

Collection Plumbing & Stub Outs

Plumbers/ Builders: How to construct them correctly Regulators: How to inspect them

Based on the California Plumbing Code, the Uniform Plumbing Code, Arizona and New Mexico Greywater Laws,¹
*The New Create an Oasis with Greywater*² and the *Builder's Greywater Guide*³

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Greywater collection plumbing is the plumbing inside the house to either the surge tank if there is one, or a point a few feet outside the house. **Stub outs** are greywater collection plumbing which dead ends at a cap. Stub outs provide for easy diversion of greywater to a future greywater system.

Stubbing out the greywater collection part of the system without the greywater distribution part of system has several advantages:

- ❖ **Stub outs enable the greywater distribution system to be installed later** with the landscaping, as it must be for best results. Often, the landscaping won't happen until months or years after the structure is completed and inspected.
- ❖ **The economic hurdle which must be cleared to attain occupancy is lowered** by deferring the construction of most of the greywater system and landscaping until after occupancy.
- ❖ **It makes sense to stub out greywater lines in anticipation of new system types.** Greywater systems are rapidly evolving. Even if no currently available greywater system meets the owners requirements, others will become available over the long life of the house. Lines entombed under a slab without stub outs are lost to reuse forever.

Since they are a subset of builder's considerations, we'll look at greywater collection/ stub out requirements from the inspector's viewpoint first, then we'll look at the additional considerations for builders.

For Regulators: How to Inspect Greywater Collection Plumbing/ Stub Outs

In states which follow the Arizona greywater regulatory model,¹ the collection plumbing may be the only part of the system which needs inspection. However, there isn't much guidance on how this should be done.

The Arizona Greywater Code¹ has only this to say about collection plumbing:

6. *The gray water system is constructed so that if blockage, plugging, or backup of the system occurs, gray water can be directed into the sewage collection system or on site wastewater treatment and disposal system, as applicable.*

New Mexico has this collection plumbing requirement:

- (L) 1. *A constructed gray water distribution system provides for overflow into the sewer system or on-site wastewater treatment and disposal system.*

In the California Plumbing Code¹ there is only one sentence on stub outs:

7. *Graywater stub-out plumbing may be allowed for future connection prior to the installation of irrigation lines and landscaping. Stub-out shall be permanently marked "GRAYWATER STUB-OUT, DANGER - UNSAFE WATER."*

Not much to go on, is it? The UPC is totally silent on greywater stub outs.

Checklist for Inspection of Collection Plumbing/ Stub Outs:

Required for UPC/CPC Appendix G:

- ❑ **Stub out is permanently marked "GRAYWATER STUB-OUT, DANGER - UNSAFE WATER"** as per appendix G, section G-5 (a)-7 (above). *This is not required in all areas.*
- ❑ **Provision is made for diversion or overflow** of greywater to septic/sewer. *New Mexico requires overflow; either works in Arizona.*

Required elsewhere in plumbing codes:

- ❑ **Pipes slope 1/4" per foot minimum in all flow directions.** *Note: The only way to do this with currently available 3-way valves is to tweak the pipes in the hubs, which are not angled like drain fittings.*
- ❑ **Cleanouts are present every 270° of aggregate bend.**

Not mentioned in code but should be required in inspection:

- ❑ **Diversion is downstream from vents and traps**—so they will perform their function in either greywater or septic/sewer modes.
- ❑ **For a stub out, valve is in sewer position and stub out pipe to future greywater distribution system is capped.**
- ❑ **Stub out is not too deeply buried to make greywater irrigation impractical**—at exterior grade level is ideal, 6" down is OK, more than 12" below grade on flat lot is pretty much useless. If the lot slopes strongly, it may be possible to get useful irrigation from a deeply buried pipe, but not near the house where it is most welcome. *The codes are silent on this serious, practical issue of excessive irrigation depth.*

Other considerations

- ❑ **One main diversion valve -or- multiple diversion valves to multiple outlets are both valid approaches.** The flatter the yard, the more sense to send greywater to multiple outlets. If the system includes kitchen sink water, this is ideally separately divertable.
- ❑ **Confirm that the movable “inlet” designation on the 3-way valve cover is at the port which is receiving the inlet water.** “Jandy” three way valves, the most common type, work equally well in all orientations. (If the inlet is wrong, the builder can just unscrew the face plate and spin it to the right port).
- ❑ **Confirm that no toilet is connected upstream of the greywater diversion** (not to belabor the obvious!) Downstream toilet connection is OK; upstream connection through vent pipe connected 12” above spill point of highest fixture is allowed by code, too.
- ❑ **Check valve** could be added with stub out or (more commonly) later with greywater system (UPC/CPC only). *Note: check valves are not required for any other type of waste plumbing, are a source of clogging, and they form an effective trap to prevent plumbing snakes from being retracted. In practice, the check valve requirement is widely ignored by inspectors of full greywater systems for these reasons, and is rarely if ever called for during inspection of stub outs.*

For Builders: How to Design and Construct Collection Plumbing and Greywater Stub Outs

(For complete info on collection plumbing, see *Create an Oasis*.²)

One outlet or many?

Your first critical decision is: 1) to bring all the greywater together to one point, then divert it through one valve and distribute it from there, OR, 2) divert greywater at multiple points with multiple valves and start with it already somewhat distributed. Once you plumb it one way or the other, you are committed. All the considerations for making this decision are covered in *Create an Oasis*.

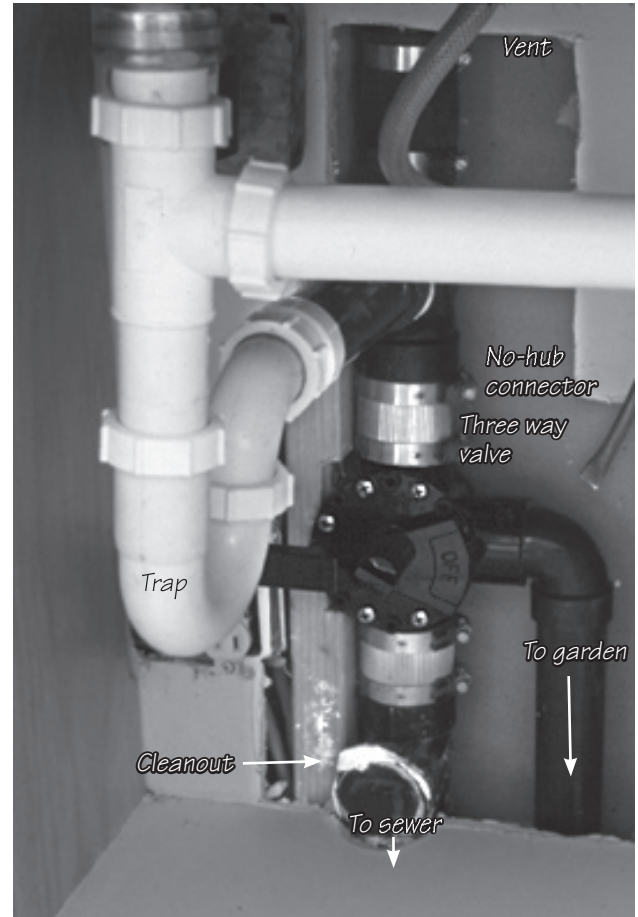
Outlet(s) as high as possible

The next critical design issue is to get the outlet(s) from the house as high as possible. While this can involve extra work, the value of having the outlets high can't be stressed enough. This is also covered in *Create an Oasis*.

Valve handle(s) accessible

Ideally the position of a diversion valve can be seen while using or on the way to use a fixture, its position can be changed while using the fixture or without going far from the fixture, and it's position can be locked against meddling by children and curious guests. Sometimes this can be achieved with valve handle extensions, but often there isn't any alternative to slithering through a crawl space to change the position.

GREYWATER DIVERTER VALVE UNDER A SINK



Valves serviceable

I suggest installing the valves with no-hub connectors (which use removable clamps instead of glue) so that you can remove the entire valve for service or replacement without sawing up any pipes. If there is no space (e.g., street angles plugging right into the valve), you can use silicone sealer in place of ABS glue. This makes a watertight seal, but the fitting can easily be removed.

Valve sources

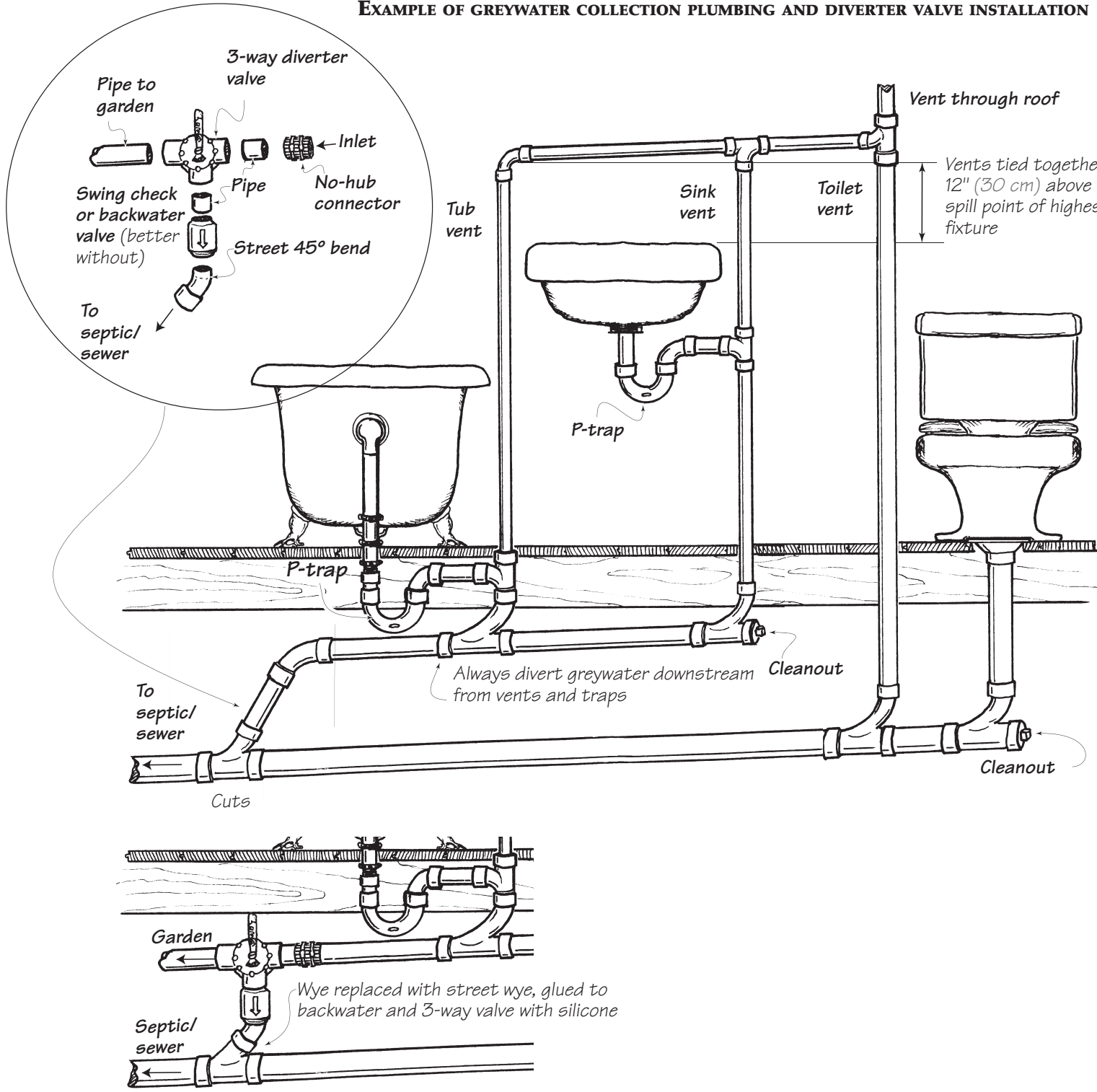
I prefer using Jandy three-way diverter valves, not least because the inlet can be moved to any of the three ports. Ortega and other three way valves also work fine. Using a tee or wye with two ball valves is commonly done, but less advisable. If the valves are seldom operated, crud can accumulate in the short dead end before the shut valve and congeal the passage shut. If you must do two ball valves, provide access for cleaning out the dead ends.

Professional installation

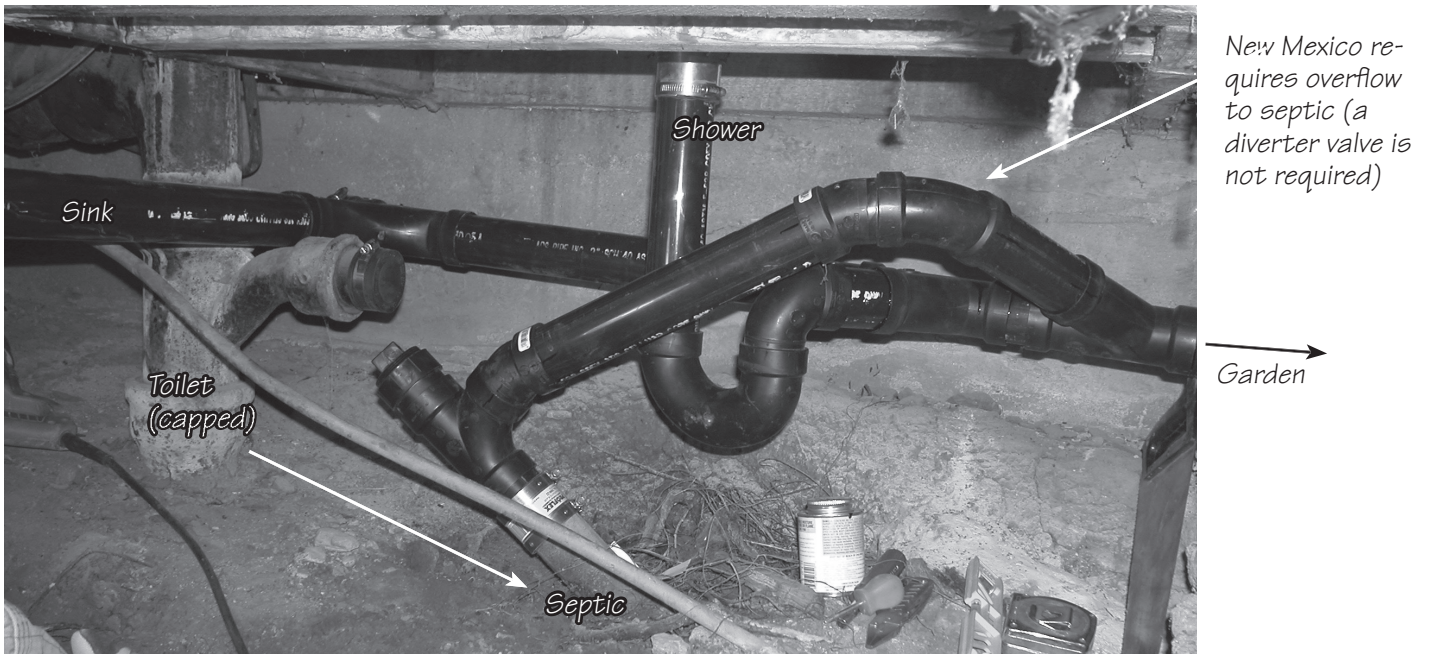
I counsel greywater system do-it-yourselfers to hire a plumber to either do the collection plumbing, or check the design and your installation. There are several reasons for this.

1. **Plumbers already know how to do collection plumbing** (apart from the special considerations above), so you might as well take advantage of their expertise. *They are generally clueless about distribution plumbing.*

EXAMPLE OF GREYWATER COLLECTION PLUMBING AND DIVERTER VALVE INSTALLATION



Diversion Installed



Greywater collection plumbing installed.

2. **Much drain/ waste/ vent plumbing behavior is counter intuitive** and hard to anticipate from common sense alone. Furthermore, there are real health issues with cross-connections and waste flowing in unexpected directions, more so indoors than out.
3. **Collection plumbing is a long term investment.** It is less apt to be changed in the future than distribution plumbing.
4. **Impeccable collection plumbing** (which they understand) **will reassure inspectors** that the rest of your system (which they probably won't understand) is well-thought out and executed. The converse is even more true; forget passing inspection if you've done a schlock job of the collection plumbing.

More information

1. Greywater Policy Center www.oasisdesign.net/greywater/law includes links to most state codes, Cottonwood, AZ greywater stub out ordinance.
2. *The New Create an Oasis with Greywater*—Describes how to choose, build, and use twenty different types of greywater systems. It thoroughly covers all greywater basics, and will benefit everyone who is using or contemplating the use of greywater.
3. *Builder's Greywater Guide*—A supplement to *Create an Oasis* which will help building professionals or homeowners work within or around building codes to successfully include greywater systems in new construction or remodeling. Includes information on treatment effectiveness, sample US codes, and permit submissions.
4. Both books are available from www.oasisdesign.net/greywater which also contains over 100 pages of free info on greywater.
5. Please share your feedback and insights: www.oasisdesign.net/about/contact.