



Center for Stormwater Technology Evaluation and Verification

Treatment Unit K - Tree Box Filter



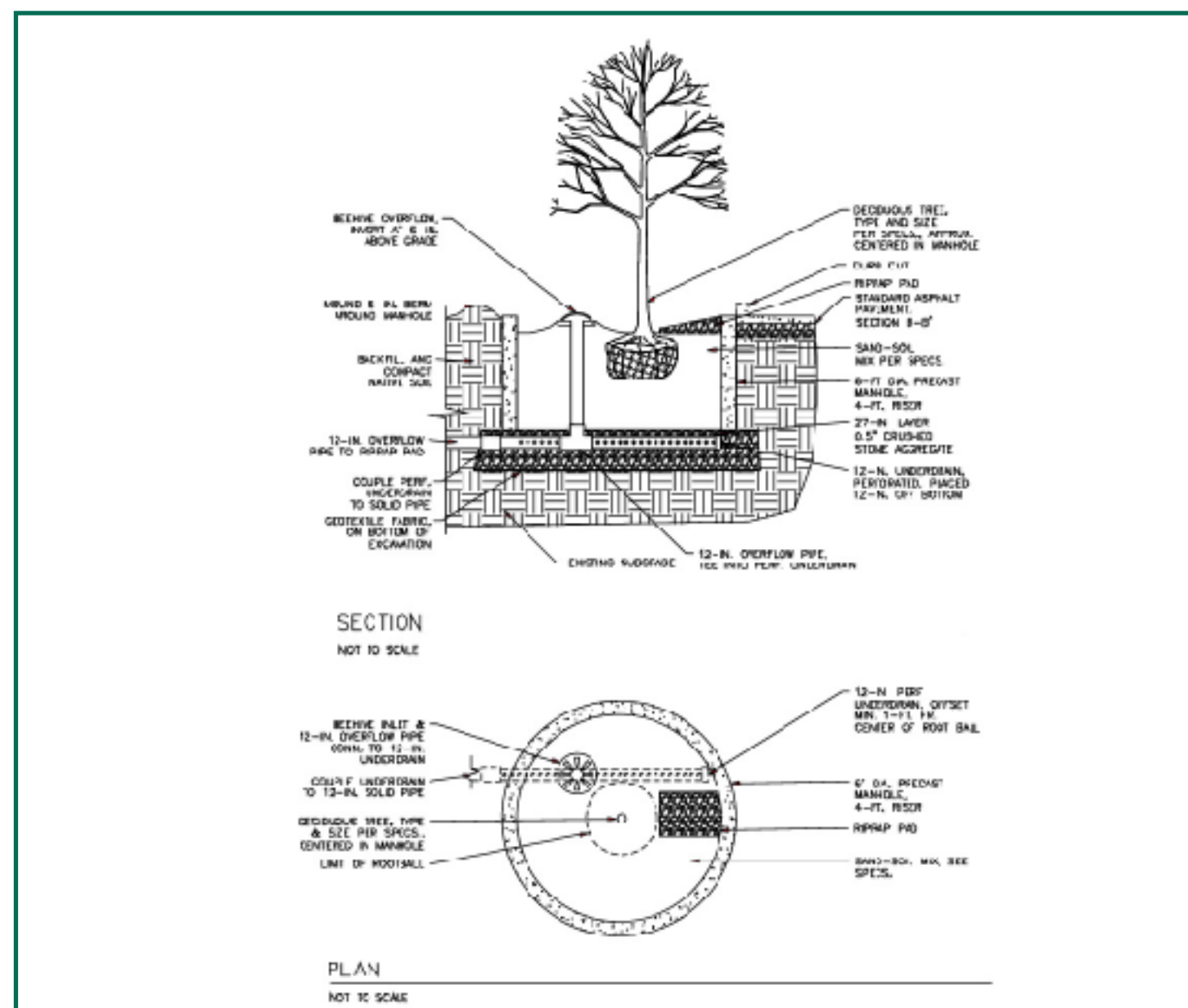
Tree box filter after installation. The inlet, overflow and berm are not complete in this photo.

Treatment Device Description

A tree box filter consists of an open bottom concrete vault filled with a porous soil media planted with vegetation and underlain by an underdrain in crushed gravel. Stormwater runoff enters the device from streetside and passes through the media into the subgrade and underdrain. The underdrain carries the treated runoff to either a surface discharge location or to the stormwater sewer system. The tree box filter used at this 0.1 acre site is an economical 6 foot diameter concrete manhole riser filled with a two feet thick sand-compost mix (76% sand/ 24% compost). The mix was designed to maximize permeability while providing a minimum organic matter of 10 percent to sustain tree health and adsorb pollutants. At the surface, there is a two-inch mulch layer and gravel pad where flow enters to dissipate energy. A two-inch caliper inundation-tolerant ash tree planted is planted in the center. An overflow is set approximately six inches above the sand-compost mix. Flows that pass through the filter media and into the overflow are collected in an underdrain that eventually discharges onto a riprap pad and swale. This unit features a bottomless unit that allows for infiltration of water pooled in the 12 inches of high porosity crushed gravel below the underdrain. Maintenance is anticipated to consist of occasional trash removal and raking of surface to maintain permeability. The life of the tree is expected to be 5 to 10 years, similar to standard street trees. The surface can optionally be planted with inundation-tolerant and hardy shrubs and herbaceous vegetation.

WQ Treatment and Stormwater Benefits

The tree box filter is designed primarily for water quality treatment. Tree box filters can be ideal solutions for new construction or for retrofits to existing catch basin inlets, especially in urban environments where space and cost are primary concerns. Water quality treatment occurs through filtration and adsorption in the sand-compost mix. Some biological treatment is expected within the microbe rich soil-root matrix. This research will examine water quality treatment performance. For bottomless units, there will be some runoff retention and groundwater recharge, especially on sites where high permeability soils underlie the tree box filter. Tree box filters can be combined with a downstream manhole that provides additional settling of solids. An alternative patented design made by AmeriCast and called the Filterra have sealed bottoms so infiltration and recharge do not occur, which may be desirable if highly contaminated stormwater is anticipated and/or the subgrade has a low infiltration rate.



Fact Sheet

Category Type
Filtration, Infiltration

BMP Type
Low Impact Design

Design Source
CSTEV (UNH)

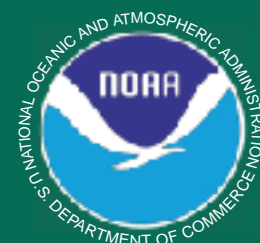
Dimensions
Diameter: 6 ft
Depth: 4 ft

Specifications
Catchment Area: 0.1 acre
Peak flow: 0.1 cfs
Treatment Volume: 425 cf
Tree: 2-inch caliper Ash

Treatment Functions
Physical-Chemical and
Biological, Filtration



Close-up of the coarse sand-compost media used in the tree box filter. This 76% coarse sand / 24% compost mixture has 10% organic matter and infiltrates water at a rate of 14.6 inches/hour in the laboratory.



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