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Challenging Sites: 2 Contained Planters Over Hardscapes

Contained planters are one way to reduce runoff from small areas and beautify your landscape. Contained planters are an easy way to disconnect impervious area and improve aesthetics anywhere. Put a potted plant anywhere there is unused pavement or a roof. Acting much like green roofs, contained planters can reduce annual runoff by 40% to 60% from the area on which they are placed.

Design

Container Materials

The container can be made of anything you like as long as it can drain from the bottom. Since these will be outside year-round, consider durability. Plastic breaks down in sunlight.

Soils

Consider using a native soil or an amended native soil instead of store-bought potting soil because:

- Having adapted over geologic times, native plants are usually healthier and thrive better in native soil.
- Potting soil is designed to over-nourish plants. As rainfall runs quickly through potting soil, it leaches nutrients out, which will be carried downstream to impact water quality.
- Potting soil is sterile. Plants benefit from microbes and mycorrhizae (mushroom roots), and larger soil animals like beetles, which move and process nutrients and preserve permeability. If you do use potting soil, throw a handful of organic (dark colored) soil into the pot.
- Potting soil is usually less dense than native soil, which makes it less resistant to temperature swings.
- Potting soil is fast draining, so it doesn't absorb much water, and won't reduce runoff as much as native soil.

If your native soil is clay and the water table isn't too high, you could successfully put a native plant right into the clay soils with no amendments and it would do fine. This is done in watershed restoration projects all the time. However, since you'll be disturbing all the structure of the soil to put it into a container and since clay isn't that easy to work with, you may consider amending it with compost (see the Compost Specifications in *Restore Disturbed Soils*).

For any kind of soil or planting, you might consider mycorrhizal treatments to make your plantings more resilient and to reduce water demand. Most plants in our region have co-evolved with this mushroom root material. You can buy these amendments as pellets or water-soluble powder. Mushroom roots interact with the plant roots by feeding on the plant's waste and by bringing the plant nutrients, thereby expanding the effective root area of the plant by many fold. Plants receiving this kind of amendment consistently grow bigger and faster than plants without it.

For contained planters on roofs with adequate structural integrity, you may want to consider purchasing engineered lightweight soil mixes. Lightweight mixes are usually 80–90% lightweight stone, like pumice or expanded shale. Look for a mix with amendments that include mycorrhizal fungi, biota, and a natural carbon



Figure 1 Contained planters are a common beautification method that can have real benefits to the watershed when placed over impervious surfaces.

source like jute that will degrade slowly over time. Some mixes have water holding pellets that will reduce water demand. Green roof practitioners in Europe are successfully using native soils on roofs. If your roof can take the extra weight, this would be ideal for a contained planter. Again, consider the wetted weight of your soil when determining structural capacity. Before placing contained planters on roofs, make sure that the roof is strong enough to support the container, the soil, the mature plants, and the weight of the water that will temporarily be filling the voids of the soil. If the container gets clogged for some reason, the roof must be able to withstand the weight for a potentially long period of time. If living in cold climates, consider the snow load as well.



Figure 2 These benches were created to intercept some rainfall and seat people on a roof terrace.

access to the soil volume they need. Too little soil can stunt the size of the plant; however, this is sometimes used as a landscape design approach. For instance, a Ponderosa Pine in a small container will stay small and will survive, but may be high maintenance, dropping dead limbs.

For plants to reach full maturity and be low maintenance, soil depth requirements vary with the plant type. Soil depth rule of thumb minimums are as follows:

- Grasses: 12". Generally, the roots of grasses and grass-like plants will be as deep as the plant is tall.
- Shrubs: 18", but 24" is preferable.
- Trees: 36", but depending on the species, trees also need a minimum volume of soil, 400 to 1,000 cubic ft. Since tree roots don't usually extend much beyond 3 ft, the minimum area needed is 133 to 333 square ft.
- Vegetables would be fine in these containers, but rooting depth probably varies widely. Consider the size and weight of vegetables when designing your project.

Correct Planting Techniques

Plants from nurseries can often be root-bound in their pots. If the roots aren't loosened and unwound, the roots will continue to twist around in the hole you planted them in instead of growing downwards and outwards. Another key to low maintenance plant establishment is to ensure that the roots have good contact with the soil.

To properly plant container plants:

1. Fill your container up with soil to the desired depth leaving up to 4 inches to the top of the container.
2. Dig a hole twice the size of the pot the plant comes in. Keep the soil pile nearby and clear of leaves and other surface debris.

Plant Choices & Soil Depth

All kinds of plants are suitable for use in contained planters, although perennials that won't require much irrigation after an establishment period of 2 – 3 years are easiest to maintain and better for water quality. Take care to avoid the numerous invasive plants (i.e. noxious weeds) such as periwinkle (vinca minor or major), English ivy, and yellowflag iris that may be sold at your local nursery or hardware store.

Generally, the more soil, the better it will be for the plant. Provide enough soil at the start so that at maturity, roots have

3. Take note of where the potting soil level is compared to the stem of the plant. Many plants have a different color and texture on the section that sits below the soil than on the sections that sit above ground.
4. Except for vegetables and herbs, gently shake the potting soil off as much of the roots as possible. The nutrition from the potting soil has probably been exhausted.
5. For balled and burlapped trees, the soil may be left in. However, ensure that burlap or any other confining material will not impede root growth by removing at least the bottom half of the material.
6. Loosen the roots.
7. Taking some of the soil you dug out, create a mound at the bottom of the hole and lightly tamp it down.
8. Drape the plant roots around the mound so that they're touching the mound on the bottom and pointing downwards. There are two kinds of roots, larger structural roots and tiny feeder roots, which is where the plant "drinks" and "eats". In pot-bound plants, some roots may be really long and will just continue winding around the other plant roots. If they're feeder roots, shorten them by pulling them off to be a similar length as the other roots. A few of the bigger structural roots can be cut, but it's better to dig a deeper hole and get them pointed downward.
9. As you backfill the hole by pushing soil in around the tops of the roots, hold the plant so that the point at which the plant came out of the soil in its original pot will be the place where the final grade of soil in the contained planter will be (level of soil on the stem is the same). Plants that are too deep may drown or the stem may rot. Plants that are too high may not have enough feeder roots in the soil to survive.
10. When finished, tamp down the soil. If the container is very large, step around the stem of the plant. This, combined with previous steps, will ensure good root contact with the soil.
11. Place an organic mulch that meets the specifications in "*Restore Disturbed Soils*" to a depth of 2 to 3". For woody stems on shrubs or trees, push the mulch a few inches away or the stems could rot.

Maintenance

Since contained planters are above ground, depending on the soil, they may be more subject to freezing and may drain faster than the soil around plants that are in the ground. Maintenance for contained planters is similar to conventional landscape maintenance practices:

- Remove weeds twice a year.
- Replenish compost to a depth of 2-3 inches annually.
- Irrigate per the establishment period guidance provide in (see *Establishment Period Irrigation*).

Fertilizing

Avoid NPK (nitrogen – phosphorus – potassium) as these are common pollutants found in waterways and will easily dissolve in water, flow out of the container bottom onto an impervious surface, and likely into a pipe that drains to a waterway. Replenishing the 2-3" of organic compost every year will provide adequate nutrition slowly and safely. Bunch grasses are self-fertilizing, since 30% of their roots die off every year, and they may not need any fertilizing, but the compost is needed to keep the soil covered anyway.

Permits

Permitting varies, so check with your local jurisdiction's building or development services department to find out what codes may apply to your project. Retrofits using these practices will likely not require permits, but new development could. In addition, where stormwater management is required, clarify relevant calculations such as detention to confirm where you can subtract areas where you will install stormwater management practices from the total project area that you may have to detain or otherwise treat. If information in this guidance conflicts with your jurisdiction's requirements or approach, then follow their guidance instead.