Pennsylvania Environmental Council

Philadelphia Water Department Office Of Watersheds

Second Ward Park, Upper Darby Township
AN URBAN STORMWATER MANAGEMENT DEMONSTRATION SITE

Cobbs Creek Watershed, Delaware County

October 2006

This fact sheet describes stormwater retrofit best management practices (BMPs) employed at the Second Ward Park in Upper Darby Township. This park was a one of several sites that received technical assistance through the Pennsylvania Environmental Council's (PEC's) Stormwater Retrofit Technical Assistance Program, funded by a Pennsylvania Coastal Zone Management Program Grant and the William Penn Foundation. Site redevelopment demonstrates how BMPs can be incorporated into developed urban areas to manage stormwater better, control flooding, protect our urban creeks and watersheds.

Site Background: This 2.8 acre park is surrounded by urban residential development including row home neighborhoods and a nearby cemetery. Prior to park renovations, stormwater management at the site was very limited and included a shallow asphalt channel swale that conveyed site runoff into the township storm sewer system that discharges to Cobbs Creek. Site improvements called for three new basketball courts to replace an existing baseball field, and an expanded parking area. Since this site was scheduled for recreational improvements, the Township saw this as an opportunity to demonstrate stormwater BMPs. With support from PEC's Retrofit Technical Assistance Program, stormwater management concepts were developed to incorporate BMPs into park renovation. Upper Darby Township finalized the stormwater BMP concept designs and hired a local firm to renovate the park and install BMPs. The concept design was developed in Spring 2006 with final construction completed by October 2006.

STORMWATER BMPs at the SECOND WARD PARK

- **Porous Pavement Basketball Courts and Underground Infiltration System**
  The park's three new basketball courts are surfaced with porous asphalt and underlain by an underground stormwater storage/infiltration system to provide infiltration of stormwater runoff from the courts. The underground storage/infiltration system is directly beneath the courts and was designed to provide temporary storage for approximately 9,000 cubic feet of runoff. The storage/infiltration system consists of a shallow sub-surface stone bed, comprised of an 18-inch layer of uniformly graded aggregate wrapped with geotextile fabric. (The geotextile fabric liner protects the storage capacity of the stone bed by preventing dirt or sediment from penetrating and clogging the system.) The stone bed is surfaced with a single layer of porous asphalt that conveys stormwater directly into the storage/infiltration bed below. The storage/infiltration bed is designed with positive overflow to ensure that if the bed fills to capacity any overflow will discharge into the shallow infiltration basin. See **Figure 1** for typical porous pavement and subsurface storage/infiltration bed cross section.

Sub-Surface Infiltration System: A Stormwater best management practice that temporarily stores stormwater in an underground storage structure designed to allow stormwater to gradually percolate into the subsurface. Infiltration BMPs reduce stormwater runoff volumes and recharge groundwater supplies which, among other things, helps stabilize flow in creeks year round.

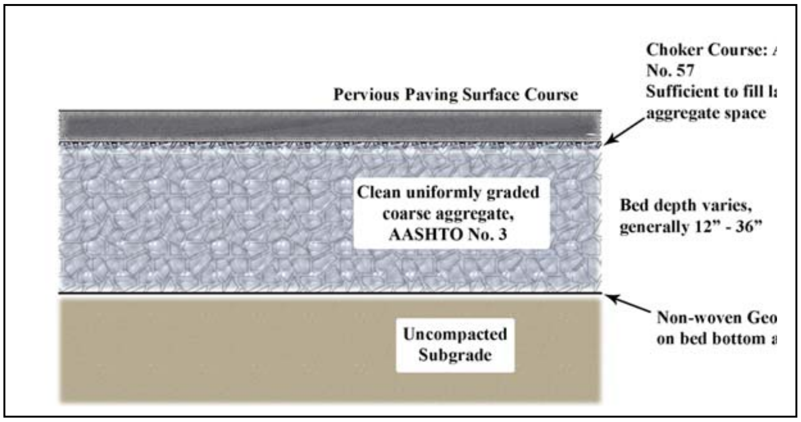

Figure 1. Typical Porous Pavement Section with Subsurface Storage/ Infiltration Bed. (Cahill & Associates.)

- **Tree Trench.** The asphalt swale, which conveyed runoff from site parking lot into stormwater inlets, was removed and replaced with a tree trench to reduce runoff from the parking lot and provide water quality treatment. A tree trench is a linear stormwater element consisting of a narrow sub-surface stone storage/infiltration bed wrapped in geotextile fabric. A perforated pipe can be laid among the stone to provide added storage capacity (this trench has an 8" perforated pipe within the stone bed). Above the stone infiltration bed, the trench is back filled with soil to support trees. Trees in a tree trench look like street trees, but the trench provides sub-surface storage of stormwater, which is then either absorbed by the trees or percolates into the ground below. This BMP will divert stormwater from the township storm system during small storms and provides for infiltration and evaporation of stormwater. See **Figure 2** for typical tree trench cross section.

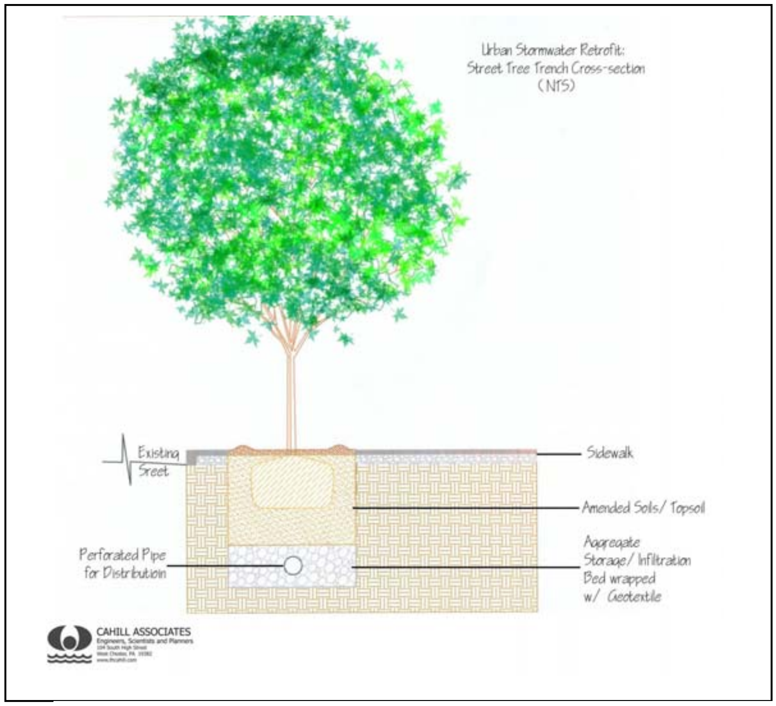

Figure 2. Typical Tree Trench Section. (Cahill & Associates.)

- **Shallow Infiltration Basin**
  This shallow infiltration basin (Figure 3) with well-drained soils and planted grass will receive any overflow from other site facilities and features and provide for infiltration of stormwater. The basin is designed to fill to a maximum depth of 10 inches before overflowing into a domed riser inlet in the basin. To maximize opportunities for evapotranspiration of stormwater by vegetation and filtration of any runoff pollutants, the grass should be mowed less frequently than the park's lawn. At some time in the future, this basin may be easily retrofitted by planting low-maintenance meadow plants and/or shrubs – this modification would increase biofiltration and evapotranspiration of stormwater runoff.

Figure 3. Second Ward Park Shallow Infiltration Basin with newly planted grasses (PEC)

Costs and Benefits

Benefits: There are several benefits that will accrue from the park's BMP projects.

- These BMPs will reduce the volume of storm water in streets and storm drain system during storm events. The combined storage from the park BMPs totals approximately 11,000 cubic feet of stormwater. The stormwater managed in these BMPs would otherwise contribute to flooding in streets, storm drains or streams during storms. Stormwater held temporarily in these BMPs will soak into the soil, be absorbed by plants, recharge groundwater, and evaporate into the atmosphere. As the groundwater slowly moves underground and enters the creek through seeps and springs, it will help maintain a stable year-round flow in Cobbs Creek.

- These BMPs will slow the flow of stormwater entering Cobbs Creek during storms. By storing and gradually infiltrating and releasing stormwater into the water table and groundwater below, stormwater from the park will recharge the creek hours or days after rains have stopped, which will help reduce creek flooding during storms. As such, these BMPs will help protect Cobbs Creek from damaging fast and high flows that typically occur in urban areas during storms.

- These BMPs will improve the quality of stormwater runoff. Stormwater runoff picks up pollutants as it flows over land, these BMPs provide an opportunity to filter common runoff pollutants like oil and grease, nutrient and bacteria, and can trap dirt and sediment. Grass in the basin, plants in the tree trench, and organisms in the soil will help trap, filter and breakdown common pollutants in stormwater runoff. So stormwater leaving the park and entering the creek will be cleaner than stormwater runoff from surrounding streets.

- The porous asphalt used on the courts will allow courts to drain and dry quickly after a storm, providing more court time for basketball players and park patrons.

- The new trees offer shade and landscape enhancement for park patrons and neighbors to enjoy.

Costs: Construction of the porous pavement cost approximately $31,000 and the subsurface storage/infiltration system under the three basketball courts cost approximately $102,000. The cost to construct shallow infiltration basin was approximately $27,000. The cost to construct the tree trench and plant ten 2-2.5 inch caliper Honey Locust trees was approximately $44,000.

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