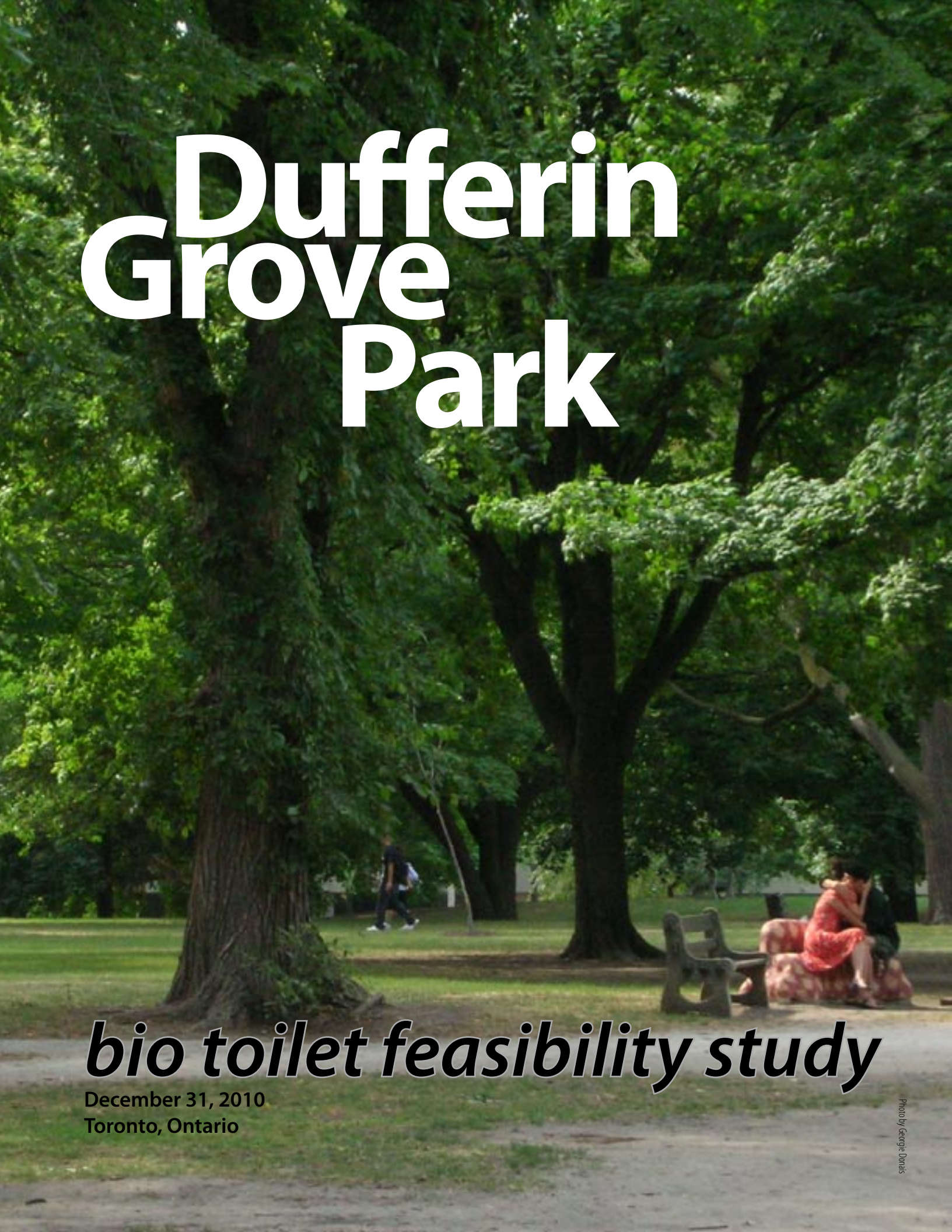
Dufferin Grove Park



bio toilet feasibility study

December 31, 2010
Toronto, Ontario

Photo by Georgie Donais

Dufferin Grove Park

Dufferin Grove Park is a public neighbourhood park located in Toronto, Canada, just south of Bloor Street, on the east side of Dufferin Street in the city's west end. The 14.2 acre park encompasses green space, vegetable and ornamental gardens, an outdoor skating rink for both hockey and pleasure skating, a club house, wood-fired bake ovens, and a field house and soccer field. The south end of the park is home to a children's playground, an adventure playground, a wading pool, and a cob courtyard. It is one of the few shaded wading pools in the city, with a tree canopy made up predominantly of mature Norway Maples. Activities run by recreation staff at the park include summer and winter community dinners, a summer food-cart program, a year-round farmers' market, and warm weather theatre and music performances.

Commissioned by:
Parks, Forestry and Recreation (PFR) Capital Projects, Peter Didiano, Supervisor

Consultant:
Spaces by Rohan Inc. Rohan Walters, Principal

Dufferin Grove Park:
875 Dufferin Street
Toronto, ON

bio toilet feasibility study

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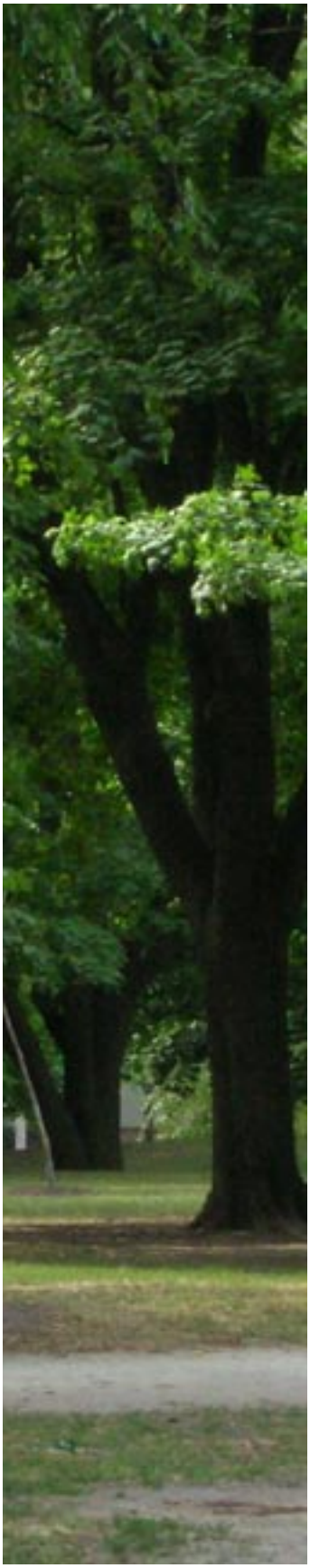

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Dufferin Grove Park composting toilet design proposal / Spaces by Rohan Inc.

Description of this feasibility study

The City of Toronto's Parks, Forestry and Recreation Division is engaged in a Phase One feasibility study for the development of a proposed future park washroom structure at Dufferin Grove Park. Although the study focuses on an installation in this particular park, large portions of the study can be applicable to many parks in the city where a need has been identified for toilet facilities.

The goal of this study is to identify and describe a solution that is flexible and able to meet the needs of diverse situations (including locations where standard plumbing hook ups are inaccessible), is economically feasible, environmentally sensitive, and if possible, offers opportunities for education.

First we introduce the team who completed the feasibility study, in consultation with Parks, Forestry and Recreation Division staff. Next, we describe the rationale behind strategies put forward, and the history of the washroom project particular to Dufferin Grove Park. Following that is a detailed description of the washroom installation as it is currently envisioned by the consultant, supported by expertise from the team. This includes a narrative on the building and the toilet assembly, and provides a preliminary costing for the project.

The report goes into detail in examining the safety of such an installation, and responds to frequently asked questions and concerns raised during the study. This is an important aspect of the report, as we expect that different neighbourhoods will share many of the concerns raised, and it is important that these concerns be addressed with accurate information.

Consulting team

Report Coordinator: Designer Rohan Walters B.Arch., B.E.S. of Spaces By Rohan Inc.

www.spacesbyrohan.com

Spaces By Rohan Inc. was hired by the City of Toronto because of its experience in innovative small building design and engineered system integration. Mr. Walters holds two degrees from the University of Waterloo: a degree in Bachelor of Environmental Studies, and a Bachelor of Architecture. Spaces By Rohan Inc. is a licensed company designing small buildings and houses in the province of Ontario. Mr. Walters has also raised two children in the neighbourhood and is familiar with the local environs and the community.

The 'triple bottom line' is practiced by Spaces By Rohan Inc.:

1. Honour the Environment
2. Honour the Community
3. Honour Responsible Capitalism

Mr. Walters has consulted with the following experts during the course of the study. Their biographies are found in the appendix of this document.

Bruce Tree Expert Company Ltd.
Georgie Donais, Natural Builder
Gabe Faraone P.Eng. (Civil Engineer), GPF Design Services Inc.
Andrew Hellebust P.Eng. (Water Engineer), Rivercourt Engineering Inc.
Pitamic Construction (General Contractor), Metro Licensed Contractor
Rykon Electric, Metro Licensed Electrical Services
Sunergy Composting Toilet Systems Ltd.
Techno Metal Post (Helical pile systems)
Xero Flor Canada (Green roof systems)

Working committee

Peter Didiano, Parks, Forestry and Recreation (PFR) Capital Projects Supervisor
Peter White, PFR Parks Supervisor
Dave Hains, PFR Recreation Supervisor
Mayssan Shuja, PFR Lead Recreation Staff, Dufferin Grove Park
Anna Galati, PFR Recreation Staff, Dufferin Grove Park
Jutta Mason, Centre for local research into public space
Rohan Walters, report author
Georgie Donais, report author

Feasibility study process

The process for the study occurred over the fall and winter of 2010 and included the following aspects:

Research
Consultants researched regulatory requirements, financial feasibility, site and environmental considerations, and benefits and challenges of such an installation.

Plan development
Based on the above research, two versions of preliminary designs were developed for the site, which included use of the composting toilet fixture already in the possession of Dufferin Grove Park. One design version implemented the City of Toronto's Accessibility Guidelines.

Working committee meetings
The working committee met over the course of the study to review progress on plan development, and to review the results of the community consultation meetings.

Community consultation meetings
Two meetings were held in autumn 2010 where preliminary design options and rationales were presented, and where feedback from attendees was invited.

Report writing
This report is the culmination of the above effort, and it summarizes the process that has taken place to date. It includes recommendations as to the optimal design version, building cost estimate, and other relevant conditions affecting the composting toilet's ultimate manifestation. Also included in the report are plans, elevations, sketched details, 3-D sketches, building methodology explanations, integration initiatives to applicable City policies and the like. Submitted comments and concerns will be appended to the report.

Terminology

Bio toilet

Composting toilet

Waterless toilet

These are all terms for a toilet assembly that meets the following criteria:

- They consume no or very little water in their functioning
- They retain and process waste on-site
- They are unconnected to the sewer grid
- They produce compost at the end of their processing cycle

Rationale for the proposed installation

This section speaks to the idea behind the original project, and to the rationale for its ongoing consideration as a viable option in Dufferin Grove Park.

The original idea was to create a close-by, safe and clean place for children enjoying the playground at the south end of the park to go to the bathroom. This need was identified by a safety review conducted by the area councillor some years ago, and is apparent every summer by the numbers of children who use "pee trees" around the playground to relieve themselves.

Looking at the particular circumstances of a close-to-the-playground washroom location, the following issues can be identified:

- Water and sewer hook up cost is prohibitive, and installation of long lines through the park from the street is dangerous for the park's trees
- Capital budget for a conventional, City-built washroom is unavailable

A viable option, then, would meet the following criteria:

- It would require no water or sewer hook-up
- It would be relatively low-cost
- It would be a modular, scalable solution adaptable to particular sites and circumstances, further reducing infrastructure cost

There are other situations where these same requirements exist, namely in federal and provincial parks, children's camps and with conservation authorities. One of the solutions used in these circumstances is a **composting toilet**.

Benefits

Facilities

A safe place for children and families to use the washroom

Water conservation

Uses per season = up to 6,900

Litres of water saved per season = 65,550

Education

A chance to provide a positive example of how Toronto can address climate change issues while improving its infrastructure

Environmental benefits

Reduction in strain on municipal sewer system, and a savings in sewage processing costs

Reduction in erosive rainwater runoff through green roof use

Sensitive treatment of tree roots with helical pile foundation system

* see page A17 for calculations

Composting toilet

Especially designed for use as public facilities, these composting toilets meet all of the above criteria, in that they are cheap to build and maintain, require very little disruption to the surrounding land, and are suitable for sites that range from rare, occasional use, to constant, year round use.

For a site with these kinds of considerations, a composting toilet fits the bill, providing facilities where needed, regardless of access to services.

Benefits

A composting toilet also presents some other, very attractive benefits, both for the park, and for the City of Toronto as a whole.

Water conservation

Firstly, a composting toilet uses no water for flushing. That means that every time someone uses it, they avoid flushing an average of ten litres of water down the toilet. In a season, the toilet stands to remove over 65,000* litres of water from the waste stream per season. As impressive as that is, the energy use this saves is possibly more important. This is because the flushed water would have at first been cleaned to drinkable status before being used to flush a toilet, and then would be re-cleaned and sanitized before its release back into the lake. By avoiding the use of this water, this is essentially a double savings in terms of energy expended and emissions exhausted.

Environmentally friendly construction

The building would have a green roof, which would have the effect of absorbing much of the roof's rain runoff, and moderating the speed that the rest of it returns to the ground, allowing it to be absorbed, instead of diverted into the sewer. Using helical piles in the foundation system reduces disruption to existing tree root systems.

Educational opportunities

All these environmental benefits are worth sharing with others. Signage inside and around the building would answer questions regarding the mechanics of composting toilets, and people would have a chance to add their "contribution" to the composting process. This is a uniquely interactive way of involving people in thinking about possible solutions to our overburdened sewage system. Signage would point out some of the other environmental benefits of the installation as mentioned above.

Closing the nutrient cycle

Highlighted so far have been the financial, environmental and educational benefits of the proposed installation, but there has been no mention of the "compost" part of the composting toilet. That is because the fact that the toilet creates usable compost from human waste is really a side benefit to a facility that provides safe and local toilet access to a constituency in need.

If the facility is used at full seasonal capacity for two years, it would yield about 350 litres of compost at the end of it, which is about eighteen five gallon pails full. This would provide enough compost to amend a few ornamental gardens with compost, and that is all. If the proposed project was billed as a compost creation facility, it would certainly disappoint. But if we contrast 350 litres of compost every two years with over 130,000 Litres of water that would be flushed over the same period of time, the savings start to become apparent.

Based on the above criteria, it seems that a composting toilet provides the most option to save money, to respect the environment and to provide opportunities for learning.

History of the project

In 2005, Georgie Donais devised the cob wall project in Dufferin Grove Park as an answer for Public Health requirements for a proper hand- and dish-washing station to support recreation staff's food cart program. That summer, around 500 park goers came by and helped mix mud to create the structure, with support from then-named Parks and Recreation staff.

Ongoing comments by participants about the lack of close-by toilet facilities encouraged Donais to look into options for the south end of the park. Facility upgrades were years in the future, and the area was without appropriate water and sewer service in any case. Research showed that the Government of Canada had solved the services issue by installing composting toilet facilities in their parks. Further investigation revealed that composting toilets were also the solution of choice for several provincial parks and YMCA camps in Ontario, and for a downtown park in Edmonton, Alberta. A donor stepped up to purchase a public facilities grade composting toilet for Dufferin Grove Park, and Donais met with Parks staff regarding permissions. By designing an earthen building to house the toilet, the intention was that the public could again be involved in a second community art project that would be cheap and easy to construct.

Building began the spring of 2006. Construction continued as with the cob wall, with children, parents and caregivers mixing mud and forming it into the structure. The informal meeting process was deemed insufficient as neighbours unhappy with the prospect of the building made their concerns known. The project attracted media attention and ever more neighbourhood and park user interest. Two large public meetings were held that summer and fall. The first was attended by both supporters and detractors of the project, as well as by those in opposition of the nearby Lansdown Narrowing project. The second meeting packed the park's rink house with attendees, all of whom were in favour of the project (see *The Star* article on page A26).

Throughout the summer, work had started and stopped and started again. Eventually the area was declared a construction site, meaning children were no longer allowed to build and adults were required to wear safety boots in order to stomp in the mud. In the fall of 2006, the foundation was complete and worked ceased.

Architect Martin Liefhebber was then engaged to amend the building's design for building code compliance. Discussion continued until August of 2007 when plans were stamped by Building Division staff. Although approved, the resulting design was no longer something that the community itself could create (original budget: $41,000), and since there was no available capital money for the project, building did not go ahead.

In spring of 2008, recreation staff and park friends shaped the earthbag stemwall into a generous-sized oval cob seating area. It is currently known as Gossip Rock and is a popular place for groups to sit, chat and picnic.

Proposed washroom installation

Composting toilet assembly

There are two primary manufacturers of large scale composting toilet assemblies in North America: the Clivus Multrum and the Phoenix. The composting toilet assembly chosen for this installation is the Phoenix Public Facility Model PF-201. Made in Cremona, Alberta, the assembly is a combination of toilet seat, tank, vent stack, and leachate field. The assembly uses no water, and very little electricity. The toilet seat resembles a standard flush toilet seat,

Instructional signage and compost toilet bin at St. Lawrence National Park, Ontario

except that it is attached to a chute that leads to the bin below. The bin is characterized by its small footprint and upright orientation, measuring about four feet wide, five feet deep and seven feet tall. It is designed to process urine and fecal matter into usable compost that is then removed once every several years, tested for safety, and dug into ornamental gardens as a soil amendment. The bin is formed from polyethylene which has been molded into the appropriate shape, and has three sets of rotating tines inside it, along with 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. The fan circulates air through the pile to assist in aerobic composting, and expels exhaust through the vent stack at the top of the structure. Any excess liquid is accommodated in an inspected and approved standard leaching bed located beside the building within which the installation is housed.

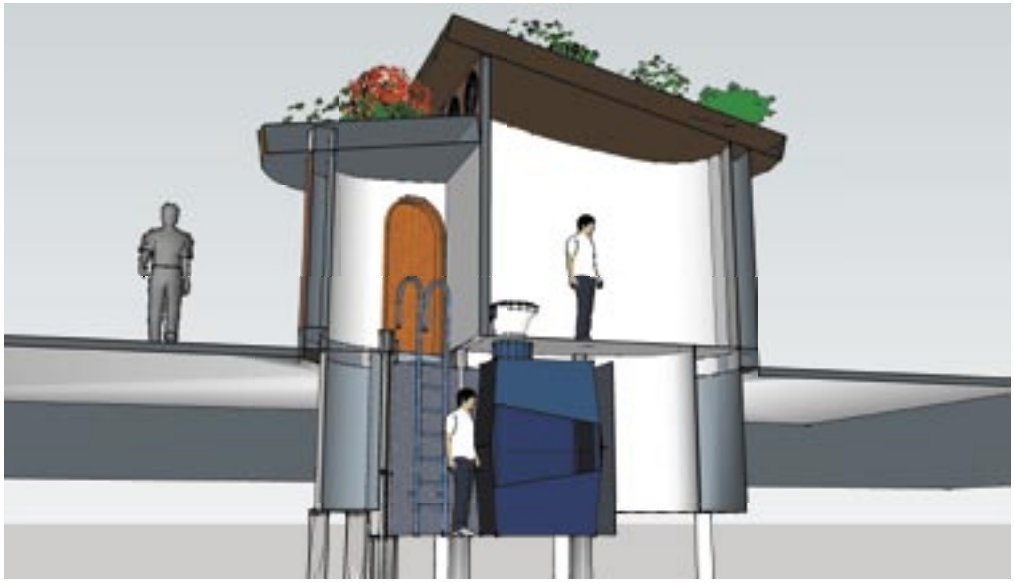
Building

A successful building design for any site would take into account pre-existing conditions and topography, the physical aspects and maintenance requirements of the toilet assembly, comfort and accessibility for patrons, visual impact, and environmental factors.

The proposed design makes use of an existing excavation, thereby reducing physical impact on the land. Clad in natural wood and topped with a green roof, it would recede into the landscape, reducing its visual impact. Incidentally, these choices also have environmental advantages, formed from a renewable and minimally processed material in the case of the wooden cladding, and supporting local water reintegration in the case of the green roof. The patron room would be wheelchair accessible, and would have ample space for strollers and bags that often accompany parents and caregivers of young children.

The curvilinear shape of the design for this particular building in Dufferin Grove Park is a result of the pre-existing earthen bag foundation wall. The original intention of this shape was to form a strong thick base to support an above cob structure. Although a building permit was obtained for a cob structure to be built on this site in 2007, construction did not go ahead at that time. Nevertheless the existing excavation was still suitable for the Phoenix composting container and its location in the park near the wading pool was still a very good location.

To preserve the existing excavation, helical pile technology was chosen as the appropriate



structural and practical solution. It allowed us to preserve the existing root structure of the trees, and preserve the existing earth bags by creating a steel structural skeleton around them. The steel posts allow us to attach steel or wood posts to support and brace walls, floors and ceiling structures.

The cladding material can be wood, concrete board, cob infill, straw/clay or straw bale. We have chosen to use board and batten with wood studs. The board and batten can receive paint or stain, or weather naturally to a soft grey colour.

To top off the structure, we recommend a green roof. Sedums, grasses, small flowers and shrubs growing on the roof would accomplish two things: first, the roof would blend into the park much better than a conventional roof; second, the green roof would absorb rainwater as well as delay excess water discharge into the surrounding soil. In other words, the surrounding native soil will not be expected to handle more water than it naturally would without a building present.

Costing

As at this writing, water/sewer pipe construction costs are currently at $1,000 per meter, or approximately $333 per foot. To bring water and sewer service in to a location near to the playground from the closest street location would cost, at minimum, $73,000. The building, landscaping and professional fees would be on top of that, bringing the cost of this option up to at least $149,000 plus taxes. A sewer-coupled facility would use approximately 66,000 litres of water in a season, along with all the attendant costs.

In contrast, a composting toilet installation at the current location, including building, professional fees and landscaping, would come in at around $136,000 plus taxes. This installation would use no water at all.

By starting with new excavation just north east of the current site, and using conventional building methods, costs could be reduced to around $115,500, with use of the donated toilet assembly.

If a particular site possessed features that facilitated optimal installation conditions, the cost of the installation could be further reduced. Those conditions are outlined in the Phoenix Facilities Guide included as an attachment.

Wall systems

Cob

A mixture of clay, sand, straw and water, mixed by foot and applied by hand., creating a structural wall that retains heat and cold in its thermal mass.

Straw/clay

Straw mixed in a clay slurry and stuffed into forms to create an insulative, breathable wall system.

Straw bale

Bales of straw stacked like bricks and then plastered over with earthen or lime plaster.

Concrete board

A prefabricated wall board product made of cement and magnesium: trade name *Magnesiacore*. Its specifications indicate excellent performance characteristics with regard to impact and fire retardant capabilities.

Board and Batten

Lengths of wood are attached vertically to a wall, with the spaces in between bridged by thin strips of the same wood.

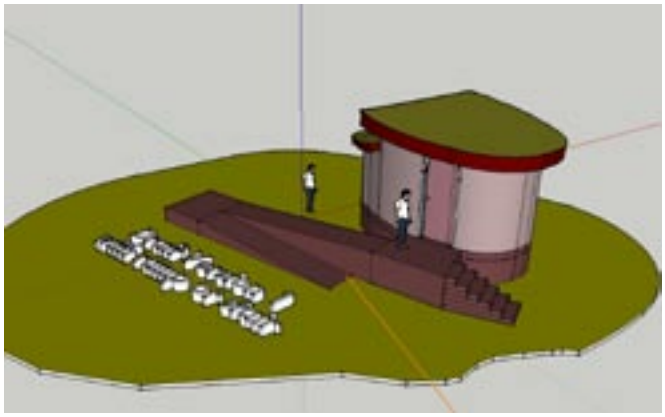
Image above:

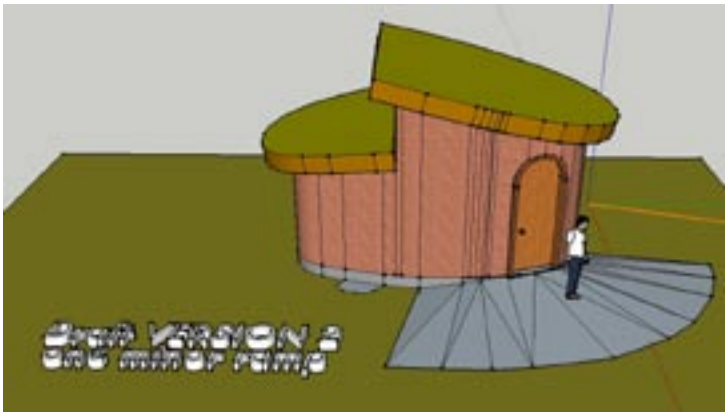
Dufferin Grove Park composting toilet design proposal / Spaces by Rohan Inc.

Cost comparatives based on Dufferin Grove Park

	Conventional	Feasibility Study version 2	Conventional building w/ composting toilet	Existing Edmonton installation
Building	56,000.00	118,210.00	98,210.00	25,500.00
Hydro access	5,520.00	5,520.00	5,520.00	Included in above
Site: Tree removal, landscape, paving, etc	10,000.00	11,700.00	11,700.00	25,000.00
Subtotal	71,520.00	135,430.00	115,430.00	50,500.00
Composting toilet unit / sewer access	73,000.00	9,500.00	9,500.00	9,500.00
TOTAL	144,520.00	144,930.00	124,930.00	60,000.00
Donated toilet unit		*-9,500.00*	*-9,500.00*	
TOTAL for this location	**144,520.00**	**135,430.00**	**115,430.00**	

Notes	Standard City-issue building; Sewer cost is minimum estimate, actual would likely be higher	Building designed for optimal site usage; Composting toilet donated by an anonymous donor	Standard City-issue building; Composting toilet donated by an anonymous donor	Built by Sunergy Systems using a sloped location, minimizing costs
Civic benefits	Provides toilet facilities to high use park area	Provides toilet facilities to high use park area	Provides toilet facilities to high use park area	Provides year-round toilet facilities to high use park area
Environmental benefits	None	1) Uses existing excavation, 2) employs green roof rainwater management, 3) uses sewer use elimination technologies	1) Employs sewer use elimination technologies	1) Employs sewer use elimination technologies
Environmental challenges	1) The high likelihood of tree endangerment during sewer pipe excavation makes it unlikely that Forestry would allow such an installation	None	None	None
Educational opportunities	None	1) Site sensitive building techniques, 2) rainwater management, 3) composting education	1) Composting education	1) Composting education
Future considerations	1) Standard building upkeep, 2) cost of annual water usage, 3) generational sewer renewal	1) Standard building upkeep	1) Standard building upkeep	1) Standard building upkeep





Feasibility study design versions 1 and 2 / Spaces by Rohan Inc.

Regulatory requirements

Requirements of the Planning Department in detail

The zoning designation for this project would be 'Open Recreational' (OR).

The proposed waterless toilet building is approximately 13 square meters in area with a height of 4.5 meters.

An excerpt from the by-law: 90.30.60 Ancillary Buildings and Structures that the waterless toilet and building would be required to meet.

90.30.60.1 General (to be verified by planning)
(1) Application of this Article
The regulations in Article 90.30.60 apply to ancillary buildings or structures in an OR zone.
(2) Ancillary Building or Structure on a Lot with No Principal Building
Despite 5.10.60.1 (1), in an OR zone, an ancillary building or structure may be erected on a lot where there is no principal building.

90.30.60.20 Setbacks
(1) Yard Setbacks for Ancillary Buildings or Structures
For an ancillary building or structure in an OR zone, the minimum setback from a front lot line, rear lot line and side lot line is:
(A) 1.5 metres, if its
    (i) height is 2.0 metres or less, and
    (ii) gross floor area is 50.0 square metres or less; or
(B) 3.0 metres, in all other cases.

90.30.60.40 Height
(1) Maximum Height of Ancillary Buildings or Structures
The maximum height of an ancillary building or structure in an OR zone is 6.0 metres.

90.30.60.50 Floor Area
(1) Maximum Floor Area of Ancillary Buildings or Structures
The total maximum gross floor area of all ancillary buildings or structures on a lot in an OR zone is *the greater of*:
(A) 500 square metres; or
(B) 5% of the lot area.

Area occupied by buildings in Dufferin Grove Park

Proportional area analysis of park area versus buildings area: we find that by taking the existing club house adjacent to the skating rink, the existing field house and the covered play structure, we arrive at a percent coverage of 2.9% of the park area.

If we take as the worst case scenario, and include the skating pad, the basketball court and the wading pool – counting them as buildings – into the area calculation, we arrive at a percent coverage of 4.5% of building area relative to the park area.

Therefore, with the addition of a small 13 square meter waterless toilet building, the worst case scenario indicates the total coverage will be under 5% of the park area.

Special note: It seems that no City of Toronto planning consultation process is required for this little waterless toilet. However, upon an official application made to the building department or a request for review by the ward councillor, that planning may request that a community consultation process be undertaken to address community politics.

Requirements of the Ontario Building Code in detail

This waterless composting toilet building is approximately 13 square meters in area. In Ontario any building over 10 square meters in area requires a building permit. This is particularly the case when plumbing, electrical and septic systems are involved.

This project would be utilizing various qualifications. At a minimum: a) a BCIN certified small building designer, b) registered civil engineers with structural and soil specialties, c) a registered mechanical engineer with septic system speciality, d) metro licensed builder, e) plumber, f) electrical, g) qualified septic system installer, h) The project will require some provisional guidance from a certified arborist as a contingency to insure the existing trees are protected to City forestry standards.

With regard to the proposed sewage system specifically, the final decision rests between the City building code septic examiners and the septic certified mechanical engineer. In other words, the 'class' of septic system will be determined during the time of building permit submission.

In summary, the Ontario Building Code and current planning guidelines seem to indicate that the proposed waterless toilet in Dufferin Grove Park meets all the requirements.

Toronto Conservation Authority

Photos left to right:

Rohan Walters
Andrew Hellebust

Accessibility guidelines related to design

The Consultants Terms of Reference originally provided by the City for this feasibility study required two designed versions to this park and, if possible, utilization of the original location.

Refer to section: *Frequently Asked Questions and Concerns: 1) Why another toilet?* for the reasons we supported this location.

As part of the City of Toronto's commitment to the accessibility of its renovated and future buildings, we endeavored to illustrate the consequence of working around the existing height of the earthbag retaining wall versus reducing their existing height. It quickly became apparent that lowering the height of the existing earthbags allowed for a more accessible structure while having the least area, space and structural effect on the local area.

Of the two versions created and presented at the first public meeting, it was determined, by Spaces By Rohan Inc. and supported by the working committee, that we would move forward with the more inclusive and less onerous design route that was version two. Version Two was priced in relative detail by consultants on the project (see page A10).

Approvals process

The planning process for a project such as this would likely take the following form:

- The Parks, Forestry and Recreation Division must decide whether it will fund from the capital building budget a prototype waterless composting toilet structure in order to confirm its cost effectiveness and environmental sustainability.
- The City would inform the ward councillor of its desire to build a waterless toilet in one of the ward's local parks.
- The ward councillor would, in all likelihood, hold a community meeting in order to inform the local citizenry and gauge its feedback subsequent to the meeting or meetings.

Water-filled Dufferin Grove Hollow / Photo courtesy of Jutta Mason

- The City or the ward councillor may request a planning confirmation report verifying the applicable zoning if, as described in the section below, a small toilet like this in the park most likely would not require planning approval.
- The City would likely create an Request For Proposals (RFP) from its list of consultants to bid on the project. The specific guidelines for RFPs can vary and should be sought once an intention to build is indicated.
- The City would either engage the services of a designer or architect from the private sector, through the RFP process, or the City's own staff can design the waterless toilet building, along with the appropriately credentialed consultants, and submit for a building permit. If the City can design its own waterless toilet, it could potentially save more time and money. The construction component would still need to meet the requirement of the City tender process.
- The City building department, once receiving a submission for building permit, would examine the proposal for its compliance to the Ontario Building Code (OBC). Once planning has signed off on the proposal as to whether or not they need to grant permission, and if and/or when the proposal is found in compliance to the OBC, a permit would be issued for its construction by qualified builders and installers who meet the requirements of the construction component of the RFP.
- The proposal would then be constructed and be overseen by the Parks, Forestry and Recreation Capital Projects Division through to completion and granting of an occupancy permit.

Safety Comparatives

In this section, we examine aspects of a composting toilet as it pertains to safety of the park and the surrounding neighbourhood, and compare them with the standard sewage disposal system in place in all local construction.

Safety Comparative 1

Safety of compost exhaust vs conventional sewer exhaust

- The exhaust from the compost toilet system is non-toxic; conventional sewer air *is* toxic. The compost toilet's aerobic decomposition, aided by an electric fan exhaust, means no odor or extremely low odor.
- Around the park, many houses over thirty years old will have floor drains in the basement or basement showers that emit objectionable smells due to gases exiting directly from the existing plumbing. Older homes and buildings, when they were constructed, did not separate the toilet fecal/urine water (black water) from the bath water or dishwater (grey water).
- In contrast to the composting toilet system, the sewer gas, created from the anaerobic decay of organic matter in pipes (anaerobic reaction = without air) located under these homes, is toxic. The plumbing stack of all homes is required to be approximately 2.1 meters higher than any point a human being might breathe near it for this very reason. In some cases this stack is to be even higher.
- The composting toilet system takes the added precaution of adding a vent fan to aid in aerobic decomposition, and stack to vent the resultant exhaust.

Safety Comparative 2

How flooding affects the composting toilet versus the conventional home, particularly homes and buildings thirty years old or more

- When flooding occurs in or around a conventional home, particularly a home more thirty years or older, there is valid cause for alarm. This is because these homes contain black water pipes that carry toilet waste. Therefore, as flood water fills the floor drains, fecal matter, kitchen waste, and urine come up from these sewer pipes and create a pool of floating excrement and rotted, liquefied garbage floating in basements. This is an ongoing health concern for most of the homes around the park, although some homes may have 'back-flow preventers' that are designed to stop this possibility from happening. Many of these valves need to maintained by the home owner on a regular basis, otherwise they are of no help in preventing the street's sewage from backing up into their home.
- Conversely, composting systems are not connected to the conventional water sewer system and backups like this are not possible.
- If external flooding caused by a torrential rain, hurricane or other extreme weather event were to occur, many of the homes that surround the park would likely see their basements flooded long before the composting toilet system would be affected. The reason for this, in particular regard to Dufferin Grove Park, is because the compost toilet is located in relatively high ground, perhaps as much as 3.0 meters higher than the lowest point in the park.
- No composting toilet or drainage field would be allowed to be located in or near a flood plain by officials. In fact, no new construction – unless it has been sanctioned by the local regional conservation authority – is allowed be built in a flood plain except under extreme and unique circumstances. The location chosen for the composting toilet is not one of the prohibited zones.
- Further, no composting toilet, septic bed, leaching field and the like would be allowed within 15 meters of a well or potable water source. The composting toilet is approximately 45 meters away from the wading pool.
- The bottom of trenches of a septic system leaching bed must be at least 0.9m from the high groundwater level. Note: many conventional basements by comparison are within 0.6m (2FT) of ground water.
- Soil testing: If this site, or any site for that matter, were to be considered for future building, the ground water test and soil percolation rates may be redone in 2 to 3 other proximal locations as an extra precaution.
- If ground water should percolate up into the room holding the composting tank, this design has a sump pump which, hard-wired to the city electrical grid in this case, would pump the excess ground water and place into a 'french drain' or at-grade dispersion system designed by a professional sewage engineer.
- Further, the room holding the composting container is surrounded by 3/16" steel walls, 18" thick hardened rammed earthbags and 4" concrete floor with 6 mil polyethylene vapour barrier. If water should enter the chamber, it would likely be pumped out before contamination occurred in the surrounding area.

Safety Comparative 3

Maintenance and repair

- Broken sewer pipes below the ground are a notorious problem for many conventionally plumbed buildings if they have not be upgraded to the new plastic pipes.

Broken sewer pipes

"Having your drain back up is one of the most frustrating, dirty and expensive problems any homeowner can face. If it's happened to you once, you never want to have it happen again"

– Mike Holmes,
The Globe and Mail

See Attachments for the full article

Toronto average temperature for periods of anticipated highest use

Month	Low / High	
May	43 / 64°F	06 / 18°C
June	52 / 75°F	11 / 24°C
July	57 / 81°F	14 / 27°C
Aug.	55 / 79°F	13 / 26°C
Sept.	49 / 70°F	09 / 21°C
Oct.	39 / 57°F	04 / 14°C

- Many broken sewer and water pipes go unnoticed as they spill tens of thousands to millions of gallons of untreated waste directly into the ground. These breaks can be caused by tree roots, broken/old concrete basement floors, or old clay and concrete pipes simply at the end of their life cycle.
- Water supply pipes will leak for years due to corrosion, shifting ground, freezing, and the like. The result: sink holes that appear suddenly after years of slow erosion; flooding in and around homes and other buildings; loss of water pressure; and loss of City revenue in the case of un-metered water or uncharged water. The cost of repairing these pipes can be extremely costly as it involves large excavations and/or tunnelling, as well as repair of structural and finished features.

- By comparison, a composting toilet system may freeze, but is not damaged by sub-zero temperatures. Most, if not all, pipes are within easy reach for examination and repair. Furthermore, composting toilets that are maintained regularly by park staff would have fewer issues go undetected because accessible systems and pipes are more amenable to thorough maintenance. Conventional water and sewer pipes are largely hidden and hard to find and harder to repair or replace.
- In contrast to conventional plumbing, a composting toilet does not need a plumbing snake or video camera to examine its pipes underground or in walls – at distances of tens if not hundreds of meters – to find breaks, cracks, or miscellaneous foreign objects. Instead, the composting container needs only maintenance staff with a rake and/or small grasping device to collect potential foreign objects thrown down the toilet.

Safety Comparative 4

Security of the toilet assembly and building

- Features included to thwart attempts to break and enter in order to destroy (all homes and buildings are subject to the same precautions) include well-made doors, door frames, locking, latching devices, quality windows with acylite clear panel or approved equal as the primary deterrent.
- Flooding of compost chamber by underground water:
    - Please refer to Safety Comparative 2 and 3 – comparative hazards to conventional sewer systems – for a comprehensive answer.
- Accidental foreign objects and conscious acts of sabotage are considerations here as would be the case for many homes and buildings. In the case of this waterless toilet, park staff performing regular maintenance visits throughout the day would identify and remove foreign objects.
- As for chemical sabotage, it is a criminal act and subject to legal action should the perpetrator be identified. Nevertheless, the facility would be closed until the contaminant was safely removed and the facility would returned to normal in a timely manner. Note: this procedure would apply to a public pool, wading pool, ice rink, and any public washroom.
- Overuse: chamber too full of waste and cannot keep up with amount of users.
    - The toilet would be monitored by staff as part of their regular duties, and by logging door counter numbers. Staff can determine if the facility has reached its daily capacity. See the chart in the attached Phoenix facilities guide.

Photos left to right:

The mixing tines in the interior of a Phoenix composting unit

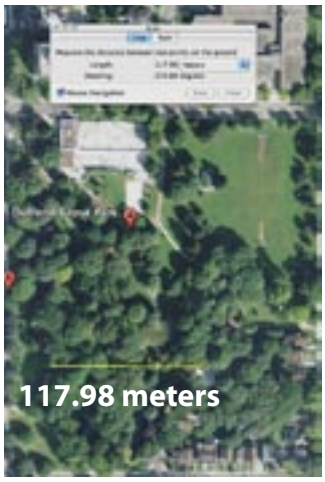
On of the composting toilet installations at St. Lawrence Islands National Park

Safety Comparative 5

Danger posed by freezing temperatures

- Danger to and from the unit:
    - A composting toilet system may freeze, but is not damaged by freezing temperatures, and most if not all pipes are within easy reach for examination and repair in the unlikely event that damage does occur. As pointed out above, this is in marked contrast to conventional plumbing, which can leak for long periods of time into the ground without detection and, once discovered, require major intervention in terms of digging up lines in order to fix. Again, this situation cannot occur with a composting toilet unit, as it is not connected to the sewer.
- Adverse operation of the unit in freezing weather:
    - The composting unit is most active during the warm months, and will stop composting entirely in the winter. The periods of highest biological activity correspond to the periods of highest use, so that the unit is processing most effectively when it is most needed.
- Optimal composting temperatures:
    - Consulting team member, Andrew Hellebust P.Eng., comments on the perception that composting can only take place above 65°F. He writes "… 65°F is a target temperature, not minimum. Phoenix says 'Our capacity ratings assume a minimum tank room temperature of 65°F (18°C. Below 55°F (13°C), composting is very slow' but does not imply that installation in such a situation is contra indicated. Further *The Composting Toilet System Book* says 'biological zero is 5°C', meaning that composting takes place at a decreasing rate between the temperatures of 65°F to 41°F, but that it does indeed occur." Mr. Hellebust also points out: "a supplemental heat source is a design option" if it turns out that year round composting is desired.
    - From Sunergy Systems Ltd. – Phoenix Composting Toilet Supplier – in response to Mr. Hellebust's question regarding temperature and physical orientation to achieve good performance of the composting biology:

      The capacity of a system is dependent upon temperature, usage and maintenance conditions. The temperature is important. However, you are quite right in that we have many facilities that operate at relatively low temperatures. The usage that Dufferin Grove will receive is not easily known. However, we do know that it is a day use facility which means that a disproportionate amount of usage will be biased towards liquid which represents a lower loading. We know that the period of greatest



Distances from current facilities to playground

usage will coincide with the season of warmest temperatures. This is helpful. In the winter period the tank will not be biologically active and will simply act as a holding tank.

Frequently asked questions and concerns

During the course of this study, we received feedback about the proposed project; that feedback is included as an attachment to this document. The following Frequently Asked Questions are responses to concerns that were not addressed in the safety comparisons above.

Why another toilet? Don't we have enough toilets already in Dufferin Grove Park?

Dufferin Grove Park does not have a toilet facility in close proximity to the playground at the south end of the park, where the bulk of warm season use of the park takes place. Due to the existence of the wading pool, the children's play area with swing, slides, climbing gyms, cob summer kitchen, sand box etc., this location in the park is extremely well used by children and adults alike. These activities attract a significant number of users for approximately a four month period, with July and August being the peak summer months.

Why was the proposed location chosen?

The location chosen is the optimal distance from existing connection to City electrical power box in the park that would supply the sump pump, venting fan, lighting and potential monitors for motion sensors or various alarms. (A photo voltaic power source is not suitable for this location because local tree cover interferes with adequate access to the sunlight needed to power the cells.)

Feasibility of other locations:

- Dufferin Grove land depression area (south west corner of Dufferin Grove): if electrical hook up is needed, this location would require going though tree protection

Portable toilets in parks

Left: The Occupational Health and Safety Act requires that toilet facilities be available within a set distance of construction sites, such as at the recent wading pool resurfacing construction site at Dufferin Grove Park.

Middle: The new multi-million-dollar HTO Park on Toronto's waterfront does not include washroom facilities.

Right: Portable toilets at Kew Beach in Toronto.

Photos by Jutta Mason

zones and jeopardizing tree root systems. It is very unlikely that Toronto Urban Forestry would approve of that possibility.

- As a septic system and 'French' drainage bed might be necessary, the historically wet depression in the south western area of the park would be not be conducive.
- Distance from existing facilities are too far (see diagrams on the facing page). The diagram on this page shows a potential location in the Dufferin Grove depression suggested from a public meeting. However, this location is subject to flooding and wet conditions as well as being far from the high activity area.
- It is also noteworthy that, although the Ontario Building Code does not specifically address distances to 'toilet facilities' from high activity area in parks, an analogous relationship can be drawn to the appropriate distances for new shopping malls and their food court areas, that a distance of a public toilet in the complex is no more than 45 meters [3.7.6.3.(3)(a)(b) of the OBC Location of Plumbing Fixtures]. With the high activity of the wading pool and the legal summer food service provided directly adjacent to this area – in addition to the people who picnic in this location – it is only logical that this OBC analogy be considered.
- A pre-existing excavation is in reasonable distance to the wading pool multi-purpose area, does not endanger existing tree roots, and can be easily structured to accommodate a toilet building.
- This pre-existing excavation had a previous soil test indicating that the water depth at this location is favorable for a septic field and as well, the percolation rate requirements were acceptable to the presiding engineer.
- The septic field would not endanger existing root systems.
- No existing Park programming would be compromised in this location if and when it is constructed.
- As previously indicated, a soil particle test has been done (see page A18). One was deemed appropriate for the small size of this system. Other factors such as grading, surface water runoff, groundwater levels were also taken into evidence or tested for.

Why a waterless toilet and not a conventional toilet?

If we assume that a logical argument can be made that a toilet in close proximity to the high activity multi-purposed area known as the wading pool is warranted, then should it be conventionally built or waterless?

In Edmonton

"For the cost of construction, a few watts a year and some wood shavings, we're able to offer people a zero footprint experience", says Ron Nichol, Operations Supervisor for the Kinsmen Sports Centre. Composting toilets are independent of the sewer system and require no plumbing, which makes them a very cost-effective option; an attractive feature for the agencies involved.

Intense review

An Edmonton bylaw requires an "initial product review", a sort of a mini environmental assessment. As such, the project has been intensely scrutinized at every step. The waste management department and the planning department reviewed the scientific data and determined that, even though the installation is situated on a flood plain in a river valley, the compost toilet system presents no danger to the surrounding area. They therefore granted permission to go ahead.

The full interview can be found on page A15.

The primary driver for many capital projects is: can the City and neighbourhood afford the project? Further, if they can afford the project will they decide to afford the project? Therefore if a preliminary cost analysis is taken (see the chart on page 12, and A10.) what becomes evident is the basic costs of conventional design and construction in this park site is more expensive. For example: The largest construction savings is the cost of constructing water and sewer supply lines to any place in the park. This cost is approximately $1,000 per meter. This cost only includes the laying of pipe. That $1,000 per meter does not include: hookup to toilet, landscape repair, planting and tree protection. In fact, due to the numerous trees in the park, it would be unlikely that a location near the wading pool would be even possible without removing trees. The removal of trees would be counter to the intent of the park at this point.

The significance of this infrastructure cost cannot be underestimated. As a result of this infrastructure base cost, it is clear that conventional construction will be more expensive than the cost of a waterless toilet of comparable size.

Further, the cost of water going forward cannot be applied to this facility, whereas a conventional facility will incur costs with every use for its entire life span.

Year to year maintenance costs would be similar; that is to say daily inspections, daily cleaning, minor repairs, and the like. However, because this would be a pilot project for the City of Toronto, the waterless facility will be logged and monitored to better gauge this aspect of actual maintenance performance costs.

Underground pipe repair and replacement can be assumed to be substantially simpler with a waterless toilet because there is no sewer pipe or water supply pipe running four to eight feet below the ground.

Also see Safety Comparative 3 for further maintenance issues that are avoided, and *Rationale for the proposed washroom installation* above for benefits related to water conservation, environmental sensitivity and educational opportunities.

Why should this community want to afford this waterless toilet?

The City of Toronto is committed to providing its entire community with high quality, accessible recreation and leisure opportunities for Torontonians of all ages and abilities. Many park goers look to the Dufferin Grove playground as their children's primary outdoor experience in the summer. Many find that the lack of nearby toilet facilities impedes their enjoyment of the park, since they find themselves hustling small children all the way to the north end of the park. When unable to drag older children away from their play in order to accompany a bathroom run for their younger siblings, parents sometimes leave their older children playing unsupervised. If enough park goers experience these situations, then it only seems appropriate that the City look at options for alleviating these issues that impact both the enjoyment and the safety of playing in the park. Indeed, enough parents supported the original project to come out in large numbers at two separate community meetings in the summer and fall of 2006.

Doesn't a waterless toilet require specialized maintenance?

The maintenance instructions and guidelines are relatively simple as are the safety protocols with regard to the handling of biological matter at the facility. As is the case with other park washrooms, Parks staff would perform the maintenance. In Dufferin Grove Park, Recreation staff would be involved in monitoring facility use.

Won't it smell just like the 'outhouses' we have at cottages?

An outhouse consists of a deep pit that stores putrefying human waste. The nitrogen/carbon ratio is extremely out of balance, with only toilet paper to add carbon to the nitrogen rich waste. The resulting decomposition from this unbalanced mix is anaerobic, which is associated with the characteristically offensive odor. In marked contrast, composting toilet bins have a high carbon to nitrogen ratio, with the waste being distributed within a matrix of wood shavings. This results in aerobic composting, which gives off a barely detectable, and much more pleasant odour. In fact, the predominant smell is one of wood shavings.

Bronz Zoo composting toilet installation / Image courtesy of www.treehugger.com

How do you wash your hands in a waterless facility?

In a waterless facility, standard running water washing sinks are not available. In this case, patrons would have two options: use the supplied hand sanitizer, or use the hand washing sink at the cob courtyard. Note that the sinks are within the distance of 45 metres of the toilet facility as required by the Ontario Building Code.

What are the precedents for such toilets?

Here is a partial list of composting toilets installed across the country and in New York City:

National Parks

- St. Lawrence National Park, 13 installations
- Bruce Peninsula National Park, Approx. 11 installations

Provincial Park

- Algonquin Park, Approx. 3 installations

YMCA Facilities

- Kingston RKY Camp, Four units in one installation
- Sudbury YMCA Camp, Six units

Cities

- City of Edmonton, Joint Project of the City of Edmonton Planning Department and Alberta Environment, One unit
- Toronto Regional Conservation Authority Building
- CK Choi Building, University of British Columbia
- Bronx Zoo, New York

Why did those precedent localities decide to build a composting toilet and what similarities do they have to Dufferin Grove Park?

They decided to use a composting toilet installation for the same reasons it is contemplated here: composting toilets are cheaper to build and maintain, require very little disruption to the surrounding land, work well in remote or unserviced locations, and are suitable for sites that range from rare, occasional use, to constant, year-round use.

What would be the facility's hours and seasons of operation, and how does that compare to other conventionally build park toilets hours and seasons of operation?

Toronto Park washrooms are generally opened during the day from May to the end of October at the latest, if they are subject to freezing. Hours and seasons of operation for this facility would be comparable, keeping in mind that, unlike a conventionally plumbed toilet, a composting toilet facility's workings are not affected by freezing and are therefore not adversely affected by the cold like conventional plumbing can be. The facility can therefore be opened to provide winter access for occasional special activities in the park that attract numbers of people.

Conclusion

The research indicates that composting toilets represent a wealth of future possibilities for augmenting toilet facilities in Toronto parks. The waterless toilet is about a future with safe, clean, affordable, easily maintained alternatives. The waterless toilet is not only an option for Dufferin Grove Park, but possibly thousands of other parks across the City and country.

In 1996, or fourteen years ago, water/sewer pipe construction costs were running at $600 per meter or $200 per foot. In 2010, water/sewer pipe construction costs are now at $1,000 per meter or $333 per foot. In addition, residential water rates have increased 9% per year for the last four years and will continue to rise for the foreseeable future. One of the important question we must address as a society is how much drinking water can we afford to flush down the toilet in the future? Furthermore, the question of ease of repair and maintenance are part of that equation. It is postulated by some that to continue managing and maintaining our water in this way – cleaning it, supplying it, sending it into the sewer – the same way as we are doing now will lead to tax and utility increases that will be unaffordable for many.

The waterless toilet experience, education and technology has evolved and is evolving further to become a major contributor in safe and affordable alternatives to infrastructure growth, maintenance and repair. A project such as this could help to improve understanding around alternatives and make their future acceptance more likely.

A few words about feasibility. Even though this waterless toilet may be technically feasible, political feasibility is another matter. This report deals with the technical feasibility of the waterless toilet at Dufferin Grove Park. Further, much of the information gleaned here can also be applied to many other parks from a technical view point.

Ultimately, political acceptance will determined by community consensus, possible local referendum, the local councillor, the City's Parks, Forestry and Recreation Division, and Planning and Building Divisions.

Appendix

Team Biographies

Bruce Tree Expert Company Ltd.

http://www.brucetree.com/

Todd Irvine of Bruce Tree Expert Company Ltd. is a certified arborist and has been a regular contributor to Spacing Magazine known to many in the Toronto design and political community.

Georgie Donais, Natural Builder

www.busygirl.ca

Georgie Donais was the lead on the original composting toilet project in Dufferin Grove Park. As such, she has a working knowledge of the decisions that were made then, the context of those decisions and the people involved both from the city side, the community side and the supplier side, as well as the existing building methodology that was used in the earth bag retaining and foundation wall. Donais' knowledge is crucial in saving time when conveying necessary information to other consultants, including but not limited to: the structural engineer; the water and sewer engineer; the general contractor; the electrician; the supplier of the Phoenix composting system; and Mr. Walters, the small buildings designer. Donais is also a member of the community who has spent many seasons with her children in Dufferin Grove Park.

For her work in Dufferin Grove Park, she was a recipient of a 2005 Clean and Beautiful City award and, as a finalist in the 2007 Green Toronto Awards, she received an Award of Excellence. She was also a Hometown Hero finalist in 2008. Donais is a member of the Ontario Straw Bale Building Coalition and Natural Builders North East. For more information about these projects, go to www.cobinthepark.ca.

Gabe Faraone P.Eng. (Civil Engineer), GPF Design Services Inc.

Gabe Farone is a licensed engineer in the province of Ontario. He has been a building code examiner for the City of Toronto and is now in private practice designing structures from churches, schools to houses and more. Farone brings many years of experience in structural feasibility and assessment as well as providing licensed provincial ability.

Andrew Hellebust P.Eng., Rivercourt Engineering Inc.

www.rivercourt.ca

Andrew Hellebust is a licensed engineer with two degrees that are critical to this composting toilet project: chemical engineering; and mechanical engineering with a specialty in sewer, waste protocols, septic field design and installation protocol. His degrees are from the University of Toronto in Canada and Princeton University in the United States.

Hellebust works municipally, provincially and federally on constructed wetlands, and other composting systems of a complexity comparatively to this relatively small project. Andrew is one of the most knowledgeable individuals in Canada in terms of understanding the science behind composting. He is able to separate fact from fiction as well provide up to date research and practice methods throughout Canada.

Pitamic Construction (General Contractor) Metro Licensed Contractor

Edwin Pitamic is a metro licensed contractor and a certified mason in the city of Toronto. Pitamic specializes in small and complex work and has decades of building experience. He has provided a preliminary estimate to verify the costing of this composting toilet feasibility. Pitamic has factored in much of the sewer installation with provisions for possible special installers.

Rykon Electric Metro Licensed Electrical Services

Manual Machado of Rykon, provided preliminary electrical cost verification. Rykon is experienced in control system electronics, alarms and monitory systems, industrial and residential electric installations.

Sunergy Systems Ltd.

http://www.compostingtoilet.com/

Michael Kerfoot of Sunergy Systems Ltd. supplied the Phoenix Composting System. Sunergy has supplied public facilities grade composting toilet systems to locations across Canada, with Ontario locations including including St. Lawrence National Park and Bruce Peninsula National Park, Algonquin Provincial Park, and YMCA Camps in Kingston and Sudbury. Downtown Edmonton also has a Phoenix installation, located in a park on the banks of the North Saskatchewan River.

Techno Metal Post

http://www.technometalpost.ca/

Roger Lauzon of Techno Metal Post has provided a preliminary costing for the installation and testing and submissions required to any building department regarding soil stability for helical pile installation. Techno Metal Post will work with GPF Design Services Inc. (the civil engineer) and and general contractor to coordinate structural ground work.

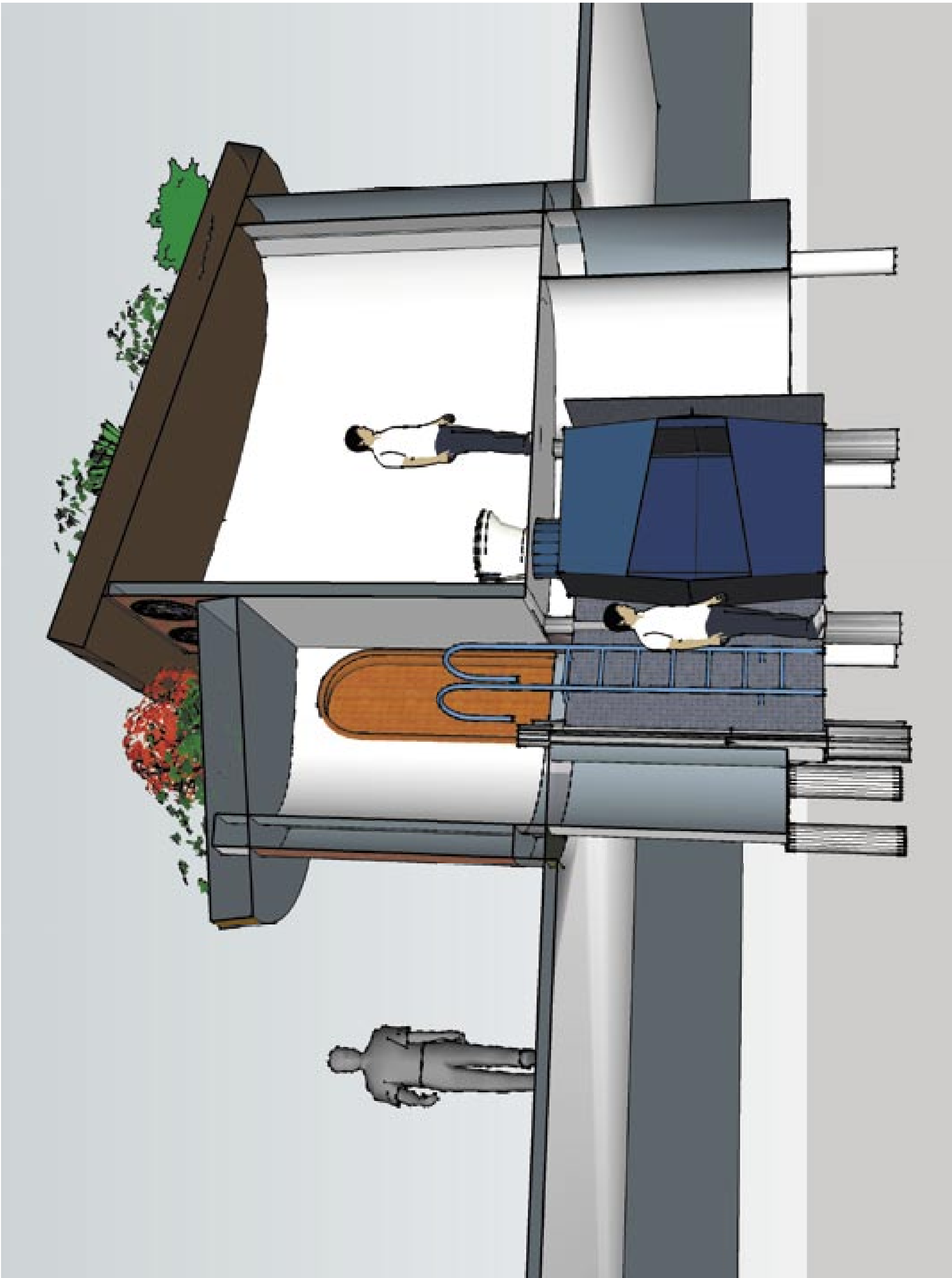
Xero Flor Canada

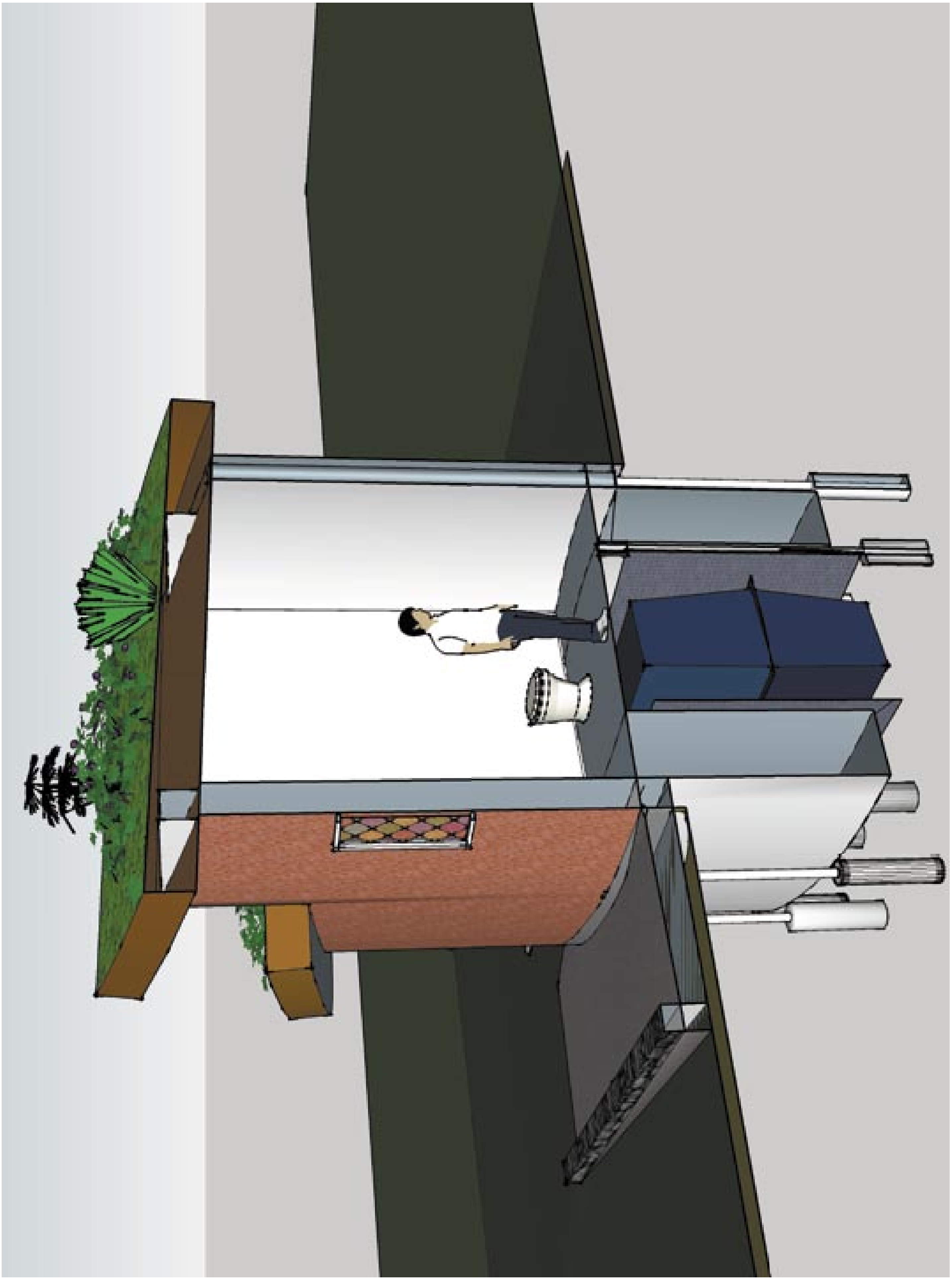
http://www.xeroflor.ca/

Sasha Aguilera of Xero Flor has provided preliminary pricing and construction specifications for installing a green roof on the building. Xero Flor Canada were the major suppliers and installers to the 2010 Vancouver Olympics.

3-D Drawings

Detailed design drawings can be found in the Attachments.





Detailed budget

Dufferin Grove Park

Bio Toilet Feasibility Study

	Pitamic Construction 34 Cowan Avenue, Toronto, Ontario, M6K 2N4, Metro Licence T85-309268	November 2010 Based on drawings P-1 to P-5 Dated Nov. 23, 2010	Areas of possible reductions in Cost	
	Construction and supplies			
a	To provide perimeter safety fence for the duration of the project	2,400.00		
b	To provide tree protection for two trees	750.00		
c	To remove 3 feet high earth bags	350.00		
d	To remove 4" Cob facing to grade[1]	950.00		
e	To remove 4" of granular "A" from bottom and save to later re-use	300.00		
f	To excavate bottom of pit manually to depth of 8 feet from grade	3,600.00		
g	Helical Piles (16) installed	12,800.00		
h	To supply 3/16 x 72" steel between piles. 3 1/2" steel post on piles inside pit to underside of floor system. 3 1/2" steel posts on piles to underside of roof system. 3/16" steel skirt just above grade. Small beam system, Galv. metal ladder	18,000.00		
i	To supply 3" concrete floor over tiop 6 mil poly v.b. over top 4" granular "A"	1,800.00		
j	Backfill behind new steel wall	800.00		
k	Install composting unit[2]	800.00		
k1	Supply and intall grab bars	800.00		
l	Build metal floor joist system	2,400.00		
m	2"x6" floor and 1/2" MDO plywood	2,800.00		
n	Termite treatment	500.00		
o	Linoleum or tiles	2,400.00	-800.00	If linoleum
p	Build metal roof structure	6,600.00		
q	Build 2"x4" wall system	7,400.00		
r	Supply and install two doors and window and 20 - 4" aluminum vents	4,800.00		
s	Supply and install board and batten cladding	7,400.00	-3,000.00	depending on quality of wood
t	Wood soffit and facia with 2" dia. aluminum vents 1600	1,600.00	-800.00	depending on quality of wood
t1	Wood stain	1,400.00	-600.00	depending of stain type and quality of application
u	To supply single ply torch down roof membrane	1,100.00		
v	Supply metal flashing	900.00		
w	Green Roof by XeroFlor 160 square feet	4,000.00		
x	Provide a 3 foot deep trench x 80 feet for electrical conduit	2,400.00		
y	Supply 1" di. ABS conduit in trench	260.00		
z	26 feet of tight paving stones	3,200.00		
z1	35 feet of (8"x26 feet) concrete curb	3,500.00		
z2	To supply and install 'gin wheel', rope and two hooks for simple hoist system	350.00		
z3	To trench 30 feet long x 2 feet wide x 2 feet deep for leaching field	1,200.00		
z4	To supply and install 8" weeping tile system (septic bed)	1,100.00		
z5	All Electrical Work	5,520.00		
z6	Landscape construction	5,000.00		
z7	Sump	1,000.00		
z8	Construction Waste Removal	1,150.00		

Total construction and supplies	111,330.00	-5,200.00	potential price reductions
HST 13 %	14,472.90		

Consultant and Other Costs

Phoenix Toilet and Composting	0.00	donated	actual cost 9,500
Civil Engineering	3,000.00		
Sewer and Mechanical	3,000.00		
Building Permit Fee Estimated	1,000.00		
Techno Metal Post Helical Pile Engineering and permit submission	500.00		
Designer fee	10,000.00		
- Educational component development	2,000.00		
- Consulting on existing construction	2,000.00		
Miscellaneous fees	2,600.00		
Total consulting and other fees	24,100.00		
HST 13 %	3,133.00		

Combined total expenses	**135,430.00**
HST	17,605.90

Conditions:
$10,000 Deposit upon signing the proposal
Bi-Weekly Progress Payments
Balance upon completion

To assist with trades is a 15% Contingency for unanticipated coordination and extras.
Any extra work to be charged at $45/man/hour plus materials
Any extra changes in work and the price to be charged for same shall be in writing
This proposal is made on the basis of current material and labour cost
A delay in acceptance of more than (90 days) will require a review of the proposal and re-dating before the agreement becomes binding
WSIB
Commercial Liability Insurance AUR

Compost analysis

Sunergy Systems Ltd.

WSH LABS (1992) LTD.

3851B - 21 STREET NE, CALGARY, ALBERTA, CANADA T2E 6T5. TELEPHONE #: (403) 250-9164, TELEFAX #: (403) 291-4597

12694

July 22, 1994

SUNERGY SYSTEMS LTD.
Box 70
Cremona, Alberta
T0M 0R0

ATTN: Michael Kerfoot / ACS Glenn Nelson

RESULTS

Sample Type: Wood chips - compost

Fecal Coliforms	< 10 / 10 grams
Moisture Content	71.3 % by weight

Odour Detection:

First day when dry - low level of mouldy smell, non offensive

Seventh day - open container - moderate mouldy smell
closed container - low level of mouldy smell

* All ordour are not offensive

per
Bill Wong

RESULTS OF MoTH COMPOSTING TOILET ASSESSMENT

SOLIDS CHARACTERISTICS

At age 30 months

Arbutus Rest Area, Malahat

TKN (Total Kjeldhal Nitrogen)	4700 ppm
pH	7.5
Bulk Density	.6 kg/L
MC (moisture content)	70%
VS (volatile solids)	80%
O2 U/R (Specific oxygen uptake rate)	0.1 mg/hr/gm VS
C:N	20:1
Bacterialogical Quality	neg CFU/gDS

***T & E* CONSULTANTS INC.**
July 1997

LEACHATE QUALITY

	BOD mg/L	TKN mg/L	NO3 mg/L	NH3 mg/L	ALK mg/L	TDS g/L	SAL ppt	pH	FC cfu/100mL
AS 09/94	60		38		2390			8.8	
AS 12/94	400	1455	42.24		3745	9.6		8.82	neg
AS 03/95	260	420	141	79.8	940	16.7	15	7.74	neg
AS 06/95	320	915	253	45.9	445	18.2	16	6.58	neg
AS 09/95	295	1035	420	40.6	1881	17.6	19	8.3	1.00E+04
AS 12/95	170	1335	572	154	735.3	20.4	16	6.91	neg
AS 03/96	340	1035	280	121	513	19.2	13	7.59	neg
Averages	264	1033	249	88	1521	17	16	7.8	
AN 09/94									
AN 12/94	360	345	47.52		359	11.2		6.7	neg
AN 03/95	200	660	252	71.4	342	15.4	14	6.76	neg
AN 06/95	260	990	291	37	291	17.9	15	6.42	neg
AN 09/95	160	780	530	22.7	239.4	17.8	22	6.4	8.00E+07
AN 12/95									
AN 03/96	130	945	360	110	342	15.4	13	6.75	neg
Averages	222	744	296	60	315	16	16	6.6	

Edmonton composting toilet

Interview with Ron Nichol by Georgie Donais

[Edmonton, 2007] Ron Nichol is supervising the installation of Edmonton's first city-owned composting toilet. On the bank of the North Saskatchewan River in downtown Edmonton, it is located between two heavily used attractions: Fort Edmonton Park and the John Janzen Nature Centre. The project is a joint effort between the City of Edmonton Planning Department and Alberta Environment, a provincial agency. The Edmonton Nature Centre Foundation has also been involved in financing and studying this pilot project.

Edmontonians take the protection of their environment seriously: for example, over 84% of single family households participate in curbside recycling.* When it came time to provide toilet facilities for this well-used area of the city, officials took the opportunity to advance their environmental agenda by choosing a toilet that would compost waste rather than flush it. Water use reduction and energy conservation are automatic benefits of such an installation, but its most important function is educational. As part of Edmonton's Urban Composting Centre, the toilet will offer visitors a way to contribute to the composting process that is unique, memorable and beneficial for the park.

"For the cost of construction, a few watts a year and some wood shavings, we're able to offer people a zero footprint experience", says Ron Nichol, Operations Supervisor for the Kinsmen Sports Centre. Composting toilets are independent of the sewer system and require no plumbing, which makes them a very cost-effective option; an attractive feature for the agencies involved.

Intense review

An Edmonton bylaw requires an "initial product review", a sort of a mini environmental assessment. As such, the project has been intensely scrutinized at every step. The waste management department and the planning department reviewed the scientific data and determined that, even though the installation is situated on a flood plain in a river valley, the compost toilet system presents no danger to the surrounding area. They therefore granted permission to go ahead.

2010 update

Construction is now complete and the toilet has been up and running since the summer of 2007. The unit has provided worry-free functionality while giving visitors a chance to think about, and contribute to, a waste-management solution that is easy on the earth, all the while being easier on the city's pocketbook.

Project budget	
Unit: Assembly and building	**$35,000**
Site: Tree removal, landscape, paving, etc.	**$25,000**
Total	**$60,000**

* www.recycle.ab.ca/images/stories/envirobusiness/Community.pdf

Compost toilet installation in Edmonton / Photos by Michael Kerfoot

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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

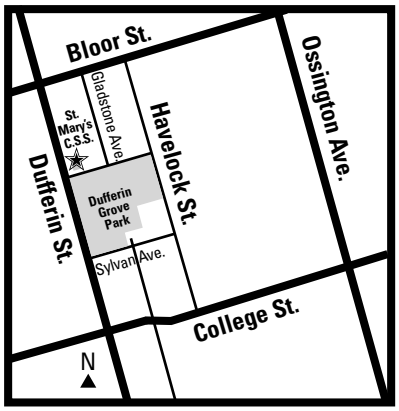
Toronto Parks, Forestry and Recreation, along with a consultant hired by the City of Toronto, is undertaking a feasibility study. Options will be presented for the development of a future washroom structure containing a bio-toilet, to be located near the playground. The local community is invited to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

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.

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



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

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.

OBC Location of Plumbing Fixtures

3.7.6.3.(3)(a)(b) of the OBC Location of Plumbing Fixtures

(3) A room containing plumbing fixtures for the public in Sentence (2) need not be located in the restaurant if,
(a) the room is located in the building containing the restaurant, and
(b) the distance of travel between the restaurant and the room is not more that 45 m [metres 147,.63 ft]

Volume calculations

Uses	Days	Uses/day		
June	8	50	400	
July	31	100	3,100	
August	30	100	3,000	
September	8	50	400	
Max uses			6,900	
Water use avoided				
litres/flush	6	6900	41,400	
litres/flush	13	6900	89,700	
Likely average	10		65,550	
Over 2 years			131,100	litres
Cubic meters			131	
Uses per year			6,900	
Years of composting			2	
Uses per composting batch			13,800	
Compost per batch	90 gallons	12 ft3		Water 350 litres

Engineer's leachate bed report

Andrew Hellebust, P.Eng.
Engineering Design in Water and Wastewater

Suite 502, 250 Merton St.
Toronto ON M4S 1B1
cell 416-456-2319
ho 416-421-4419
fax 416-628-3707
email ahellebust@ca.inter.net

March 19, 2008

Martin Liefhebber, MOAA, MRAIC
Breathe Architects t 416 469 0018; f 416 469 0987;
e info@breathebyassociation.com; w www.breathebyassociation.com

Dear Martin:

Subject: Phoenix Composting Toilet leaching system soil test and design update, Dufferin Grove Park

This is an updated design brief to reflect the results of a soil grain size analysis conducted in the location of the effluent trench system for the composting toilet building in Dufferin Grove Park. The only modification concerns the location and length of the trench, adjusted to the actual percolation ("T") time of the soil.

Use: The toilet is open on weekends starting in mid-May, full-time in July and August and weekends in September to mid-October. It is estimated by Parks that there will be 40 uses per day in July and August.

For the purposes of sizing the leaching bed trenches, a peak load of 100 uses per day is contemplated at average July/August temperatures, or a peak of 2.5 times over average daily use.

The manual "Using the Phoenix Composting Toilet System in Public Facilities: *An Information & Application Guide*" by the manufacturer, Advanced Composting Systems, LLC (195 Meadows Road, Whitefish, Montana 59937, Phone: 406-862-3854, Fax: 406-862-3855, Email: phoenix@compostingtoilet.com, Internet: http://www.compostingtoilet.com), Revised & Expanded February, 2007, states:

> **§ 4.2 — Liquid end product (leachate)**
> 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 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, holding tank, or a secondary evaporator. The liquid end product contains considerable bacteria and dissolved salts, but generally has a low coliform indicator concentration (<200 org/100 ml), low BOD, (<50mg/liter) and low

TSS (<100 mg/liter) compared to septic tank effluent, so a short (3 meter) leach line is all that is necessary.

The Phoenix composting toilet is a Class 1 Sewage System under the Ontario Building Code (OBC) Section 8.3. Sentence 8.3.1.2.(3) states that a toilet with a drain must drain to a Class 3 (disposal of Class 1 effluent), 4 (leaching bed), or 5 (holding tank) sewage system. While the leachate from a composting toilet may contain high levels of nitrogen, phosphorus and salt, the BOD and TSS concentrations listed by the manufacturer, at 50 and 100 mg/L respectively, are comparable to septic tank effluent. "Small and Decentralized Wastewater Management Systems" (Crites & Tchobonaglous) lists septic tank effluent with at BOD 150-250 mg/L and TSS 40-140 mg/L (or with an effluent filter at BOD100-140 mg/L and TSS 20-55).

It is proposed that the Phoenix effluent filtration system provides the equivalent function to a septic tank in terms of reducing effluent strength. The leachate from the Class 1 toilet can then go directly into a Section 8.7 leaching bed.

Effluent design flow: a peak load of 100 users per day in July and August will introduce 26 L of liquid. The manufacturer states that day-use facilities can accept 30% more users due to the increased ratio of urine to feces expected. If this implies that the liquid volume increases by 30%, the total liquid introduced increases from 20 L/d to 26 L/d. The manufacture recommends 3.8 L of bulking agent per 100 uses, which I will assume can absorb on the order of 1 L of liquid only.

The amount of this liquid that evaporates depends on the volume of ventilation air, the temperature and the relative humidity. If we consider the case where it is a cool rainy day at 100% RH, there will be no evaporation. This is to ensure that the trench system can handle peak loading on a rainy day.

The design effluent flow is 26 L/d – 1 L/d (absorbed by bulking agent) – 0 L/d evaporated = 25 L/d.

Soil Test: A soil sample was taken by Andrew Hellebust from a soil pit located approximately 3 m southwest of the composting toilet building at a depth of 70 cm. The soil layers consisted of 20 cm of brown topsoil, then orange brown sandy soil to 70 cm depth. From observations while digging for the foundations, reported by Georgie Donais, the soil changes to a lighter colour a few cm below 70 cm depth and stays that way to 10 feet (3 m).

A grain size analysis was performed by Shaheen and Peaker (please see attached results), with an estimated percolation rate of 8-20 min/cm. Approximately 50% of the sample was sand, 30% was coarse silt to fine sand, and 10% was clay and silt less than 20 μm. This silt content was noticed previously as the native soil was considered unsuitable for making cob. Due to the clay and silt a conservative percolation rate of 20 min/cm is used for the design. Groundwater was not found to 3 m depth, as reported by Georgie Donais.

Trench design: An absorption trench 8.7.3.1.(2) is sized at L = QT/200 where L is the length in m, Q the design flow in L and T is the percolation rate in min/cm. Taking a percolation rate of 20 min/cm and a Q = 25 L/d the length required is:

L = (25 * 20) / 200 = 2.5 m

The manufacturer gives an example of 3 m of trenches as being typically sufficient. Although the formula allows a shorter trench, the manufacturer's guideline will be taken as the minimum trench length and a trench of 3.0 m is to be used.

L actual = 3.0 m

Clearances to groundwater, structures, wells etc. must be observed as per Part 8 OBC except that the toilet building is a treatment unit itself and so the normal 5 m clearance between distribution piping and that structure is not considered applicable.

Nevertheless, it is recommended that the distribution pipe be at least 1.6 m (5 ft) away from the adobe structure to prevent short circuiting down the foundation. The rationale is that a plume starting at the depth of the trench floor should clear the bottom of the foundation or at least to frost depth (~4 ft). It is also recommended that the distribution pipes be min. 1.6 m from the rainwater drywell.

The trench depth may depend on the drain invert from the toilet building, but is to be between 0.3 m and 0.9 m in depth, with 0.4 m as a desirable depth. Width is between 0.5 m and 1.0 m, with 0.5 m being adequate. The surface is to be graded to divert surface water away from the trenches. The distribution pipe is 3" perforated (3 m of "weeping tile" supplied by Phoenix is considered acceptable) with 50 mm of gravel over and 150 mm under the pipe (see 8.7.3.3.). OBC Part 8 is to be followed in the construction and placement of the trenches.

Please see the attached "Trenches" drawing (plan and section) and "Leaching Bed Site Plan" drawings.

Sincerely,

Andrew Hellebust, P.Eng.
Engineer, PEO Certificate of Authorization #100124683

shaheen & peaker *limited*
consulting engineers
20 Meteor Drive
Toronto, Ontario, M9W 1A4
T: 416.213.1255
F: 416.213.1260
info@shaheenpeaker.ca

Project: SP7626

October 23, 2007
Fax: (416) 628-3707

Andrew Hellebust
4 Beechwood Cres.
Toronto, Ontario
M4K 2K8

Attention: Mr. Andrew Hellebust

Grain Size Analysis
Dufferin Grove Park
Toronto, Ontario

Dear Sir:

Attached please find the Grain Size Analysis results of a sample delivered to our laboratory.

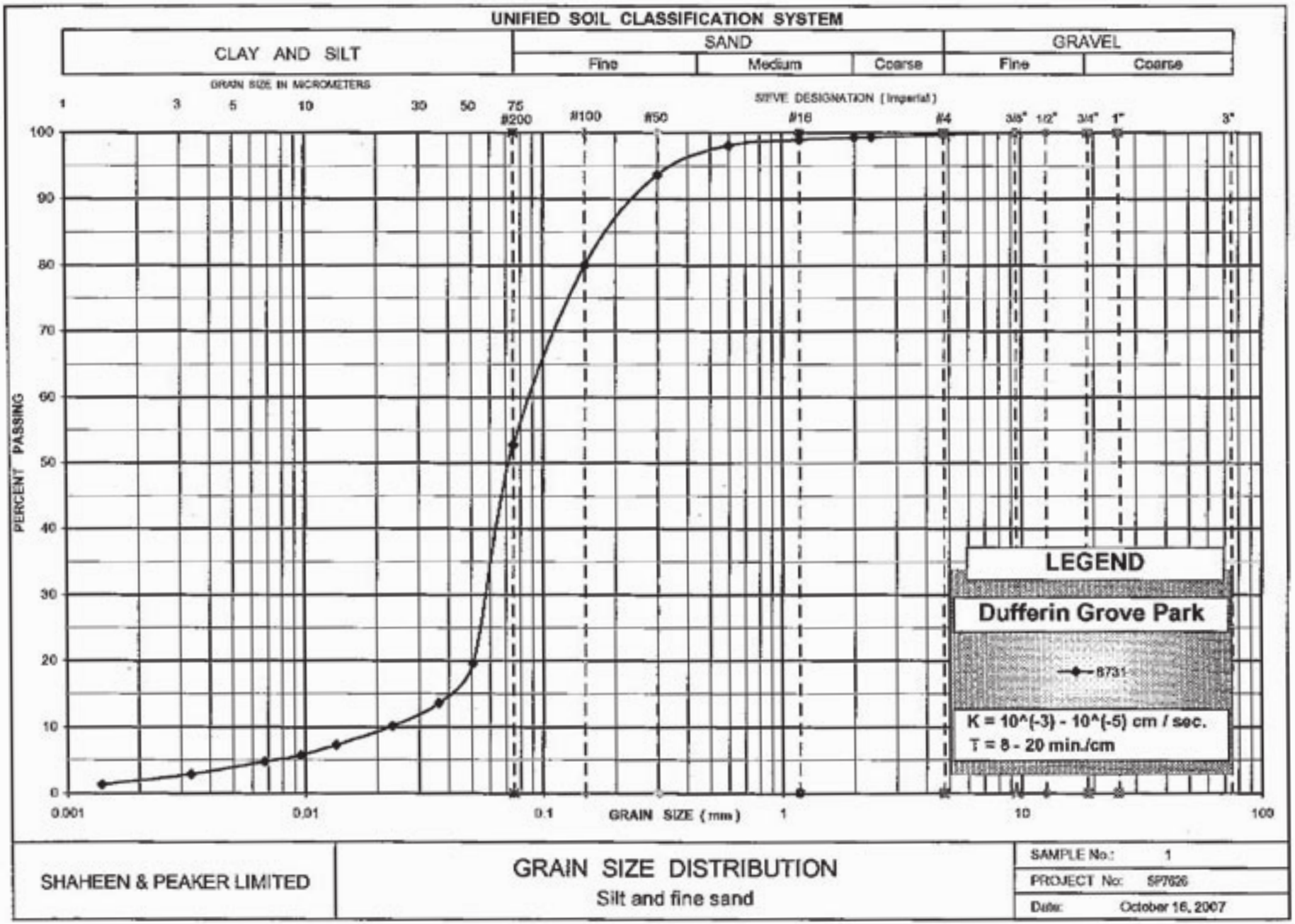
Based on the grain size distribution the approximate relationship to permeability and percolation time are $10^{-3} - 10^{-5}$ cm/sec and 8-20 min./cm respectively.

Should you have any questions please feel free to contact this office.

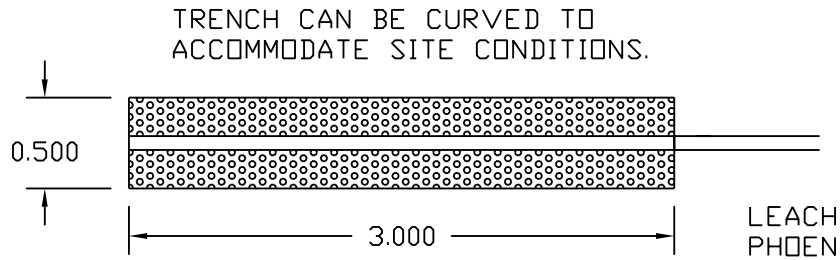
Yours very truly,
SHAHEEN & PEAKER LIMITED

Andrew Mendonca, MLFS

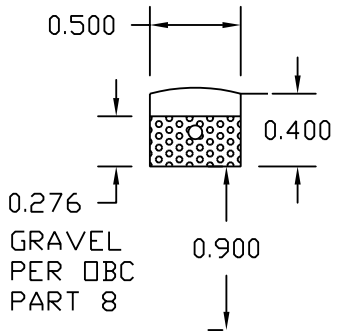
AM:lj
Attach.


UNIFIED SOIL CLASSIFICATION SYSTEM
CLAY AND SILT
SAND
Fine
Medium
Coarse
GRAVEL
Fine
Coarse
GRAIN SIZE IN MICROMETERS
1
3
5
10
30
50
75
#200
#100
#50
SIEVE DESIGNATION (Imperial)
#16
#4
3/8"
1/2"
3/4"
1"
3"
PERCENT PASSING
100
90
80
70
60
50
40
30
20
10
0
0.001
0.01
0.1
GRAIN SIZE (mm)
1
10
100
LEGEND
Dufferin Grove Park
8731
K = 10^(-3) - 10^(-5) cm / sec.
T = 8 - 20 min./cm
SHAHEEN & PEAKER LIMITED
GRAIN SIZE DISTRIBUTION
Silt and fine sand
SAMPLE No.: 1
PROJECT No: SP7626
Date: October 16, 2007

PLAN VIEW



SECTION VIEW



GRAVEL 0.05 m
OVER AND 0.15 m
UNDER 0.076 m
DIAM. PERF. PIPE

NATIVE SOIL PERCOLATION T
= 20 min./cm AND TRENCH
BOTTOM MIN. 0.9 m FROM HIGH
GROUNDWATER LEVEL

DIMENSIONS CAN VARY IF SATISFYING
OBC PART 8 FOR
ABSORPTION TRENCHES

DISTANCE IN METRES

PRELIMINARY - NOT FOR CONSTRUCTION
SUBJECT TO APPROVAL AGENCIES

Andrew Hellebust, P.Eng.
Suite 502, 250 Merton St.
Toronto ON M4S 1B1
Tel. 905-856-5225 x33

Engineering Design in
Water and Wastewater

Project Name:
Dufferin Grove Park
Project Address:
Toronto ON

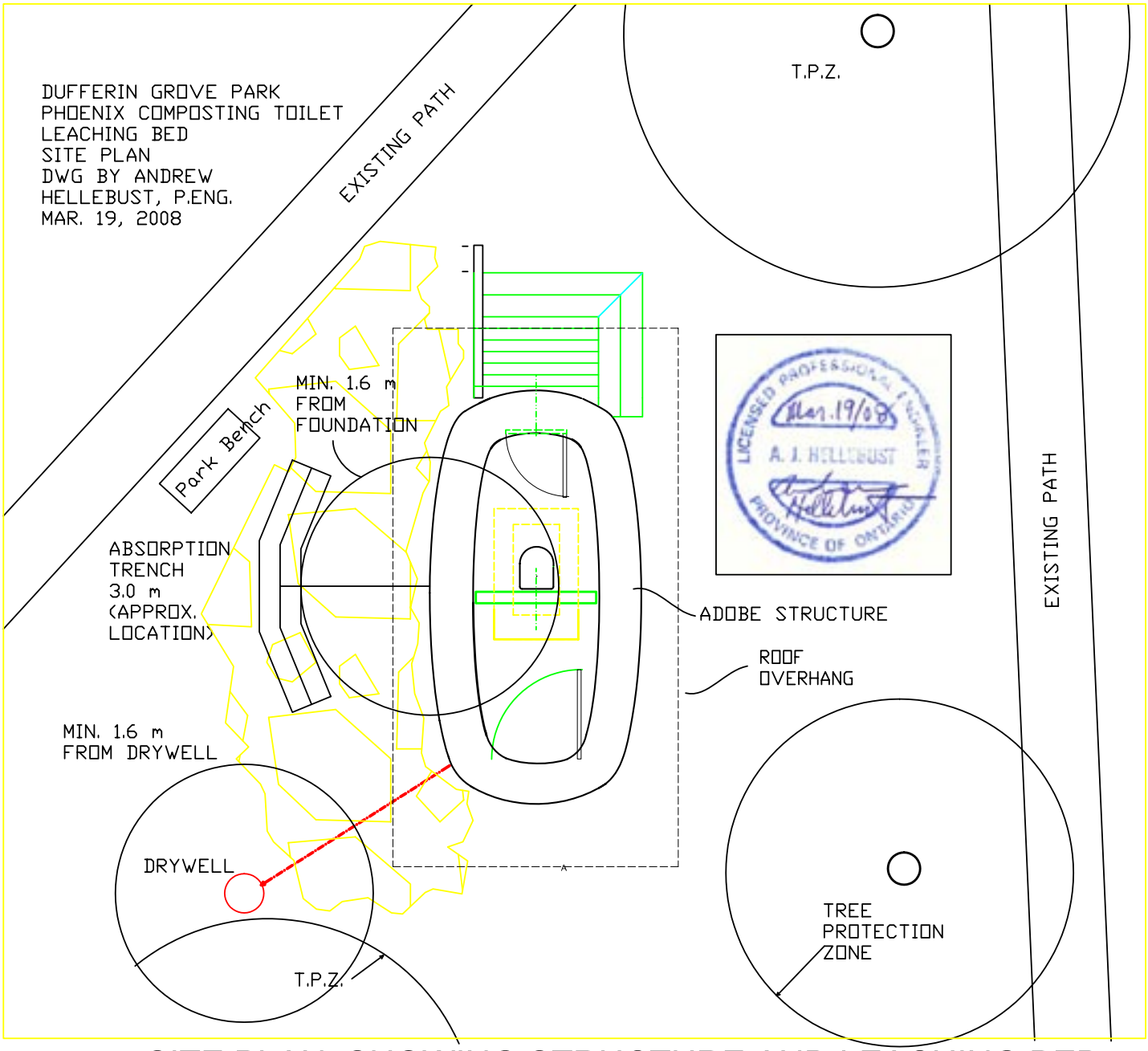
Date:
Mar. 19, 2008

Scale:
as indicated

Drawing Title:
TRENCHES

Drawing #:
Trenches

Drawn By: AH
Checked By: AH
Approved by: AH



SITE PLAN, SHOWING STRUCTURE AND LEACHING BED

Selected media coverage

NOW | AUGUST 31 - SEPTEMBER 6, 2006

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CITY IN BRIEF

By JENNY YUEN and KATE ZANKOWICZ

Park's new poop-and-scoop

Dufferin Grove Park will soon grow flowers with your poop.

Local artist Georgie Donais is working with the city to install Toronto's first outdoor compost toilet close to the park's playground.

"It's a statement that there are other options," says Donais, referring to the city's struggle to find a destination for its many thousands of tonnes of sludge. "[Our toilet] doesn't drain into the sewer system and doesn't go into Lake Ontario."

Right now, a 100-square-foot hole in the ground is the starting point for the toilet, which should be ready next summer.

Says Parks and Rec manager Sandy Straw , "Porta-potties are also an option, but then there's the whole question of disposal."

You can go number one or two in the compost toilet, and instead of flushing you put a scoop of wood chips in the bowl. The plan is for city staff to turn the crank on the outside of the stall once a day to filter material downwards. Fans will suck air down the toilet to minimize the stink factor.

Says Donais, "We're going to make sure that everyone is comfortable with the use and that there's no chance of odour."

Gord Perks of the Toronto Environmental Alliance says we should take advantage of any long- or short-term solution to the sludge problem. "Compost toilets have improved drastically in the last 25 years," he says.

But even though a compost toilet is cheaper and saves water, you can't replace an existing residential toilet with one for health reasons, according to **Ministry of Housing building code interpreter Al Suleman** .

If this pilot project doesn't crap out, the city will look at putting more compost toilets along the waterfront.

TORONTO STAR
www.thestar.com

Tempest in a composting toilet

Dufferin Grove | Park activists are no strangers to battling with bureaucrats. *By Christian Cotroneo*

Sep. 17, 2006. 01:00 AM

CHRISTIAN COTRONEO

For a few uncertain days, the future of one of the city's most celebrated and progressive public parks hinged on a toilet.

The Friends of Dufferin Grove Park, a grassroots collective of neighbours and volunteers who tend the west-end park, were hoping to build the facility so children and parents using the nearby playground and wading pool could relieve themselves.

The idea, championed by volunteer and activist Georgie Donais, was to construct the city's first composting toilet, and to do so as an art project, with parents and children working side-by-side. The loo would be completely enclosed by something called a "cob" — a traditional mix of sand, straw and clay. It would take much of the load off the only facilities within range of the must-pee-*now* crowd — an uncomplaining old tree near the playground.

But the city, ever an awkward dance partner with park activists, saw it not so much as art but construction. Thus a two-metre-high fence was installed, hard hats and safety boots were required — and children could be nowhere near the site.

Friends of Dufferin Grove, having tangoed with the city for years, knew the drill. They rallied, set up a meeting with city officials — even baking homemade bread for the occasion — and spent last Tuesday evening squaring off against the bureaucracy.

On Wednesday morning, the tale of the toilet came to a close, with activists celebrating a victory.

For Donais, the toilet isn't merely a toilet but the apotheosis of community activism.

"It's a really big deal," the 37-year old magazine designer and mother of two said of the 10-square-metre cob structure. "It's a huge comment on how we build things today. Everybody can build it. It's not a contracting firm that does it. It's not professionals that do it. It's actually the people who are actually going to use it."

But like so many ventures in this award-winning park, oft-compared to a community centre without walls, the project soon found itself mired in bureaucracy — and fenced in by order of the city.

So last Tuesday, nearly 100 people gathered in the park clubhouse to try to keep the entire enterprise from swirling down the, well, toilet.

There was Donais, leading the charge to build it and backed by scores of Friends.

There was Adam Giambrone, the city councillor, who supports the project but had to grapple with the bureaucracy that threatened it.

And there was the aptly named Sandy Straw, the Parks, Forestry and Recreation department manager who has the unenviable task of enforcing building codes, policy and legislation.

"I think what we were butting up against was the whole notion of total community engagement, regardless of the existing rules and regulations that are set up through Occupational Health and Safety policies and procedures," Straw

said later.

"A lot of this particular group really likes to do things the old-fashioned way — that whole community engagement, everybody part of the team. Often, that philosophy butts up against those big towers at city hall."

The toilet and surrounding cob seemed to fall under existing safety codes, meaning kids would not be allowed to muck around in the clay and straw to help erect the structure.

According to building code, construction hats and safety boots would be mandatory — and the Modu-Loc fence would stay up throughout the project.

But the whole point, argued Friends of Dufferin Grove, was never about the end, but the process — a community sculpting its own space.

"It won't get built if the kids aren't allowed," vowed a frustrated Jutta Mason, standing outside the meeting. "We just won't do it. The whole idea is what happens when a community builds with very simple, natural materials. The building code says you can't build with simple, natural materials. We don't recognize that."

That defiant visionary spirit has been Dufferin Grove's guiding light for more than a decade. And it has invariably led to one wall after another. Not only is Mason a recipient of the prestigious Jane Jacobs Prize for her revitalizing efforts, but the park itself has been recognized as a beacon of green space on the international scene. Yet Dufferin Grove seems to battle the city at every turn.

"I was really hoping somebody would write a song called the `Bylaw Blues,'" Mason said, a tall glass of water and lemon in hand.

`I think what we were butting up against was the whole notion of total community engagement'

Sandy Straw, Department

of Parks, Forestry and Recreation

A few years ago, when the park began hosting a weekly farmer's market, an anonymous complaint found its way to city hall.

"So then, the bylaw officer came out and told the farmers they were all going to get $105 tickets for being at the market," Mason recalled.

But that soon passed, and today the Dufferin Grove farmer's market is a bustling affair on Thursday afternoons.

Then, there was the Great Zamboni Crisis of 2003.

The city said the Friends had to clear out the part of the rink house where the Zambonis were kept. No cohabitating with Zambonis.

So, some large puppets, as well as the tables, chairs and ovens essential for the park's Friday community suppers, had to go.

"That was definitely our biggest crisis," Mason recalls.

But a funny thing happened on the way to silencing a park.

"We asked them to go through the regulations. That took some months .... And it turned out it was not against the regulations. It was really amazing."

Crisis averted. Cue the next one.

"The city has a corporate model that's designed to administer roughly 1,450 odd parks," Giambrone said last week.

"It does it fairly well. But when it comes down to something that doesn't fit the pattern, that's when big

organizations, big systems, throw up their hands and go, `Don't know quite how to deal with this.'"

"If the city planners look under `C' in their procedure manual," summed up Henrik Bechmann, webmaster for the Friends of Dufferin Grove Park site. "They don't find `cob.'"

The toilet meeting had all the usual elements — a dash of policy threatening to hamstring the project, as well as an anonymous complaint or two from the neighbourhood to draw the city's attention to it.

The complainants were no-shows, so Straw of Parks and Rec gamely fielded questions, accusations and angry outbursts from the crowd.

Even small children stood up to ask why they couldn't work on the project.

The meeting established that every side liked the idea. It was just those niggling legal details — or at least how they were being interpreted — that were the problem.

The next day, Donais and city-ordained architect Martin Liefhebber met at the project site.

He liked the project.

For Dufferin Grove, it would work like this: once the foundation is finished, the fences come down and the children can come in.

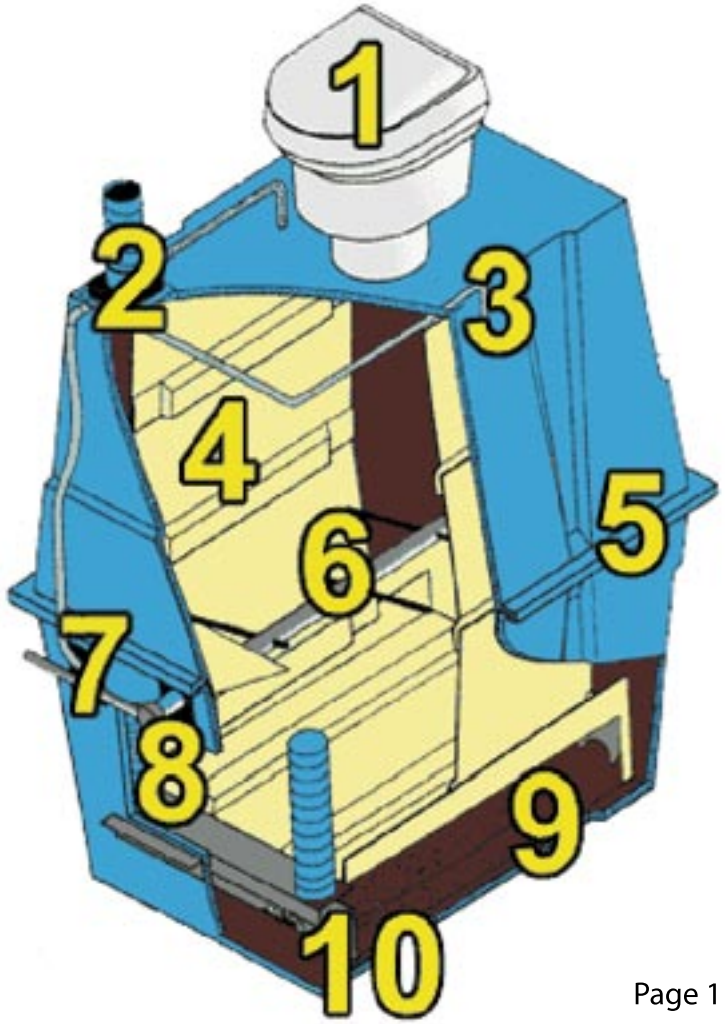
Then, when the "cobbing" begins, it's an art project everyone can take part in. The fence will go up again for a short stint while the roof is being built — and finally down again for the rest of the construction.

"Have you ever heard of people directly talking about things?" said a buoyant Mason after hearing the news. "Isn't that a fabulous invention?"

And so ended another tempest, this time, in a toilet.

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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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.

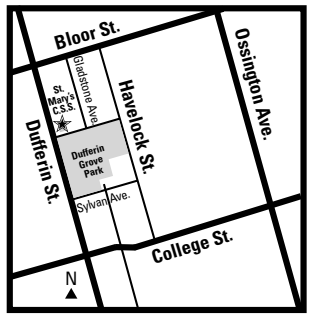
Date: Monday, November 8, 2010
Time: 7 to 8:30 p.m.
Location: St. Mary's Catholic Secondary School cafeteria, 66 Dufferin Park Ave.

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

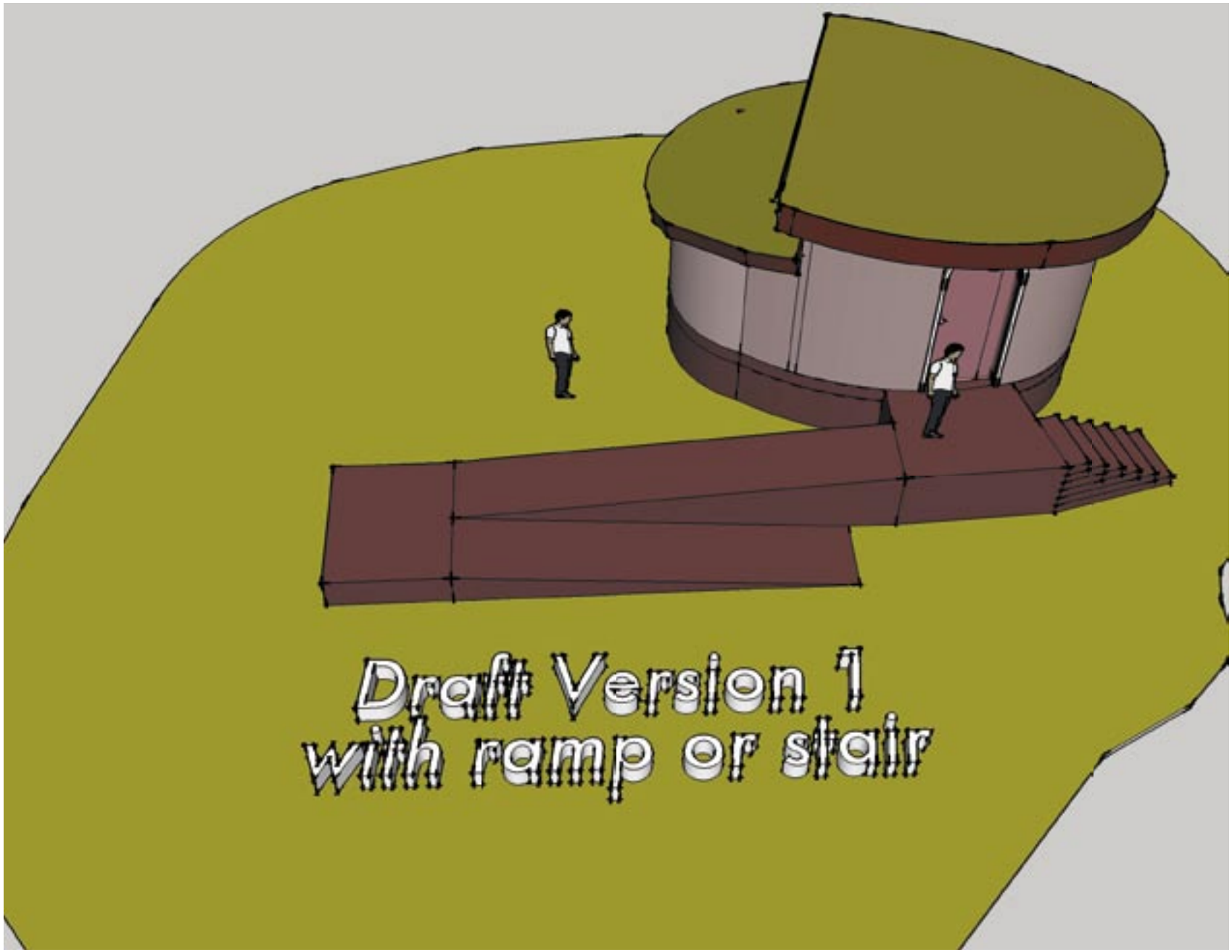
Date: Wednesday, December 1, 2010
Time: 7 to 8:30 p.m.
Location: St. Mary's Catholic Secondary School cafeteria, 66 Dufferin Park Ave.

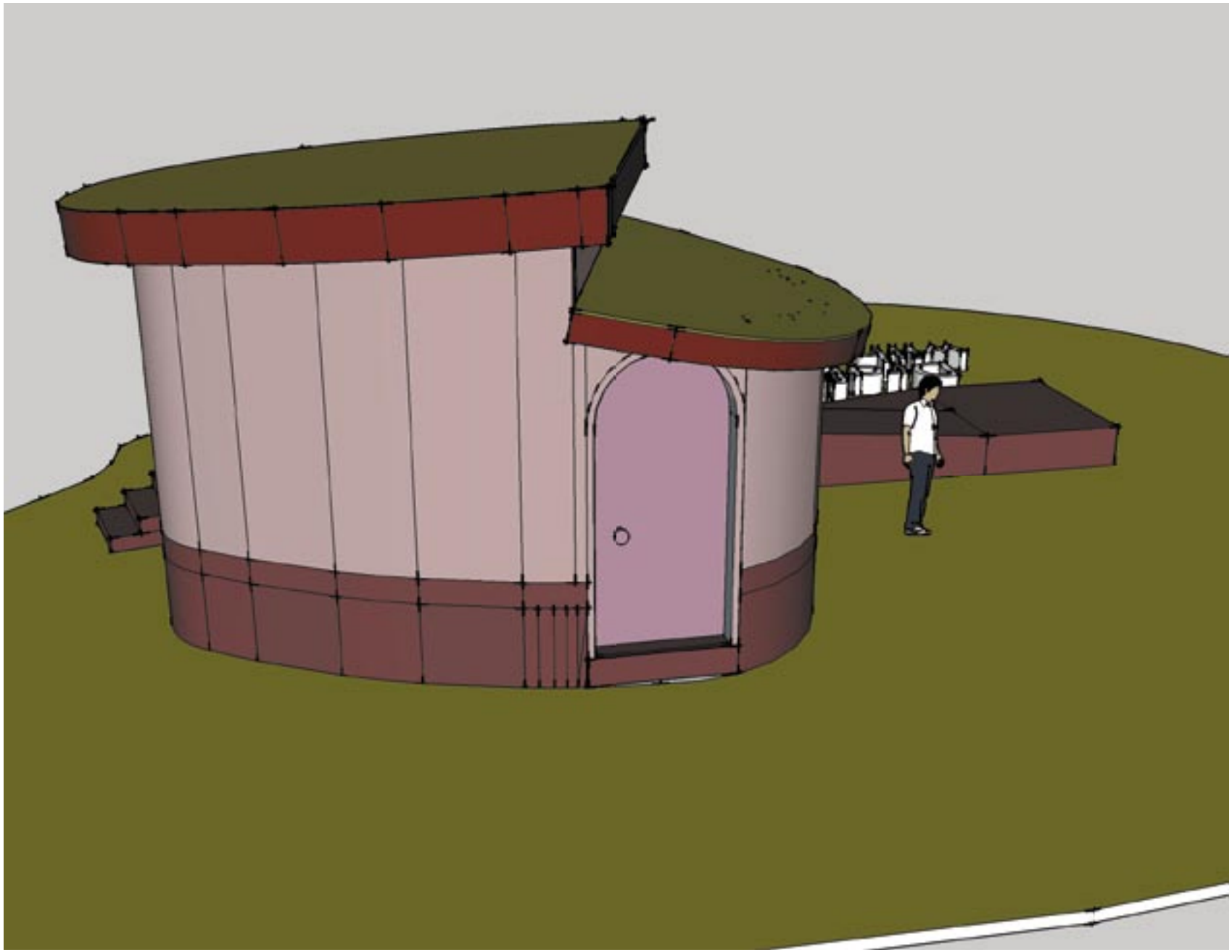
Interpretation services may be arranged with at least one week's notice in advance of the meeting date.

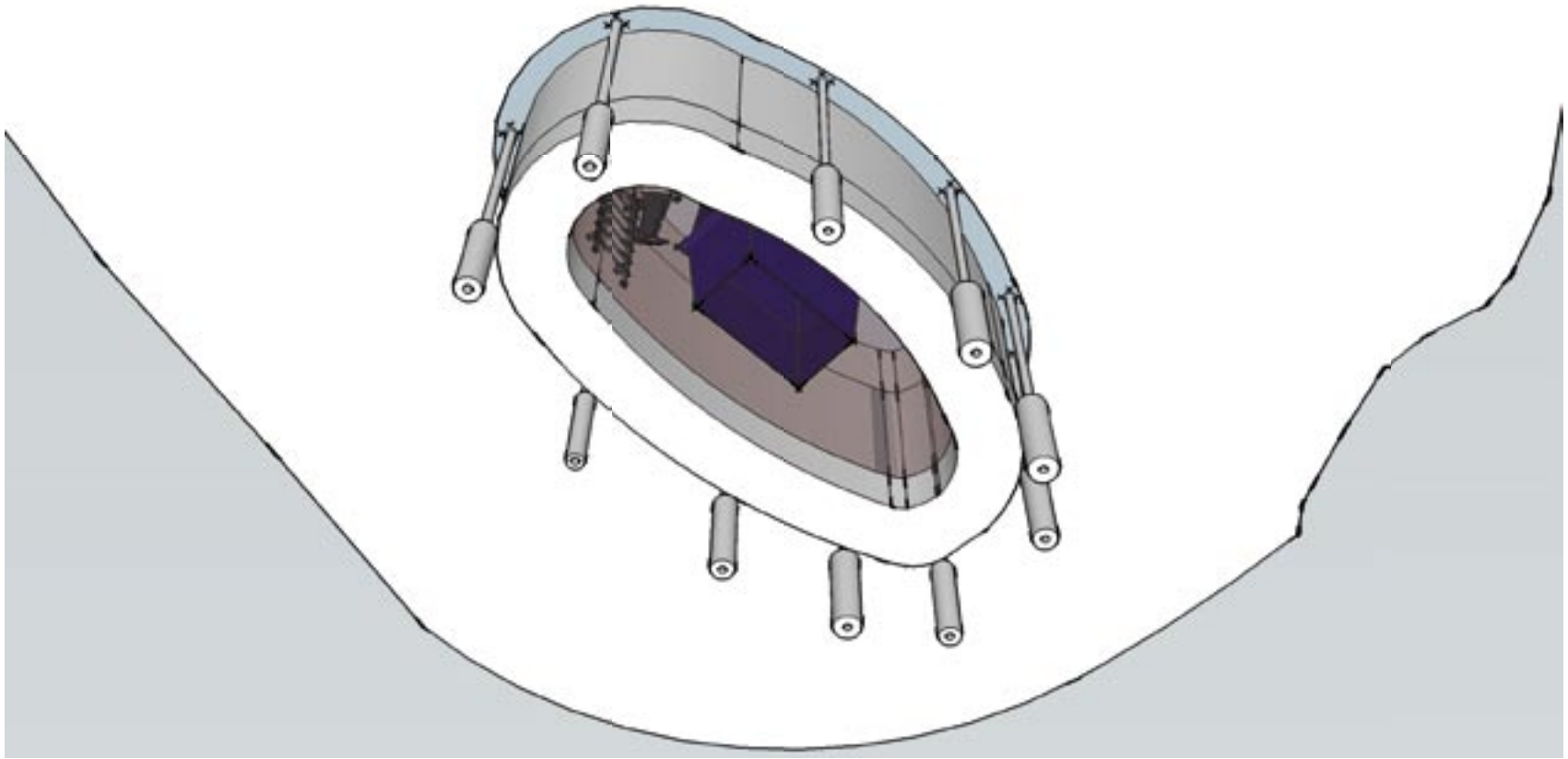
For more information please contact:
Peter Didiano, Supervisor of Capital Projects,
City of Toronto
416-392-8704,
pdidiano@toronto.ca

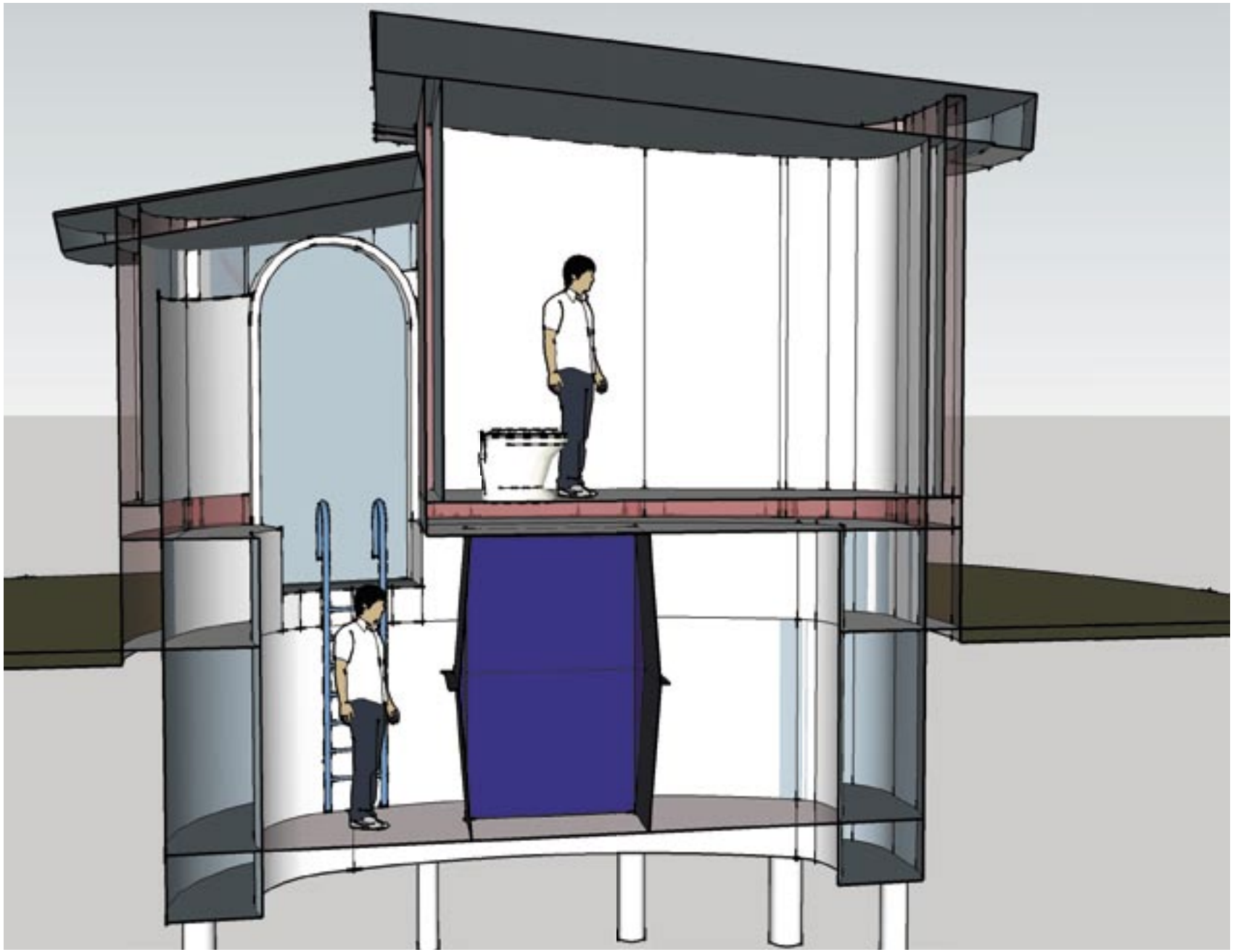


Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.


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.

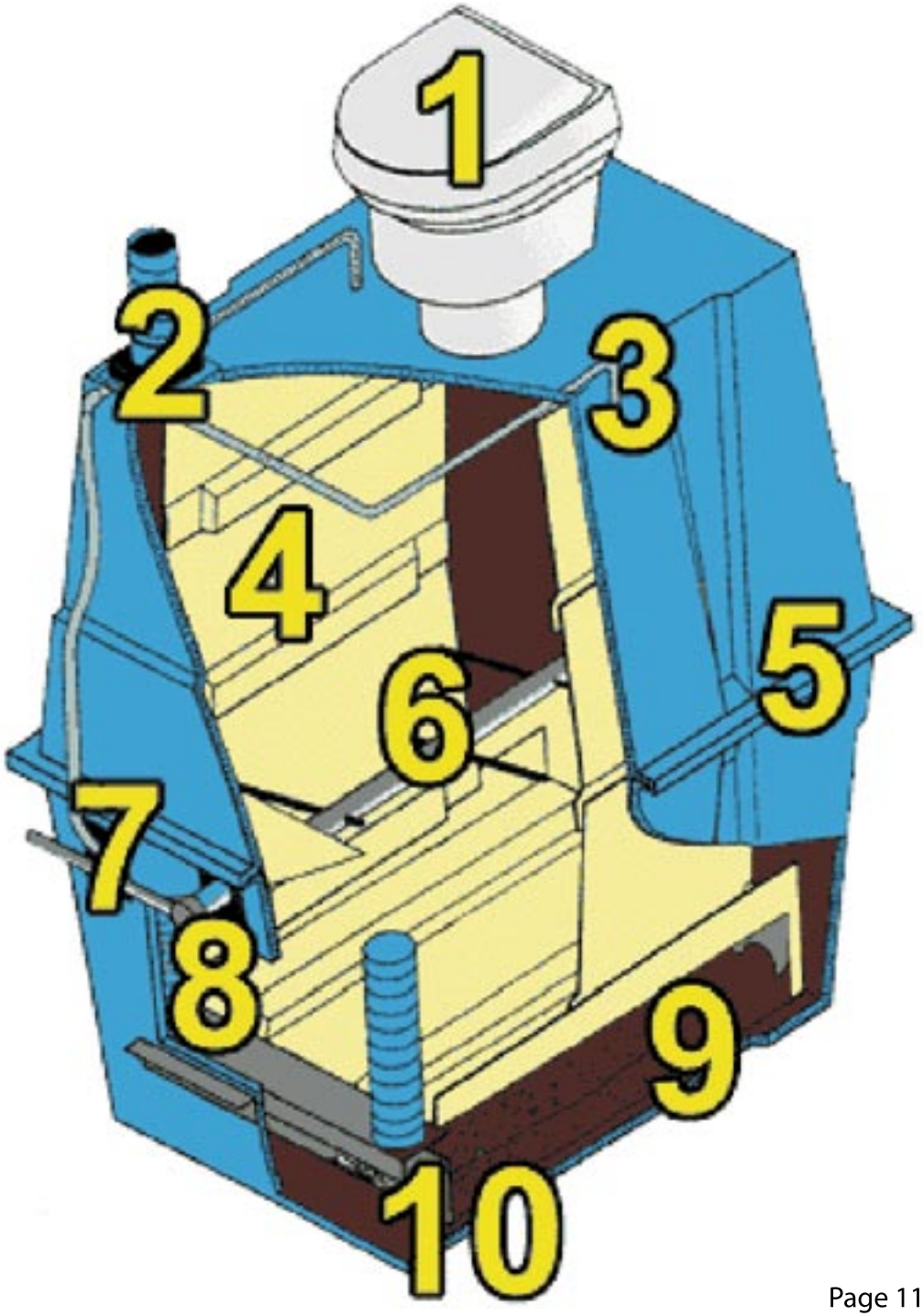
(6) Rotating tines control the downward movement of the material in the compost pile. The big Phoenix Model 201 has three tine shafts, each above the other. The Model 200 (shown) has two shafts, and the Cabin model has one. (For clarity, only one tine shaft is shown in this illustration.)

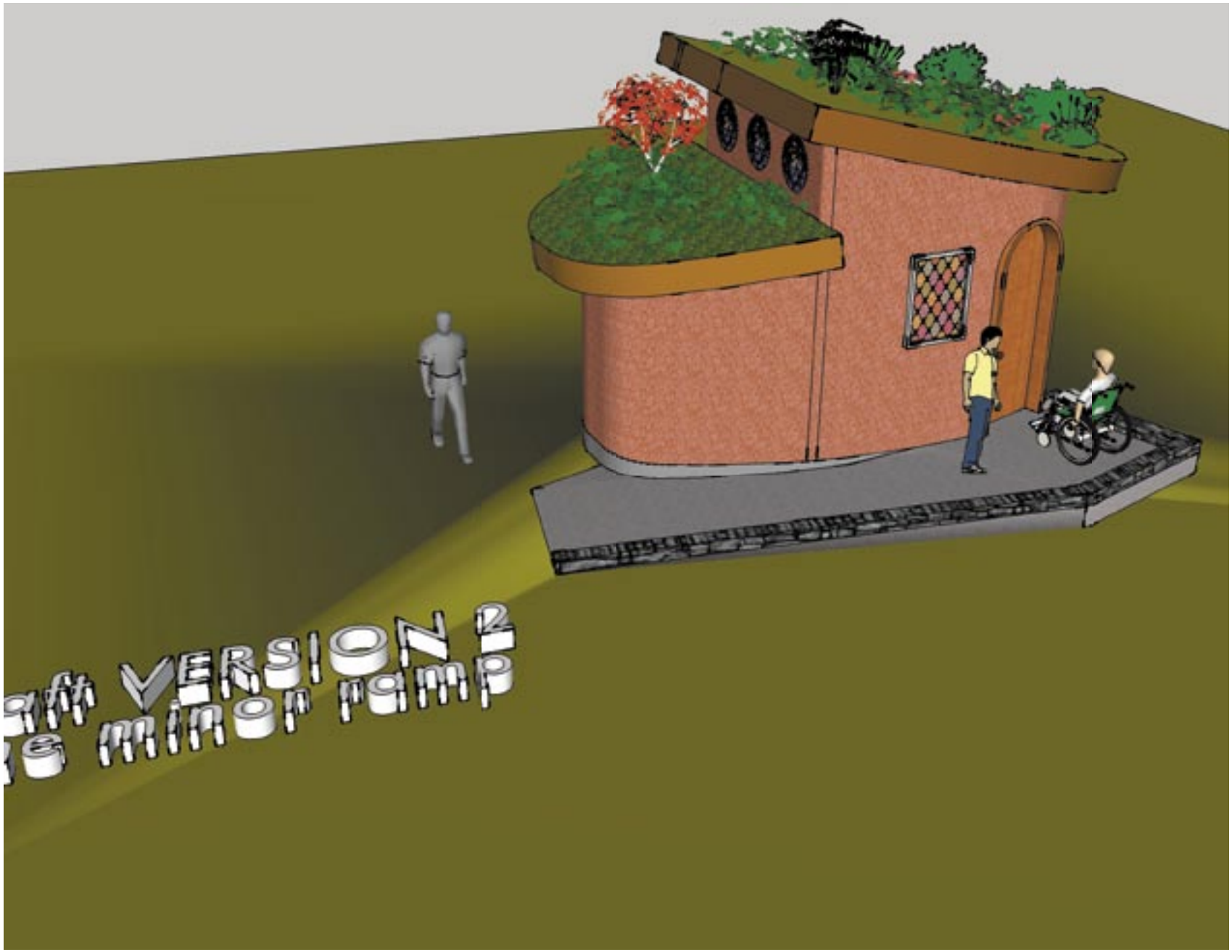
(7) Air enters the Phoenix through a screen inlet. A sealed path for ventilation air, and a large contact area, increase ventilation efficiency and allow supplemental heating.

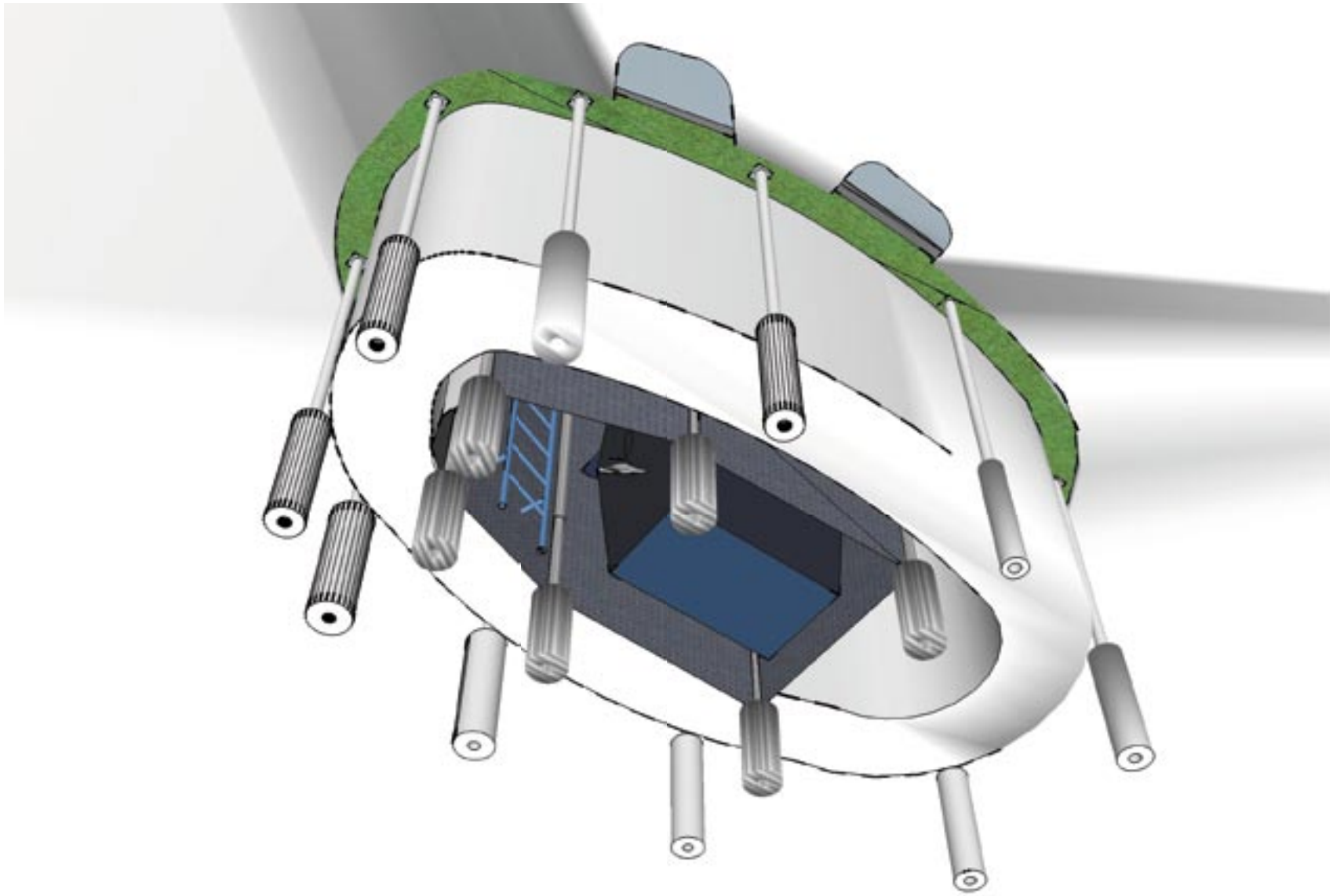
(8) Finished compost is removed easily through the lower access door from the entire bottom of the Phoenix assuring maximum and uniform retention time.

(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



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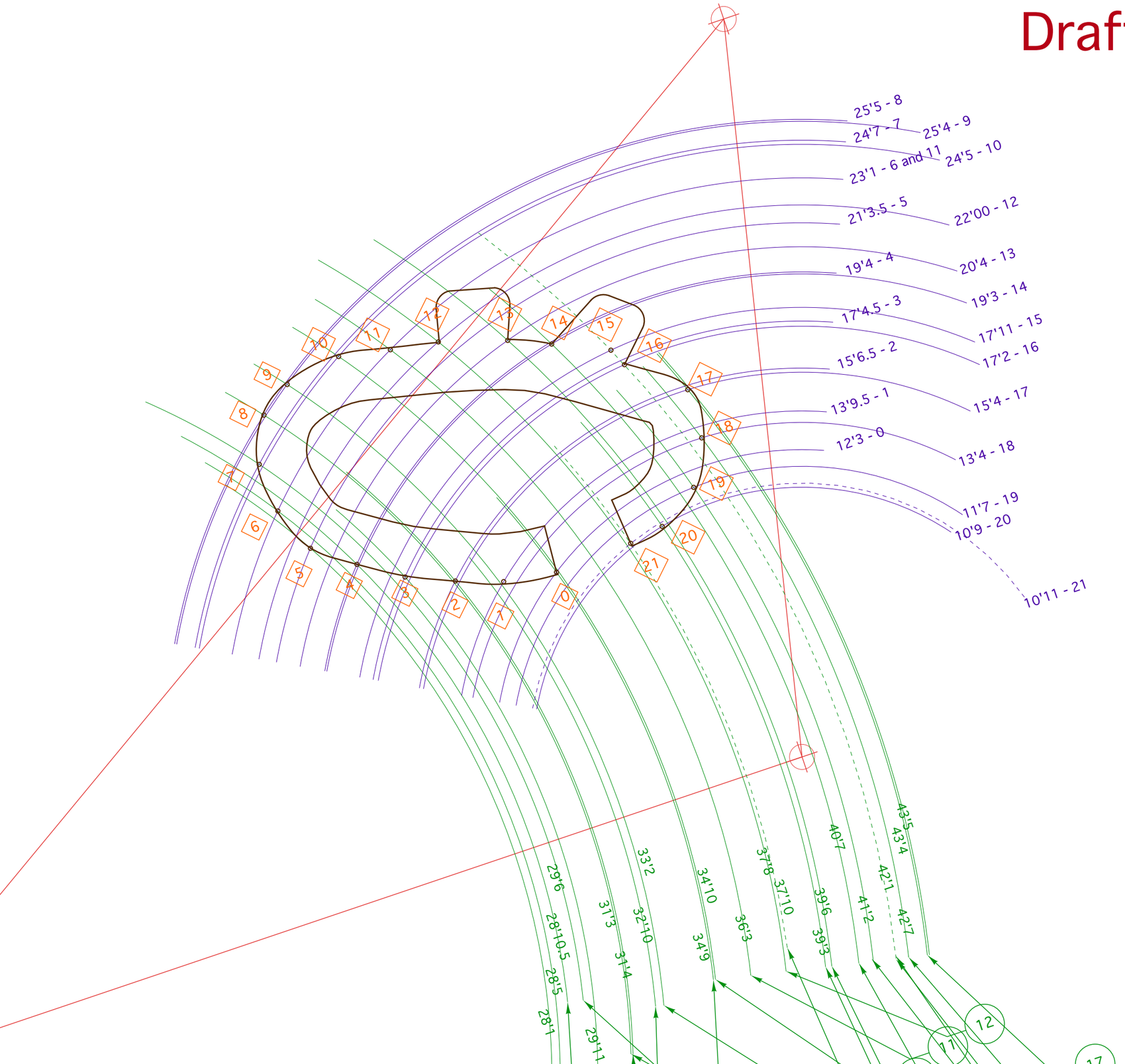


1
E-0

Earth Bag Plan Verification

SCALE: 1/4" = 1'-0"

SPACES
BY
ROHAN Inc.

PRINCIPAL DESIGNER:
ROHAN WALTERS
B.ARCH., B.E.S.
1292 COLLEGE STREET
TORONTO, CANADA
M6H 1C4
PHONE: (416) 532-5483
PAGER: (416) 858-3935

DRAWN BY:
rw

DATE:
Nov. 23/10

SCALE:
As Indicated

ADDRESS:
Dufferin
BioToilet

Drawing Title:
Existing
Outline
if earth bags

Drawing No.
E-0

Draft: not for construction.
for discussion and pre-costing

Existing
12" Ø Tree Trunk

7'-10 ½" D
Tree protection Zone

Green Roof

23'-0"

5'-6"

Flat Portion of
Walkway

Walkway 1:20 Slope

6'-7"

Green Roof

Ø60"

Wood
Chip
Container

4'-5"

31'-11"

70 feet Electrical line 20 amp @ 36" deep to be confirmed
contractor to provide 1"Ø conduit and trench

Dashed Line incicates
Safe Zone for Leaching Field
or Septic Bed or French Drain

32'-0"

13'-6"

Building Face Below

7'-10 ½" D

Existing
12" Ø Tree Trunk
Tree protection Zone

11'-1"

Dashed Line incicates
Safe Zone for Leaching Field
or Septic Bed or French Drain

33'-3"

Existing
6"x6" sign post
used as a reference
anchor

Walking Path Existing

1
P-1

BioToilet Immediate Area

SCALE: 1/4" = 1'-0"
Combination Site Plan and Floor Image Below

SPACES
BY
ROHAN Inc.

PRINCIPAL DESIGNER:
ROHAN WALTERS
B.ARCH., B.E.S.
1292 COLLEGE STREET
TORONTO, CANADA
M6H 1C4
PHONE: (416) 532-5483
PAGER: (416) 858-3935

DRAWN BY:
rw

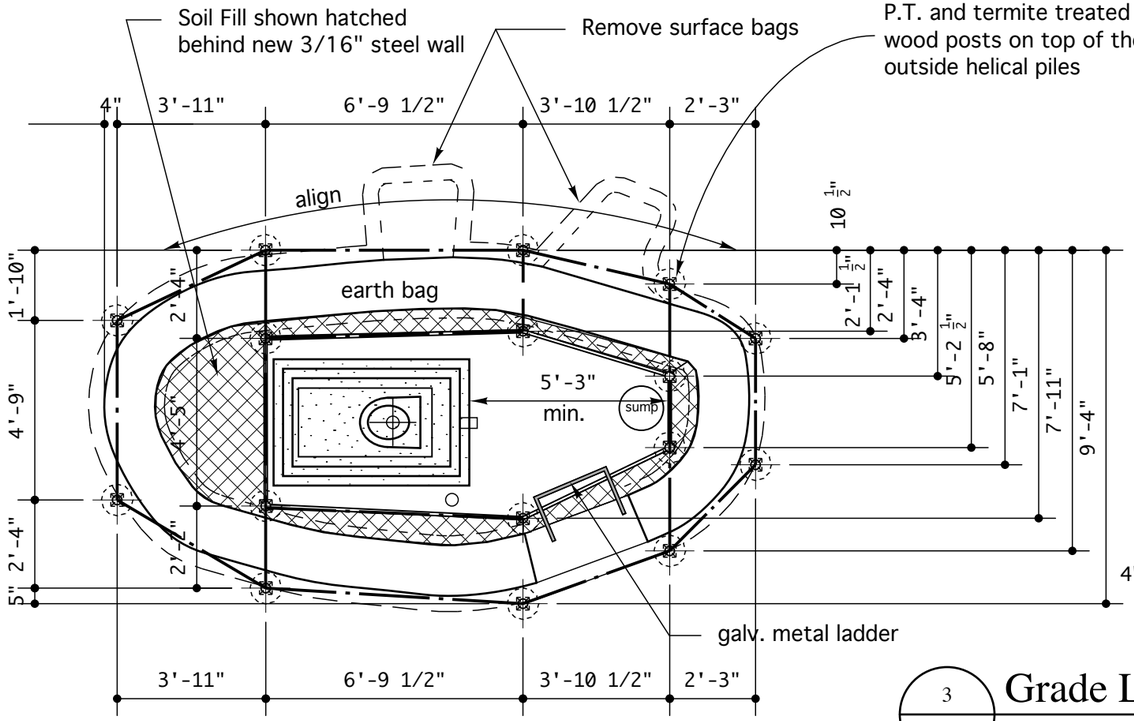
DATE:
Nov. 23/10

SCALE:
As Indicated

ADDRESS:
Dufferin
BioToilet

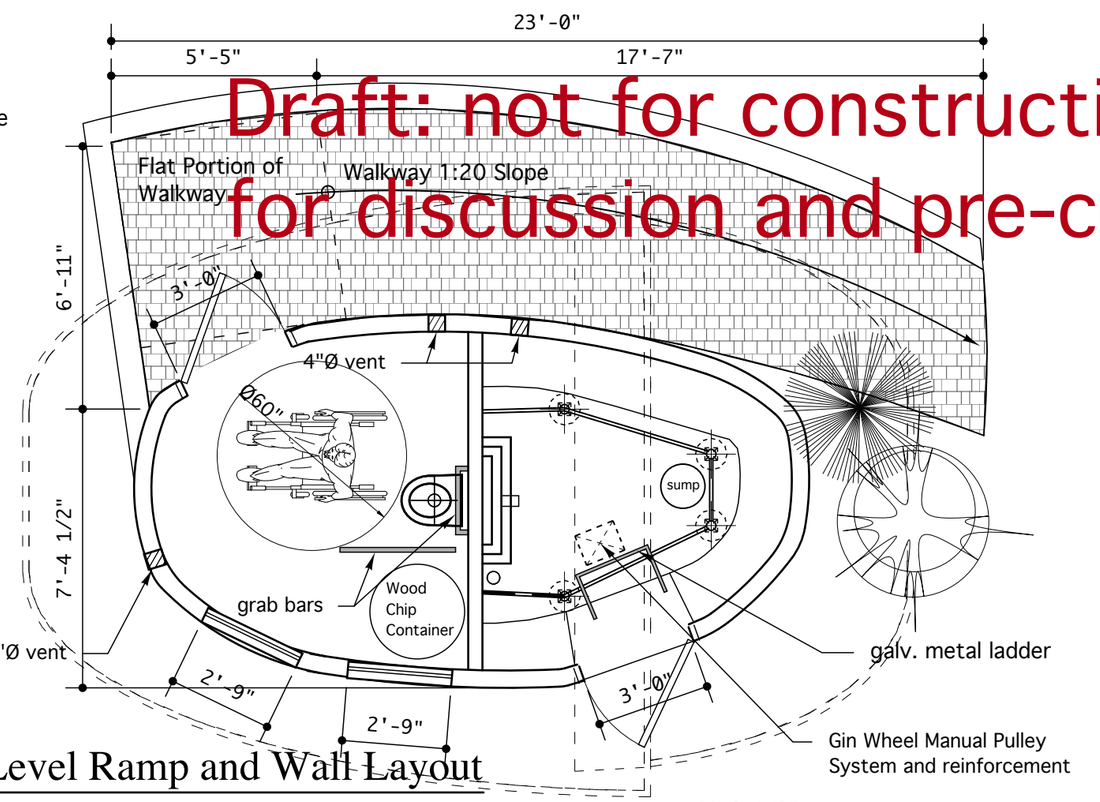
Drawing Title:
Biolet Draft
Plan

Drawing No.
P-1



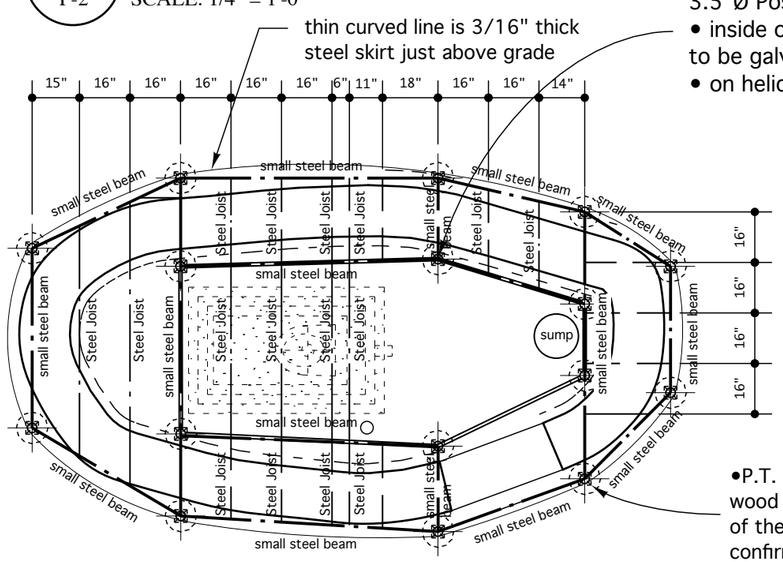
1 / P-2 **Footings, Foundation and Layout**

SCALE: 1/4" = 1'-0"



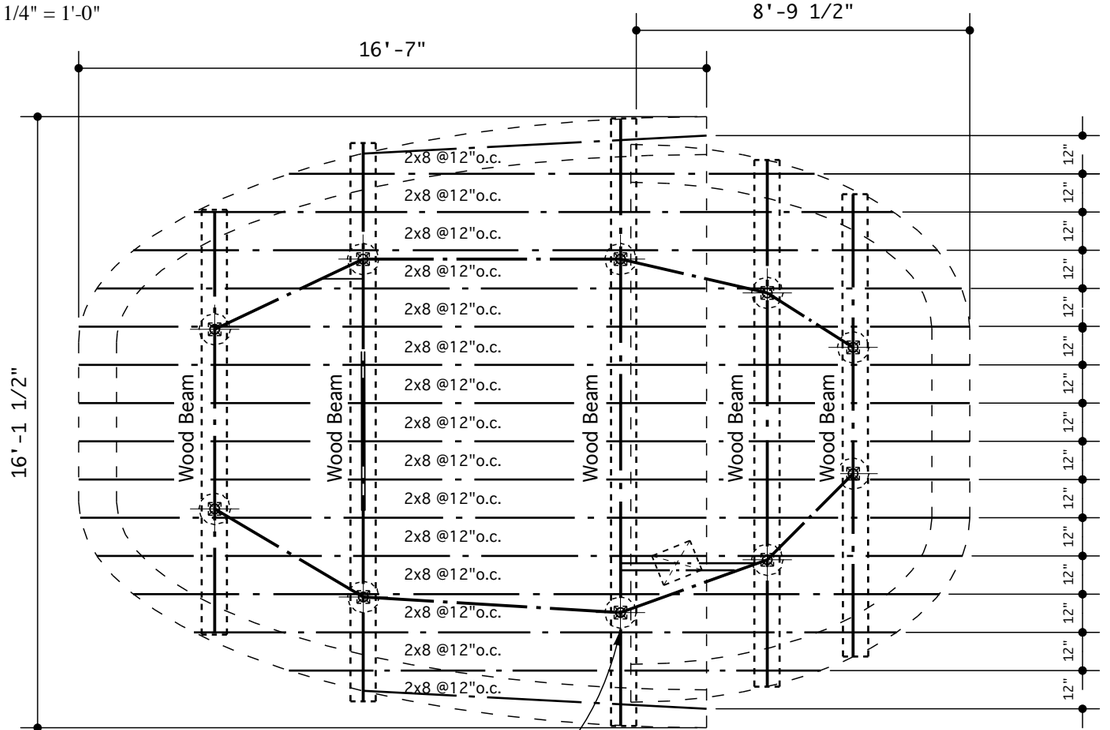
3 / P-2 **Grade Level Ramp and Wall Layout**

SCALE: 1/4" = 1'-0"



2 / P-2 **Floor Beams and Joists Layot**

SCALE: 1/4" = 1'-0"



4 / P-2 **Roof Structure Layout**

SCALE: 1/4" = 1'-0"

•P.T. and termite treated wood posts on the outside of the pit (to be engineer confirmed) or 3.5" steel posts

SPACES BY ROHAN Inc.

PRINCIPAL DESIGNER:
ROHAN WALTERS
B.ARCH., B.E.S.
1292 COLLEGE STREET
TORONTO, CANADA
M6H 1C4
PHONE: (416) 532-5483
PAGER: (416) 858-3935

DRAWN BY: rw

DATE: Nov. 23/10

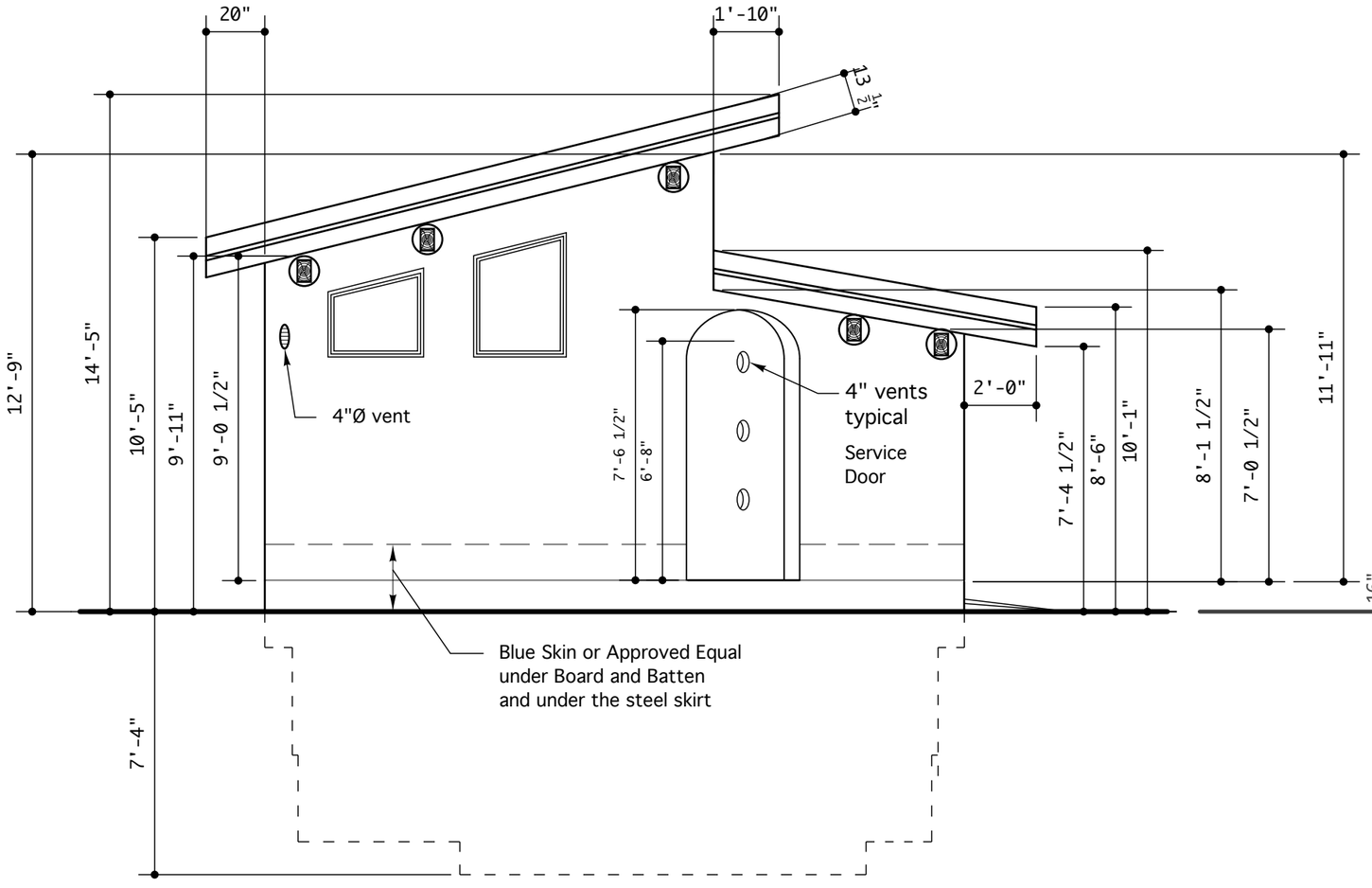
SCALE: As Indicated

ADDRESS:

Drawing Title: BioToilet Plans

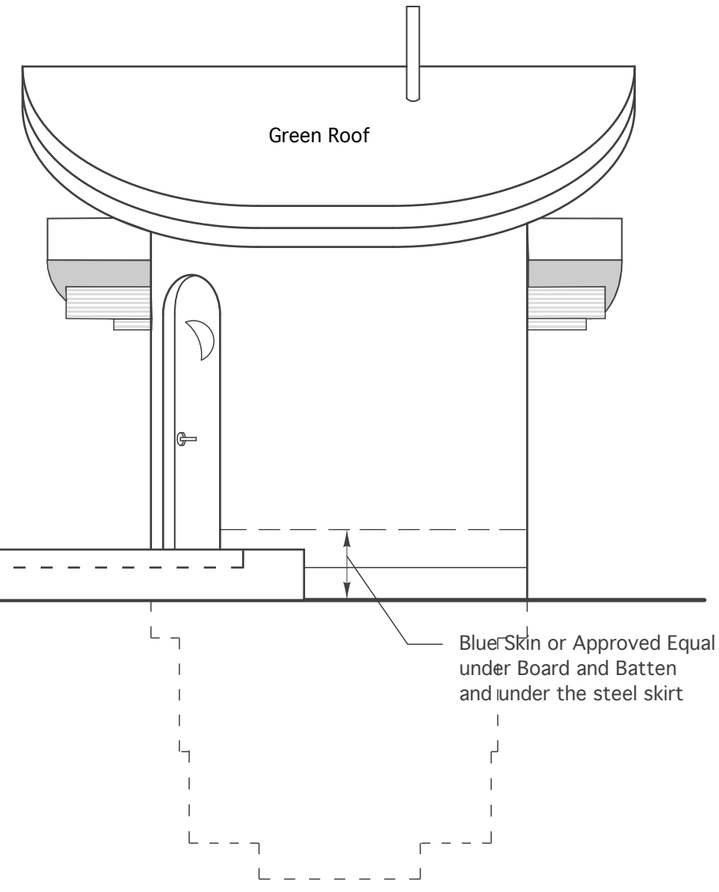
Drawing No. P-2

Draft: not for construction.
for discussion and pre-costing



1 P-3 West Elevation

SCALE: 1/4" = 1'-0"



2 P-3 North Elevation

SCALE: 1/4" = 1'-0"

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ROHAN WALTERS
B.ARCH., B.E.S.
1292 COLLEGE STREET
TORONTO, CANADA
M6H 1C4
PHONE: (416) 532-5483
PAGER: (416) 858-3935

DRAWN BY:
rw

DATE:
Nov. 23/10

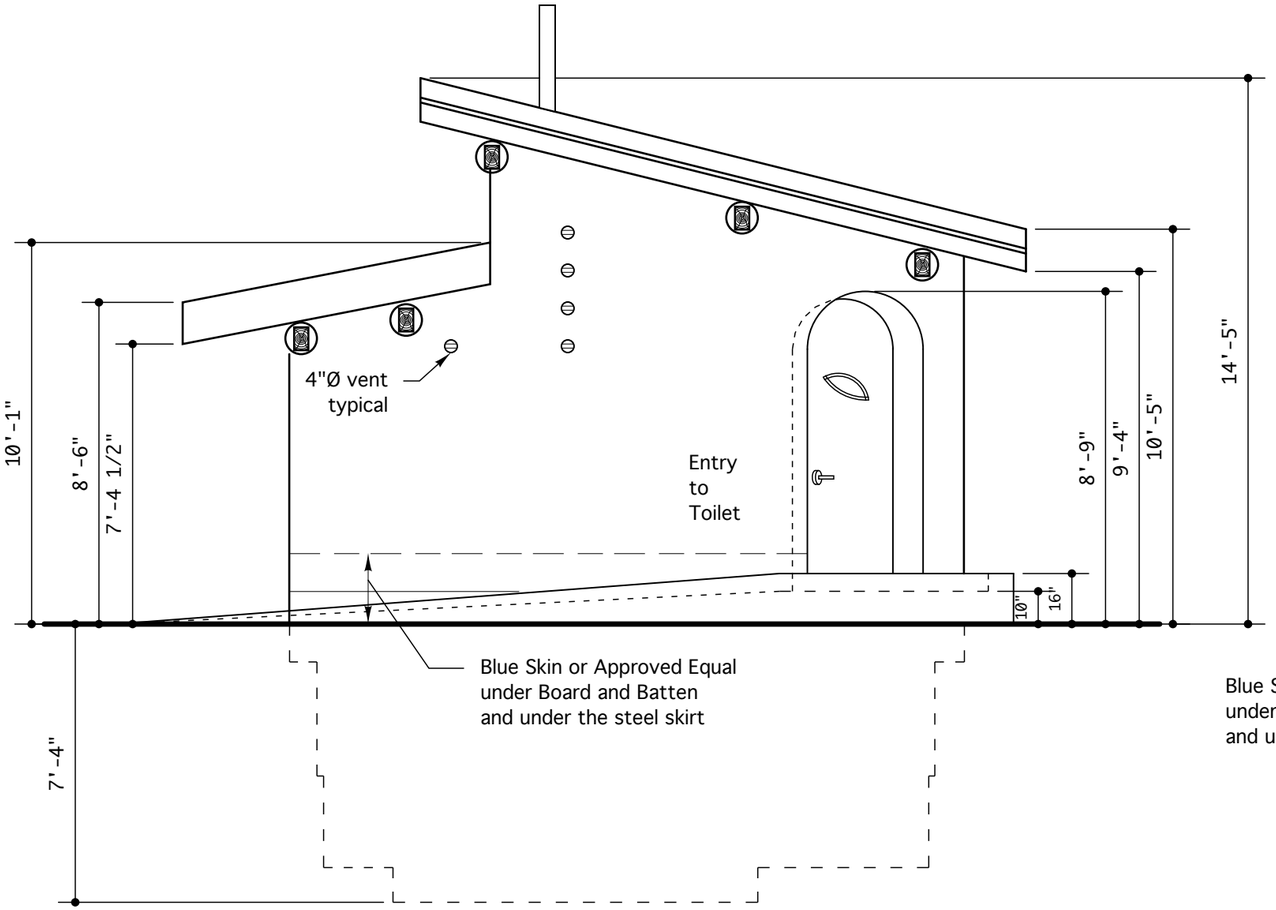
SCALE:
As Indicated

ADDRESS:

Drawing Title:
Biolet
Elevations

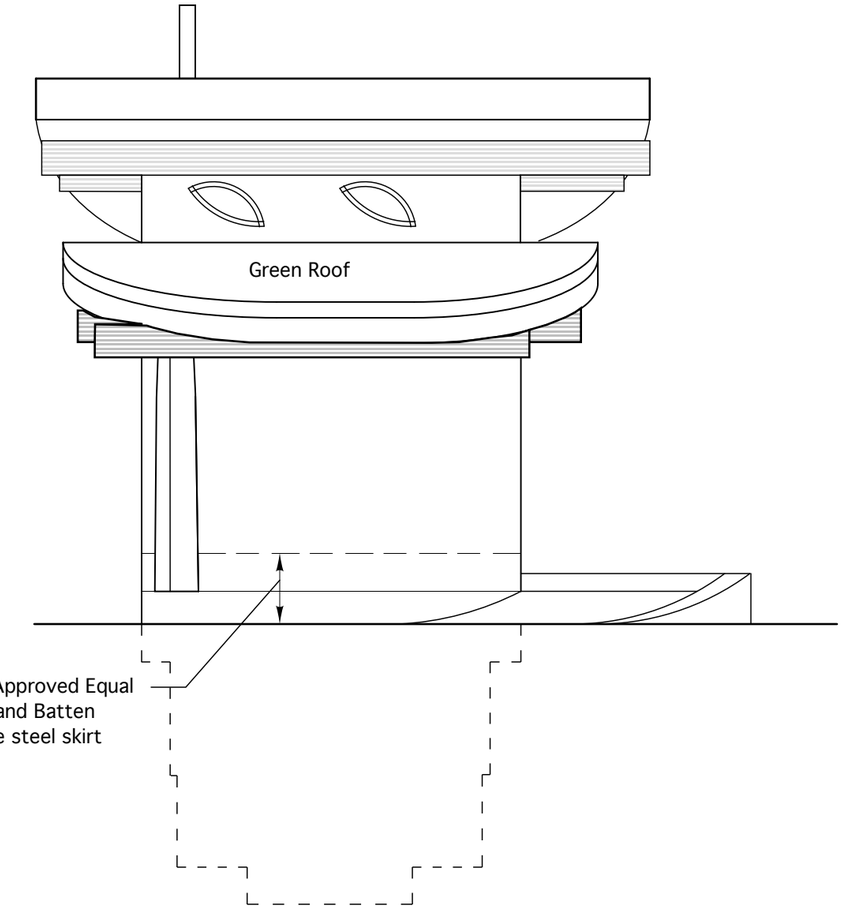
Drawing No.
P-3

Draft: not for construction.
for discussion and pre-costing



1 / P-4 East Elevation

SCALE: 1/4" = 1'-0"



2 / P-4 South Elevation

SCALE: 1/4" = 1'-0"

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BY
ROHAN Inc.

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B.ARCH., B.E.S.
1292 COLLEGE STREET
TORONTO, CANADA
M6H 1C4
PHONE: (416) 532-5483
PAGER: (416) 858-3935

DRAWN BY:
rw

DATE:
Nov. 23/10

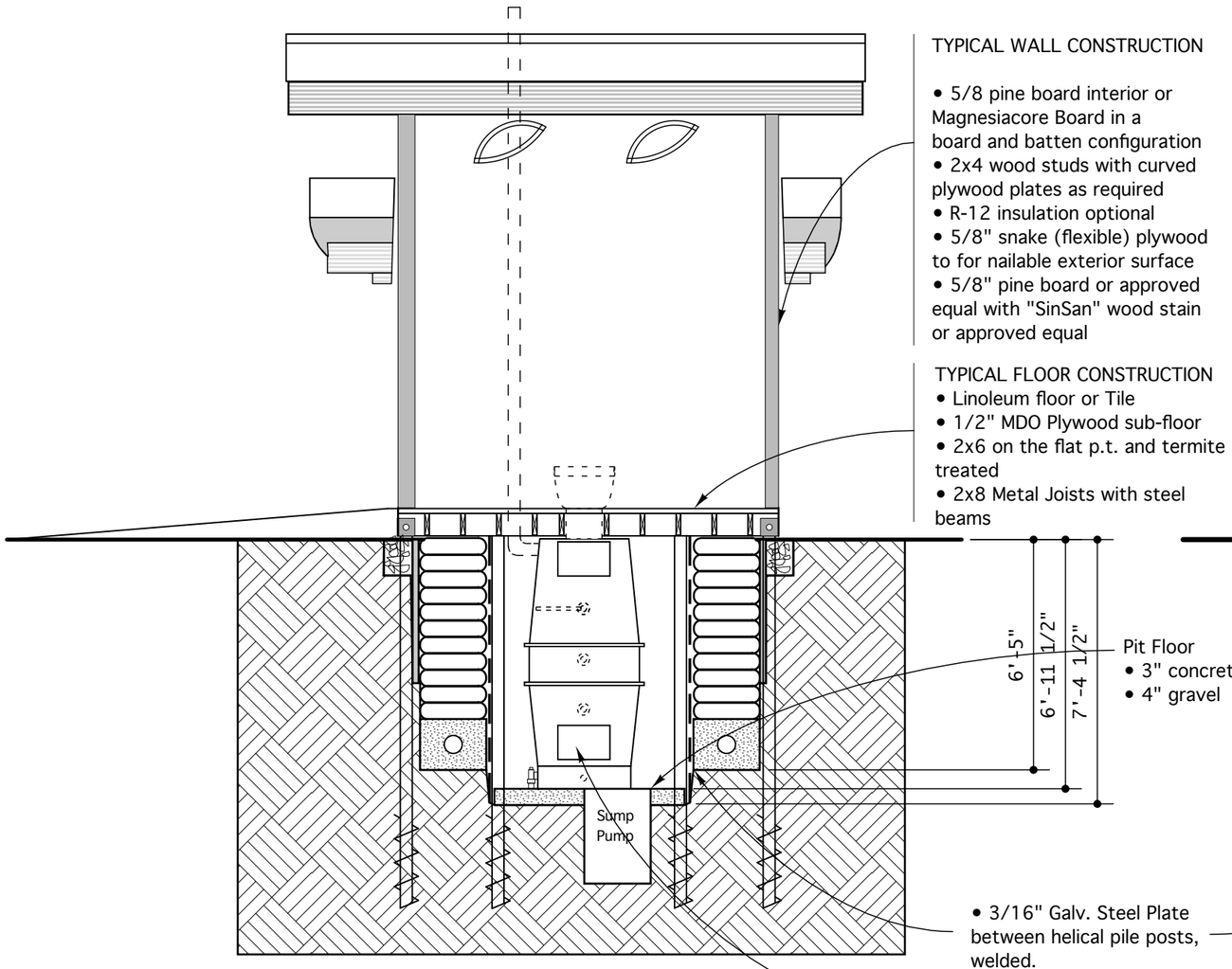
SCALE:
As Indicated

ADDRESS:

Drawing Title:
Biolet
Elevations

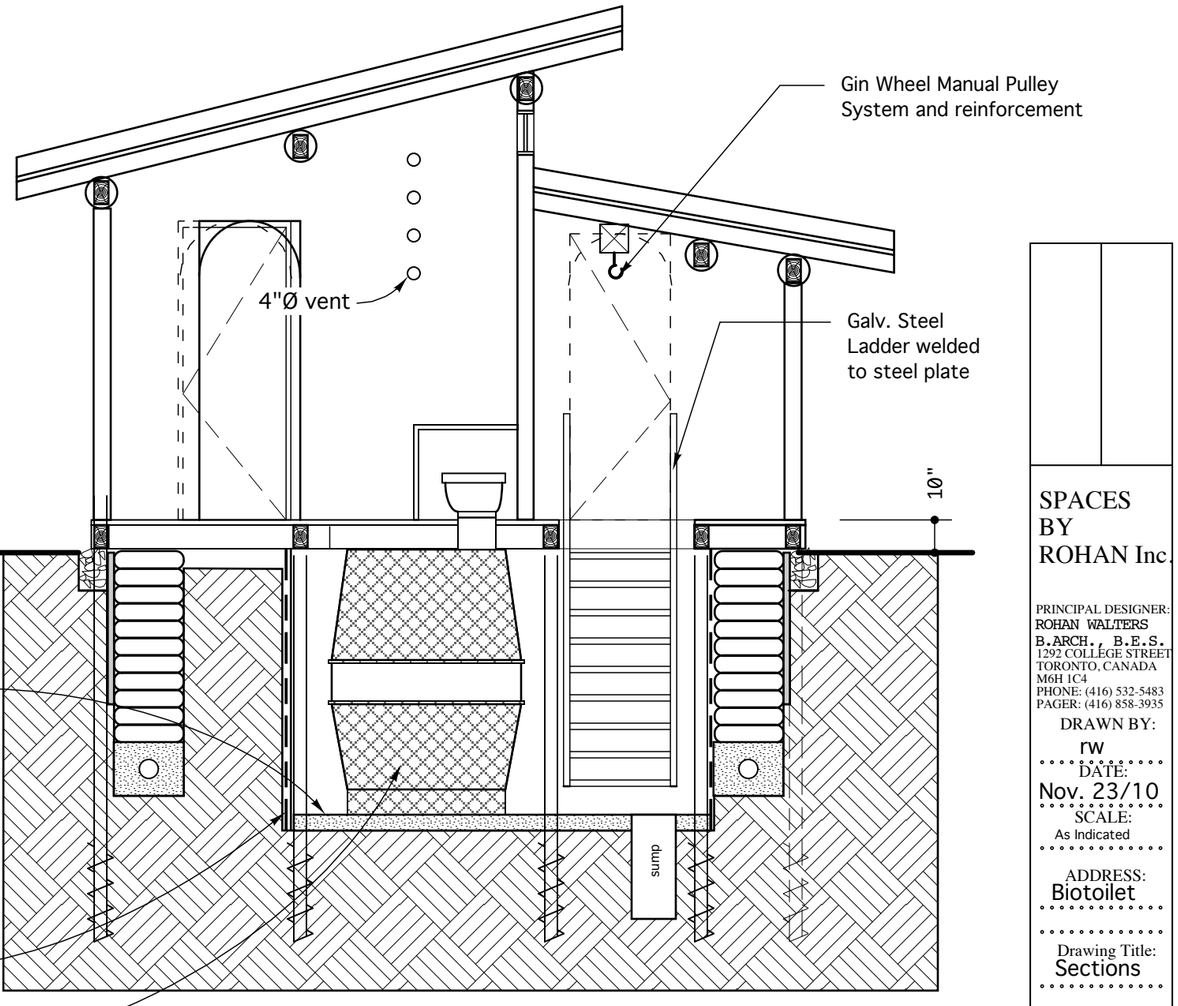
Drawing No.
P-4

Draft: not for construction.
for discussion and pre-costing



2 / P-5 Short Section

SCALE: 1/4" = 1'-0"



2 / P-5 Long Section - Composite

SCALE: 1/4" = 1'-0"

SPACES BY ROHAN Inc.

PRINCIPAL DESIGNER:
ROHAN WALTERS
B.ARCH., B.E.S.
1292 COLLEGE STREET
TORONTO, CANADA
M6H 1C4
PHONE: (416) 532-5483
PAGER: (416) 858-3935

DRAWN BY: rw

DATE: Nov. 23/10

SCALE: As Indicated

ADDRESS: Biotoilet

Drawing Title: Sections

Drawing No. P-5

Responses to study
Organized by date

Nov 30, 2010

Just wanted to confirm that we are indeed supporters of this exciting new and forward-looking green project, the bio-composting toilet, in our park. We have every confidence in the ability of the park community and park staff to realize and maintain such a project.

Name Withheld

07/12/2010
Letter to Peter Didiano
Cc: Brenda Patterson. Rohan Walters, Councillor Ana Bailao

Dear Ms Patterson:

On behalf of the Bloor-Dufferin Residents' Committee Ltd. (BDRC) I am writing to you to request your assistance in ensuring that our residential community has adequate time to understand the proposals put forward in the preliminary feasibility study presented to the community on December 1,2010 and to comment within a reasonable time frame.

Many residents surrounding the park did not receive notices of the meeting. As a result, my group distributed a flyer to residents around the park informing them of the meeting.

At the meeting no printed material was handed out explaining the proposals arising out of the study. Several important issues were raised at that meeting which were not addressed and several important questions were asked which had no adequate response.

On December 4,2010 I received an email from the design consultant, Rohan Walters, addressed to "Name Withheld and all: stating that the "cutoff date" for commenting on the proposed feasibility study will be Friday December 10 at 9 a.m. As well. he stated that "Name Withheld and all" were expected to distribute his email to "those in attendance at the public meeting: i.e. we were to be responsible for informing residents of the "cut-off date" and the details of the format that he has proposed for submissions.

Clearly informing residents who attended the meeting of conditions regarding the timing of submissions to the City is the City's responsibility. not ours. The City has a list of people attending the meeting. We do not. Also, the deadline of December 1 O. 6 days following our notification of the cut-off date provides insufficient time for community residents to comment on the proposals. No printed information was distributed at the meeting for residents to comment on.

On December 6 neighbourhood resident Name Withheld asked for copies of the presenters' notes and received a response from Mr. Walters directing her to a "CELOS website" for these presentations. So now the proposed ·cut-off date" is 4 days away from the date on which the presenters' notes are made available to her and subsequently to me and not, I presume. to anyone else at the meeting.

Why were these notes posted only on the CELOS website? How could residents unaware of the connection between CELOS and the Friends of Dufferin Grove Park and the CELOS site ever find information? Why can details of the study and the presenters' comments not be found on the City's website where they belong?

The timeframes proposed by Mr. Walters for comments are unacceptable. The issue is a complex one and after a hiatus of four years, needs more time for discussion. The BDRC took on the responsibility of thoroughly researching the issue of the compost toilet four years ago, raising many questions which have never been properly addressed. We continue to take responsibility for again raising serious issues in the light of the revived proposal arid continue to be optimistic that an intelligent discussion could possibly take place respecting these concerns.

In the meantime, we would request that the timeframe for comments on the proposals be extended to the second week in January, given the oncoming Christmas season, the lack of notice about a cut-off date to area residents and the lack of information on the City's website.

Thank you for your consideration.

Name Withheld
President, Bloor-Dufferin Residents' Committee Ltd.

12/12/2010

please note that I fully support the construction of the Compost Toilet at Dufferin Grove Park. it has been delayed long enough. time to get the shovels in the ground and get the thing built and operational.

Name Withheld

12/12/2010

I received a pamphlet asking for my support for the group that opposes the composting toilet, and asking me to contact you about this. I would like to say that I fully support the toilet. The arguments presented on the pamphlet are deceptive and short-sighted and do not represent me as a constituent.

Dufferin Grove is equipped with toilets, indeed, as the pamphlet points out--but they are far across the field from the playground. As a mom with young children, I have many times had to rush my daughter all the way over there when she "really had to go." Anyone who's been in that situation knows how onerous that is, and how it can ruin an otherwise serene evening in the outdoors.

Playing in the playground was a big part of my daughter's growing up, and continues to be a big part of my younger daughter's childhood as she in her furn matures. I cannot say how strongly I feel that the pamphlet I received DOES NOT REPRESENT MY INTERESTS. Having an accessible, NEARBY, eco-friendly toilet would be a huge improvement in what is already a wonderful park.

May I point out what people who wrote the pamphlet may not want to face: kids who can't make it to the existing toilet do PEE ON THE TREES, Which is not good for the trees and not good for hygiene conditions in the park as a whole. This happens with more regularity than the people who wrote the pamphlet may realize. The existing toilets are also NOT ADEQUATE for the amount of usage the park gets in the summer months (if you've ever tried using them at the end of a summer day, you'll know there is never any toilet paper left, and things like paper towels and soap are hit or miss at the best of times). Having the composting toilet would be a tremendous boon. May I also point o.ut that there are knowledgeable, involved people around who know about composting toilets and would be able to lend their expertise to ensure that disasters such

as those described in the pamphlet do not happen.

Finally, the ONLY group that has done anything to solve the toilet problem at Dufferin Grove (and it is a problem,. believe me, and if you are a parent you know it is too), the only group has been the group who pioneered the composting toilet. The naysayers are not offering any solutions.

This is not the pleasantest topic to have to get into, but there are my views. I support the composting toilet, and you should know that there are many of us out here who do support it.

Name Withheld

13/12/2010

Proposed Amendments to the Dec. 1 Public Meeting Minutes
Attachments: Proposed Amendments to the Dec. 1 (included in Appendix)
On December 7, 2010 I requested a copy of the minutes from the December 1 st public meeting on the Dufferin Grove Compost Toilet Feasibility Study. I was eager to review the notes as ~ was preparing a response to the toilet project proposal.

When the minutes arrived the following day I discovered they were incomplete and lacking in important details.

Therefore I am submitting to you proposed amendments to the December 1, 2010 meeting minutes in order to include the many questions and comments raised by residents in attendance.

I submit this information to you for two reasons. First, it is important that the opinions of community members go on the record. Second, the minutes of the meeting were supposed to provide information to the feasibility study team. How can the study team respond effectively to concerns based on cursory notes that don1 t capture the complexity of the issue or the community's reaction to it?

I have attached the following for your review and consideration: the proposed amendments, the December 1,2010 meeting notes, and the November 8, 2010 meeting notes.

At the November 8th meeting, sentiment was in favour of the project. The meeting minutes were thorough, fairly and accurately representing the comments that were made. The minutes were posted on the CELOS website as part of the body of material available on the toilet project. The public could access this information.

At the December 1,2010 meeting, the overwhelming sentiment was against the toilet project. The meeting minutes were presented as bullet points and failed to capture the level of concern and opposition to the toilet project. The minutes were not made available on the CELOS site. I had to request the information and it was sent to me as a Word document. It is in everyone1 s interest to ensure both sides in the compost toilet debate get equal consideration. I look forward to receiving a revised copy of the minutes, which includes important details missed in the original document.

Name Withheld

13/12/2010

Dear Councillor Bailao and Peter Didiano:

As a long time resident (30years) of Havelock Street I am writing to voice my concerns about the plan to install a composting toilet near the children's play area in the park.

I have concerns regarding the health aspects for young children playing nearyby created by such an installation when there are already exisiting washroom facilities available. My understanding is that the toilet would in fact only be able to function for a few months a year as temperature is a key factor in the composting process. For the remainder of the year the excess waste would have to be pumped from the toilet and dispersed in the soil. This would result in foul odours and an increase in flies and paraSites and ruin the neighbourhoods enjoyment of the park not to mention the health hazzards.

As a taxpayer I not only have concerns regarding the health aspects but I have concerns regarding the cost of installation and ongoing maintenance of such a facility when there is already an existing washroom in the park.

Having raised three children and escorted many neighbourhood children to the park over the years the facilities provided by existing public washrooms were and are perfectly adequate. I think the money would be better spent in improving the existing washroom.

Name Withheld

13/12/2010

Dear Councillor Bailao,

As a resident of Havelock St near the park and as one of its daily users I would like to register my strenuous opposition to the prospect of a compost toilet being installed. The potential problems of such a facility and the significant expense it would require make it a very bad choice for scarce resources. I hope you will do all you can to make sure that the park remains free of this unnecessary and potentially obnoxious facility.

Name Withheld

13/12/2010 10:18 PM
.
Subject:
Dufferin Grove Compost Toilet

Dear Ms Bailao and Mr Didiano,

I am writing to voice my concerns and protest event he consideration of building a compost toilet at Dufferin Grove Park.

I have heard all the arguments on both sides ofthe issue with an open mind and no one has been able to convince me that it is a worthwhile and practical idea.1 am strongly against the idea and will canvass against it at any opportunity I get.

I understand that at this stage, the city is only looking at the feasibility of having a compost toilet in the park and not going ahead with the project, and that funds are not currently available. Yet, at the last meeting I raised the question that if the study was to prove successful, would those in

favour of going ahead with the project be able to find funding other than that which is allocated from the city budget and everyone avoided the question and would not respond, even after I repeated my question three or four times. There is no need for a second washroom facility in the park of this dimension, especially one that is so controversial simply because a small group of people wish it so.

The park belongs to ALL residents in the area. Just because a certain group has taken over a city property does not make it theirs to with as they see fit. If it was private property, I could understand, but that park belongs to everyone. Simply by frequenting it, does not make it theirs. It is my park too.

This is a sensitive issue that splits the community with both parties feeling very strongly on both sides ofthe issue. It re-opens old wounds that are better left sealed if we are to continue to work together to build a better Toronto. This issue had been resolved years ago, so why is it being raised again? We thought it had been resolved.

The city handled the entire issue rather shamefully the first time round. And spectres of what was done previously are once again raising their ugly heads with meetings being held where residents are not dutifully informed and a whole slew of misinformation flying about.
This is your opportunity to handle it correctly, and the way it should be.

I AM AGAINST THE POSSIBILITY OR CONSIDERATION OF BUILDING A COMPOST TOILET IN DUFFERIN GROVE PARK.

Thank you for listening to my concerns.

Name Withheld

On 2010-12-14

Rohan,

I think you could make a pretty intuitive argument comparing it to a worst case scenario - one thing that strikes me is the fact that it's so far from the property line - if it's neighbours of the park that are opposed on the basis of odour, I really don't think they have much to worry about.

I've been in the park & seen where the composting toilet is to be, and I can't imagine an odour being able to reach to the edge of the park - it seems to me that if you were to dump a wheelbarrow of horse manure in that spot, it could stink up a few metres around it and probably cross the path to the playground, but there's no way it would reach the property line. And especially if you built walls and a fan ventilation system and put it into a composting system dug into the earth beneath the building, you'd be unlikely to have odours getting very far. But furthermore, we're not trying to deal with a load of horsemanure every day, we're just dealing with a few kids & parents going to the washroom.

I think if you use that as a comparative example, it should be pretty straightforward and intuitive for anyone regarding odour.

2. From the Now article in your presentation I saw that it will be "Toronto's first *outdoor* composting toilet" - the fact that there is a pre-existing one(s) that is *inside* a building is also a good argument that odours are not a huge problem - they wouldn't be using it long if it was stinking up the whole building.

Name Withheld

15/12/2010

Hello Ana and Peter,

As a local resident, I oppose construction of the compost toilet at the Dufferin Grove park and allocating any additional budget for feasibility studies, public discussions, etc. This subject has to be closed with no more taxpayers' money spent on it. It's been going on for too long and caused too much of controversy.
I do have several arguments to support this position that by far outweigh any benefits of such construction I am aware of. I can share my arguments if requested, but omit them from this message for the sake of brevity.

Thanks for taking my opinion into consideration.

Name Withheld

15/12/2010

Councillor :Ana Bailao
City Of Toronto : Peter Didiano

Please do not Destroy Dufferin Grove Park with a Compost Toilet. The city has provided 2 washrooms with running-water and sinks that is more than enough. This compost Toilet is for a selected few and not for all as a public park should be for everyone. In the past people have lobbied Adam Giambrone for the current "kitchen sinks" located near the proposed compost toilet an eye sore of a structure and was never needed. This compost toilet is not a necessity, do not destroy the park with a compost toilet or another eye-sore of a structure.

Name Withheld

14/12/2010

To Councillor Bailao:

I am writing to let you know about my concern about the proposed biotoilet in Dufferin Grove Park.

I live on Havelock St. across from the south end of the park. My husband and I are in the park 365 days a year with our dog. I feel that there was insufficient community consultation before the toilet was begun. The location of toilet may have contributed to the death of one of the most beautiful trees in the park which was located adjacent to the partially completed structure.
I am currently concerned about the long term level of maintenance needed for the toilet and the fact that it is not possible to control the kinds of materials that may be added to the toilet by some users. Also the park is built over the old Garrison Creek and I wonder about the leaching of the sewage into what remains of the Creek. It seems to me that the presence of a bio-toilet in a the middle of a relatively small urban park is quite different from one in a provincial or federal park.

I feel that the bio-toilet is not suitable for our park.

Name Withheld

14/12/2010

Dear Councillor Bailao and Mr. Pidiano

I am writing to express my support for the planned composting toilet in Dufferin Grove Park. I own and live ... across from the south-east entrance to the park and playground. My three children have grown up in the park, and we have watched the growth of the park community, and the building of cob structures in the park with enthusiasm.

The plan to complete the composting toilet project will serve the families who flock to the park in the summer. It will be economically and environmentally prudent. The project has been studied, and prepared with care, and the proposals for its building and maintenance are sound.

Furthermore, it will stand as an example for sustainable and beautiful community projects elsewhere.

I truly hope that this initiative will not be scuttled by a loud minority who have been in conflict with this plan from the beginning. Over the past four yearswe have received a steady stream of leaflets, full of contradictory mis-information, from the so-called Bloor-Dufferin Residents Committee. They do not represent my family or any community residents I talk to.

Thank you for your consideration, and I hope that both of you will serve the real community of Dufferin Grove and support the completion of the Composting Toilet.

Name Withheld

16/12/2010 10:06 pm

Subject: .. Dufferin grove toilet

Please add my name to those expressing opposition to the proposed composting toilet project in Dufferin Grove Park. Not only is it a bad idea, but it is a project that a small group of advocates have been trying to advance through stealth for over 4 years. It is time to reclaim that patch of land for the park and the community. Thanks for taking the time to note my concerns.

Name Withheld

16/12/2010 9:16 PM

Dear Peter Didiano:

I am writing you regarding the composting toilet in Dufferin Grove Park. I live directly in front of the toilet and you must know that when the "friends" of the park initally started to dig a hole, they told us that they were making a garden. Another person later said they were just building a structure. They manipulated and lied before we could do or say anything about it. One of their strategies is to NEVER inform us of any meetings regarding the toilet. They send out information flyers to residents who do not live near the park. This park already has flushable toilets -TWO!

My family has lived here for over 40 years and when we went swimming, we walked to the toilet if we needed to use it. The friends claim that the toilets are too far from the pool. What do these people do when they go to the Ex or Wonderland or any other public pool? In addition, why are the "friends" allowed to dig and build in a public park without a permit? The existing structure by the pool does not have a permit either. It's almost as though they have made the park their own personal garden. This park needs to be controlled by the city.

Living so close to such a project is a concern for several reasons. First of all, no one can guarentee that it will not smell. During hot summers the odour will be terrible, especially if we have a hot summer like the one we had this year. Some summers are actually cool (like last summer). The toilet needs warm temperatures to function properly. I'm also conerned about leaching especially since human waste can pose health hazards. Who will be held legally respon_sible if anything does go wrong with the toilet or if it causes a health risk?

We are infuriated about this whole project and that the discussion about it continues. The way" the "friends" went about achieving their goals was immoral. Allowing them to continue on with this toilet would be rewarding them for their manipulative ways. The worst part of it is that this is what their children are learning. Lie, manipulate, keep secrets and that is the way to get what you want. Also, is it worth spending all that money (regardless of where it comes from) on a toilet that will be open a few hours during the day for a few months out of the year? Please don't allow them to build this toilet here.

Name Withheld

17/12/2010

The Dufferin Grove Compost Toilet Feasibility Study comes more than four years too late.

Now that it is underway, the Feasibility Study cannot be considered objective. Two of the lead consultants involved have close ties to CELOS, the Centre For Local Research into Public Space, which is closely affiliated with the Friends of Dufferin Grove Park.

These are the very groups that have tried relentlessly to force this unwanted compost toilet onto the community.

The City of Toronto’s Parks Department, together with the office of former Ward 18 Councillor Adam Giambrone, has gone out of its way to accommodate these pro-toilet groups. Thousands of dollars have been spent on engineers, consultants, an architect and drawings. City staff has lost countless hours in meetings, on the phone, and through email correspondence. Neighbours have been subjected to years of frustration because their concerns have not been adequately acknowledged.

A" because nobody wants to admit this project is a mistake. It was ill conceived from the start and, at great expense to taxpayers, spectacularly bungled at every subsequent opportunity.

I have done more research into compost toilets than I care to admit. understand how they work and the conditions required for them to succeed. A compost toilet in Dufferin Grove Park, as proposed thus far, is certain to fail. I was prepared to list my concerns for the Feasibility Study consultants until I realized that would be beside the point.

In their presentations to the community, the consultants wooed us with the environmental benefits of a compost toilet; plied us with the cost-savings compared to a conventional flush toilet; they tried to convince us that the facility is almost maintenance free; that its green roof will ensure the structure blends in; that it won't smell.

What the consultants and toilet advocates fail to grasp is that it's not the stench of the toilet that's offensive but the stench of the egregiously flawed process that has led us this far. No amount of pro-compost toilet information or feasibility study conclusions will ever change that.

More than four years ago, a small group of individuals took a walk around Dufferin Grove Park. Without regard for planning principles and procedures and without regard for neighbours, they picked a spot to excavate a large hole and build a foundation for an earthen-building to house a compost toilet. Then, in an incident that will never be forgotten and certainly not forgiven, one of those individuals told a concerned neighbour that the entire endeavour was an art project.

It wasn't art. It was a mistake. The Parks Department needs to find the courage to acknowledge this mistake instead of trying to justify it. Please end, once and for all, the years of frustration, wasted dollars and wasted time associated with this project.

Name Withheld

December 17, 2010

Andrew,

On behalf of the Bloor-Dufferin Residents' Committee Limited, I am sending you some questions that have arisen following the public meeting and to which I hope you'll be able to help provide answers.

The Phoenix Composting Toilet Guide contains a wealth of information regarding the important considerations to be undertaken to determine the appropriateness of locating a compost toilet on a particular site. The remarks contained within quotation marks below are actual quotes taken from the Phoenix Toilet Guide.

APPROPRIATENESS OF COMPOST TOILET

Q1 Do you believe that this proposed compost toilet is "appropriate… considering the type of user, environment and maintenance commitment?"

a. **type of user**
Preschool children are prone to dropping things in the toilet…actions which would seriously damage the composting process leading to dysfunction, constant maintenance and stinky toilet.

b. **environment**
The toilet requires a minimum temperature of 19 degrees Celsius (65 degrees Fahrenheit) in order to keep the composting process going. With average monthly temperatures in June of 66.6 degrees Fahrenheit, 72 in July and 70.3 in August, the toilet will have about 2 and one-half months to actually be working to decompose the human waste. With the toilet located in the shade, even lower temperatures could reduce this already short usability time period.

During the rest of the year, composting will not be occurring and human waste will be sitting in the toilet, producing unpleasant odors, particularly during the spring and fall months.

The Phoenix Guide stresses the need to locate the toilet in unobstructed, direct sunlight with "sunlight availability for solar heat and electricity" in order to help maintain the minimum 65 degree composting temperature

Q2 Do you think that locating the compost toilet in a shaded area with no direct sunlight is an optimal solution?

Q3 Have you looked at alternate sites in direct sunlight that could greatly improve the ambient temperature and could accommodate solar panels, both of which would increase the rate of decomposition?

Q4 Have you examined the possible need for a supplementary heat source?

c. **maintenance**

As the Phoenix Toilet Guide says "Maintenance! Maintenance! Maintenance!"
"Frequent, thorough maintenance---spraying liquid, adding bulking material and mixing the compost pile—increases the rate of decomposition". Our sewage system consultant says "Maintenance is the biggest factor here since the high use will demand constant attention and even then may not be able to withstand the peak usage."

MAINTENANCE/OPERATING COSTS OF COMPOST TOILET

Q5 Have you completed any comparisons of operating/maintenance costs of the compost toilet vis-à-vis a regular toilet?

Clearly ongoing daily maintenance of the compost toilet, taken together with the ever constant need to monitor the dropping of items in the toilet as well as retrieving them so as not to stop the entire process, will be an ongoing cost item.

ONTARIO BUILDING CODE REQUIREMENTS

The Ontario Building Code (OBC) requires numerous site evaluation studies
prior to choosing a specific site. i.e. examining a number of different sites in order to determine the best possible site for such a facility.

You mentioned at the public meeting that only one soil test was done and that
it was" probably inadequate"

Q6 Are you saying that no site evaluation studies were completed with the exception of one soil test?

Q7 If one soil test is "inadequate" why weren't additional studies undertaken to assess alternative sites which may have produced a better result?

The proposed leachate bed is regarded as a Class 4 sewage system requiring a Class 4 building permit. The latter involves detailed formulae to be followed re length of distribution pipe, absorption rates, filter beds, etc.

Q8 Did you undertake such studies?

The OBC also requires the hiring of an on-site sewage system installer.

Q9 Did you include the costs of hiring an on-site sewage systems installer in your $20,000 estimate?

Q10 a) Given our cold weather conditions, will the toilet actually produce compost?

b) If yes, what will be done with the finished compost?

According to the Phoenix Guide, "Finished compost must be handled carefully since it can contain some parasites and pathogens." The guide suggests that pasteurizing the compost can result in material which can be applied on site with no restrictions under the Environmental Protection Act in the United States. Presumably the Ministry of the Environment would be required to classify the finished compost product and to determine how it can be used.

Q11 Were you able to find comparable situations where compost toilets have been installed in other places given similar conditions?

The examples in your presentation were not comparable to the conditions on the Dufferin Grove Park site.

The Wolf Education Centre pictured on the cover of your notes is located in a state park in Idaho with no access to a water source. On the other hand Dufferin Grove Park has the option of a flush toilet because of its proximity to the City's water supply.

The composting toilet in the Chris Van der Hout residence is in a heated building allowing for efficient decomposition all year round while in Dufferin Grove Park the toilet would compost 2 and one-half months at the most.

The TRCA compost toilet is also in a heated building, guaranteeing that the minimum required temperatures can be maintained all year long.

I'll look forward to receiving your response.

Name Withheld
Bloor-Dufferin Residents' Committee Ltd.

12/15/2010

Dear Councillor Bailao and Mr. Didiano,

My wife and I reside on Gladstone Avenue just south of Bloor and just north of Dufferin Grove Park. We strongly oppose the installation of a composting toilet and concur with the detailed and carefully considered arguments against the composting toilet that Name Withheld has outlined in her circular. Having regarding to our financial challenges in Toronto, noting the fact that there are already sufficient washroom facilities at the park and underlining the technical challenges of having a composting toilet, it is our position that this is a frill that we cannot currently afford. This money -- and the significant resources required to maintain a composting toilet -- are best devoted elsewhere. I urge you to not approve the composting toilet.

Regards,

Name Withheld

Notes from Bio Toilet Public Meeting

Monday, November 8th, 2010

Notes taken by Ozren Stambuk. The meeting lasted for approximately one and a half hours. Five community members not connected to the project were present. The Parks manager, Sandy Straw, Recreation supervisor Dave Hains, and Parks supervisor Peter White also attended the meeting. The following notes are not a direct transcription of what was said at the meeting. They are arranged by order of speakers and are thus chronological.

Presentations and Introductions:

Peter Didiano (Capital Projects):

Introduced the meeting

- The meeting was to discuss a 'feasibility study which the city commissioned using funds left over from the playground program
- This stage of the proceedings is just meant to be a study, meaning that no money has been approved for the program
- Rohan Walters will deliver a report after the last meeting

Rohan Walters B.Arch., B.E.S., BCIN – Small Buildings (designer):

Introduced the team of the study

- The purpose of this meeting is to address the need for toilets; the team members include Georgie Donais, working as a community builder and Andrew Hellebust, a water/chemical engineer

Georgie Donais (park builder):

Introduced herself as project leader on cob wall and gave a brief history of the bio toilet project with slides and explanations, showing where the project was suspended and the unfinished structure near the wading pool. Later in the meeting she also added that if the project were to proceed, it would have wooden walls and no longer be cob.

Andrew Hellebust M.S.E., P.Eng. (engineer):

Explained the engineering aspect of the bio toilet

- CELOS has developed designs for the toilet
- Small units are easily overwhelmed, at the park we have the best possible one, the Phoenix
- Shallow soil is the most active biological area, so we want to take advantage of it
- We want to provide proper conditions for aerobic composting, meaning that warm temperature and oxygen are key
- This is the opposite of a septic tank or outhouse, where the former is sealed and the latter gathers a compressed pile of excrement
- In both cases, the process is anaerobic, meaning that it is without sufficient oxygen supply
- The Phoenix is aerobic, promoting circulation and decompression through woodchips, resulting in no odour

- In addition, there is ventilation which all together produces good bacteria
    - These bacteria need a moist, warm and oxygenated environment to function properly
- There is also a mechanism, in the form of a 'crank arm', which can be turned to allow breaking down of the piles and promoting oxygen supply

Rohan Walters:

Provided a summary of the key advantaged for installing a bio toilet in Dufferin Grove Park

- What prompted this project was distance of toilets from the playground
- Based on maps of Dufferin Grove and some approximate triangulation, families have to walk 700-800 feet from the wading pool to the washroom in either the field or the rink house
- The bio toilet is tiny, it is 140-150 square feet
- How do we affordably and sensibly make it into the building it was supposed to be, conforming to the Ontario building code?
- There are two possible ideas and models: if we keep the current unfinished foundation/structure, we will have to build an accessibility ramp which is an extra cost
- If we decide to go with the other model, we will not need a ramp since the foundation will be lower
- In either case, helical piles will need to be installed, which will act like a bracing system along with a small steel wall to brace the earth around the foundation
- The bio toilet will have a green roof, which can capture rainwater and prevent excessive discharge on the area around the toilet
- Installing a regular toilet in this location would cost one thousand dollars per meter of pipe, which in Dufferin Grove would equal between 73 to 147 thousand dollars depending on the street the pipes connected to
- These pipes would also disturb tree roots
- Toronto Urban Forestry and the Toronto Regional Conservation Authority are insistent on preserving the tree root systems.
- The bio toilet does not disturb the tree roots, saves money by saving on water and labour through a intelligent design
- There are existing precedents in the Bronx Zoo where the laying of pipes was unfeasible due to animal enclosures and the solution was bio toilets
- There is an existing precedent in Ontario Government offices; the head office of the Toronto Region Conservation Authority Building located in Vaughan.

Jutta Mason (CELOS):

Related the bio toilet study to the facility situation in other parks across Toronto

- Many parks have no washrooms at all
- The problem is that people in these parks have no recourse if they live more than five minutes away or if the parks are not near coffee shops, as is the case in many suburban neighbourhoods
- City started using chemical toilets, few and far between in very large areas
- People have to walk very far from the playground to get to the field house or rink house toilets

- In contrast, when the work was being done on the wading pool at Dufferin Grove, the law required a chemical toilet to be put close to the workers
- Likewise, in shopping malls the farthest distance of a toilet from any give point in the complex is 45 meters [3.7.6.3.(3)(a)(b) of the OBC Location of Plumbing Fixtures]

Questions and Comments:

When there is more than one name in bold letters, the speaker will be denoted by the first letter of their first name in the proceeding bullet point list {For example: Andrew = (A)}

Resident name with held

Lives on Dufferin Street and has been following issue for several years

- Appreciates environmental aspect to it but has several questions:
- What is the cost of the project? Who will maintain the facility? What kind of specialized knowledge is required to maintain it? If we have a bathroom in the park that works, why do tax dollars need to go into another Dufferin washroom when other parks have none?

Rohan Walters and Georgie Donais:

Responded to the questions

- (R) The cost will be given in the next meeting
- (G) The maintenance is straightforward since it involves going into the room once a week, turning the crank, checking the fan
- The structure is actually designed to be relatively maintenance free,
- If something goes seriously wrong with it, it is possible to talk to the manufacturer. With whom we have a five year relationship
- The door has a counter which tells the park staff if the washroom is being overused and needs to be closed so it can “rest”

Park user, name with held

- A number of park users wonder why there is no washroom at the south end of the park
- Regular washrooms set back children in toilet training due to their poor condition
- Parents with more than one child have to bring everyone to the washroom each time somebody wants to use it
- The toilet was donated by park users who understand these demands
- Dufferin Grove is a high volume park and is therefore good for testing the toilet for future locations

Park user, name with held

- Question regarding science of the toilet: how does the venting actually make it less smelly if is allowing odour to circulate?
- Question regarding compost: residents are already able to get compost from the city, but would they also be able to harvest it from this bio toilet?

Andrew and Georgie:
Responded to the questions

- (A) Regarding the smell: the idea is not specifically air circulation but oxygenation which will promote composting process, also the waste container is very big and has more woodchips at any point than it does human waste
- (G) Regarding composting: it would take up to 5 years to have enough compost for distribution but it would also need to be tested in a lab first and then circulated in the park

Volunteer gardener and park user, name with held

- Questions regarding function of toilet: If water is not being used, how is leachate being produced? What happens when there is no water? Where is electricity coming from? Are there any environmental problems? Does the fan emit any smell? What is the comparison between chemical and bio toilet in terms of cost?

Rohan and Andrew:
Responded to the questions

- (A) The water comes from the urine
- The only case when there is no water is if somebody does not urinate when they sit on the toilet
- (R) Only 5 watts are required to power the fan and this can be provided through an electrical line or a solar panel
- (A) Through oxygenation and woodchips the toilet does not emit a strong smell, and in any case it is not a septic smell since the oxygen changes the chemical composition of the waste and produces a very different smell (pleasant)
- (R) For example: the composting toilet is being used in enclosed government offices, and there is no smell because it would be unsustainable in such places
- The maintenance and cost of the chemical toilet are not even on the table, and the December meeting will show different cost comparison between other models

Resident, name with held

- Raised questions about safety: What are the implications of having water and children in the same area as the toilet? What are the chances of contamination, spill or overflow? What checks and balances are in place to prevent any major problems? What about vandalism? What about the sanitary conditions inside the toilet? Can somebody or something be stuffed down the toilet, what is the opening width?

Rohan, Georgie, Andrew and Jutta:
Responded to the questions

- (G) Overuse has a check in the form of a door counter which marks each time the door is opened
- (G) Regarding a massive flood: it will affect all facilities in the same way as the bio toilet
- (A) In the case that the door counter fails and 300 people somehow use the toilet in one day then, in the case that they urinate, the trench has extra space and in the case of excrement, the composting chamber has a lot of volume outside of it for overflow before it would ever contact a park user

- (R) Regarding vandalism: there are electric monitoring systems available as well as park staff, however we do not want to put any kind of overbearing security system that would then be required at all other park facilities
- (G) Regarding sanitations: there will be hand sanitation stations in the facility but we do not want to add components to the toilet that add to its maintenance
- (J) Regarding vandalism: the field house toilet was vandalized in the past, such as when one person regularly stuffed cardboard down the toilets and chemical toilets are sometimes pushed over, such as at MacGregor
- (A) Regarding the opening: the opening is about 12" but there is a bar across it to prevent bigger object from falling in
- (G) Regarding the opening: in other bio toilet cases, there are regular incidents of bathing suits, watches, towels etc falling into the toilet but there is a special tool to allow the removal of these objects into a bin after which they are disposed

Resident, name with held

- Question regarding vandalism: How about monitoring our current toilet and preventing the kinds from the school across the park (St. Mary's) from vandalizing it instead of building a whole new one?

Jutta:

Responded to the question

- We tried to keep the doors of the field house locked during school hours but that did not last
- There is less chance for vandalism with the bio toilet because the kids are exposed to the significance and importance of environmental projects at school

Resident, name with held

- Stated her opinion on the project and asked questions regarding the implementation of the toilet
- Cannot accept the distance argument because people should just take their kids across the field if they need to use the toilet since it is not a long distance
- Cannot accept the spending of resources for a facility that will only function for three months of the year due to peak season
- The Phoenix manual states that the ambient temperature of the toilet should be 18 degrees which will only allow it to function during three months of the year
- Why is the location of the toilet the same as before, even though the manufacturer suggests it be built on a hill? If we are looking for the most affordable and sensible solution, why not look for the best location?

Rohan and Andrew:

Responded to the questions

- (R) Regarding distance: parents have different opinions regarding the distance and are subject to mobility concerns and the number of children they have
- (A) Biological rate of decomposition double for every 10 degrees so the manufacturer statement is unhelpful because it is run at a number of different places at lower

temperatures, in any case it is underground and away from the sun as the manufacturer suggests

Resident, Repeats her concern regarding project

- There is no point spending a lot of money to build a container to contain human waste when washroom is approximately 700 ft away, it is a container because it will only function for three months of the year

Sandy Straw:

Parks manager

- From a parks and recreation perspective, we need to encourage more park users and washrooms will allow this to happen
- Right now we are simply trying to create a feasibility study and it is not being built at this moment
- Regarding the peak seasons: New expensive washrooms were built at Woodbine and they are only used for about three months of the year, the peak summer season, and then they are locked down for the rest of the year

Resident and mother of four, name with held

- Closer washrooms would be very important when spending time at the wading pool

Resident, name with held

Reiterates her concern for the bio toilet and its implications for the park in general

- Dufferin Park is not a good place to do this project, the washroom will be a beacon for division, division of a community which does not agree on its importance, there are better places to put it, Georgie should not be a part of the team because she is partial, along with Rohan they are not the right people to present this project impartially to the community, there should be a review of the way things work at Dufferin Park in general

Peter:

Concludes meeting

- Nothing has been done wrong in hiring Rohan, I am the project manager who defers to our consultant's professionalism, and we hired a qualified designer for this reason who has his BCIN [Building Code Insurance Number], the proper WSIB paperwork (Workers Safety and Insurance Board) qualifications required by The City and he has a degree in architecture. He can choose who he wishes for his team. Again there is no money right now and no project has started yet, this is just a feasibility study

END OF MEETING

Dufferin Grove Bio Toilet
Feasibility Study
Public Meeting Notes
December 1, 2010

Prepared by: Peter White
Supervisor Parks

Meeting commenced at approx 7:05 pm.

Peter Didiano:

- Brief History- Study to determine if Dufferin Grove is a suitable location
- Previous attempt unsuccessful
- Last meeting- good feedback
- No further meetings will be held
- Report to be prepared by Rohan Walters
- City hired Rohan who assembled a team of experts
- No funding currently available to do the work
- Capital funding is on a 1year program

Rohan Walters

- Feasability study to obtain technical and empirical data
- Request considerate discourse
- Be prepared with your points
- Points will go into report
- Technical aspect to be followed up on by Andrew Helleburst:
    - Location
    - Aerobic vs. anaerobic decomposition
    - Distances: why there?
- Location
    - Reasonable proximity to wading pool and playground
    - Close to electrical
    - No impact on tree roots
    - Wheel chair accessible

Georgie Donais

- Has spent many years in park
- Was lead on original project

Public Comments

- Some residents did not receive flyer
- Celos and Friends of Dufferin Grove could fund the project to get around the capital plan.
- Requested a vote of people present. Peter Didiano stated that there would be no vote.
- Rohan Walters stated that all parts must be considered.

Georgie Donais

- Rationale
    - Safe washroom by the playground for children
    - Save on water and sewer costs
    - Capital funding unavailable

- Criteria
    - No water usage
    - Low cost
    - Modular construction

- Other Locations where bio toilets exist
    - Provincial parks
    - Conservation Areas

- Benefits
    - Zero water usage – conservation
    - Removes over 65,000 litres of water from waste stream
    - No concrete used in retaining wall
    - Green roof able to absorb water
    - Helical piles to anchor building do not disrupt tree roots.
    - Signs posted inside building to ecucate about mechanics of bio toilet.
    - Provides usable compost. (2 years to produce 350 litres of compost

Andrew Hellebust

- 99% of western world uses flush toilet
- Waste serves a food for microbes
- Oxygen must be added to the pile to promote decomposition.
- Recreating a natural process
- Highlighted book: "Composting Toilet System Book"

- The higher the temperature the more bacteria present to speed decomposition
- The Phoenix is a large composting toilet
- Must add wood chips/shavings after each use
- Excess water flows out into "trench".
- Compost should be dug into soil when used
- Promoting Aerobic (with air) decomposition

Rohan Walters

- Noted location in park on map
- Wheelchair accessible
- Doesn't jeopardize trees
- No disturbance to park programming
- Parks staff to maintain

Dave Hains and Maysan Shuja

- Monitoring to be done by Recreation staff
- Cleaning to be done by Parks staff

Public Comments/Questions

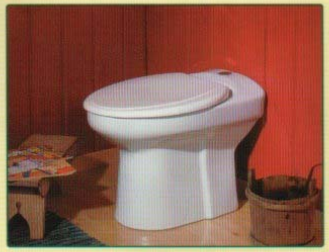
- How will the fan run and how important is the fan?
    - Andrew answered: Fan runs on electricity which is available near the site
- The leachate flows into the trench and is absorbed by the soil. What happens when the sol reaches capacity?
    - 50 to 100 years to reach capacity
- What if the feasibility study is approved and funding for the project comes from somewhere else?
    - Peter Didiano responded: There would be further public consultation and then approval by the building department.
- Temperature factor: What happens in the winter?
- What happens when the pile gets compacted? One set of tines is not enough.
    - Andrew responded that there were 3 sets of tines for agitation. If the bottom of the pile became compacted, some manual turning might be necessary
- What is the smell from the vent stack?
    - Andrew answered that the smell from the stack would be better that sewer gas from conventional plumbing.
- What guarantees are there against the smell?
- What is the smell test?

- Why can't park users use the existing washrooms? We have always taken our kids there.
- What consideration for the people?
- Was the area tested to determine the suitability? Were there soil tests? Landscape study?
- What measures are in place to prevent public endangerment?
- Was the existing foundation inspected?
- What is the square footage of the building?
    - Concern expressed about the loss of green space in the park.
- Encroachment on neighbours. Park is more about entertainment and less about green space.
- Feel a lack of balanced opinion in the presentation.
- Previous project attempt was done in secret without consultation
- Who would install the toilet? Doesn't it need to be a licences contractor? Will there be any warranty? Will there be a service contract?
- What about leachate reaching the wading pool?
- What will be the effect on the resale value of neighbouring homes?
- Residents have expressed concern about the report being available on the Friends of Dufferin Grove website and request that it be available on the City's website.

Rivercourt Engineering Inc.

Wolf Education Research Center, Winchester, Idaho. Phoenix Composting Toilet

The Composting Toilet System BOOK

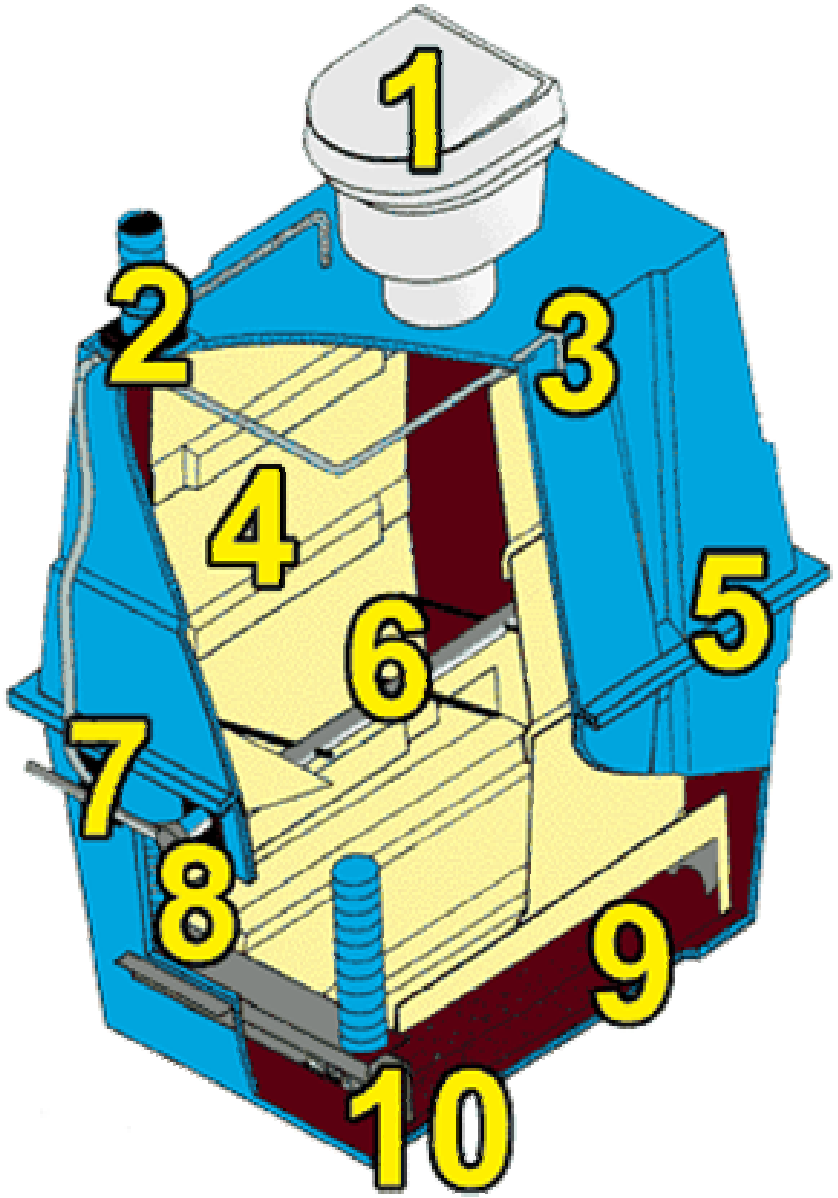


A Practical Guide to Choosing, Planning and Maintaining Composting Toilet Systems, an Alternative to Sewer And Septic Systems

Technologies • Sources • Applications • Graywater Issues • Regulations

DAVID DEL PORTO & CAROL STEINFELD

REVISED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10

Composting Toilets – Access, Siting, Maintenance

Large composting toilet.

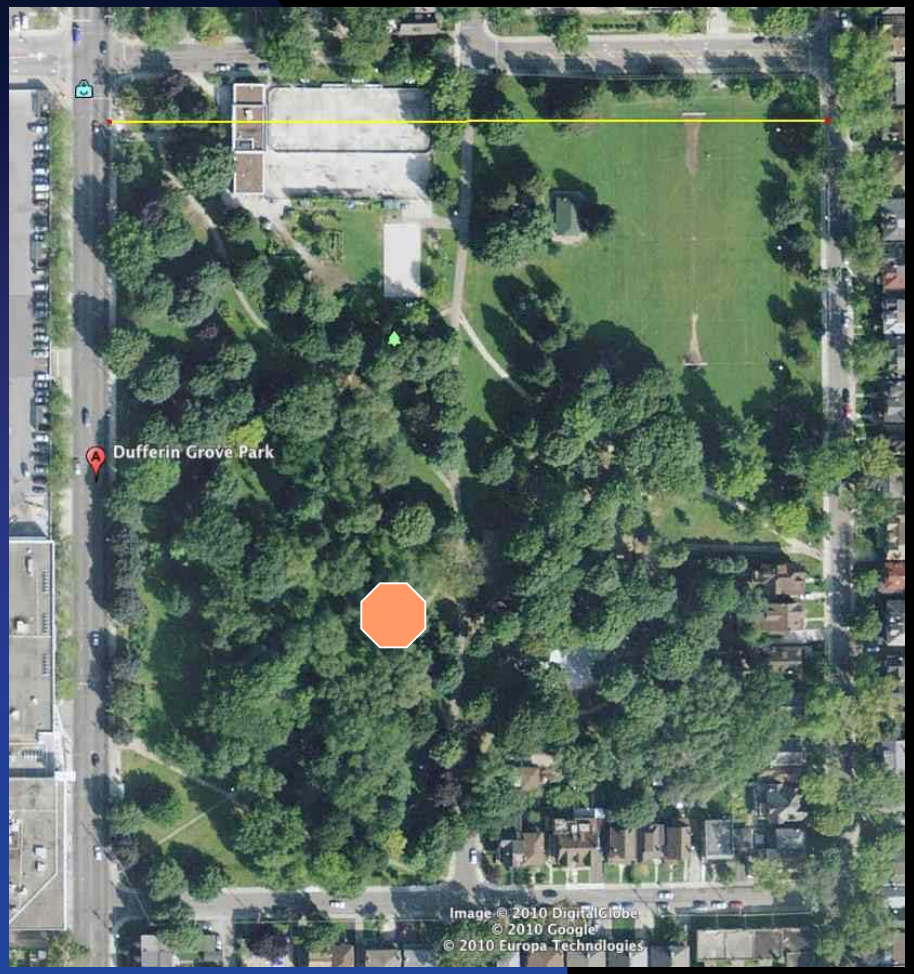
Chris Van der Hout residence

Clivus Multrum M12’0s
Restoration Services TRCA

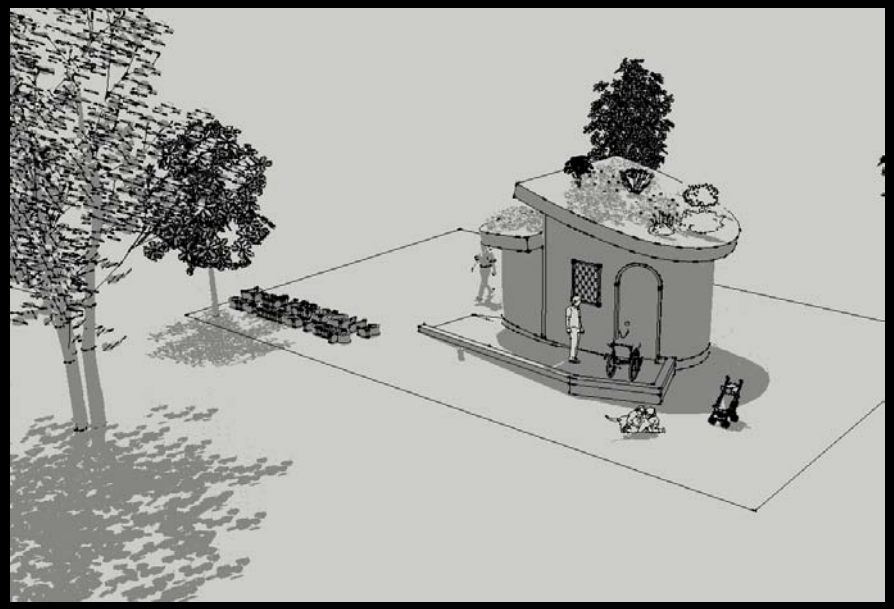
Andrew Hellebust, P.Eng.
Rivercourt Engineering Inc.

4 Beechwood Crescent
Toronto ON M4K 2K8
Tel 416-421-4419
ahellebust@rivercourt.ca
www.rivercourt.ca

Bio Toilet Feasibility Study



Rohan Walters B. Arch.
Georgie Donais Consulting



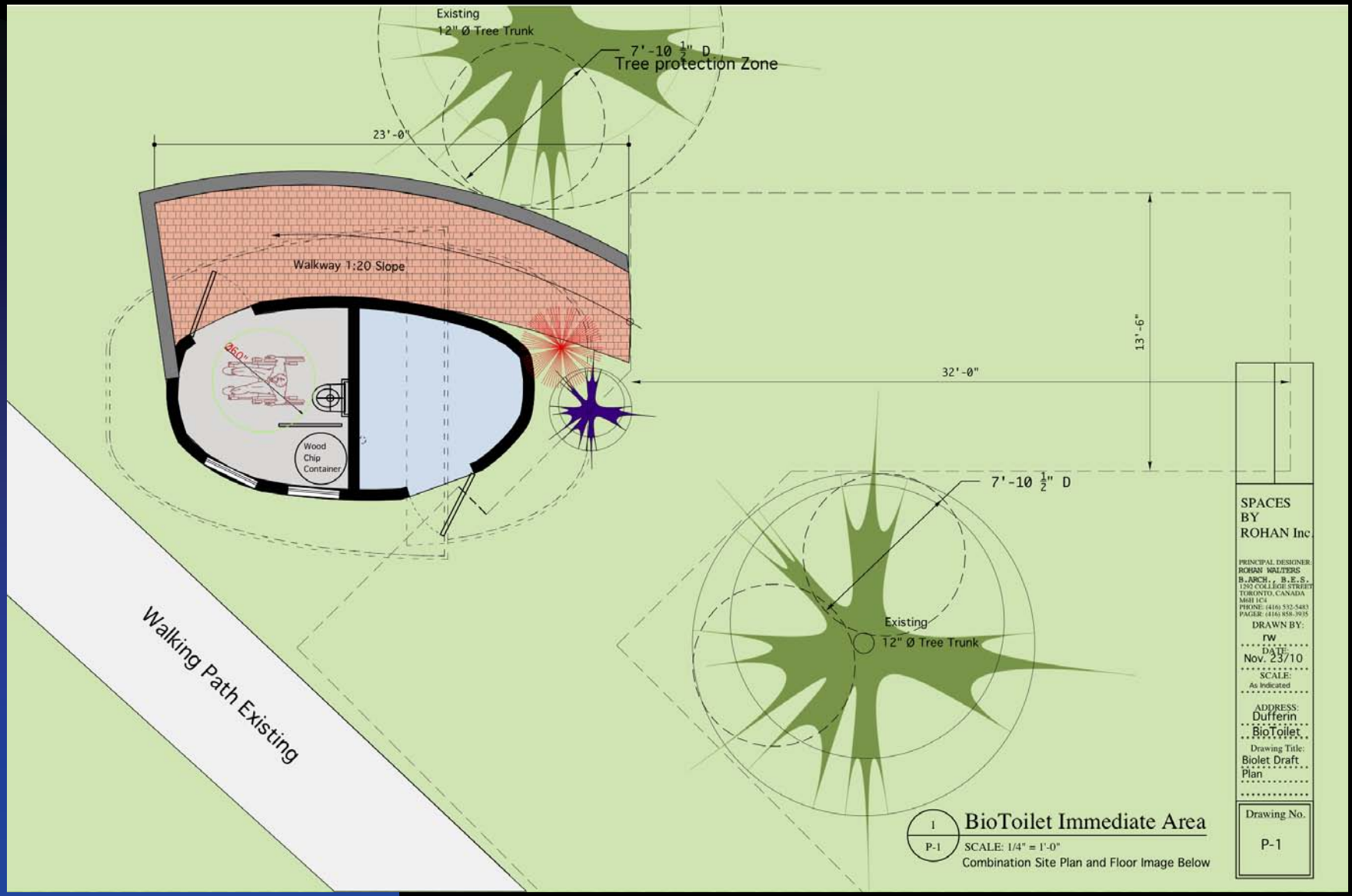
Introduction

- Needed Toilet near Wading Pool

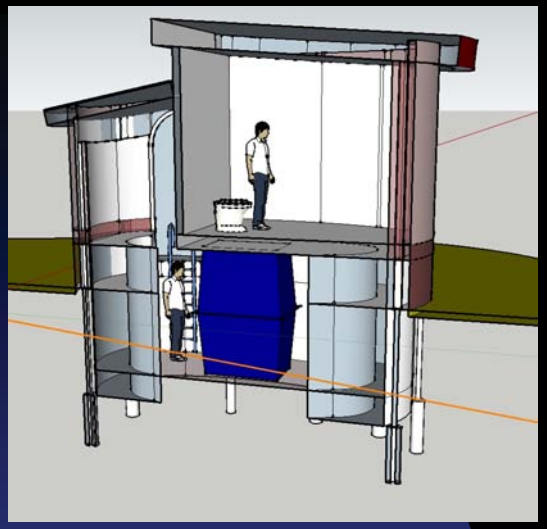
Existing Condition

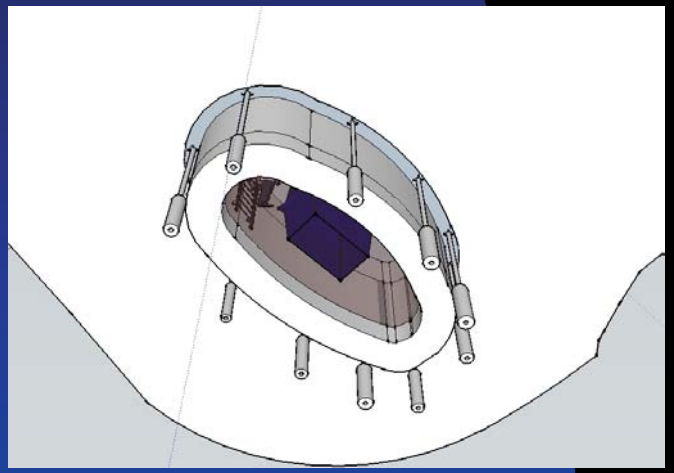
3D View of BioToilet

Proposed Site Around BioToilet



Helical Piles and Retaining / Bracing Structure

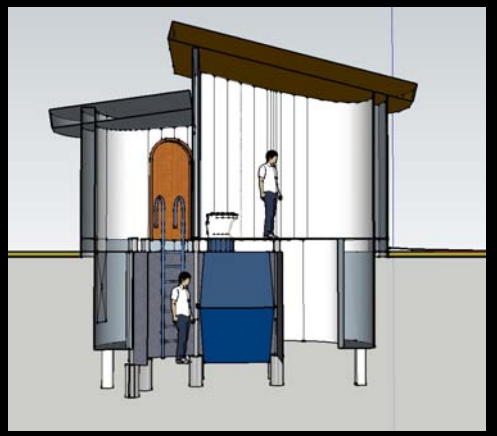


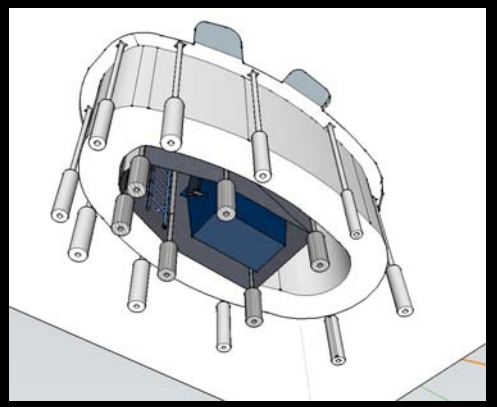


Version 1 Piles

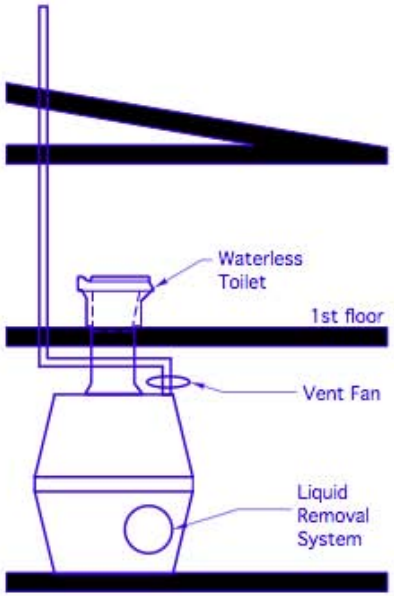
Helical Piles and Retaining / Bracing Structure

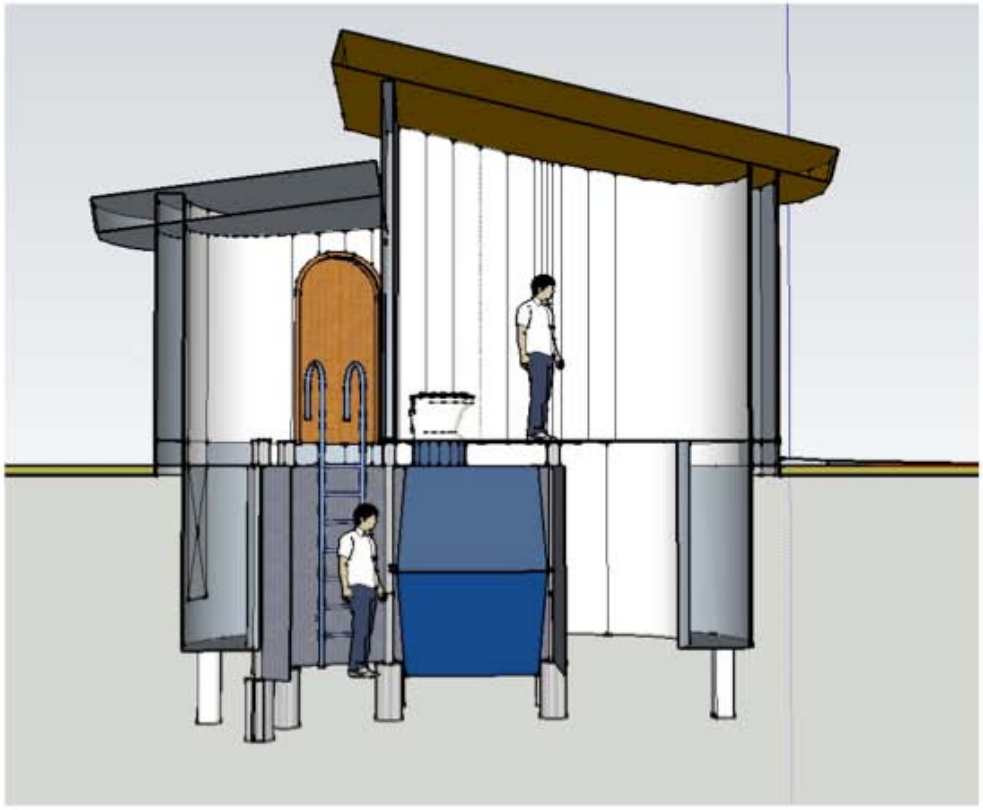
Steel Retaining Wall Required in Version 2



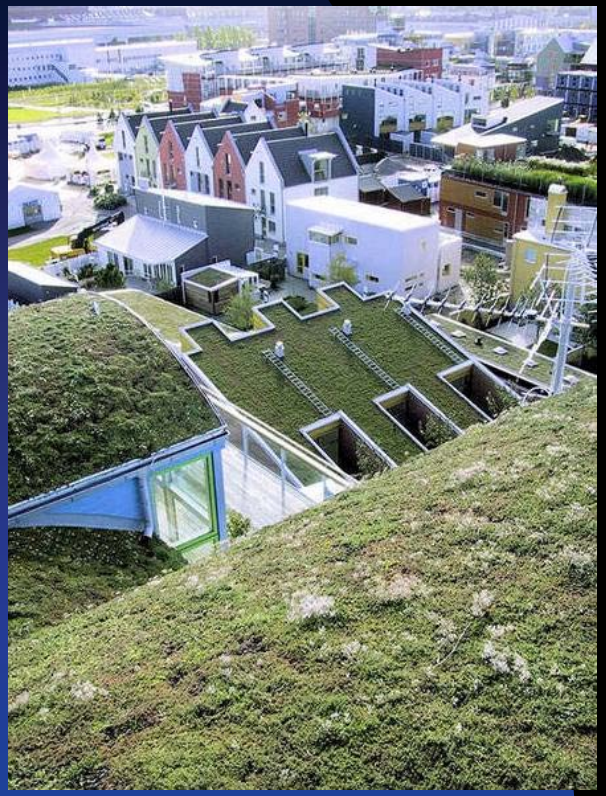


Simple Composting Toilet Diagram





Green Roof to Assist in on Site Drainage, Building Cooling and Aesthetic Integration into Park Setting

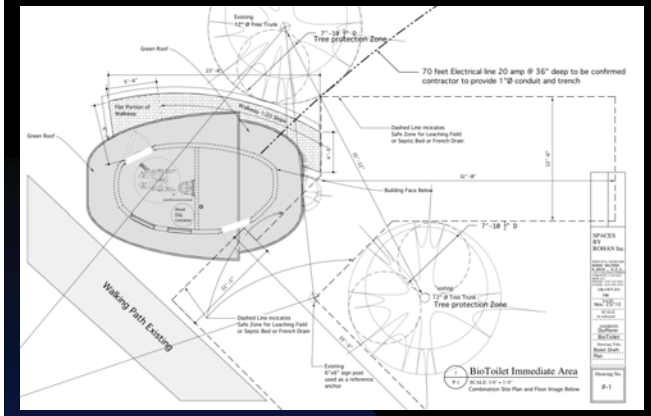


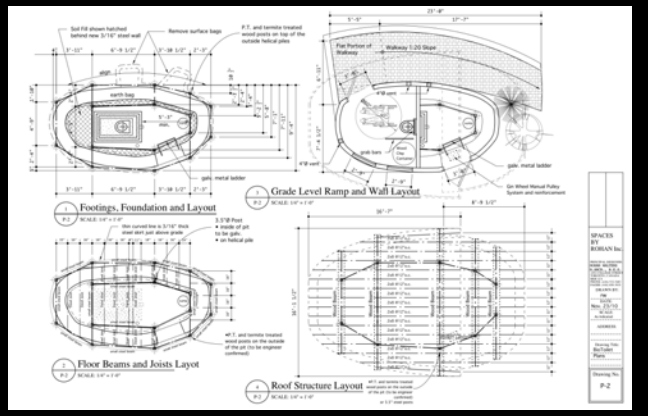
Sweden

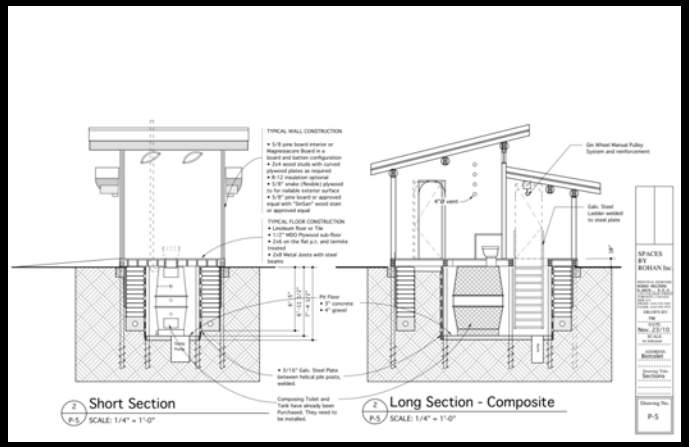
Dufferin Grove

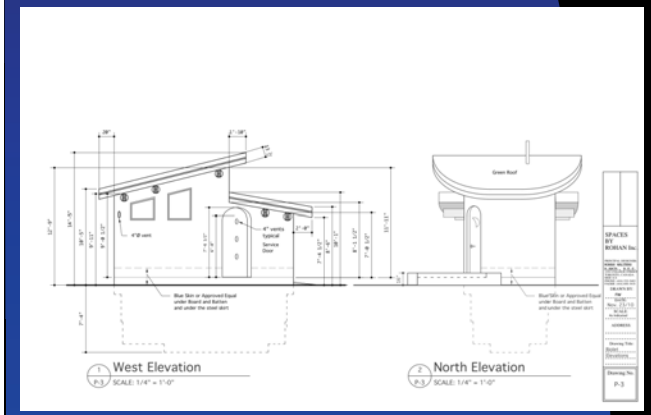
Toronto

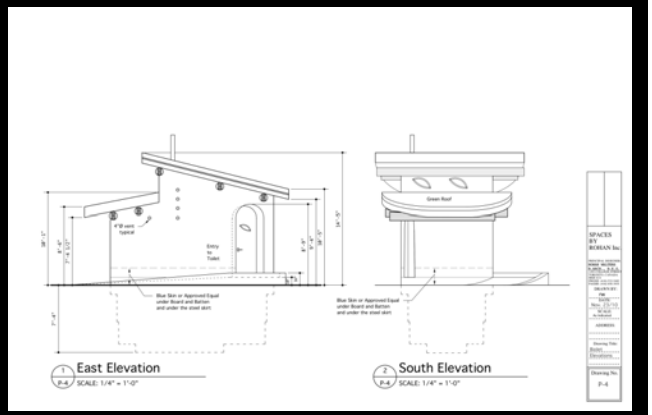
Draft Drawings for Preliminary Consideration by the City of Toronto and Local Community











Existing Precedents

January 29, 2008

TOM ARBAN
The Toronto Regional Conservation Authority Restoration Services Centre makes extensive use of recycled materials, including reclaimed brick.

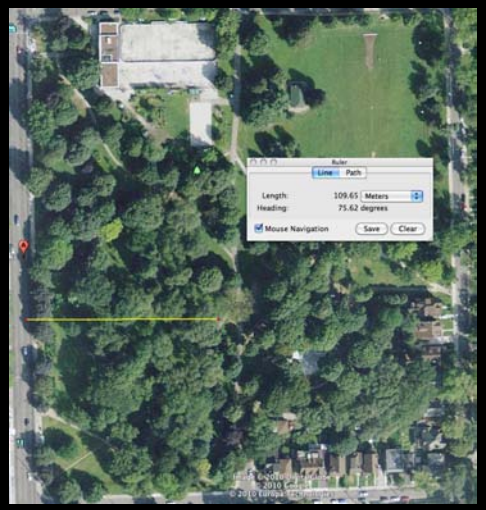
Toronto and Region Conservation Authority's Restoration Services Centre earns LEED Platinum

Building sets "benchmark" for future Ontario projects by earning 56 LEED points

Preliminary Cost Comparison Between Typical Toilet Building and Composting Toilet

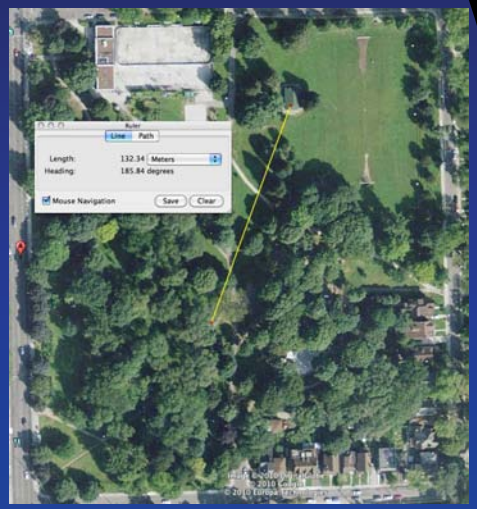
•Public Works Charges $1000 Per meter for Water/Sewer

@73 Meters
$73,000
• No BLDG.



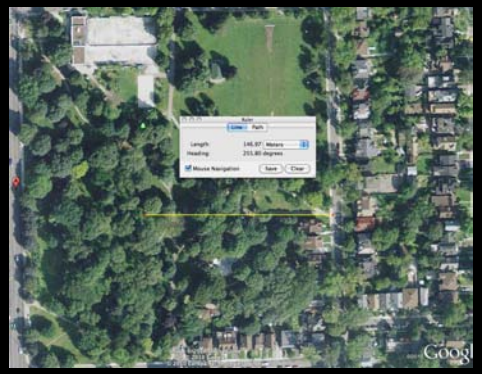
•Tree Roots Endagered

@110 Meters
$110,000
• No BLDG.



•Topography Uncertain

@133 Meters
$133,000
• No BLDG.

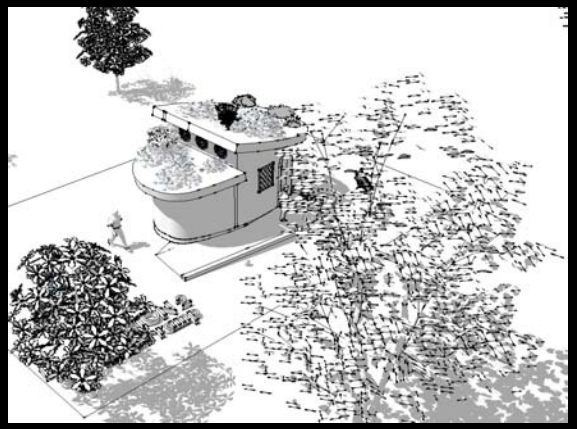


@147 Meters
$147,000
• No BLDG.

Typical W/C
140 s.f.

- $56,000 building
- $10,000 landscape
- $20,000 fees
- $149,000 @ 73 m
- $196,000 @ 110 m
- $219,000 @ 133 m
- $233,000 @ 147 m

66,000 liters h_2O
Per Season



BioToilet
140 s.f.

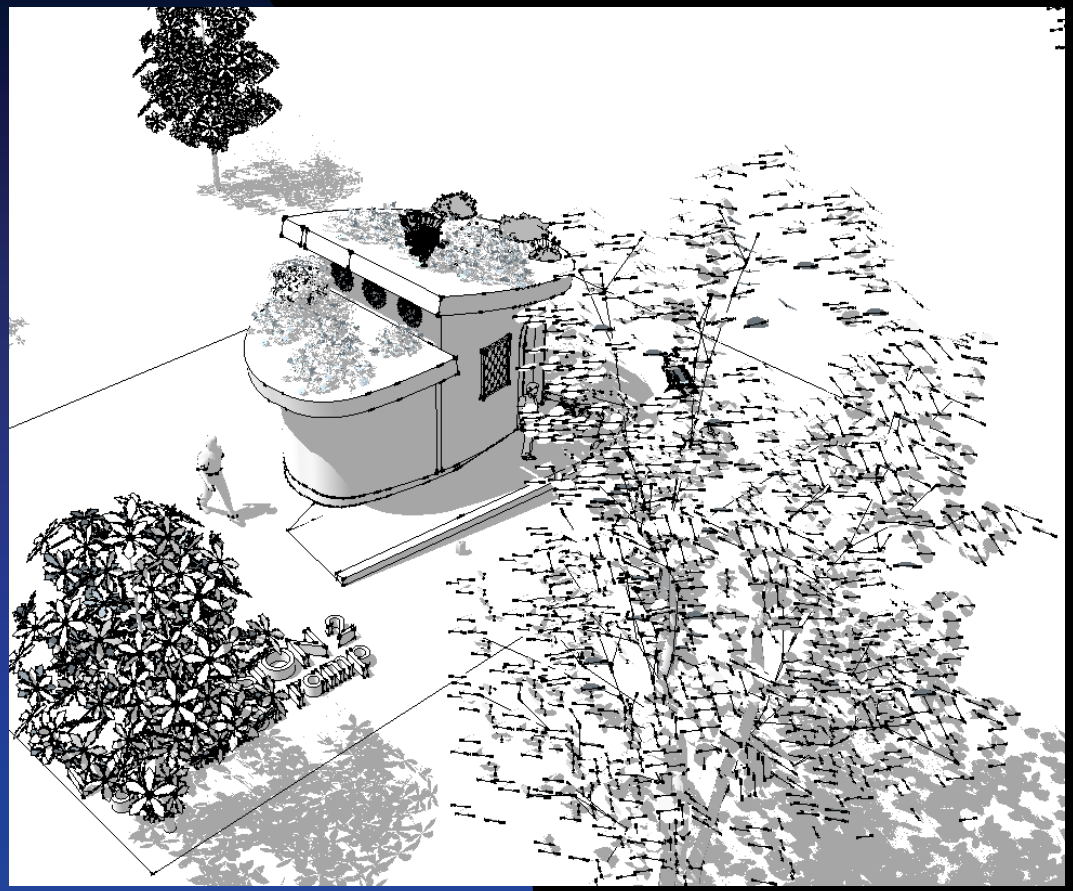
- $117,000 building
- Landscape Included
- $20,000 fees
- $137,000

- Zero (0) liters h_2O
Per Season

Portable Bathroom

- No Wheelchairs
- No Walkers
- No small children
- Not Chemical Friendly

Compost Toilet will NOT require Water / Sewer hookup nor disturb tree roots



- Therefore We Can Save Money By Spending on the Building, Design and Maintenance Only While Saving Water and Labour!

- More Flexible Placement In ANY Park!

Next Steps

- Take your comments and notes and incorporate into working final document and or design recommendations
- Once City has accepted and approved the Feasibility Study it will be put onto Dufferin Park Website
- Some conclusions and recommendations will be suggested.

Dufferin Grove Park
Composting toilet project

NOW magazine

CITY IN BRIEF

By JENNY YUEN and KATE ZANKOWICZ

Park's new poop-and-scoop

Dufferin Grove Park will soon grow flowers with your poop.

Local artist Georgie Donais is working with the city to install Toronto's first outdoor compost toilet close to the park's playground.

"It's a statement that there are other options," says Donais, referring to the city's struggle to find a destination for its many thousands of tonnes of sludge. "[Our toilet] doesn't drain into the sewer system and doesn't go into Lake Ontario."

Right now, a 100-square-foot hole in the ground is the starting point for the toilet, which should be ready next summer.

Says Parks and Rec manager Sandy Straw , "Porta-potties are also an option, but then there's the whole question of disposal."

You can go number one or two in the compost toilet, and instead of flushing you put a scoop of wood chips in the bowl. The plan is for city staff to turn the crank on the outside of the stall once a day to filter material downwards. Fans will suck air down the toilet to minimize the stink factor.

Says Donais, "We're going to make sure that everyone is comfortable with the use and that there's no chance of odour."

Gord Perks of the Toronto Environmental Alliance says we should take advantage of any long- or short-term solution to the sludge problem. "Compost toilets have improved drastically in the last 25 years," he says.

But even though a compost toilet is cheaper and saves water, you can't replace an existing residential toilet with one for health reasons, according to **Ministry of Housing building code interpreter Al Suleman** .

If this pilot project doesn't crap out, the city will look at putting more compost toilets along the waterfront.

You are invited
to an outdoor **Public Meeting**

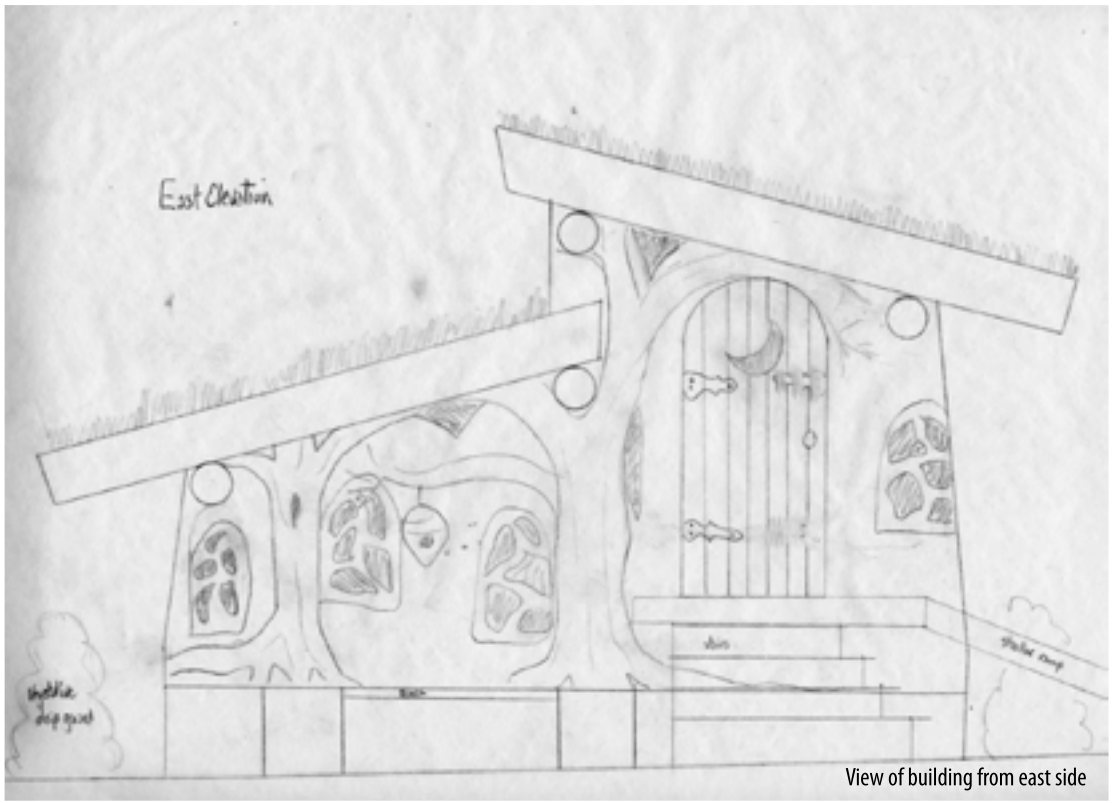
to discuss the proposal for a **composting toilet facility** near the playground in Dufferin Grove Park

Sunday, June 25, 3pm, by the cob wall

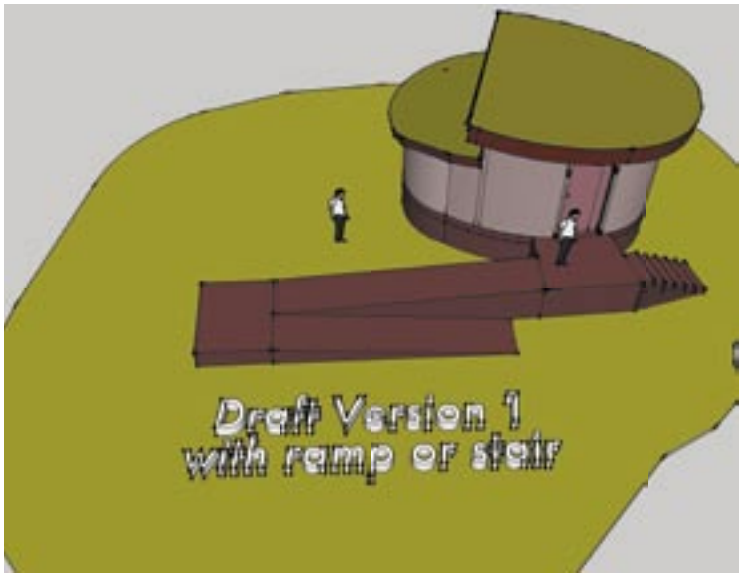

ORGANIC
SOYBEANS

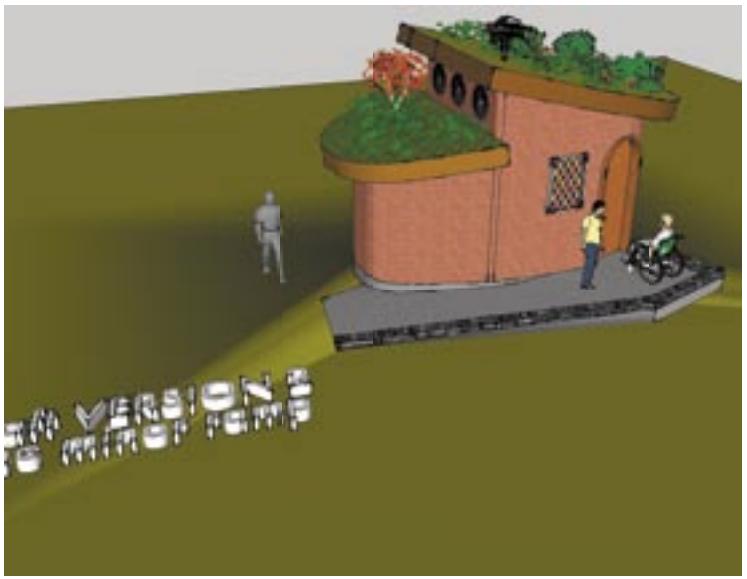
Earthen Architecture

Community-Built Earthen Building/Bio-toilet
Dufferin Grove Park
2007



View of building from east side





TORONTO Building a great city - *together*

Call 311

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

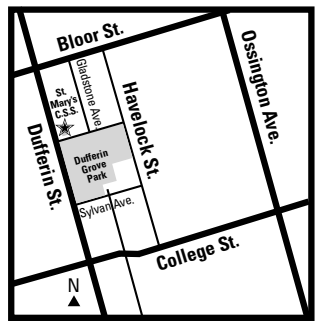
Toronto Parks, Forestry and Recreation, along with a consultant hired by the City of Toronto, is undertaking a feasibility study. Options will be presented for the development of a future washroom structure containing a bio-toilet, to be located near the playground. The local community is invited to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

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:

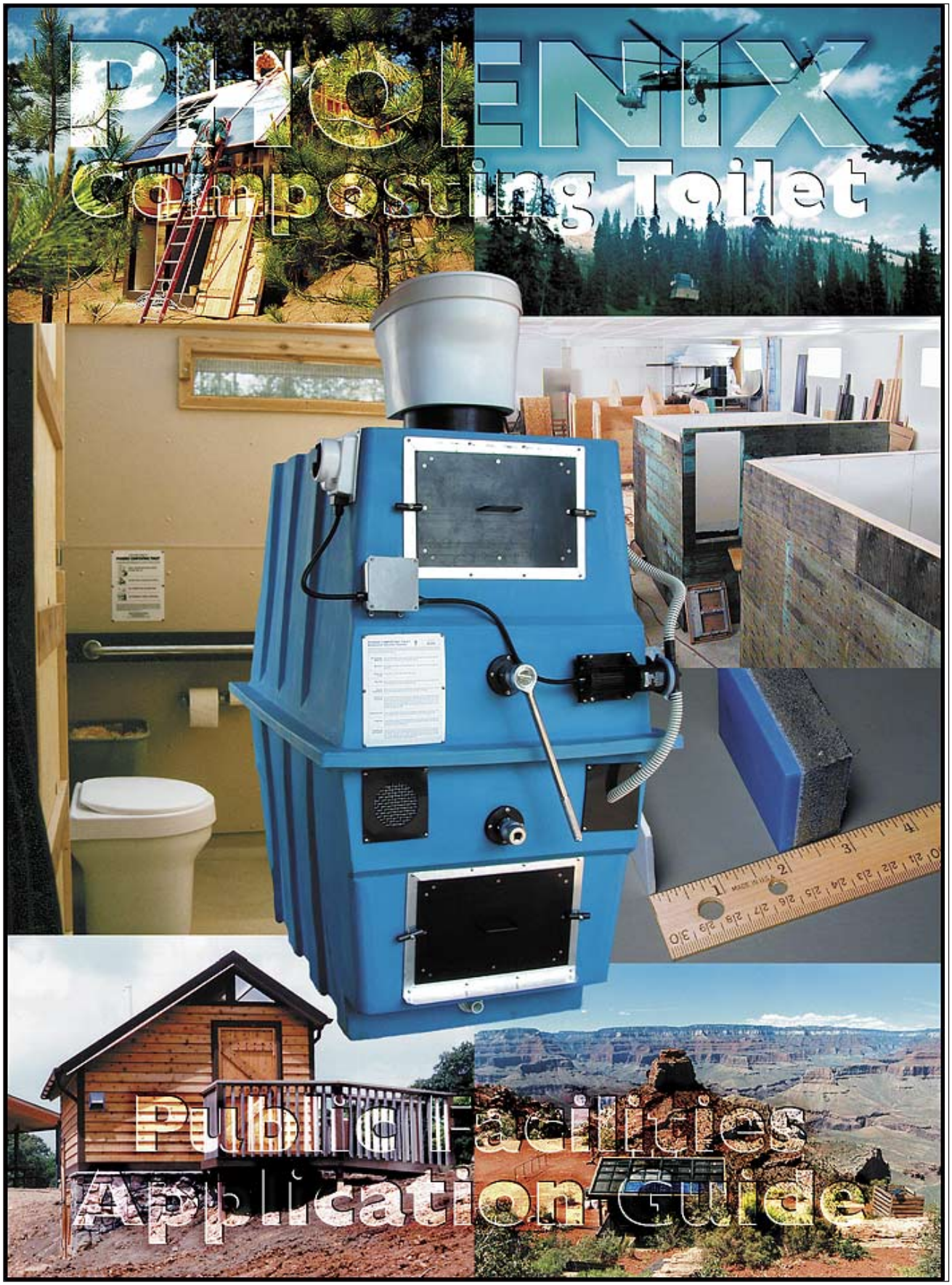
Date: Wednesday, December 1, 2010
Time: 7 to 8:30 p.m.
Location: St. Mary's Catholic Secondary School cafeteria, 66 Dufferin Park Ave.

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



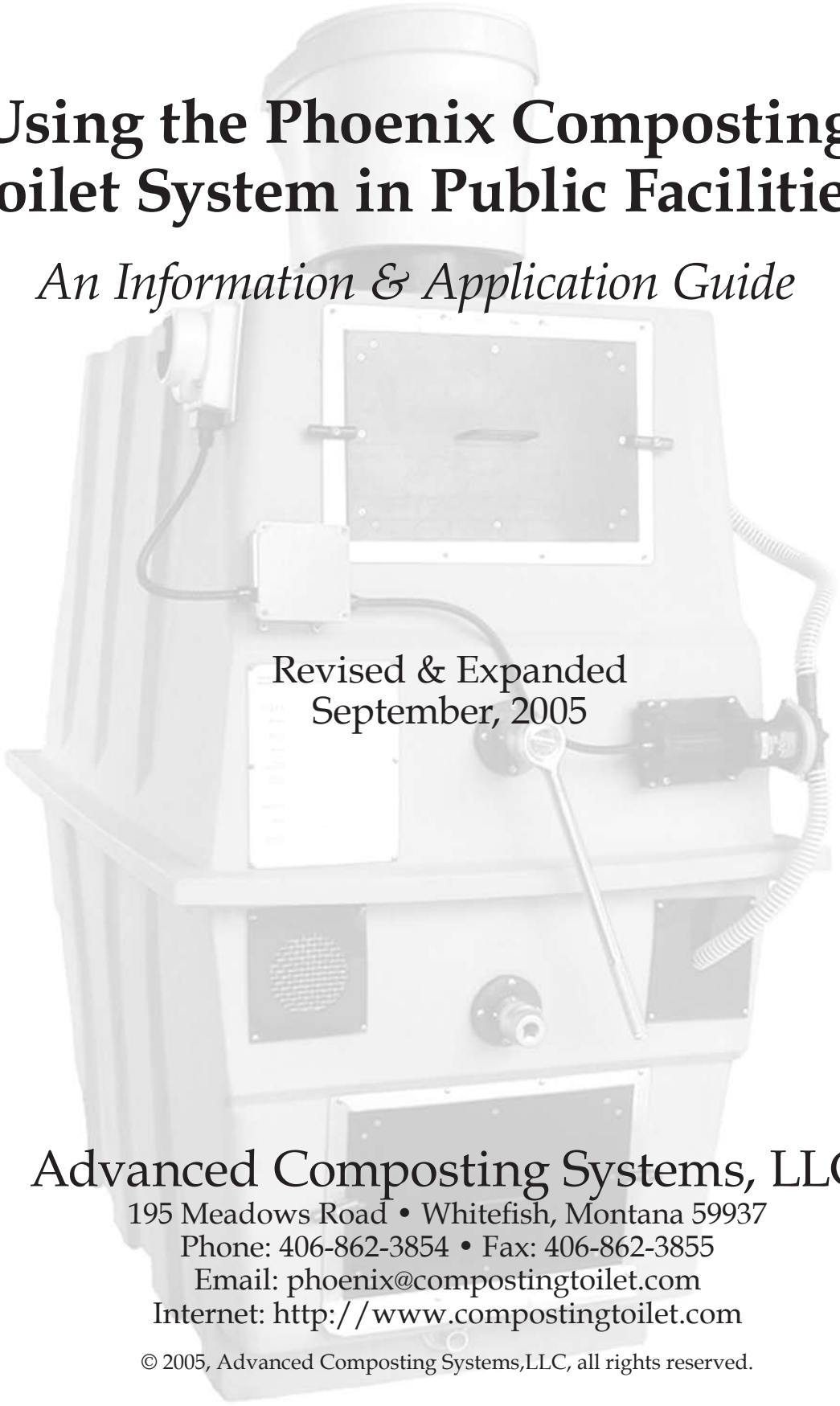
For more information please contact:
Peter Didiano, Supervisor of Capital Projects,
City of Toronto
416-392-8704,
pdidiano@toronto.ca

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.


PHOENIX
Composting Toilet
Public Facilities
Application Guide

Using the Phoenix Composting Toilet System in Public Facilities

An Information & Application Guide



Revised & Expanded
September, 2005

Advanced Composting Systems, LLC
195 Meadows Road • Whitefish, Montana 59937
Phone: 406-862-3854 • Fax: 406-862-3855
Email: phoenix@compostingtoilet.com
Internet: http://www.compostingtoilet.com

Table of Contents

Rear cover. *Yosemite National Park, California.* Located at a concessionaire operated backcountry camp at 9,000 feet, this building incorporates solar heat, photovoltaic generated electricity, and a Phoenix supplemental evaporation system for zero on-site discharge of liquids.

Choosing a Composting Toilet: 8 Key Questions

Composting is a familiar process to many people. Organic materials, such as leaves, lawn clippings and food waste, are placed in a pile or enclosure. Over time, in the presence of oxygen, heat and moisture, biochemical processes convert the waste to stabilized compost, which resembles rich, dark, potting soil. Pathogens are nearly eliminated and the volume of the organic material is reduced by 90 percent or more.

The same biochemical processes are employed by composting toilets to treat human waste. A composting toilet is a system that provides an environment within a container for *aerobic* (in the presence of oxygen) decomposition and stabilization of waste. It is a miniature, on-site sewage treatment plant. It is NOT a dehydration system which uses heat to dry waste, nor a "waste reduction system" which circulates large volumes of air over the waste to evaporate liquid, nor a "recycling system" which merely stores the waste for periodic removal and composting at a remote facility.

Not all composting toilets are created equal. They vary in size, materials, features, effectiveness, maintenance, energy requirements and safety. In choosing a composting system, we recommend that you consider the following questions.

1. *What are the durability, suitability and longevity of the materials used in manufacturing?*
2. *Does the size and shape of the composting vessel make sense?*
3. *Does compost removal require a pumper truck or climbing into the tank?*
4. *Can you remove compost without also removing fresh waste?*
5. *What are the energy and ventilation requirements?*
6. *What are the long term operating costs?*
7. *Would you personally be willing to perform the required maintenance?*
8. *Are the product specifications meaningful?*

At Advanced Composting Systems, we manufacture the Phoenix Composting Toilet, a large and very rugged composting system that provides for the *safe* and *effective* stabilization of human waste on site. The insulated tank, efficient ventilation system and automatic controls assure the lowest possible heat and electrical requirements; most often these requirements can be met with solar energy. The Phoenix's built-in rotating tines and vertical design assure higher quality compost and easier, safer maintenance.

Our public facility models are displayed schematically on page 6 and in Appendix E.

We also design, manufacture, and install prefabricated buildings (Appendix D) that house our composting toilets. Many of these structures are placed in remote areas and therefore feature built-in photovoltaic systems for generating electricity, solar hot air collectors for keeping the composting equipment warm, and computerized controls that regulate the operation of pumps, fans, lights, and monitoring devices.

Please contact us if you have questions about your application.

— *Glenn Nelson*

The Planning Procedure

The process for planning and designing a Phoenix composting toilet facility for a specific application requires several important steps. The following application guide will help in this process. If you need further information for a unique situation, please contact us. ACS designs, supplies, and installs complete "turn-key" facilities satisfying a wide range of criteria. We also perform site visits to help select a building location.

An outline for the planning process follows. Some steps will be easy, others will require research, design decisions and tradeoffs. All are important to guarantee a successful project. Our application guide follows this outline. Refer to it to assist with each step.

Phoenix considerations

1. Is a composting toilet appropriate for this application considering the type of user, environment and maintenance commitment?
2. Determine the amount, type and season of use expected for the design life of the facility.
3. Determine the capacity of the Phoenix, model and quantity of systems needed for the expected environment (temperature, maintenance and use). Will supplemental heat be required to facilitate composting?

Facility considerations

1. Accessibility for the handicapped. Is formal ADA accessibility compliance required?
2. Sunlight availability for solar heat and electricity. What, if anything, will obstruct direct sunlight?
3. Sloped ground to provide a daylight basement.
4. Avoid confined space problems!
5. Does leachate require a holding tank or evaporator for zero discharge or is an on site leachfield possible?

Operational considerations

1. Maintenance! Maintenance! Maintenance!
2. What will you do with the removed compost?

§ 1.0 — When does a Phoenix make sense?

Certain management and site conditions suggest a composting toilet while others are inimical to its success; employing a Phoenix does not always make sense. A better alternative may be a conventional system, vault toilet or pit privy.

§ 1.1 — What circumstances exploit the Phoenix's unique characteristics?

- At *heavily used backcountry sites* where access and transportation are limited, the Phoenix needs only simple manual maintenance.
- In *environmentally sensitive areas* such as lakeshores, the Phoenix offers zero discharge.
- Where *no utility electricity is available,* a photovoltaic system can be used to supply the Phoenix's minimal electrical needs.
- Where *water scarcity precludes flush toilets*, the waterless Phoenix will operate. To facilitate maintenance, provide a small amount of pressurized water from a rain water cistern.
- *Winter freezing conditions* which may damage pipes and fixtures in a conventional flush system will not damage the Phoenix. As long as the tank is in a heated space, the composting process continues. A drainback water supply for sink faucets offers the same freeze protection.
- In *high density campgrounds,* a Phoenix facility's odorless toilet room and aerobic decomposition are more aesthetic than a vault toilet's penetratingly offensive odor.

§ 1.2 — When does a Phoenix *not* make sense?

- Consistently cold conditions that reduce the Phoenix's capacity below use requirements will result in incomplete stabilization of the end product and in unhealthy and unpleasant maintenance.
- If sewer and water connections are available, a flush system may be less expensive.
- Severe vandalism could destroy a composting system. A hardened concrete vault and toilet building offer more immunity.
- Inconsistent or improper maintenance will reduce tank capacity and composting efficiency resulting in poorly decomposed end product.

§ 2.0 — Sizing the facility

How many tanks and how many toilets will a facility need? The answers depend on total annual use, and peak daily use. "Uses" should not be confused with the number of people in an area, for "uses per person" varies depending on the nature of visitor activities in an area.

The number of total annual uses determines how many tanks are needed. The peak daily use determines how many toilets must be installed (a tank can accommodate two toilets).

When calculating rates of use, one often needs to account for the accelerated rates of use that can occur following the opening of a new facility ("if you build it, they will come and go").

The Phoenix's capacity is rated in average uses per day and varies according to the tank's temperature, the type of use, and the frequency and quality of maintenance.

§ 2.1 — Predicting facility use

The total annual use for a facility can be inferred (with varying degrees of accuracy) from a variety of data. Here are a few common situations:

Highway rest areas. The Federal Highway Administration has quantified toilet use as a function of traffic counts. Thus historical traffic count data can be used to estimate current use and project future use.

Existing facilities. The amount of use at an existing toilet facility can be calculated from:

- *Water consumption,* provided that the water is metered. This is true even when water is used only for washing, as in the case of a facility equipped with pit toilets.
- *The volume of waste* pumped from a vault or portable toilet (20 uses/gal., 5 uses/liter).

- *The consumption of toilet paper.* For example, 90 uses per roll seems to be the norm for restricted delivery holders.
- *Door counters.* We sell an automated door counter that can be retrofitted to any facility with a toilet room door. This, obviously, is the best method for ascertaining the amount of use.

Campsite capacity and occupancy. In campgrounds, the daily per capita use of toilet facilities is a function of access, recreational opportunities, and the amount of time spent in the area:

- *At campgrounds accessible by vehicles,* daily per capita use ranges from 3 to 5. The average group numbers 3 persons, but may be larger in campgrounds that attract a high percentage of family use. Campgrounds offering close-at-hand recreational opportunities, such as swimming or fishing, experience longer stays and higher per capita use than sites that are used mostly for overnight stops.
- *At backcountry campgrounds,* daily per capita use ranges from 2 to 3. Tallies from trailhead registers, and the number of campsites, can be used for estimating backcountry facility use.
- *At facilities for day hikers,* daily per capita use is between zero and one. Tallies from trailhead registers, and/or vehicle traffic counts, can be used to estimate the amount of day use.

Parking areas. The number of parking spaces, visitor turnover rates, and remoteness affect the rate of toilet use.

§ 2.2 — Determining the Phoenix's capacity

Capacity is the amount of use (expressed as "uses per day") the Phoenix can sustain while producing stabilized, non-offensive, liquid and solid end products with low coliform counts, solids with a moist but not saturated texture and liquids with a high ratio of nitrate to ammonia nitrogen. Removing compost from a Phoenix that has been properly maintained, and used within its capacity rating, will not be an unpleasant operation.

Our ratings are conservative, and are derived from operational experience. We have equipped representative facilities with data loggers to record temperature and use and we visit many Phoenix installations to retrieve use data and to assist with removing compost. Our extensive hands-on experience with the capacity-environment-maintenance relationship has allowed us to quantify capacity as a function of maintenance and ambient temperature. We continue to refine our numbers by monitoring existing facilities, and through an ongoing research and development program.

§ 2.2.1 — Temperature

The rate of decomposition within a Phoenix primarily depends on the internal temperature of the compost pile. The higher the pile's temperature, the more rapid the decomposition, and thus the higher the capacity of the tank. Moreover, a relatively small increase in compost temperature results in a relatively large increase in the rate of decomposition.

Proper temperature management is critical to successful composting. Two temperatures affect the composting process:

Ambient temperature is the temperature of the tank's surroundings and ventilation air supply. This temperature can differ significantly from the out-of-doors air temperature, and/or from the temperature of the ground. A low ambient temperature increases the heat loss from the Phoenix and depresses the compost temperature.

Compost temperature is the temperature of the compost pile. When significant composting activity occurs, the compost temperature almost always will be higher than the ambient temperature. Conversely, a low compost temperature indicates a "cold tank" and a lack of significant composting activity.

Compost self-heating. The biochemical reactions of the composting process produce carbon

dioxide and water, and release energy, heating the compost pile. The rate of the biological and chemical processes involved in composting approximately doubles for every 18°F (10° C) of increase in compost temperature. Self-heating occurs when the pile has sufficient fuel, moisture and oxygen, and when the ambient temperature is high enough that the reactions can be sustained. The Phoenix's low ventilation rate and insulated tank hold the heat generated by the compost pile.

Composting activity is very slow at ambient temperatures below 55° F (10° C), but accelerates rapidly as the ambient temperature rises. Our specifications assume a minimum ambient temperature is 65° F (19° C).

Ventilative and evaporative cooling. The Phoenix is kept odorless by drawing air through the toilet and tank, and expelling it through a vent in the roof.

Air flowing through the Phoenix increases the evaporation of liquid, cooling the pile. In addition, heat from the pile is lost when the temperature of the ambient air drawn into the tank is lower than the temperature of the pile. The Phoenix minimizes these losses by ventilating at the lowest rate necessary to control odors and supply oxygen for aerobic decomposition. It is better to use an external evaporator when liquids must be evaporated on-site.

Cold composting conditions. At ambient temperatures below 55° F (13° C), heat loss through the tank wall prevents significant self-heating. Consequently, supplemental heat is mandatory to promote composting. Under cold ambient conditions, we recommend that the Phoenix be placed in a small, well insulated, (solar) heated room

The Phoenix can be used at a reduced rate at ambient temperatures colder than 55° F (13° C). Liquids will still evaporate and drain. Some use is possible even while the tank is frozen, for the compost pile will melt slowly and be treated when temperatures rise. Nevertheless, it should be kept in mind that at very low temperatures, significant composting does not occur and the tank essentially functions as a holding vessel.

Unlike conventional plumbing, which can rupture when frozen, the Phoenix tank is not damaged by freezing.

Table 1
Phoenix capacity as a function of ambient temperature
Uses per day & (per year)

Temp	Model 200	Model 201
Frozen	200 cumulative	300 cumulative
55° F	15 (5,500)	25 (9,000)
65° F	30 (11,000)	50 (18,000)
75° F	60 (22,000	100 (36,000)

Adjustment. If day use is the predominant use (higher urine to feces ratio), increase the capacities for 65° and 75° by approximately 30 percent.

§ 2.2.2 — Maintenance

Maintenance is the other major parameter affecting capacity. Frequent, thorough maintenance — spraying liquid, adding bulking material, and mixing the compost pile — increases the rate of decomposition.

Table 2
Sample capacity calculation for a Phoenix 201

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Ave mthly temp	<32	<32	40	55	65	80	85	80	70	60	55	40
Sust. uses/day	—	—	25	25	50	100	100	100	50	50	25	25
Sust. uses/mth	300	300	750	750	1,500	3,000	3,000	3,000	1,500	1500	750	750

Annual capacity with above conditions is 17,100.
Annual capacity at 65° F is 18,000.
Annual capacity at 75° F is 36,000

Annual capacity at 75° F with day use and mostly urine is 46,800.

Moisture management. The proper moisture level and porosity of the compost pile (from the addition of bulking agents, such as wood shavings) must be established. The Phoenix includes a liquid spray system to help maintain moisture levels. The addition of bulking material is a simple task when performed frequently. The Phoenix includes built-in rotating tines to mix the bulking material with waste; additional raking often is unnecessary.

Pile aeration management. Because raw fecal matter is too wet and non-porous to compost, it must be mixed with a bulking agent — we recommend white wood shavings — to provide the structural support and the airspaces necessary for aerobic decomposition. The bulking agent must be thoroughly mixed into the pile. The more frequently the bulking agent is added to the pile, the less frequently mixing the pile will be required.

User behavior. At day use facilities, the urine-to-feces ratio is higher than at overnight facilities. This translates into an increase in capacity of 30 percent.

§ 2.3 — Total sustainable use

The amount of use that the Phoenix can sustain in any month correlates reasonably well with the average ambient temperature for that month. Use at 150 percent of capacity can be sustained for long periods as long as monthly averages are within ratings. Even higher rates of use can be accommodated for short periods, such as a Fourth of July Weekend. The capacity of properly maintained Phoenix systems for different ambient temperatures is shown in Table 1.

§ 3.0 — Facility design and site selection requirements and tips

§ 3.1 — Selecting a site

Choosing a site for a Phoenix facility will have dramatic effects on system capacity, building design, user accessibility, energy use, maintenance effort, and construction cost. Therefore, thoughtfully consider the needs of the composting toilet and maintenance personnel as well as visitors when selecting a site.

Sloped terrain. The Phoenix can be installed on level ground, but taking advantage of sloped terrain will reduce the excavation requirements and allow easier access to the tanks for maintenance. It is more convenient for maintenance persons to enter a daylight basement through a vertical door than to descend stairs into a full basement. A daylighted basement can also be smaller, since large doors in front of each Phoenix permit the required maintenance area to extend outside the building. We recommend a daylighted basement if the terrain slopes 20 degrees or more. Access to the toilet rooms is provided easily by extending a small deck and ramp to the hillside.

Flat terrain requires a full basement or an elevated building. Conventional stairs and perhaps active ventilation may be required to avoid a permitted confined space. Providing a 5-foot area in front of the Phoenixes, artificial lighting, and reflective white walls, facilitates maintenance. Avoid a flooded basement by building above maximum high ground water, elevating the building slightly, sloping soil away

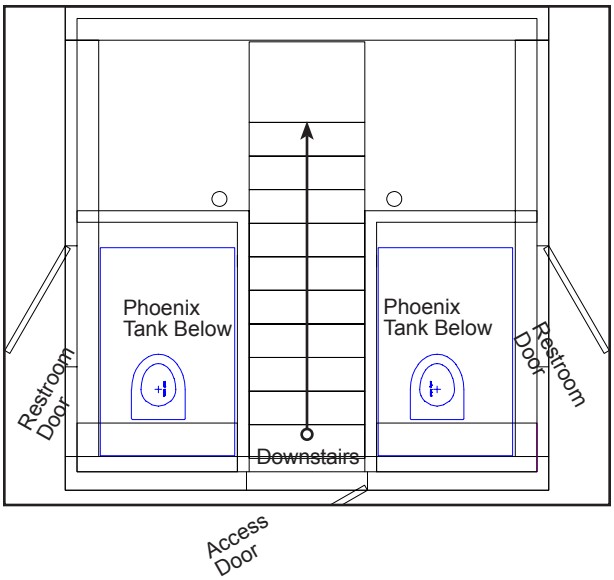


Figure 1. *Top view of a toilet building with two Phoenixes located in a full basement with stairway access.*

from the foundation, and adhering to good drainage practices.

If high ground water or impenetrable rock precludes excavation, an elevated building is necessary. A stairway, or an extended ramp for accessibility may be required.

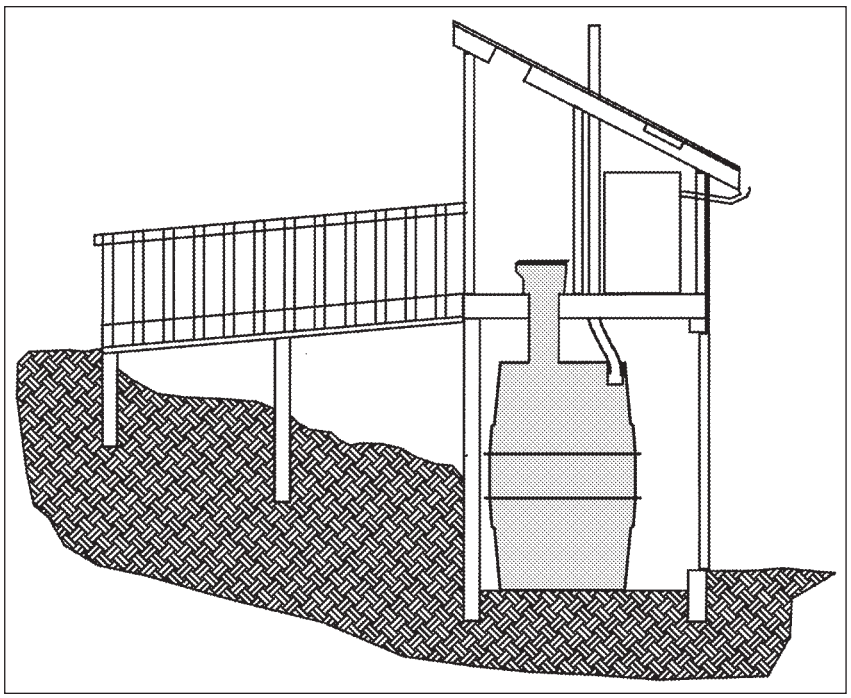


***Figure 2**. Side view of a toilet building with a daylight basement. This is the preferred configuration as it eases maintenance considerably.*

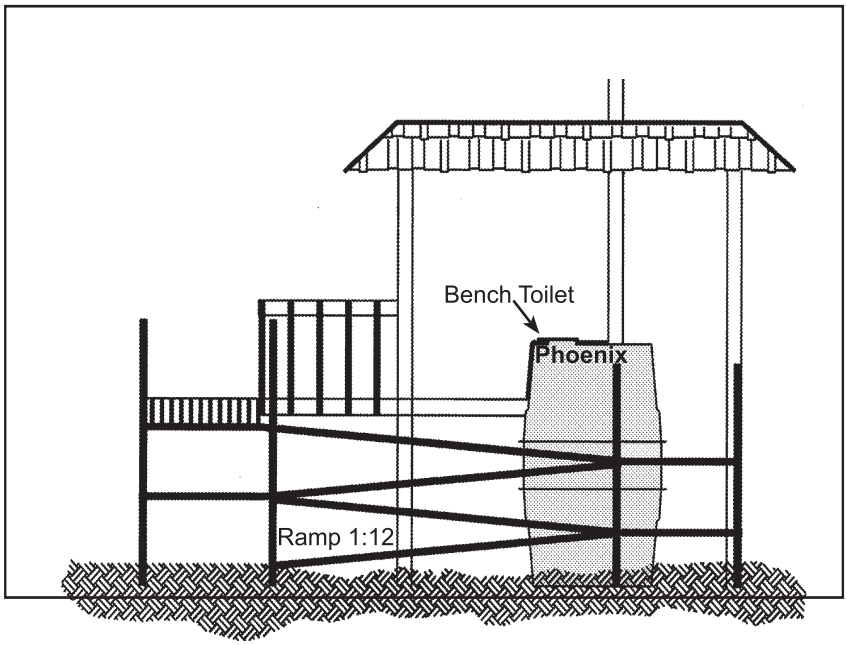


***Figure 3**. An elevated toilet building with a bench toilet and a ramp for universal access.*

Disposal of liquids. Suitable conditions must exist for disposing of the liquid end product from the Phoenix. If local conditions, such as high ground water, preclude a leach field, then provide a holding tank, a raised bed evapotranspiration system, or a Phoenix liquid evaporation system. A holding tank requires strict attention to prevent overflows.

Preventing unauthorized dumping and vandalism. If the Phoenix is located near a parking area, the design must prevent the emptying of recreational vehicle holding tanks into the toilet. Locate the building far enough away from the parking area that drain hoses cannot reach it, or elevate the building slightly so that the toilet is above an RV's holding tank. Provide a waste dump near the building that offers a convenient alternative, and post signs advising users against dumping chemical toilets and holding tanks into the Phoenix.

Similarly, locate trash cans and cigarette disposal containers immediately outside the building to reduce misuse of the Phoenix. If trash collection needs to be minimized, a trash container inside the toilet room will intercept those intent upon misuse, while not attracting others to dispose of their trash.

§ 3.2 — Designing the building

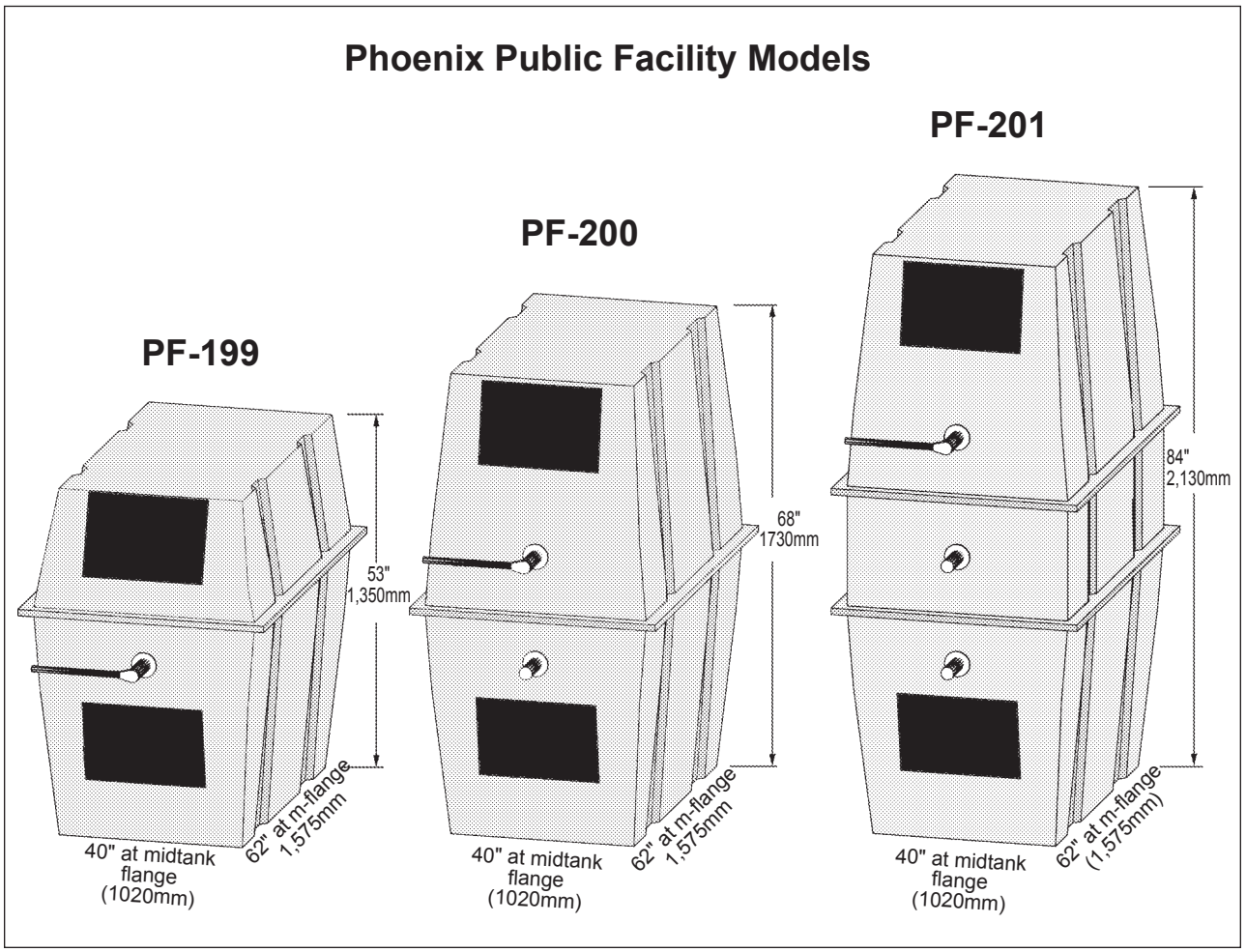
Nearly any building design satisfying the following conditions is compatible with the Phoenix:

- The Phoenix must be located directly below the toilet(s).
- The tank must rest upon a smooth, level, flat surface.
- Convenient access, good lighting and ventilation, and adequate space in front of the Phoenix, must be provided for maintenance operations.
- Adequate space for storing the bulking agent and supplies must be provided.
- The Phoenix's 4-inch DWV ventilation pipe should be supported by the building framing, and extend above the roof ridge for proper air flow.
- A drain, holding tank, or evaporation system for the liquid end product must be provided.
- Electricity must be available for the Phoenix's ventilation fan, pump(s), and other systems.
- The tank area must be maintained at or above the temperature upon which the Phoenix's capacity rating is based.

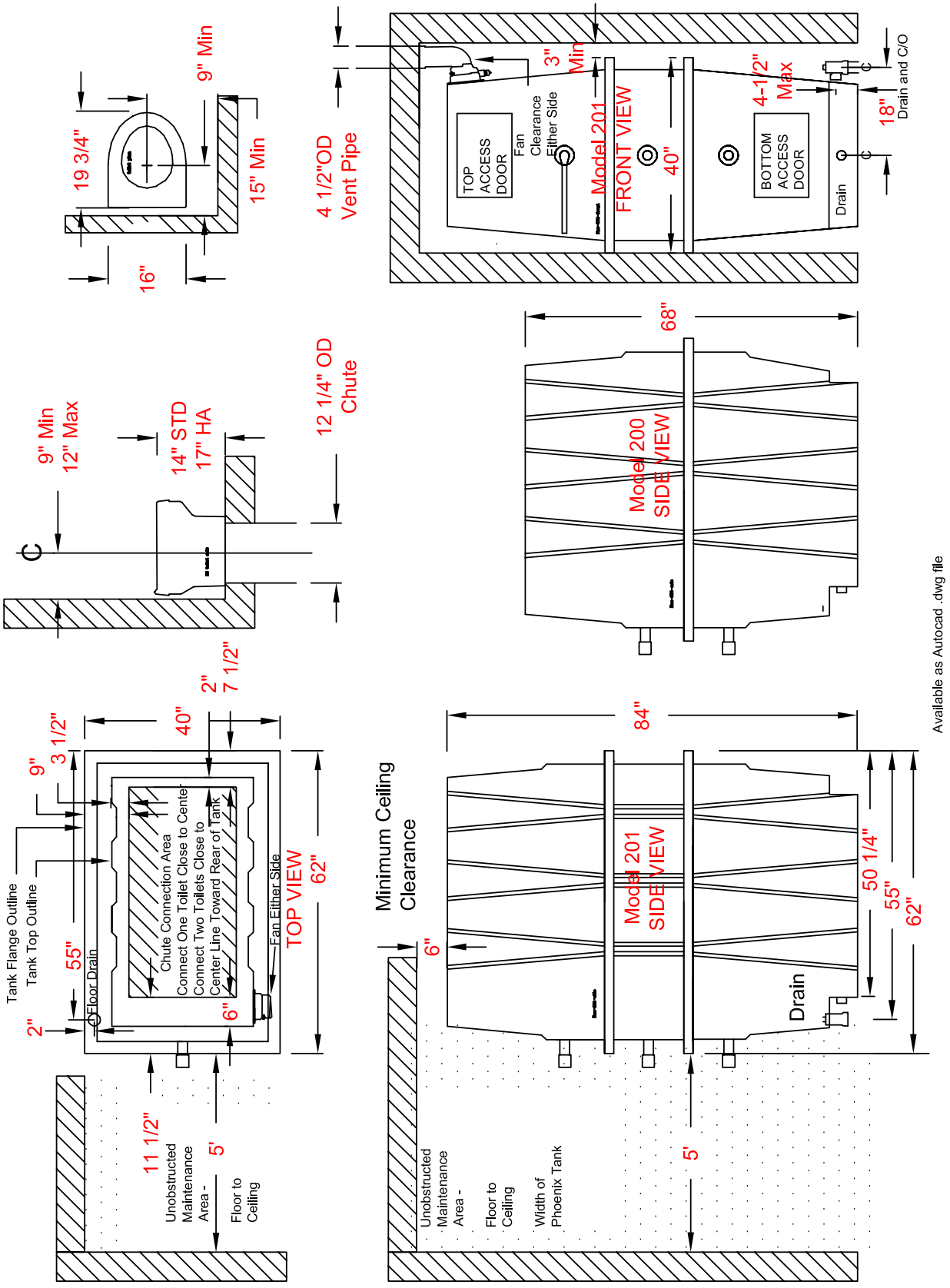
§ 3.2.1 — Placing the tank

The dimensions of the Phoenix composting tanks are shown below. Installation clearances for Phoenix components are shown in the following figure

Provide convenient access to the Phoenix so that the composted end product can be removed easily from the basement area. It is very convenient with a daylighted basement to locate a 3-



Phoenix Dimensions and Clearances



foot-wide or larger door directly in front of each Phoenix so that the composted material can be shoveled directly into a wheelbarrow or other container (we provide a bin). For full basements, a good stairway is essential. Ladders and wall-mounted rungs are not only inconvenient, they are dangerous and create a confined space. If a conventional stairway is impossible, Lapeyre manufactures a very compact 56-degree alternating tread stair that is quite convenient for basement access.

§ 3.2.2 — Placing the toilets & urinals

Dimensions of the Phoenix toilet and installation clearances are shown in the previous figure. One or two toilets can connect to a Phoenix tank. The twelve-inch diameter toilet chutes must be vertical and enter the Phoenix tank top within the shaded area in the previous figure, although centering the chutes is preferable. For a two-toilet installation, the toilets must be located back-to-back against a common partition wall.

A trapless porcelain or stainless steel urinal can be connected to the Phoenix with conventional 1-1/2-inch DWV pipe. The pipe must slope continuously toward the Phoenix and enter the tank at least 6 inches away from side walls. The DWV pipe connects to the urinal drain and extends vertically through the floor or horizontally through the wall.

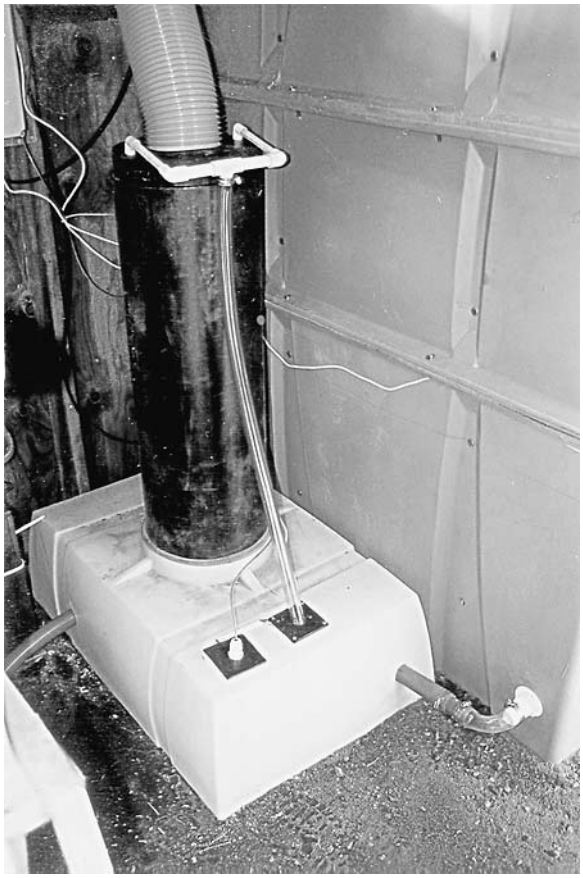
§ 3.2.3 — Options for managing Phoenix Leachate

Usually not all of the liquid in a Phoenix will evaporate so some method for disposing of the leachate must be provide. Three strategies are viable

Ground disposal on-site. If soil conditions and pertinent environmental considerations allow, the simplest strategy is piping the liquid to a small leach field. If high ground water and/or a thin soil layer is a problem, construct an earthen raised bed.

Off-site disposal. The excess liquid can be transferred into a holding tank, and subsequently disposed of at an approved site.

Evaporation on-site. A secondary evaporation system is a viable strategy in warm, dry climates. Under favorable conditions, the Phoenix's companion evaporation system (photo below) can evaporate all of the liquid end product and limited amounts of graywater. In cold, humid sites, no appreciable evaporation occurs. Please see Appendix A, and/or contact us, for site-specific information on evaporation systems.



§ 3.2.4 — The ventilation system

The Phoenix is equipped with a rugged, efficient, ventilation system. The fan housing mounts directly over a precut hole on either side of the tank top, or at any other accessible location in the tank top. This allows the fan to be cleaned easily without removing it from the housing, or to be replaced easily.

Four-inch flexible hose connects the fan housing to 4-inch DWV pipe which is easily contained within a 2x6 framed wall. The pipe and hose

should slope continuously towards the fan housing so that liquid from rain or condensation will run back to the fan drain.

The 4-inch DWV pipe should exit through the roof near the ridge to avoid potential snow loads and downdrafts. Several shroud arrangements can conceal one or several juxtaposed Phoenix and evaporator vent pipes as long as the exhaust air exits several feet above the roof in an upward direction. Do *not* enclose vents in a louvered cupola.

If the Phoenix is used in subfreezing temperatures, insulating the exterior vent pipe and the interior sections passing through cold areas helps prevent condensation and freezing. The room in which the Phoenix is located should be provided with a 25-square-inch (150 cm^2) opening for ventilation makeup air.

§ 3.2.5 — The electrical system

All electrical devices and accessories supplied with the Phoenix operate on direct current: exhaust fans, pumps, light fixtures, and the system monitor and controller. Twelve-volt systems are the default, but 24-volt systems are available (we install both, and can help you determine which is best for your situation). If power from a utility's electrical grid is not available, electrical requirements can be met from an independent generating system, such as our photovoltaic system. We provide an a.c. power supply for use where 120-volt a.c. is available.

Photovoltaics. If a photovoltaic system is required, provisions must be made for mounting the photovoltaic array in an unshaded area, routing the array output conductors into the building, and locating the batteries and controller in the maintenance area. If utility supplied 120-volt a.c. electricity is available, locate an electrical outlet close to the Phoenix for the power supply and controller.

§ 3.2.6 — Strategies for managing the tank temperature

As explained above, the Phoenix must be in a warm environment to compost effectively. The composting process itself generates energy that increases the temperature of the compost pile, but first the compost pile must be warm enough for sufficient activity to take place. As the temperature of the Phoenix is increased, the rate of composting and heat generation increases.

In a below-ground basement, the predominant influence on the temperature of the tank room is the temperature of the ground, which can be much cooler than the outside air temperature during the season of use. Moreover, in some climates the outside air temperature varies greatly throughout a 24-hour period. If the ambient temperature in the Phoenix room drops below 65°F (19°C) , the tank cools and the rate of decomposition declines sharply, reducing capacity. At ambient temperatures of 55°F (13°C) and lower, composting slows to a virtual standstill.

§ 3.2.7 — Preventing a cold tank room

Basically, there are two strategies:

Insulation. The first step is insulating the entire tank room, including the floor, ceiling, doors and foundation walls to reduce heat loss.

Supplemental heat for the tank room and/or tank. In a well insulated room, a relatively modest input of energy results in a significant rise in temperature. We have constructed many buildings incorporating an active solar collector in the roof framing. Hot air from this collector is ducted into the tank room, or to the Phoenix's air inlet. Conventional electric or gas space heaters also can be used to heat the room.

§ 4.0 — Maintenance requirements

The Phoenix operates much like a garden compost pile, requiring adequate food, air, moisture, and heat to support the organisms that transform wastes into a stable end product. The key to successfully operating a composting toilet is maintenance — and the easier it is to perform, the more reliably it will be done. The Phoenix's design invites proper maintenance with its convenient access doors, rotating tines, separation of liquid from solid waste, and liquid spray system.

- Rotating tines stir the compost pile from outside the tank and control the movement of compost downward to the access area

- Internal baffles separate the liquid and solid end products before the liquid receives secondary aerobic treatment beneath the lower baffles.
- Fresh water and/or treated liquid is automatically sprayed periodically onto the compost pile to inoculate the pile with bacteria, and to maintain the compost pile's moisture so that the solid end product is merely moist, not dripping wet, and can be removed easily from the entire tank bottom below the lower tines.

Maintenance requirements and frequency depend upon the amount of use the system receives. Bulking agent must be mixed into the waste pile thoroughly, and trash removed, at least every few hundred uses. A heavily used system requires frequent attention and considerable bulking agent (approximately one gallon per 100 uses). Locate a storage bin for bulking agent and a container for liberated trash in a convenient location near the Phoenix.

Waste pile moisture must be checked and either more bulking agent or liquid added as needed. Systems in hot, dry climates, or systems that are used very lightly, require more attention to moisture control. Keeping the waste pile moist also prevents fires from vandalism or misuse. All Phoenixes include a programmable automatic spray system that uses liquid end product and/or fresh water to moisten the compost pile periodically.

Under many circumstances users can add bulking material through the toilet after each use, a "wood shavings flush." This reduces mixing requirements so that periodically rotating the tines is sufficient to maintain a homogeneous mixture.

We strongly recommend keeping a log of conditions and actions (e.g. door counter readings, amount of bulking agent added, compost pile height) for a historical record and continuity among maintenance persons. We provide a suggested format and a get-started set of log pages along with our operating manual. The complete *Phoenix Operation and Maintenance Instructions* is available on our website (www.compostingtoilet.com) as a PDF.

§ 4.1 — Solid end product (compost)

The amount of end product, and the frequency of its removal from the Phoenix, depends upon the amount of use, the rate of decomposition, and the quality of maintenance the system receives. The volume of finished end product is reduced by evaporation, draining (which also carries away dissolved and suspended solids), and decomposition. Coarse wood shavings, recommended for a bulking agent, do not decompose completely. However, they do compact and smaller particles fill some of the air voids.

Finished material should be removed from the Phoenix at least every two years. Approximately 12 bins of material (90 U.S. gallons, 350 liters, or 12 cubic feet) should be removed from beneath the tines. The amount of solid end product which must be removed from the Phoenix so use is sustainable will be about 30 liters (8 gallons) for every 1,000 uses, less if the tank is used at a lower rate or receives mostly urine. If this is too much, some material can be reintroduced at the top of the tank to maintain the compost level or some loosened material can be left in the clean out area below the tines.

Under the EPA's sludge rule, 40 CFR part 503, Phoenix compost is a class B material suitable for land disposal in an area with restricted public access, e.g., burying on site. Finished compost must be handled carefully since it can contain some parasites and pathogens. However, it also contains valuable nutrients which can be reused by plants. If the compost is pasteurized, (a solar pasteurizer is easy to construct and very effective in sunny areas) it can satisfy EPA Class A requirements and may be applied on site with no restrictions.

§ 4.2 — Liquid end product (leachate)

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.

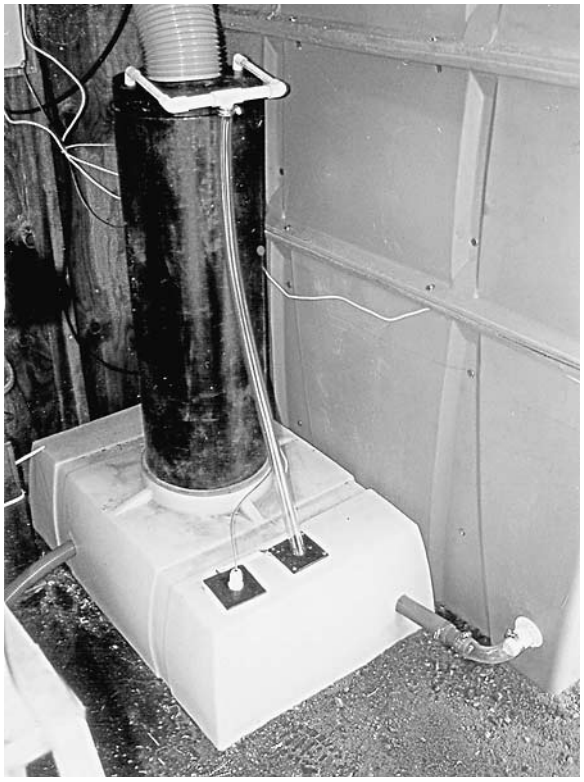
Incoming ventilation air circulating above the secondary liquid treatment medium can evaporate some of this liquid. The remaining liquid draining from the tank should be directed to a leaching field, holding tank, or a secondary evaporator. The liquid end product contains considerable bacteria and dissolved salts, but generally has a low coliform indicator concentration (<200 org/100 ml), low BOD, (<50mg/liter) and low TSS (<100 mg/liter) compared to septic tank effluent, so a short (10-foot; 3-meter) leach line is all that is necessary.

§ 4.3 — Zero discharge on-site. If the Phoenix is located in an area where zero discharge is desired or mandatory, the liquid can be stored in a holding tank for periodic removal, or it can be eliminated with a secondary evaporation system. Either a small evapotranspiration bed or a compact active evaporator system can be employed. We can assist with design of the former and can supply the latter. Our liquid evaporation system (detailed in Appendix A) includes a storage tank for peak loading, and a vent system and controls to optimize evaporation while using energy efficiently. Please contact us for additional information.

Appendix A — Evaporating Phoenix Leachate

Principles. Leachate from the Phoenix is generally free of coliform bacteria, but can have significant amounts of nutrients such as phosphates and nitrates. At some sites it is imperative to keep these nutrients out of the environment to avoid eutropfication of surface water. Because the leachate is mostly water, evaporation is often a practical and affordable alternative to transporting it from the site.

Evaporators require a steady flow of warm, dry air to provide the energy to vaporize the water. Evaporation is more efficient, requiring less air flow, under hot, dry conditions than under cool, wet conditions. In cool and/or moist climates, preheating the air that is blown through the system increases the evaporation rate — but the process is energy intensive.



ACS auxillery evaporator *with a 50-gallon tank holding tank connected to two Phoenixes. The 12 or 24-volt d.c. fans draw 30-60 watts. The high volume 110-volt a.c. blower draws 130 watts. The evaporator is designed for efficiency, durability, reliability, and easy maintenance.*

As a general rule, using solar collectors to support preheating the air is more economical and environmentally sound than using electricity or burning hydrocarbons. For sites that are off-grid and off-road, solar collectors are the only practical source of preheated air.

Planning. Evaporation potential is maximized by integrating the evaporation hardware with the building, and by performing a site-specific analysis of the parameters affecting evaporation prior to designing and constructing the facility. We can analyze the evaporation potential for your site so that your installation's configuration is optimized for your conditions.

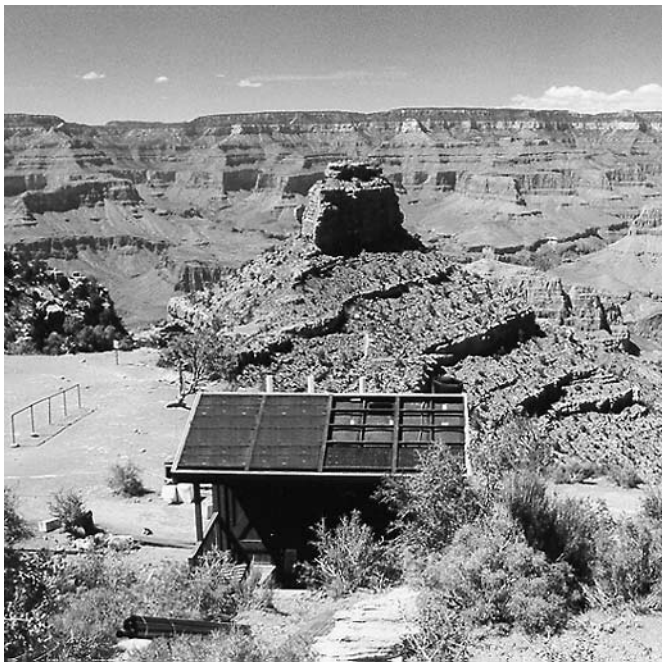
ACS Evaporators. Our evaporator's design is based upon the pioneering work of the New York Department of Environmental Conservation. The system consists of a tank that stores surge flows, and an evaporation tower containing an evaporative medium with a large surface area to volume ratio. A pump sprays liquid on the media in the tower while a fan moves air through the tower, accelerating evaporation. The control system monitors the level of the liquid, and optionally, humidity and temperature.

Capacity. In relatively warm (95° F, or 35° C) and dry (25 percent relative humidity) conditions this system can evaporate the leachate from 30 toilet uses per day, approximately 1-1/2 gallons. The higher volume a.c. blower increases the capacity. A larger system with more media and higher air flows can evaporate the leachate from 100 uses/day. Higher humidities and/or lower temperatures reduce evaporation rates significantly.

Appendix B — Phoenix Electrical Loads & Photovoltaics

Off grid qualified. The Phoenix has extremely low electrical requirements, and thus is ideal for off-the-utility-grid installations. This is by design.

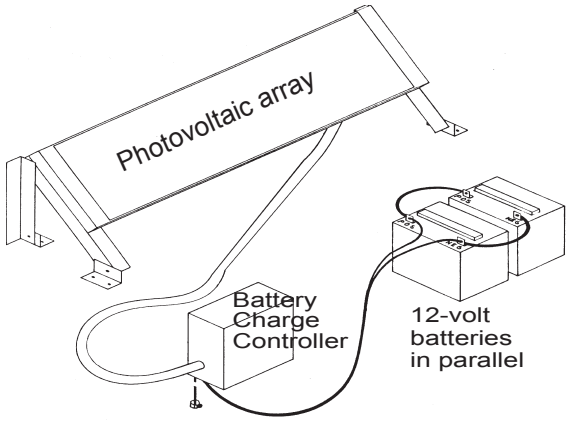
Typical loads. The Phoenix's 12-volt d.c., five-watt ventilation fan nominally consumes 120 watt hours each day. A 24-volt fan is optional. During periods of low use, such as midnight to dawn, the fan can be slowed to a two-watt draw, reducing daily energy consumption by 10–20 percent.



An ACS photovoltaic system under construction in Grand Canyon National Park (Cedar Ridge along the Kaibab Trail).

Rugged, twin-walled Lexan plastic protects the photovoltaic array, and does double duty as weatherproof roofing. Lexan covers the finished half of the roof. Right, photovoltaic panels are being installed

Typical configuration for charging 12-volt storage batteries with a photovoltaic array



Photovoltaics. In reasonably sunny climes, a single photovoltaic array and matched lead-acid battery and charge controller can power both the Phoenix and small loads such as lamps. Additional panels and/or an auxiliary generator may be necessary in cloudier situations, and more northerly latitudes. Sunlight access to the photovoltaic array must not be obstructed by trees, buildings, or landscape features.

Wind and micro-hydro. Even the smallest systems usually can handle the Phoenix with ease, and without requiring significant adjustments in electricity consuming activities.

Hydrocarbon fueled generators. Although less friendly from an environmental standpoint, these are viable options both as backups for renewable energy systems and as primary systems. Even a 500-watt generator can recharge a battery in an hour or two.

How we can help. We design and install photovoltaic systems that are reliable, efficient, and affordable. We can supply individual components such as photovoltaic panels, battery charge controllers, batteries, mounting hardware, inverters, and hard-to-find d.c. lights and pumps.

Which is best — low voltage d.c. or inverter supplied 120-volt a.c.?

There is no single answer. We recommend starting with d.c., adding an inverter only if 120-volt a.c. is unavoidable.

Low voltage direct current. Twelve and 24-volt d.c. systems have fewer components, thus greater efficiency and reliability and, usually, lower cost. All of the Phoenix's electrical components are powered by d.c., and we use d.c. for the lights and pumps in all off-grid toilet buildings.

Inverter supplied alternating current. Standard 120-volt a.c. requires smaller wires than 12 or 24-volt d.c. for a given load, important for long runs of wire. Some electronic and motorized equipment requires a.c. Some maintenance electricians are more comfortable with a.c. An inverter increases system complexity while reducing reliability and (usually) efficiency, and adds to the cost.

Appendix C — A Case Study in Energy Efficiency

Careful planning pays. ACS designed and installed a photovoltaic system that reduced pollution and brought peace and quiet to the north entrance station for Crater Lake National Park. This project was successful because the site was suited for solar energy, and because a careful analysis of the entrance station's true electrical needs was performed prior to designing the system.

Reprinted from the January, 1996, *Maintenance News,* published by the Pacific-West field area of the National Park Service.

MAINTENANCE NEWS
NATIONAL PARK SERVICE
PACIFIC—WEST FIELD AREA
VOLUME 1 NUMBER 2 JANUARY 1996

Photovoltaics Power An Energy Hungry Entrance Station

New technology soothes rattled nerves, improves working conditions and silences gasoline generator at beautiful Crater Lake NP. All this without polluting the air or burning a single hydrocarbon.

The North Entrance Fee Collection Station at Crater Lake National Park is only open about 100 days every summer. This does not, however, diminish the station's energy needs. Commercial power is [not] available to this remote location. An 8000-watt generator filled the bill, powering electric heaters, large light fixtures and fans.

Life with a generator.

The thirsty generator was fueled 2 or 3 times a day by station employees shuttling gasoline in the trunk of their cars. The generator's oil was changed every week.

The station's remoteness had one advantage: it allowed thieves time to dismantle and steal the generator.

The staff and management had mixed emotions about their loss. The theft, in truth, did have a silver lining: managers decided to operate the station with a photovoltaic system.

Starting over

To design the new system, four major issues were addressed. The park needed to:

1. Reduce electric loads as much as possible.
2. Minimize operational and maintenance costs.
3. Meet architectural concerns.
4. Prevent potential vandalism.

Creative Solutions.

Catalytic propane heaters (12V ignition) replace electric heaters, 3M window tinting reduces heat buildup on hot days, high efficiency light fixtures went up, and 12-volt circuits minimize loss associated with voltage inverters.

Batteries are easier to service because they are mounted on a simple cart and two [charge] controllers provide MSX-64 photovoltaic redundancy (essential to any well heeled PV system).

Placing the panels on a 45-foot pole 300 feet from the entrance station solved architectural and vandalism concerns. The batteries and controllers are cleverly hidden in the old generator house, some 150 feet from the entrance station. To the untrained eye, it appears the fee station now has commercial power.

The project costs ($9,500.00) were shared by Crater Lake national Park, the Columbia/Cascades SSO, and Sandia Labs.

Big savings.

The photovoltaic system has been in place for 1.5 years. It is very reliable and operational costs are minimal. In fact, savings realized by the photovoltaic systems will pay for the improvements in just 9.5 years. Factoring inflationary increases, the payback period decreases dramatically. The biggest savings are for the environment because Crater Lake will NOT use some 5.000 gallons of gasoline and 300

Appendix D: ACS Modular Prefabricated Buildings

Advanced Composting Systems manufactures and installs a wide variety of facilities compatible with the Phoenix Composting Toilet. The design of each building addresses the specific conditions and needs at a particular site, such as climate, location, the type and amount of use, and accessibility for the handicapped. We then prefabricate the building in our climate controlled factory.

We specialize in the design and prefabrication of structures that must be transported to remote sites by helicopter, boat, raft, or all-terrain vehicles (ATVs).

Advantages of prefabrication:

Prefabrication provides superior quality control and, by eliminating delays caused by inclement weather, shortens the time needed for construction. Because only building components are transported to the site we need fewer trips.

On site, the project moves forward rapidly and quietly. Most often we are able to erect an entire facility in less than a week using only electricity from the sun. Hydrocarbon fueled generators are not necessary.

Integrated design:

All of the services and features below are tightly integrated into a compact, efficient design that not only is pleasant for users but convenient for maintenance personnel.

Environmentally friendly materials:

Our buildings are constructed using environmentally friendly, durable materials.

- Ammonical copper quatenary (ACQ) pressure treated wood is used for the permanent wood foundation. Unlike chromated copper arsenate (CCA), ACQ contains neither arsenic nor chromium.
- Planks extruded from recycled plastic and wood waste (*Trex* is a popular brand) are used to construct the deck, ramp, railings and balusters.
- Cellulose-cement siding provides fire and decay resistance and unmatched longevity.
- Board made from soybean or sunflower seed waste is used for a small but convenient shelf in the toilet room.

On-site resource generation:

As the drawing on page 17 shows, ACS facilities can provide many services in addition to the Phoenix — even when hookups to conventional utilities are unavailable.

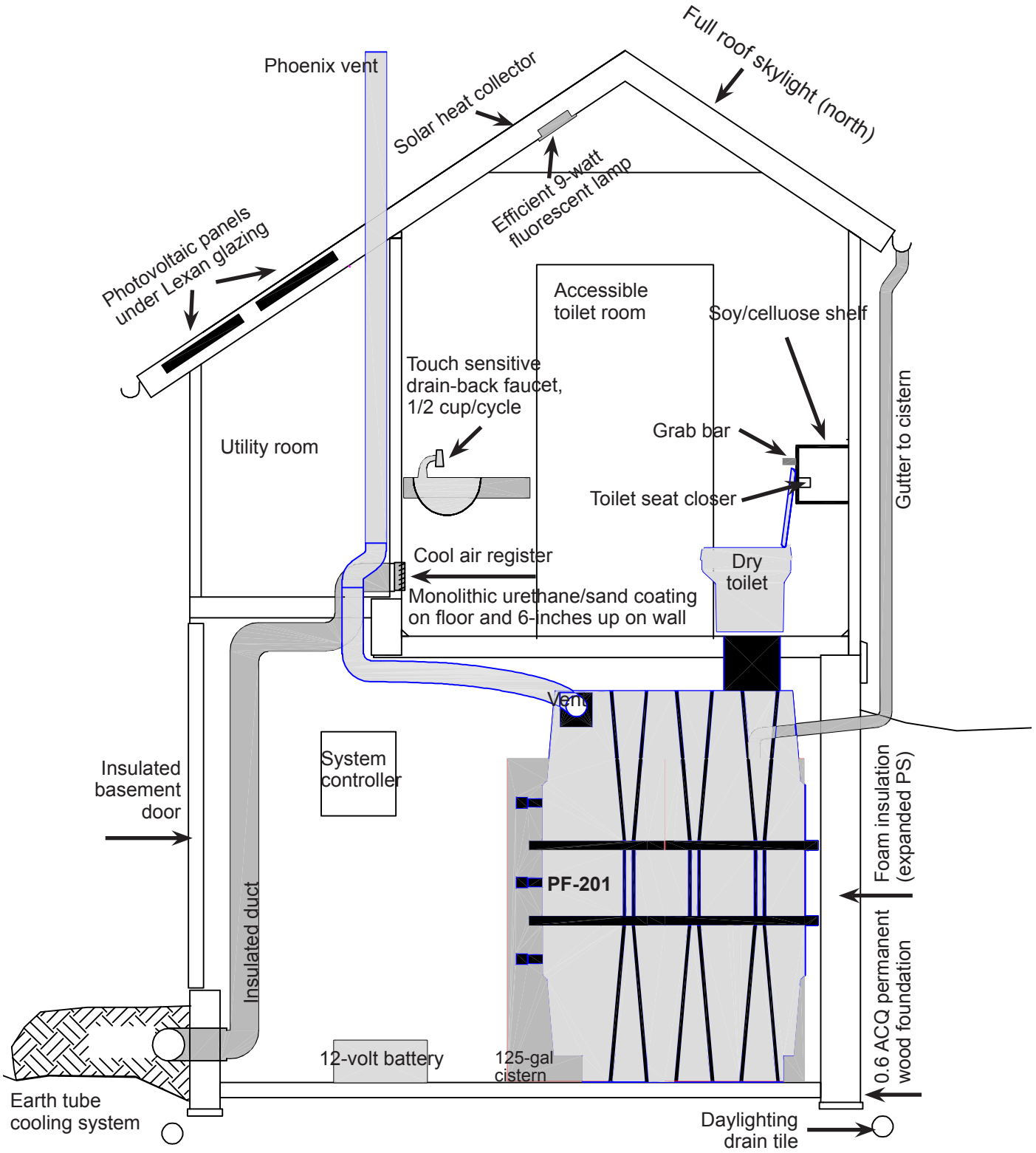
- Photovoltaic panels provide electricity.
- Rainwater collected from the roof is stored in basement cisterns; a pump provides pressurized water for maintenance and hand washing.
- A solar heat collector built into the roof framing delivers hot air that warms the basement.
- An earth tube delivers cool air that cools the toilet rooms in hot climates.

Staying within the resource budget:

The efficient use of resources that are collected on-site requires faithful adherence to a resource budget. Our strategy for staying within a structure's resource budget includes:

- Well insulated building walls to retain or reject heat.
- Efficient compact fluorescent lamp or low power, long life, light emitting diodes (LEDs) to provide nighttime illumination.
- Automatic faucets provide water for hand washing with minimum waste.
- Programmable logic controllers monitor temperatures, the amount of use, and other conditions, so that electricity is used efficiently.

Appendix D — Resource Efficient Buildings



These features are found in an ACS designed, Phoenix equipped, building that ACS installed at Quail Ridge County Park for the county parks department of St. Charles, Missouri.

Appendix E: Phoenix Specifications

General. The Phoenix Public Facility Package shall be supplied as a complete system except for the exterior vent pipe and wood shavings starter bed. The package shall contain all of the components, hardware and instructions necessary for assembling, installing, and operating the system.

The **Phoenix Composting Tank** shall be manufactured with a 1/4" thick rotationally molded, polyethylene exterior shell and a chemically bonded, 5/8" thick foamed polyethylene internal insulation layer. An internally overlapping, gasketed flange shall assure a leak proof joint between tank sections. The system design, dimensions and geometry shall assure that: the entire top of the compost pile is accessible for maintenance; compost travels through the tank in a First-In-First-Out path; all of the oldest material beneath the bottom tines can be removed with a conventional shovel without contamination with fresh waste.

Access Doors shall have a pultruded fiberglass frame, polyethylene interior and exterior faces sandwiching 1" insulation and an anodized aluminum handle. The Access Doors shall fit into extruded aluminum frames sealed to the Phoenix Tank and shall be totally removable to facilitate maintenance.

Baffles shall be located along the interior of both sides of the Phoenix Tank to provide aeration of the compost pile while and not interfering with compost movement.

A **Porous Floor** located above the bottom of the Phoenix Tank shall separate leachate from compost. A stable, aerated medium located beneath this floor shall provide secondary treatment for liquid before it drains from the tank.

Rotatable tines shall assist in mixing the top of the compost pile and control the movement of finished compost to the access area during compost removal. Tine shafts installed in the tank bottom and midsection shall be perforated to provide additional aeration to the interior of the compost pile. An optional air injection system shall control pressurized air delivery to the tine shafts based on toilet use. All components of the tine shaft and bearing assembly shall be innately corrosion proof, fiberglass, UHMW polyethylene, and 316 stainless steel.

The **Vent** system shall consist of a fan assembly; 5' of wire-reinforced, flexible, vinyl interior vent hose; neoprene flashing to fit roof pitches from flat to 12/12; stainless steel screened vent cap and all fasteners required for installation.

The **Fan** assembly shall contain a 5-watt, 12 or 24-volt dc, brushless fan, encapsulated for corrosion resistance so that it will run under water, and a temperature sensor and condensate drain. The fan shall be capable of being powered with a plug-in 120-volt ac power supply or an optional photovoltaic system. To conserve electricity and heat, an optional fan speed controller shall control the ventilation rate based on the time of day, occupancy and battery state of charge.

A **Liquid spray system** shall periodically spray water or leachate on the compost pile to inoculate fresh material with organisms that promote the decomposition process, and to keep the entire compost pile moist.

The **Toilet** shall be manufactured from white cross-linked polyethylene and ABS. It shall be 14" tall (barrier free, 18" tall) and include a black tapered polyethylene liner, 3' of 12" diameter polyethylene chute, tank connector and toilet seat which seals when shut.

All **Fasteners** shall be corrosion proof stainless steel, nylon, or fiberglass.

Maintenance tools shall include a rake capable of reaching to the back of the tank, a tray for collecting finished compost, a reacher for removing trash and a door opening counter to tally uses.

Installation shall be performed by an ACS trained installer and certified by an authorized representative of Advanced Composting Systems to assure proper installation and to validate the warranty.

Substitution of an "*or equal*" system shall require that an independent engineering firm verify, through scientifically documented engineering analyses, demonstrations and tests, to the satisfaction of the customer, that the substituted system is equal to the Phoenix in the following specific areas: Composting tank material longevity, strength, service temperature, corrosion resistance and tank wall thermal conductivity; Tine shaft and bearing material strength, wear resistance and corrosion resistance; First-in, First-out compost movement, ease of compost removal and tank volume and utilization factor; compost aeration root-mean-square path length; mean liquid path length and retention time; ventilation rate, fan speed control and energy consumption; ventilation fan corrosion resistance and longevity; vent system corrosion resistance and leak resistance.

Appendix F — Design Features of the Phoenix

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, leak-proof, and continuously insulated.

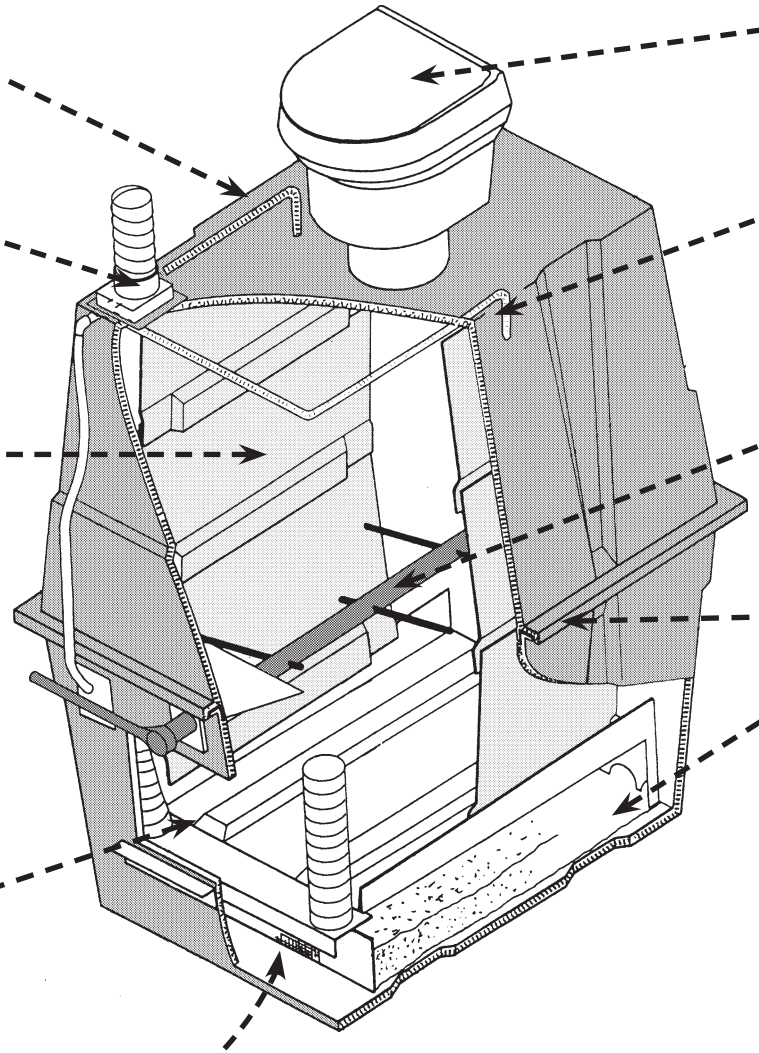
Ventilation is provided by an efficient, 5-watt, direct current fan. The fan housing is mounted directly to the tank for easy maintenance. A small power supply or a photovoltaic system provides the energy. Flexible 4-inch duct and 4-inch PVC pipe are installed easily.

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.

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.

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

Liquid is separated from the solids.



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

The accumulated liquid and/or fresh water is automatically **resprayed** 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, or an evaporation or holding tank.

Rotating tines control the downward movement of the material in the compost pile.

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

A **permanent medium** provides **secondary liquid treatment** beneath the porus bottom baffle. Air travels over the entire surface of the liquid to increase evaporation and aerate the leachate.

Bloor-Dufferin Residents' Committee Ltd. (BDRC) Comments Dufferin Grove Park Compost Toilet Feasibility Study December 16, 2010

1. Introduction

The Bloor-Dufferin Residents' Committtee Ltd. is interested in alternative technologies to help pave the way for environmental innovation throughout the City. However, we wish to promote innovations that make sense and that will work; those that are not well thought-out, eventually failing, will only be cited as evidence of their lack of feasibility in the big City and inevitably hurt the environmental cause.

The proposal to locate a compost toilet in Dufferin Grove Park is one such proposal that has not been well thought-out, that is not feasible and that has been subject to a flawed political and bureaucratic process from the beginning.

The proposed composting toilet system is designed for use in areas where there are no possible connections to a sewer system, e.g. national parks. There are also a few examples of compost toilets which have been installed for environmental reasons inside buildings which are heated to maintain the temperature required to ensure that decomposition of human waste takes place (a minimum of 18 degrees C or 65 degrees F).

Neither of these conditions applies to Dufferin Grove Park. The Park has ready access to the City's water supply and, in fact, toilet facilities are already located in two separate buildings in the park. Secondly, the toilet would not be heated, resulting in limited use for only three months of the year while posing particular problems concerning the handling of the remaining waste material during the rest of the year.

The city has talked for some years about a possible Pilot Project to determine the feasibility of locating compost toilets in some City parks in the future. Since there are many City parks that have no toilet facilities, why wasn't one of those parks chosen as the site of a Pilot Project?

A LITTLE BIT OF HISTORY

The compost project originated with The Friends of Dufferin Grove Park, a loosely-knit group of individuals who run many of the park's programs. In 2006, the Friends had plans to create a cob village at the south end of the park, following completion of a cob courtyard in the wading pool area. Many residents in the area voiced their concerns about the dozen or so large cob sculptures proposed as part of this cob village and the idea was eventually abandoned.

However, when the offer of an allegedly "free" compost toilet came along, the Friends seized the opportunity to justify building a large cob structure to house the toilet. But, of course, they also the had to argue that a toilet was really needed at the south end of the park or their cob structure would be a no-go!

Sometime in the summer of 2006, the Friends, impatient with the progress of talks with City officials, went ahead and dug the hole for the compost toilet and constructed earthbag foundations, all without a building permit! Of course, none of the construction complied with Ontario Building Code standards. So the City shut the project down.

WHO DONATED THE TOILET?

That is a bit of a question mark! According to notes on the Friends of Dufferin Park website it came from an" anonymous donor" described on the website as "the brother of a cob worker who lives in the southern United States".

However, it was recently brought to our attention that another note on the Friends website says that Georgie Donais, the originator of the cob building structures and the initiator of the compost toilet proposal, had ordered and paid for the toilet. Earlier website notes had Ms Donais quoted as saying she had already raised $20,000 for the toilet project.

In 2007 the City hired consultants to produce drawings for a toilet building that would comply with the Ontario Building Code. A few months later, the City shut the project down once again and the hole in the ground was covered with a cob bench.

FEASIBILITY STUDY
In July of 2010, the City awarded a feasibility study on the Dufferin Grove Compost Toilet to consultant Rohan Walters on the recommendation of the Friends of Dufferin Grove Park and CELOS, the research and advocacy arm of the Friends of Dufferin Grove Park. Georgie Donais, originator of the toilet proposal has also been hired as a paid consultant and Ms Donais' blog says that CELOS is "guiding" the study.

TOILET SUPPORTERS NOW THE CITY'S 'OBJECTIVE' CONSULTANTS!
Rohan Walters is a participant in CELOS projects. CELOS has supported the toilet project from the start and could possibly be raising money to construct the toilet building. Ms Donais, as noted above, initiated the project and according to the Friends website, ordered and paid for the toilet.

THIS IS NOT AN OBJECTIVE STUDY!
The BDRC has raised concerns about conflicts of interest. This study is not an "objective" study of the feasibility of locating a compost toilet in the park when the hired consultants are proponents of the project.

RESIDENTS SAY NO!
At public meetings held recently (November 28 and December 1), residents strongly voiced objections to the proposal and posed many detailed questions to the consultants which largely went unanswered.

The Bloor-Dufferin Residents' Committee Ltd. has prepared this response as input to the consultants' final report due later this month..

2. What's wrong with a compost toilet in the park?
(i) TEMPERATURE
The Phoenix toilet specifications assume a minimum ambient temperature of 65 degrees F (19 degrees C) for it to work as intended.

This will be difficult to achieve and maintain because requirements for ambient temperature, suitable location and capacity cannot be met in Dufferin Grove Park.

TOO COLD TO COMPOST!
The ambient temperature (temperature of the tank's surroundings and ventilation air supply) would likely be too cold to sustain minimum requirements for composting.

When the temperature in the Phoenix room drops below 65 degrees F (19C), the tank cools and the rate of decomposition declines sharply, reducing capacity.

At 55 degrees F (13 C) composting slows to a virtual standstill. Below 40 degrees F there is no biological decomposition and the toilet functions primarily as a storage tank.

Also the toilet is located in the shade surrounded by trees rather than unobstructed, direct sunlight with "sunlight availability for solar heat and electricity" to keep the ambient temperature at 65 degrees F as recommended by the manufacturer.

ELECTRIC HEATERS NEEDED TO MAINTAIN CAPACITY!
The capacity of the Phoenix toilet has been touted by the Friends to be 100 uses per day in the summertime. This usage figure contained in the Phoenix guide (page 5) is based on warmer climes where 80-85 degrees F is the average monthly temperature in July and August (as compared with 70-72 degrees F in Toronto). Given the Toronto temperatures, the daily

maximum usage in the summer months would be more like 60 rather than 100 and would fall off drastically in the spring and fall months unless heaters were used.

TOILET AS STORAGE TANK FOR HUMAN WASTE
Moreover, with average monthly temperatures in Toronto 66.6 degrees F in June, 72 in July and 70.3 in August (Environment Canada), the Phoenix toilet would have about two and onehalf months to actually be working, i.e. decomposing the human waste. During the remainder of the year, composting will not occur and the toilet will function primarily as a storage tank.

It also appears that supplemental heat would be required simply to keep any of the waste composting. A solar solution (roof panels) is impossible because of the choice of site location in the shade.

(ii) USE

The users will primarily be children, many of whom are prone to dropping things in the toilet which interferes with the composting process.

Ongoing daily maintenance of the compost toilet together with the ever-constant need to monitor the toilet facility and compost pile will be an ongoing cost item.

Foreign objects such as tampons, cigarette butts, or children's toys dropped down the toilet chute must be removed regularly from the compost pile; foreign objects interfere with the composting process.

Toilet upkeep, regular turning and mixing of the compost pile, the regular addition and expense of bulking material, the regular monitoring of toilet use, the removal of finished material and the dispersal of finished material are all ongoing costs which were not addressed in the Feasibility Study presentations to the community.

Representatives of Dufferin Grove Park Recreation Staff have agreed to monitor and maintain the proposed compost toilet. This is a unique arrangement with staff that does not exist in other parks.

As this staffing model **has not been tested**, costs and maintenance requirements should be established from the outset by requesting information from municipalities that already have composting toilets in use.

(iii) MAINTENANCE COMMITMENT

"Maintenance is the other major parameter (in addition to temperature) affecting capacity. Frequent, thorough maintenance—spraying liquid, adding bulking material and mixing the compost pile—increases the rate of decomposition." (page 5)

"Inconsistent or improper maintenance will reduce tank capacity and composting efficiency resulting in poorly decomposed end product."

The amount of maintenance required in the Toronto climate to keep the toilet functioning properly seems to have been vastly understated by the toilet's advocates.

MANAGEMENT OF THE PILE AND THE FINAL COMPOST PRODUCT

The finished composted material must be removed every few years. Provisions for how the material will be removed and used must be made.

Keeping the composting material uniformly moist and porous is essential. Mixing is crucial. Without proper management measures there is a risk of producing organic concrete, which once formed, is very difficult to deal with.

It must be broken up with a turning fork or other long handled tool. It must be removed and worked back into the system after it has softened with exposure to fresh waste and moisture. If it doesn't soften, it will have to be incinerated or buried.

According to the Phoenix Guide, "Finished compost must be handled carefully since it can contain some parasites and pathogens." The guide suggests that pasteurizing the compost can result in material that can be applied on site with no restrictions under the Environmental Protection Act in the United States.

Will the Ministry of the Environment be required to classify the finished compost product and determine how it can be used? Have local health authorities been contacted to determine regulations regarding the dispersal of the finished compost product?

(iv) WARRANTY AND SERVICING

Appendix E: Phoenix Specifications (appendix to the Public Facility Application Guide) says "Installation shall be performed by an ACS trained installer and certified by an authorized representative of Advanced Composting Systems to assure proper installation and to validate the warranty."

This stipulation has not been met. Is the warranty therefore null and void?
Service contracts are required in other jurisdictions.

Who will sign a service agreement contract on an experimental pilot project toilet for which there is no warranty?

Is the City willing to enter into a service agreement on an experimental pilot project for which no warranty exists?

Will the donor or the Friends pick up the labour and parts costs if the unit needs repairing or replacing?

(v) PROTOCOLS AND PROCEDURES

Necessary steps to determine protocols and procedures of maintaining the facility, handling the compost pile and handling the finished composted material have not been addressed in the proposed Dufferin Grove Compost Toilet project.

The goal of composting human waste is the destruction of human parasites and pathogens. However, composting human waste is not an exact science. It requires trial and error. A delicate balance must be achieved and maintained between wet and dry, nitrogen and carbon. Using a commercial composting toilet does not guarantee a trouble free experience composting of human waste.

Neither compost nor effluent can be considered absolutely safe as they may contain diseasecausing organisms and must be handled with great care. This is a view held widely around the world.

Parks and agencies worldwide have public health protocols and procedures in place regarding the servicing and maintenance of the compost toilet itself as well as for the emptying and handling of composted human waste material. Many parks require workers to wear safety equipment such as safety glasses, gloves, boots and Tyvek overalls just to turn the handle for mixing the material.

Composted human waste is not considered safe. Although e-coli levels may not pose a health risk, composted human waste may contain pathogens and parasites, which pose serious health hazards. Necessary precautions and protocols must be in place.
Do Ministry of Environment and Public Health guidelines permit Parks Recreation Staff to handle human waste and human waste products?

(vi) INADEQUATE SITE EVALUATION AND SOIL TESTING

The toilet location was chosen without a Site Evaluation. No alternative sites have been considered.

Ontario Building Code Requirements
The Ontario Building Code (OBC) requires performing soil analysis and percolation tests on a number of different sites prior to choosing a specific site.

The Ontario Building Code regulations require, among other things, a detailed site evaluation, including its topography and drainage systems, an evaluation of soil conditions including soil permeability and including the potential for flooding, a detailed set of plans showing the depth to bedrock, the depth to zones of soil saturation, location of any unsuitable disturbed or compacted areas and the proposed access routes for system maintenance.

The Ontario Building Code regulations also outline detailed formulae re: length of distribution pipe, absorption trenches, leaching and filter beds as well as hiring a licensed sewage systems installer.

Comments of the Feasibility Study Engineer
At the December 1, 2010 public meeting, the feasibility study engineer Andrew Hellebust mentioned that only one soil test was done (this occurred after the location was chosen and the foundation dug) and acknowledged that it was probably inadequate to satisfy community concerns.

Comments by consultant Georgie Donais at the December 1st, 2010 public meeting
Ms. Georgie Donais said **the earth bag retaining wall took hundreds of pounds of clay** out of the waste cycle, presumably recycled in the earth bag foundation.

The Groundwater Resource Engineer we consulted informed us that clay soil cannot absorb, treat and disperse leachate as effectively as gravelly or sandy soil. Nor is the feasibility study complete without comprehensive soil testing and a determination of where the water table is. If the soil does not have the capacity to absorb the toilet residues, the accumulation of the liquid end products or leachate will contaminate the soil.

According to the guide : ***"The Phoenix can be installed on level ground but taking advantage of sloped terrain will reduce the excavation requirements and allow easier access to the tanks for maintenance." (page 6)***

The ground is level at the toilet site, creating difficulty in providing a daylight basement, which is preferable for easy access to the waste for turning, etc.

The Phoenix Compost Toilet Guide says to avoid the problem of confined spaces. The compost toilet chamber or tank is below ground, accessible by a ladder with limited space for individuals maintaining the compost pile or removing composted material**.**

The preferred method of installation involves using sloped terrain to provide a "daylight basement." Dufferin Grove Park features sloped terrain. However, the failure to conduct a site evaluation and heed the manufacturer's recommendation has precluded the possibility of locating the toilet in the preferred setting.

A detailed site evaluation and comprehensive soil testing must be completed.

3. Comments on materials provided by consultants

TERMS OF REFERENCE

***(i*) No consultation with community groups**

The terms of reference for the feasibility study, dated July 13, 2010, include the following statement on page 2:

"The feasibility study will be developed in conjunction with the local councillors, *community groups* and City Project Team"

The Bloor-Dufferin Residents' Committee Ltd. (BDRC) is an important "community group" representing residents in the area bounded by Bloor/Ossington/College and Dufferin. Our group has thoroughly researched the compost toilet issue and has had extensive meetings with City staff from the beginning in 2006 respecting concerns about the proposed toilet in the Park. In researching compost toilets, the BDRC has been consulting on a continuous basis with a Groundwater Resource Engineer, a certified Sewage Installer and an Urban Planner.

Yet, the BDRC was never contacted by the consultants to aid in the "development of the feasibility study" as outlined in the terms of reference. Nor did the BDRC even receive a notice of the two public meetings.

***(ii*) no discussion of non-compliance with Zoning By-law**

Page 3 of the Terms of Reference notes that the toilet and building must be in "conformity to the most current City of Toronto zoning and noises by-laws"

The compost toilet is not a permitted use within the City's Zoning By-law. Nor for that matter is such a use permitted in the Toronto Municipal Code which provides that all human waste must be connected to a sewer.

The consultants failed to discuss these issues either in their presentations at the public meetings or in their notes.

COMMENTS ON CONSULTANTS' PRESENTATONS AND NOTES

(i) Need for toilet

There has been no analysis by the consultants of the need for another toilet in the park when there are already two buildings with toilet facilities . Rohan Walters' notes simply refer to the "needed toilet" with no analysis of the actual need. Since the Parks Department seems to be regarding this as a "Pilot Project", it would have been more feasible to examine the many other city park locations where no toilet facilities are available at all.

(ii) Consultants' precedents bear no relationship to Dufferin Park conditions

Page 3 of Rohan Walters' presentation notes headed "Existing Precedents" show photographs of three compost toilet projects, two of which (the Bronx Zoo and the Toronto and Region Conservation Authority) are located in heated buildings. The third appears to be located in a provincial park where there is no ready access to a water source.

The Dufferin Grove Park conditions bear no resemblance to these conditions; the toilet would not be in a heated building and there is ready access to City water.

Similarly, the presentation notes of consultant Andrew Hellebust of Rivercourt Engineering show photographs of three toilet precedents, one of which is located in an Idaho State Park with no access to a water supply and two of which are located n heated buildings where the ambient temperature can be controlled to ensure that decomposition of the human waste occurs.

(iii) Building Costs not broken down
The consultants' material states that a building with a typical flush toilet would cost $56,000 for the building and $10,000 for the landscaping while a building housing a compost toilet would cost $117,000 for the building with the landscaping included.

It's impossible to comment on these figures without a breakdown of costs for each building. Also there is no indication in the consultants' presentations whether or not the earthbag foundations installed by the Friends of Dufferin Grove Park without benefit of a building permit will remain or will be removed. This could surely affect the cost estimates.

For some time, the BDRC has been asking whether or not the earthbag foundations were ever inspected by the Buildings Department to ensure that they are in conformity with the Ontario Building Code. We are still without an answer.

(iv) Landscaping costs…why no costs with compost toilet?
The consultants' notes indicate that landscaping costs of $10,000 are associated with a flush toilet but not with a compost toilet?

Page 14 of Rohan Walters' presentation notes refers to savings on "labour" with a compost toilet . Does this suggest that someone (perhaps the Friends) would donate their labour to landscaping a compost toilet building but would not do the same for a flush toilet building?

(v) Consultants' fees way too low for compost toilet
The presentation notes quote $20,000 as the amount allocated for consultants' fees for the flush toilet and $20,000 as well for the compost toilet.

However, construction and installation of the compost toilet triggers many additional requirements including a multitude of site evaluation studies (as outlined in Section 2 above), in order to meet the essential requirements of the Ontario Building Code

The services of a sewer systems installer would also be required not only to approve plans but also to supervise the installation of the compost toilet.

There would be legal fees associated with a required amendment to the Toronto Municipal Code to permit such a toilet as well as to pay for a rezoning application and subsequent complex building permits for the toilet.

In addition, substantial consultants' fees have already been incurred respecting the compost toilet with the hiring of an architect and engineer back in 2007. Also consultants for this current 2010 feasibility study are being paid around $7,000 .

Clearly, consultant fees for a flush toilet would be a minor item in comparison with consultant fees associated with a compost toilet. The arbitrary assignment of $20,000 to each is not feasible.

A breakdown of consultants' fees for each toilet is required. Costs already incurred for the compost toilet must be included in such breakdown.

(vi) Maintenance costs not mentioned: compost toilet is high maintenance!
As the Phoenix Compost Toilet Guide says over and over again:
"Maintenance! Maintenance! Maintenance!
Constant attention to the toilet is required in order to keep the composting operation going, given the cold temperatures, the cap on usage and the user group of primarily less-than-careful children.. See Section 2 for details of required maintenance.

Our sewage consultant says " Maintenance is the biggest factor here since the high use will demand constant attention and even then may not be able to withstand the peak usage."

The consultants' material makes no mention of maintenance costs.

(vii) Costs of compost toilet itself should be included
As mentioned in the Introduction, Georgie Donais, one of the consultants, is quoted on the Friends of Dufferin Park web site as admitting to ordering and paying for the toilet. The earlier suggestion that the toilet was donated by an anonymous donor is obviously not correct.

Therefore the cost of the toilet itself should be included in the total cost estimate.

(viii) No details of site evaluation results, details of leaching bed, etc.
The presentation notes from the consultant engineer, Andrew Hellebust contained no text, only photographs and pictures. A number of detailed questions concerning the operation of the toilet were asked at the meeting and were largely unanswered. Subsequently, the BDRC sent a letter to Mr. Hellebust posing a number of specific questions. To date, no response has been received. The BDRC letter is attached in the Appendix.

At the December 1, 2010 public meeting, Mr Hellebust admitted that only one soil test had been done and that it was probably "inadequate". As outlined in Section 2 above, the Ontario Building Code requires a thorough site evaluation including numerous soil tests, among many other items, to be conducted in order to find an optimal site for the toilet."

Clearly a proper site evaluation is missing from the study.

(ix) No evaluation criteria proposed for the pilot project
The Dufferin Grove Compost Toilet has been proposed as a pilot project, and as such, evaluation criteria and project parameters must be in place before the project can be considered feasible. Critical data must be logged, kept and published by the City in print and online to a city website for the public to review. The data will inform the City of Toronto's Parks Forestry and Recreation Department, which has been exploring compost toilets as one option for city parks without washroom facilities.

The opportunity to collect data on the effectiveness of the compost toilet cannot be squandered**. However, more than four years into this project, project parameters and evaluation criteria have yet to be set.**

Anecdotal evidence that a waste pile is composting is insufficient for a pilot project in a public park. Detailed data must be collected.

This includes data on the ambient air temperature in the tank room. The tank room air must remain above 65 degrees for successful composting to occur year round. The internal temperature of the waste pile itself must be monitored to ensure that it is composting at the temperature range needed to destroy pathogens.

The use of thermometers is routine. Two thermometers are needed: one for ambient air in tank room, the other for the waste pile itself.

The finished end product (humus) must be tested for pathogens prior to onsite disposal even if not required by law since this is a pilot project in a public park upon which future citywide installations rest.

This brings up the following unanswered questions:
Will thermometers be used?
Will a schedule be devised with a systematic checklist?
Will a detailed logbook be kept?
Will findings be published?
Will the finished product be tested for pathogens prior to burial onsite?
Who will test the finished product, how much will it cost ?
What Ontario and municipal laws govern the composting of human body waste and subsequent testing and disposal of it?

(x) Community response
At the two public meetings held recently two people spoke in favour of the toilet while a large number of residents spoke against. Several specific questions were raised at the meetings which went largely unanswered.

4. CONCLUSIONS

A composting toilet in Dufferin Grove Park is not a feasible proposition for all of the reasons outlined above.

5. RECOMMENDATIONS

(i) The proposed compost toilet project in the City's Dufferin Grove Park be abandoned.

(ii) If the City wants to go ahead with locating a compost toilet in a City park as a pilot project, the City might examine alternative sites lacking toilet facilities.

THE GLOBE AND MAIL

Don't let a basement reno go down the drain

MIKE HOLMES

From Friday's Globe and Mail
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Having your drain back up is one of the most frustrating, dirty and expensive problems any homeowner can face. If it's happened to you once, you never want to have it happen again.

Every drain in your house - sinks, toilets, showers and laundry - goes to the main stack that runs under your basement floor. The stack leads to the sanitary sewer line in the street and eventually to your city's sewer system.

A sewer backup can be caused by a blockage in your drain, and the solution is simple: Call a plumber to come and clear it out. In older houses, backups are sometimes caused by old-style clay pipe breaking down with age. Or, sometimes tree roots wrap around the pipe and break it, or get inside and block the pipe so water can't flow.

If you have an old clay tile drain, and there is any doubt about its condition, have a camera inspection done by a professional. Make sure he time-stamps the video, and notes at what distance from the house any potential obstructions are located. Have a copy of the video made to keep on file.

If there is a problem with your clay tile drain, get it fixed before you have another backup. Replace it with polyvinyl chloride (PVC) pipe, which won't corrode or break when under the pressure of tree roots. Yes, you'll have to excavate, and you might have to break up your basement floor, but you won't regret it.

Even if the drain looks good, I would check it again in two or three years. If it looks like there are breaks in the tile and a tree root or dirt is getting into the drain, but there is still no significant danger, check it again in a year. But whatever you do, don't spend money on finishing your basement without first making sure your drains are in good shape.

Downspouts on older houses often feed directly into the weeping tile at the base of the foundation wall - and ultimately into to the main sanitary line. This is no longer allowed in new buildings under the building code because it puts too much strain on the sewage system. But any existing setup is grandfathered, so you aren't required to take it out. I would recommend you do it anyway.

Those downspouts might be full of debris and just overflowing, dumping tons of water where you need it least - right beside the foundation where it has the best chance of working its way into your basement. The water also can push the accumulated garbage down past the junction of the weeping tile and the sewer drain, causing a serious backup into your house.

Take the downspouts out, direct them as far away from your foundation wall as you can, and have them discharge into a swale, gravel pit or garden.

In new homes, the storms and sewers are separate, so you don't have storm water overloading the municipal system and pushing sewage into your home. But you can still end up with a sewer flood if there is a blockage downstream, either on your property or in the general municipal system.

In sewer backups, the challenge is to figure out where the problem lies. If it's on your property, you have to fix it; if it's on city property, then they need to come out and deal with it. A camera inspection can help determine who is responsible.

A sewer drain also can back up when the pressure from the main line in the street is so great - because of a big storm, for instance - that the system can't handle the water. It is forced back up your main sanitary sewer pipe and into your home.

One way to stop this from happening is to have a professional install a backflow-preventer valve inside your house, in the main drain under the concrete floor ahead of "the cleanout," a small, sealed access hatch in the main stack that's required under the code so the stack can be inspected, and cleaned out if necessary.

Some new-home builders now routinely install them there, but backflow-preventer valves are actually not legal in some municipalities. The thinking in those places is that, if everyone installs such a valve, the pressure from a backup with nowhere to go may destroy the sewer system. Those municipalities prefer to use your house as a handy pressure-relief valve, even if it means the destruction of your basement.

It's a great idea to have a backflow-preventer valve installed where it is legal because having one could mean a reduction in your insurance premium. If a sewer backup does occur, your only protection from disaster may be your insurance policy; make sure it covers drain backups, and that the amount payable isn't limited to an unusually small amount or by certain conditions.

Mike Holmes is the host of Holmes on Homes on HGTV. E-mail Mike at mikeholmes@holmesonhomes.com or go to http://www.holmesonhomes.com

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