Commercial Composting Toilet Installations in Oregon

East Multnomah Soil and Water Conservation District Office in Portland, Oregon

Composting Toilet Type & Model:  Advanced Composting Systems LLC, Phoenix Model PF-201
Building Type:  Commercial Office Space
CT Installed:  2009
Capacity:  Manufacturer specs say capacity based on ambient temperature (25 uses/day at 55 degrees or 50 uses/day at 65 degrees);
Leachate Management:  Leachate discharges to sewer system per City requirement.
Solids Management:  Removed solids once since 2009.
Occupancy:  ~130 times/week (self reporting)
  • Office closed on weekends
  • 3 flush toilets + 1 composting toilet in the building (also 2 additional flush toilets in basement that are rarely used).

Total Cost:
  Toilet = $7,300
  Installation = $5,240
  Permit = $85

Permitting Authority:  City of Portland, Plumbing permit – water closet replacement; final inspection on 6/19/2009
Installer:  Black Cat Plumbing and Advanced Composting Systems
Maintenance Provider:  Scot Wood, EMSWCD Facilities Manager

Maintenance & ongoing operation activities:
  • The pile is raked and turned once per week.
  • Moisture levels are also adjusted every week, either by adding water or cedar chips. Moisture level is assessed by visual inspection of pile.
  • 1-2 cups of compost accelerator is added every two months.

Permit Process:  “All we really know is that a permit compromise was required by the City, which required leachate to drain into the existing sewer system.”

Lessons Learned:  We had a minor moth issue in the summer, which was the result of the pile being too dry (remember, the leachate drains to the sewer system).  Scot had been turning the pile every two weeks, but
increased that to once per week. No issues since increasing to weekly management. Scot is also going to experiment with pine shavings instead of the cedar shavings to see if the pile breaks down quicker.

Desert Rain House in Bend, Oregon

Architect: Vidas Architecture
Environmental Engineers: Whole Water Systems

Composting Toilet System: Porcelain vacuum flush toilets and piping by JETS
- Phoenix Model 201 by Advanced Composting Systems LLC
- Evaporator by Advanced Composting Systems LLC (treats leachate from composter and liquid from dishwasher)
- Kitchen scrap processed by composter.

Building Type: Residential with two detached accessory dwelling units
CT Installed: 2014
Capacity: Same as EMSWCD

Leachate Management: Leachate goes to custom evaporator
Solids Management: Have not removed solids yet.

Occupancy: 2 year round residents who travel often. Frequent guests, who stay in guest cottages. System is designed to accommodate 6-8 full-time residents.

Total Cost:
- JETS vacuum toilets (3 toilets) = $18,907
- Phoenix Compost Processor = $7,300
- Installation = $13,000
- Permit = Unsure
- Evaporator, greywater filter, tipping bucket, system controller= $9,812.

Permitting Authority: City of Portland, Plumbing permit – water closet replacement; final inspection on 6/19/2009

Installer: Advanced Composting Systems, Timberline Construction (vacuum toilets)

Maintenance Provider: Owner

Maintenance & ongoing operation activities:
- The pile is raked and turned once per week.
- Pine shavings are added once per week (1 bucket)
- Currently introducing vermiculture into composter
- Monitor level of evaporator and tipping bucket use to prevent excess liquid in pile

Permit Process:
- AHJ required engineer stamp on the vacuum plumbing, not for evaporator or toilet system (though that was considered, but ultimately not called for). Interface Engineering provided PE stamp on vacuum system.
- Had to present proof of NSF 41 certification for composting toilet to AHJ.
- Needed rough-in for 1 standard toilet fixture
Lessons Learned: Had problems with excess leachate in the evaporator system initially. This was due to a faulty control board that was programmed incorrectly and not cycling the solar hot air system properly. Once that was repaired, the system has been trouble free.

Lewis & Clark College in Portland, Oregon

Composting Toilet System: Clivus Multrum Composting Toilet M54W Trailhead
- The composting unit is buried and serves as the foundation
- Standalone ADA accessible toilet room structure.
- Foam-core panels for the floor and walls
- Installed in less than two days.
- No concrete needed.

Building Type: Commercial
CT Installed: 2016
Capacity: 22,000 uses per year (average 60 uses/day)

Leachate Management: Leachate is drained to a tank below the compost chamber.
Solids Management: Have not removed solids yet. Maintenance provider will manage this material.

Occupancy: Restroom located near parking lot, athletic field and tennis dome. Gets quite a bit of foot traffic from parking lot to athletic fields during the week and sports events.
- Locked at night

Total Cost:
Toilet = ~$25,000 including $2k for the foam flush toilet which was not used.
Installation = $10,000 + $3,000 for stone facade and pavers for accessibility
Permit = About $2,3000 for building, plumbing permit, electrical, and structural permits.
Additional Costs= Structural engineering ~$700.

Permitting Authority: City of Portland, McKenzie James. Entire campus is a conditional use permit, and conditions are renewed every 10 years.

Installer: Bremik Construction.

Maintenance Provider: College custodian will clean the restroom. Clivus Multrum has a contact for the maintenance of the system.

Maintenance & ongoing operation activities: Maintenance provider will rake solid material quarterly and they anticipate they will need to remove solids after a year or so.

Permit Process:
- Appeal granted for NSF 41 composting toilet in a commercial building using the Alternative Technology Advisory Committee (ATAC) for the City.

Once appeal was granted, the following came up in review and inspections:
• Stamped structural analysis for seismic and wind conditions. Kit came with steel plates and cables for hold down and structural drawings, but not sufficient calculations to satisfy reviewers.
• PV system for fan and foam flush (which was later omitted) didn't come with a shut off and had to be added later as required by inspector.
• Foam flush required water supply. Foam flush feature mixes 3oz of water with a soap to clean the bowl after use. We have irrigation lines nearby, which are fed from the City main, i.e. potable water, which was helpful as the first issue that came up was concern about someone drinking from a non-potable water supply. The next issue raised was backflow prevention - from the composting toilet to the irrigation lines, as there is backflow prevention at the connection to the street and to the area irrigation main. Note, Clivus Multrum said they have never seen a backflow preventer required with the foam flush toilet because the toilet has a built in air gap. The inspector required us to use a RPB in an insulated box adding $5k to the project and an unsightly above ground utility box, so we bought a dry toilet from Clivus Multrum and are saving the foam flush for an easier installation. This all came up during construction and our plumber wasn't interested in working with the inspector, so we chose the path of least resistance and bought the dry toilet.

Lessons Learned:
“Getting through the initial appeal was one step in a long permitting process that I wish was facilitated better by the City - some sort of hand off of special ATAC approved projects may be helpful. The plumbing inspector didn't know we had an approved ATAC appeal until I brought it to his attention. Admittedly, I wasn't involved in the appeal. Had I been involved, I might have been able to get ahead of some of the permitting hurdles,” Gina Franzosa, Director Project Management, Facilities Services, Lewis & Clark College.

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Government Island State Recreation Area in the Columbia River northeast of Portland, Oregon

Composting Toilet System: Two Phoenix composting toilets
**Building Type:** Stand-alone restroom structure.

**CT Installed:** One in 2011 and the other in 2006

**Capacity:** Two tanks about 6 feet high, each lasts about a year or two years before needing to be cleaned out.

**Leachate Management:** Leachate at the bottom of the compost tank is automatically sprayed over the pile to keep it hydrated. Excess leachate goes to drain field with perforated pipe.

**Solids Management:** Every year and a half to two years about a yard of material is emptied from the composter. Material is spread on non-native grasslands on the island that are out of bounds for visitors.

**Occupancy:** About 1,300 visitors per year with about 5,000 uses per year.

Day and overnight camping visitors arrive at the island by boat. No public road access. Electronic sensor tallies how many times the door to the restroom is tripped. The door was tripped approximately 11,000 in 2015, assuming the door is tripped going in and out of the restroom that means that each composting toilet receives about 5,000 uses per year. According to qualitative reports the park receives about 1,300 visitors per year.

**Total Cost:**
- Toilet = Not sure: possibly about $90,000 for each structure.
- Installation = in the hundreds
- Permit= Not sure

**Permitting Authority:** Unsure.

**Installer:** Glenn Nelson, Advanced Composting Toilet Systems.

**Maintenance Provider:** John Cowan (Oregon Parks & Recreation Ranger) and crew of two seasonal employees.

**Maintenance & ongoing operation activities:**
- The top pile is raked and turned once per day in the summer when it is busy and once a week during the winter.
- Occasionally and depending on inspection they wash the toilet chute under the commode (the equivalent to the toilet bowl in a flush toilet).
- Automated spray pumps liquid to the top of the pile.
- No compost accelerator is added.
- Pine chip bedding (marketed for horses) is added regularly. Four cubic feet of pine bedding lasts about a month and a half.
Motivation: It wasn’t advisable or recommended to have outhouses on site anymore, but there was no water supply for flush toilets. There is one chemical toilet on location already and it was seen as undesirable to purchase more because they are labor intensive: tanks must be removed once a month and driven by boat to a pump out station. Previous outhouses had unlined pits that leached material into the surrounding environment. In addition to the composting toilets on the site there are also outhouses, a floating restroom and some portapotties.

Permit Process: There was a plumbing inspection, even though there was no plumbing. Plumber didn’t know what to make of it, system was approved.

Lessons Learned:
- Occasional vandalism as per customary for public restrooms, but no serious issues.
- “The stacks work flawlessly,” says manager John Cowan.
- The electronics that control the fan and leachate pumping on one of the toilets caused a problem and was fixed by changing the controller.
- The Lucite panels on the solar panels might of crazed, so the system is not getting enough power, they suspect fixing the panels will solve the problem.

User and Maintainer experience:
- Smells like wood chips.
- John Callow says “They’re great, definitely more labor than in an outhouse, but less labor than a plumbing facility, not clearing out blockages and drain problems.”
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