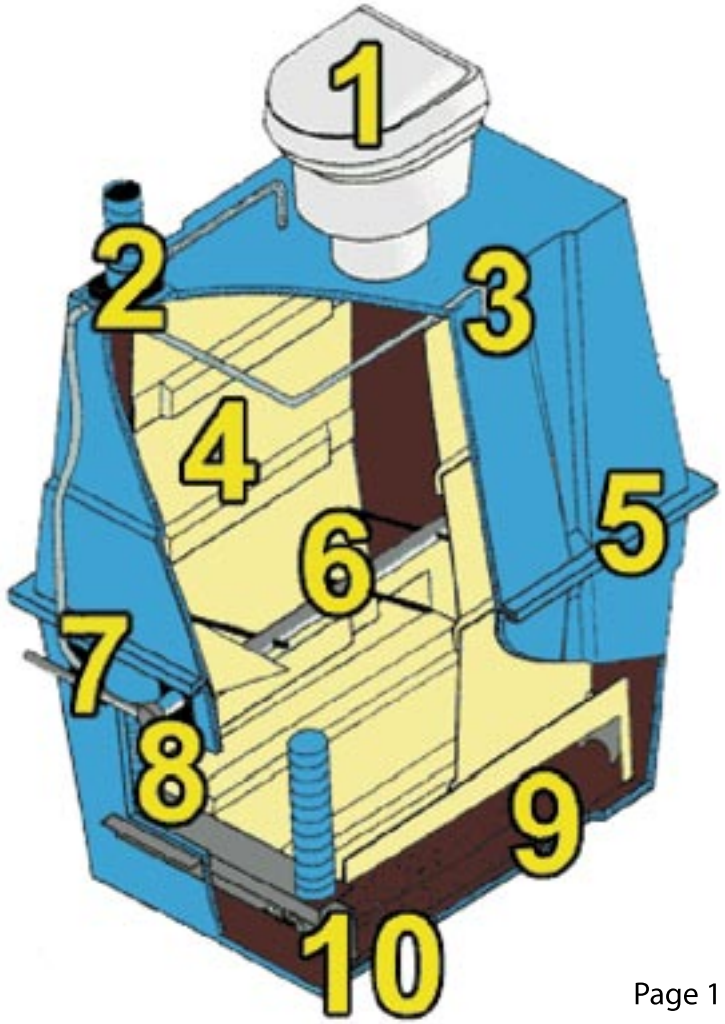
Dufferin Grove Park

Bio Toilet Feasibility Study



What's happening?

Toronto Parks, Forestry and Recreation, along with a consultant hired by the City of Toronto, is undertaking a study into the feasibility of installing a composting toilet facility in Dufferin Grove Park. The study is due for completion in December of 2010.

What is a composting toilet?

A composting toilet (also known as a bio-toilet) is a container that composts human waste instead of flushing it. It uses no water, very little electricity and produces usable compost after a number of years' use. This is a proposal to study the installation of one unit west of the playground and wading pool, enclosed and protected by a small building.

Why do we need it?

Toilet facilities: Identified in a safety audit over a decade ago and confirmed by parents ever since is the need for nearby toilet facilities to serve small children using the playground.

Learning opportunities: The toilet would function as a site to learn about environmentally-friendly waste management alternatives. Using earth-friendly construction techniques and materials whenever possible, the building would be a showcase of green building methods.

Why a composting toilet?

Because of the structure of the plumbing in the south end of the park, the city deemed toilet plumbing hook-up to be too expensive to consider at this time. As an alternative to a flush toilet, the Phoenix composting toilet is a completely self-contained system that does not require sewer or plumbing hook-up.

How does it work?

The system takes the form of a large bin with three sets of rotating tines inside it, and interior baffles to separate liquids from solids. Before its first use, the bin is filled two thirds full with wood shavings, which act as a bulking agent and help the waste to compost effectively. As the waste moves through the shavings, it is slowly digested, ending up as compost in the bottom of the bin. Often the first batch of compost is ready two years into the toilet's use.

Does it smell?

As the material is integrated into the wood shavings, it loses its objectionable smell. The Phoenix composting toilet also has a robust fan inside the bin that draws air into the bin through the toilet seat and out through a venting stack. This aerates the pile to keep aerobic composting happening, as it is piles that are starved of oxygen that have an objectionable smell. It also results in slight negative pressure inside the washroom, keeping any smells from leaking into it.

How much use can it take?

In the summer, this facility is rated at approximately 100 uses per day. The manufacturer allows increases to this number for seasonal operations and for daytime usage operations (day time usage involves mostly liquids as opposed

to solids). An automatic counter will be installed on the door so that staff can keep track of how much use the toilet is getting. If they have concerns about overuse, they will simply close and lock the facility until the toilet has had a chance to rest.

Are there any other emissions?

Since a vast majority of the input is liquid, most of what goes in ends up evaporating. The remainder of the liquid is pumped back over the bulking material to keep it moist and actively composting. In the case of excess liquid, the system is set up to output to an engineer-designed leaching bed. This is an ornamental garden with a tube running under the soil to where the leachate is pumped out. There it disburses high above the water table and the nutrients from it are allowed to back into the soil.

The Canadian Standards Association (CSA) has approved the Phoenix toilet. The Phoenix Facility Application Guide states that the leachate "generally has a low coliform indicator concentration ([cfu] (<200 org/100 ml), low BOD [biochemical oxygen demand], (<50mg/liter) and low TSS [total soluble solids] (<100 mg/liter) compared to septic tank effluent, so a short (10-foot; 3-meter) leach line is all that is necessary."

The Phoenix leachate consistently tests at less than 10 cfu/100 ml; usually negative, which means undetectable. As a comparison, monitored swimming areas are required to not exceed 200 cfu (coliform forming units) per 100 ml of sample over a long period and 400 over 24 hours. Septic tank sampling would probably yield about 6,000,000 cfu/100 ml.

Who would maintain it?

To keep the toilet composting properly, the toilet needs weekly and monthly maintenance, which park staff will attend to. Keeping the room clean will be a joint effort between users and staff. Any misuse of the facility may result in its temporary closing to maintain its safety.

What would it look like?

This oval building would have walls clad in wood, a walkway for access, and a green roof held up by structural columns. The foundation is of rammed earth (earthbags) and helical piles.

What standards are required?

Toilet: This toilet facility – the Phoenix 201 PF (Public Facilities) – is installed in several national and provincial parks in Ontario, as well as a number of YMCA camps. It is CSA approved, and is a well-accepted alternative to standard sewage or septic options where there is concern is about minimizing environmental impact and encouraging environmental stewardship.

Building: Engineers and an architect have been working with the project leader and Parks, Forestry & Recreation officials on this feasibility study.

Hand-washing: Although hand-washing facilities at the cob wall are located within the distance required by Public Health, those working on the project are looking into possibilities for portable hand-washing stations that might be suitable for installation inside the client room of the facility.

Day-time use: A toilet that is used only during daylight hours has, as a rule, fewer solid deposits than one available 24 hours a day. This actually increases the daily use threshold, although use will be kept under the published recommendations.

Unheated composting unit: Since this is a seasonal, warm weather facility, no heating is required. The toilet is closed through the winter.

Leachate: The manner of dealing with leachate is the same as is common in Ontario's many national and provincial parks where this facility is installed.

From the Phoenix installation guide literature:

> After filtering through the compost pile, liquid receives secondary treatment in the well-aerated, stable, peat moss medium beneath the bottom baffle. The stability and tremendous surface area of peat provides an excellent filtering medium for treating liquid. The amount of liquid discharged from the Phoenix depends upon the amount of use it receives, and the temperature and relative humidity of the ventilation air. Approximately 20 liters (five gallons) of liquid is added to the Phoenix for every 100 uses. Incoming ventilation air circulating above the secondary liquid treatment medium can evaporate some of this liquid. The remaining liquid draining from the tank should be directed to a leaching field.

This line will run into an engineer-designed leachate bed located immediately beside the structure. The line will be made of PVC weeping tile surrounded by filter cloth. It will be pumped there by a condensate pump which has a small reservoir and float switch and will pump the liquid up to the leach line. A garden will keep people from walking near the leach line, although the line will be buried and no evidence of it or its contents will appear above ground. The soil and plants will integrate the minerals; the liquid will evaporate and be used for plant growth.

What would the visual impact of the building be?

The building has been designed to minimize its visual impact on the park, and to blend in as completely as possible.

- The walls are curved, so the building takes up less space than a rectilinear building of comparable dimensions
- It is nestled in amongst trees, instead of out on the open green space
- The wooden wall cladding will help it to blend in with the surrounding trees
- A green roof will further integrate the structure into the park's greenery

Who has jurisdiction?

Parks, Forestry and Recreation has commissioned this feasibility study. If the building is built sometime in the future, PFR will maintain the facility.

If the project went ahead, how would it be evaluated?

Effectiveness: Staff and park users would keep a close eye on the unit's effectiveness. Safeguards in place include:

- Slow, measured implementation: Can include opening the unit for short periods to start, to ensure that the unit is used below recommended capacity
- Ability to lock the unit down in case of misuse
- Monitoring use: Taking door counter readings will allow staff to monitor

number of uses. If uses approach capacity on any particular day, the facility will be closed for the rest of the day.

- Watching for foreign objects: A door in the mechanical room gives access to the top of the compost medium, so that any foreign objects can be removed and disposed of. Standard equipment for this job includes a special rake, so that staff never touches the toilet bin's contents. This check is done before the pile is turned.
- Paying attention to potential odors: Any questionable emissions would mean closure of the facility for investigation.

Compost: A unit used year-round will likely have compost ready in about two years. It is possible that a seasonal-use facility such as this might take several more years than that to produce its first compost. Tests have shown that compost produced from this type of unit is safe for use on gardens, and indeed that is the intention of the unit's designers. Here however, compost from the facility would be destined for use on flower gardens only.

What is the history of this project?

Begun as a PFR authorized community building project in 2006, neighbors' concerns brought a halt to construction that summer. Professionals designed an Ontario Building Code compliant structure in 2007, but construction did not proceed. Parks, Forestry and Recreation has now commissioned this feasibility study, to be completed by the end of 2010.

How has this proposal changed since 2006/07?

The current proposal is different from the last iteration in a number of respects. The new versions include helical piles to support the wall and roof system. One new option lowers the earthbag stemwall which allows the client door to be almost at grade, enhancing accessibility. What was formerly designed to be an earthen infill wall system is now wooden wall cladding. This thin wall system will allow expansion of the client room to accommodate wheelchair accessibility.

What are the differences between the two new versions?

Version 1 maintains the current earthbag stemwall, requiring a ramp and railing to allow for accessibility. Version 2 removes most of the above-ground foundation and shifts the exterior walls out to the edge of the footprint, allowing for more space inside the client room. It also has a walkway instead of a ramp, giving the building's approach a lower profile, as railings are not required. The footprint of the walkway is also much smaller than the ramp, requiring less by way of cement and helical piles in its construction.

Where can I find out more?

- www.compostingtoilet.com/index.htm > Public Facilities Application Guide
- www.cobinthepark.ca
- http://www.cityfarmer.org/comptoilet64.html
- http://en.wikipedia.org/wiki/Composting_toilet

Where can I comment on this proposal?

There are two upcoming Public Meetings to be held on this topic. The local community is invited to attend these meetings and provide suggestions and/or feedback that will guide the feasibility study.

Date: Monday, November 8, 2010
Time: 7 to 8:30 p.m.
Location: St. Mary's Catholic Secondary School cafeteria, 66 Dufferin Park Ave.

The community is also invited to attend a follow-up meeting:

Date: Wednesday, December 1, 2010
Time: 7 to 8:30 p.m.
Location: St. Mary's Catholic Secondary School cafeteria, 66 Dufferin Park Ave.

For more information please contact:
Peter Didiano, Supervisor of Capital Projects, City of Toronto
416-392-8704, pdidiano@toronto.ca

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The City of Toronto holds public consultations as one way to engage residents in the life of their city. Toronto thrives on your great ideas and actions. We invite you to get involved.

Dufferin Grove Park

Public Meeting

Toronto Parks, Forestry and Recreation, along with a consultant hired by the City of Toronto, is undertaking a feasibility study. Options will be presented for the development of a future washroom structure containing a bio-toilet, to be located near the playground. The local community is invited to attend this meeting and provide suggestions and/or feedback that will guide the feasibility study.

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Interpretation services may be arranged with at least one week's notice in advance of the meeting date.

For more information please contact:
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City of Toronto
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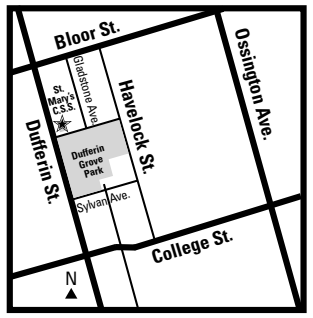
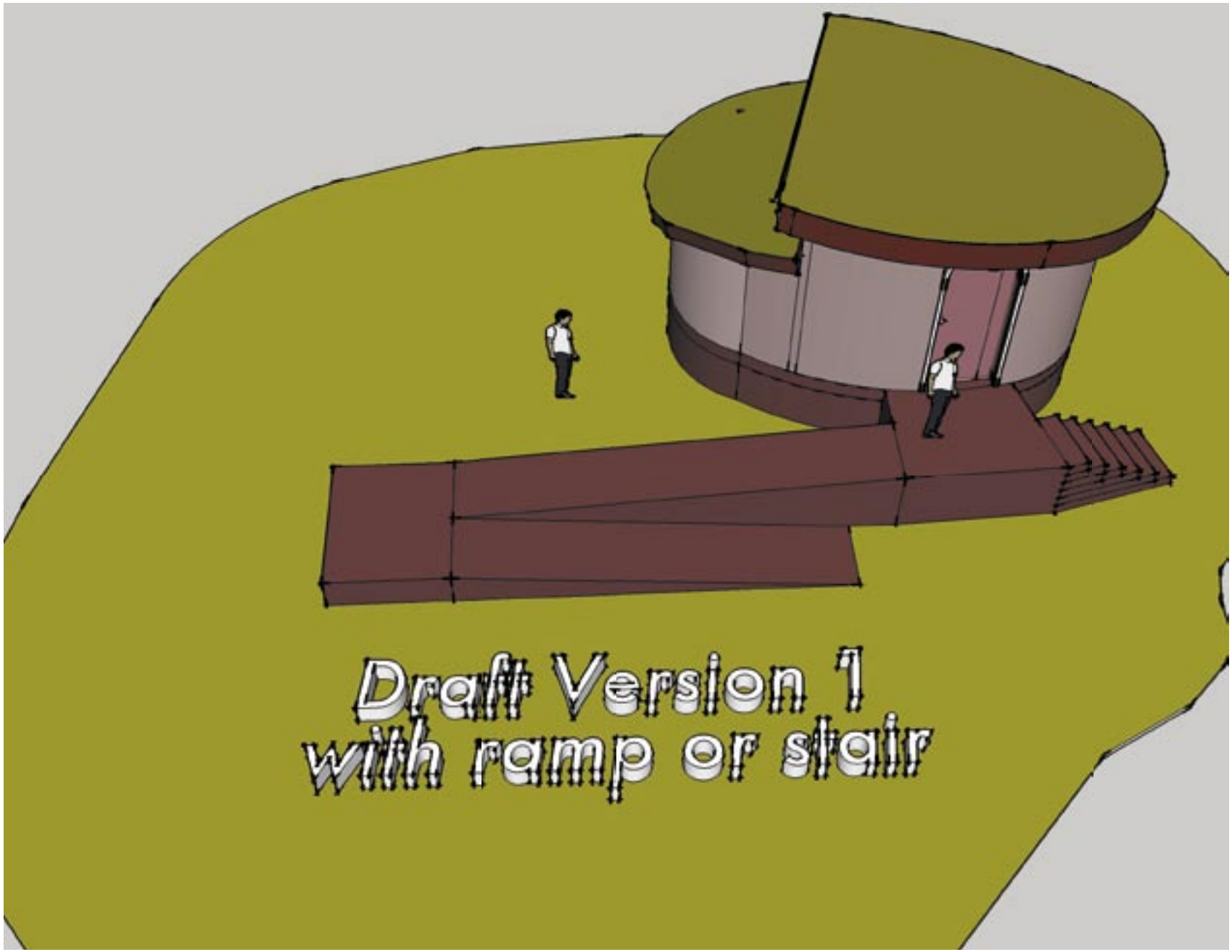
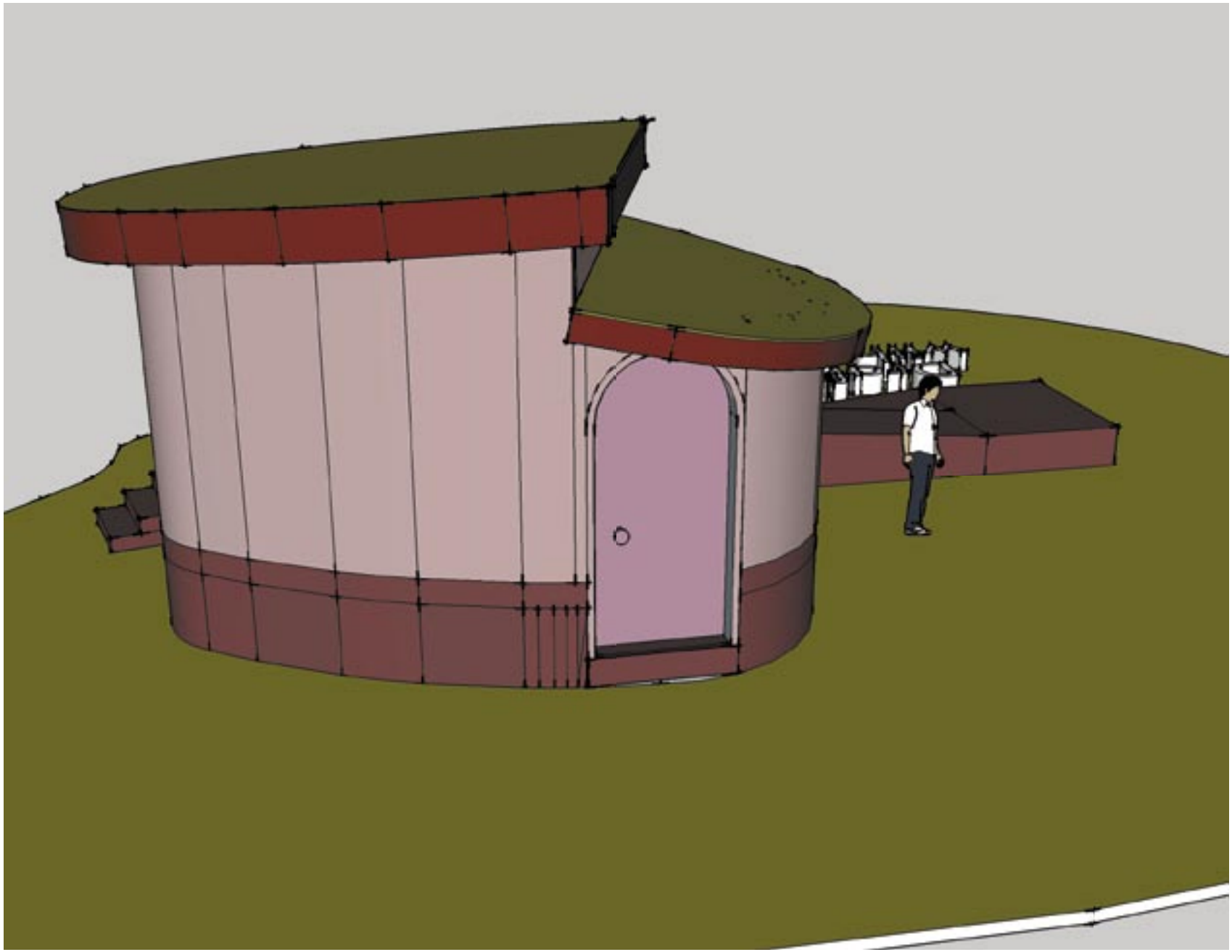
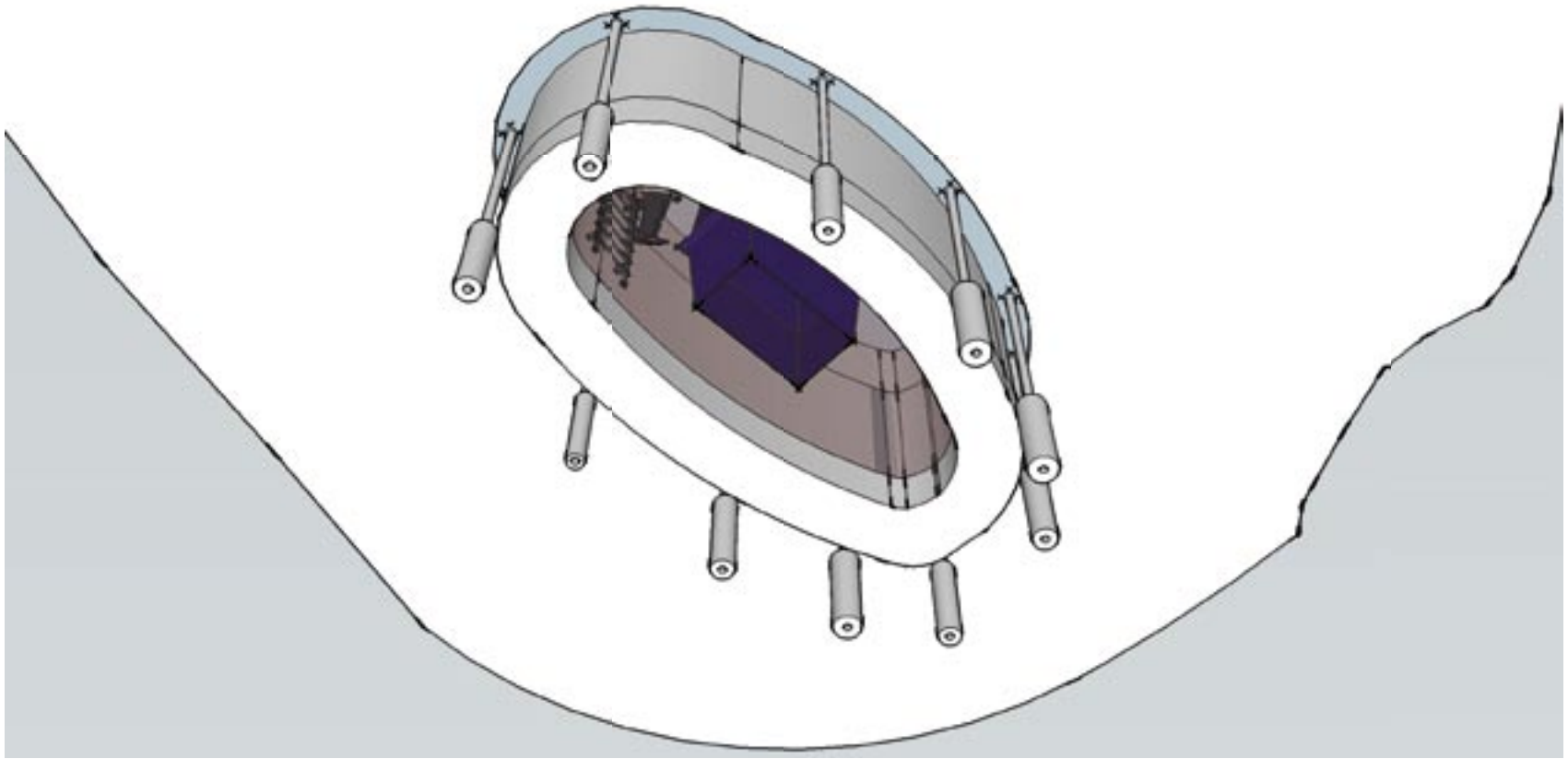
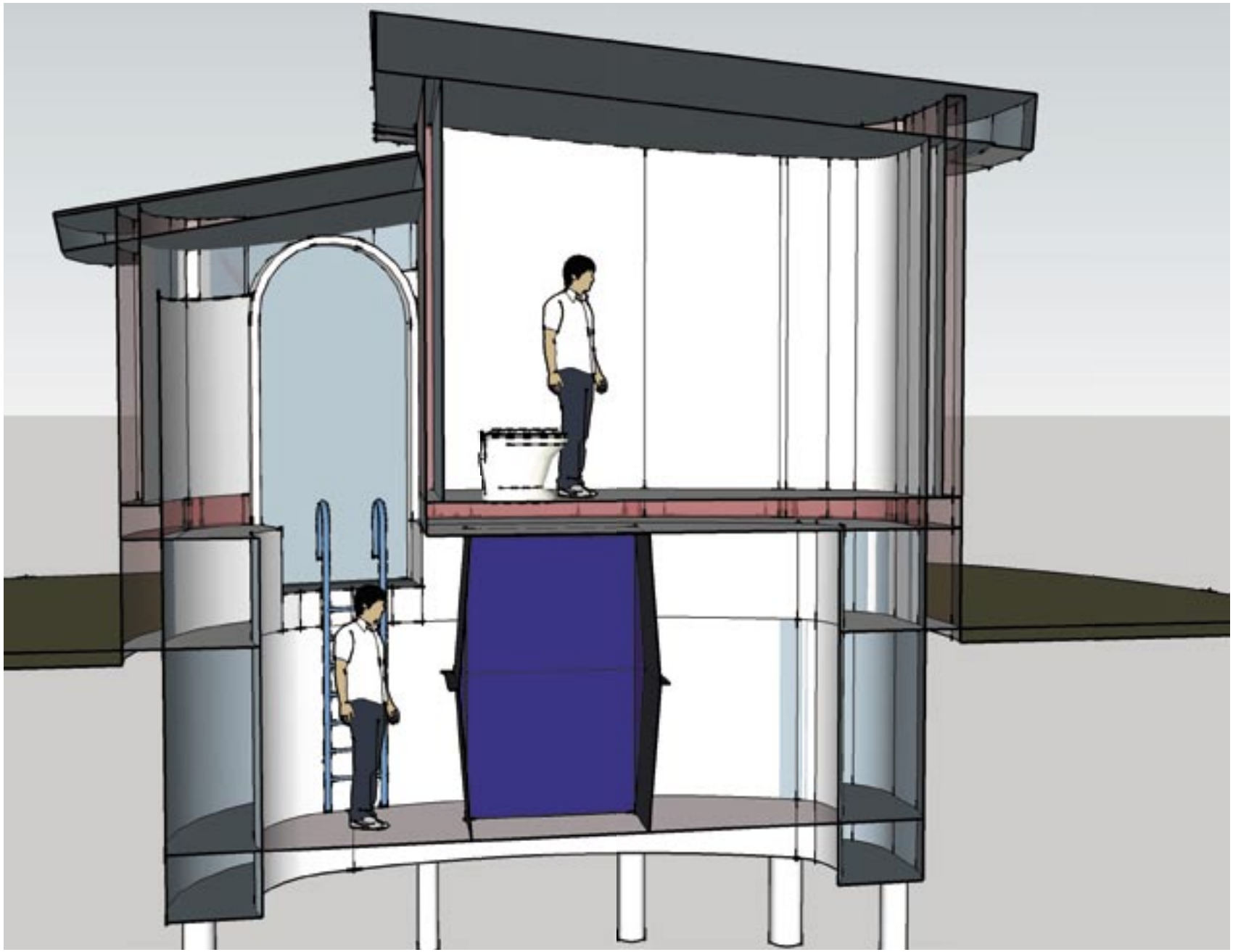


Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.


Draft Version 1
with ramp or stair







Design Features of the **Phoenix Composting Toilet**

(1) One or two toilets connect to the Phoenix with 12-inch diameter chute. The toilets are molded from vandal resistant polyethylene and ABS plastic.

(2) Ventilation is provided by an efficient, 5-watt, direct current fan. The fan housing is mounted directly to the tank for easy maintenance. A small power supply or a photovoltaic system provides the energy. Flexible 4-inch duct and 4-inch PVC pipe are installed easily.

(3) The Phoenix is fabricated from rotationally molded solid and foamed crosslinked and linear polyethylene, assuring many years of service. The tank is durable, corrosion resistant, leakproof, and continuously insulated.

(4) Continuous air baffles along the tank sides provide aeration of the compost pile without interfering with compost movement. Their large surface area allows the insulated tank to be readily warmed with circulating air from a heater or active solar collector.

(5) A leakproof joint is accomplished with a gasket and interlocking flange. Assembly requires only a few bolts and no caulking.

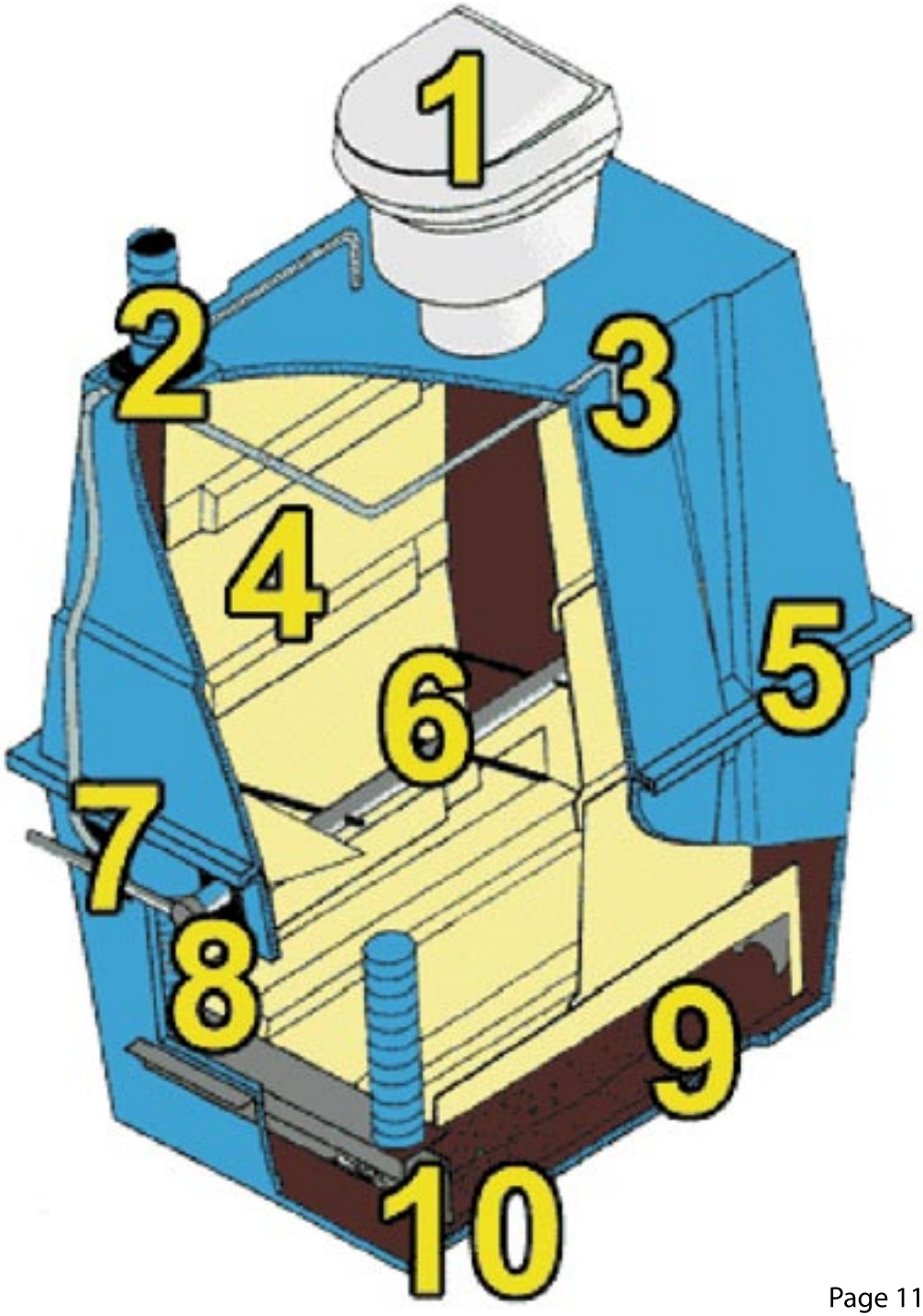
(6) Rotating tines control the downward movement of the material in the compost pile. The big Phoenix Model 201 has three tine shafts, each above the other. The Model 200 (shown) has two shafts, and the Cabin model has one. (For clarity, only one tine shaft is shown in this illustration.)

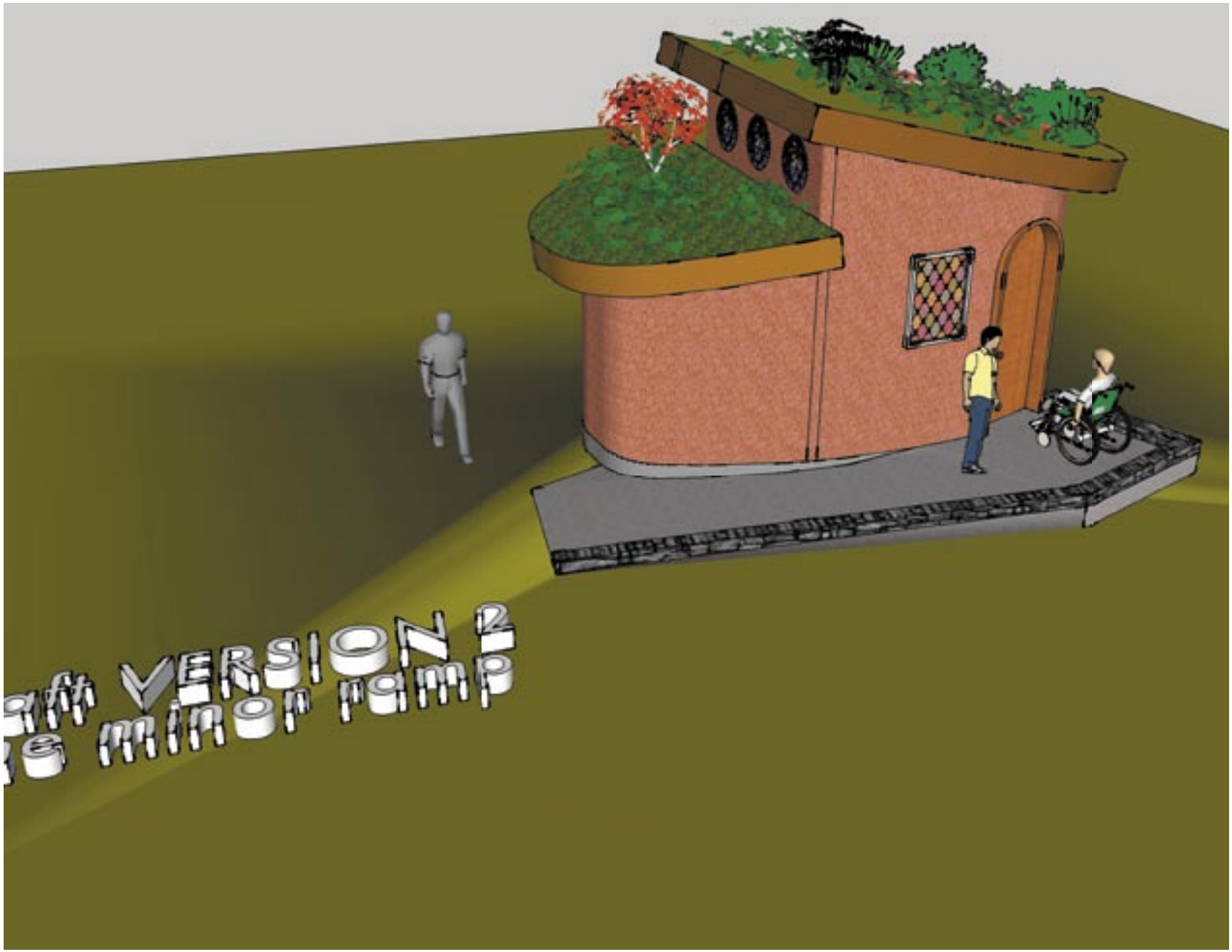
(7) Air enters the Phoenix through a screen inlet. A sealed path for ventilation air, and a large contact area, increase ventilation efficiency and allow supplemental heating.

(8) Finished compost is removed easily through the lower access door from the entire bottom of the Phoenix assuring maximum and uniform retention time.

(9) The accumulated liquid and/or fresh water is sprayed on top of the compost pile to maintain moisture and inoculate the pile with compost-friendly micro-organisms. The excess liquid is drained to a leach field, to an evaporator, or to a holding tank.

(10) Liquid is separated from the solids by a screened baffle and resprayed, or drained, from the Phoenix. The drain connection can be made from either side through an inch-and-a-half flexible hose.




VERSION 2