

Graywater-Ready Buildings: Model Ordinance



By The Decentralized Water Policy Council

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Credits:

Text by Laura Allen and Regina Hirsch

Illustrations 1-4 by Paddy Morrissey paddydesigns.com, Illustration 5 and 6 copyright Steve Sanford from the Water-Wise Home by Laura Allen (2015).

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Graywater-Ready Buildings: Model Ordinance

Notes: The goal of the Graywater-Ready Building Ordinance is to lower the costs and barriers for future graywater system installations. The cost to make graywater drains accessible for installation of a future graywater system is lowest during the construction or remodel of bathroom or laundry room when the piping is being installed.

It is not the intention of this ordinance to prevent any alternative, but equivalent method to construct a graywater-ready building that meets the intent of this document.

Definitions:

Graywater access point: A pre-determined location in a graywater drain line where a future diverter valve can be installed without requiring replumbing of the drain pipes. In this ordinance an access point refers to an 18 inch section of straight pipe (connected by no-hub bands so that 16 inches of pipe are visible between the bands) or equivalent, where a future diverter and backwater valve (or other suitable method of diversion) can be installed **before** the drain combines with any blackwater.

Diverter valve: A single valve that can direct graywater to either the sewer/septic or to a graywater irrigation system.

Dual drainage plumbing: Plumbing the graywater drains separate from the blackwater drains until an accessible location outside of the building. A **graywater access point or stub-out** needs to be installed before the graywater drain connects to the building sewer.

Pass-through: A passageway, such as a short section of pipe or sleeve, where a future graywater line can be connected or inserted through a wall, floor, or foundation at an optimal height and location without having to drill or do other construction.

Stub-out: The termination of pre-plumbed graywater collection piping outside a dwelling, capped and ready to be connected to a graywater irrigation system.

Ordinance language:

Graywater accessibility points (stub-outs, access points, dual plumbing, or pass-through plumbing) must be included in all new construction, as well as in bathroom or laundry room remodels that alter the drainage plumbing of the fixtures, so that the graywater drains are accessible and able to be diverted into a graywater irrigation system.

A graywater accessibility point is provided for all graywater sources identified from the Graywater Accessibility Chart. See diagrams for example configurations. If the future diverter valve location won't be easy to access for manual turning of the valve, an outlet should be located within 10 feet of this location so that an electronic actuator can be connected to the diverter valve for remote switching.

Exception: Buildings on small lots may not require all graywater sources from the chart to meet 100% of the irrigation needs. A designer may provide calculations to show how many sources of graywater will be needed to meet the irrigation requirements on the site instead of following the ordinance requirements.

Graywater Accessibility Chart

Type of building	Mandatory	Voluntary/Recommended
Single family (1-2 units) with crawlspace or basement	Minimum of one shower/bath, and laundry, on ground floor. <i>(see Illustration 1a and 4b)</i> All sources on 2nd floor and above. <i>(See Illustration 1b and 2)</i>	All graywater sources from all floors. <u>Exception:</u> For homes with three or more showers/baths, one shower/bath located in a less frequently used bathroom should be left off the system.
Single family (1-2 units) slab-on grade	Minimum of one source of graywater (either shower/bath or laundry) on ground floor. <i>(see Illustration 3 and 4a)</i> All sources on 2nd floor and above <i>(See Illustration 2 and 3)</i>	All graywater sources from all floors. <u>Exception:</u> For homes with three or more showers/baths, one shower/bath located in a less frequently used bathroom should be left off the system.
Multifamily residential (triplex, quadraplex, bungalow, patio homes, townhouses,	Same as single family.	Same as single family.
Multifamily residential apartment building, student housing, mixed use residential,	Rooms that generate high volumes of graywater, such as laundry facilities and showers in pool/spa area shall have an accessibility point. New construction should be plumbed with both potable and non-potable water lines to supply toilets so that toilets can be flushed with treated graywater or other non-potable sources of water.	Showers, if on 2nd floor or higher. Bathrooms should be designed so graywater and blackwater pipes are naturally separate and drain through separate drains.
Commercial	Same as multi-family residential.	One laundry point of use to be offline and plumbed for potential filtering/recirculation to cooling tower.
New subdivision	All graywater sources except lavatory (bathroom) sinks shall be dual drainage plumbed to an accessible location outside the building.	

List of Illustrations

- **Illustration 1a: Graywater access point in crawlspace or basement from first floor source**
 - Graywater access point from a first floor shower/bath is located in a crawlspace or basement.
- **Illustration 1b: Graywater access point in crawlspace or basement from second floor source or above**
 - Graywater access point from a second story shower/bath is located in a crawlspace or basement
- **Illustration 2: In-wall access panel from upper story sources**
 - Graywater access point from a second story shower/bath is located in the wall of the first floor, with an access panel installed in the wall.
- **Illustration 3: Subsurface access point in slab-on-grade buildings**
 - Graywater access point for shower/baths from a house with a slab-on-grade foundation is located outside the building envelope in a subsurface enclosure (i.e. an irrigation valve box).
- **Illustration 4a: Laundry-to-landscape pass-through in slab-on-grade building**
 - Laundry-to-landscape pass-through piping using a “dual drain washer box” with 1” rigid pipe installed from washer drain box through the wall to the exterior for future graywater irrigation system.
- **Illustration 4b: Laundry-to-landscape pass-through in building with crawlspace**
 - Laundry-to-landscape pass-through piping using a “dual drain washer box” with 1” rigid pipe installed from washer box through the floor and crawlspace to exterior for future graywater irrigation system.
- **Illustration 5: Overview of the laundry-to-landscape system**
 - Conceptual image showing how the washer drain hose connects directly to the valve with one side sending the water to the sewer/septic and the other side of the valve going out to the irrigation system.
- **Illustration 6: Overview of a gravity-flow, branched drain system.**

Notes:

- Graywater drains may include a combined flow from the shower/bath and the lavatory sink, though combining the flows is considered optional due to the small quantity and lower quality of graywater from the lavatory sink compared to graywater from the shower/bath and laundry sources.
- Whenever possible, located graywater diverter valves where they can be operated manually. The use of electronically operated valves adds cost and energy use, and should be used when necessary, not as the default method.
- These images show one potential plumbing configuration. There are many more ways to install a graywater accessibly piping that would meet the requirements of this ordinance than are shown here.
- The images are for reference and conceptual planning purposes and are not meant to be a plumbing guide.

Illustration 1a: Access point in crawlspace from a first floor source

Graywater access point from a first floor shower/bath is located in the crawlspace or basement.

The section of straight pipe can be removed to install a future diverter valve and backwater valve.

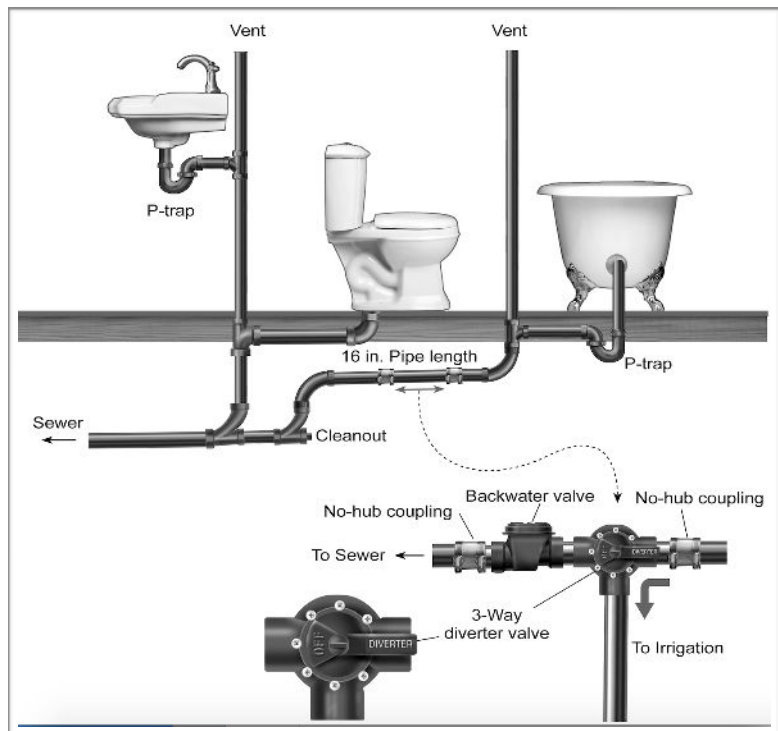
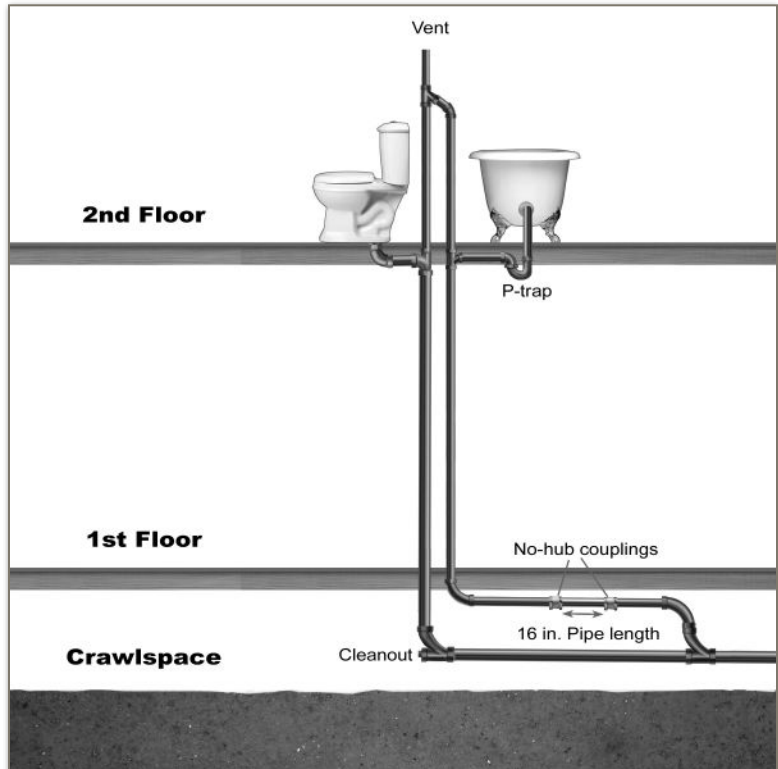


Illustration 1b: Access point in crawlspace from second floor source

Graywater access point from a second story shower/bath is located in the crawlspace or basement

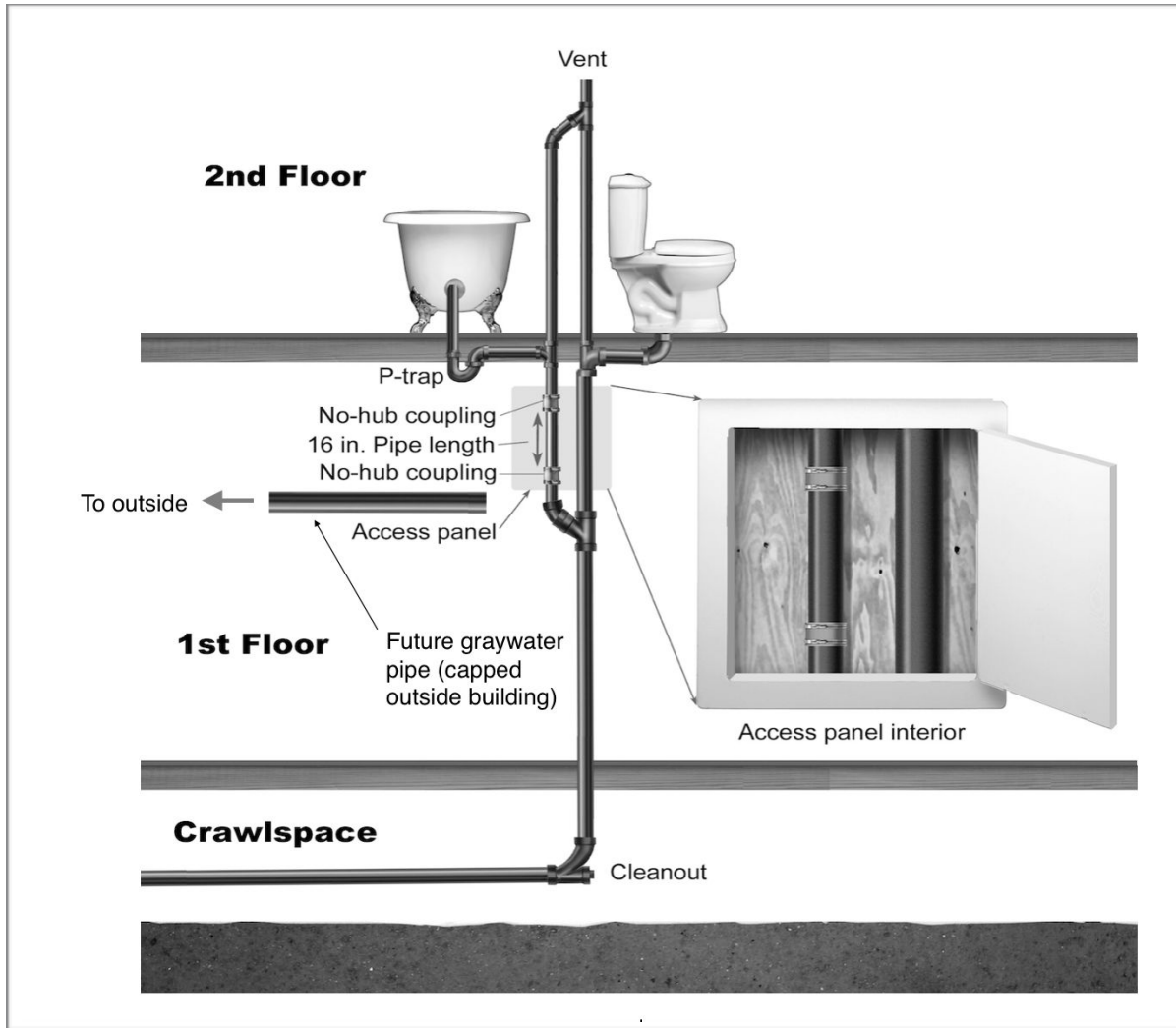
The graywater drain is plumbed separately from the blackwater drain and doesn't combine until after the access point.



Conceptual illustrations, not to scale.

Illustration 2: In-wall access panel for upper story sources

Graywater access point from a second story shower/bath is located below the bathroom inside the wall of the first floor. An access panel in the wall enables future access to the drain.



Conceptual illustration, not to scale

Notes:

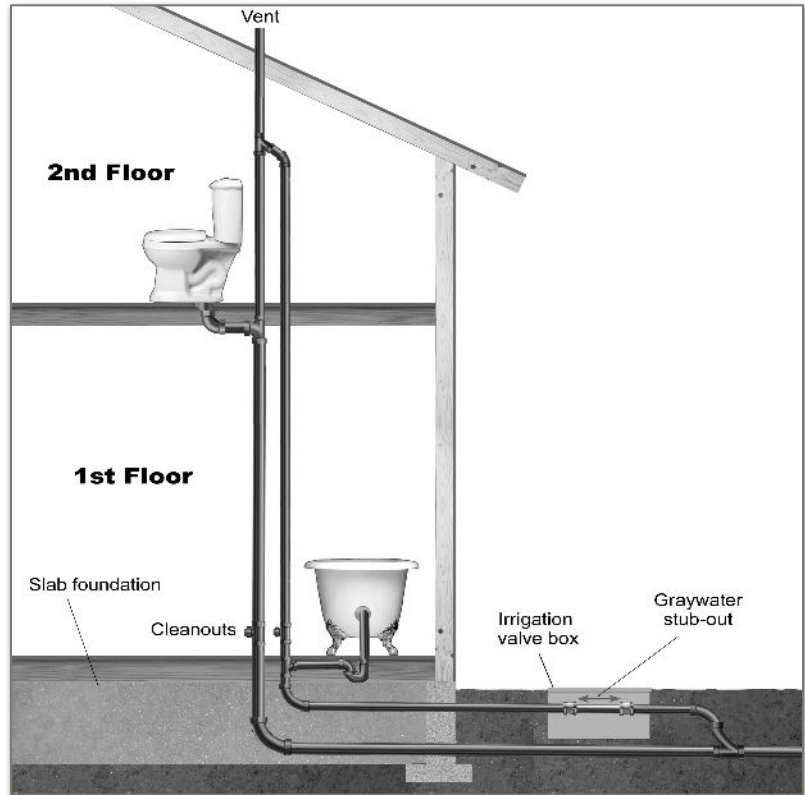
- This same access point configuration can be installed for a third floor bathroom, with access in the second floor.
- Graywater and blackwater drains require a 3 inch minimum separation distance between the edges of the two pipes to fit in the valve.
- The access panel should be located in an exterior wall so the future graywater piping can send the water outside. If graywater pipes are located in an interior wall this type of access point configuration should not be used; instead use Diagram 1b or 3b.
- The main benefit to installing an access point in the wall instead of in the ground or crawlspace is to allow for a future gravity flow system. (If the graywater pipes are too low in elevation the water will have to be pumped to the landscape.) Keep the

Illustration 3: Subsurface access point in a slab-on-grade building

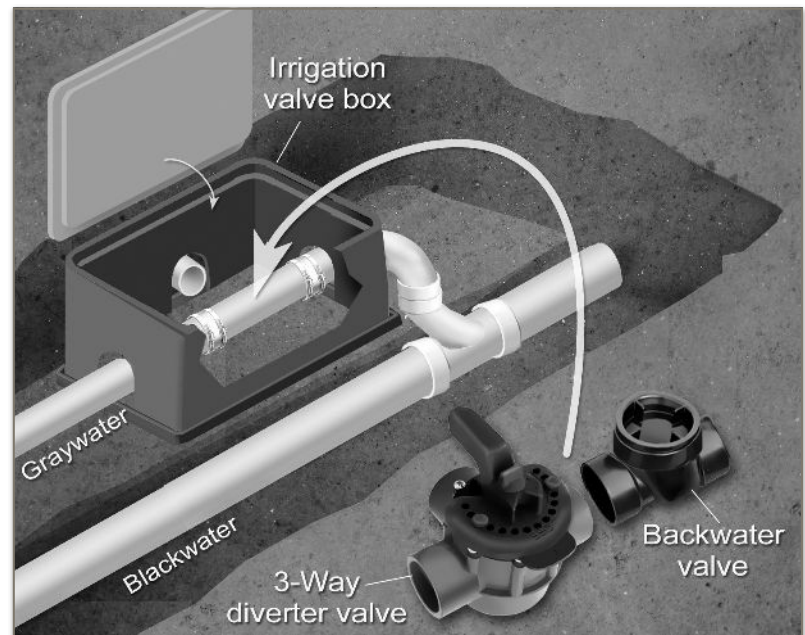
Graywater access point from shower/bath in a house with a slab-on-grade foundation can be located outside the building envelope in a subsurface enclosure, for example an irrigation valve box.

Notes:

- An electrical outlet should be located nearby if a pump will be needed.
- The irrigation valve box containing the access point must be permanently accessible: no structures or hardscape covering it.
- The diverter valve and backwater valve will be located inside the valve box.
- For a gravity flow system, the stub-out should be kept as high as possible.
- For a pumped graywater system, a sump basin with pump will need to be installed near the stub-out to pump graywater to the landscape.
- Note that the 3-way diverter and backwater valves shown in the image are not required to be installed to satisfy the requirements of this ordinance.



Close-up detail of graywater access point inside the irrigation valve box.



Conceptual illustration, not to scale

Illustration 4a: Laundry-to-landscape stub-out plumbing in slab-on-grade building

One side of a “dual drain outlet box” is plumbed following conventional plumbing to the sewer/septic system. The other side of the outlet box is outfitted with a 1” rigid pipe, for example schedule 40 PVC, and run to the exterior of the building. A threaded cap closes off both ends.

NOTE: ALTERNATIVELY, A LARGER PIPE COULD BE RUN FROM THE DRAIN BOX TO THE EXTERIOR, FOR EXAMPLE 2” ABS, AS A “PASS-THROUGH PIPE” FOR A FUTURE 1” TUBING TO BE RUN.

Notes:

- The 1” pipe is NOT part of the DWV system of the house and should not be required to meet local codes for drainage piping. If it’s used for a future graywater system it will be part of the irrigation system.
- The 1” pipe should NOT have a trap or vent.
- The future diverter valve will be mounted to the wall above the washer box and connected directly to the discharge hose of the washer.

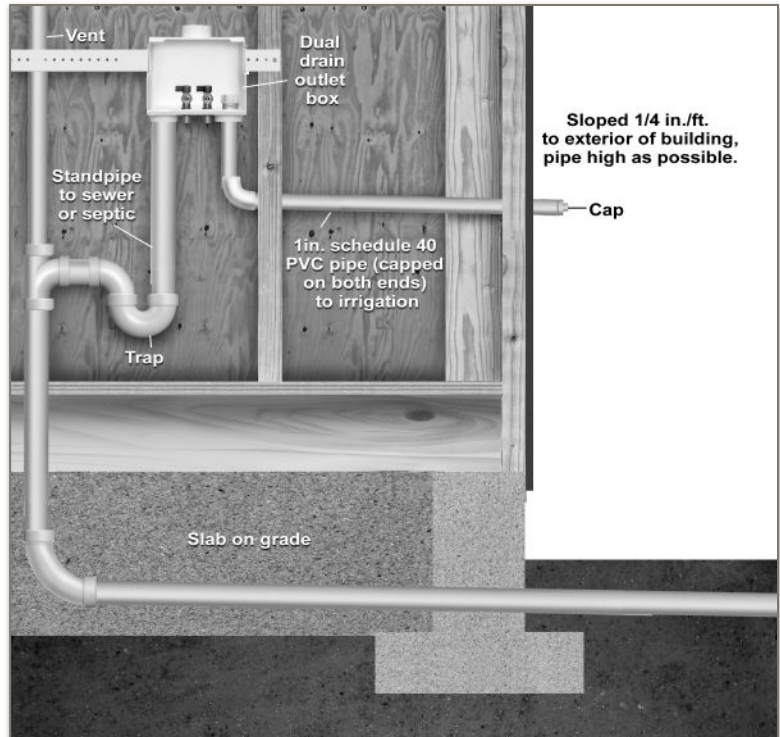
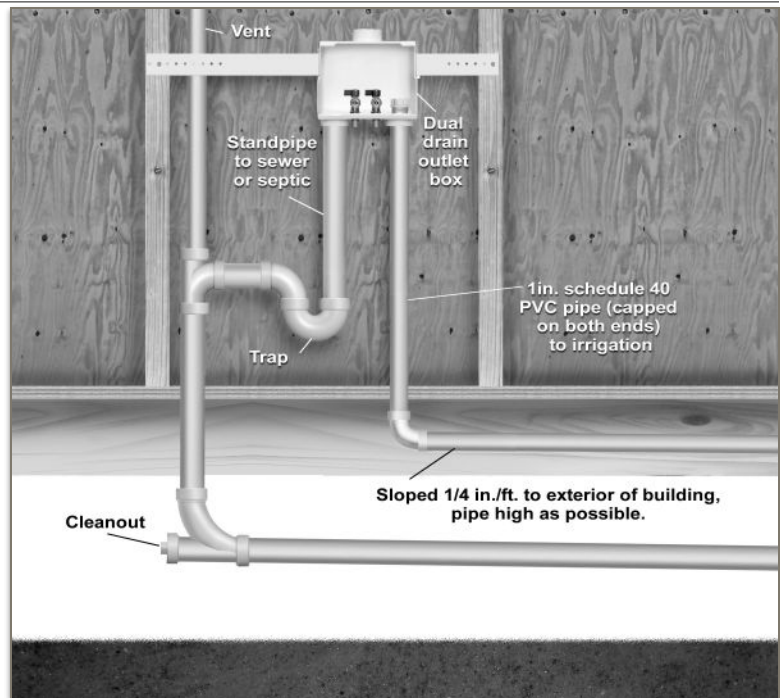


Illustration 4b: Laundry-to-landscape stub-out plumbing in building with crawlspace

This pass-through is the same as 4a except the rigid pipe is run through the floor into the crawlspace and then to the exterior.

Note:

- Refer to notes from 4a.



Conceptual illustration

Illustration 5: Overview of the laundry-to-landscape system

This conceptual image shows how the washer drain hose connects directly to the diverter valve to direct graywater outside to the irrigation system. The diverter valve (mounted on the wall) and the graywater piping are not connected to the house's DWV system.

Notes:

- This image does not show irrigation system details (it would be subsurface).
- This image does not show the dual drain outlet box.

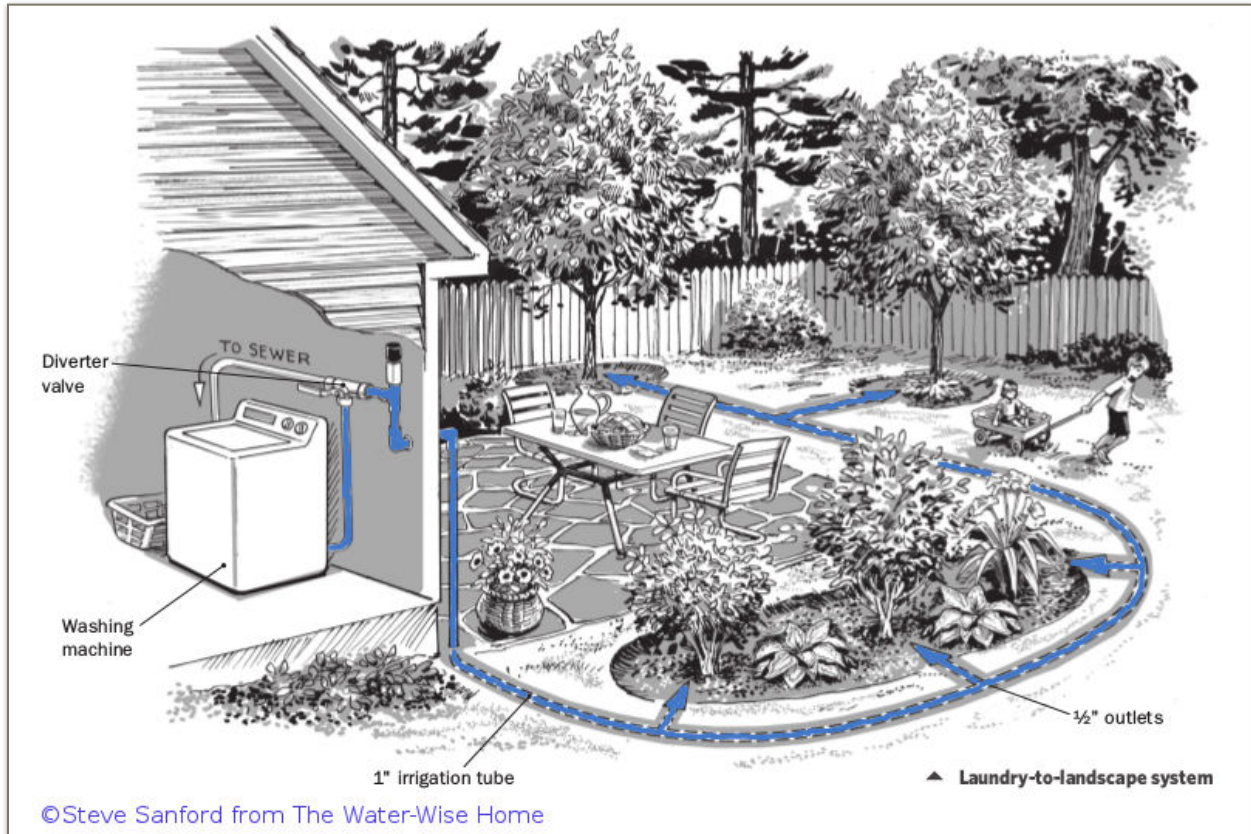
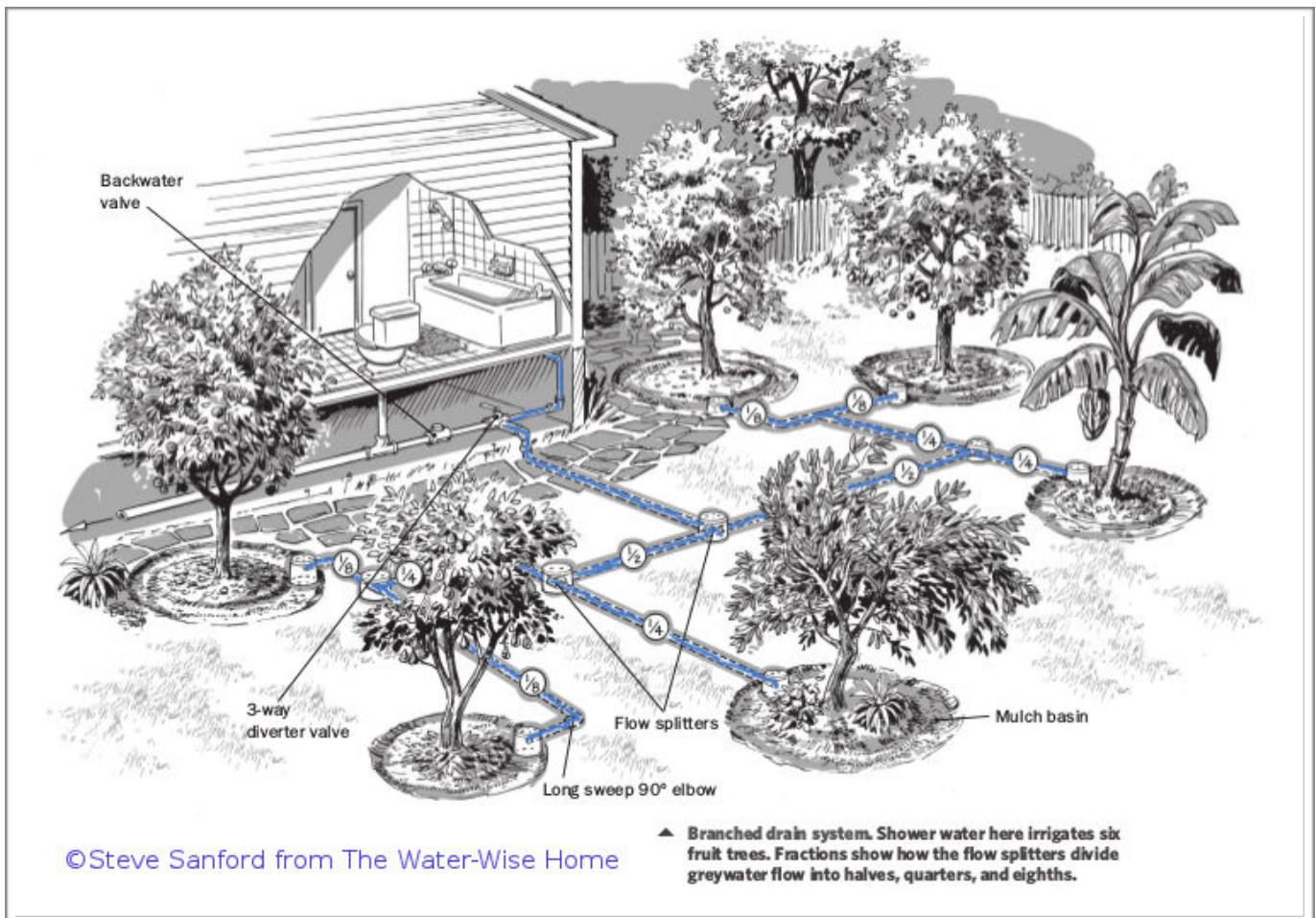


Illustration 6: Overview of a gravity-flow, branched drain system

This conceptual image shows how a gravity-flow, branched drain graywater system transports graywater to multiple landscape plants without any storage tank or pumps.

Notes:

- All piping in the landscape would be buried and mulch basins filled to the top of the valve box, which is protecting the outlet from root intrusion.
- ABS pipe is used for the irrigation portion of the system, and should be buried as shallow as possible since the pipe will get progressively deeper the farther it travels from the house (2% slope).



Supplemental images
 from
RainwaterHarvesting.com,
 courtesy of Brad Landcaster,
 Rainwater Harvesting for Drylands
 and Beyond.

