

MAIN STREETS TO GREEN STREETS

Harnessing the Power of Trees Downtown

Urban areas are challenged by extensive impervious surfaces, damaged soils and little area to build traditional engineered stormwater facilities. Creative Best Management Practices (BMPs) that harness the ability of vegetation and soils to mitigate urban runoff are needed. Traditional methods of stormwater in urban areas include collecting runoff at a centralized facility, such as a detention pond, or relying on a storm sewer system. Newer goals are aimed at distributing the treatment across the landscape at many sites or at the point of contact. But some sites do not have sufficient conditions to handle water collected from surrounding impervious surfaces. In addition, sites that are largely paved usually cannot support large trees, and thus unable to benefit from tree canopy interception and the influence of roots on soil hydrology. With new technologies and strategies - trees can play an important role in managing stormwater in our downtowns.

Montpelier, VT



New Take on Tree Pits

Tree wells or tree box filters use bioretention to filter sediment and pollutants out of stormwater runoff. Bioretention systems collect and filter runoff through layers of mulch, soil and plant root systems. The treated stormwater is then infiltrated into the ground or discharged into a traditional stormwater drainage system. Numerous prefabricated tree pit structures are commercially available. They typically include a ready-made concrete box containing an appropriate soil mixture and often the plant material. Many of these systems offer limited space for trees and the trees are essentially used as a replaceable filter every 7 – 10 years. Newer designs are emerging that offer open sides suitable for tree roots to move beyond the tree box.



Tree filter box in Milton, MA. Neponset River Watershed Association

For More: www.lid-stormwater.net/treeboxfilter_home.htm

Trees Need Room

Tree roots need adequate amounts of uncompacted soil volume to thrive in urban environments. The key to designing sites that support large trees and harness a tree's power is to have essentially unlimited rooting space. Tree pits (a.k.a. cutouts, planters) should be as large as possible. A typical 4 × 4 ft. cutout with no access to surrounding soil limits tree growth almost immediately. The usable rooting space provided by any cutout can be expanded by a continuous soil bed under pavement.

GREATER SOIL VOLUME = INCREASED TREE CANOPY = OPTIMAL WATER INTERCEPTION = REDUCED RUNOFF

Stormwater, Trees and our Downtowns

Making Room for Roots under Pavement

Winooski, VT



Being creative to harness the power of trees to manage stormwater requires thinking below ground to give trees what they need – soil and space. This not only helps to mitigate the problems associated with stormwater, but healthy trees downtown also means business. Studies show that the presence of street trees positively influences shoppers' perception. Trees in the streetscape are working in many ways and are worth the investment in better growing conditions.

Winooski, VT



Photo credit: Nina Bassuk, Cornell University



Engineered Soils Under Pavement

Compacted soils beneath paved surfaces like roads and parking lots are necessary to support the weight of cars and pavement but they must also provide space for tree roots to flourish. With engineered soil (a mixture of stones and soil), such as CU Structural Soil, compaction requirements are met, but the porosity of the mix allows for tree root growth. Water enters the engineered soil reservoir through swales and tree pits, filtering through and recharging the groundwater below, instead of creating stormwater runoff and black ice in winter conditions.

For More: www.cnr.vt.edu/urbanforestry/stormwater/

An Underground Soil Framework

Pavement is suspended by open stacks of plastic 'cells' that are able to support traffic loads—the sidewalk, pedestrians and even construction equipment—while housing uncompacted soil below allowing for large volumes of healthy soil for tree roots and on-site stormwater management. The cells limit root uplifting and damage to sidewalks while providing the space for a tree to reach maturity over the next several decades. **For More:** www.deeproot.com

Photo credit: Gary Johnson, University of Minnesota



References

Watershed Forestry Resource Guide, Center for Watershed Protection and US Forest Service, Northeastern Area State & Private Forestry
Control Stormwater Runoff with Trees Fact Sheet, Center for Urban Forest Research, Pacific Southwest Research Station, USDA Forest Service.
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