Overview of Double Chamber Composting Toilet System

The Double Chamber Composting Toilet system utilizes two separated chambers constructed of masonry block. Each chamber is approximately 1 cubic yard in volume. The batch-type composting toilet system allows for complete segregation of aging material from fresh material. The toilet is simple to use and odorless.

The design can be integrated into new construction or built as a stand-alone structure. For composting toilet structures without heating systems, it must be used in mild climates to insure sufficient heating for effective composting. Outdoor systems are suitable for locations with average temperatures of 53° F or higher during the four coldest months.

A toilet seat and ventilation assembly is integrated into the top of each chamber. A chamber is designated as an "active" chamber and the second chamber is either "inactive" or if a composting pile is present then "aging". When the active chamber is full, use is switched to the second chamber and the first chamber becomes an "aging" barrel. At this time, the second chamber becomes the "active" chamber. The aging chamber contents continue to compost for a minimum of four months before being emptied. A two chamber system is designed to accommodate approximately up to 4-5 regular users in a home setting.

Safeguarding Public Health. The primary purpose of a composting toilet system is to provide a safe and effective process to handle human excrement. Adherence to the following performance criteria and adoption of the specified best management practices by each and every composting toilet system shall ultimately safeguard human and environmental health for both on-site and community stakeholders.

Composting Toilet Performance Criteria. The double chamber style composting toilet reference design adheres to the following performance criteria which are also indicated on the design sheets:

1) Prevention of groundwater contamination (E303(C)(1,3)): The composting toilet is a "dry" system meaning waste waters are not produced in the process. A minimal amount of leachate may infiltrate into the sub-surface native soil floor. Systems shall not be allowed in areas with groundwater levels less than 10 feet from the soil surface. Diversion of urine prior to contact with composting materials is optional in the double chamber composting system with a native soil floor. A urine diversion system is required if the composting chamber has a cement floor.

2) Disease vector control (E303(C)(2)): The chamber system utilizes insect and rodent-proof screens at all openings into the composting chamber. An insect light-trap is included in the design to capture and isolate any flying insects which may have gained access to the chamber during use.

Additional requirements under E303.

1) Construction material characteristics (E303(E)(1)): The chamber design is to be constructed with specified materials selected to be durable and corrosion resistant.

2) Toilet capacity sized appropriately (E303(D)(1)(d) and (E)(3)(a)): The double chamber system may accommodate up to 4-5 regular daily users to ensure a composting period of at least 4-6 months for most parts of Arizona where the average low temperature is greater than 53°F.

3) Effective composting environment (E303(G)(1)(a-j)): The composting chamber is sized adequately to facilitate the composting process. The best management practices detail how to maintain an effective composting environment which is dependent on an adequate mix of air, moisture, carbon material, and appropriate temperature.

4) Minimizing user interaction of aging compost materials (E303(G)(1)(d)): The system is designed to minimize user interaction with non-fully composted materials. The best management practices detail use and management processes to safeguard individual user's health.

5) Deactivation of potential pathogens: This reference design has been tested to ensure effective deactivation of potential pathogens to meet US Environmental Protection Agency standards for Class A Biosolids which allows unrestricted use of the composted material in small quantities.

Best Management Practices. The best practices outlined below are meant to facilitate both safe handling and optimum composting conditions free of smells and issues with insects. This Double Chamber Composting Toilet reference design shall be kept with the composting toilet system and passed on to future users/managers to ensure documentation of the system is maintained.

Use of the Active Chamber. The empty chamber is known as the "active" chamber.

After each use of the toilet:

1) Moisten toilet paper with a squirt bottle (located beside toilet). This helps with the next step. Be sure to moisten only the toilet paper, not the surrounding compost.

2) Cover the deposit and toilet paper with ample carbon-based cover material. Appropriate cover materials may include dry, finely chopped, carbonaceous material such as sawdust, wood shavings, chopped straw (less than 3-4" length), shredded paper, etc.. Wood shavings can be obtained from pet stores, feed stores, cabinet makers, etc. Avoid shavings from cedar, redwood, treated wood or plywood.

3) If optional urine diverter is installed, it should be rinsed with approximately 1/4-1/2 cup water from squirt bottle following each use. If pieces of cover material fall into the urine diverter, remove the screen from the diverter, turn it upside down and spray it clean using squirt bottle.

4) Close the lid after each use to prevent entry into the composting chamber by insects.

Composting in the Aging (inactive) Chamber:

1. The contents of the aging chamber will now compost for a minimum of 4 months with no additional material being added.

2. The aging chamber is aerated once every two weeks using a Compost Crank. At the end of 4-6 months, the chamber may be emptied. The aging chamber should be aerated prior to aeration of the active chamber to ensure that pathogenic material will not be transferred from fresher to older material.

Emptying chamber: After a minimum retention time of 4 months, the composted contents of the chamber may be safely handled as a composted material and emptied. The composted material may be spread as compost in mulch basins around shrubs, vines or trees or deposited into an outdoor composting bin for further composting.

Performance Evaluation and Troubleshooting.

Odors: If odor problems arise it indicates that one or more of the four essential elements of composting is out of balance. Typically, the carbon/nitrogen ratio is out of balance, the compost is too wet and not enough air is present. All of these can be remedied by adding dry, high-carbon cover material and then thoroughly aerating the compost.

Attention should be paid to the compost during aeration. If the moisture content is greater than a wrung-out sponge, more carbonaceous material should be added.

Insects: Insects and other arthropods will be excluded from the compost by the insect screen over all vents and the weather stripping around the toilet seat on the active barrel and by the insect screen on top of the aging chamber. An insect trap is incorporated into the design to control insects that may enter the active chamber.

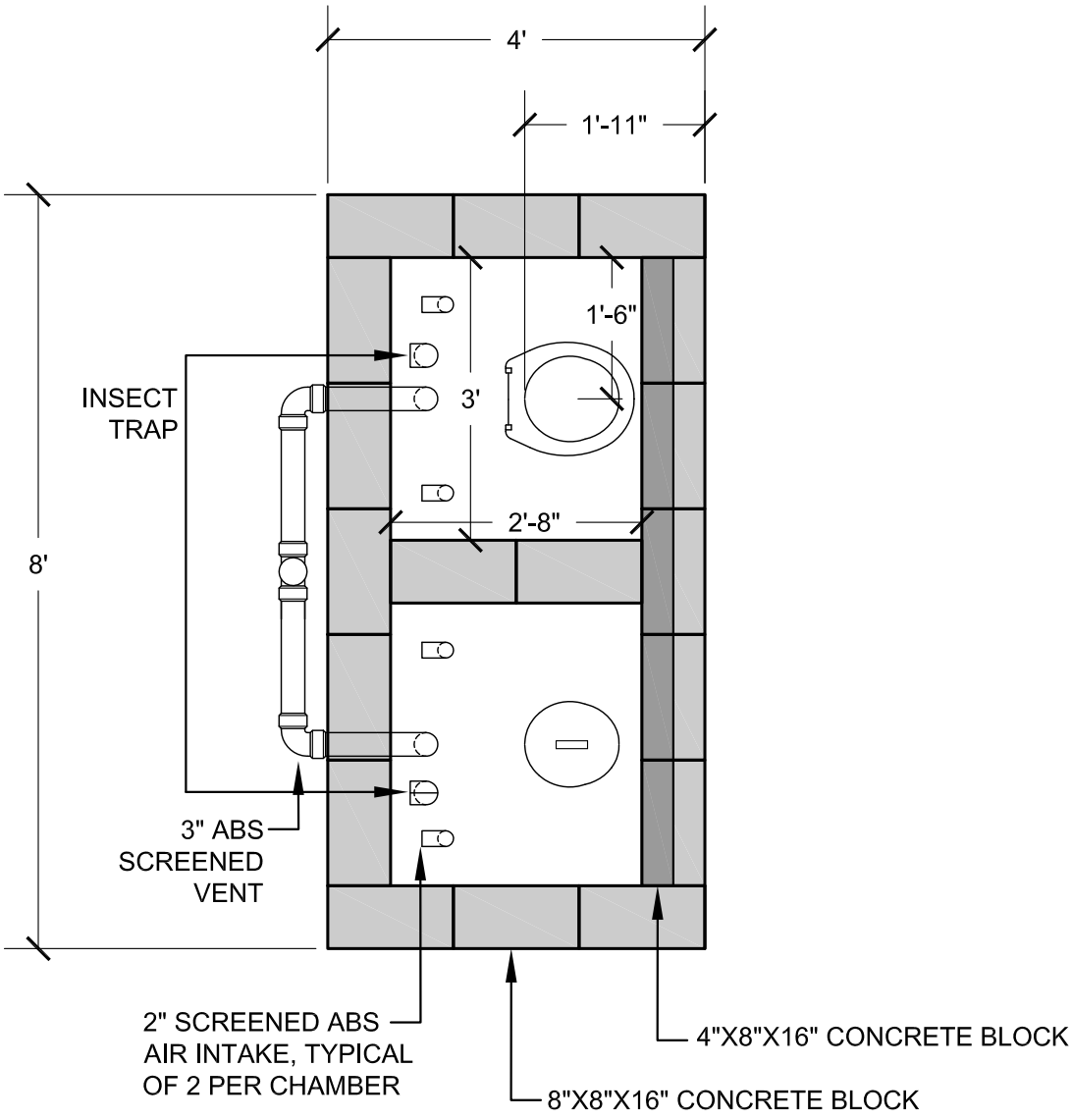
Online Reference Materials

Reference design and additional materials can be also found at Watershed Management Group's Composting Toilet Informational pages: www.watershedmg.org/composting-toilets (*Coming Soon*)

Appropriate Climates for Outdoor Installations:
http://www.omick.net/composting_toilets/barrel_toilet_outdoor_locations.htm

Calculating Effective Leaching Chamber Absorption Area for Subsurface Urine Disposal:
http://www.omick.net/composting_toilets/barrel_toilet_urine_leaching_chamber.htm

Reference design and additional materials can be also found at Watershed Management Group's Composting Toilet Informational pages: www.watershedmg.org/soil-stewards



SPECIFICATIONS:
CONCRETE BLOCK: 8" x 8" x 16" AND 4" x 8" x 16"
REBAR: #4 (1/2"), ALL OVERLAPS 40 DIAMETERS (20" MINIMUM)
CONCRETE: 3500psi, CONCRETE MIX FOR FOOTINGS AND FLOOR
MORTAR: TYPE S
GROUT: 3500psi, CONCRETE MIX OF EASILY POURED CONSISTENCY

NOTE:
ALL VENTS TO BE COVERED WITH ALUMINUM INSECT SCREEN OVER NO-SEE-UM NETTING, BOTH SECURED WITH STAINLESS STEEL CLAMPS

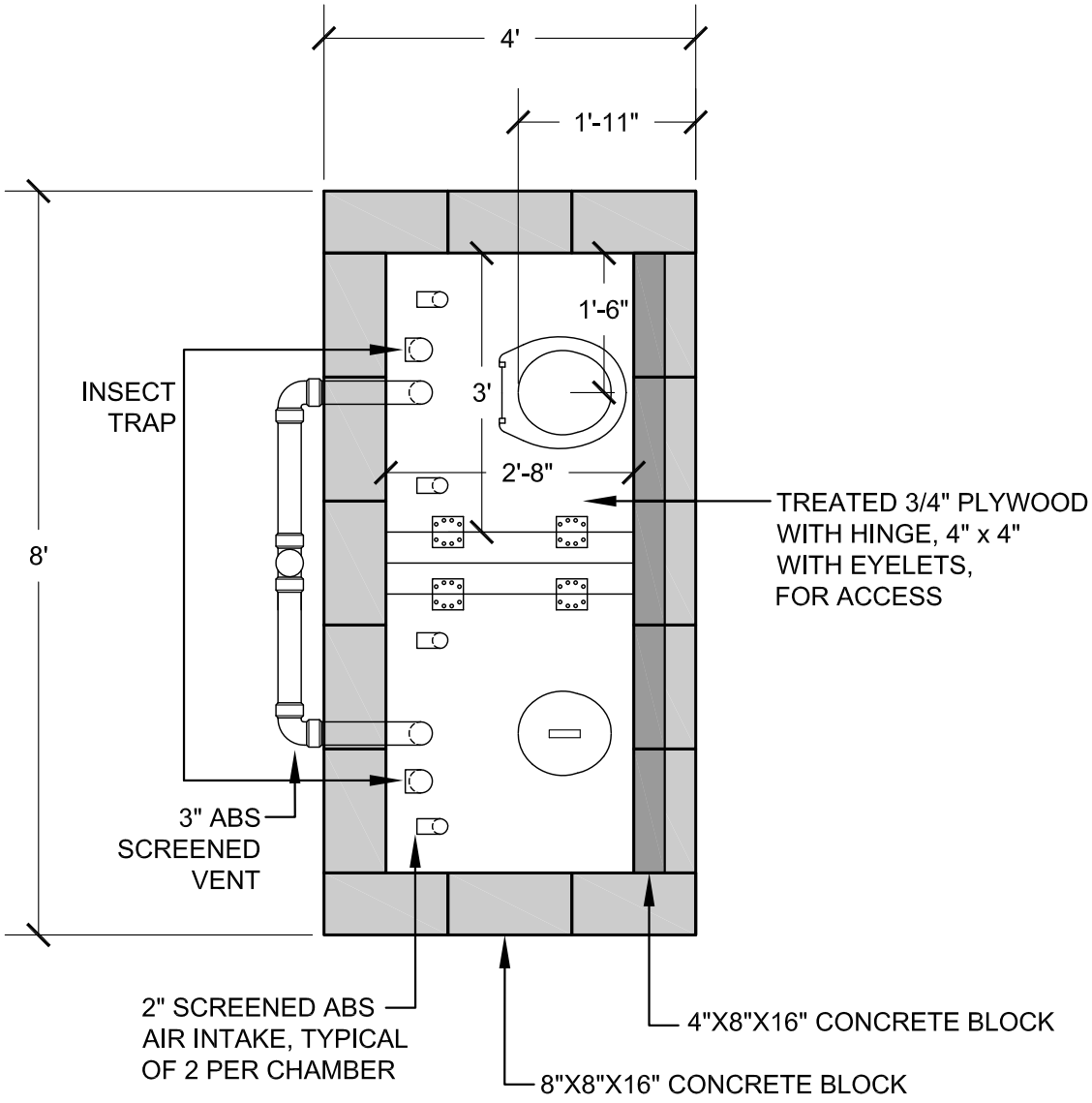
TYPICAL 2 CHAMBER SYSTEM

SHEET 1

TOP VIEW

SCALE $\frac{1}{2}$" = 1'-0"

Watershed Management Group



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MORTAR: TYPE S
GROUT: 3500psi, CONCRETE MIX OF EASILY POURED CONSISTENCY

NOTE:
ALL VENTS TO BE COVERED WITH ALUMINUM INSECT SCREEN OVER
NO-SEE-UM NETTING, BOTH SECURED WITH STAINLESS STEEL CLAMPS

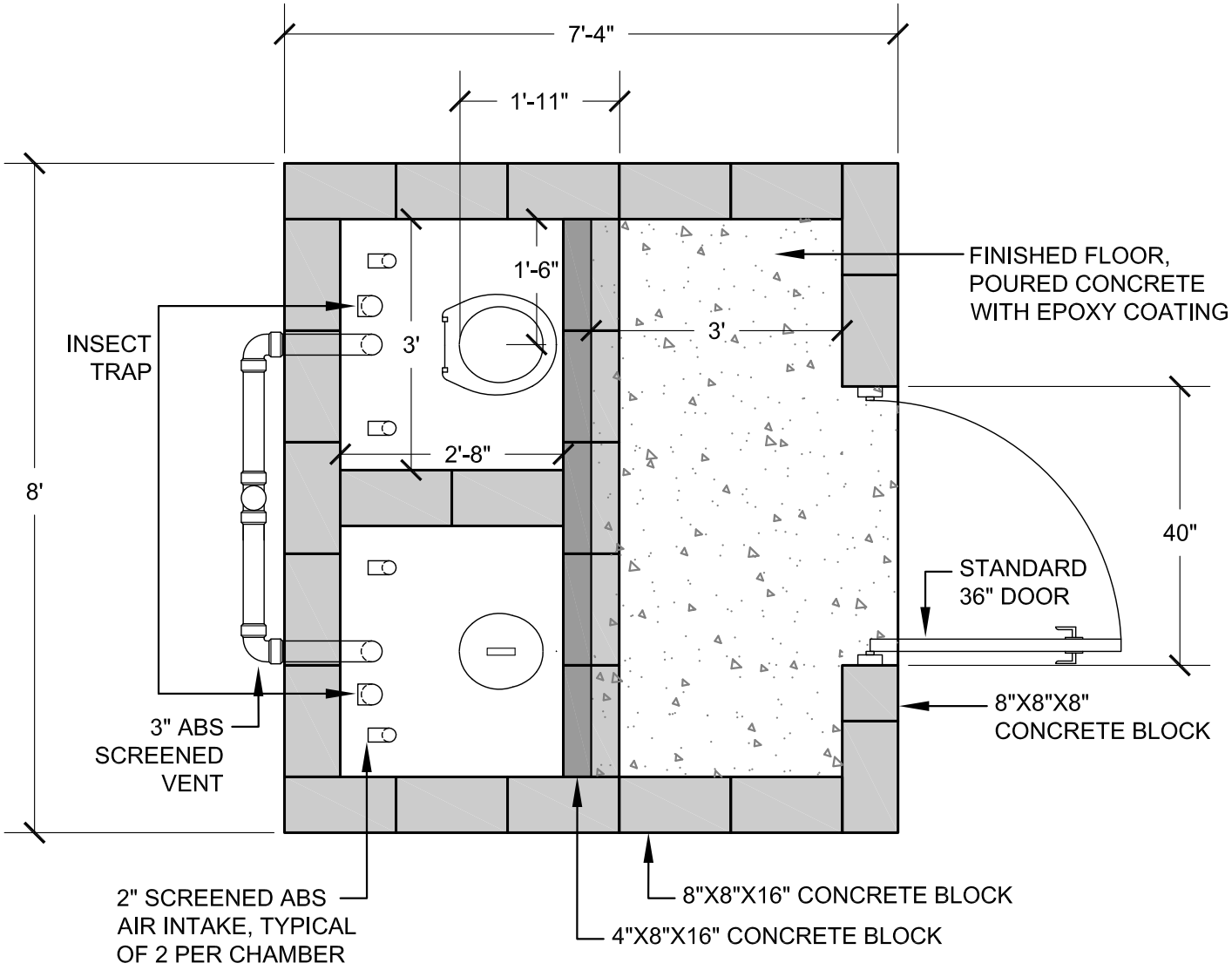
TYPICAL 2 CHAMBER SYSTEM
WITH HINGED LID ACCCESS OPTION

SHEET 2

TOP VIEW

SCALE $\frac{1}{2}$" = 1'-0"

Watershed Management Group



SPECIFICATIONS:
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REBAR: #4 (1/2"), ALL OVERLAPS 40 DIAMETERS (20" MINIMUM)
CONCRETE: 3500psi, CONCRETE MIX FOR FOOTINGS AND FLOOR
MORTAR: TYPE S
GROUT: 3500psi, CONCRETE MIX OF EASILY POURED CONSISTENCY

NOTE:
ALL VENTS TO BE COVERED WITH ALUMINUM INSECT SCREEN OVER
NO-SEE-UM NETTING, BOTH SECURED WITH STAINLESS STEEL CLAMPS

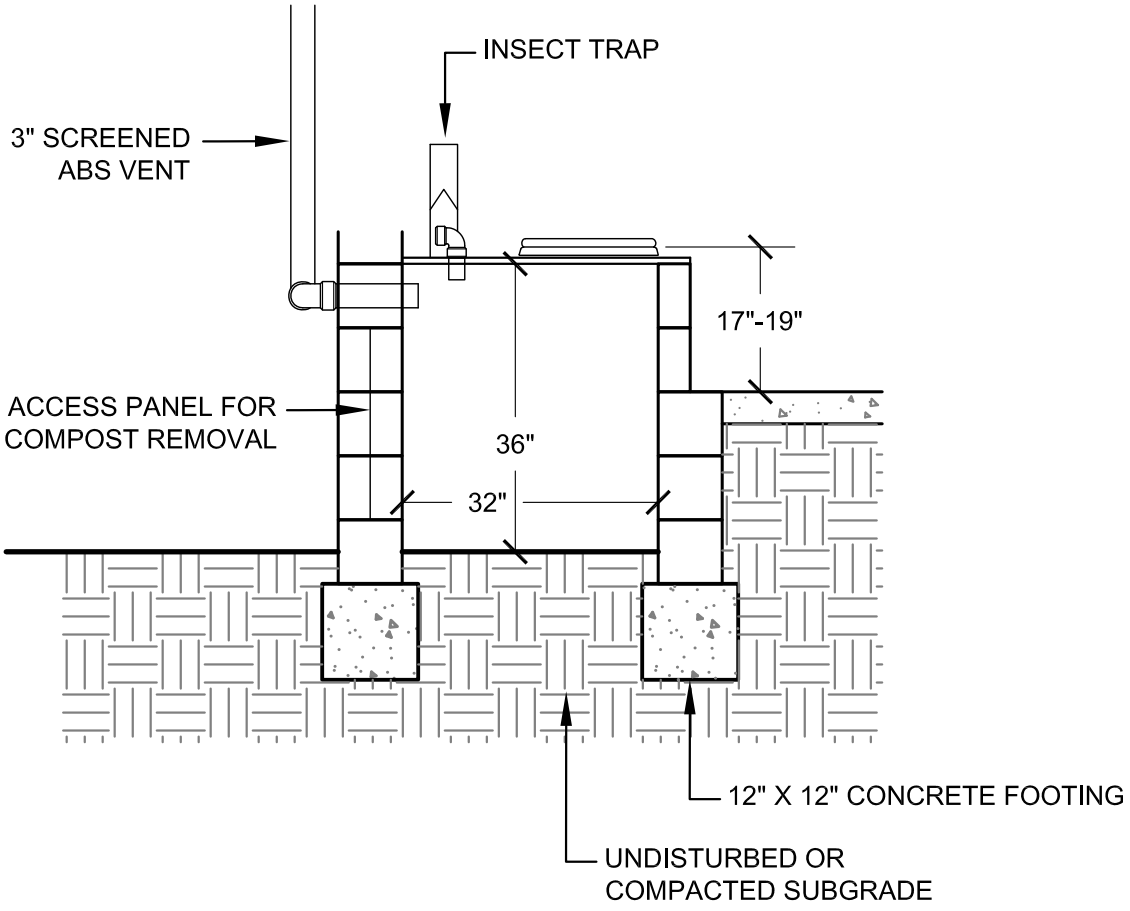
TYPICAL 2 CHAMBER SYSTEM
BUILDING STRUCTURE FOR CONTEXT ONLY

SHEET 3

TOP VIEW

SCALE $\frac{1}{2}$" = 1'-0"

Watershed Management Group



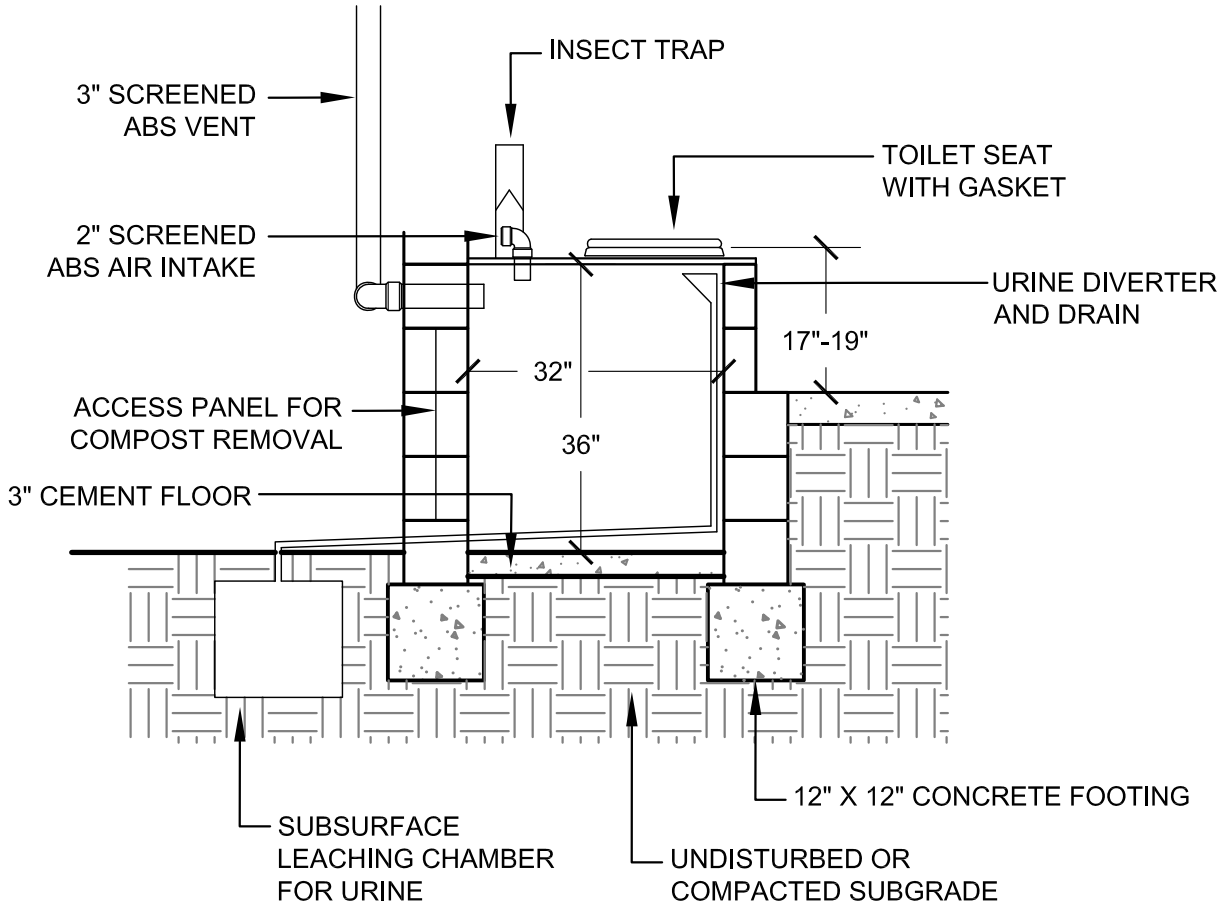
TYPICAL 2 CHAMBER SYSTEM

SHEET 4

SIDE VIEW

SCALE $\frac{1}{2}$" = 1'-0"

Watershed Management Group



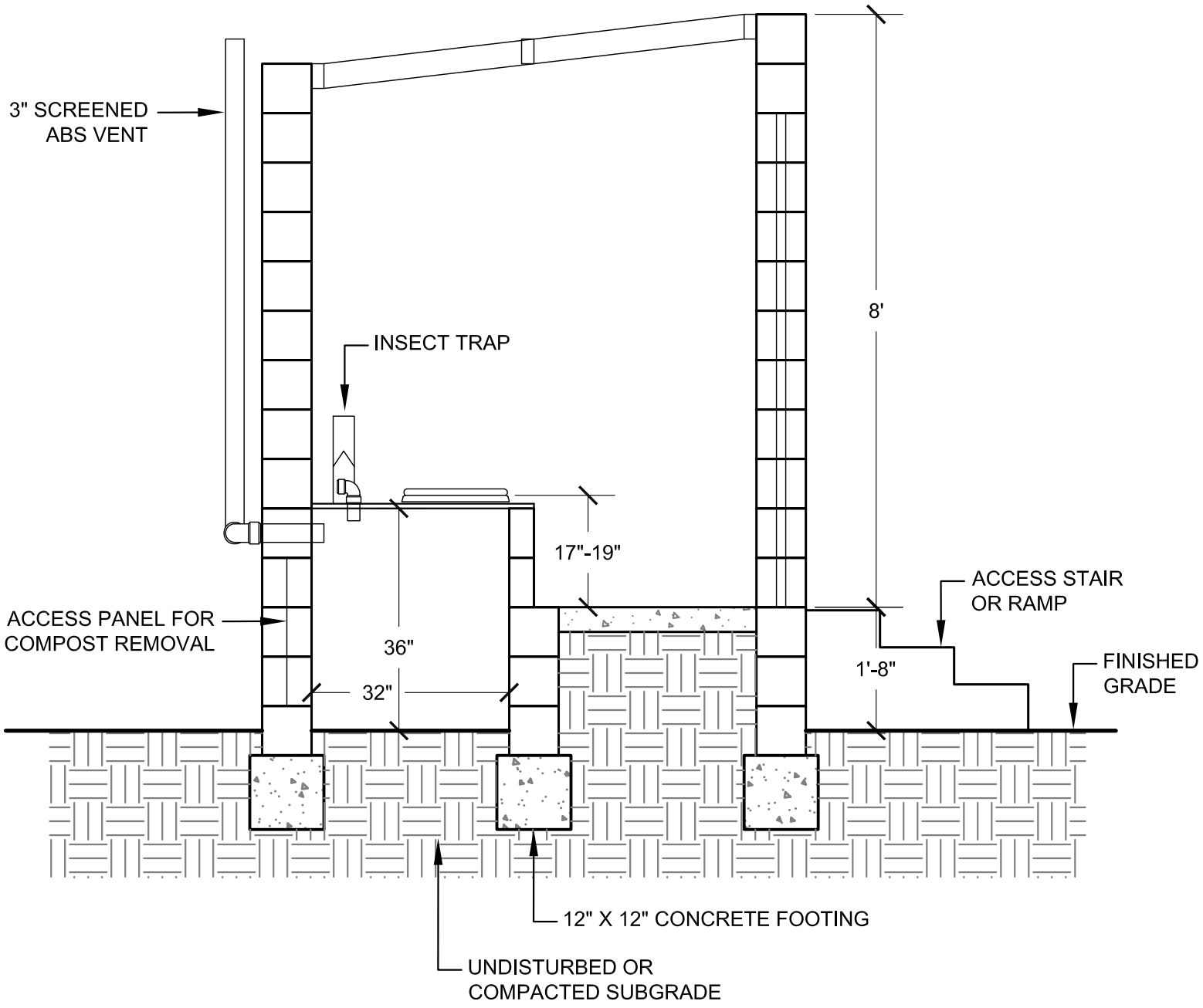
TYPICAL 2 CHAMBER SYSTEM
WITH URINE DIVERSION AND CEMENT FLOOR OPTION

SHEET 5

SIDE VIEW

SCALE $\frac{1}{2}$" = 1'-0"

Watershed Management Group



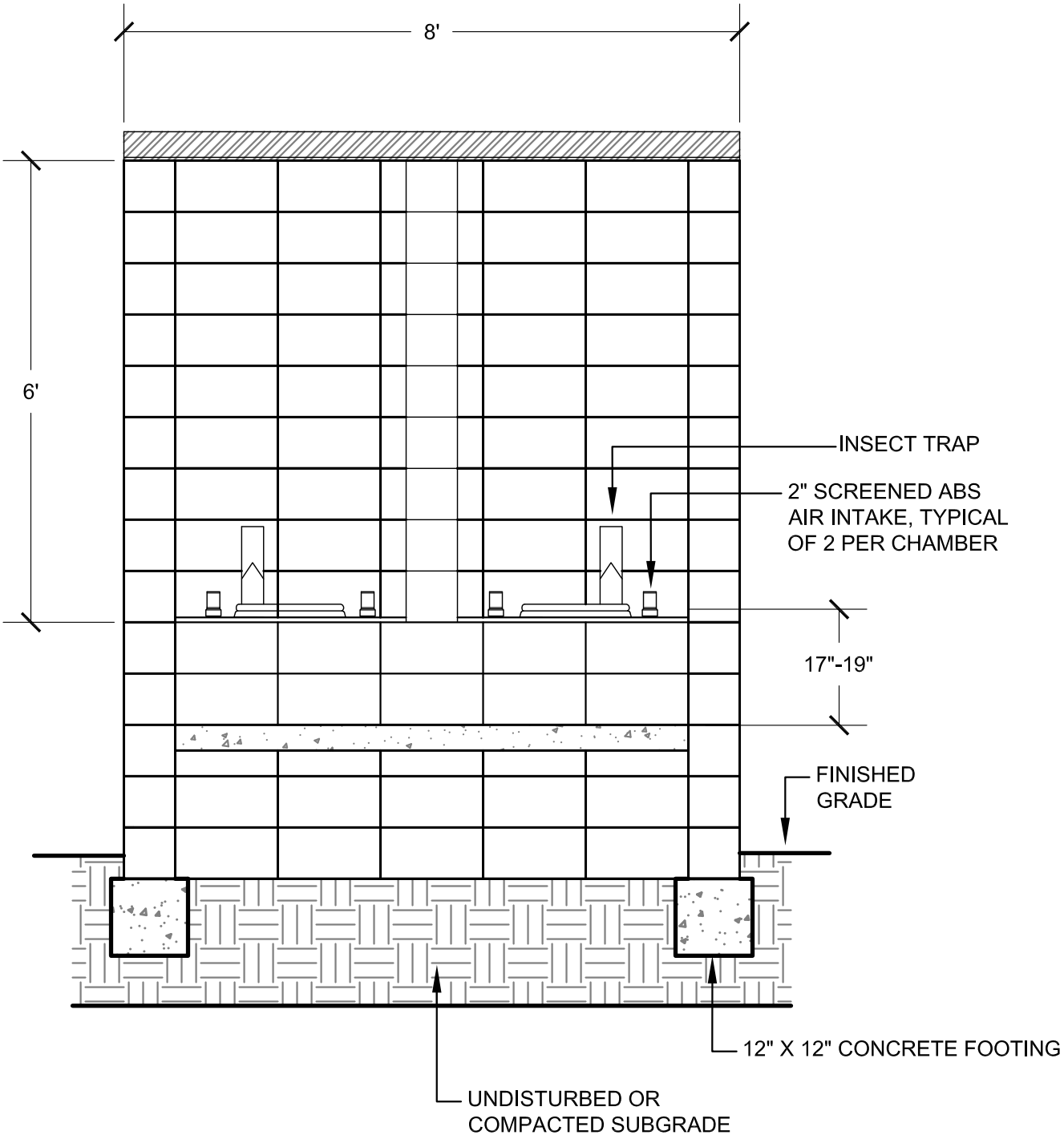
TYPICAL 2 CHAMBER SYSTEM
BUILDING STRUCTURE FOR CONTEXT ONLY

SHEET 6

SIDE VIEW

SCALE $\frac{1}{2}$" = 1'-0"

Watershed Management Group



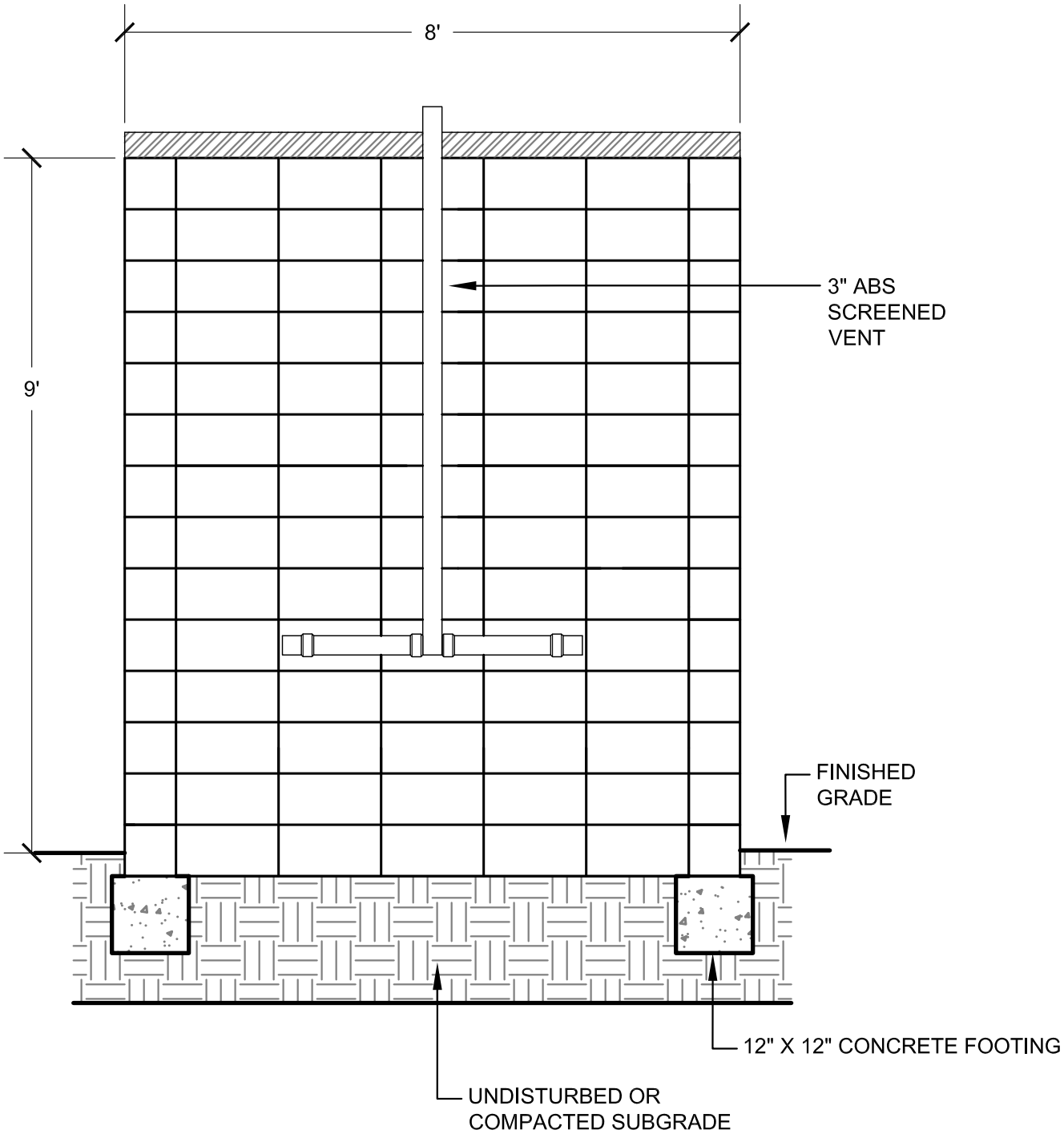
TYPICAL 2 CHAMBER SYSTEM

SHEET 9

FRONT VIEW

SCALE $\frac{1}{2}$" = 1'-0"

Watershed Management Group



TYPICAL 2 CHAMBER SYSTEM

SHEET 8

REAR VIEW

SCALE $\frac{1}{2}$" = 1'-0"

Watershed Management Group