

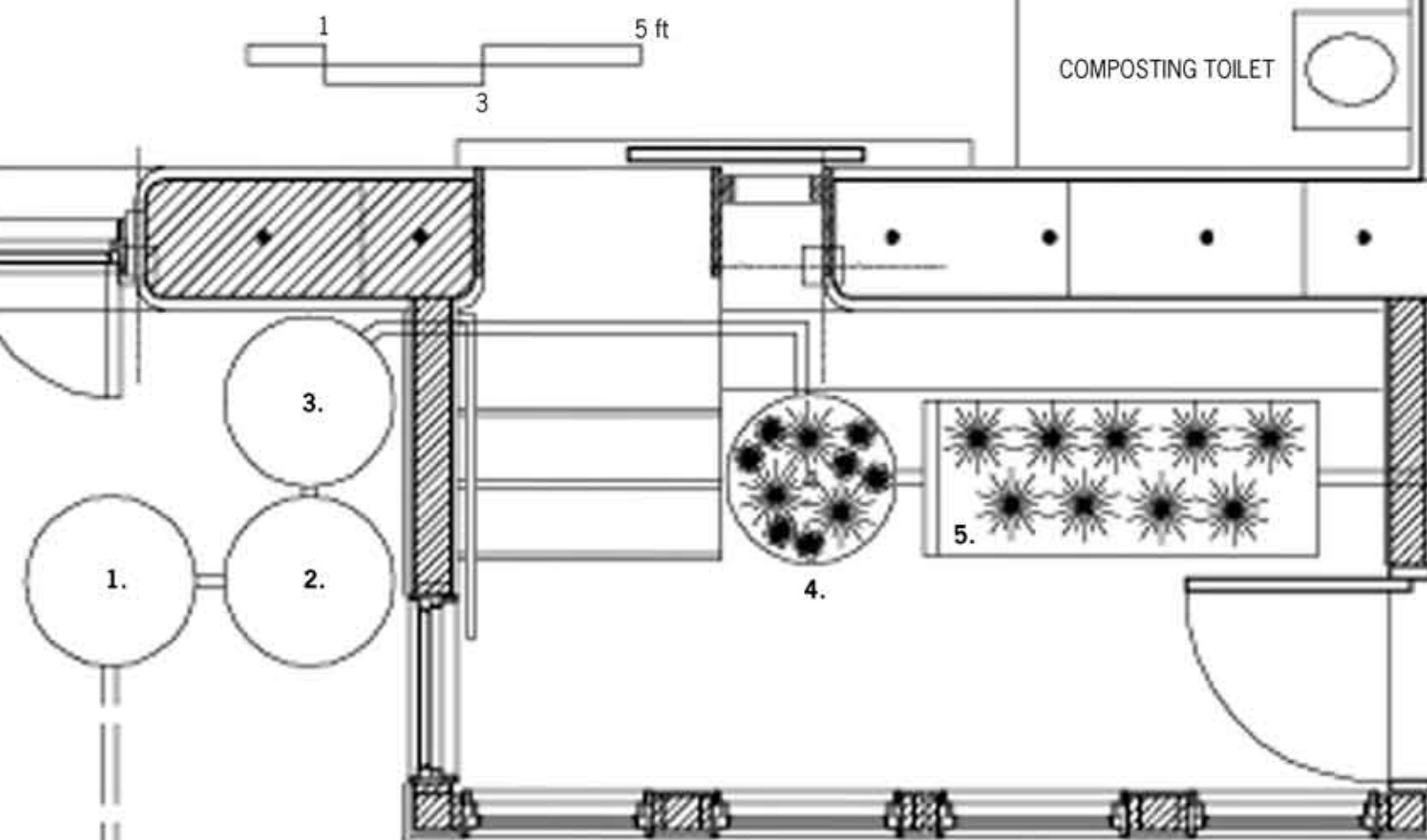
SUSTAINABLE BUILDING

FSEEC LANDLAB: BALL STATE UNIVERSITY

WATER-WASTEWATER SYSTEM

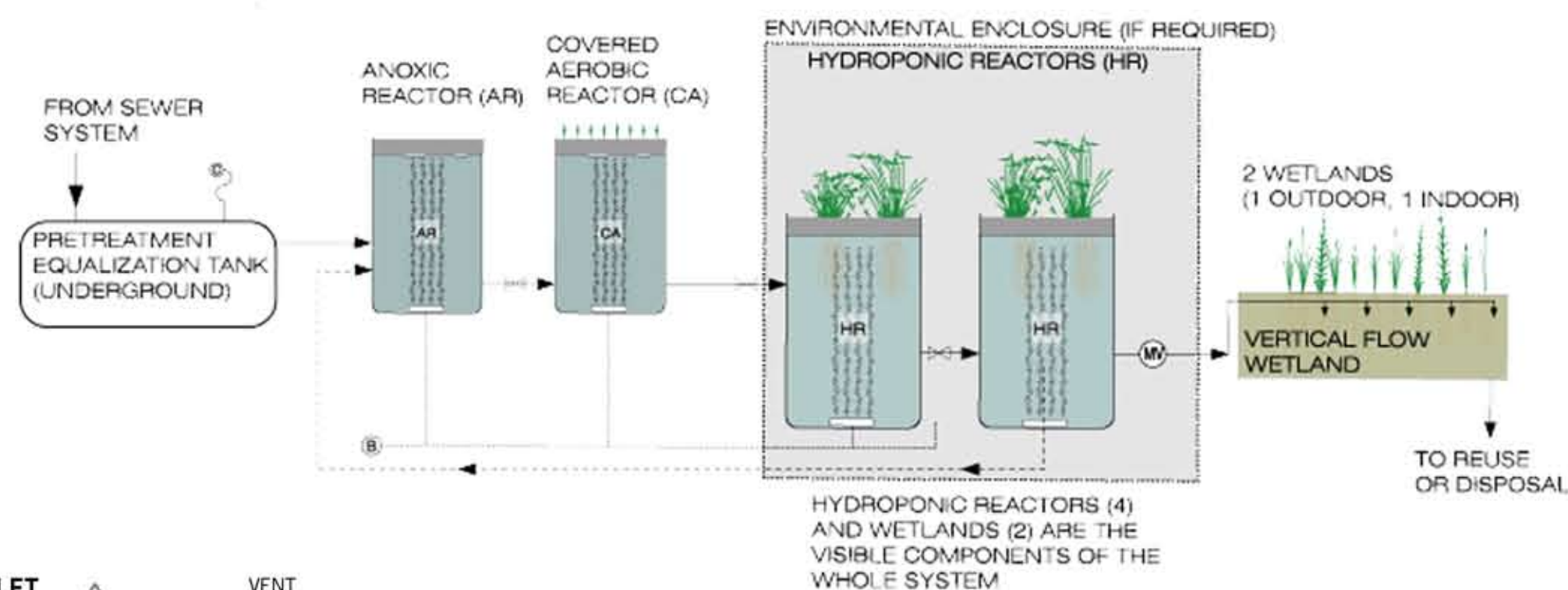
WASTEWATER SYSTEM

WASTEWATER PLAN



WASTE WATER FROM HOME; A VALVE ALLOWS MATERIAL TO BE SENT TO SEPTIC TANK TO PREVENT SYSTEM OVERFLOW

LIVING MACHINE



each person uses about 80-100 gallons of water per day
<http://ga.water.usgs.gov/edu/qahome.html#HDR3>

- 1: anaerobic digester-similar to a septic tank, solids settle from the liquid and microorganisms begin to break down materials.
- 2: closed anoxic reactor- a transition system between anaerobic and aerobic environments; denitrifying microorganisms break nitrates down into nitrogen gas. Some oxygen is added through a diffuser at the bottom of the tank.
- 3: closed aerobic reactor- Oxygen is added by a diffuser pump at the bottom of the tank. Levels of organic wastes are significantly reduced by bacteria. Aerobic bacteria use oxygen to convert ammonia into nitrates. Bad smelling gases from previous stages are passed through a biofilter of substrate and plants where bacteria remove odors.
- 4: open aerobic reactor- an ecosystem of plants, algae, snails, and fish further break down gases and organic materials. Plant roots provide microbial habitats and absorb some gases, algae settles organic wastes to bottom where the sludge is consumed by snails.
- 5: "polishing" rock- reed bed- The wastewater is circulated through the constructed gravel bed wetlands to remove the remaining organic materials in-addition to providing the planted vegetation an opportunity to absorb remaining nutrients in the waste stream. Water is non potable but may be collected for reuse in plant watering or for toilets.

APPROXIMATE COST : \$2000

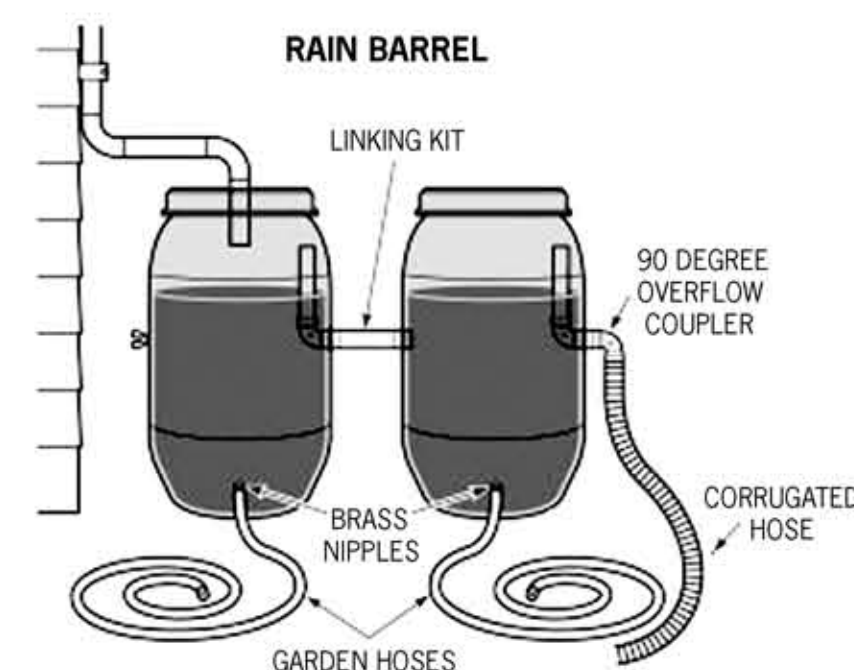
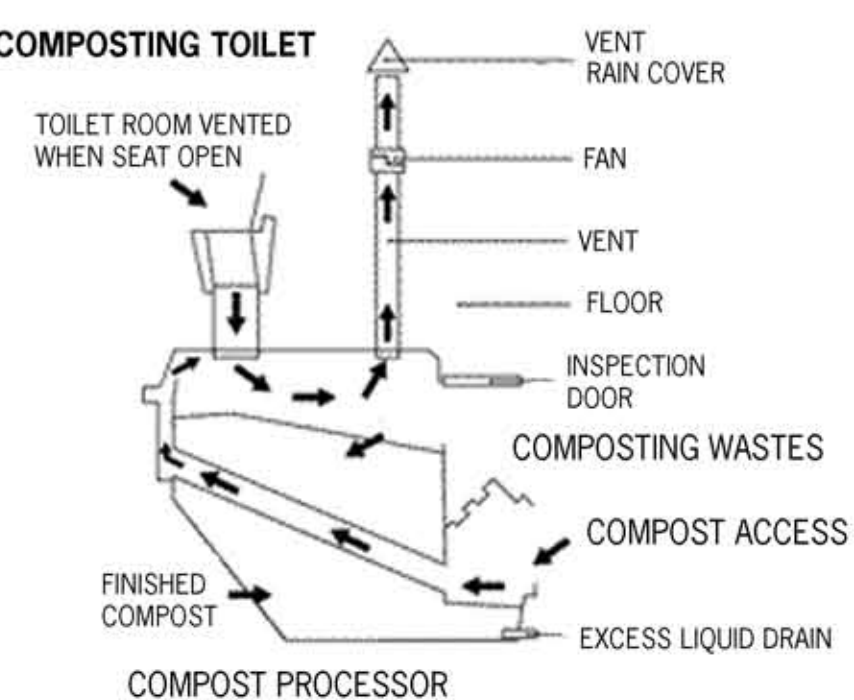
MATERIALS

- 4- 70 gal tanks. 26"D.x 40"H.
- 3- air pumps w/ diffusers
- Plants- cattails, reeds, rushes, lilies, water lettuce, etc.
- Substrate- gravel, soil.

<http://www.livingdesignsgroup.com/>
http://www.oberlin.edu/ajlc/systems_lm_4.html
<http://www.oceanarks.org/natural/>
<http://www.toddecological.com/ecomachines.html>
<http://www.rps.psu.edu/0009/machine.html>

STORMWATER SYSTEM

COMPOSTING TOILET



STORMWATER PERSPECTIVE

MATERIALS

- RAIN BARREL:
- 55 GALLON PLASTIC BARREL
 - SEALED LID
 - ENTRANCE SCREEN
 - DOWNSPOUT CONNECTOR
 - RUNOFF PIPE
 - SPIGHOT
 - EXPANDED VOLUME (EXTRA BARRELS)
 - WATER DIVERSION SOAKER HOSE
 - AUTOMATIC OVERFLOW

APPROXIMATE COST
 \$110-\$190 PREFABRICATED
 LESS THAN \$50 HOMEMADE

