and abilities.

PART 2

Planning a Potential Intervention

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In a crisis situation, four internationally recognized guidelines that apply to WASH and education in emergencies must be consulted when conducting a comprehensive response:

- The Inter-Agency Network for Education in Emergencies (INEE) 'Minimum Standards for Education: Preparedness, Response, Recovery'; information on the INEE Minimum Standards is available at www.ineesite.org.
- *The Sphere Handbook 2011: Humanitarian Charter and Minimum Standards in Humanitarian Response*, for understanding water, sanitation and hygiene considerations; information on the Sphere Project handbook is available at www.sphereproject.org.
- The World Health Organization-UNICEF 'Water, Sanitation and Hygiene Standards for Schools in Low-Cost Settings'; the PDF is available at www.who.int/water_sanitation_health/publications.
- The UNICEF 'WASH in Schools Monitoring Package', available at www.unicef.org/wash/schools.

This compendium does not seek to reproduce in full the WASH standards detailed by the Sphere Project and complemented by the World Health Organization (WHO) environmental health standards for schools. It is nonetheless helpful to highlight some of the most essential considerations arising from the INEE standards. For ease of reference, relevant standards and guidance notes are highlighted in the boxes below.

Assessing the emergency situation

INEE analysis standard 1

Assessment: Timely education assessments of the emergency situation are conducted in a holistic, transparent and participatory manner.

The INEE minimum standards and the Sphere Project handbook can help coordinators and managers determine which questions to ask during an assessment. In addition, the Global Education Cluster 'Joint Education Needs Assessment Toolkit' provides WASH-related guidance throughout, including a school questionnaire with questions on water, latrines and toilets, and hygiene and sanitation.[1]

In any assessment related to WASH and education in emergencies, it is essential that WASH and education staff coordinate their activities from the very beginning of the crisis and throughout the planning process. Specific points that must be considered include:

- Contextual understanding is critical.
- Assessments must be conducted with the agencies and organizations responsible for coordinating education, in consultation with community members and local government counterparts.
- Gender and protection considerations are paramount, particularly to maximize girls' school attendance; consultation with education and protection specialists is highly recommended.
- Plans for facilities need to assess the overall site and school layout, considering such factors as access, protection, drainage and wind.
- Even temporary infrastructure must be built and designed well; a thorough technical assessment of water sources, soil conditions and other environmental features is vital to providing a sanitary and safe environment.
- Location-specific hygiene and health issues need to be understood so that WASH interventions address the primary health concerns of the recipients.

Schools used for temporary shelter

INEE access and learning environment standard 1

Equal access: All individuals have access to quality and relevant education opportunities.

As stated in guidance note 9 for this INEE standard: "Educational facilities should only be used as shelters for displaced people when there are no other possibilities. Alternative locations for shelter in the event of an emergency or disaster should be identified during preparedness planning."

Although it is not recommended practice, the reality is that schools are commonly used for housing displaced persons during emergencies. The challenge for the WASH sector is to provide interventions that meet the temporary needs of displaced people living in schools; minimize damage to permanent facilities; and ensure complete and safe decommissioning of temporary facilities, repair and improvement of permanent facilities, and handover to the appropriate authorities once internally displaced people or refugees leave the school building.

Protection considerations

INEE access and learning environment standard 2

Protection and well-being: Learning environments are secure and safe, and promote the protection and the psychosocial well-being of learners, teachers and other education personnel.

The location of WASH facilities within a school or temporary learning space must take into account the protection and well-being of learners, teachers and other staff. Although the scope may be limited for changing the location of facilities in existing schools, or for finding room for temporary learning spaces within camps for internally displaced people, it is crucial to consider the principles of protection before planning begins.

1 Global Education Cluster, 'The Joint Education Needs Assessment Toolkit', Save the Children, Geneva, 2010; available at www.savethechildren.org.uk/en/54_13164.htm, accessed 21 October 2011. 'Tool 3: School questionnaire' begins on p. 80, with WASH questions on pp. 84–86.

There are three main circumstances that present different protection challenges and require different solutions:

(1) ***Preparedness and response in schools used for emergency housing –*** There is no scope for changing the school building's location, but there is ample opportunity to consider the layout of any temporary WASH facilities within and around the school to afford better protection, particularly for girls and women.

(2) ***Temporary learning spaces in camps –*** At the camp planning stages, adequate space should be allocated for temporary learning spaces that are centrally located to enable effective supervision for children and provide easy access to WASH facilities. Where rapid camp development has precluded temporary learning spaces, and populations will be living in the camp for a long time, some shelters or houses might need to be moved to make room for learning spaces.

(3) ***Recovery efforts –*** It is possible that authorities will plan to rebuild a school in its original location. But during recovery, it may be necessary to promote the idea of moving a school to a new location or changing the layout within school boundaries. This is particularly required when the site becomes unsafe due to environmental conditions such as landslides, river bank erosion or flooding.

WASH facilities in temporary learning spaces and schools

INEE access and learning environment standard 3 Facilities and services: Education facilities promote the safety and well-being of learners, teachers and other education personnel and are linked to health, nutrition, psychosocial and protection services.

Layout and location

The most effective layouts ensure optimal use, and a thorough site analysis is required to guarantee children's safety and to minimize the intervention's impact on the environment. But when planning horizons are for the very short term, careful layout in education spaces that are rapidly provided or adapted may be neglected. WASH facilities placed in one location to meet today's needs may be poorly situated for the longer term.

Although overall layout in regard to such factors as wind, sun, modular design and planning for expansion is not mentioned explicitly in INEE or WHO guidelines, site location and layout are essential considerations. When planning layouts, 'An Inclusive Approach for School Sanitation & Hygiene Education: Strategy, norms and designs'[2] should be used as a key reference. To encourage an approach that addresses immediate needs while keeping potential longer-term requirements in mind, significant points from the approach are highlighted below:

Expandable core and modular design – Emergency WASH facilities should be designed and located to allow for expansion. Structures built during emergencies will eventually need to be upgraded to meet health standards and additional facilities may be needed for a population surge. Space for building latrine or toilet[3] cubicles in the same block location, enlarging water-collection areas or adding bathing facilities is an important factor in choosing a location. A design that is modular, i.e., self-contained and replicable, allows units/capacity to be added as required.

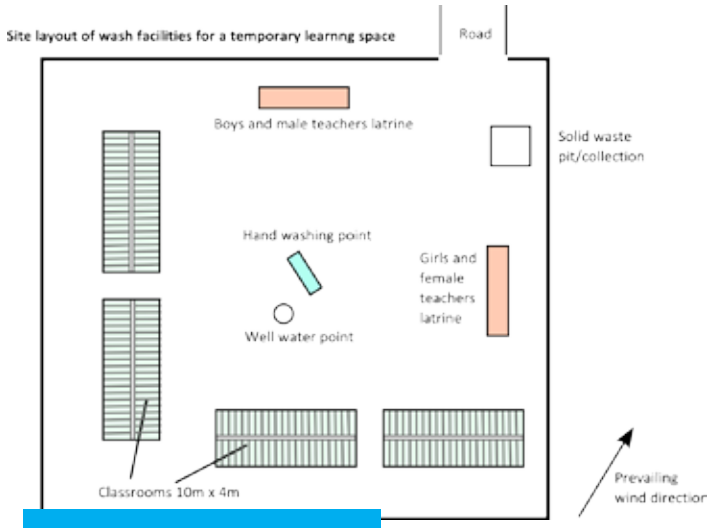
Climatic conditions – Prevailing weather conditions in a specific geographical location influence design as well as layout. The WASH facility's orientation to wind and sun is a critical factor. Ventilation of latrines is crucial. Sunlight should be available for lighting, hygiene and drying, and depends on the facility's location within the morning or afternoon shadows cast by nearby structures.

Leach pits – Systems for handling both sewage and 'grey water', which has been used for washing but does not contain human waste, need to be designed for proper emptying and maintenance. Within space constraints, leach pits should be an adequate size and placed in the most effective location.

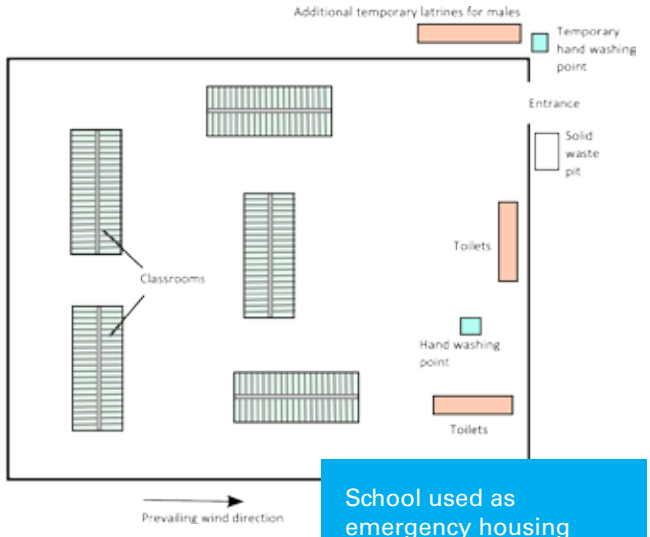
2 Government of India (Department of Drinking Water Supply and Department of Elementary Education and Literacy) and UNICEF, 'An Inclusive Approach for School Sanitation & Hygiene Education: Strategy, norms and designs', New Delhi, August 2008.

3 The term 'latrine' as used in this compendium refers to temporary installations and 'toilet' to permanent facilities.

Generic site plans illustrating WASH layouts



Temporary learning space



School used as emergency housing

Land profile and surface water drainage – Physical features of the immediate environment should be taken into account when planning the layout. WASH facilities in low-lying areas that are prone to accumulating rainwater, for example, can leave latrine pits vulnerable to flooding, creating a significant health hazard and making water-collection points unsafe and inaccessible.

Rainwater collection – Simple rainwater collection systems can be promoted to maximize resources. In the longer term, consideration of preserving and/or planting trees and their space requirements relative to WASH facilities could also be important.

In other considerations for temporary learning spaces, hand-washing facilities should be placed in or adjacent to latrines to maximize hand-washing opportunities and limit the spread of disease. The lifespan of latrine pits in temporary learning spaces will usually be shorter than anticipated. Clear access to WASH facilities must be ensured for trucks to empty the pits.

During an emergency, it is not unusual for temporary shelters to be built on school grounds and classrooms to be used for housing. But providing shelter for those who have been displaced often means that a far greater number of people will be using WASH facilities than intended in the original design.

Designing emergency WASH facilities

The Sphere Project and WHO guidelines provide a comprehensive list of requirements for fully meeting the facilities and services standard. WASH interventions immediately following a crisis prioritize latrines and toilets; hand-washing facilities; and sufficient and safe water supplies – and the intervention case studies presented in this compendium reflect these priorities. Details to consider for each area include the following:

(1) ***Latrines and toilets –*** Safe excreta disposal and menstrual hygiene management require providing latrines or toilets to serve the needs of all users, including girls, boys, small children and those with disabilities, as well as teachers and other education personnel. (Sphere Project indicators are one toilet for every 30 girls and one toilet for every 60 boys, along with a urinal.) Facilities for safe and comfortable menstrual hygiene management are a crucial factor in determining older girls' attendance at temporary learning spaces and must be addressed, including waste disposal for used sanitary pads.

(2) ***Hand-washing facilities*** **–** Reliable water points and hand-washing facilities should be located near latrines or toilets and areas where food is prepared or eaten. Soap should be provided as part of a hygiene package to schools and temporary learning spaces in addition to distribution among the general population.

(3) ***Water supply*** **–** Along with providing sufficient quantities, water quality must be consistently safe for the intended use. Where post-source contamination is likely, school-level water treatment is good practice and encourages better water hygiene awareness among learners. (The Sphere Project indicator for minimum water quantities in schools is 2–3 litres of water per student per day for drinking and hand washing.)

In each emergency situation, the basic design, number, location and type of facilities to be constructed should follow the guidelines on standards and assessment. The design and construction of these facilities should involve the intended users, both WASH and other stakeholders.

What is behind a tap, and underneath or around a latrine slab, will primarily be determined by environmental conditions, availability of materials, cost, and the length of time that facilities are expected to be used. Soil conditions and the groundwater table, for example, determine latrine pit depth and shape, the need for a lining and the rate of filling, but they are seldom investigated sufficiently.

Specific guidance on sanitation can be found in *Emergency Sanitation: Assessment and Programme Design* and in *Excreta Disposal in Emergencies: A Field Manual*; guidance on water supplies is offered in *Engineering in Emergencies: A Practical Guide for Relief Workers*.[4]

Construction and upgrades

In camps for people displaced by a crisis, certain agencies are responsible for providing water, sanitation and hygiene to the general population. But their commitment may not extend to plans for providing such services in temporary learning spaces. To avoid gaps in interventions, agencies for both WASH and education must work in close cooperation for planning and constructing WASH in Schools facilities.

The nature of emergencies and how long people will remain displaced is unpredictable, making the expected lifespan of temporary facilities difficult to estimate. Context analysis can guide a 'best guess' regarding design requirements. To achieve consensus on the proposed facilities, this estimation should be shared with all parties, preferably at the level of WASH and education coordination groups/organizations, as part of an agreed strategy.

Broadly speaking, more money is available for initial construction at the start of a response than there is for ongoing maintenance. For this reason, it is most helpful to consider a design that requires lower maintenance and replacement costs.

Given the uncertainties of emergency situations, designing facilities with upgrades in mind is the most expedient and efficient approach. Building a single offset pit to one side of a latrine, for example, would allow another pit to be added later – making the latrine into a twin-pit composting facility. If the latrine has a plastic-sheeting superstructure, a matting screen could be added and, eventually, brick walls for conversion to a more permanent facility. Designing and building the substructure, or pit, the slab and the frame superstructure in a robust way provides options for expansion.

4 Harvey, Peter, Sohrab Baghri and Bob Reed, *Emergency Sanitation: Assessment and Programme Design*, Water, Engineering and Development Centre, Loughborough University, Leicestershire, UK, 2002; Harvey, Peter, *Excreta Disposal in Emergencies: A Field Manual*, Water, Engineering and Development Centre, Loughborough University, Leicestershire, UK, 2007, see www.washdoc.info/docsearch/title/154709 to download the PDF; and Davis, Jan, and Robert Lambert, *Engineering in Emergencies: A Practical Guide for Relief Workers*, 2nd edition, Practical Action, Bourton on Dunsmore, UK, January 2002.

Operation and maintenance

Some WASH facilities have significant operation and maintenance requirements, and it is better to anticipate this and favour designs that reduce such requirements to a minimum. Specific challenges arise when water has to be transported to a site, and waste moved off site. Water trucking, management of sludge from latrine pits, and containment and disposal of solid waste can be addressed by planning a second stage of intervention, when basic installations will be upgraded to reduce transportation and other operation requirements through:

- Installing on-site water points such as handpumps, piped connections and rainwater harvesting to reduce or eliminate trucking operations.
- Sorting, reusing and burning solid waste to reduce or eliminate trucking.
- Using twin-pit compost latrines to reduce or eliminate complex mechanical or motorized pit de-sludging.
- Constructing urinals to keep urine and excreta separate, to enable latrine pits to fill more slowly.
- Reducing water use through conservation and grey-water recycling.

It is important to be clear about which aspects of operation and maintenance can be addressed by students, teachers and other staff in temporary learning spaces and schools. Given the social disruption that emergencies cause, it will take time to establish community and student groups. But basic cleaning arrangements – including classroom-level water treatment and hand-washing organization – could be undertaken by students, teachers and community members, with encouragement and support through provision of tools and materials.

WASH agencies should discuss and agree on a rota of activities outlining which tasks are appropriate for teachers, students and the general camp population, and which require specialist equipment and support, for example, latrine de-sludging.

Phasing out

The final phase of a WASH intervention life cycle is linking the emergency response with long-term development. WASH facilities in temporary learning spaces will generally continue to function until the camps close. The critical considerations are decommissioning temporary installations, salvaging materials whenever possible, and closing latrines and solid waste pits safely.

Phasing out facilities in schools that have been housing displaced people is likely to be more complicated, involving both closure of temporary facilities and repair or replacement of permanent facilities, in line with government standards.

Semi-permanent facilities provide a bridge between temporary interventions and permanent facilities until resources such as funding and contractors can be mobilized to build the permanent structures. Responsibility for semi-permanent installations should generally be handed over to school authorities and local government, so they are prepared to manage closure when permanent facilities are ready.

PART 3

WASH in Emergencies Scenarios

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Context and time during the disaster management cycle are the most significant factors that influence what type of WASH interventions are appropriate for each situation. For the water, sanitation and hygiene sector – in tandem with the education sector – three main scenarios need to be considered:

- Emergency preparedness, including prefabricated latrine modules, water treatment and storage, and facilities for schools that are expected to be used for emergency shelter.
- Emergency response interventions in temporary learning spaces and schools immediately after and during the crisis.
- Long-term interventions and recovery, including semi-permanent facilities and WASH in Schools interventions that lead to disaster risk reduction.

This section outlines the crisis context and location where such interventions have taken place, as more fully described in Part 4, and provides an overview of interventions for each scenario.

Emergency preparedness

WASH kits and equipment: The agencies working in a country increasingly hold some form of cluster- or government-agreed emergency facility designs and pre-agreements with suppliers for purchase of materials. WASH equipment or kits may also be part of such arrangements. These will typically be for the general population but could be used for schools that shelter displaced people or for temporary learning spaces, noting the need to adapt them for children's use.

- *Global* – prefabricated latrine modules; water treatment and storage technologies
- *Sri Lanka* – in-country prefabricated latrine kits, used in camps

Schools prepared for use as temporary housing: In rural areas, school buildings are often one of the few forms of public infrastructure, and therefore they are frequently used for temporary shelter. Preparedness measures should address this possibility in a way that meets the needs of those who are displaced, while mitigating damage to facilities. This should include an estimate of carrying capacity determined by available space and facilities, and what temporary WASH facilities could be installed to supplement permanent fixtures.

- *Bangladesh* – disaster-resistant facilities in schools to be used as cyclone shelters

Table 1 provides a template grid for notes on mapping the capacity of schools to house internally displaced people in a crisis situation. This information needs to be clearly communicated to government authorities, along with advocacy for maintaining standards in the event of overcrowding.

TABLE 1. Mapping school capacity for emergency housing

	School 1	School 2	School 3
Classroom/building area (square metres)			
Potential carrying capacity of classrooms/buildings (number of people)			
School compound area suitable for housing people in temporary shelter (square metres)			
Potential carrying capacity of classrooms/buildings (number of people)			
Capacity of existing toilets (number of people)			
Capacity to provide additional temporary latrines			
Capacity of existing water supply (number of people)			
Capacity to provide additional water supply			

Emergency response

Short-term temporary learning spaces: Populations are displaced into camps and other shelters due to natural disaster such as floods, typically for several weeks to a few months, or due to earthquakes, typically for many months or years. Displacement due to armed conflict is less predictable and may last weeks, months or years.

In all of these situations, provision of WASH for temporary learning spaces in camps becomes a key requirement, but the duration these spaces are needed will differ. The initial WASH focus should be on providing latrines and urinals, hand-washing stations and safe water supply, with subsequent upgrading to include more latrines, solid waste disposal systems and improved water supply.

- *Sri Lanka* – prefabricated latrine kits for populations affected by armed conflict
- *Pakistan* – flood response in pre-existing schools and temporary learning spaces

Existing schools used as centres for internally displaced people: Where preparedness measures have not been put in place to receive internally displaced people and refugees in existing schools, response measures may include repair and cleaning of existing facilities – typically repair of doors, unblocking toilets and emptying septic tanks.

In all likelihood, there will also be a demand for supplementary facilities such as temporary latrines, in accordance with agreed standards and indicators to ensure that permanent facilities do not get overused and damaged.

- *Democratic Republic of the Congo* – emergency sanitation, sustainable latrines and water supply addressing chronic crisis due to ongoing armed conflict
- *Pakistan* – response to large movements of people due to massive floods

Long-term interventions and recovery

Long-term temporary learning centres in camps: Where refugees or internally displaced people remain in camps for several years or more, semi-permanent facilities provided in the early months or years may take on characteristics of permanent facilities. In these cases, more robust semi-permanent facilities without overly burdensome maintenance requirements are preferred. Latrine walls and roofs will need better and stronger materials; a second pit may need to be added; water points could be provided with concrete aprons for better drainage; and solid waste systems could be built, with arrangements set for burning and rubbish collection.

- *Nepal* – WASH in long-term, temporary schools for Bhutanese refugees
- *Sudan* – facilities for temporary schools in Darfur

Semi-permanent facilities for temporary learning spaces or schools as an early recovery intervention: In situations where damage to schools has been extensive and a programme of fund-raising and reconstruction could take more than a year, an interim, semi-permanent solution to bridge the gap between initial emergency efforts and the provision of permanent facilities may be necessary.

These facilities be constructed within or outside the school grounds, and may only be designed for one year or so, but in reality be used for several years. Where there was no provision for pre-existing schools, temporary learning space becomes the de facto school. As above, more robust semi-permanent facilities without overly burdensome maintenance requirements is preferential.

- *Myanmar* – post cyclone/flood rebuilding and rehabilitation of schools
- *Indonesia* – WASH for temporary classrooms after the Padang earthquake

Late recovery – disaster risk reduction: Where schools are at high risk from damage or destruction due to natural disaster, measures should be introduced to prevent or mitigate such effects. Disaster risk reduction should be part of ongoing development programming – not be seen as 'bolt on' emergency preparedness measures. It is understood, however, that recovery programmes following emergency response interventions can present an opportunity to 'build back better'. Earthquake-resistant structures and construction of schools on localized high points in flood-prone areas, where land access permits new school facilities to be built, are ways to mitigate the effects of future disasters.

This compendium of designs does not seek to comprehensively cover this type of intervention.

- *Plurinational State of Bolivia* – WASH facilities in schools adapted to prepare for flood risks

PART 4

Compendium of WASH in Schools facilities

Overview and note on adapting the designs

The 'Compendium of WASH in Schools Facilities in Emergencies' is intended as a beginning step in collecting and sharing programme experience. We hope it will encourage a culture of documentation during the coming years.

The focus of this compendium reflects the priorities for WASH in emergencies: latrines and toilets for safe excreta disposal, as well as menstrual hygiene management; hand-washing facilities that are reliable and strategically located; and sufficient and safe water supplies. Documentation for latrines includes technical drawings, bills of quantities, photographs and case studies to place the response in context. Site plans, water supply, hand-washing and hygiene facilities have been provided as sketches because less technical detail is required.

The equipment and designs have all been used in emergency preparedness and response, and most of them are from country experience in schools or temporary learning spaces. There is little that is radically new, although some ideas may not have been widely used before, including:

- Latrines and toilets that provide for menstrual hygiene, as in designs from Bangladesh and Pakistan.
- Prefabricated septic tank modules in Sri Lanka, perhaps the first known example.
- Two sets of concrete ring chambers in a series, used in lieu of adjacent baffled septic tank compartments, as in latrine designs for Bangladesh and Indonesia.
- Latrine superstructure and liner kits, used in Haiti by Oxfam.
- Ecological and sustainable compost latrines and toilets from Nepal and the Plurinational State of Bolivia.
- Peepoo bags, used during the earthquake disaster in Haiti by Oxfam and others.

Adapting the compendium designs

The photographs, drawings and bills of quantities presented in this publication are not meant to serve as a technical guide to actual construction. Before adapting any of these designs, the compendium user must determine whether a design is: socially acceptable and appropriate; technically viable; buildable, taking into account availability of materials and cost; and in accordance with government standards.

Inclusion of an experience in the compendium implies a broad endorsement of the intervention. In all cases, the drawings and bills of quantities have been compiled based on information from the countries providing the documents; content details, e.g., materials, dimensions, units, costs, are presented as provided. Due to rotation of the staff and other people involved in an intervention, bills of quantities and technical designs may not be perfectly documented. Some details raise questions we cannot answer because insufficient information is available.

Although every effort has been made to produce accurate drawings, these should not be scaled. Materials, number of units and dimensions noted in bills of quantities should be checked carefully. If possible, a pilot should be built to refine the design and the details to meet actual conditions in the intervention's location. And, finally, it is always important to take necessary measures to be prepared before an emergency actually happens.

Emergency response

1 Global – Pre-packaged solutions for general emergency response

WASH kits, prefabricated latrine components

The stocking and use of a variety of WASH kits for general emergency response is quite common for UNICEF and many other large agencies. The School-in-a-Box approach has similarly been widely adopted as a preparedness measure that will enable basic services to be provided much more rapidly after a crisis. To date, however, pre-stocked equipment, kits, or even kit lists, have not been widely established and are rarely used for WASH interventions in schools and temporary learning spaces.

Pre-packaged solutions are very valuable where wholesale destruction of school facilities has occurred and where temporary facilities need to be established quickly. The extent to which they are designed to suit the conditions of a particular country or area within a country depends primarily on whether such kits are produced or stocked in-country or internationally.

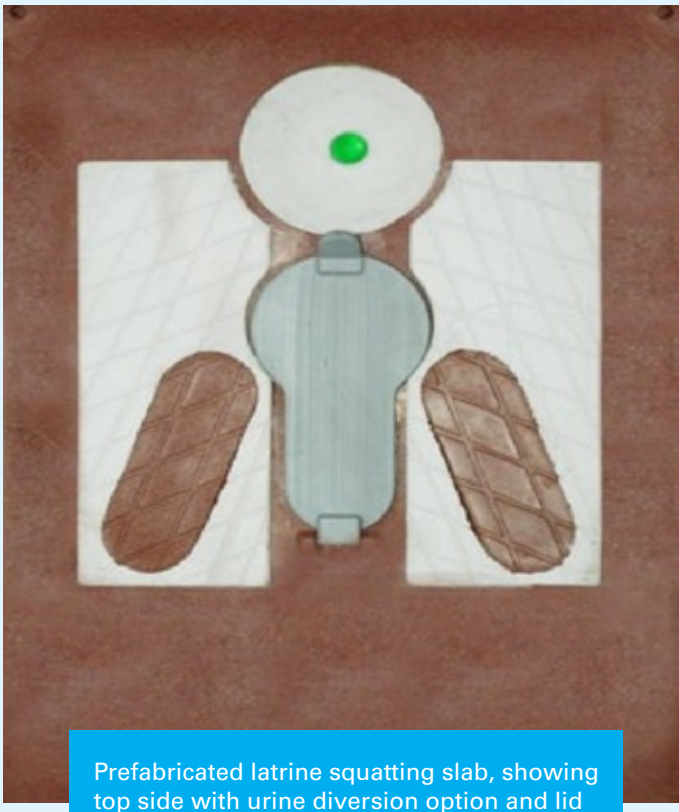
Where schools and temporary learning spaces need to be set up within weeks after a rapid onset crisis, it might be sufficient to have predefined lists that have been put out to tender, with contractors invited to submit proposals, costs estimated and suppliers pre-identified. Pre-purchase of kits or equipment could be considered where immediate use is anticipated.

The following items provide guidance on options for WASH interventions:

- Plastic water tanks, pumps, small-sized water pipes, taps, etc., are all likely to be purchased in-country on the local market.
- In general, all items in hygiene kits should be purchased from the local market.
- Because household water treatment might not be well established in some countries, items such as ceramic filters and biosand filters might only be available in limited quantities in the local market; international procurement could be required.
- Some items, such as prefabricated latrines, have very limited availability, so international procurement is generally required.

The following photographs illustrate some of the options for prefabricated latrine kits:

Corrugated plastic modular pit latrine lining (Evenproducts, United Kingdom)



Prefabricated latrine squatting slab, showing top side with urine diversion option and lid for covering squat hole (Nag Magic, India)

Underside of prefabricated latrine squatting slab, showing u-bend trap (AirCell Structures, UK)

Corrugated plastic latrine superstructure, in use for response to Haiti 2010 earthquake (Evenproducts, United Kingdom)

2 Household – Water treatment and storage

Household technologies adaptable for classrooms

For basic water treatment, there are four types of household technologies that are commonly used and suitable for adoption in schools and temporary learning spaces: candle filter treatment systems; sedimentation and chlorination; solar disinfection; and biosand filters.

For each of these four options, Table 2 (*below*) outlines the equipment needed for basic water treatment, covering 25 students. Choosing the appropriate option will depend on the following factors:

- The type of filter that is familiar because it has been used before in the area.
- Availability of equipment on the local market or easily supplied by the agency or organization that is supporting the learning space.
- Specific water quality issues and the type of treatment required to deal with these conditions; for example, where there are high levels of suspended solids (dirt or physical particles), solids will need to be removed.

The list of equipment in this table may be used as suggested examples, taking the following considerations into account: To provide water for 25 students, an estimated 2–3 litres of drinking water per day per student is required, implying that children can get additional water for hand washing and anal cleansing from other, less thoroughly treated sources. If the water to be treated has a high level of suspended solids, the rate of treatment could be lower and more equipment may be required to compensate.

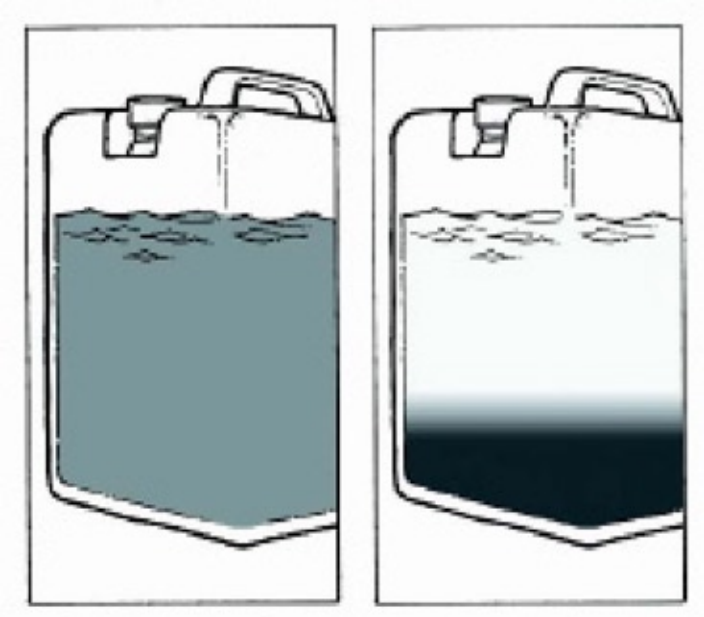
TABLE 2. Equipment for basic water treatment, covering 25 students

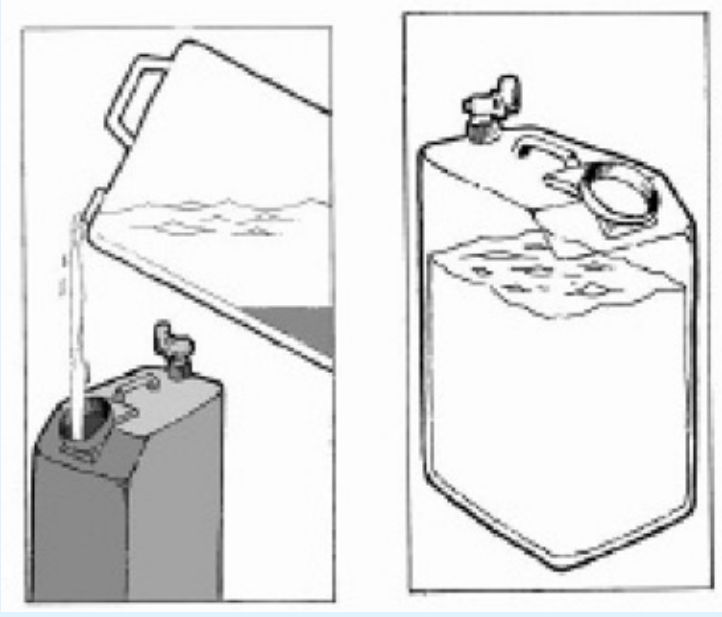
Item no.	Description (materials)	Unit	Quantity	Unit rate	Cost
Option A: Candle filter treatment system					
1	Candle filter treatment system	no.	1	–	–
2	Filtered water storage vessel with outlet taps	no.	2	–	–
3	Drinking cups	no.	25	–	–
Option B: Sedimentation and chlorination					
1	Sedimentation vessels	no.	3	–	–
2	Filtered water storage vessel with outlet taps	no.	3	–	–
3	Jug for lifting sedimented water	no.	1	–	–
4	Chlorine tablets for 75 litres water treatment each day	no.	1	–	–
5	Cloth for water straining	no.	1	–	–
6	Drinking cups	no.	25	–	–
Option C: Solar disinfection					
1	One 2-litre plastic bottle or two 1-litre bottles	no.	10	–	–
2	Filtered water storage vessel with outlet taps	no.	3	–	–
3	Drinking cups	no.	25	–	–
Option D: Biosand filter					
1	Biosand filter	no.	1	–	–
2	Filtered water storage vessel with outlet taps	no.	3	–	–
3	Drinking cups	no.	25	–	–

The following photographs illustrate various types of possible water treatment:

Solar water disinfection using recycled bottles

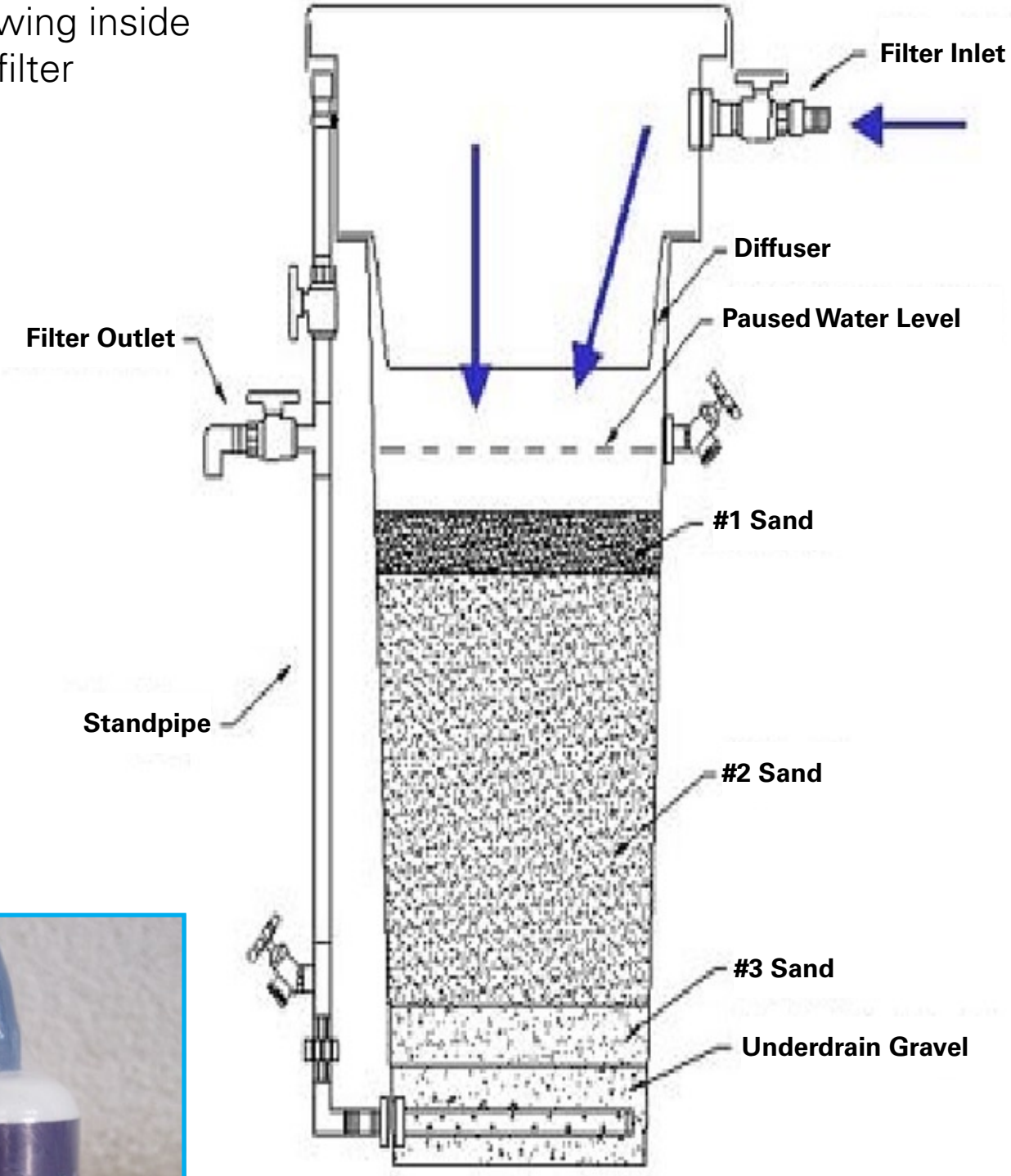
Ceramic candle filter showing top section with ceramic candle and lower section with storage and outlet tap





Stages of plain sedimentation using one water container for settling and a second for storage of clear water prior to chemical treatment with chorine

Diagram showing inside of a biosand filter



Liquid chlorine solution used for microbiological water treatment, made in Nepal

3 Bangladesh – Disaster-resistant facilities in schools

Standard block of three toilets, 2008–2009

Context: The Southern part of Bangladesh is particularly vulnerable to cyclones, coming from the Bay of Bengal and causing major floods. To provide protection from flooding, schools throughout Bangladesh are often located on higher ground and are frequently used as cyclone and flood shelters for people displaced from their homes.

Because the duration of displacement can range from a few days to several weeks, the provision of facilities and supplies as a preparedness measure in these schools has been prioritized. Disaster-resistant WASH facilities also benefit students and the entire school community on an ongoing basis; therefore, permanent, disaster-resilient facilities were provided in order to serve both preparedness and ongoing school needs.

Organization: Oxfam GB

Location: Southern Bangladesh, cyclone- and flood-affected districts of Bagherhat and Pirojpur

Usage and duration: More than 100 schools equipped with disaster-resistant toilets, built in 2008–2009

Intervention/facilities provided:

Latrines/toilets	Standard block of three toilets – one each for girls, boys and teachers – with a separate space for boys' urination; a facility for girls' urination is provided within the girls' toilet
Water supply	A shallow-depth (<7m) handpump is installed in front of the girls' toilet
Hygiene and cleaning kits	Toilet for older girls was designed to provide room for washing menstrual cloths in privacy

Construction time: 2–3 weeks

Cost: 3 toilets – approximately USD 1,805

Maintenance: The school management committee was responsible for cleaning the toilets, as well as operation and maintenance of the toilets and the handpump. Toilet pits were designed to have a one-year lifespan before emptying was required. The committee members received training and were fully equipped with the necessary tools for future operation and maintenance.

Closure: Handover to school management committee

Successes and challenges:

- Girls' school attendance increased significantly due to easy access to proper toilet facilities.
- Teachers tended to lock their own toilet and those of the boys, which obliged the boys to go elsewhere for excreta disposal. Female teachers often used the girls' toilet and control these facilities as well.

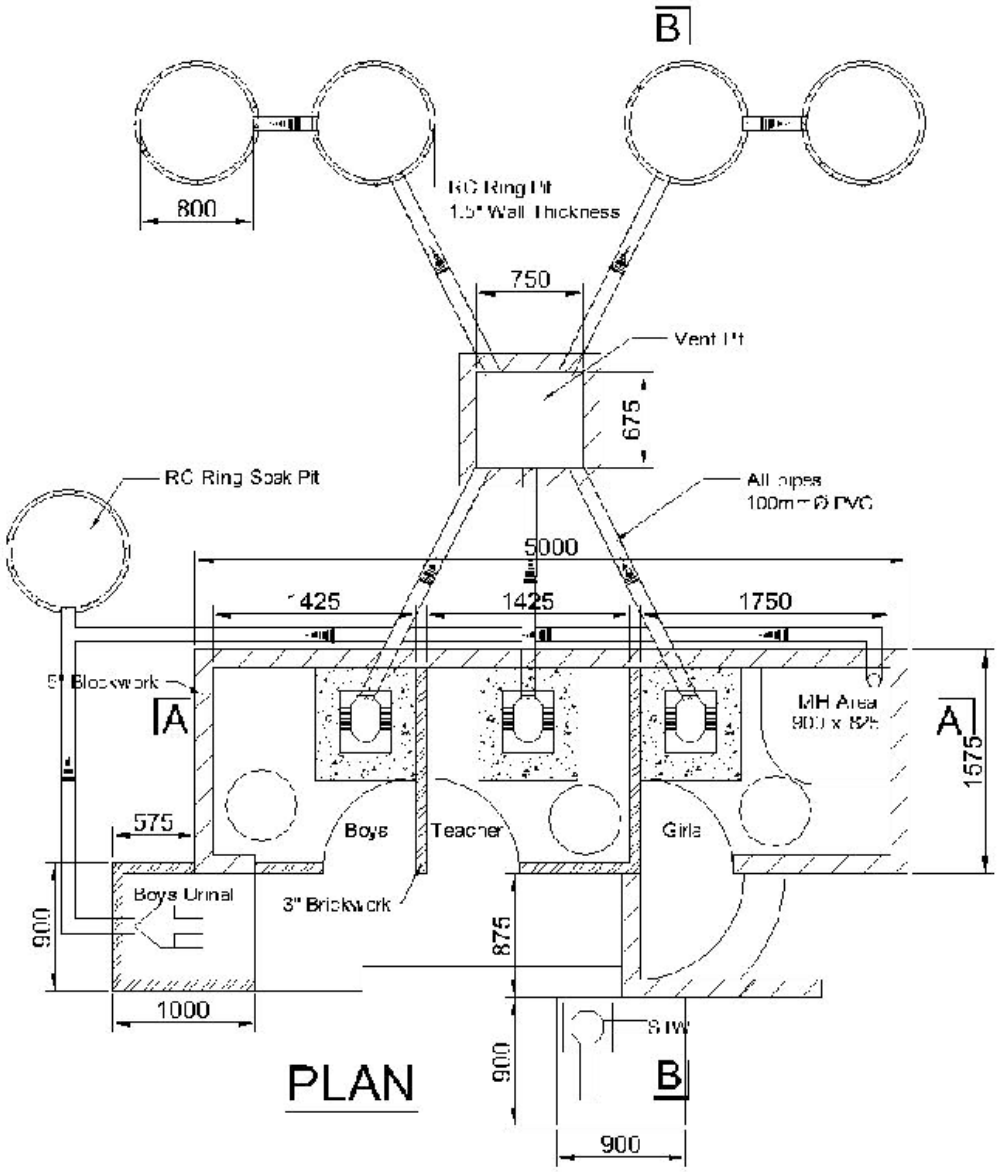
Recommended adaptation for future use: Mapping the number of people who might need temporary shelter in each school area would enable the school management committee and the district education department to determine whether the three toilets provided in each school are sufficient or need to be supplemented with temporary facilities. Such information could also be used to plan the locations where emergency facilities can be constructed.

TABLE 3. Bill of quantities for construction of standard block of three toilets in schools, Bangladesh

Item no.	Description	Unit	Quantity	Rate (BDT)	Cost (BDT)
1	Earthwork: excavation, in all kinds of soils, for foundation trenches; levelling, ramming and preparing the base; bailing out water and shoring if necessary; providing centre line and benchmark pillars; removing spoils, etc. – all earthwork completed as per direction of engineer-in-charge and as per drawing and design	cft	102.56	4	359
2	Brickwork, 10 in.: 1st class, in cement mortar (1:4) in foundation and plinth; filling interstices fully with mortar, raking out joints, cleaning and soaking bricks for at least 24 hours before use and curing at least 7 days, etc. – all brickwork completed as per direction of engineer-in-charge and as per drawing and design	cft	122.66	122	14,964
3	Sand: filling in foundation trenches and plinth with fine local sand having minimum fineness modulus (FM) of 0.50; levelling, watering and consolidating each layer by layer up to finished level, etc. – all filling completed as per direction of engineer-in-charge and as per drawing and design	cft	46.39	8	371
4	One layer of brick flat apron in floor with 1st class or picked *jhama* bricks; preparation of bed and filling interstices with local sand, etc. – all work completed as per direction of engineer-in-charge and as per drawing and design	sft	61.85	24	1,484
5	Mass concrete (1:2:4) in floor and anchor for roof structure: 10 mm rod with cement, sand and picked *jhama* chips; breaking chips, screening, centring, shuttering, casting, curing for at least 7 days, etc. – all work completed as per direction of engineer-in-charge and as per drawing and design	cft	28.00	155	4,341
6	Brickwork, 5 in.: 1st class brickwork in cement mortar (1:4) in superstructure; filling interstices fully with mortar, raking out joints, cleaning and soaking bricks at least for 24 hours before use and curing at least 7 days. etc. – all brickwork completed as per direction of engineer-in-charge and as per drawing and design	sft	226.08	75	16,956
7	Brickwork, 3 in.: with 1st class brickwork in cement mortar (1:4) in superstructure; filling interstices fully with mortar, raking out joints, cleaning and soaking bricks for at least 24 hours before use and curing at least 7 days, etc. – all brickwork completed as per direction of engineer-in-charge and as per drawing and design	sft	85.00	45	3,825
8	Supplying, fitting and fixing of roof frame with 0.36 mm CGI sheet (each 7 ft. long) with fittings, etc. – all work completed as per direction of engineer-in-charge and as per drawing and design	set	1.00	9,000	9,000
9	Plastering inner wall and floor: minimum 1/2 in. thick cement plaster (1:4) to inner wall and floor; finishing corner and edges, including cleaning the surface, scaffolding and curing for at least 7 days, etc. – all plastering completed as per direction of engineer-in-charge and as per drawing and design	sft	210.01	16	3,360
10	Plastering outer wall: minimum 1/2 in. thick cement plaster with (1:4) to outer wall; finishing corner and edges; cleaning the surface, scaffolding and curing for at least 7 days, etc. – all plastering completed as per direction of engineer-in-charge and as per drawing and design	sft	410.00	15	6,150

Item no.	Description	Unit	Quantity	Rate (BDT)	Cost (BDT)
11	Tube well installation at 200 ft.-0 in. depth raised platform adjacent to latrine (detailed bill of quantities attached in original document)	no	1.00	14,437	14,437
12	Five separate pit installations: each with 5 rings and 1 cover slab; cementing joint of ring/ring and ring/slab, etc. – all installations completed as per direction of engineer-in-charge and as per drawing and design	set	5.00	1,500	7,500
13	Three coats of whitewash: with slacked stone lime, supply of gums, blue pigment; scaffolding and curing for at least 7 days, etc. – all completed as per direction of the engineer-in-charge and as per drawing and design	sft	205.00	2.5	513
14	Ceramic squatting pan (standard/best quality): with footrest and trap (RFL brand uPVC), 4 in. diameter uPVC 'Econo Sanitary' pipe (10 ft. length), etc. – fitting, fixing all completed as per approved quality of materials and direction of engineer-in-charge	set	3.00	1,700	5,100
15	Urinal with trap (RFL brand uPVC) with 20 ft. long, 3 in. diameter uPVC 'Sanitary' pipe (RFL brand), etc. – fitting, fixing all completed as per approved quality of materials and direction of engineer-in-charge	set	1.00	1,800	1,800
16	1.5 in. diameter PVC vent pipe (RFL, class-c) with 1.5 in. x 4 in. tee etc. – fitting, fixing all completed as per approved quality of materials and direction of engineer-in-charge	set	1.00	202	202
17	Manufacturing, supplying, fabrication and fixing mild steel (MS) door: made of MS angles 1.5 in. x 1.5 in. x 1/8 in. door frame, 1 in. x 1 in. x 1/8 in. shutter frame and 1 in. x 1/8 in. bars placed horizontally and vertically – all passing through the centre as per drawing Top to bottom part covered with 18 BWG MS sheet and fixed with bars providing locking arrangements on 1/8 in. thick MS plate, providing 1.5 in. x 1.5 in. x 1/8 in. MS angle clamps fitting and fixed with the outer frame of the door, the clamps being embedded in the masonry pillars Holes cut and damaged areas mended, including riveting/welding as or where necessary Painting two coats of synthetic enamel paint over a coat of priming of anti-corrosive paint, etc. – all completed as per drawing design and direction of the engineer-in-charge	set	3.00	2,500	7,500
18	Plastic container for water storage, 200-litre capacity	no	1.00	2,000	2,000
19	Arrangement for double action pump	no	1.00	8,000	8,000
20	Painting and lettering outside wall to provide messages, as per instruction	LS	1.00	3,000	3,000
21	Carrying of all materials to the specified site	LS	1.00	5,000	5,000
Total					**115,862**

USD 1 = BDT 73.50 (June 2011); USD total = 1,805.00



All dimensions in mm unless otherwise noted
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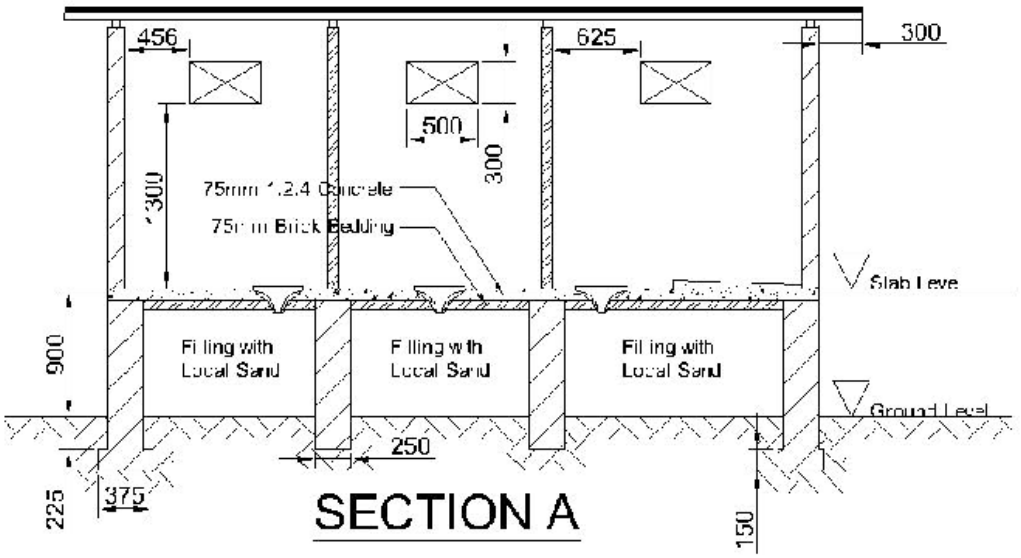
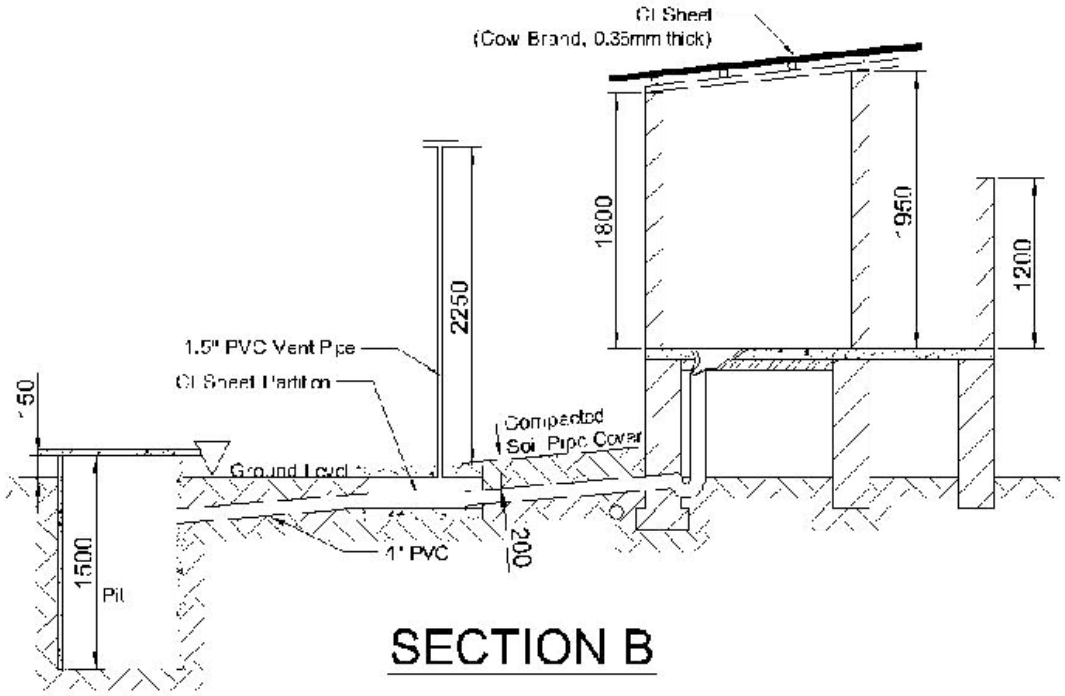
Drawing Title: Bangladesh Community Latrine for Children Option 3: Plan & Drainage		
Drawing Reference: Ex-Ban(Pre)-Dwg-RevPR1		Sheet Number: 1 of 2
Scale: 1:50	Sheet Size: A4	Date: June 2011



SECTION A



SECTION B

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Drawing Title		
Bangladesh Community Latrine for Children Option 3: Sections		
Drawing Reference Ex-Ban(Pre)-Dwg-RevPR1		Sheet Number 2 of 2
Scale 1:50	Sheet Size A4	Date June 2011

4 Sri Lanka – Meeting needs of populations displaced by conflict

Prefabricated latrines with septic tank, slab and superstructure, 2007–2008

Context: Long-running conflict in the eastern and northern areas of Sri Lanka prior to 2009 resulted in small- to medium-scale displacement, which occurred on an ongoing but unpredictable basis. Water supply was addressed through the provision of tanks, water trucking and other measures, but managing excreta was a much more complicated issue.

The original concept was to produce several hundred kits for latrines with septic tanks – prefabricated in Sri Lanka – for use by the general population and in alignment with the Government's standards requiring improvements over simple pit latrines.

The design for latrines eventually constructed addressed the very sandy soil conditions in Batticaloa District and included a raised squat plate. These units were a success in the east, and the UNICEF office in Vavuniya stockpiled many of the kits with partners in and around the city of Puttalam, in case of mass displacement from the Vanni region in northern Sri Lanka. The prefabricated latrine kits were also available for use in schools, although on a limited basis.

Agency and organization: UNICEF and Agency for Technical Cooperation and Development (ACTED)

Location: Batticaloa District, initially, then Kilinochi District

Usage and duration: N/A

Intervention/facilities provided:

Latrines/toilets	A block of 4 prefabricated latrines with septic tank, slabs and superstructure was developed as a prefabricated kit, particularly for use in areas where the groundwater table is high
Hand-washing and bathing facilities	To be developed on site once latrine kits are deployed
Water supply	To be developed on site once latrine kits are deployed
Hygiene and cleaning kits	To be provided on site once latrine kits deployed

Construction time: 3 days to assemble each kit, including time for excavation of ground for the septic tank

Cost: N/A

Maintenance: N/A

Closure: N/A

Successes and challenges: N/A

Recommended adaptation for future use: This prefabricated system, alongside twin-pit composting latrines, could reduce levels of groundwater contamination. Where government standards require a latrine that reduces groundwater contamination, the design offers better control of effluent than simple pit latrines; however, it was not tested in practice to confirm that it works as well as a proper septic tank system. Where groundwater contamination is not a concern, a simple pit with effluent soaking into the surrounding soil would offer a cheaper and faster emergency solution.

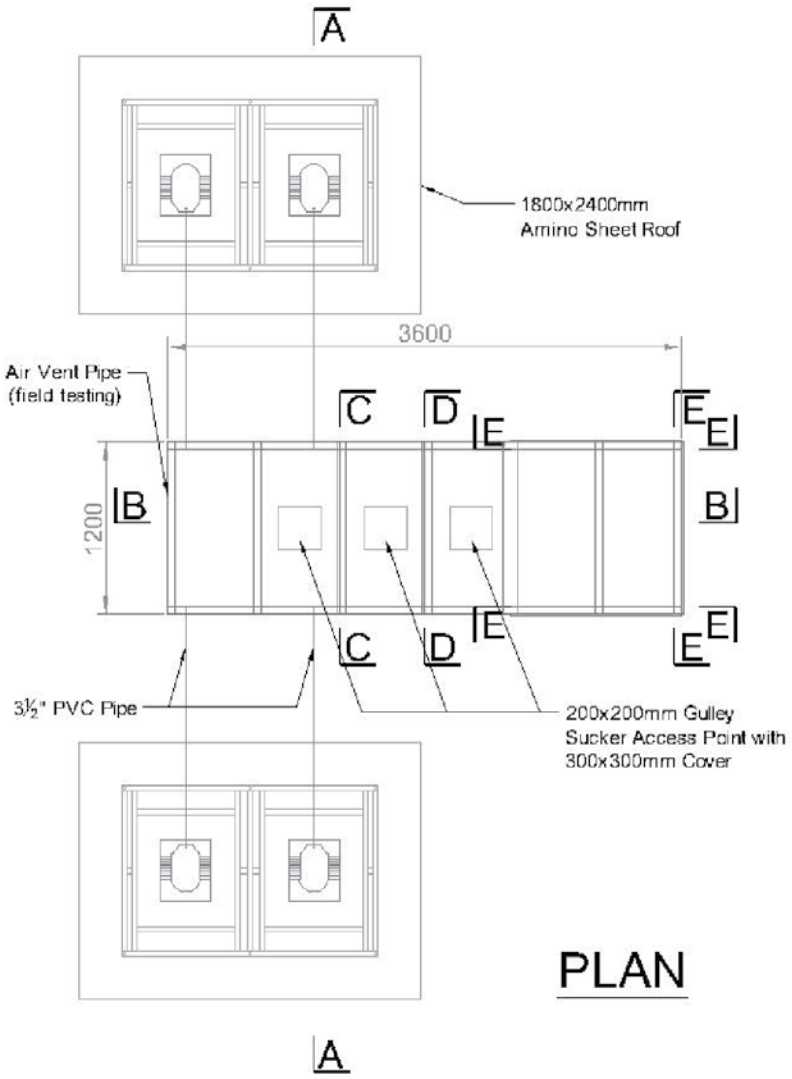
The following photographs show the emergency preparedness latrine and septic tank kit as assembled in Sri Lanka:

Assembling the prefabricated septic tank

The assembled latrine superstructure

TABLE 4. Construction materials for prefabricated latrines in Sri Lanka

Item no.	Description	Unit	Quantity
Superstructure frame (2 frames per 1 set; 2 toilet units per 1 frame)			
Roof and walls (3 side frames)			
1	Roof structure; amino sheet, 26 gauge, 6 ft. 0 in. x 8 ft. 0 in., with GI pipe frame	no.	2.00
2	Side frame-right, 3/4 in. GI pipe, 9 ft. 6 in. height	no.	2.00
3	Side frame-middle, 3/4 in. GI pipe, 9 ft. 3 in. height	no.	2.00
4	Side frame-left, 3/4 in. GI pipe, 9 ft. 0 in. height	no.	2.00
5	Back support, 3/4 in. GI pipe, 3 ft. 0 in. length	no.	4.00
6	Cabin cover, plastic tarpaulin (standard UNICEF dimensions)	no.	2.00
7	Binding wire to attach tarp to frame	kg	0.20
Doors (2 units, left and right side)			
8	Door frame-right, amino sheet and GI pipe door frame	no.	2.00
9	Door frame-left, amino sheet and GI pipe door fra dme	no.	2.00
10	Passive door guard, nylon string	m	2.50
Flooring, squatting pan and plumbing connections			
11	Floor frame, L angle bar and wood planks	no.	2.00
12	Foundation support post, 1 in. GI pipe, 2 ft. 6 in. length with 4 in. x 4 in. plate	no.	12.00
13	Floor surface, prefabricated plastic floor slab	no.	4.00
14	Fibreglass squatting pan with trap	no.	4.00
15	Self-tapping screws, to attach squat pan and frame	no.	12.00
16	Pipe to pit, PVC pipe 3.5 in. diameter	no.	2.00
17	Plumbing connection, PVC glue, 50 grams	no.	2.00
18	Sealing for trap, silicone 400 grams	no.	3.00
19	Entrance step to cabin, empty rice bag, 50 kg, 4 in. fill height	no.	4.00
Soakage pit, 12 ft. x 8 ft. x 4 ft. (1 pit, 2 superstructure sets, 4 toilet units)			
Pit structure			
21	Soakage pit structure (2 sides), plywood 8 ft. 0 in. x 4 ft. 0 in. x 15 mm (waterproof)	no.	2.00
22	Soakage pit top (3 access holes), plywood, 8 ft. 0 in. x 4 ft. 0 in. x 15 mm (3 8 in. x 8 in. cuts)	no.	1.00
23	Soakage pit bottom, plywood, 6 ft. 0 in. x 4 ft. 0 in. x 15 mm (waterproof)	no.	1.00
24	Pit structure front-top, plywood, 4 ft. 0 in. x 4 ft. 0 in. x 15 mm (waterproof)	no.	2.00
25	Pit structure middle panel, plywood, 4 ft. 0 in. x 4 ft. 0 in. x 15 mm (12 in. x 6 in. cut)	no.	1.00
26	Pit structure middle panel, plywood 4 ft. 0 in. x 4 ft. 0 in. x 15 mm (1 ft. 0 in. weir cut)	no.	1.00
27	Walls, soak pit-exfiltration cuts, plywood 4 ft. 0 in. x 4 ft. 0 in. x 15 mm (1 in. circular cuts)	no.	3.00
28	Gully suck access cover, plywood, 12 in. x 12 in. x 15 mm (waterproof)	no.	3.00
29	Gully suck access plug, plywood 8 in. x 8 in. x 15 mm (waterproof)	no.	3.00
30	Waterproof lining for storage pit, polythene plastic sheeting, 500 gauge	kg	14.00
31	Timber supports for pit, pine, 2 in. x 2 in. x 4 ft.	no.	26.00
32	Timber supports for joining pits, pine, 2 in. x 4 in. x 4 ft.	no.	4.00
33	Water seal for exfiltration cuts, silicone, 400 grams	no.	2.00
34	Attach timber to plywood, thin nails, 2 in.	kg	1.25
35	Attach timber to plywood, thin nails, 3 in.	kg	1.00
Ventilation			
36	Air vent pipe elbow, 2 in. diameter	no.	1.00
37	Air vent pipe, 2 in. diameter (12 ft. 0 in. height)	no.	1.00
38	Air vent pipe, cap, 2 in.	no.	1.00
39	Air vent pipe, PVC mesh net (vector control)	sq. ft.	0.50
40	Air vent pipe, support timber posts, 2 in. x 2 in. x 8 ft.	no.	1.00



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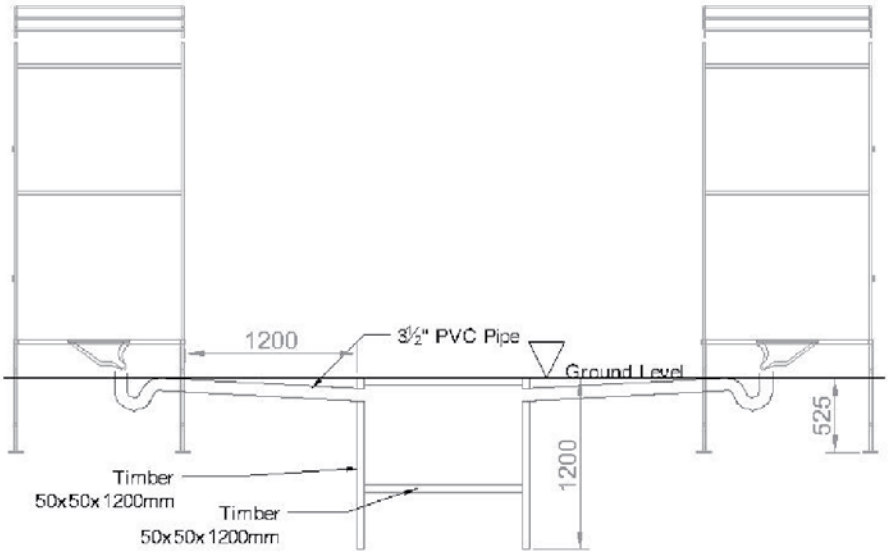
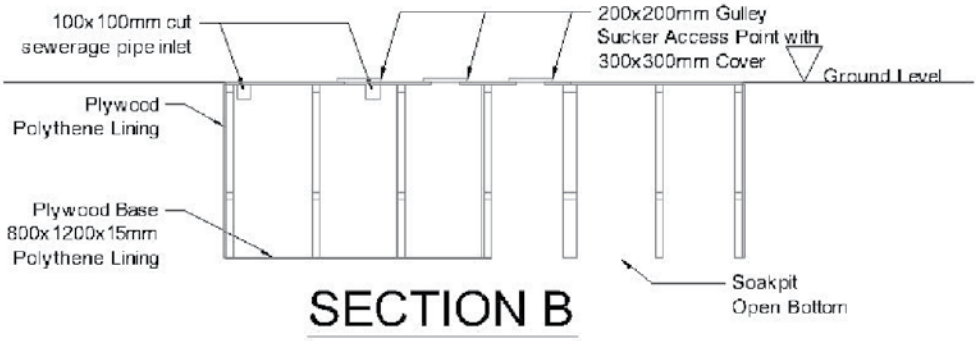
Drawing Title		
Sri Lanka Portable Toilet for Emergency Response: Plan		
Drawing Reference		Sheet Number
Ex-SrL(Pre)-Dwg-RevPR		1 of 3
Scale	Sheet Size	Date
1:50	A4	June 2011



SECTION A



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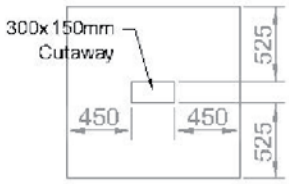

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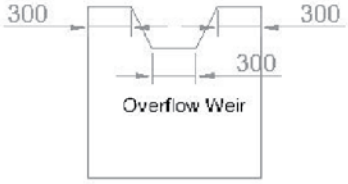

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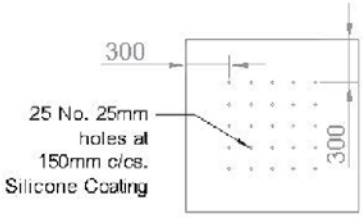

SECTION E

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Drawing Title		
Sri Lanka Portable Toilet for Emergency Response: Sections		
Drawing Reference: Ex-SrL(Pre)-Dwg-RevPR		Sheet Number: 2 of 3
Scale: 1:50	Sheet Size: A4	Date: June 2011

5 Democratic Republic of the Congo – Interventions in pre-existing schools used for shelter

Emergency latrines, water supply and sustainable facilities, 2010–2011

The Democratic Republic of the Congo has been wracked for years by ongoing armed conflict, both internally and cross-border, resulting in a chronic humanitarian crisis. At end-December 2010, the Office for the Coordination of Humanitarian Affairs (OCHA) estimated that more than 1,700,000 displaced people and 900,000 returnees in the country had been affected by armed conflict.

Recurrent displacement, precarious returns and increased vulnerability of host communities have devastating effects on children and women. Local communities hosting displaced families, and aid agencies that seek to support them, struggle to assess and meet critical needs in a context where many areas are still facing insecurity and limited access.

This case study on the Democratic Republic of the Congo features two WASH interventions in schools that provide shelter for displaced people: (1) in Province Orientale, where Solidarités International provided emergency latrines with hand-washing facilities, as well as hygiene and cleaning kits, under the Rapid Response to Movements of Population programme, led by the OCHA and UNICEF; and (2) in Nord Kivu Province, where Solidarités International provided emergency latrines, and Oxfam GB worked on emergency water supply and sustainable latrines.

Province Orientale, Democratic Republic of the Congo

Context: In late 2008, the Ugandan Lord's Resistance Army (LRA) began large-scale killing, kidnapping and other atrocities in remote areas of Bas-Uele and Haut-Uele Districts, Province Orientale, in north-eastern areas of the Democratic Republic of the Congo. Despite joint military operations by Congolese, Ugandan and MONUSCO forces, LRA incursions were again on the rise after January 2011.

OCHA currently estimates that the Uele districts are hosting 266,655 internally displaced people and 85,024 returnees. Large areas of the remote districts are only sporadically accessible, or entirely inaccessible, to humanitarian actors due to the non-existent or unusable roads and ongoing insecurity.

LRA attacks around the town of Faradje, in the farthest north-eastern corner of the Democratic Republic of the Congo, caused major population movement in Kurukwata. Consequently, the population doubled and morbidity rates due to lack of drinkable water and improved sanitation increased dramatically.

As identified in household surveys, around 68 per cent of children under age 5 had diarrhoea. In school, there were almost no latrines and knowledge of basic hygiene was very low. Implementation of emergency sanitation in schools and reinforcing children's knowledge of good hygiene practices, therefore, were part of the work carried out by Solidarités International.

Organization: Solidarités International, Rapid Response to Movements of Population

Location: Kurukwata, Bas-Uele and Haut-Uele Districts, Province Orientale, Democratic Republic of the Congo

Usage and duration: The intervention reached 1,950 in children in total, 1,000 girls and 950 boys. The latrine walls and roofs were constructed with plastic sheeting, which has a lifespan of 6–8 months but could be replaced by local materials such as mud.

Intervention/facilities provided:

Latrines/toilets	44 emergency latrines, separated by gender (25 for girls, 19 for boys) in four primary schools: superstructure in wood, with plastic sheeting for the walls and roof; female and male signs outside, lock inside
Hand-washing and bathing facilities	For each block of latrines, 1 container with tap for hand washing; containers are filled by rainwater
Hygiene and cleaning kits	1 hygiene and cleaning kit for each block (1 bucket, 1 broom, 1 bottle of bleach, plastic gloves, 1 bar of soap)
Other	A latrine management committee – Comité Gestion de Latrine (CoGeLa) – was established for each block of latrines; school sensitization was conducted to reinforce knowledge of basic hygiene awareness

Construction time: 2.5 weeks to build 44 emergency latrines

Cost: Block of 2 latrines – USD 286
Block of 3 latrines – USD 380
Rainwater harvesting basin (impluvium) – USD 105

Maintenance: The latrine management committees were responsible for maintaining the facilities and received training for this purpose; one hygiene kit was provided for each committee. Children received training in basic hygiene awareness, especially in washing hands after using the latrine.

Closure: The children's committee, as well as the parents' and teachers' committee, were informed that they could substitute the plastic sheeting used for walls with local materials, such as mud, for a more robust design and greater sustainability. Advocacy to the WASH coordination mechanism was conducted to find a partner to implement sustainable latrines in the area.

Successes and challenges:

- Construction was facilitated by a specific contract for each part of the latrine: digging, superstructure and impluvium. Contractors were supervised by WASH technicians from Solidarités International.
- Latrine management committees were still effective three months after they were established.
- Considering the insecurity and difficult logistics in this context, the main challenge for implementation was to find local materials, such as timber and planks, and to transport these materials to the construction site.

Recommended adaptation for any future use: N/A

The photograph below shows latrine construction for schools that were sheltering internally displaced people in the Democratic Republic of the Congo:

Constructing the wooden floor for a latrine block

Nord Kivu Province, Democratic Republic of the Congo

Context: In Nord Kivu Province, ongoing displacement has occurred in the wake of extreme violence against civilians during clashes between government forces and multiple non-government militia groups, based both within the Democratic Republic of the Congo and in neighbouring countries.

Large areas of the Masisi and Rutshuru territories, for example, have been controlled by the National Congress for the Defence of the People, an armed militia, with many other armed groups integrated into local communities or split into smaller cells that employed hit-and-run tactics.

In 2010, clashes between government forces and armed groups severely impacted local populations. Around 12,000 households in villages around the town of North Beni fled for safety and assistance, with approximately one third of them eventually staying in such places as schools, churches and abandoned houses.

Nord Kivu Province hosts an estimated 508,000 internally displaced people and 510,000 returnees. The intervention in schools was split between two actors:

- Solidarités International, for sanitation emergency response, such as latrines.
- Oxfam GB, for water emergency response, such as water trucking, and for sustainable sanitation response, including rehabilitation and construction of rainwater collectors, and rehabilitation of latrines.

Location: Oicha, Mavivi and Mbau, Beni Territory, Nord Kivu Province

Agencies: Solidarités International, Rapid Response to Movements of Population – emergency latrines, Province Orientale, Democratic Republic of Congo

Oxfam GB – emergency water supply and sustainable latrines

Usage and duration: The emergency interventions covered 30,000 people, with an additional 10,000 users for sustainable facilities. The lifespan of emergency latrines was six months, with expectations that they could be used longer with sustainable implementation based on the level of maintenance.

Intervention/facilities provided:

Latrines/toilets	600 emergency latrines, separated by gender: superstructure in wood and plastic sheeting (walls and roof); female and male sign outside, lock inside Rehabilitation of 200 latrines in schools Rehabilitation or construction of 30 rainwater collectors
Hand-washing and bathing facilities	1 bucket for emergency latrines or 1 container for sustainable latrines with tap for hand washing provided for each latrine block; containers filled by rainwater
Water supply	Water trucking, plus 30 rain collectors: 13 with 5,000-litre plastic tank; 17 with ferrocement tank
Hygiene and cleaning kits	1 hygiene and cleaning kit for each latrine block (1 bucket, 1 broom, 1 bottle of bleach, plastic gloves, 1 bar of soap)
Other	A latrine management committee – Comité Gestion de Latrine (CoGeLa) – was established for each block of latrines

Construction time: 15 days to construct 600 emergency latrines; rehabilitation of sustainable facilities took a few days for each, 2 months to achieve all sustainable structures

Cost: *Emergency* – Block of 2 latrines – USD 286
Block of 3 latrines – USD 380
Sustainable – New rainwater collector with 5,000-litre plastic tank – USD 1,565
Rainwater collector rehabilitation – USD 1,000
New rainwater collector with ferrocement tank – USD 2,357
Latrine rehabilitation – USD 200

Maintenance: The latrine management committees were responsible for maintaining the facilities and received training for this purpose; one hygiene kit was provided for each committee. Children received training in basic hygiene awareness, especially in washing hands after using the latrine.

Closure: As Oxfam had other programmes in the area, the organization dismantled emergency latrines once internally displaced people had left school buildings. Some latrines were decommissioned by breaking the slab and pushing it into the latrine pit, then adding lime and backfilling the pit.

Successes and challenges:

- Latrine superstructures and floor were built at one site, in a production line with stages for superstructure and door construction; covering the superstructure and the doors with plastic sheeting; and floor construction and covering. When it was finished, the superstructure was transported to schools where a latrine pit had already been excavated.
- Employment for construction included people from the host communities, as well as those who were displaced, to avoid tensions between the two groups.
- Construction at each site was supervised by WASH technicians from Solidarités International.
- The main challenge for emergency latrines was to implement a large number of latrines, covering a large area, as quickly as possible. Construction was facilitated through a specific contract for construction of the superstructure and the wooden floor.

Recommended adaptation for future use:

For water supplies, using plastic tanks is the most feasible option for an immediate intervention. Ferrocement tanks, which are permanent and take a few weeks to build and cure, might be added later – with the plastic water tanks released and put back into emergency stockpiles. (Recommendations for latrines are not available.)

The following photographs illustrate construction of a ferrocement water tank in the Democratic Republic of the Congo:

Formwork for the tank roof

Building the steel reinforcement for a ferrocement tank

TABLE 5. Materials and labour for a block of two latrines, Democratic Republic of the Congo

Item no.	Description	Unit	Quantity	Rate (USD)	Cost (USD)
1	Plastic sheeting	roll	4.0	0.87	34.80
2	Wooden log, 2.5 m	piece	4.0	2.00	8.00
3	Wooden planks, 0.30 x 4.5 x 3 m	piece	6.0	15.00	90.00
4	Timber, 4 m	piece	17.0	5.00	85.00
5	Nails, 4 cm	kg	2.5	2.00	5.00
6	Nails, 6 cm	kg	0.7	2.00	1.00
7	Nails, 10 cm	kg	2.5	2.00	5.00
8	Nails, 12 cm	kg	2.5	2.00	5.00
9	Hinges	piece	4.0	1.00	4.00
10	Stencil for male/female signs on latrine doors	piece	1.0	1.00	1.00
11	Paint	small tin	1.0	5.00	5.00
Total materials					**244.20**

Item no.	Labour	Man	Days	Rate	Total
1	Digging	3	2	3.70	22.20
2	Carpenters	2	1	6.10	12.20
3	Carpenters' assistants	2	1	3.70	7.40
Total labour					**41.80**
Total materials + labour					**286.00**

Hygiene kit

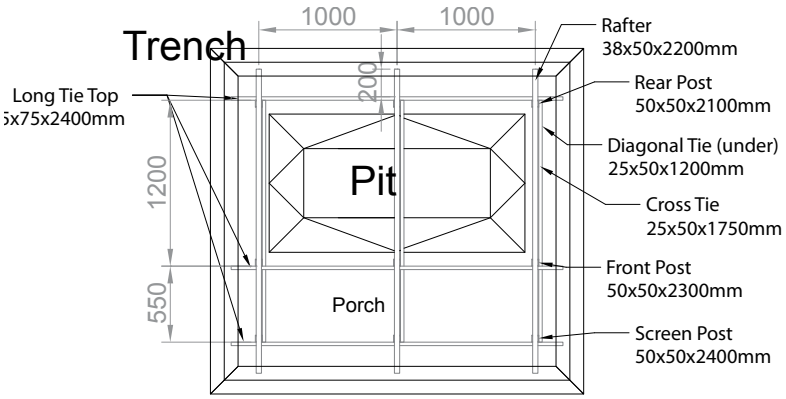
Item no.	Description	Quantity	Rate (USD)	Total (USD)
1	Soap, 750 grams	1	0.80	0.80
2	Plastic bucket, 20 litres	1	4.00	4.00
3	Broom	1	3.00	3.00

Item no.	Description	Quantity	Rate (USD)	Total (USD)
4	Plastic gloves	1	0.50	0.50
5	Bleach (bottle)	1	3.00	3.00
Total				11.30

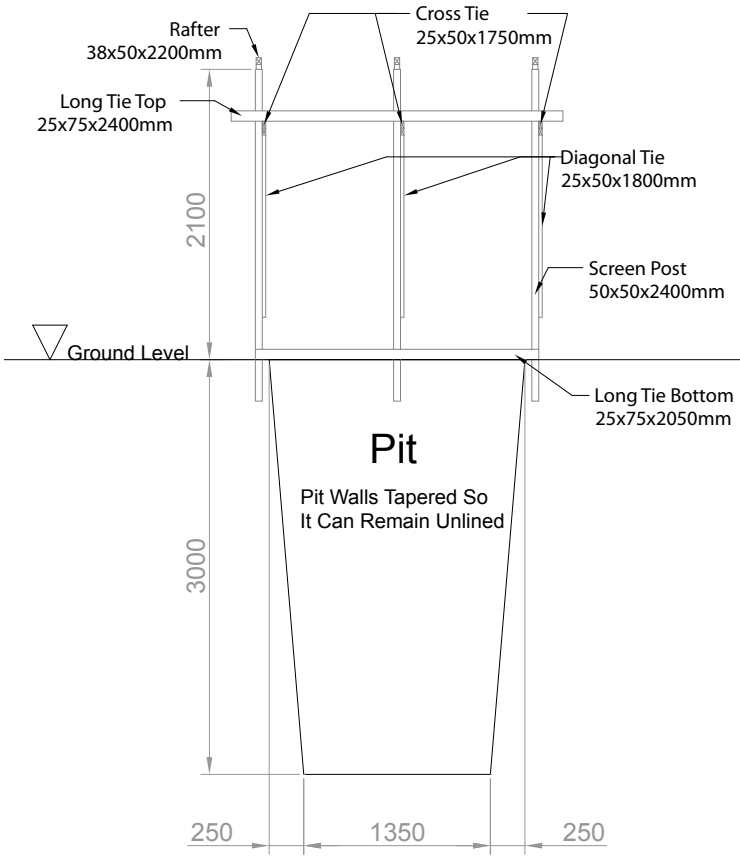
Impluvium for hand washing

Item no.	Description	Unit	Quantity	Rate (USD)	Total (USD)
1	Wooden planks, 0.30 x 4.5 x 3m	piece	1.00	15.00	15.00
2	Timber, 4 m)	piece	2.00	8.00	16.00
3	Other materials	piece	2.00	9.00	18.00
4	Plastic container	piece	1.00	15.00	15.00
5	Tap	piece	1.00	5.00	5.00
6	Iron wire	kg	0.50	3.00	2.00
7	Cement	sack	0.25	18.00	5.00
8	PVC pipe, 3/4 in. diameter, 0.5 m length	piece	1.00	7.00	7.00
9	Nipple, 3/4 in.	piece	3.00	2.00	6.00
10	PTFE	roll	1.00	1.00	1.00
11	Gravel	m3	0	15.00	0
12	Stone	m3	0	15.00	0
Total materials					89.00

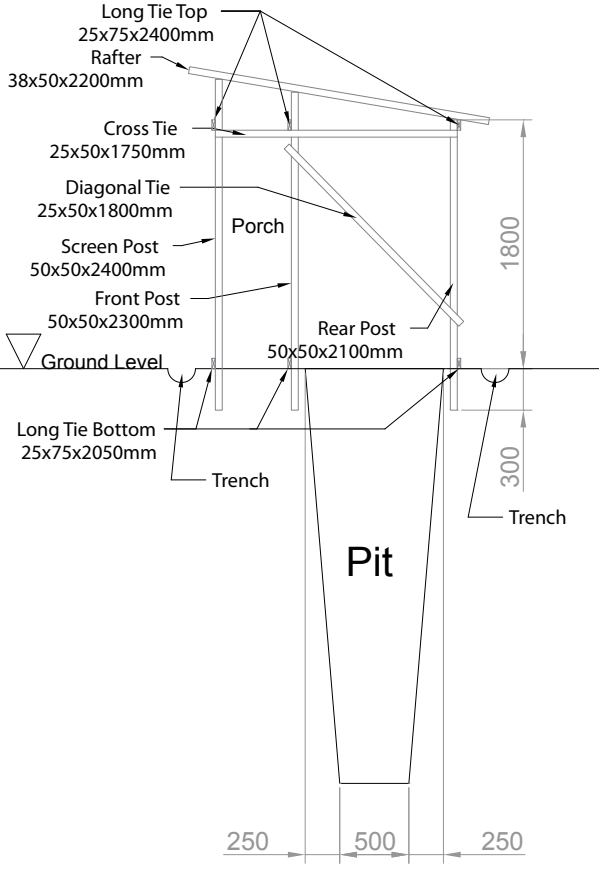
Item no.	Labour	Man	Days	Rate/ day	Total
14	Mason	0	0	6.10	0
15	Carpenter's assistant	1	1	3.70	3.70
Total labour					3.70
Total materials + labour					92.20



PLAN



FRONT ELEVATION



END ELEVATION

All dimensions in mm unless otherwise noted
Do not scale from this drawing, use figured dimensions only

Drawing Title
DR Congo School Latrines
Plan & Elevations

6 Sudan – WASH for temporary schools in Darfur

Simple pit latrines, water reservoirs in camps for people displaced by conflict, 2004–2011

Context: In 2004, armed conflict in many parts of Darfur caused massive movements of people into emergency camps, each one typically sheltering populations up to tens of thousands. There were about 2.6 million internally displaced people in Darfur as of 2011, many who sought shelter in schools as the crisis began and remained living there for the next seven years.

Temporary schools were built in the camps under the assumption that people would be able to return to their homes after a short time, and even those who were not displaced were affected by the conflict. Considering these factors, UNICEF worked to improve WASH services in existing schools that were still functioning as education facilities, as well as in temporary learning spaces and child-friendly centres. The average number of students per school was 400, and up to 10 schools were situated in one work location, such as a camp or town.

UNICEF's first priority was to provide WASH services in child-friendly and learning centres in camps, alongside WASH services to the camps in general. All work undertaken in the camps was intended to be temporary, while most work in rural areas and villages was permanent. Water supply systems, however, tended to be more permanent in the camps.

Agency: UNICEF, for direct implementation, along with some partners

Location: Darfur, Sudan – across all emergency camps, and in rural areas and villages affected by conflict

Usage and duration: UNICEF has developed a manual on WASH in Schools for permanent facilities in the Sudan, although it is not applied fully to camps. Where space allows, there are separate girls' and boys' latrines; where there is not enough space, latrines are combined. Basic guidance is for one squat hole for 30–50 students; usage increases up to 80–100 for the general camp population.

Facilities have been in use since 2004, though original structures were upgraded or replaced.

Intervention/facilities provided:

Latrines/toilets	Simple pit latrine, with sanitation platform slab and superstructure made from local reeds or matting – initially, emergency plastic slabs and plastic sheeting was used for walls Latrine provision based on a ratio of 1:50 for boys, 1:30 for girls Cultural practice is for children to take water with them into the latrines, even though the latrines used in this intervention were direct-drop, not pour flush In temporary learning spaces, latrines built in sandy soils are lined with sacks or mud bricks
Hand-washing and bathing facilities	A reservoir of 2–5 cubic metres, with taps, set up in each school No specific hand-washing or bathing facilities
Water supply	Reservoirs typically filled by water main for camps; handpumps usually used for permanent schools
Hygiene and cleaning kits	Soap distribution to schools, along with the whole camp
Other	No facilities were provided for solid waste disposal by UNICEF

Construction time: 1–2 days for latrine construction; latrine slabs were produced in centralized slab-production depots

Cost: 1 latrine – approximately USD 45–50

Maintenance: Given that usage is high and space is limited, latrines must be emptied regularly. UNICEF developed a sludge extractor, gully sucker system; disposal is by burial away from the camps. Toilet cleaning is undertaken by the student hygiene club, monitored by teachers. For general cleaning and solid waste clearance, there is a monthly camp clean-up campaign that includes schools; UNICEF provides tools and materials for the clean-up.

Closure: In temporary learning spaces, latrines built in sandy soils last 1–1.5 years. Where latrines have to be closed, soil is mixed with the excreta slurry, and the pit is backfilled and sealed off. Sometimes a tree or bush is planted in the pit location.

Successes and challenges:

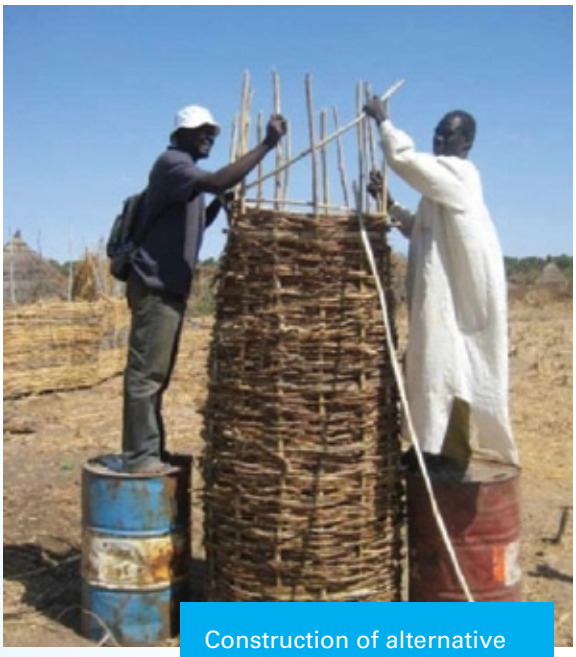
- Overall, a key indicator of success is that diarrhoeal disease levels were reported to be acceptable.
- The greatest challenge has been achieving behavioural change.
- Space is constrained in the camps.
- Better standardization of latrine design across the camps is needed.
- It appears that no adaptations of the basic latrine design initially developed for the camp population were undertaken. Detailed information on construction in temporary learning spaces was not provided, and plans for construction had to be drawn from photographs. This could imply that learning from school latrine design and construction was limited.

Recommended adaptation for future use: N/A

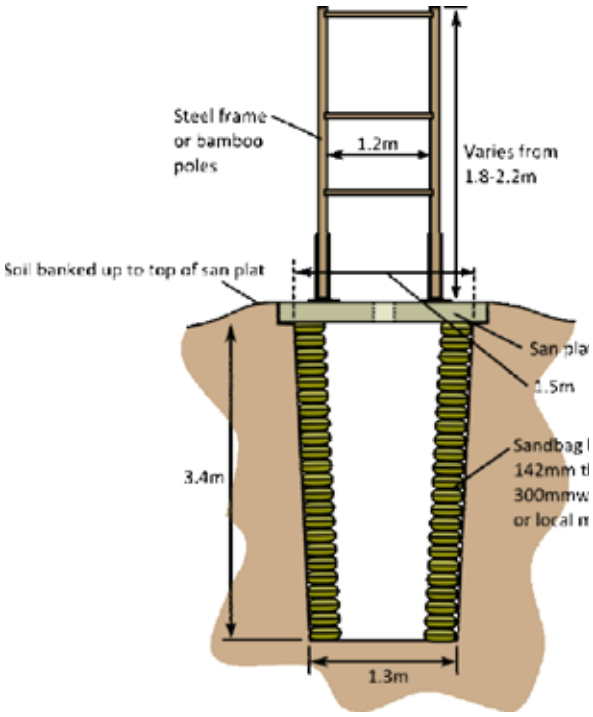
The following photographs illustrate latrine construction in Darfur:

Yard for fabrication and storage of latrine superstructure frames and concrete latrine slabs

Completed latrine with wooden frame and local matting walls; the light-green apparatus is a hole cover for reducing flies



Construction of alternative (from sand bags) pit liner for sandy soils



Cross-section diagram of a latrine used in Darfur

7 Sri Lanka – Temporary facilities for Menik Farm camp and pre-existing schools

Pour flush latrines with offset excreta containment pit, 2008–2009

As a consequence of escalating military action in northern Sri Lanka beginning in mid-2008, internally displaced people arrived in the town of Vavuniya, requiring emergency shelter and other services. Around 15,000 were based in and around Vavuniya until end-2008, mostly living with friends and family.

Numbers rose to about 30,000 by late February 2009, then swelled dramatically to about 280,000 by the end of May 2009. Around 25,000 people from the north were housed in 22 existing Vavuniya schools, while the rest moved into the newly constructed camp of Menik Farm – where the population remained high until returns commenced around November 2009.

WASH facilities for temporary learning spaces in Menik Farm camp

Context: The initial two zones of Menik Farm were established very quickly by the Government of Sri Lanka, with little input from the international community. Temporary and permanent latrines were built to accommodate school children in only one of these zones. In five other zones, plus the three smaller camps known as the 'purams', the WASH cluster was involved in planning and implementation.

As zones 2, 3 and 4 were being built, space was allocated during the planning phase for temporary learning spaces and toilets, although the learning spaces were not erected for some time. In some cases, the allotted space was used for shelter or other infrastructure due to the delay.

In zones that were established later, temporary learning spaces were often constructed at the same time as the shelters. The layout included the toilets, which were located most appropriately for children and for maintenance. The toilets in temporary learning spaces were in addition to the overall number of toilets allotted for the camps, as requested by the education and protection clusters and agreed to by the military and civilian authorities in charge of the camps.

In Vavuniya, the WASH and education clusters agreed that if an agency or organization intended to build a temporary learning space in the camps, it had to take responsibility for the WASH facilities (hardware) – but could call on the WASH cluster for assistance if it did not have the capacity to construct the facilities. The temporary learning spaces were built by FORUT, Save the Children and UNICEF, with toilets generally constructed at the same time as the learning space.

Agency: UNICEF, working through direct implementation and with such partners as Arbeiter-Samariter-Bund (ASB), ACTED, CARE and Oxfam

Location: Menik Farm, Sri Lanka

Usage and duration: Facilities were in use for 4–9 months

Intervention/facilities provided:

Latrines/ toilets	Standard latrine design for the Menik Farm camps – pour flush latrines with offset excreta containment pit and plastic/ wood superstructure – was used in temporary learning spaces No specific child-friendly provisions were made for temporary learning spaces; 1 in 10 toilets were constructed for children with limited mobility, the same ratio provided in the rest of the camp
Hand-washing and bathing facilities	Hand-washing stands were not constructed for temporary learning space toilets, so children relied on the water supply from the tanks Bathing facilities for temporary learning spaces were not considered to be necessary by the coordinating groups
Water supply	1,000-litre water tanks (or similar size) with frames to raise them off the ground and taps were installed in all temporary learning spaces Water tanks included in the roster for water delivery, as managed by the National Water Supply & Drainage Board and supported by various agencies
Hygiene and cleaning kits	Hygiene kits were delivered as part of a wider non-food item package to the general population, and to some temporary learning spaces, coordinated between the Hygiene Promotion Working Group and the Non-Food Relief Item cluster
Other	Solid waste disposal managed as part of overall camp services

Construction time: N/A

Cost: N/A

Maintenance: Latrine maintenance was undertaken by the TLS management, and WASH cluster partners helped schools obtain cleaning gear such as rakes and shovels. Distribution of cleaning gear was managed by the WASH cluster's Hygiene Promotion Working Group. Gully sucking – pumping excreta sludge out the pits – was included in overall camp schedules, as managed by the Assistant Commissioner Local Government (ACLG) with support from agencies. Sewage waste was initially dumped at an uncontrolled site, but eventually moved to a new controlled site.

Closure: Decommissioning, beginning in November 2009 when the camps were being emptied and people allowed to return home, was difficult because many agencies had no funding by then, so the WASH cluster set up a decommissioning allocation process. Agencies that still had programme funds available were allocated a set of blocks within the camps and as they became vacant, the agency moved in to decommission all toilets in the blocks – including those for the temporary learning spaces if they shared a block with a shelter.

Stand-alone temporary learning spaces were allocated in the same way. Priority was given to the agency that had constructed the latrines, but this quickly became irrelevant as agencies ran out of funding. If an agency ran out of programme funds before decommissioning got started, another agency was allocated the site.

The Vavuniya WASH cluster developed and agreed to decommissioning guidelines well before any decommissioning happened. Only a few agencies, including UNICEF were involved in decommissioning in the end.

Successes and challenges:

- The link between establishing a temporary learning space and building the latrines for that space was very good; agency cooperation was a highlight.
- UNICEF tried to give priority to filling water tanks in temporary leaning spaces when trucks delivered water, but the tankers were often diverted to other facilities once within the camps.
- Some of the temporary learning space latrines were built by agencies acting outside the cluster; these latrines were often constructed in the middle of the block, away from the road, which created maintenance problems.

Recommended adaptation for future use:
The design of these latrines required the top cover of the soakage pit to be built around 100 millimetres above ground. But ground slope and inaccuracy of construction meant the covers were sometimes built flush with the ground. Moreover, drainage channels were not built around the pits and plastic sheeting placed vertically down the outside of the top 300-millimetre section of the latrine soakage pit was often not effective in providing a seal against rainwater.

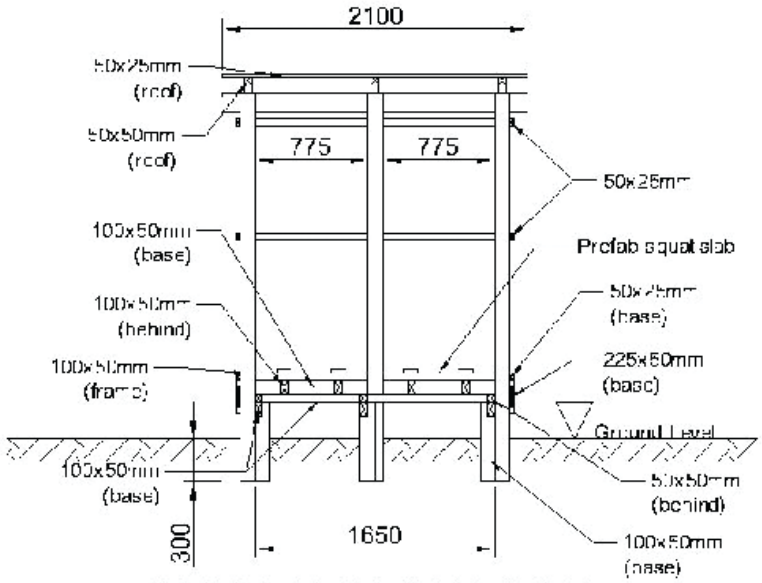
During monsoon rains, rainwater entered latrine soakage pits and caused flooding. To address this problem, pits should be built 150 millimetres above ground, and provided with a plastic membrane on outside of the pit – vertically for 500 millimetres at side of pit and horizontally over section, then backfilled with covering of soil on top of this. In addition, drainage channels should also be provided.

The following photographs illustrate WASH services in the Menik Farm camps of Sri Lanka:

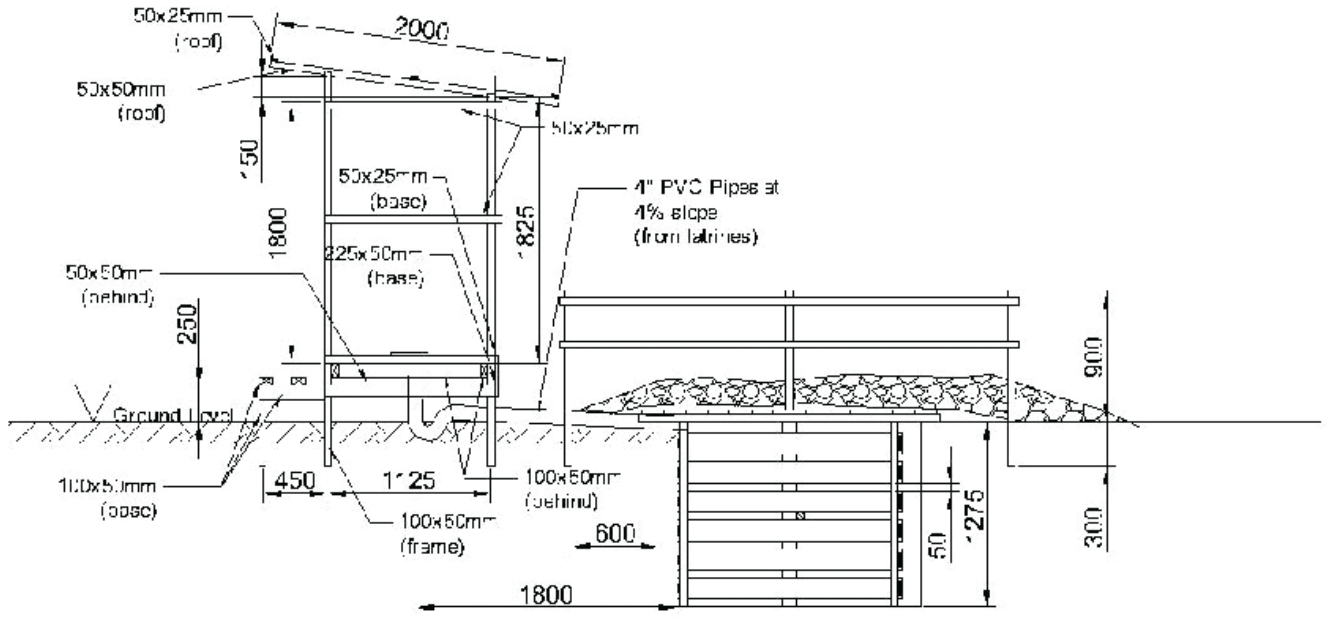
Two twin-pit latrines at a temporary learning space

Truck filling a water tank

Children collecting water at a temporary learning space



FRONT ELEVATION



END ELEVATION

SECTION A

All dimensions in mm unless otherwise noted
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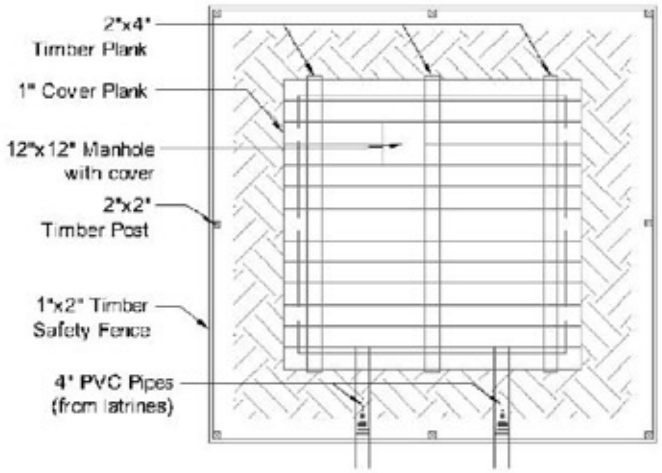
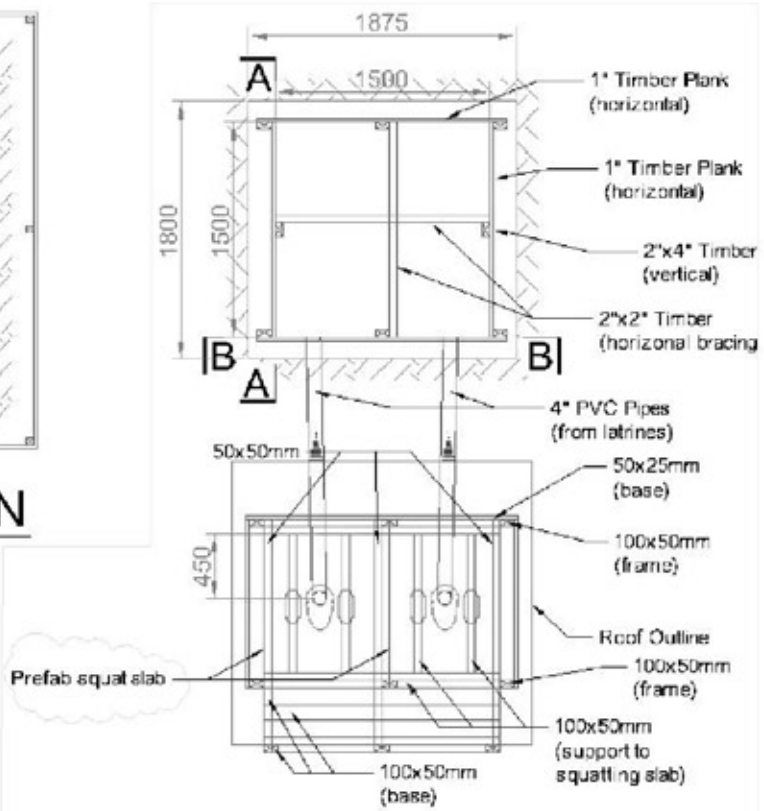
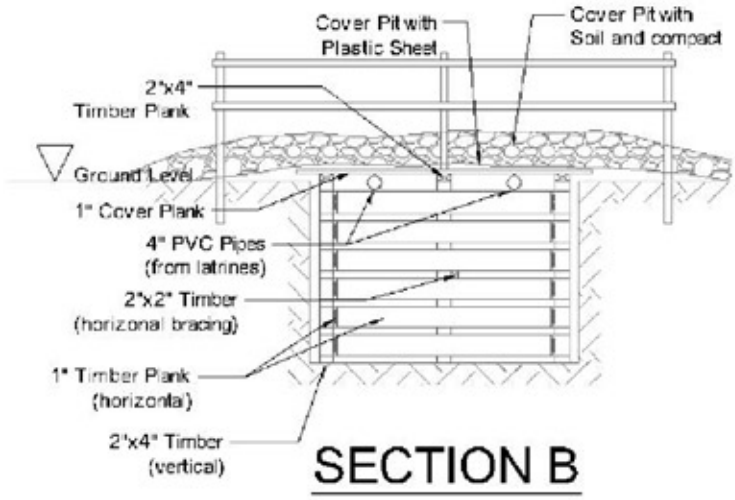
Drawing Title		
Sri Lanka Two Unit Emergency Toilet Cluster: Latrine Details		
Drawing Reference: Ex-SrL(TLS)-Dwg-RevPR4		Sheet Number: 1 of 2
Scale: 1:50	Sheet Size: A4	Date: June 2011



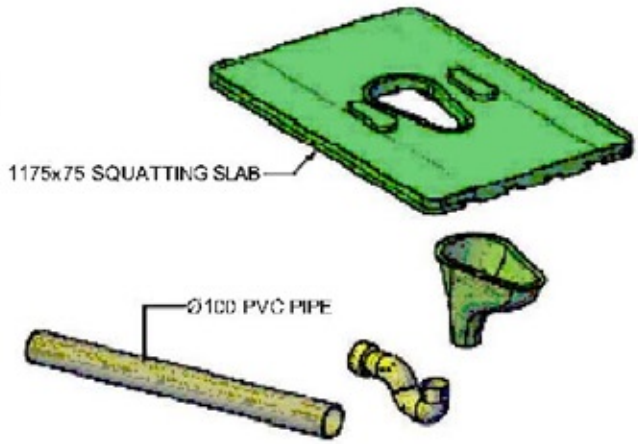
SOAK PIT ROOF PLAN



LATRINE FLOOR PLAN



SECTION B



SQUATTING SLAB SET

All dimensions in mm unless otherwise noted
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Drawing Title		
Sri Lanka Two Unit Emergency Toilet Cluster: Soak Pit & Sections		
Drawing Reference: Ex-SrL(TLS)-Dwg-RevPR4		Sheet Number: 2 of 2
Scale: 1:50	Sheet Size: A4	Date: June 2011

TABLE 6. Two-unit latrine block in Menik Farm, Sri Lanka

Specifications: Ceramic squatting pan with cement floorings, timber frame work with timber frame enclosure, plywood pit with timber frame and alternative screen arrangements

Item no.	Description	Unit	Quantity	Unit rate (LKR)	Cost (LKR)
1	Timber 100 x 50 mm x 10 ft. long	no.	6	540	3,240
2	Timber 100 x 50 mm x 8 ft. 6 in. long	no.	2	459	918
3	Timber 100 x 50 mm x 4 ft. 6 in. long	no.	3	243	729
4	Timber 50 x 50 mm x 6 ft. long	no.	7	144	1,008
5	Timber 50 x 50 mm x 7 ft. long	no.	1	168	168
6	Timber 50 x 50 mm x 3 ft. long	no.	9	72	648
7	Timber 50 x 50 mm x 2 ft. long	no.	3	48	144
8	Timber 50 x 25 mm x 4 ft. 6 in. long	no.	6	35	210
9	Timber 50 x 25 mm x 8 ft. 6 in. long	no.	4	68	272
10	Timber 50 x 25 mm x 10 ft. long	no.	3	80	240
11	Timber 50 x 25 mm x 4 ft. 6 in. long	no.	6	39	234
12	Timber 50 x 50 mm x 4 ft. long (handrail)	no.	1	96.0	96
13	Timber 50 x 50 mm x 5 ft. long (handrail)	no.	1	120.0	120
14	Timber 50 x 50 mm x 8 ft. long (handrail)	no.	2	48.0	96
15	Timber 50 x 50 mm x 2 ft. long (handrail)	no.	1	192.0	192
16	Timber planks 225 x 20 x 8 ft. 6 in. long	no.	4	390.0	1,560
17	Timber planks 225 x 20 x 4 ft. 6 in. long	no.	4	270	1,080
18	Tin sheet partition 34 gauge, 6 ft. x 2 ft. 6 in.	no.	14	250.0	3,500
19	Tin sheet door 34 gauge, 6 ft. x 3 ft.	no.	2	540.0	1,080
20	PVC pipe 100 mm diameter	ft.	13	93.0	1,209
21	Squatting pan and bend	no.	2	900.0	1,800
22	Compactable material for filling	cu. ft.	2 1/2	800.0	2,000
23	Cement	cwt.	1 1/2	835.0	1,253
24	River sand for flooring	cu. ft.	1/3	5,500.0	1,925
25	1-in. metal for flooring	cu. ft.	1/7	9,600.0	1,440
26	Plywood pit 128 cubic feet	no.	1	15,800.0	15,800
27	Iron nails, 3-in.	kg	1	130.0	130
28	Iron nails, 2-in.	kg	1 1/2	130.0	195
29	Iron nails, 1.5-in.	kg	1/4	130.0	33
30	Umbrella nails 1.5-in.	kg	1	340.0	340
31	Tee hinges, 150 mm, with screws	no.	4	100.0	400
32	Door handle, 150 mm, with screws	no.	2	35.0	70
33	Tower bolt, 150 mm, with screws	no.	2	160.0	320
34	Gate hook, 100 mm, with screws	no.	2	50.0	100
Subtotal for materials					**42,549**
1	Skilled – carpenter	days	3 1/2	900.0	3,150
2	Semi-skilled – carpenter's helpers	days	3	600.0	1,800
3	Unskilled labourer – excavation and backfilling	days	2	500.0	1,000
4	Skilled – masons	days	1 1/2	800.0	1,200
5	Semi-skilled – masons' helpers	days	1	600.0	600
6	Unskilled labourer – excavation and backfilling	days	3	500.0	1,500
7	Skilled – plumber	days	1/2	800.0	400
Subtotal for labour					**9650**
Total materials and labour					**52,199**

WASH facilities for emergency housing in pre-existing schools

Context: The emergency centres in Vavuniya schools were under-prepared for the arrival of internally displaced people. Many of the schools had functioning toilets and water supplies, although not always very well-functioning due to the Ministry of Education budgetary constraints.

Extra temporary shelters were generally erected in the school grounds supplementing existing classrooms, and school kitchens were sometimes enlarged. Agencies were also asked to construct temporary latrines and to repair existing toilets.

Due to government security concerns, these locations were closed and, other than for the WASH facility construction, little or no access was permitted to humanitarian agencies. This made maintenance and repair, as well as hygiene promotion, extremely difficult.

Agency: UNICEF, working through direct implementation and through such partners as Arbeiter-Samariter-Bund (ASB), ACTED, CARE and Oxfam

Usage and duration: Around 25,000 internally displaced people, for 6–7 months

Intervention/facilities provided:

Latrines/ toilets	At some school sites, temporary emergency latrines were built to supplement existing toilets; at other schools, this was not possible due to lack of space, poor access for gully suckers (pit de-sludging), inadequate drainage or high water tables The WASH cluster and Government of Sri Lanka agreed on pour-flush temporary latrine designs, used in all cases
Hand-washing and bathing facilities	At schools with wells, screens were erected to provide gender-segregated bathing areas; at schools without wells, temporary facilities were constructed and water provided from overhead tanks Where possible, drainage was improved No new hand-washing facilities were constructed.
Water supply	Water tanks were placed in many schools and included in the government water trucking roster Some schools had large wells that could pump up to overhead tanks; others were the schools were connected to Vavuniya's piped water supply No new wells were constructed
Hygiene and cleaning kits	School sites were included in overall programme of hygiene kit and environmental sanitation kit delivery, and in the Hygiene Promotion Working Group programme for community-based hygiene promotion Delivery of hygiene promotion was easier than in some schools than in others, depending on camp managers; with change in overall camp management in mid-2009, access for hygiene promotion improved
Other	Solid and liquid waste removal and treatment were responsibility of local government; because many of the schools were in town, it was easier to include them on the ACLG's regular rosters Drastic solid waste problems seen at Menik Farm did not, on the whole, take place in school sites Drainage from schools was improved, where possible; in locations where drainage was not improved, the cluster advocated for closure of these schools as sites for sheltering internally displaced people (although with little success)

Construction time: N/A

Cost: N/A

Maintenance: Gully sucking from the school toilets (temporary latrines and regular) was incorporated into the local government's roster with support in cash or trucks from a small number of agencies. There was no schedule per se, and requests were made directly to the ACLG office. Emptying the pits was difficult, because the schools were fenced off with razor wire that hindered access.

Sewage waste from the schools was emptied into the Vavuniya treatment centre, just outside the town. Maintenance of deteriorating temporary latrines

became a problem as they neared the end of their design life by late 2009. In some schools, particularly those that became camps for ex-combatants, the military decided to take on maintenance, rather than letting agencies come in to decommission the facilities.

Closure: As internally displaced people began to leave the school sites, in July–August 2009, about half of them segued to ex-cadre sites and the others were returned to the schools. Some of the schools were split, half for the ex-cadres and half for students (UNICEF provided extra permanent toilets to such schools to cater for the needs of schoolchildren). Notification of such transitions was extremely limited, and usually the school principle had a few days in which to recreate a school environment.

The first few schools were emptied during a weekend, making it difficult to find agencies to assist in the clean-up, repair the existing permanent water and sanitation facilities and, more importantly, to decommission the emergency toilets. Often, school principals involved the children and parents in the clean-up once the main work was undertaken by agencies.

The Ministry of Education, UNICEF and the schools developed a plan to rehabilitate school toilets to a condition on par with their condition before they were used as housing. Twenty schools were prioritized for such rehabilitation by the end of 2009. The work was planned to take place once the schools were empty, around January 2010.

Successes and challenges:

- In schools with adequate space, temporary latrines were able to meet Sphere Project minimum standards; in others schools this was not possible, due to limited space or high groundwater levels.
- In 2008, an inter-cluster study was commissioned by the Government Agent of Vavuniya to determine the capacities of schools in and around the town to house internally displaced people. This study, however, was not presented to and acknowledged by the military, until late in 2009 – when the schools were already occupied by those seeking shelter.
- In most cases, schools were hosting far more people than the facilities could accommodate. Many of the schools used for housing were not recommended in the 2008 study. Coupled with difficulties in providing reliable maintenance, the facilities were in very poor condition.

Recommended adaptation for future use:
Mapping of school grounds to estimate potential carrying capacity for internally displaced people – and therefore the extent of temporary WASH facilities required to supplement permanent facilities – was undertaken by government authorities, but the information was not made available to the education officials. It is important that the humanitarian community undertakes such mapping and that the collected data are available to all concerned parties.

8 Pakistan – WASH design for possible learning space adaptation

General population latrines with screening and facilities for menstrual hygiene management, earthquake response, 2005

Context: The 2005 earthquake in Pakistan left more than 2 million people homeless, and those who were internally displaced lived in camps for many months, sometimes more than a year. In the context of a traditional society, where purdah (screening girls and women from men) is strictly observed, menstrual hygiene management was a complex issue that required specific provisions.

To address the needs of women and girls in the emergency camps, latrines were fully enclosed with bathing cubicles. A cubicle for washing menstrual cloths is included in the latrine design, and the soakaway pit is built within the enclosed area – thereby offering total privacy.

Agency: Oxfam

Location: Pakistan

Usage and duration: N/A

Intervention/facilities provided:

Hand-washing and bathing facilities	Latrine blocks for the general camp population provided high levels of privacy for girls and women Bathing cubicles and a cubicle for washing menstrual cloths were included within the latrine block

Construction time: N/A

Cost: N/A

Maintenance: N/A

Closure: N/A

Successes and challenges: N/A

Recommended adaptation for future use:
It is not known whether these hygiene blocks were provided for schools or temporary learning spaces during this emergency. Accommodations for privacy and menstrual hygiene management can encourage girls' school attendance, and the design shared here could be adapted for emergency education facilities.

The drawing below and the photograph at right illustrate the women's hygiene block used during the emergency response to the 2005 earthquake in Pakistan.

Completed structure, on site

Floor plan of women's hygiene block, featuring enclosed washing areas and a high level of privacy

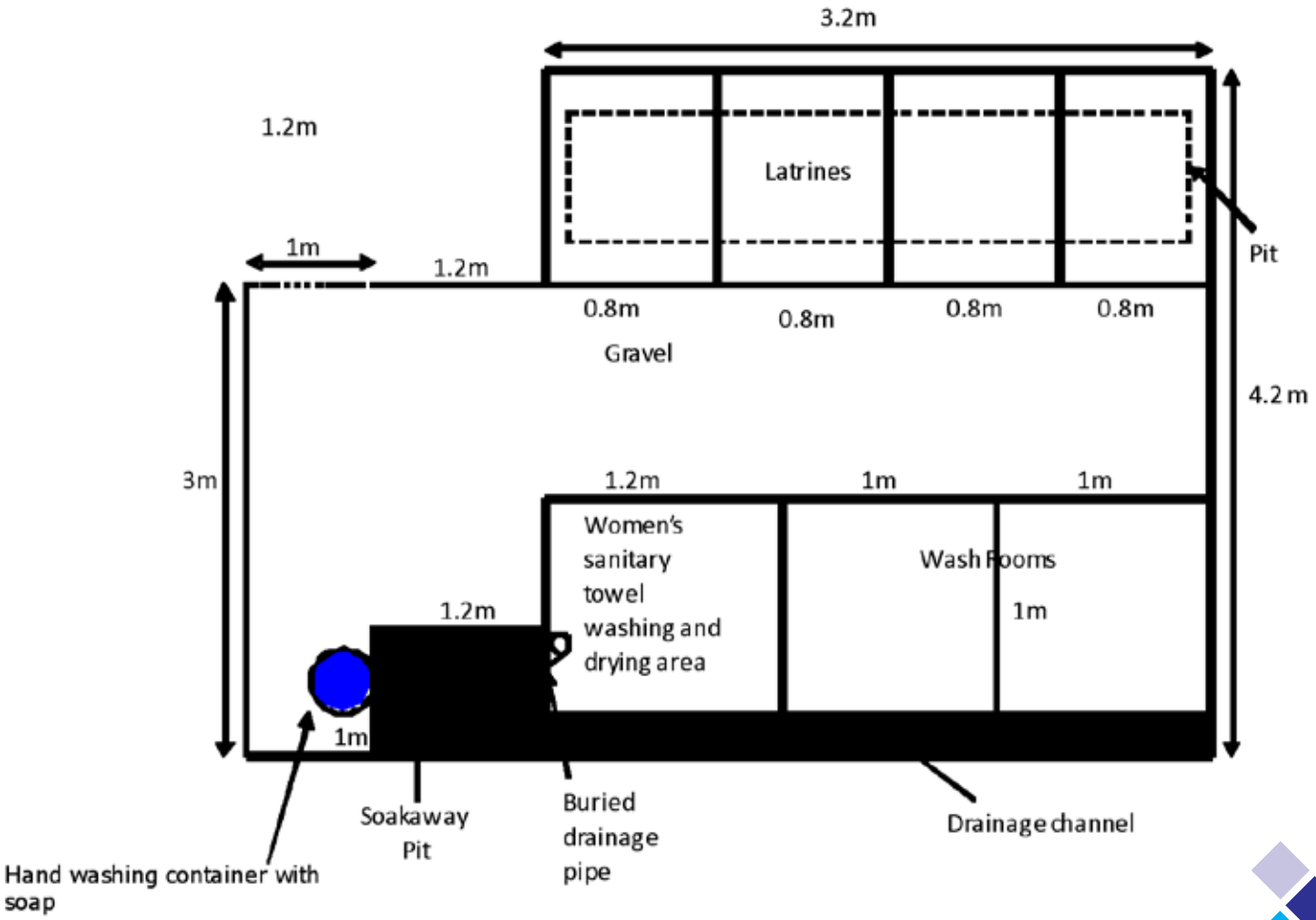


TABLE 7. Women's hygiene unit, Pakistan earthquake

Item no.	Description (materials)	Unit	Quantity	Unit rate	Cost
1	Wooden posts, 50 x 50 x 2,400 mm	no.	14	–	–
2	Wooden posts, 50 x 50 x 2,100 mm	no.	9	–	–
3	Wood, 50 x 25 x 2,400 mm, for crossbars and bracing for walls	no.	36	–	–
4	Wood, 150 x 50 x 1,600 mm, for wooden frame for supporting latrine slabs at top of pit	no.	9	–	–
5	Gravel/small stones (no fineness) for ground surface and top soak pits	m3	1	–	–
6	Large stones/rocks for soak pit	m3	1	–	–
7	Non-transparent plastic reinforced/woven tarpaulin	m2	100	–	–
8	Washers for use with nails to stop tarpaulin from tearing	kg	3	–	–
9	Nails, 3 in.	kg	1	–	–
10	Nails, 2 in.	kg	5	–	–
11	Nails, 1 in.	kg	1	–	–
12	Binding wire for door locks and additional bracing for screen if required	kg	2	–	–
13	Sand for bedding hygiene and bath unit slab	m3	1	–	–
14	Self-reinforcing plastic latrine slab	no.	4	–	–
15	1,000 x 1,200 x 20 mm rough surface marble slabs for bath and hygiene units	no.	3	–	–
16	Cement for plastering brick edges of hygiene unit and connecting to uPVC pipe outlet	kg	12	–	–
17	Burnt bricks for hygiene slab edging	no.	30	–	–
18	90 mm uPVC pipe	m	1	–	–

9 Pakistan – Flood response in pre-existing schools and temporary learning spaces

Pour flush latrines with soakage pit; VIP latrines and water-collection points, 2010

The 2010 floods in Pakistan arose from exceptionally heavy rainfall in the north-west and caused widespread damage across the country – displaced more than 20 million people. Although a large percentage of the affected population was displaced for less than one month, others were unable to return to their homes for several months.

This case study on the flood response in Pakistan covers two interventions: (1) temporary latrines constructed in damaged schools by Save the Children; and (2) WASH facilities provided by UNICEF in temporary learning spaces.

Save the Children UK's temporary latrines for shelters in schools

Context: In the weeks and months that people were displaced and moved into camps, dedicated WASH facilities were generally not constructed for child-friendly and temporary learning spaces because it was assumed that children would use facilities provided for the general population. Camps typically consisted of a couple hundred tents, up to a few thousand.

Part of the intervention focused on schools in areas of return that had been inundated by flood water. In some cases, mainly in Punjab Province, school buildings needed only minor rehabilitation and additional WASH facilities. In other schools, mainly in Sindh Province, infrastructure was damaged heavily and full rehabilitation was expected to take more than a year; in these cases, a temporary learning space was built or rented nearby. The intervention in schools focused on:

- Repair of existing toilets and provision of additional permanent toilets, to supplement the standard practice of providing two toilets per school regardless of class size. Total toilet provision would align with WHO standards.
- Providing temporary (3-month lifespan) and semi-permanent (up to 12 months) latrines for child-friendly and temporary learning spaces to be used while schools were repaired.

Agency: Save the Children UK

Location: Two districts in Sindh Province and three districts in Punjab Province

Usage and duration: Schools in these areas typically serve around 100 students. Save the Children focused on mixed facilities for child-friendly temporary learning spaces. Use of temporary facilities was expected for 3–12 months, while permanent facilities had a design life of up to 10 years, with the septic tank emptied every 3 years.

Intervention/facilities provided:

Latrines/ toilets	Temporary latrines (3-month life) for child-friendly and temporary learning spaces using plastic sheeting for superstructure Semi-permanent latrines (up to 12 months) for child-friendly temporary learning spaces using fired and mud bricks for superstructure (designs not included in the compendium) Repair of existing toilets and provision of permanent septic tank toilets in schools (designs not included in the compendium)
Hand-washing and bathing facilities	Small table provided with containers with tap for hand washing and buckets positioned underneath for grey water capture Containers kept full by hygiene attendant, who filled them from nearby handpump In existing schools, a hand-washing pad was built, supplied by motor pump and a tank built on top of the latrine block

Water supply	The whole area was served by locally made handpumps drawing water from very shallow tube wells, which were often prone to contamination Water for child-friendly and temporary learning spaces was treated using imported candle filters and chlorine tablets; drinking water was served from a water cooler, glasses were provided Hygiene attendant managed the water treatment In existing schools, rehabilitation typically involved installation of motor pump filling a water tank located above the latrine block
Hygiene and cleaning kits	Hygiene/ maintenance kits were provided to hygiene attendants Mini hygiene kits were provided to children Children received training on how to use pour flush latrines, or the potties provided for young children

Construction time: 3–4 days

Cost: 1 double-pit temporary latrine – USD 390

Maintenance: Overall, the school management committee had responsibility for layout and maintenance of facilities. A memorandum of understanding was signed between school management and Save the Children UK, detailing responsibilities of the two parties.

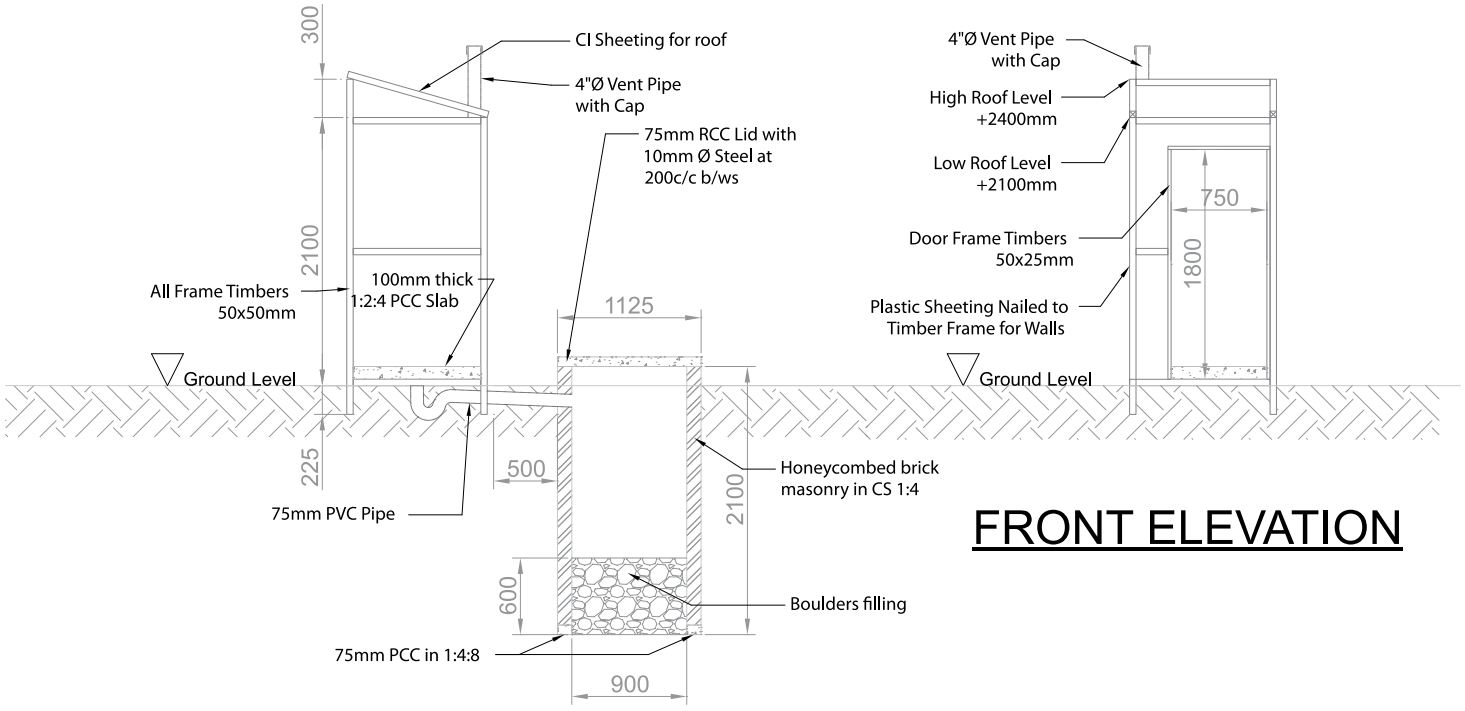
In each of the child-friendly or temporary learning spaces established in or adjacent to schools that were to be rehabilitated, a paid hygiene attendant was responsible for cleaning and light maintenance, as well as water supply and hand-washing facilities. There was no requirement for latrine pit emptying.

Closure: In some cases, when temporary child-friendly spaces were moved or closed the latrines were taken over and used by the community. Some of the temporary latrines were decommissioned by breaking the slab, pushing it into the hole, adding a high-strength bleach product, and backfilling the hole.

Successes and challenges:

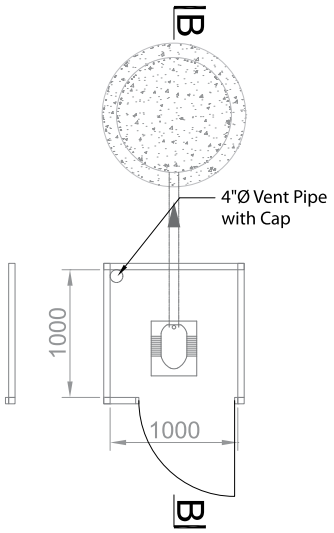
- WASH infrastructure was usually elevated 50 centimetres above ground level in case of future floods.
- Initial use of pit latrines was problematic; pour flush latrines were built subsequently.
- It was often a challenge to adhere to WHO standards because there was seldom enough space to fit the required number of toilets into a school compound.
- Hygiene items provided as part of general non-food item distribution or in shelter kits were frequently duplicated.
- Use of local sticks or branches as a frame or superstructure with plastic sheeting was inadequate, because plastic sheeting requires sawn timber and a rigid structure if the superstructure is to remain intact beyond a few days.
- More expensive fired bricks were used for construction because the mud bricks commonly used in this area were not water resistant – so could not be used for pit lining or base of superstructure.
- WASH for schools typically falls under the education section and the budget for infrastructure repairs had to cover a host of elements; as a consequence, funds allocated for WASH facilities were often inadequate.

Recommended adaptation for future use: N/A



FRONT ELEVATION

SECTION B



LATRINE PLAN

All dimensions in mm unless otherwise noted
Do not scale from this drawing, use figured dimensions only

Drawing Title		
Pakistan Emergency Latrines: Latrine Details		
Drawing Reference: Ex-Pak(TLS)-Dwg-RevPR2		Sheet Number: 1 of 1
Scale: 1:50	Sheet Size: A4	Date: July 2011

TABLE 8. Temporary latrines in schools, Pakistan floods

(Latrine unit size = 5 ft. x 4 ft.)

Item no.	Description (materials and labour)	Unit	Quantity	Unit price (PKR)	Total cost (PKR)
1	Tarpaulin sheet for walls – double ply, 4 ft. wide, superior quality	sq. ft.	480	8	3,840
2	CGI sheet for roof covering – 22 gauge, 2.5 ft. x 6 ft.	no.	5	1,400	7,000
3	Wooden poles for column – height 9 ft., 4 in. x 4 in. diameter	no.	12	340	4,080
4	6 ft. x 3 in. x 3 in.	no.	4	240	960
5	Wooden posts for roof framing – 5 ft. x 3 in. x 3 in.	no.	4	210	840
6	Nails, 3-in. long – good quality with head	kg	1	130	130
7	Nails, 1-in. long – good quality with head	kg	1	130	130
8	GI wire – 14 no., soft quality	kg	4	220	880
9	Steel strips – 1/2 in. wide, 26 gauge	ft.	200	8	1,600
10	Cement – Ordinary Portland DG Cement	bags	6	380	2,280
11	Sand – Clean sand	cu. ft.	40	25	1,000
12	Crush – Well aggregated	cu. ft.	40	35	1,400
13	Bricks (9 in. x 4.5 in. x 3 in.) – Class A bricks	no.	1,000	7	7,000
14	Vent pipe cap, 2-in. diameter – Superior quality	no.	2	50	100
15	Vent pipe, 2-in. diameter – PVC pipe (Royal)	ft.	20	40	800
16	PVC pipe, 4-in. diameter– good quality (Royal)	ft.	20	50	1,000
17	Water closet – Indian (medium size)	no.	2	800	1,600
18	Door lock – good quality	no.	2	150	300
19	Door handle – good quality	no.	2	130	260
20	Hinges – 3 in.	no.	4	50	200
21	P-trap [drain-pipe section] – 4 inch	no.	2	150	300
22	Precast RCC slab – 5 ft. x 1.5 ft. x 3 in.	no.	6	250	1,500
23	Door covered with plastic sheets – 2.5 ft. x 6 ft., frame of bamboo sticks, 1-in. diameter	ft.	20	10	200
24	Skilled labour – mason	man/day	3	500	1,500
25	Unskilled labour – local labour	man/day	6	250	1,500
Total					**40,400**
26	**Deduction for CGI sheets already present in warehouse**				**7,000**
Net total cost					**33,400**

Latrine wooden infrastructure installed along with pour flush pans (above) and completed latrine with plastic sheeting walls (left)

TABLE 9. Hygiene packages for schools, materials and consumables; WASH kits for institutions, Pakistan floods

Item no.	Description	Quantity
1	Antibacterial soap	1 per day for 30 children in a centre, 2 per day for 60 children, etc. ... • to be replaced every few days or when finished • to be attached with rope near hand-washing place or on a soap tray
2	Liquid disinfectant solution (on monthly basis) 100 ml and pack of cottons	1 per month for 50 children, 2 per month for 60 children, etc. ...
3	Bucket, 12 litre, and lid	2 for 30 children, 4 for 60 children, etc.
4	*Lota* (water jug) for anal washing	1 per toilet
5	Toilet mop (per month) + bucket	1 per toilet + 1 spare
6	(Liquid detergent for cleaning floors)	2 per month – only for building (not for tent)
7	Portable potties for young children's defecation	2 for 50 children, 4 for 100 children
8	Small table, 0.8 m x 0.8 m and 60 cm high (for placing the water filters and the hand-washing unit)	2 for 30 children, maximum number of 12 tables
9	Drinking glasses 250 ml	1 glass for 10 children, 2 glasses for 20 children
10	Stainless steel hand-washing container, 30 litre, with tap	1 for 30 children, maximum 12
11	Ceramic candle water filter with tap	1 for 30 children (if not available, provide 5 (water purification tablets) 67 mg per day and 1 water cooler for each 30 children, maximum 12)
12	Rubbish bin	1 per 50 children, maximum 12
13	Dish-washing powder	1 per 50 children per month
14	Soap tray	2 per 30 children
15	Sponges	2 per month/30 children
16	Kit of information, education and communication materials for hygiene promotion (cloth flip chart, WASH in Schools Snakes and Ladders game, 'faecal oral' transmission route posters)	1 per each 30 children
17	Latrine brush	1 per latrine + 1 spare

UNICEF's temporary learning spaces

Context: Pakistan has faced frequent emergencies, including earthquakes, floods and conflict, damaging the structures as well as the environment of education institutions, including the WASH infrastructure. The floods in 2010 caused unusually long periods of displacement, sometimes for several months.

Emergency response required investments in temporary learning spaces and associated WASH infrastructure. Lack of adequate WASH facilities negatively affects enrolment and attendance, particularly in girls' schools, so it was important to ensure facilities were constructed to maximize girls' attendance at the temporary learning spaces.

Agency: UNICEF Pakistan

Location: Pakistan

Usage and duration: Number of users depends on the extent of displacement. School-age children, 5–18 years old, compose around 46 per cent of Pakistan's population. In disaster-prone areas, an estimated 70 per cent of the population will be displaced during a crisis. For a community of 100,000, emergency WASH facilities could be used by 32,000 students. (Specific information about the flood emergency intervention is not available.)

Intervention/facilities provided:

Latrines/ toilets	Ventilated improved pit (VIP) latrines; around 40 students (boys) per latrine and around 30 students per latrine in girls' TLS
Hand-washing and bathing facilities	Hand-washing facilities, with 6 taps for around 60 students Bathing facilities were not considered an integral part of the WASH package for temporary learning spaces
Water supply	In the early days of the emergency, all water might be supplied by trucking; for longer-term interventions, handpumps or pipe networks provide more economical solutions – facilities were upgraded accordingly, where required
Hygiene and cleaning kits	Student hygiene kits provided to almost all students in TLS with awareness of key messages raised and sessions repeated every three months
Other	Solid waste areas and waste bins were provided

Construction time: 2–3 days per VIP latrine (considered to be fully usable after 3 days) assuming agreement with partners is already in place; approximately 2–3 weeks for complete set of WASH facilities

Cost: 1 VIP latrine – approximately 240 USD

Maintenance: Maintenance was undertaken by implementers for three–four months; after the students adopt safe hygiene practices, they are expected to assume responsibility for safe use and maintenance of facilities. Commitment to full maintenance by the beneficiaries, however, was sometimes uncertain.

Closure: At the end of the emergency period, and when conditions were established for return of internally displaced people, the facilities were safely decommissioned according to the approved guidelines.

Successes and challenges:

- Students became familiar with safe hygiene practices and used them outside the learning spaces.
- Regular maintenance was a challenge.
- Most of the humanitarian organizations working in Pakistan did not have long-term plans and their assistance typically spanned 3–6 months, focusing on the very basic needs of the temporary learning space. In addition, many organizations did not have expertise in providing durable solutions, such as reconstruction of permanent buildings and tube wells for services after the emergency.

Recommended adaptation for future use: N/A

The following photographs illustrate UNICEF WASH facilities in temporary learning spaces established in response to the 2010 floods in Pakistan:

Latrine superstructures are prefabricated in a central yard and moved to the required location when pits are dug (left). At right, a teacher demonstrates hand washing with children in a temporary learning space.

Solid waste area for a temporary learning space

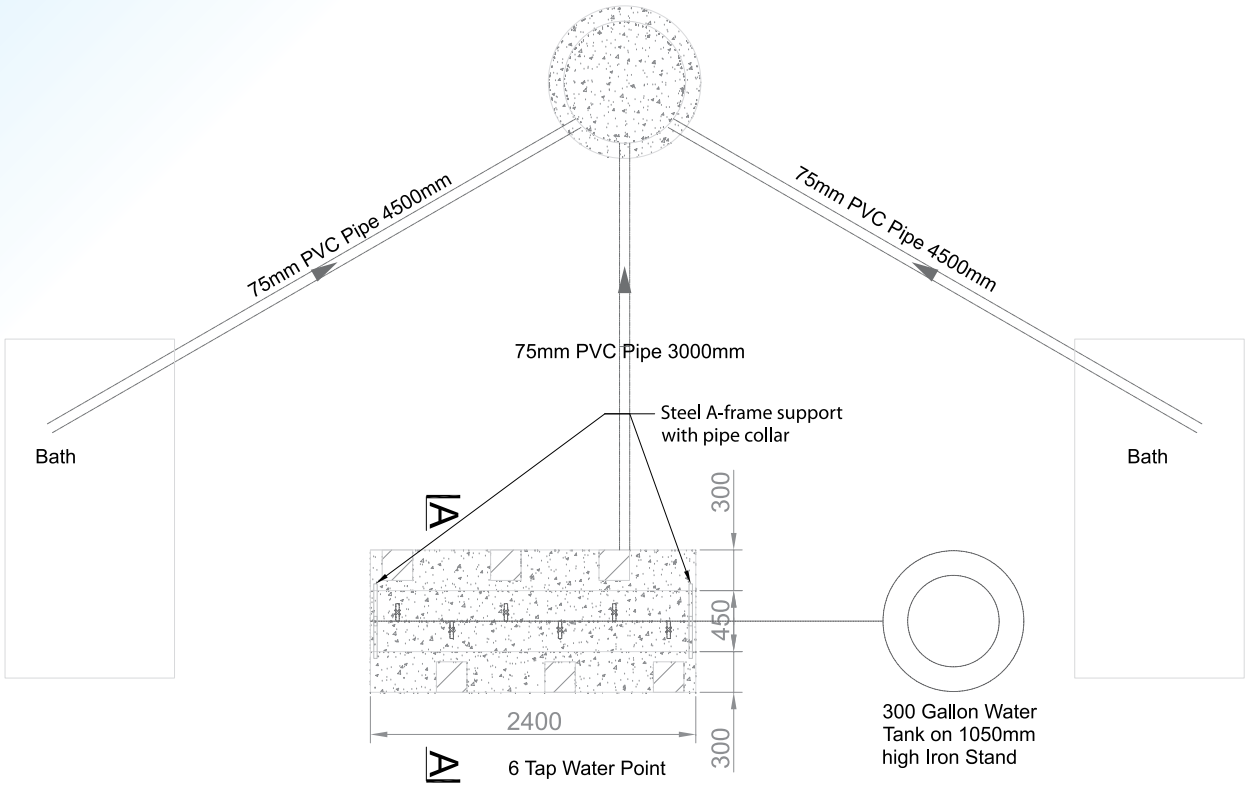
Elevated water tanks supplying temporary tap frames, adjacent to latrine, for hand washing and anal cleansing

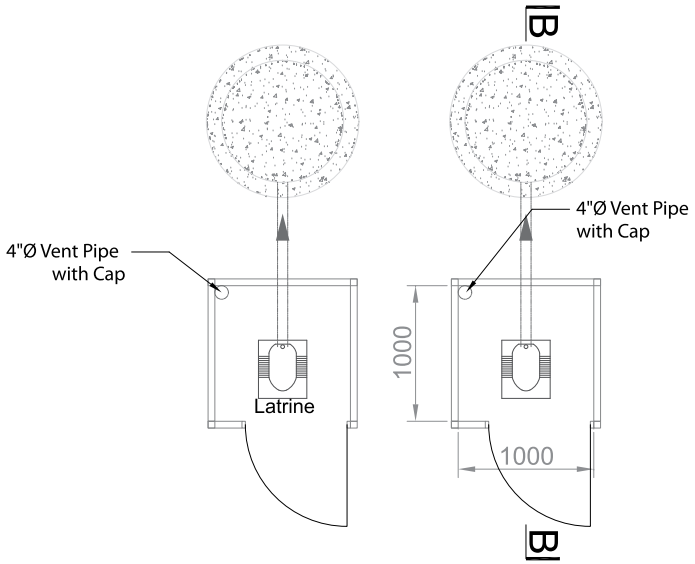
TABLE 10. WASH facilities in camps, bills of quantities, Pakistan floods

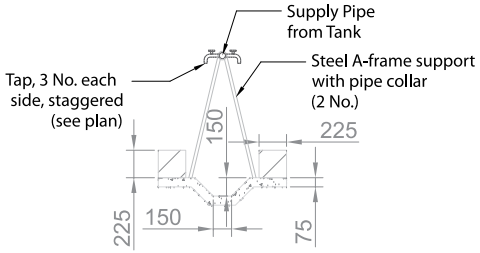
Item no.	Description (materials, labour & installation)	Unit	Quantity	Unit rate (PKR)	Cost (PKR)
A	**VIP toilets in camp for internally displaced people**				
1	Digging pit, 3.5 ft. x 2.5 ft. x 7 ft., for slab size 37 in. x 37 in.	cft	61	15.00	919
2	Timber front side, 8 ft. x 2 in. x 2 in., for vertical posts	no.	2	133.30	267
3	Timber back side, 7 ft. x 2 in. x 2 in., for vertical posts and door support	no.	3	116.70	350
4	Timber, 4 ft. x 2 in. x 2 in., for base plate, wall plate and bracing	no.	13	66.70	867
5	Timber, 4 ft.-4 in. x 2 in. x 2 in., for base plate, wall plate and bracing	no.	2	72.20	144
6	PCC 1:2:4, 4-in. thick, under latrine slab	cft	5	400.00	2,131
7	Timber, 2 in. x 1 in. x 7 ft., for vertical door posts	no.	2	58.30	117
8	Timber, 2 in. x 1 in. x 4 ft., for door (horizontal connection and bracing)	no.	3	33.3	100
9	Mesh net around the wooden structure	ft.	9	18.00	162
10	CGI sheet, 26 gauge, for rooftop (5 ft. x 5 ft.)	no.	25	37.00	925
11	Timber braces, 4 in. x 4 in. x 5 ft., for supporting latrine slab	no.	2	416.70	833
12	PVC vent pipe, 3 in. diameter, 10 ft. long, with mesh	no.	1	600.00	600
13	Nails, handle, hinges, etc.	lump sum	1	200.00	200
14	PCC 1:2:4 for fixing of toilet frame (grouted in 12-in. depth)	cft	2	400.00	900
15	Labour and installation charges	no.	1	900.00	900
16	Transportation, including supply from UNICEF	no.	1	345.00	345
Subtotal					**9,760**
Cost of supplies (tarpaulin sheet = 1,376; slab = 2,119) per toilet					**3,495**
Total cost per VIP toilet					**13,255**
B	**Bathing place in camp**				
1	Weed eradication (4 ft. x 4 ft. x 6 in.)	cft	8	25.00	200
2	Boulders/Ghera package 6-in. thick compacted under PCC floor	cft	5	40.00	200
3	PCC 1:2:4 flooring 4 in. thick (4 ft. x 4 ft. x 4 in.)	cft	6	400.00	2,400
4	Timber, front side, 8 ft. x 2 in. x 2 in., for vertical posts	no.	2	133.30	267
5	Timber, back side, 7 ft. x 2 in. x 2 in., for vertical posts and door support	no.	5	116.70	583

Item no.	Description (materials, labour & installation)	Unit	Quantity	Unit rate (PKR)	Cost (PKR)
B	**Bathing place in camp (cont'd)**				
6	Timber, 4 ft. x 2 in. x 2 in., for base plate, wall plate and bracing	no.	5	66.70	333
7	Timber, 4 ft.-4 in. x 2 in. x 2 in., for base plate, wall plate and bracing	no.	8	72.20	577
8	Timber, 2 in. x 1 in. x 7 in., for vertical door posts	no.	5	58.30	292
9	Timber, 2 in. x 1 in. x 4 in., for door horizontal connection and bracing	no.	5	33.30	167
10	CGI sheet, 26 gauge, for roof (5 ft. x 5 ft.)	sq. ft.	25	37.00	925
11	PCC 1:2:4 for fixing of bath room frame (grouted in 12 in. depth)	cft	2	400.00	800
12	Nails, handle, hinges, etc.	lump sum	1	200.0	200
13	PVC drainage pipe, 3 in. diameter, 15 ft. length	no.	1	900.0	900
14	Bathroom floor trap	no.	1	61.0	61
15	Labour and installation charges	no.	1	900.0	900
16	Transportation, including supply from UNICEF	no.	1	345.0	345
Subtotal					**9,150**
Cost of supplies (tarpaulin sheet)					**1,376**
Total cost per bathing place					**10,526**
C	**Washing pad and water tank**				
1	Water tank stand 2 in. x 2 in. (circular) angle iron, with three legs, 4 ft. height for 300 gallon water tank	no.	1	5,200.00	5,200
2	Construction of washing pad with concrete 1:2:4 in 3 in. thickness	cft	10	400.00	4,150
3	Washing pad GI pipe, 2 in. diameter, 8 ft. length with 6 no. taps (3 ft. height) complete with connection pipes, etc.	cft	1	2,010.00	2,010
4	Drainage pipe, 3 in. diameter, 10 ft. length	no.	1	600.00	600
5	Connection to water tank, GI pipe 3/4 in. diameter	no.	1	3,200.00	3,200
6	Labour and installation charges	no.	1	2,241.00	2,241
7	Transportation, including supply from UNICEF	no.	1	345.00	345
Subtotal					**17,746**
Cost of supplies (water tank, 300 gallon capacity)					**9,500**
Total cost per washing pad and water tank connection					**27,246**

Item no.	Description (materials, labour & installation)	Unit	Quantity	Unit rate (PKR)	Cost (PKR)
D	**Soakage pit, 3 ft. diameter, 7 ft. depth**				
1	Digging for pit, 8 ft. x 3.5 ft. diameter	cft	77	15.00	1,155
2	PCC (1:4:8) at the bottom for honeycombing bricks, below the masonry	cft	1	400.00	400
3	Honeycombing with burnt bricks, 4.5 in. thickness; internal diameter of pit, excluding brick, is 3 ft. 36 in.	cft	27	110.00	2,970
4	Covering pit with RCC slab/precast panels as recommended by site engineer	sft	3	260.00	780
5	Boulders, filling in 2 ft. depth	cft	13	40.00	520
6	Labour and installation charges	no.	1	830.00	830
7	Transportation	no.	1	345.00	345
Total cost per soakage pit					**7,000**
E	**Solid waste collection/disposal point**				
1	Excavation in ordinary soil, 4 x (1 ft. x 1 ft. x 8 ft.) = 32	cft	32	16.00	512
2	PCC (1:2:4), 4 x (1/2 ft. x 1 ft. x 4 ft.) = 8	cft	10	400.00	4,000
3	Brick masonry 4 x (2 ft. x 3/4 ft. x 4 ft.) = 24; with plaster, flooring and whitewash	cft	24	345.00	8,280
4	Labour and installation charges	no.	1	1,800.00	1,800
5	Transportation	no.	1	488.00	488
Total cost per solid waste disposal point					**15,080**
F	**Laundry point**				
1	Excavation, 1 x (14 ft. x 10 ft. x 1 ft.) = 140 cft	cft	140	16.0	2,240
2	PCC (1:4:8), 1 x (14 ft. x 10 ft. x 0.25 ft.) = 35 cft	cft	35	280.0	9,800
3	Brick masonry: long walls = 2 x (14 ft. x 3/4 ft. x 1 ft.) = 21 cft short walls = 2 x (10 ft. x 3/4 ft. x 1 ft.) = 15 cft	cft	36	155.0	5,574
4	Supplying and fixing of 1/2 in. diameter GI pipe, light quality	no	30	50.0	1,500
5	Provision made for tap stand, 6 ft. long x 2 ft. wide, with required fittings and 1/2 in. brass taps (5 no.)	no.	1	2,400.0	2,400
6	PVC pipe 4 in. diameter for grey water drainage, including digging/backfilling and soakage pit	no.	1	900.0	900
7	Labour and installation charges	no.	1	2241.0	2,241
8	Transportation	no.	1	345.0	345
Total cost per laundry point					**25,000**







SECTION A

All dimensions in mm unless otherwise noted
Do not scale from this drawing, use figured dimensions only

Drawing Title: Pakistan Emergency Latrines: Site Plan & Sections		
Drawing Reference: Ws-Pak(TLS)-Dwg-RevPR2		Sheet Number: 1 of 1
Scale: 1:50	Sheet Size: A4	Date: July 2011

10 Haiti – Earthquake response in camps for internally displaced people

Portable chemical latrines, Peepoo bags, girl's urinals, 2010

Context: The massively destructive earthquake that occurred in Haiti in February 2010 caused significant damage in the capital and other major urban areas. The resulting displacement of people into temporary camps lasted for more than a year in some cases. Camps were set up in open spaces where ground was available, often sufficient for only 30 or so shelters, though larger camps – such as one established on a golf course – held several thousand people.

Oxfam deployed a number of innovative excreta and urine management solutions for the camps. It is not known if any of these were used in schools used for emergency housing or in temporary learning spaces. These examples may nonetheless provide innovative solutions for temporary learning spaces in the future.

Agency: Oxfam

Location: Haiti

Usage and duration: Varied depending upon the intervention.

Intervention/facilities provided:

Latrines/ toilets	Portable chemical latrines were hired on a daily basis and cleaned by the company that provided them Peepoo bags were used alongside ordinary plastic bags for excreta containment; people were able to use Peepoo bags in the privacy of their shelters and houses Girls' and women's urinals were screened for privacy; urine-collection channels were set up by cutting a pipe cut along its length to create a semicircle profile, this was fixed to an elbow so urine drained into a soakage pit

Construction time: N/A

Cost: Portable chemical latrine – approximately USD 20 per day
100 Peepoo bags – approximately USD 0.1

Maintenance: N/A

Closure: N/A

Successes and challenges:

- Portable chemical latrines could be rented on short notice if a contract had been prearranged and supplies were available, but they were extremely expensive. Although portable latrines may meet higher expectations of some affected populations, they should be phased out of an emergency response as soon as possible.
- Portable chemical latrines need to have a flap that closes shut when not in use, otherwise flies, smell and other problems may very quickly render them poorly used.

Recommended adaptation for future use: Use of separate urinals can significantly reduce queues for facilities, smell from excreta (urine and excreta mixed makes most of the smell) and rapid pit filling. Urinals are therefore highly recommended for installation, particularly for girls and women. The women's urinal costs less than a latrine because no special slab or pit is required, just a superstructure, pipes and a soakage pit.

Peepoo bags have a low cost per bag, but other costs – such as containment barrels – must be included in the total expense. Although the Peepoo system costs are quite high when examined closely, they offer quick facility provision, at scale, that cannot be matched by constructing latrines.

Given that WASH services in temporary learning spaces generally follow provision of facilities for the general camp population, Peepoo bags could be valuable in providing a very rapid solution until such time as temporary latrines could be built. Also, given the unpredictable duration of displacement for those who are affected by floods, Peepoo bags could help address this uncertainty – and they are certainly much cheaper than hired portable chemical latrines.

The photographs on the following page illustrate facilities used in camps for internally displaced people in Haiti, and could possibly be adopted for schools and learning spaces:

Women's urinal made from semicircle of pipe connected to elbow

Portable chemical latrines used in Haiti earthquake response, 2010

Peepoo bag being opened up

Peepoo bag being installed into a tin to make a child's potty

Peepoo bag installed into a bucket with prefabricated seat adapter for older children or adults

Peepoo bag child potty

Disposal of Peepoo bag into container

11 Global – Hand washing, menstrual hygiene management, water supply for emergencies and development

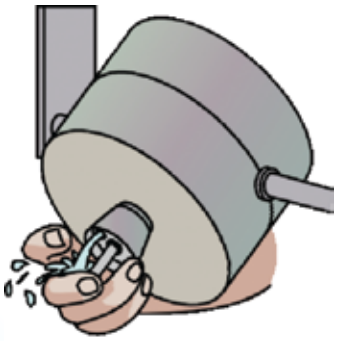
Generic technologies for possible adaptation at temporary learning spaces and schools

The following photographs and drawings show hand-washing facilities that are used in developmental and emergency situations for the general population. Not all of these devices have been reported in case studies as being used in temporary learning spaces or schools, but they are all recommended for adoption, with adaptations as required.

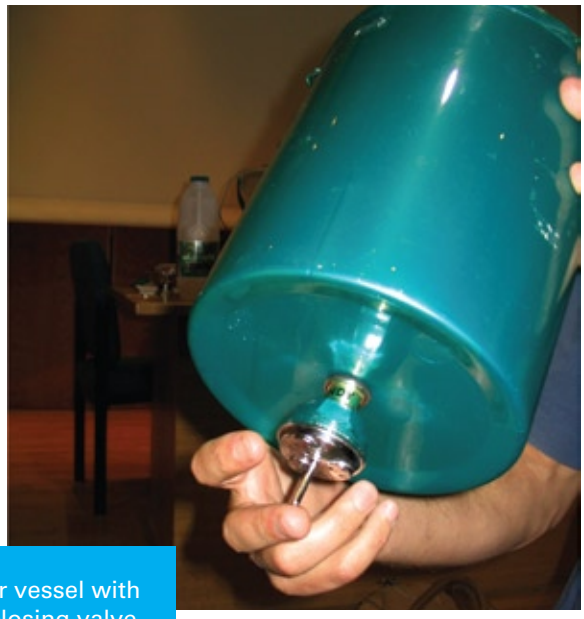
Use of jug and basin for assisted hand washing

Tippy tap arrangement, with recycled water container attached to wood frame

Tip the bottle and pour water into the handle. When the bottle is released water will slowly empty from a hole in the handle. The can is used to protect the soap from the rain.



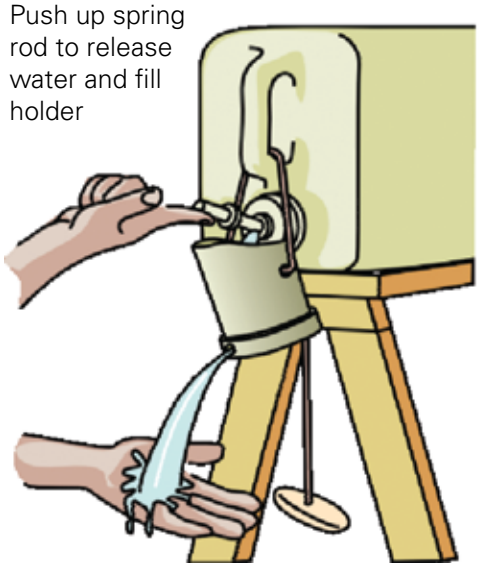
Push spring rod to release water from the pivoted container.



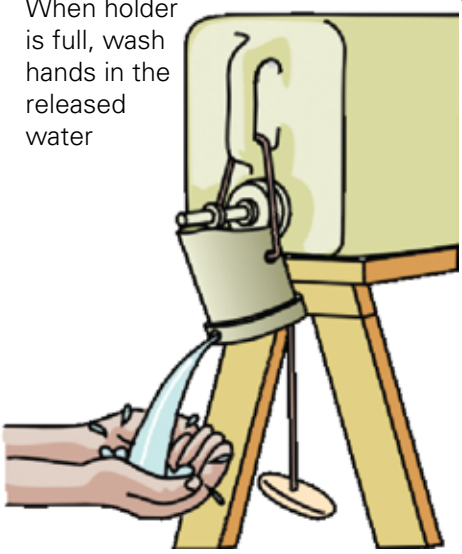
Water vessel with self-closing valve

Water container on stand with valve

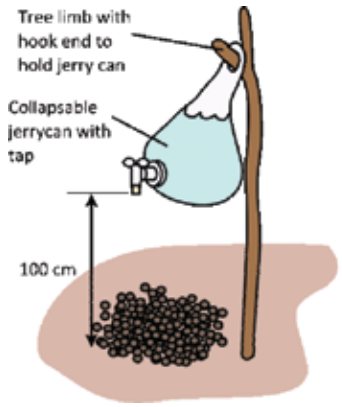
Push up spring rod to release water and fill holder

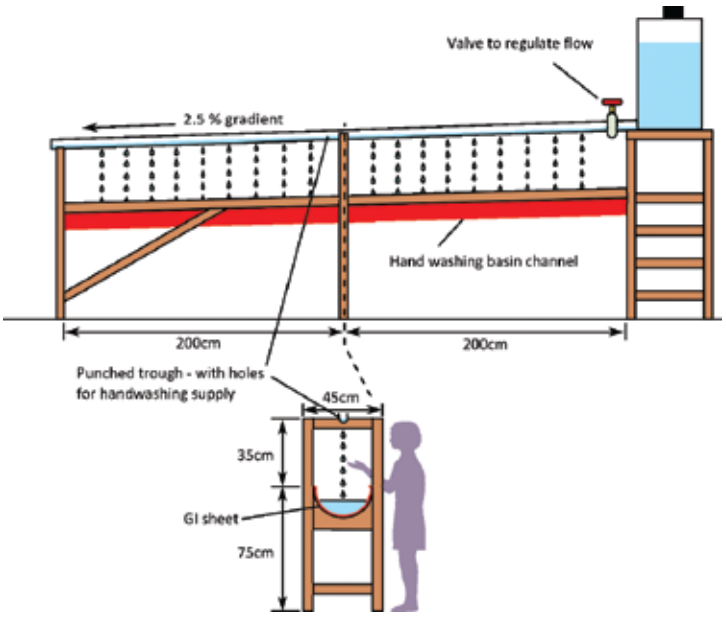


When holder is full, wash hands in the released water



Other hand-washing devices

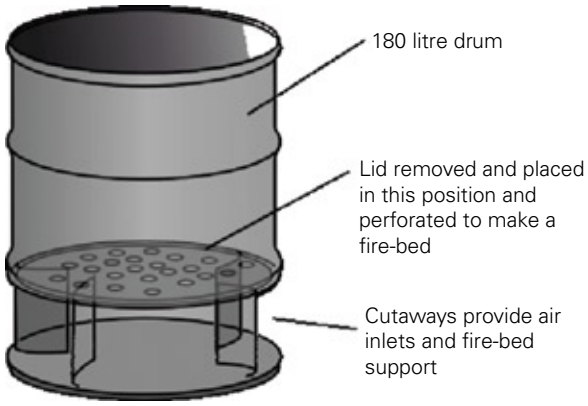




The punched pipe hand-washing system, which allows many children to wash their hands at the same time, was developed by the Fit for School organization in the Philippines.

Generic design for menstrual hygiene management

As noted in case study 8 on the hygiene block in Pakistan, facilities that ensure privacy and dignity for menstrual hygiene management may be a crucial factor in promoting girls' attendance at temporary learning spaces. The provision of an incinerator is one important consideration. The drawing at right illustrates an incinerator design based on use of a fuel drum, which could offer a fairly quick solution for addressing this issue. Although it is based on work done in India, there is nothing culturally specific about the design itself.



Design for menstrual hygiene management incinerator

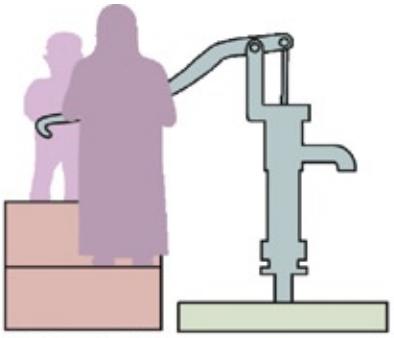
Water supply options for temporary learning spaces

Water supply solutions for schools and temporary learning spaces often focus on overhead tanks that are filled by rainwater or by pump from a water main. For temporary learning spaces, it might be expected to have emergency options provided that are quicker to install. Where shallow groundwater exists, shallow lift handpumps could be an option.

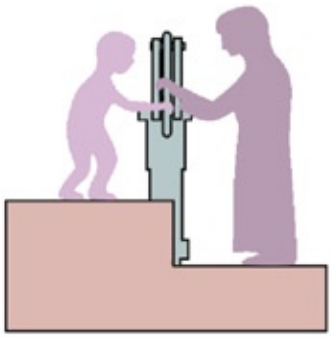
Some form of raised platform could be useful, especially when young children are expected to operate the handpump. The designs shown below include a duel-level step that can accommodate different age groups.

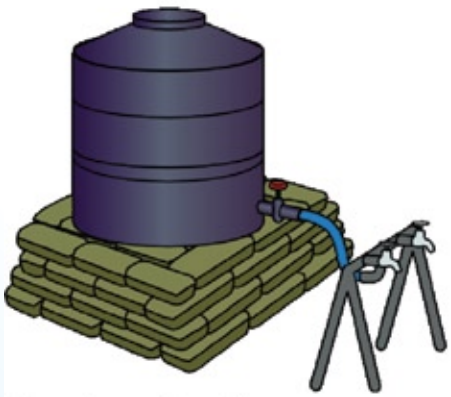
Where water must be trucked into a learning space facility and discharged into a storage tank, the tanks should be mounted on a frame or sand bags to allow convenient water collection.

Where a temporary learning space is likely to be in operation for many months, it is worth considering installation of a system that provides running water for hand washing. The examples shown below imply a forced-lift pump adaptation for the handpump, a pipe and taps, and a basin for the water storage tanks, accompanied by suitable waste water drainage arrangements.

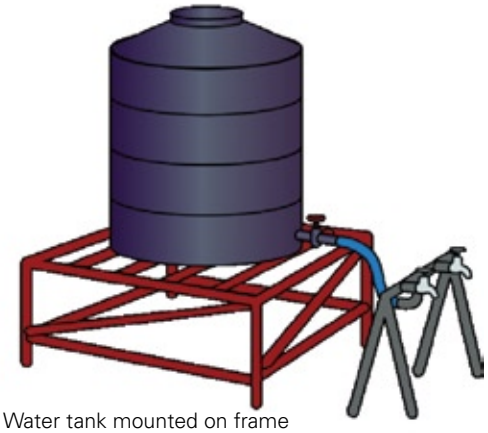


2 level steps for children





Water tank mounted on sand bags



Water tank mounted on frame

12 Federal Democratic Republic of Nepal – WASH in long-term, temporary schools for refugees

Twin-pit VIP composting latrines, upgraded to brick/cement lined pits, 1992–2011

Context: In 1992, approximately 120,000 Bhutanese became refugees in eastern Nepal and were given shelter in six camps located in Jhapa District. The refugees remained in these camps for more than 16 years, as efforts to find a political solution to allow them safe return to Bhutan were unsuccessful.

Within the first year after the camps were establishes, WASH facilities were developed to standards that could be considered semi-permanent; these were subsequently maintained and upgraded.

Large-scale movement and resettlement of the Bhutanese refugees to Europe and North America began in 2008; consolidation of the remaining caseload in a smaller number of camps was in process as of 2011. By early 2011, 46,000 refugees had been resettled, bringing the total camp population down to around 50,000, consolidated in the main camp of Beldangi.

Agency and organization: Lutheran World Federation, responsible for initial construction of water supply and sanitation for all refugee camps, in association with the United Nations High Commissioner for Refugees (UNHCR)

Location: Jhapa District, Nepal

Usage and duration: Until 2008, there were around 36 primary, lower secondary and secondary schools serving students in six refugee camps. The schools were established in 1993 and facilities remained basically unchanged.

Intervention/facilities provided:

Latrines/toilets	Primary and lower secondary schools used a basic design of twin-pit VIP composting latrines, following the same basic design as latrines used by refugee households By the mid-1990s, secondary schools had a modified design provided with same superstructure, but with twin pits lined with brick and cement that acted as containment chambers
Hand-washing and bathing facilities	No physical infrastructure provided
Water supply	All refugee camps were serviced by deep boreholes, which pumped water to raised ground tanks through transmission lines that also acted as a distribution line Each school had a tap water point provided in the school compound
Hygiene and cleaning kits	Not provided to schools
Other	No solid waste disposal facilities or collection was provided to the schools

Construction time: N/A

Cost: N/A

Maintenance: N/A

Closure: N/A

Successes and challenges: N/A

Recommended adaptation for future use: An independent review of the latrines serving the camps and schools was commissioned by UNHCR in 2008 and concluded that the design and its use over the years had been remarkably successful, and was also adopted by surrounding villages and government institutions. Because the maintenance costs and complications are low, the basic idea could be used where it seems likely that emergency-affected populations will remain displaced for several years.

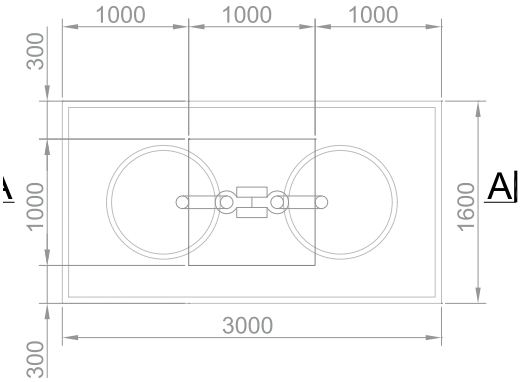
The following photographs illustrate latrines used in temporary schools for long-term refugees in the Federal Democratic Republic of Nepal:

Twin-pit composting latrines with brick and cement pit lining

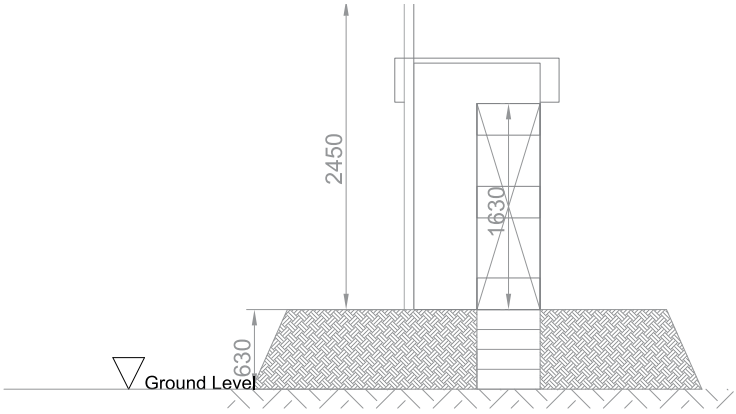
TABLE 11. Twin-pit VIP composting latrine, quantity and cost estimate, Nepal

Item no.	Description	Unit	Quantity	Unit rate (NPR)	Cost (NPR)
1	Earthwork excavation in foundation	m3	2.06	72.1	149
2	Compacted material filling base of squatting plate	m3	0.11	350.0	39
3	Backfilling	m3	1.51	350.0	529
4	Precast concrete (1:2:4) ring	m3	0.44		0
5	Precast concrete (1:2:4) slab cover	m3	0.15		0
Total volume concrete		**m3**	**0.62**	**4,524.0**	**2,805**
6	6 mm diameter steel reinforcing bars at 20 cm centres	kg	6.97	100.0	697
7	Boulder soling layer on base of ring and squatting slab	m3	0.51	810.0	413
8	110 mm HDPE vent pipe, 2.5 kg/cm^2 and 2.5 m long	m	2.50	198.0	495
9	Chute pipe for excreta 100 mm diameter	m	2.00	198.0	396
10	HDPE vent cap 110 mm	no.	2.00	60.0	120
11	Bamboo front post 2.25 m long	m	4.50		0
12	Bamboo front post 2 m long	m	4.00		0
13	Bamboo front post 2 m long	m	12.00		0
14	Bamboo front post 2 m long	m	6.00		0
Total bamboo		**m**	**26.50**	**9.3**	**247**
15	Ekra (local reeds) wall fence	m2	9.12	129.0	1,176
16	Sandwich panel for roof	m2	3.24	119.0	386
17	12.5 mm cement plaster on squatting plate and outside wall	m2	9.00	75.5	680
18	3 mm cement skim on squatting plate and outside wall	m2	6.00	55.7	334
19	Bamboo frame with bamboo mat door	m2	1.46	154.0	225
Total materials					**8,689**

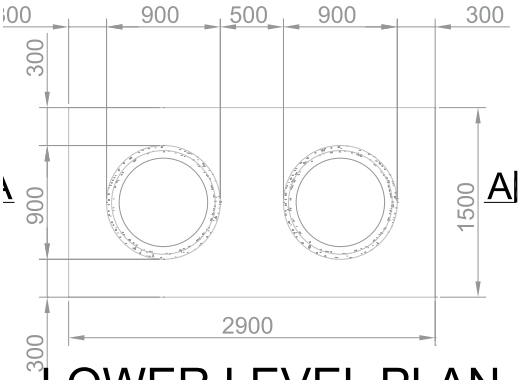
Approximate price in USD = $117.82



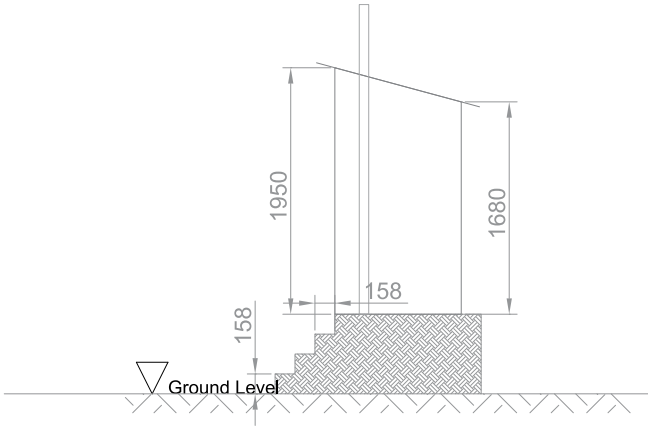
UPPER LEVEL PLAN



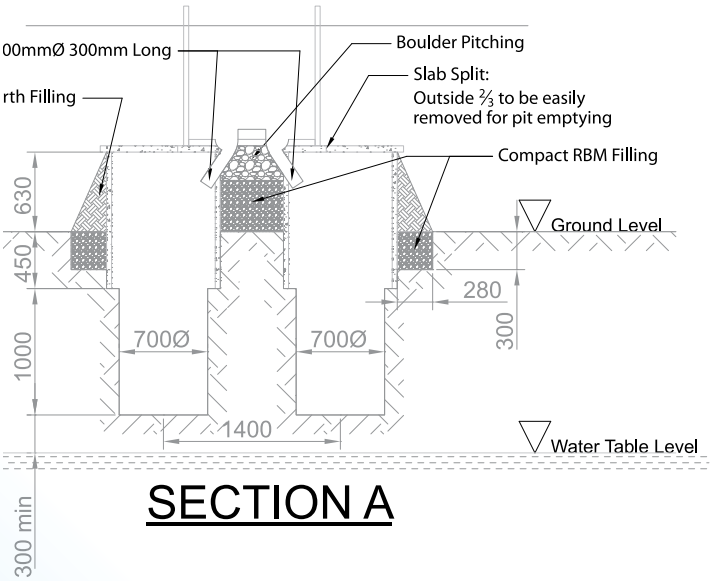
FRONT ELEVATION



LOWER LEVEL PLAN



END ELEVATION



SECTION A

Gravel/Fill

Earth

Brickwork

Blockwork

Concrete

PLAN

Long Tie Bc
25x75x205

A A

Ground L

13 Myanmar – Supporting school reconstruction after Cyclone Nargis

Simple pit latrines for emergency classrooms, 2008–2009

Context: On the night of 2 May 2008, Cyclone Nargis made landfall in the Ayeyarwady Delta region of Myanmar. The accompanying tidal surge caused widespread devastation and loss of more than 140,000 lives – and displaced more than 800,000 people in the low-lying townships. An initial assessment indicated that 2.4 million people were affected and required immediate humanitarian assistance.

The cyclone had a devastating impact on the main drinking-water sources, as ponds and dug wells became salinated by tidal waves, and rainwater harvesting systems were destroyed. Hundreds of thousands of homes collapsed. The livelihoods of entire communities were shattered by the destruction of farmland, fishing areas, salt farms, shrimp farms, businesses and local trade.

The Post-Nargis Joint Assessment carried out in mid-June 2008 by the Tripartite Core Group (Government of Myanmar, Association of Southeast Asian Nations and the United Nations) showed that the impact of Cyclone Nargis on Myanmar was similar in scale to that suffered by Indonesia following the 2004 Indian Ocean tsunami.

School reconstruction was expected to take at least a year. In the interim, support was provided to the Government in establishing temporary learning spaces, so that the new school year could begin in early June – enabling nearly 415,000 primary-school-aged children to resume their education as scheduled.

UNICEF proposed to build semi-permanent learning spaces in or adjacent to pre-existing schools. These learning spaces were intended to provide psychosocial support for children in the affected areas, as well as a stop gap before permanent reconstruction of schools. Although both classrooms and toilets were built using wooden frames and plastic (tarpaulin) sheeting, typically associated with temporary facilities, they were intended to have a design life beyond one year.

Agency: UNICEF and partners

Location: Cyclone Nargis-affected areas

Usage and duration: Approximately 150,000 schoolchildren in 1,000 primary schools supported for 1 year

Intervention/facilities provided:

Latrines/toilets	2 temporary, simple pit latrines for each classroom
Hand-washing and bathing facilities	Water pot, bucket, cup and soap kept in latrine by school No separate hand-washing facilities
Water supply	Rainwater collection tanks, 400-gallon capacity Water also drawn from nearby ponds fed by surface run-off
Hygiene and cleaning kits	Provided hygiene promotion kits for schools with training

Construction time: approximately 2 weeks

Cost: N/A

Maintenance: School heads take responsibility for maintenance of facilities through the general worker of the school with the assistance from the parent-teacher association members.

Closure: Facilities were built with the communities and taken over by school heads and parent-teacher associations.

Successes and challenges:

- Community participation was noteworthy in the aftermath of the disaster.
- Availability of the construction and transport of materials was a challenge.
- Scarcity of the artisans and skilled workers was also a challenge.

Recommended adaptation for future use:
Plastic sheeting for latrine walls is usually the element that fails first. For structures that are intended to be semi-permanent, it is recommended that measures are taken to reduce the risk of tearing and increase the structure's lifespan, including: reinforced plastic sheeting must be used; timber frame must be rigid to withstand movement that can cause plastic sheeting to become slack and induce wind damage; and close nailing of sheeting every 300 millimetres, with strips of rubber placed under nail heads to prevent local failure.

The following photograph illustrates a temporary learning space latrine used in the response to Cyclone Nargis:

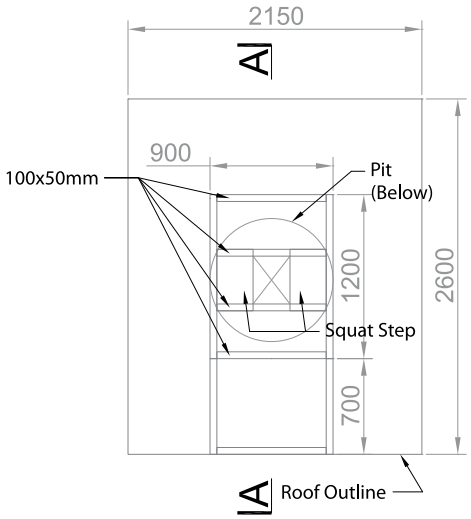
Semi-permanent latrine in Myanmar

TABLE 12. Latrine construction (one toilet), Cyclone Nargis response in Myanmar, summary bill of quantities

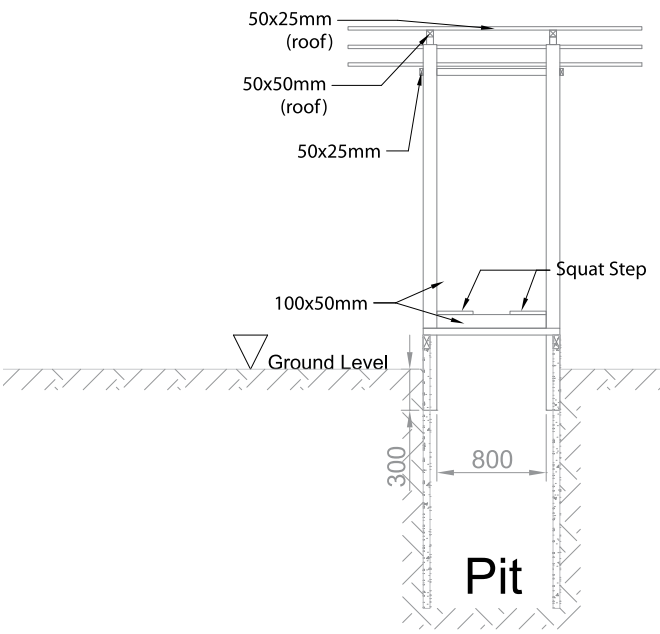
Item no.	Materials	One latrine		Unit price (kyats)	Cost (kyats)
		Unit	Quantity		
1	Bamboo, 3 in. diameter	ft.	10.50	120.00	1,260.00
2	Bamboo, 2 in. diameter	ft.	50.00	100.00	5,000.00
3	Bamboo, 2 in. diameter	ft.	70.00	100.00	7,000.00
4	Bamboo, 1.5 in. diameter	ft.	52.00	90.00	4,680.00
5	6 in. x 0.5 in. timber plank	ft.	114.00	80.00	9,120.00
6	2 in. x 1 in. timber handle	ft.	3.00	100.00	300.00
7	14 SWG binding wire	'viss'	0.25	4,800.00	1,200.00
8	Nails, 2.5 in. or 3 in.	'viss'	0.10	3,500.00	350.00
9	Nails, 1 in. or 1.5 in.	'viss'	0.10	3,500.00	350.00
10	Bamboo ring mat	sq. ft.	75.43	100.00	7,543.00
11	Soil	cu. ft.	46.09	150.00	6,913.50
12	Waterproof plastic sheeting, 16 ft. x 6 ft.	no.	2.00	–	–
Total					**43,716.50**

USD 1 = 790 kyats at market rate early June 2011
(USD 1= 6.71 kyats at official rate)

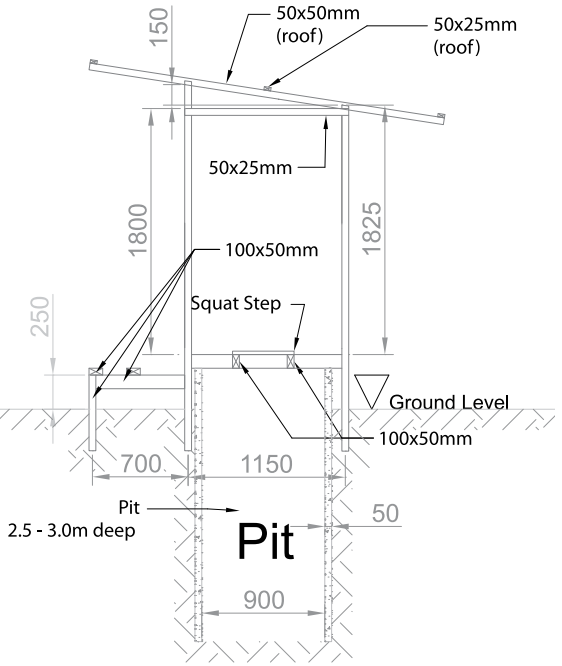
Total USD = 55.34



FLOOR PLAN



FRONT ELEVATION



SECTION A

All dimensions in mm unless otherwise noted
Do not scale from this drawing, use figured dimensions only

Drawing Title		
Myanmar: Latrine Details		
Drawing Reference		Sheet Number
Ex-Myn-Dwg-RevPR2		1 of 1
Scale	Sheet Size	Date
1:50	A4	July 2011

14 Indonesia – Rebuilding schools after the Padang earthquake

Semi-permanent latrines with adapted septic tank and rain catchment water supply

Context: On 30 September 2009, powerful earthquakes hit Indonesia's West Sumatra coast, triggering landslides and causing massive destruction. At least 1,100 people were killed and 1,200 severely injured. As of 28 October 2009, nearly 2500,000 houses were recorded as damaged – 115,000 severely, 67,000 moderately and 68,000 lightly. The earthquake also damaged government buildings; facilities for health, education and trade; hotels; and financial and banking offices.

The WASH cluster prioritized WASH in Schools activities after the Government of Indonesia announced that it could support building temporary classrooms but did not have a budget for water and sanitation facilities. WASH cluster members prioritized the locations where temporary schools or emergency school tents were in place, and where schools would be rebuilt or replaced.

Agencies and organizations: All United Nations agencies in the WASH cluster, along with Islamic Relief, Médecins Sans Frontières, Mercy Corps, Oxfam and World Vision

Location: Earthquake-affected areas – Agam, Kota Padang, Kota Pariaman, Padang Pariaman, Pasaman Barat and Pesisir Selatan

Users and duration: Each latrine unit has three cubicles – one for boys, one for girls and one for teachers. UNICEF and partners built 42 units, with additional units constructed by other WASH cluster agencies. The facilities were intended for primary school students and were in use for more than a year.

Intervention/facilities provided:

Latrines and toilets	Semi-permanent latrines with adapted septic tank built next to temporary classrooms or school tents
Hand-washing and bathing facilities	Water for anal cleansing, flushing from basins inside each cubicle Hand-washing facilities built outside toilet block, with tap outlet on water tank
Water supply	Rain catchment included in the design to provide water for cleaning the latrines, as well as hand washing; because latrines were located on existing school grounds, supplementary water was provided from wells and piped water from school grounds, and from water trucks in an emergency
Hygiene and cleaning kits	Target was primary schools, so no provisions were considered to be necessary for managing menstrual hygiene Hygiene education training for teachers provided in all schools where water and sanitation facilities were constructed Emergency school hygiene kit list (developed after last emergency, not yet used) for one school tent serving 40 children, including: • 30 bars of antiseptic/ disinfectant bath soap (*sabun mandi*); weight 80 grams • 2 plastic containers with tap and cover, made of sturdy, food-grade plastic, approximately 20-litre volume
Other	Hygiene education training provided for teachers Concrete rings set on ground provided for solid waste containment and burning

Tents for temporary classrooms, like the one shown above at an elementary school in Padang, began appearing within a week after the earthquake. As schools were rebuilt, semi-permanent latrines were constructed by UNICEF and partners.

Length of time to build: One week construction period

Cost: Block of 3 latrines – USD 1,000

Maintenance: N/A

Closure: Handover to the Department of Education and school headmasters

Successes and challenges in response to Padang earthquake, Indonesia:

- The facilities can be used for a long time because they were constructed next to damaged schools where the Department of Education planned to rebuild.
- Facilities are still in use in some locations.
- Links between the Government of Indonesia Department of Education and the education cluster were challenging.

Three-unit latrine block with rainwater harvesting system

Recommended adaptation for future use: The latrine blocks do not provide a privacy screen for girls entering the latrine, which may not be an issue for primary-school-age children, but could affect usage for older girls. The design would most likely need to be adapted for use in secondary schools.

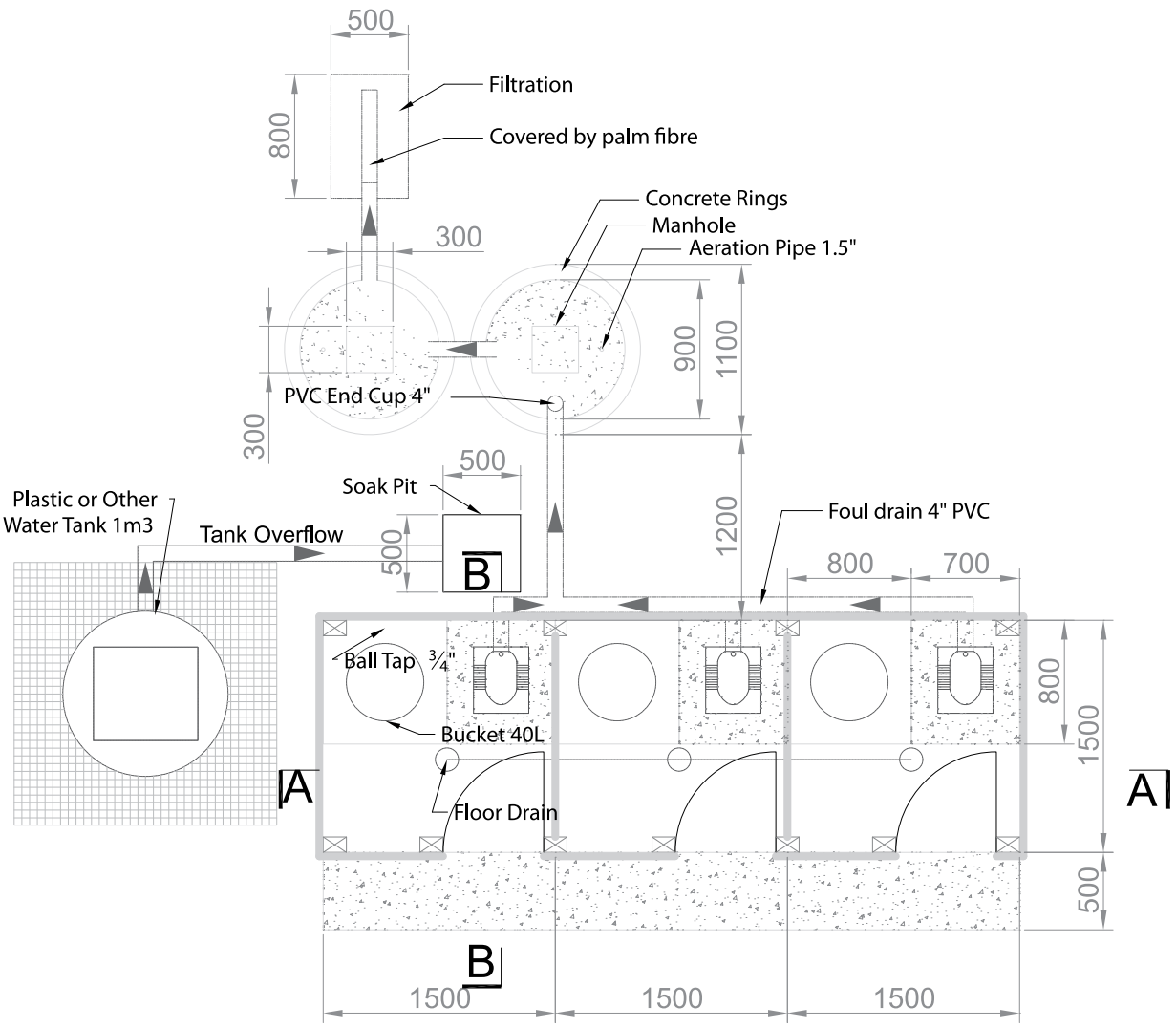
TABLE 13. Latrine rehabilitation (three latrines), Padang earthquake, Indonesia, summary bill of quantities

Item no.	Materials	One latrine		Unit price (IDR)	Cost (IDR)
		Unit	Quantity		
A. Local materials					
1	Sand (fine)	m3	1.50	60,000	90,000
2	Gravel, 1 / 2 cm	m3	1.50	150,000	225,000
3	Coconut wood, 5 / 10 x 4 m	pieces	28.00	48,000	1,344,000
4	Coconut wood, 2 / 20 x 4 m	pieces	6.00	21,000	126,000
5	Bayur wood, 4 / 6 x 4 m	pieces	1.00	21,000	21,000
6	Bayur wood, 3 / 20 x 4 m	pieces	1.00	21,000	21,000
Subtotal A					**1,785,000**
B. Materials for water connection					
1	Fibre tank, 1 m capacity	pieces	1.00	1,200,000	1,200,000
2	Electric water pump, 1 in. (SANYO brand)	pieces	1.00	200,000	200,000
3	PVC pipe, 3/4 in., Wavin AW	pieces	1.25	40,000	50,000
4	PVC reducer, 1 - 3/4 in.	pieces	1.00	8,500	8,500
5	PVC reducer, 4 - 2 in	pieces	2.00	15,000	30,000
6	PVC elbow, 3/4 in.	pieces	5.00	5,000	25,000
7	GI double nipple, 2 in.	pieces	4.00	12,000	48,000
8	PVC female adaptor, 2 in.	pieces	2.00	10,000	20,000
9	GI ball valve, 2 in. (Onda brand)	pieces	1.00	25,000	25,000
10	PVC elbow, 1 in.	pieces	3.00	8,500	25,500
11	PVC end cup (plug), 1 in.	pieces	2.00	8,500	17,000
12	PVC male adaptor, 1 in.	pieces	3.00	8,500	25,500
13	PVC female adaptor, 3/4 in.	pieces	1.00	8,500	8,500
14	Plastic ball, 2 in.	pieces	1.00	5,000	5,000
15	GI ball tap, 3/4 in. (Onda brand)	pieces	1.00	21,000	21,000
Subtotal B					**1,709,000**
C. Fabricant [manufacturer] materials					
1	Portland cement, 50 kg	bag	10.00	50,000	500,000
2	Zinc roof, 8 ft., 'BJLS' 20	pieces	49.00	45,000	2,205,000
3	Nails for roof, 2 in.	pieces	2.00	15,850	31,700
4	Nails for wood, 4 in.	kg	2.00	12,500	25,000
5	Nails for wood, 3 in.	kg	2.00	12,500	25,000
6	Nails for wood, 2 in.	kg	1.00	12,500	12,500
7	Gutter, PVC, square	set	1.50	45,000	67,500
8	Hanging gutter (*penggantung talang*)	pieces	12.00	3,000	36,000

C. Fabricant [manufacturer] materials (cont'd)					
9	Tube for gutter square, 2 in.	pieces	1.00	5,000	5,000
10	End cup Gutter square	pieces	2.00	4,000	8,000
11	PVC reducer, 3 - 2 in.	pieces	1.00	15,000	15,000
12	PVC pipe, 2 in., Wavin Class Standard D	pieces	1.00	35,000	35,000
13	PVC pipe, 4 in., Wavin Class D	pieces	1.50	95,000	142,500
14	PVC elbow, 2 in.	pieces	7.00	8,500	59,500
15	PVC elbow, 4 in.	pieces	7.00	41,850	292,950
16	PVC tee, 2 in.	pieces	4.00	14,000	56,000
17	PVC tee, 4 in.	pieces	6.00	35,000	210,000
18	End cup, PVC, 4 in.	pieces	1.00	20,000	20,000
19	Iron bar, 10 in. (9 m length)	pieces	1.00	25,000	25,000
20	Aeration pipe GI (ventilation pipe Ø1.5 in.) length = 50 cm	pieces	2.00	25,000	50,000
21	Floor drain, PVC, 2 in.	pieces	4.00	2,800	11,200
22	Glue for pipe, 45 g	tube	4.00	5,000	20,000
23	Pipe seal tape	pieces	4.00	1,500	6,000
24	Ceramic squat toilet/closet, pink or blue	pieces	3.00	90,000	270,000
25	Concrete rings 90 x110 cm Ø, with rebar inside	pieces	4.00	400,000	1,600,000
26	Door fibre material, completed with lock and hinge	pieces	3.00	180,000	540,000
Subtotal C					**6,268,850**
D. Tools and equipment					
1	Wheelbarrow	pieces	1.00	250,000	250,000
2	Shovel	pieces	2.00	50,000	50,000
3	Hammer (small) 0.5 kg	pieces	1.00	20,000	20,000
4	Hammer (large) 5 kg	pieces	1.00	50,000	50,000
5	Crowbar	pieces	1.00	25,000	25,000
6	Cement spoon	pieces	2.00	15,000	30,000
7	Wooden saw	pieces	1.00	20,000	20,000
8	Plastic bucket, 5 litre capacity	pieces	4.00	10,000	40,000
Subtotal D					**485,000**
E. Labours					
1	Skilled labourers	person/day	10.00	65,000	650,000
2	Unskilled labourers	person/day	20.00	50,000	1,000,000
Subtotal E					**1,650,000**
Total (A + B + C + D + E)					**11,897,850**

(USD 1 = IDR 8,300, early June 2011; total = USD 1,433.48)

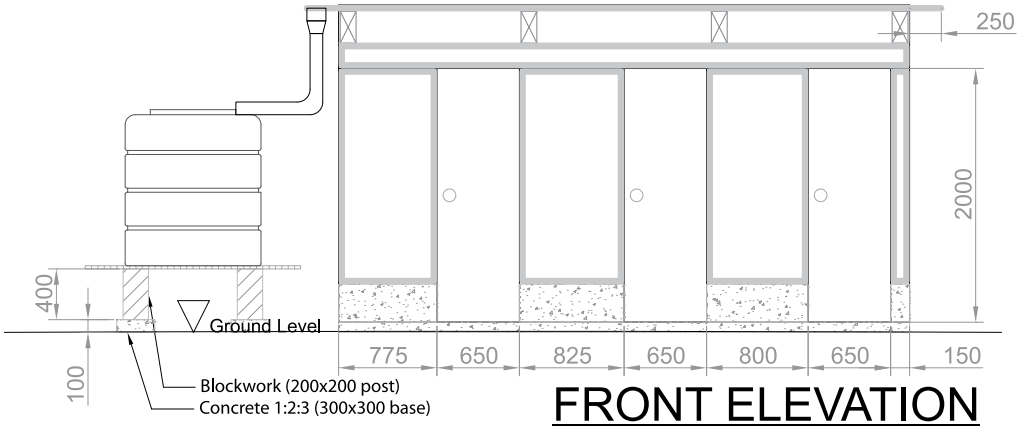
Tank Overflow



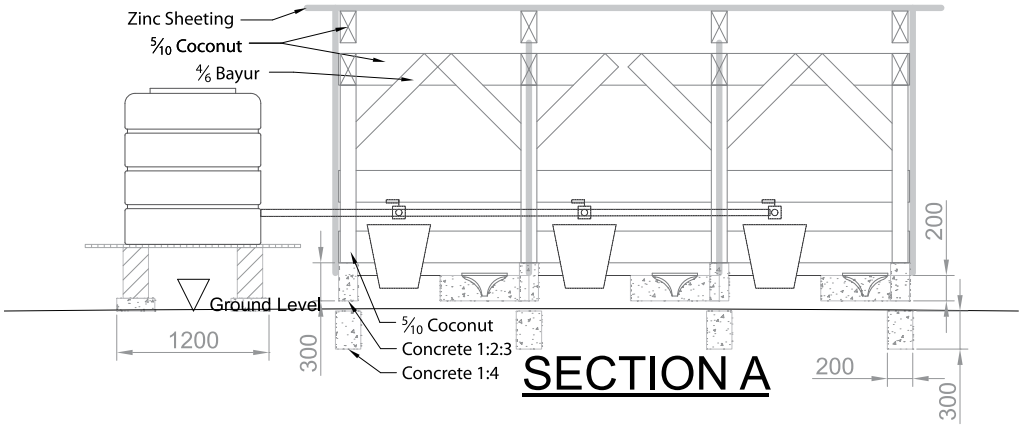
PLAN

All dimensions in mm unless otherwise noted
Do not scale from this drawing, use figured dimensions only

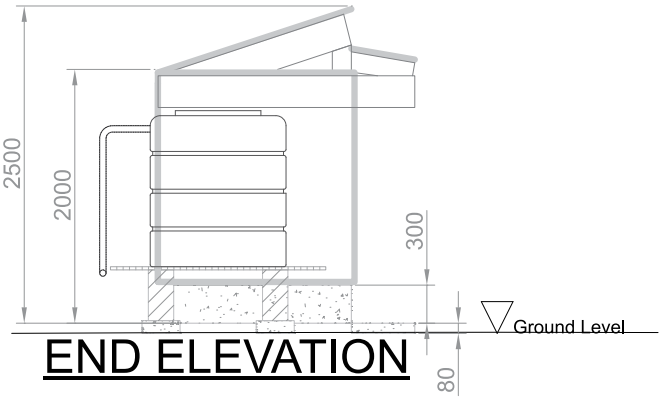
Drawing Title		
Indonesia Temporary School Latrine: Plan & Drainage		
Drawing Reference: Ex-Ind-Dwg-RevPR2		Sheet Number: 1 of 3
Scale: 1:50	Sheet Size: A4	Date: June 2011



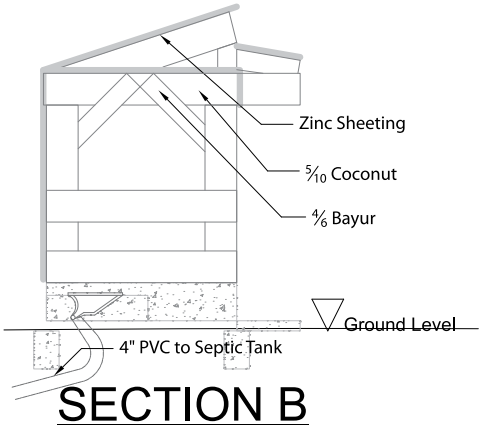
FRONT ELEVATION



SECTION A



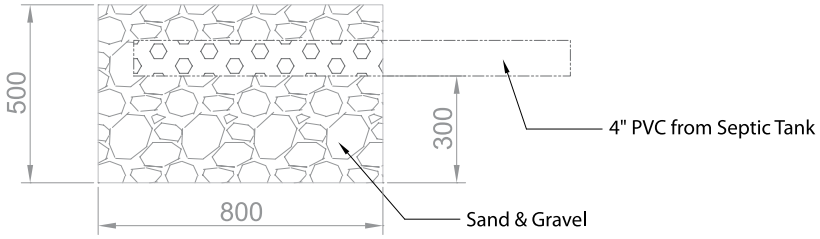
END ELEVATION



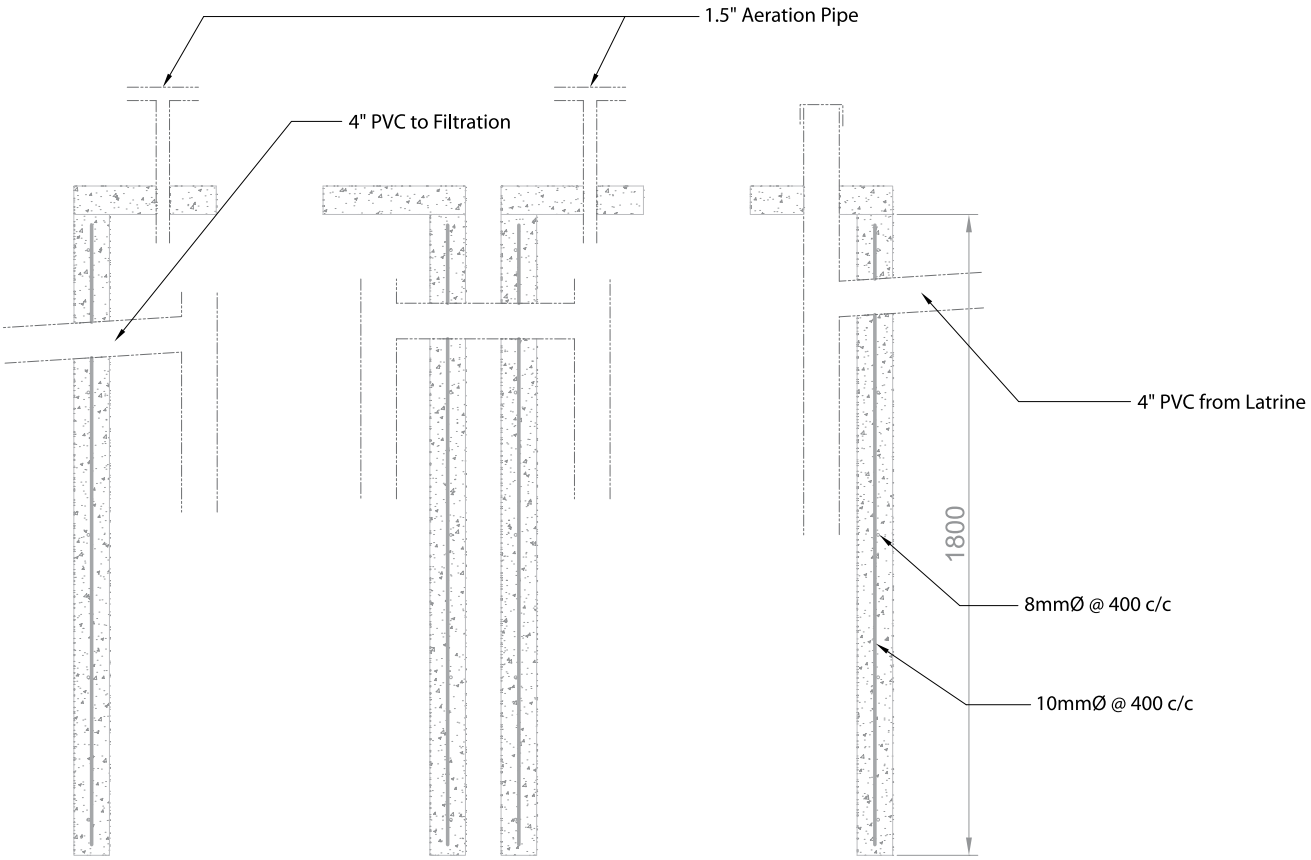
SECTION B

All dimensions in mm unless otherwise noted
Do not scale from this drawing, use figured dimensions only

Drawing Title		
Indonesia Temporary School Latrine: Sections & Elevations		
Drawing Reference: Ex-Ind-Dwg-RevPR2		Sheet Number: 2 of 3
Scale: 1:50	Sheet Size: A4	Date: June 2011



Filtration



Septic Tank

All dimensions in mm unless otherwise noted
Do not scale from this drawing, use figured dimensions only

Drawing Title		
Indonesia Temporary School Latrine: Septic Tank Details		
Drawing Reference: Ex-Ind-Dwg-RevPR		Sheet Number: 3 of 3
Scale: 1:20	Sheet Size: A4	Date: June 2011

15 Plurinational State of Bolivia – Disaster risk reduction for schools

Raised twin-pit composting toilets, 2008–2010

Context: The Plurinational State of Bolivia is vulnerable to multiple natural hazards that vary greatly by region. To understand the potential impact of natural disasters on school facilities, the Ministry of Education mapped vulnerabilities across the country.

Short- and long-term flooding occur with some regularity in Bolivia – particularly in Beni, Cochabamba, Pando and Santa Cruz Departments – and are considered to be the conditions most likely to impact water and sanitation facilities in schools. UNICEF Bolivia developed appropriate technologies for WASH facilities in the Amazon region of the country, based on an elevated design of twin-pit composting school toilets with waterproof compartments.

Agency: UNICEF

Location: See table, below, on usage and duration

Usage and duration:

Department	Municipality	Community	Year of construction	Users
Beni	Loreto	Tacuaral	2009	15
Beni	Loreto	San Bartolo	2009	25
Beni	Loreto	San Antonio De Loras	2009	55
Beni	Loreto	Gundonovia	2009	60
Beni	Loreto	El Carmen del Remanso	2008	27
Beni	Loreto	Santa Rosa del Chapare	2008	196
Beni	Loreto	Camiaco	2009	50
Pando	Puerto Rico	Motacusal	2009	28
Pando	Puerto Rico	El Mati	2010	73
Pando	Puerto Rico	El Campeon	2009	43

Elevated toilets built in Bolivia to reduce potential flood damage

Intervention/facilities provided:

Latrines/toilets	Raised twin-pit composting toilets built in order to reduce risk of future flood damage (based on an elevated design of twin-pit composting school toilets with waterproof compartments)
Hand-washing and bathing facilities	Provided as part of the toilet block, outside toilets; water is supplied from an elevated water tank
Water supply	Some schools were provided with an elevated water tank served by pumps that draw water from a nearby well or by the main water supply
Hygiene and cleaning kits	Nothing provided
Other	Nothing provided

Construction time: approximately 1 month

Cost: 2 units (1 male, 1 female – USD 4,000
4 units (2 male, 2 female) – USD 6,000

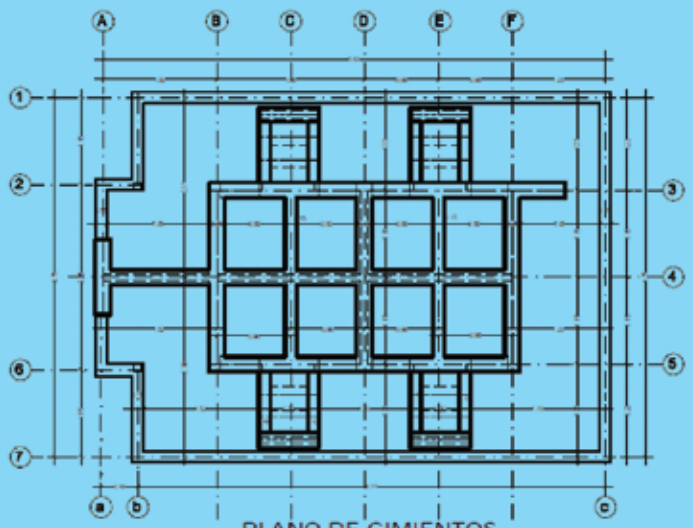
Maintenance: Responsibility of school

Closure: Official handover to the community and school after construction

Successes and challenges: N/A

Recommended adaptation for future use: N/A

BAÑOS ECOLOGICOS
DE CUATRO INODOROS



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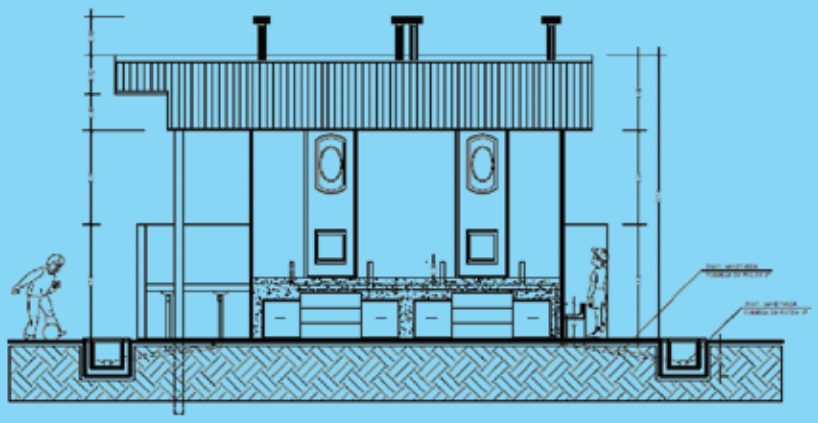

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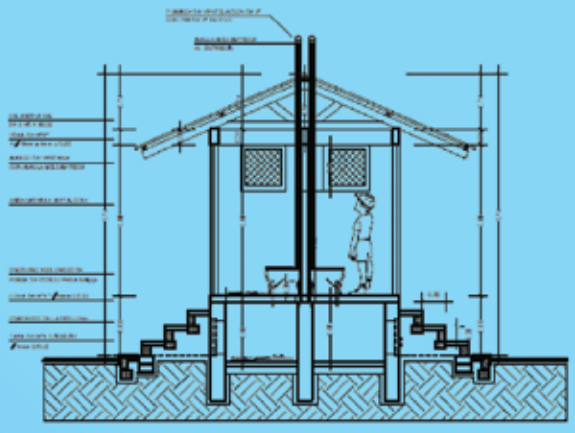

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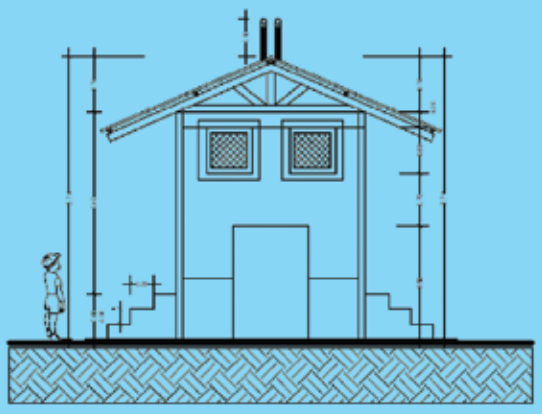

ELEVACION LATERAL
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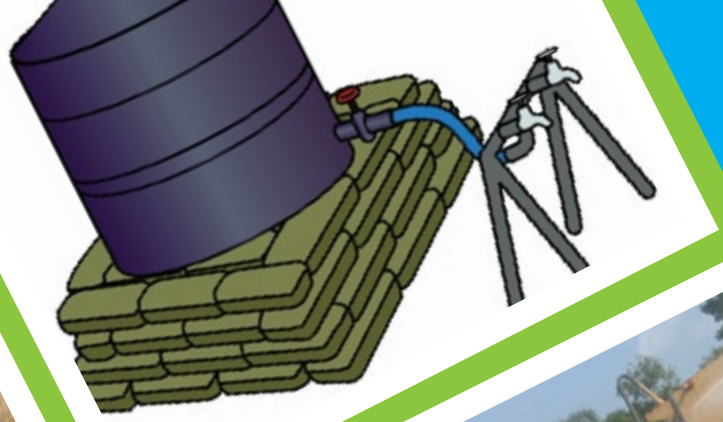

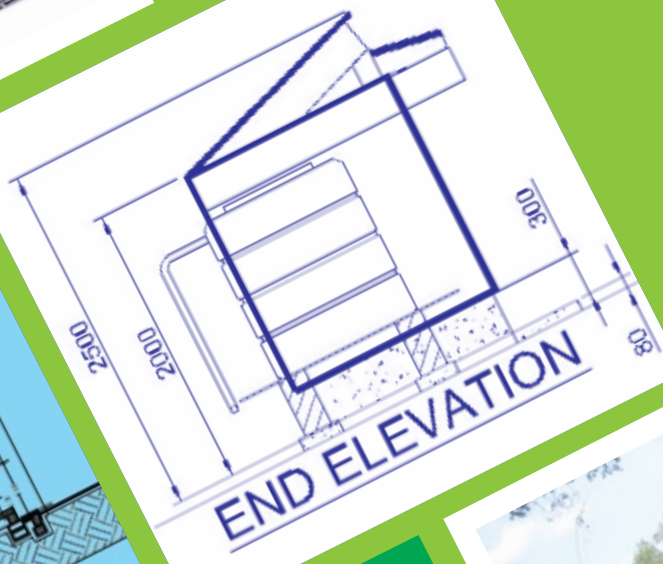

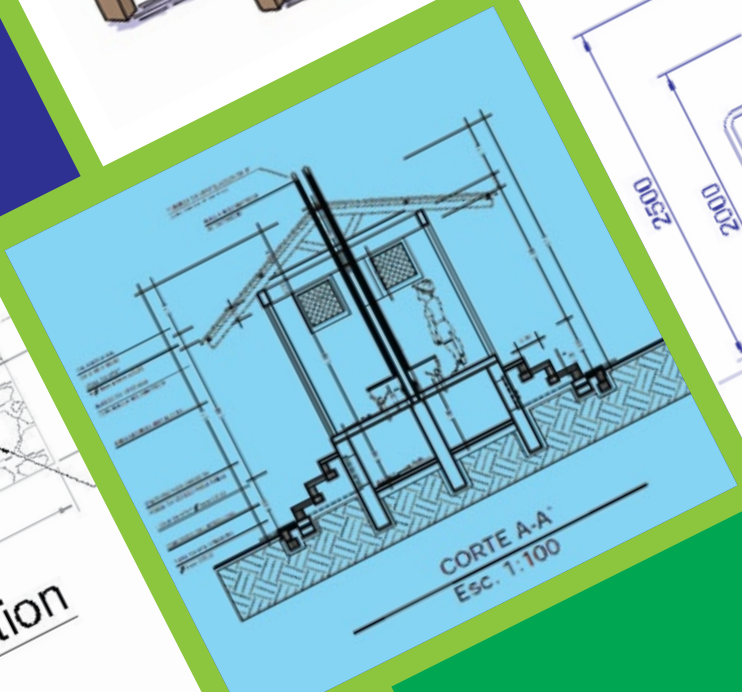

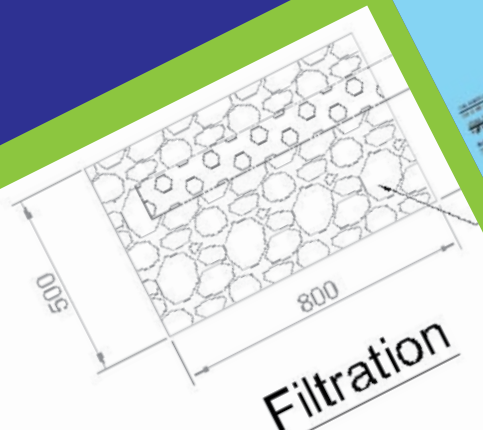

Join us in sharing your WASH in Schools emergency preparedness and response experiences.

Please contact Murat Sahin, UNICEF adviser for WASH in Schools, at msahin@unicef.org and visit www.unicef.org/wash/schools for more information.