

LAO PEOPLE'S DEMOCRATIC REPUBLIC
Peace, Independence, Democracy, Unity, Prosperity

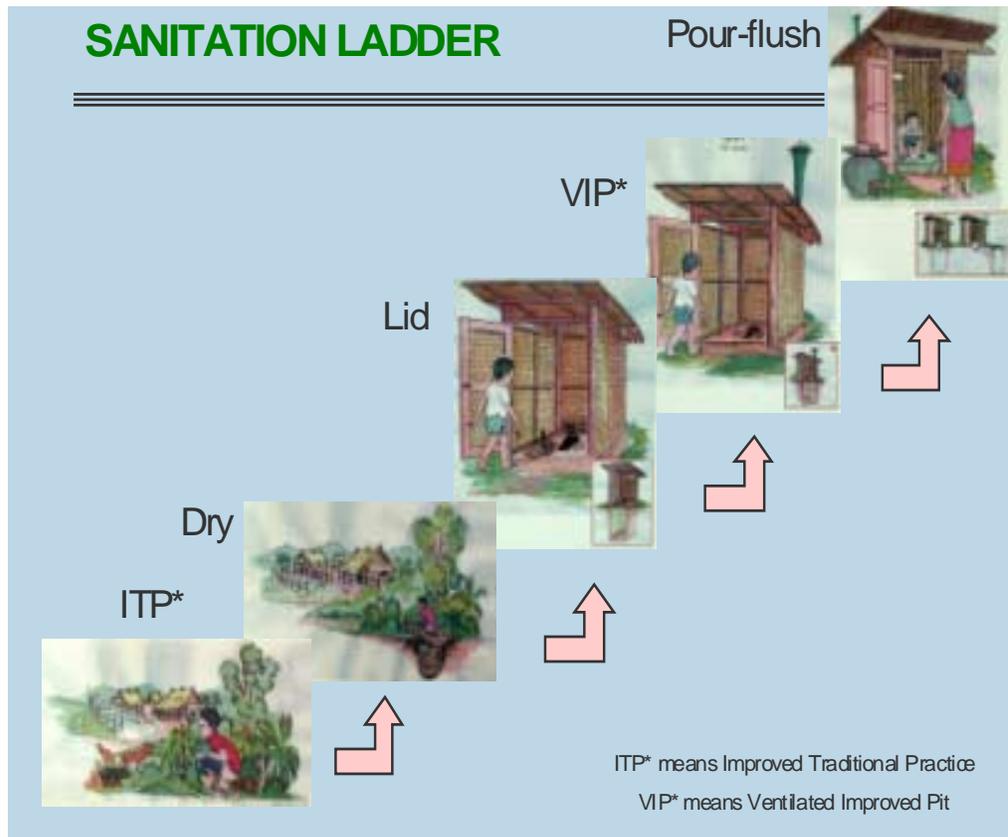
National Water Supply and Environmental Health Programme
Ministry of Health

CONSUMERS CHOICE..... THE SANITATION LADDER:

RURAL SANITATION OPTIONS IN LAO PDR



Water and Sanitation Program
East Asia and Pacific (WSP-EAP)



Vientiane, Lao PDR
May 2001

CONSUMERS CHOICE.....

THE SANITATION LADDER:

RURAL SANITATION OPTIONS IN LAO PDR

In the past, rural water supply and sanitation interventions in Laos mainly focused on locations with relatively easy access, and with limited technological options. Decisions were handed down to poor communities by projects. Communities provided labor and local materials. This traditional top-down approach, with no community participation in decision-making, has proven to be the source of unsustainable investments, in Laos and elsewhere.

In November 1997, the lead sector agency Nam Saat, successfully launched [the "Lao RWSS Sector Strategy and Guideline National Framework"](#) (link to existing publication). One of the key strategic principles of this nationally-led strategy is to support the use of demand-responsive approaches in the provision of water supply and sanitation services. To make this happen the challenge is to find optimal local solutions without sacrificing technical feasibility and quality. Informed choice involves decisions by consumers from among feasible technical, financial and organisational options based on an adequate understanding of alternative consequences. Potential consumers need to be provided with accurate information about the different technological options and service levels available, but also need to be aware of the trade-offs between the different options and service levels.

Technology options for sanitation has been developed by using a [sanitation ladder](#), whereby increasingly higher levels of service options are displayed, with approximate price tags. The "ladder" is presented during "community dialogue" process as a very simple sketch which triggers discussion within the consumers (household groups). This facilitates discussion, and enables communities to make an informed and well-considered selection of the best technical solution to meet their own requirements, resources and local conditions. Such a ladder presents summaries – for each option – of:

- basic characteristics of infrastructure and the environmental conditions for which each is suitable;
- advantages and disadvantages;
- estimated capital and recurrent costs;
- productive life of the infrastructure created (working life);
- users' responsibilities for operations and maintenance; and
- materials required.

DEVELOPMENT OF SANITATION LADDER IN LAO PDR

In the past, before 1997, the Single Pit Pour Flush Latrine was the only option being offered to the community. Once Nam Saat started planning to apply the Demand Responsive Approach in line with the Lao Strategy the importance of feasible options was felt. A set of 12 options were discussed initially. The existing local understanding, technical capacities, culture and socio-economic situation were the main [selection criteria](#) to reduce the [12 initial options to six](#), based on the lessons learned during the preparation of the Hygiene Awareness, Sanitation and Water Supply (HASWAS) Component of the Provincial Infrastructure Project for two Northern Provinces.

What is or is not technically feasible obviously varies accordingly to the different locations – and indeed different provinces – within the same country depending on environmental factors and the technical capacity available. With that caution in mind, a total of six [rural sanitation options](#) have been identified as technically feasible by central and local government professional staff in Lao PDR.

Links to [Hygiene and Sanitation Promotion \(precise title\)](#)
[Other publications on Lao PDR](#)

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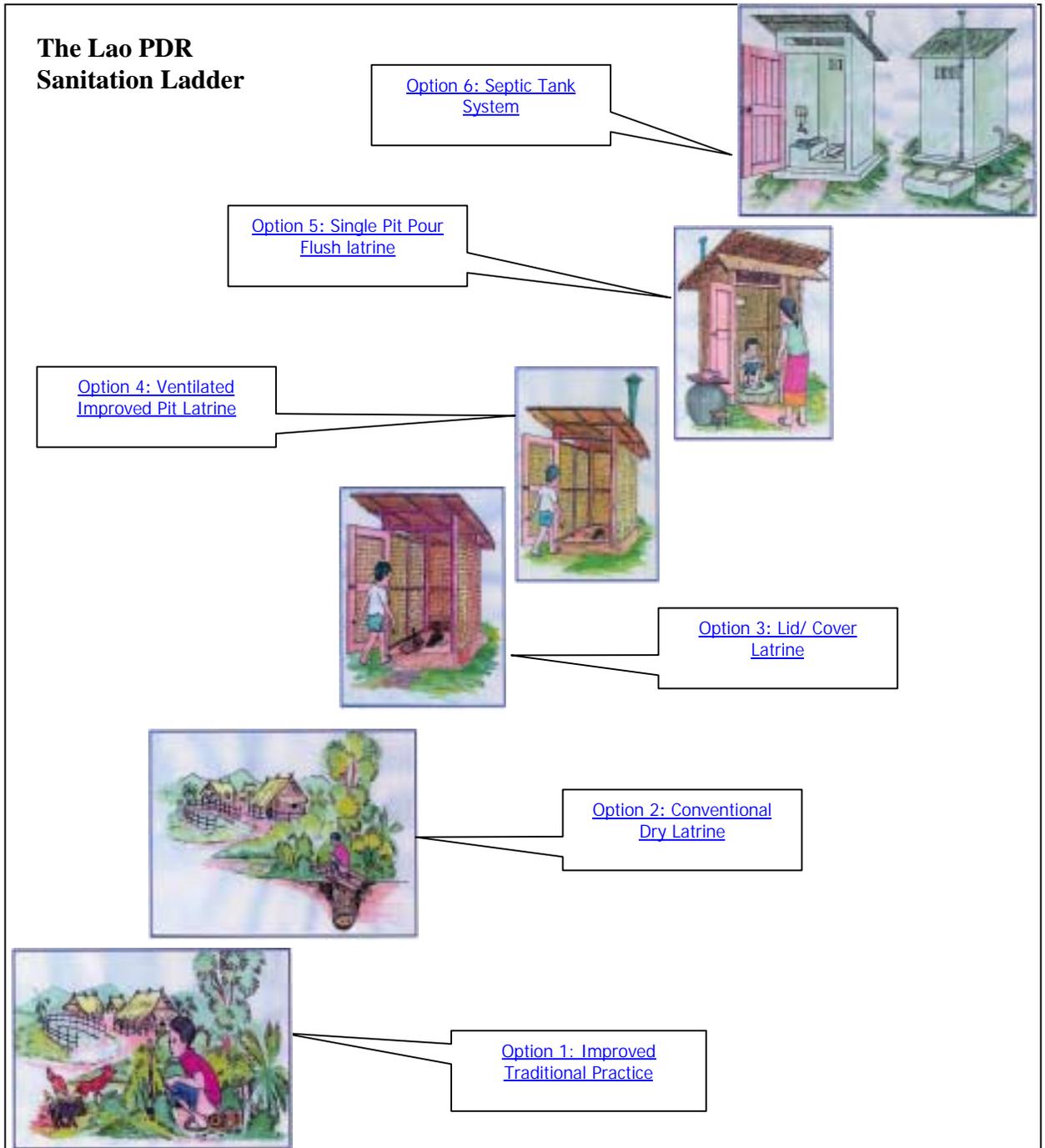
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selection criteria

Selection Criteria for Ensuring Choice:

- sustainability and lasting long-term benefits (impact);
- immediate benefits (quality, convenience, reliability)
- capacity requirement to provide supply-side support
- operation and maintenance;
- upgradability, working life, eventual replacement possibilities;
- cost-effectiveness (capital and recurrent costs and type of materials requirements for construction);
- accessibility
- scope of up-gradability.

[12 initial options to six](#)

August 1998: Options selected for overall national:

1. Improved Traditional Practice
2. Conventional Dry Latrine
3. Lid/ Cover Latrine
4. Ventilated **Programme** Improved Pit Latrine
5. Single Pit Pour Flush Latrine
6. Septic Tank System

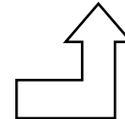
September 1997: Options considered during HASWAS preparation:

1. Improved Traditional Practice
2. Conventional Dry Latrine
3. Antipolo Latrine
4. Lid/ Cover Latrine
5. Ventilated Improved Pit Latrine
6. Single Pit Pour Flush Latrine



May 1997: Options considered during pre preparation for HASWAS component:

1. Improved Traditional Practice
2. Conventional Dry Latrine
3. Lid/ Cover Latrine
4. Antipolo Latrine
5. Ventilated Improved Single Pit Latrine
6. Ventilated Improved Double Pit Latrine
7. Ventilated Improved Lid Latrine
8. Vietnam Double Vault Latrine
9. Dehydrating Latrine
10. Single Pit Pour Flush Latrine
11. Double Pit Pour Flush Latrine
12. Septic Tank



Up to 1997: Mainly the promotion of the Single Pit Pour Flush Latrine



EVOLUTION OF CHOICE

“To Support the Demand Responsive Approach in line with Lao RWSS Sector Strategy”

OPTION 1: Improved traditional practices

Description

Improved traditional practices means health and environmental improvements through behavioral change. In Lao PDR there are many villages which are in remote areas¹ with many ethnic minorities. In these type of villages, where open defecation is a regular practice, the introduction of behavioral change might be the first option, without essential intervention of any hardware investment. This might encourage villagers to change their behavior by defecating away from water sources, main road, close to houses, the market place, clinics, etc.

This will help to:

- improve existing scattered open defecation practices
- avoid water pollution
- start to build proper personal and communal hygiene behavior
- build eventual demand for proper latrines

Advantages

- Better environment than traditional practice
- Affordable
- Very convenient
- Aesthetically better environment.

Disadvantages

- Not fully sanitary
- Risk of groundwater and surface contamination

Tentative costs

- No costs

Important features

- develop behavioral change to stop scattered open defecation;
 - introduce/support hygiene practices like hand washing, proper disposal of child excreta etc;
 - select the location 15 to 20 meters away from schools, houses, markets, clinics, road, water and drainage areas;
 - Introduced where initial willingness-to-pay for latrine is low.
-

OPTI ON 2: Conventional pit latrine

Description

A conventional pit latrine is a non-water dependent latrine which doesn't require water for functioning, though a small amount of water can be used to clean the squat plate occasionally. This types of latrine is suitable in water-scarce areas or where community uses dry cleansing materials (twigs, leaf, grass, paper etc.).

Therefore, the introduction of an unlined (or lined) pit with a squat plate with or without a super-structure can be the second option. This will be particularly applicable for those communities who have open defecation practice. Defecating through a squat plate without a superstructure sometimes helps communities to escape the initial psychological problem for defecating within a four-wall superstructure.

Advantages

- Less chance for transmission of excreta related diseases than open defecation
- Developing practice to use latrine
- Affordable
- Simple technology
- Can be used as fertilizer after composting
- Appropriate for low income families
- Aesthetically better environment.

Disadvantages

- Not fully sanitary
- Flies and odors
- Risk and fear to fall into pit
- Risk of groundwater and surface water contamination

Tentative costs

The capital cost for hardware is negligible as locally available wood / timber can be used for squat plate. Operational costs are also negligible for replacing the wooden squat plate if damaged with age.

Important features

- squat plate, unlined or lined pit, super-structure (optional)
- where initial willingness-to-pay for latrine is low

[Rural sanitation option – bill of quantities for Latrine Options 2 to 6](#)

OPTI ON 3: Lid or cover latrine

Description

A lid or cover latrine is a non-water dependent latrine which doesn't require water for functioning, though a small amount of water can be used to clean the squat plate occasionally. These groups of latrines are suitable in water-scarce areas or where a community uses dry cleansing materials (twigs, leaf, grass, paper etc.). A lid or cover latrine is an improved conventional pit latrine provided with a manual closing-lid (or cover) for the squat hole, to make it as fly-tight and odor-tight as possible.

Advantages

- Less chance for transmission of excreta related diseases than conventional pit latrine
- Privacy
- Simple technology
- Can use as fertilizer after one-year composting
- Odor reduced
- Appropriate where water is not freely available
- Suitable for low income communities as the construction materials are mainly local materials
- Construction and maintenance are easy.
- Suitable for communities using dry cleansing materials (twigs, leaf, grass, paper)
- Can be up-graded to Ventilated Improved Pit latrine or to pour flush latrine.
- Suitable for less populated area where spaces are available for relocating latrine when it is full.

Disadvantages

- Not fully sanitary
- Risk of odor if not properly constructed
- Risk of groundwater and surface water contamination
- Once pit is full the latrine has to be moved to another location
- Chances of transmission of diseases through flies and rodents are still there.
- Needs proper information to the beneficiaries to always close the lid after use.

Tentative costs

Capital costs for cement sand gravel and locally available materials for house ends up around US \$ 40. Operational costs are negligible.

Working Life

2 to 3 years (depends upon number of users and pit size).

Users responsibility

Needs maintenance of lid, squat plate and the super-structure.

Tentative material required

Cement	1 bag
Dry sand	70 lit
Gravel(12mm)	100 lit

- The pit and lining materials will be of bamboo or any low-cost materials durable for 2 to 3 years. In all cases the side wall of the pit has to be perforated.
- Squat Plate with foot rest: Concrete or bamboo floor with neat finish and brick , stone or wooden foot rest.

- Wooden lid
- House for privacy, will be made of any local materials.

Salient features

- Squat plate with a hole
- A lid (or cover)
- Foot rests near squat hole
- A pit below the squat hole
- House or latrine room
- No need of water to operate this system although a little water can be used, especially for cleaning
- Cross ventilation will eliminate odor inside the latrine room.

[Rural sanitation option - bill of quantities for Latrine Options 2 to 6](#)

OPTION 4: Ventilated Improved Pit Latrine

Description

A VIP latrine is a non-water dependent latrine which doesn't require water for functioning, though a small amount of water can be used to clean the squat plate occasionally. These groups of latrines are suitable in water-scarce areas or where a community uses dry cleansing materials (twigs, leaf, grass, paper etc.).

A ventilated improved pit latrine is an improved conventional pit latrine, slightly offset from the pit and having a tall vertical (gradually tapered towards the pit) vent pipe with a fly-screen fitted outside the superstructure to trap flies and reduce odor nuisance.

Advantages

- Little odor
- Privacy
- Less chances for transmission of excreta related disease than lid or cover latrine
- Good health and hygiene practice
- Can use as fertilizer after one year composting
- Better life and environment
- Suitable for water scarce area, as no need for water except occasional cleaning of the squat plate
- Suitable for communities using dry cleansing materials
- Can be built with local materials
- Affordable
- Construction and maintenance are easy
- Can be up-graded to pour flush latrine
- Suitable for less densely populated area where space is available for relocating the latrine when it is full

Disadvantages

- Technical support required when installed as proper construction is crucial
- Risk of groundwater and surface water contamination
- Once filled the latrine has to be moved to another location
- Odor nuisance is not fully controlled.

Tentative costs

Tentative material costs, 60 USD. Operational costs, USD 2 for replacement of fly screen and trap and for house and squat plate USD 1 to 8.

Working life

2 to 3 years depending on number of users and pit size

Users responsibility

Needs maintenance for vent pipe, fly net, squatting plate and the superstructure.

Tentative material required

VIP latrine with brick lining:

Cement	88 kg
Brick	900 nos.
Gravel	0,1 m3

Sand	0.1 m3
Rebar	2.2 kg
PVC (150 mm)	2.5 m
Fly screen	1 number
Locally available material for house	

- Unlined pit => Only shovel to dig the pit.
- Lined pit => Shovel to dig the pit and lining materials such as, bamboo / earthen rings / bricks / stones / hollow blocks etc. In all cases side wall of the pit has to be perforated.
- Squat plate with foot rest and concrete or bamboo floor with neat finish with foot rest of stone / brick / wood
- Vent pipe: Asbestos-cement / PVC pipe / brick or block work / local materials
- Fly-screen: Standard steel fly screen / PVC covered glass fiber screen / mosquito net
- House of any local materials, but direct sunlight should not come into the latrine room.

Important features

- Squat plate with a hole
- Foot-rests near squat hole
- A vent pipe extending above roof (In Lao PDR vent pipe should be on the southern side of the latrine superstructure). The vent pipe outside should be painted with black color and should be gradually tapered in bottom portion for getting effective functioning
- Fly screen covering top of vent pipe
- Single pit under the squatting plate
- House or latrine room should be oriented either on north or south to avoid direct sunlight
- House should not be located under trees or structure to allow adequate wind flow.
- Ventilation for the latrine room should be always in the upper portion of the latrine room, preferably above of the entrance door (no other ventilation should be provided).

[Rural sanitation option – bill of quantities for Latrine Options 2 to 6](#)

Note: The light attracts flies. Therefore if any fly enters in to the pit through squat hole they will be attracted to the vent pipe. They will then be trapped in the fly screen if the interior of the superstructure is kept clean and properly shaded.

OPTION 5: Pour flush latrine

Description

The function of a water dependent latrine relies mainly on the usage of water. Without water these latrines fail to operate. The water flushes out excreta from bowl, which consists of a water-seal generally known as a trap. The water dependent latrines can be further categorized on the basis of; Flushing (pour flush or mechanical flush) Location of pit (onset type: if latrine room is just above the pit; offset type: if pit is slightly offset from the latrine room) Water quantity required (pour flush latrine: where 1/2-2 liters of water is required for manual flushing; conventional bowl latrine: where 4 liters of water is required) Excreta disposal system (pit latrine: where excreta is collected and decomposed within a pit; septic tank: where excreta collected and decomposed within a water tight chamber).

The pour flush latrine is a specially designed water-sealed bowl, which requires 2-4 liters of water for flushing the excreta. This water seal latrine eliminates entry of odor and prevents rodents to the latrine room from pit through the bowl. This pour flush latrine consists of a single pit either just below the bowl (onset type) or may be offset from the bowl (offset type) using the pour flush type bowl (pan and trap).

Advantages

- Odor free
- Privacy
- Little chance for transmission of excreta related disease
- Good health and hygiene practice
- Appropriate where water is available
- Long life time and no need to move for many years
- Water requirements for flushing is low (1/2-2 liters)
- Construction and maintenance are cheap and easy
- Offset type can be adjusted in any type of dwelling without causing any smell nuisance
- Suitable for less populated areas where space is available for relocating the latrine
- Possible to upgrade it into twin pit pour flush system (for offset type)

Disadvantages

- Water necessary for flushing, 1/2-2 liters
- Risk of groundwater and surface water contamination
- Not appropriate where water is not available
- Desludging of toilet required every 3-5 years
- Needs simple orientation of users for latrine maintenance, especially the bowl.
- Locally manufactured bowls are often of bad quality due to lack of proper moulds
- Difficult to construct in high ground water table area.

Tentative costs

Tentative material cost USD 75 and operational costs are negligible.

Working Life

5-10 years, depending upon pit size and number of users etc.

Users responsibility

- Need awareness on how to use.
- Need to clean the squat plate and pan regularly.

- No paper, cotton etc. should be thrown into the pan, otherwise water seal will be choked.
- Water for flushing is a must after each use.

Tentative material required

Cement	70 kg
Sand	0.1 m ³
Gravel	0.15 m ³
Steel (dia 6 mm)	1.5 kg
1 Squatting plate	

- Bowl options => Plain cement / plastic / mosaic / fiber glass reinforced / ceramic etc.
- The bowl (the trap portion) is different for onset type and offset type pits.
- For unlined pit => Only a shovel to dig the pit.
- For lined pit => A shovel to dig the pit and lining materials such as, bamboo / stones / earthen rings / bricks / hollow blocks / ferro-cement rings etc. In all cases the side wall of the pit has to be perforated.
- Cover for offset pit in concrete or wood.
- Toilet floor with foot rest => The bowl should be fixed into either a squat plate just on the top of the pit or to be aligned from toilet floor for off-set pit. Proper finishing needs to be done of the floor.
- Vent pipe and fly screen (optional : Any material which is long lasting
- House => For privacy, made of any local materials.

Important features

- Pour Flush Bowl (the pan and trap: water seal generally 20 mm)
- Squat platform / floor where bowl and water-seal trap fixed along with foot rest
- Vent pipe and fly screen (optional)
- lined or unlined pit for on-set type; lined pit for off-set type
- Perforated side wall for lined pit
- Suitable for areas where water supply is supplied by the communal tap stand / point source
- Cross ventilation is essential to eliminate inside odor.

[Rural sanitation option – bill of quantities for Latrine Options 2 to 6](#)

OPTION 6: Septic tank toilet

Description

The function of water dependent latrine relies mainly on the usage of water. Without water these latrines fail to operate. The water flushes out excreta from bowl, which consists of a water-seal generally known as a trap. The water dependent latrines can be further categorized on the basis of; Flushing (pour flush or mechanical flush) Location of pit (onset type: if latrine room is just above the pit; offset type: if pit is slightly offset from the latrine room) Water quantity required (pour flush latrine: where 1/2-2 liters of water is required for manual flushing; conventional bowl latrine: where 4 liters of water is required) Excreta disposal system (pit latrine: where excreta is collected and decomposed within a pit; septic tank: where excreta collected and decomposed within a water tight chamber).

The septic tank is a water-dependent water-sealed toilet, consisting of a watertight tank. The excreta drops through the water seal bowl to the septic tank. The tank needs to be filled up with water before using. The tank acts as a settling chamber-cum-digestion chamber-cum-place to retain the digested sludge.

The whole process takes place in absence of air, thus known as anaerobic digestion. This process eliminates foul gases, which need to escape through a vent pipe. The excreta during digestion become liquid initially (liquefaction) and then gaseous (gasification) and what remains is retained at the bottom of the tank. This digested sludge needs to be taken out periodically (3 to 4 years as per design). The desludging is an important factor for effective functioning of a septic tank. If the digested sludge is not taken out as per design period then the depth of digested sludge zone will increase and the zone for settling and digestion will decrease. If this continues the whole process will be non-effective and it will pass excreta through the outlet. The second important element is the effluent, the liquid coming out from the septic tank that needs to be discharged in a soakage pit. This liquid percolates through this soakage pit in to the soil.

Advantages

- Odor free
- Privacy
- Little chance for transmission of excreta related diseases
- Good health and hygiene practice
- More aesthetic and less contamination of water sources
- No breeding of flies
- Can be installed very close to house and is suitable in densely populated areas
- Appropriate where water is available
- Long working life
- Suitable for high number of regular users
- Suitable for areas where house-hold water connection or water system exists
- Desludging can be done by users themselves
- *Digested sludge can be transformed into a useful soil conditioner within 2-3 years*

Disadvantages

- Water is necessary for flushing
- High initial costs
- Desludging of toilet required every 3-5 years
- Technical support required during installation

- Not appropriate where water is not available
- Capital cost is moderate to high
- Needs trained staff for construction of the septic tank
- Maintenance and desludging in regular interval should be done properly otherwise the whole system will become ineffective
- Disposing off digested sludge should be done properly otherwise it will pollute environment
- Difficult to perform well in high ground water table area, especially where there is no sewer line to discharge the effluent

Tentative costs

The Capital costs are USD 200-250. Operational costs will be the costs for desludging and cleaning of the septic tank.

Working life

Long working life (at least for 20 to 30 years).

Users responsibility

- Need awareness on how to use
- Need to clean the squat plate and pan regularly.
- No paper, cotton etc. should be thrown into the pan, as water seal will be choked.
- Water for flushing is a must after each use.
- Need to desludge every 3-4 years and need to check soakage pit every month.

Tentative material required

Cement	15 bags
GI roof sheet	6 units
Rebar	12 kg
Iron nails	1 kg
Binding wire	1/2 kg
Latrine pan	1
PVC pipe	10 m
Sand	2m ³
Gravel	2m ³

Important features

- Septic tank and soakage pit (or sewer line): Concrete / stone or bricks and cement with sand.
- Connecting pipe: Asbestos-cement pipe for connection
- PVC vent pipe
- Bowl options with trap: Ceramic / china clay etc.
- House: Bricks, stone, hollow blocks or concrete.

Rural sanitation option – bill of quantities for Latrine Options 2 to 6

- Not appropriate where water is not available
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Important features

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Rural sanitation option – bill of quantities for Latrine Options 2 to 6

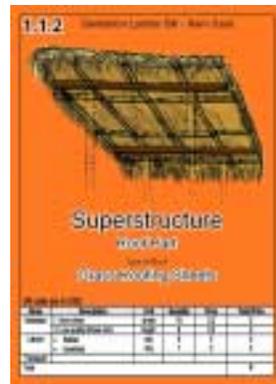
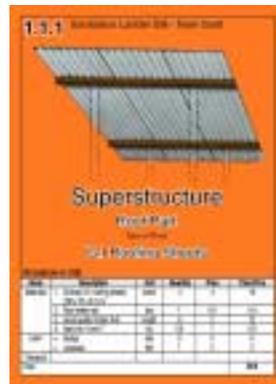
[rural sanitation option – bill of quantities for Latrine Options 2 to 6](#)

Each latrine can be further divided into 5 parts, as per materials being used for construction, such as:

- 1.1 Roof
- 1.2 Wall of the Superstructure (latrine room)
- 1.3 Latrine Poles/columns used in the latrine room
- 2.1 Latrine slab
- 3.1 Pit Lining

The different parts of each latrine can have further options as per local situation of Lao PDR. Therefore, as series of bill of quantities have been designed for community consultation to provide further choices to the households/ community.

1.1 Roof



1.2 Wall of the Superstructure (latrine room)

