

Bellatrines™ Tuff Toilet™

Your new Tuff Toilet is a maintenance free clean toilet system based on the VIP (ventilated improved pit) latrine system in universal use all over the world. A sewer connection is not required, with a suitably sized pit potentially providing many years of service, and odor is removed via the optional vent pipe (the VIP system).

The pit latrine is a natural, safe, and clean toilet system, with pit contents decomposing naturally into compost over time. When the pit becomes full the toilet can be moved to an adjacent new pit, and the old pit covered over. The VIP (ventilated improved pit) latrine system is an excellent toilet system, as the VIP vent pipe arrangement ventilates the pit to remove odors, and incorporates a device to trap and kill any flies that may occasionally enter the latrine pit. However, the VIP vent pipe is optional and the toilet functions perfectly normally without it.

The Tuff Toilet is designed to be instantly usable by placing it directly on the ground over a suitable pit, but may also be installed over larger more permanent pits, and installed on plywood or concrete floors inside semi-permanent ablutions structures.

Please comply with any local government regulations that may be in force in your area when installing your new Tuff Toilet.



Bellatrines™ Tuff Toilet™ is manufactured and sold by:
BLUEWATER EXTREME LTD
47A Koromiko Street, Tauranga, New Zealand
TEL 07 571 5114 – FAX 07 571 5142 – email: sales@tufftoilet.co.nz
website: www.tufftoilet.co.nz

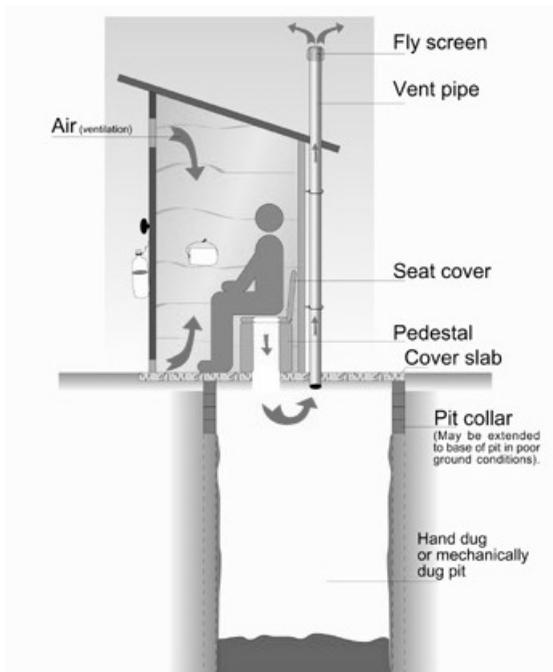
Installation Instructions.

Installation of your new Tuff Toilet consists of digging a suitable pit, placing the Tuff Toilet commode unit over the pit, and making some facility for privacy in the way of screening, or out-house construction of some type. Please read the following detailed installation instructions in full before starting to install your new Tuff Toilet.

See www.tufftoilet.co.nz for information on:

Bellatrines out-house tent.

Bellatrines relocatable out-house.



1. Choose a Location.

Choose a suitable location for your new Tuff Toilet which is clear of buildings, trees, etc that may interfere with the airflow across the top of the vent pipe.

The Tuff Toilet should be located on flat ground, ideally slightly elevated to ensure that rainwater will not drain into the pit. Do not site the Tuff Toilet on low ground where run-off water will drain into the latrine pit potentially causing overflow. A raised earth step/foundation around the pit for the Tuff Toilet to sit upon will also help to prevent rainwater from entering the pit.

Important: The effectiveness of the vent pipe in ventilating the latrine pit and removing odors is directly related to the exposure of the top of the vent pipe to wind moving over it and creating a suction. Choosing a location where the vent pipe is not sheltered by structures or trees is important.

Important: Ensure that there are no utilities (pipes or cable) in the proposed area of your pit.

2. Digging your pit.

The pit can be dug by hand or mechanically. The bigger the pit the better, and the deeper the better. The deeper the pit, the more sanitary the toilet will be.

When using the Tuff Toilet commode unit, the pit should be a minimum size of 500mm x 500mm square (or 500mm diameter for a circular pit), and a maximum of 900mm x 900mm square (or 900mm diameter for a circular pit).

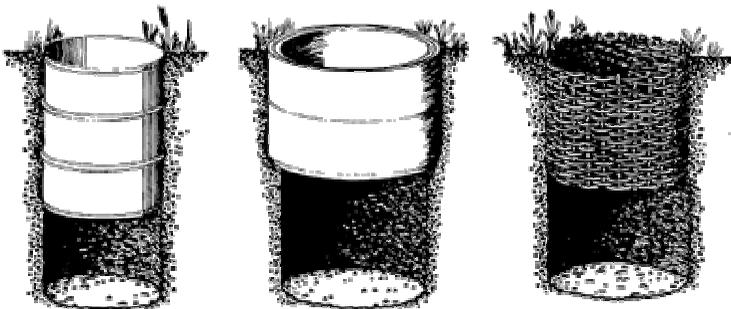
The pit should be as deep as possible, ideally about 2 meters deep. As this is impractical when manually digging a pit for short term emergency use, any depth beyond 800mm deep will suffice. When the time comes to close the pit, it is recommended (public health recommendation) that there should be space for 500mm of covering soil in the hole, so the pit depth should make allowance for this. When determining the size and depth of your pit it is necessary to consider the number of people using the toilet and how long a service life is required. Allow a volume of at least 0.06 m³ per person per year.

Important: The recommended pit digging method is to use a bobcat* with a 600mm diameter auger to mechanically bore a hole 2.2 meters deep (standard auger depth). This method is quick and cost effective, produces a pit with the capacity to serve a family of five people for over a year, and is deep enough to result in a very clean and sanitary toilet installation. See www.tufftoilet.co.nz for a list of Bellatrines accredited bobcat* companies in your area.

*A bobcat is a small and portable earthworks machine operated by landscape contractors.

If you wish to choose a different pit than the recommended method above, then please refer to the more detailed information contained in Tables 1 & 2 in the section "Pit Capacity (Volume) and Dimensions".

It is recommended to support the top part of the pit against collapse. The top 500mm (or more) should be supported with a liner or 'pit-collar' if possible. The 'pit-collar' can be made from any material, e.g. timber (treated), plastic or steel sheet, plastic pipe, a metal drum, concrete, plaster, or even brick in the case of a large pit.

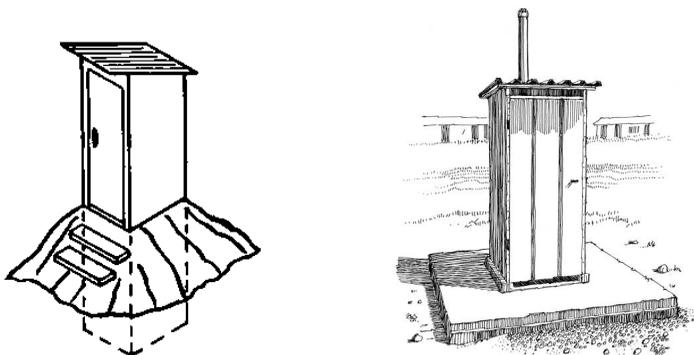


In the case of loose soils or sand it may be necessary to line the pit in it's entirety.

Important: All pits, particularly deep narrow pits, are extremely hazardous for people and animals. NEVER LEAVE A PIT UNCOVERED and always mark pits with an obvious sign or object

Digging your pit (continued).

As stated, it is important to exclude rainwater run-off from draining into the pit. If there is a possibility that run-off water may enter the pit, or if the water table is very shallow, then it may be useful to make a raised beaten-earth (hard packed) or concrete step/foundation around the pit. This raised step/foundation must be level, flat, square and suitable for the Tuff Toilet commode unit to sit upon. Most soils can be stabilised and made more resistant to water by the addition of a small amount of cement (Sprinkle cement over damp dirt and mix through, repeat several times to a maximum of 10% cement, then hard pack the soil as required. Clay based soils are best).



3. Installing your Tuff Toilet commode unit.

The Tuff Toilet commode unit is designed for use directly on the earth/ground over a latrine pit, and this surface must be suitably flat and level.

Carefully install the Tuff Toilet commode unit over the latrine pit, with the commode seat centrally located over the center of the pit opening. If installing the VIP vent pipe (highly recommended) then ensure that the vent pipe socket of the Tuff Toilet commode unit is over the pit opening and clear of any obstructions which may hinder good ventilating airflow up the vent pipe.

Ensure that there is a good fit of the commode unit to the ground, and that there are no gaps under the commode unit which may allow entry to vermin or affect the pit ventilation airflow.

The front of the Tuff Toilet commode unit (i.e. where the door will be) should be orientated facing towards any prevailing breezes, or towards an open area of airflow. This orientation is to assist the ventilation of the toilet and latrine pit and reduce possible odor. Do not orientate the door towards an immediately adjacent obstructing structure like a fence.

4. Installing the Vent Pipe.

The VIP (ventilated improved pit) latrine system depends upon the vent pipe to promote air circulation through the toilet, the pit, and out through the vent pipe for the purpose of reducing any odors that may otherwise accumulate in the toilet space. This airflow is induced by wind movement across the top of the vent pipe creating a venturi effect suction, and by convection due to sunlight heating the pipe. The vent pipe has an insect screen on the outlet to prevent the entrance of any flies, and any flies that may enter the pit through the toilet are attracted up the pipe to the bright sunlight and are trapped, eventually dying and fall back into the pit.

If installing the VIP vent pipe (highly recommended), remove the seal plug from the vent pipe tapered socket at the rear of the Tuff Toilet commode unit. Position the vent pipe vertically and insert the vent pipe into the tapered socket. Fit the support bracket around the vent pipe and position it in alignment with the two mounting holes on the upper rear area of the Tuff Toilet commode unit.

Hint: Check that the vent pipe ends are cut square and cleanly to ensure a good fit and seal in the tapered socket.

Hint: Run a bead of white silicon sealant around the vent pipe in the tapered socket to fill the small gap. Clean off any excess silicon sealant immediately with a rag wet with mineral turpentine.

Note 1: Vent Pipe: 100mm DWV (Drain Waste & Vent) pipe, 2.9 meters long. IPLEX / Marley 100mm DWV Pipe, AS/NZS 1260:2002 PVC-U pipes and fittings for drain, waste and vent application.

Note2: 100mm DWV pipe is larger (outside diameter) than the 100mm nominal size, being approximately 110mm outside diameter.

Note 3: Support Bracket for Vent Pipe: IPLEX STAND OFF KEY CLIP, IPLEX Order Code 143.100. See picture below.



Installing the Vent Pipe (continued).

Fit the insect screen over the top end of the vent pipe and secure in place with the circular plastic clip supplied. See diagram below.

Important: The vent pipe must also be supported at the top end of the pipe, for example, where the vent pipe passes through the roof of the out-house tent or construction.

Important: The vent pipe should be a minimum of 500mm above the top of the out-house structure to ensure unobstructed airflow.



5. Shelter Construction

In situations where building materials are not immediately available, a fabric structure such as a canvas privacy screen or a tent can be erected to provide immediate privacy and shelter requirements.

For longer term use, a solid shelter should be constructed in accordance with the following guidelines and recommended practices.

1. For best performance of the VIP vent pipe system the entrance doorway should face the prevailing wind (or an open area of airflow) to maximise airflow into the shelter, through the toilet & pit, and up through the vent pipe.
2. To give best odor control, the shelter must provide a free through-flow of air at all times, so some type of ventilation gaps above and/or below the door is beneficial.
3. To ensure undisturbed airflow across the top of the vent pipe, the vent pipe should exceed the height of the shelter by a minimum of 500mm.
4. To promote the absence of flies, the inside of the shelter should be as dark as possible. Avoid windows or skylights and limit light entering through ventilation gaps. This darkness in the shelter is so that a fly in the pit sees the open top of the vent pipe as the brightest object and follows the light up the tube to be trapped, die, and fall back into the pit. Using a light when using the toilet is allowed.

General use and maintenance.

Tuff Toilet / VIP latrines requires a minimum level of day-to-day maintenance. The most important aspects are air circulation and cleanliness.

1. If fitted, the toilet seat cover should always be left in the UP position so that airflow into the pit is not restricted.
2. The external surface of the Tuff Toilet™ unit should be cleaned and disinfected regularly in the same manner as regular household toilets.
3. To prevent the breeding of mosquitos, the pit should be kept as dry as possible. Do not spray water into the pit during cleaning.
4. Do not add disinfectant to the pit, as this will arrest natural decomposition/composting processes.
5. Do not deposit cans, glass, plastic or other foreign objects into the pit.
6. The fly screen must be checked regularly for damage and/or obstruction and replaced if necessary. (The openings in the fly screen should not be smaller than 1.2mm x 1.5mm so that airflow is not restricted.)
7. The pit is full when the contents reach a level of 500mm below the top of the pit. The pit must be filled in with soil and a new VIP latrine pit constructed.

Pit Capacity (Volume) and Dimensions.

The following tables provide a range of pit dimensions versus pit capacity (volume). When calculating the volume required for your latrine pit, a volume of at least 0.06 cubic meters per person for each year of use is recommended.

500mm must be allowed for soil in-fill when the pit is ultimately closed (public health recommendation), and this has already been accounted for in the below figures.

It is important to note that the deeper the pit, the more sanitary the latrine will be. The deeper in the ground that the pit contents are will result in a more pleasant toilet above. Particularly in the case of mechanically bored circular pits, ensure that the pit hole is bored as deep as the auger allows.

Table 1: Latrine pit minimum depth for **1 years service.**

	Number of people using the toilet per day.			
	5 people	10 people	20 people	50 people
500mm diameter circular pit	2000mm	-	-	-
500mm x 500mm square pit	1700mm	2900mm	-	-
600mm diameter circular pit	1500mm	2500mm	-	-
600mm x 600mm square pit	1200mm	2100mm	-	-
700mm diameter circular pit	1300mm	2100mm	-	-
700mm x 700mm square pit	1100mm	1700mm	2900mm	-
800mm diameter circular pit	1100mm	1700mm	2300mm	-
800mm x 800mm square pit	1000mm	1400mm	1850mm	2400mm
900mm diameter circular pit	1000mm	1500mm	2000mm	2500mm
900mm x 900mm square pit	1000mm	1300mm	1700mm	2100mm

Table 2: Latrine pit minimum depth for **2 years service.**

	Number of people using the toilet per day.			
	5 people	10 people	20 people	50 people
500mm diameter circular pit	-	-	-	-
500mm x 500mm square pit	2900mm	-	-	-
600mm diameter circular pit	2600mm	-	-	-
600mm x 600mm square pit	2100mm	-	-	-
700mm diameter circular pit	2000mm	-	-	-
700mm x 700mm square pit	1700mm	2900mm	-	-
800mm diameter circular pit	1700mm	2900mm	-	-
800mm x 800mm square pit	1400mm	2300mm	-	-
900mm diameter circular pit	1500mm	2400mm	-	-
900mm x 900mm square pit	1250mm	2000mm	2750mm	-

Note: The pit contents are continually decomposing and reducing in volume. For pit toilets serving the public or high traffic locations that have large pits (e.g. 1.5m x 1.5 meters x 3.0 meters deep, or larger), the composting action renders such toilets as more or less permanent.