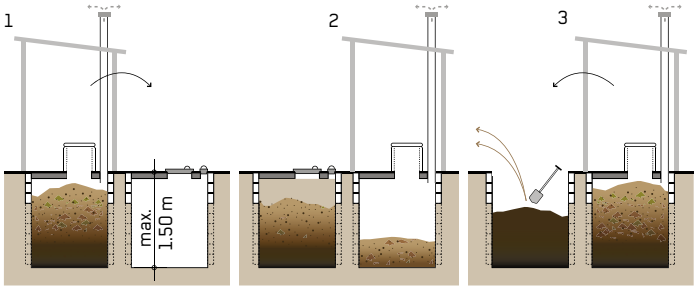
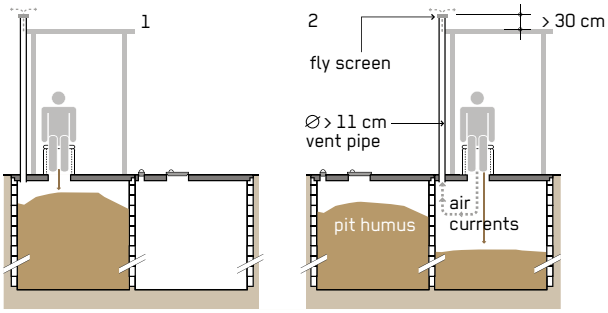
Twin Pit Dry System

Phase of Emergency	Application Level / Scale	Management Level	Objectives / Key Features
Acute Response ** Stabilisation ** Recovery	** Household ** Neighbourhood City	** Household ** Shared * Public	Excreta containment, Sludge volume reduction, Extended treatment time
Space Required	**Technical Complexity**	**Inputs**	**Outputs**
** Medium	* Low	● Excreta, ● Faeces, (● Organics), (● Anal Cleansing Water), (● Dry Cleansing Materials)	● Pit Humus

fossa alterna



double ventilated improved pit (VIP)



Twin Pit Dry Systems use two pits in alternating order. Twin pit systems include double Ventilated Improved Pits (VIP), and the fossa alterna (FA). Pit alternation allows for effluent to infiltrate into the soil and sludge to decompose in the one pit, while the other pit is in use. The alternating system reduces the amount of pit humus that needs to be emptied and makes the end product more hygienic.

Twin Pit Dry Systems can be constructed as double pit, double VIP or FA. In a double VIP excreta (or faeces, if a Urine Diverting Dry Toilet **(U.2)** is used as a user interface) are converted into pit humus, while in a FA additional organic materials are added to the pit. After every use of a FA dry organic materials such as ash or leaf litter are added to the pit. The FA is built with a shallow pit, with a depth of around 1.5 m, while the double VIP pits can have a depth of up to 3 m. In both systems, the two pits are used alternately. The effluent infiltrates into the soil. When the first pit has filled up it is sealed and the toilet user interface is switched to the second pit. While the second pit is in use the materials in the first pit can decompose and dry, thus decrease in volume and become more hygienic. Due to the extended resting time, the material within the pit is partially sanitised and humus-like. Usually the alternation cycle is 6–24 months depending on the pit volume and the number of users.

Design Considerations: For each system, only one toilet user interface is needed, which is moved from the first pit to the second pit when the first pit is full. Double VIPs are built like Single VIPs **(S.4)** but with two collection pits. Each pit must be provided with their own ventilation system. As the FA is much shallower, it can be constructed above the ground, and may be appropriate for flood prone areas or where the groundwater table is high. Pits should be built next to each other with enough distance between them to avoid cross contamination.

Materials: The latrine superstructure can be made from local materials, such as bamboo, grass matting, wood, plastic or metal sheeting (though this often heats up the interior). Pit lining materials can include brick, rot-resistant timber, bamboo, concrete, stones, or mortar plastered onto the soil. The slab can be fabricated on-site with a mould and cement. In the acute emergency phase, pre-fabricated plastic slabs may be used. Other slab materials such as wood or bamboo are also possible, where no other materials are available. For the FA there is a need for constant supply of organic material, such as ash or dry leaves, to be added after each use.

Applicability: Double pit systems are appropriate where there is enough space and reuse potential for the pit humus that is being generated. Therefore, these systems are most appropriate in rural and peri-urban settings and in communities comfortable with handling and re-using faecal material. As the second pit only comes into operation when the first pit is full, which may take between 6 to 24 months, Twin Pit Dry Systems are recommended as longer-term solutions in prolonged emergency situations.

Operation and Maintenance: Other than the operation and maintenance (O & M) required for the Single VIP, the main operational task for double VIPs is to seal pits when they are full and empty full pits prior to re-use. The FA must always be furnished with dry organic material to add to the pit after every use. If pits are used simultaneously the system does not function. Where there is only one user interface and, for the VIP, one ventilation pipe they must to be switched to the new pit when the old one is full. In some designs, the entire superstructure can be moved from pit to pit.

Health and Safety: By covering excreta or faeces with soil, ash, and/or leaves, flies and odours are kept to a minimum. Keeping the contents sealed in the pit for the duration of at least one year makes the pit humus safer and easier to handle. However, care should still be given when handling the output product. The same precautions that are taken when handling compost should be taken with the humus derived from double VIPs or the FA. Additional health concerns include that the leachate can potentially contaminate groundwater, that the pits are susceptible to failure and/or overflowing during floods and that the health risks from flies are not completely removed by ventilation.

Costs: Construction costs for Twin Pit Dry Systems are usually around double those of single pit systems, except for the user interface that can be switched. However, costs for O & M decrease as the pits need to be emptied less frequently. As the area of the system is doubled compared to single pit systems, any costs associated with elevated land use have to be considered.

Social Considerations: Users should have an appreciation of the advantages of the Twin Pit Dry System and should be willing to operate and maintain it. If users do not appreciate the benefits, the system could fail. Double pit systems are usually built as toilets serving single households, ensuring a clear attribution of O & M responsibilities. If used as shared or public facilities the responsibilities for O & M must be clearly determined prior to the implementation.

Strengths and Weaknesses:

⊕ Easier excavation than single pit systems
⊕ Reduction in sludge volume and pathogens
⊕ Can be built with locally available materials
⊕ Pit humus can be used as fertiliser/soil conditioner

⊖ Double the space and materials required
⊖ Possible contamination of groundwater
⊖ Constant organic material supply needed for FA

→ **References and further reading material for this technology can be found on page 191**