Laundry to Landscape System (CDR)

A new (2008), unproven Art Ludwig refinement of an old idea. If Laundry to Landscape systems keep working as well as they have so far, most homes should have one. It is a cost-effective retrofit system, and renter-friendly. It can irrigate areas level with or slightly uphill from the washer. This is the system I recommend most often, usually in combination with a Branched Drain or Green Septic system.

People commonly attach garden hoses to their washers. There are several issues with this practice (listed on p. 106), which the Laundry to Landscape system addresses (Figure 7.6).

It uses 1" polyethylene (the most "eco" plastic) to accommodate the rush of water from the washer, without a surge tank or stressing the pump. Thus, **the washer itself pumps water a large distance horizontally, or a short distance vertically, to multiple outlets** (six to 18 of 'em), ***without moving a hose.***

The diversion occurs upstream of the standpipe (the drain the washer outlet hooks into). You don't have to mess with the house drain plumbing. (This is a point we're stressing in our campaign to have California allow their installation without a permit or an inspection.)

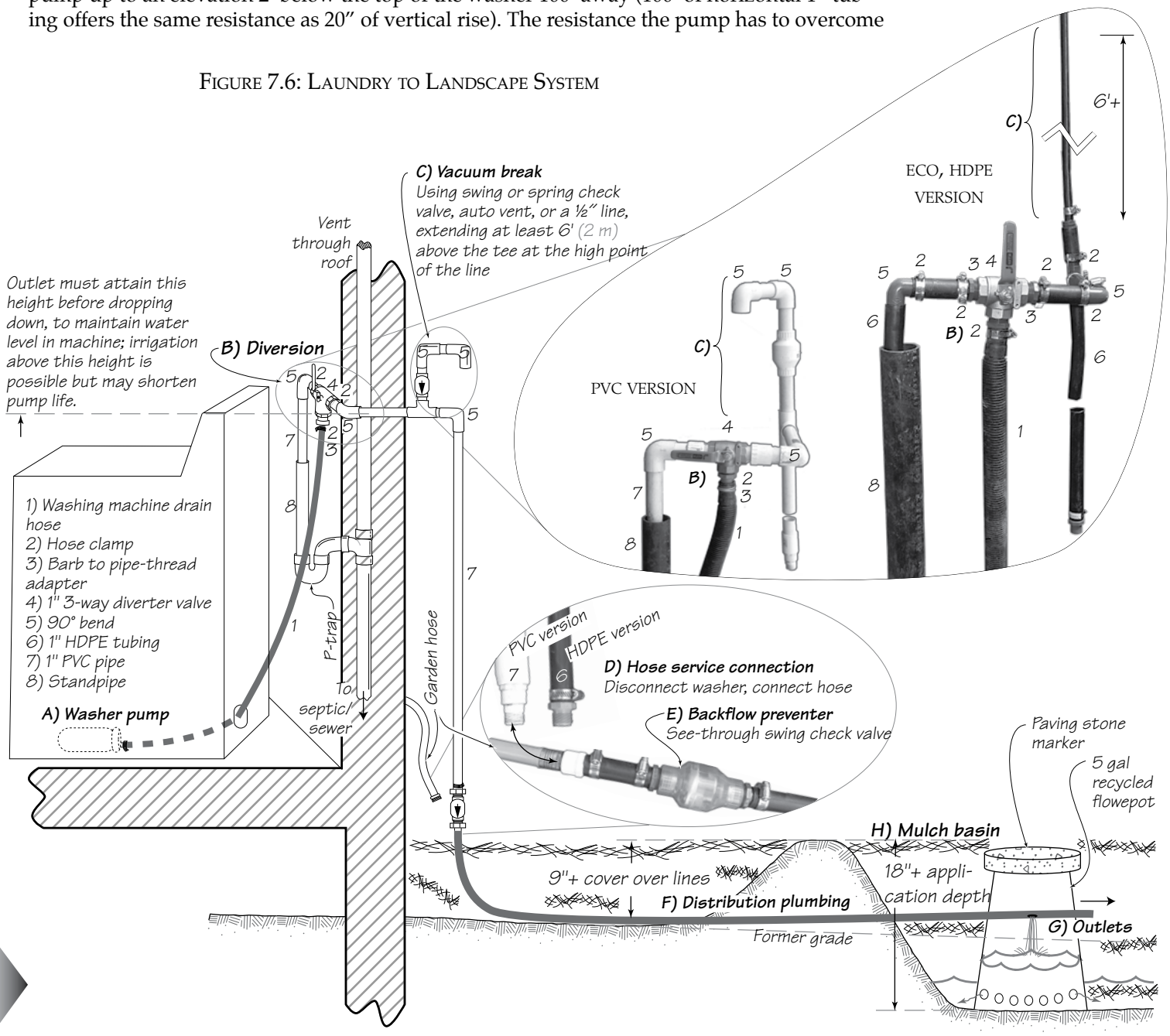
The current (March 2009) state of the art design follows...

We're compiling evolving best practices for Laundry to Landscape systems, including a list of parts and where to get them, and free "open source franchise" information to run a business installing them, at oasisdesign.net/greywater/laundry. If you have design tips or photos to share, please email us or post to our greywater forum.

Washer Pump Performance and Distribution Plumbing Limitations

Laundry to Landscape systems use the **washing machine pump (A,** in figure 7.6**)** to distribute the water. Without stressing the pump you can irrigate any distance downhill, or pump up to an elevation 2′ below the top of the washer 100′ away (100′ of horizontal 1" tubing offers the same resistance as 20" of vertical rise). The resistance the pump has to overcome

FIGURE 7.6: LAUNDRY TO LANDSCAPE SYSTEM



should ideally be about the same as in a standard installation, where the hose discharges at the height of the top of the machine. For example, if a washing machine empties through 100′ of 1″ pipe that ends 18″ lower than its lid, the effective resistance is the same as if it discharged 2″ above its lid. At considerable risk to the pump, I've seen people irrigate up to 6′ above the top of the washer. [m] The variables that affect pump life are:

- **Pump model—**Higher-quality pumps perform better. Unfortunately, every washer pump is different. The way to determine if the pump is adequate is to try it and see if it burns up.
- **Height differential—**The less rise, the easier on the pump. I wouldn't go more than 6′ up.
- **Pipe flow resistance—**The pipe should not be less than 1″diameter, and should not kink.

Diversion

The **laundry diverter valve (B)** is usually mounted on the wall behind the washer, or where it is easily visible and convenient to turn. It should be solidly screwed to the wall using copper pipe brackets or plumber's tape, so that it does not wiggle when the handle is torqued. One side of the valve diverts water into the standpipe through an air gap, the other through the wall or window to the outside. The greywater destinations should be clearly labeled, eg., "ocean" and "citrus trees."

Vacuum Breaker

If the first outlet is lower than the level of water in the washer, a **vacuum breaker (C)** is advised to keep the drain line from continuously siphoning water out of the machine as it tries to refill itself (not a problem with every machine or load, but...easier to just add it). The loose fit of the washing machine drain hose into the standpipe in conventional plumbing creates an air gap, which serves as a vacuum breaker. The vacuum breaker *must connect to the main line at its high point to be effective*. This is typically close to the washer, just outside the house. If the line must dip down before leaving the house, it could siphon even with a vacuum breaker outside. In this case, mount the vacuum breaker inside. To avoid the possibility of spillage indoors, you can route a ½″ tube from the top of the vacuum breaker outlet back into the septic/sewer drain standpipe.

If you're irrigating uphill and the first outlet is above the top of the washer, it will serve as the vacuum breaker.

Automatic Bypass (freezing climate only)

If the line could freeze, you *must* have an automatic bypass. This is a pipe through which the water rises and harmlessly overflows when the line clogs with ice instead of burning out the pump or flooding the house. The ideal bypass makes an audible splash so you know what's up. The tall vent vacuum breaker option shown as a ½″ line at the right of Figure 7.6 could double as an automatic bypass if it were made of 1″ tubing. You'd certainly notice when greywater fountained all over the side of your house. Perhaps one of you from a freezing climate will come up with a better design with less drastic notification of frozen lines. If the distribution lines slope downhill continuously they probably won't freeze (photo).

Hose Service Connection

A **hose service connection (D)** makes tuning the outlets easier (you won't have to keep doing load after load of laundry to check and tune outlet flows). It is also good for blowing out lint, if needed (or blowing the system apart if you pressurize it more than the 20 psi *(140 kpa)* that this type of plumbing is designed for). The hose service connection must be properly installed so there is no chance of greywater backflowing into the freshwater lines. The layers of protection against this are: 1) to connect the hose, the washer must be disconnected; 2) the swing check valve (below); 3) a backflow prevention device at the hose bibb.

To tune the outlets perfectly, check the flow from the washer by timing how long it takes to fill a bucket. Then adjust the hose to the same flow.

Backflow Prevention Valve

If the drain line runs (or can be lifted) above the height of the top of the washer, a **swing check valve (E)** should be included as close as possible to the washer, to keep water in the line from rushing back into the machine when it shuts off. Get a clear one with 1″ pipe thread—a clean installation and you can watch what is happening inside.

If you have a hose service connection, a swing check valve adds backflow protection.

Leveling a Laundry to Landscape line buried 4" deep in a hard-freeze climate. This line ran fine all winter, even though the plumbing inside the house froze!

[m] ***Metric:*** *... can irrigate up to 50 cm below top of washer 30 m away (30 m of 2.5 cm hose = 50 cm vertical). 30 m of 2.5 cm pipe ending 45 cm lower than lid = resistance of 5 cm above lid. At risk to pump, up to 2 m vertical rise is possible.*

Distribution Plumbing

To get the pressurized greywater to plants, 1" polyethylene tubing is the preferred **distribution plumbing (F),** ideally the kind with a purple stripe to indicate non-potable water. Smaller tubing gives too much resistance. Bigger tubing traps more septic water and crud and is a waste of plastic. PVC pipe destroys the environment, and is ugly.

You can run a single or multi-trunk line, with or without valves or branches. Branches can be 1", ¾", or ½". With lots of greywater and/or low perk soil, use two or more valved zones (photo). All the plumbing can be under 9" of mulch for a California Plumbing Code appendix G legal system (Figure 7.6), otherwise it can just go on top of the mulch.

It is best for freezing, smells, and the pump if the line slopes downhill continuously. Second best: a U-shaped line with an outlet at the low point to drain the U.

However, because the line is pressurized, it can dip up and down. The consequence is some trapped water in the line between uses. Unless the line might freeze, this is acceptable. The water can go septic if it sits for more than a few days. However, the quantity in even a long run of 1" pipe is so small that any objectionable smell is only detectable for the first moment of discharge. In an installation that includes both some rise and a long horizontal run, the quantity of trapped water is minimized by sending the pipe up to the maximum height as quickly as possible, then running the pipe down from there. This way, most of the run drains dry after each use. This same geometry works to get the water up from a basement washer to the yard in a freezing climate, as this places the part of the line that holds standing water inside the thermal envelope of the house (you could also add a surge tank and effluent pump).

Outlets

The capacity of all the **outlets (G)** should be enough that the pump is not strained trying to push too much water through too small or too few holes. On the other hand, too many or too large holes will result in pressure loss that may leave some outlets high and dry. The total cross-sectional area of all the outlets in a zone should be 1–2 in^2 (the Laundry to Landscape Calculator at oasisdesign.net/greywater/laundry can be used to find the total cross-sectional area from a variety of outlets).

Note that outlet flow in this pressurized system, unlike a gravity flow system, depends on the height, the size, and the number of outlets, as well as the length and diameter of the tubing. You can tune the flow by making the outlets different sizes, or adjusting the outlet ball valves (photo below). If you are irrigating uphill, the first outlet will get way more water than the last outlet. To avoid this, run a solid line to the high point, then do a U-turn and put all the outlets in the downhill run.

Receiving Landscape

Mulch basins (H) are the way to go. With the dimensions indicated in the drawing, they can be legal under the CPC. Otherwise, the hose can go on the surface and the outlets can be directed straight down into the mulch.

Not every installation requires a vacuum breaker, check valve, hose service connection. But, if you include the applicable components, the chance of having trouble with your system is much smaller, and including all of them won't hurt.

Outlet shield in mulch basin (5 gal pot).

Zone valves in valve box made from a recycled plastic drum.

OUTLET OPTIONS

Hole drilled in tubing as emitter. Seems like cheating, it's so easy, but they're working great so far. Put them on the bottom of the line so greywater isn't geysering everywhere. A 7⁄32" (5.5 mm) hole is the right size to be able to plug them with drip "goof plugs" if you change your mind about the location.

1" x ½" tee outlet.

½" ball valve outlet tee (have to shorten barb).