Public Building Commission of Chicago

Stormwater Management Guidelines for Campus Parks

AUGUST 2011

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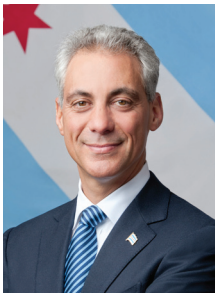
Letter from the Chairman



Chicago's lakefront is an incredible natural resource that helps define our City and drive our economy. Although there is ample water supply today, it is of the utmost importance to conserve our water for future generations, and stormwater management plays a critical role in these efforts. As Chairman of the Public Building Commission of Chicago, I welcome you to our first publication of the *Stormwater Management Guidelines for Campus Parks.* The stormwater management methods implemented in Campus Parks throughout the City of Chicago support the City's green infrastructure efforts that reduce stormwater to sewers while enhancing the natural habitat and beauty of open space amenities.

Because of the importance, it is essential that these key features are properly preserved to operate at the highest level. These guidelines provide building engineers and grounds managers an overview of best practices to maintain stormwater management features in each campus park.

Being good stewards of the environment improves the quality of life in Chicago by reducing our energy costs, preserving our natural resources and supporting our local economy with green jobs and new technologies. As you read the *Stormwater Management Guidelines for Campus Parks*, I believe you will find that the PBC's commitment to high standards for stormwater management will provide social, cultural and environmental benefits for generations to come.

Sincerely,

Rahm Emanuel

Rahm Emanuel
Chairman
Public Building Commission of Chicago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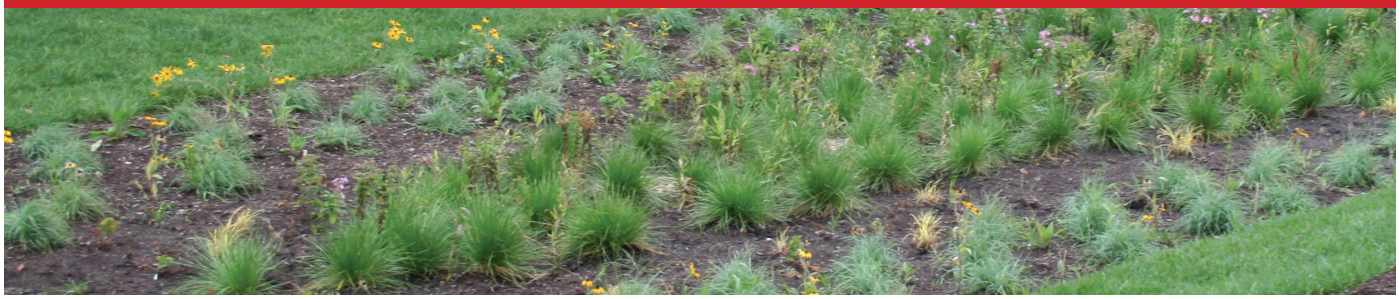
Letter from the Executive Director



In early 1997, the City of Chicago created the Campus Park Program, a concerted effort by the City of Chicago, the Chicago Public Schools and the Public Building Commission (PBC) to bring more green space to the property surrounding Chicago school buildings. Where there were once asphalt parking lots and play-surfaces, today you will find vegetable gardens, ornamental plantings, permeable pavers and inspiring spaces for outdoor classrooms. To date, over 100 public schools and their surrounding communities have benefitted from this program.

For these campus parks, the PBC has implemented many innovative environmentally sustainable design strategies as an essential component of the infrastructure for regional stormwater management. These guidelines have been developed to help the building engineers and grounds managers at Chicago Public Schools understand best practices to keep these stormwater management features functioning at the highest level, and to help teachers and administrators recognize the educational opportunities

On behalf of the PBC and the City of Chicago, we are pleased to present the *Stormwater Management Guidelines for Campus Park*.

Sincerely,

Erin Lavin Cabonargi
Executive Director
Public Building Commission of Chicago

Introduction

This document describes how stormwater management features on the grounds of Chicago public schools are maintained, why the features were installed, and what educational opportunities the features may afford for teachers and students. This document is intended for use by building engineers, grounds managers, teachers and administrators.

As with many other buildings in Chicago, the Chicago public schools employ a variety of green infrastructure techniques to capture and hold rainwater. This slows the flow of water into the sewers, and allows water to evaporate or infiltrate into the ground. Some techniques involve the installation of special drains; others are landscape treatments that capture rain from parking lots and streets or other impervious area.

Green Stormwater Management

The green infrastructure techniques in use at Chicago campus parks are considered national best practices and would be important to implement anywhere. But in Chicago, which has altered its hydrology so significantly by reversing its rivers, such techniques are particularly critical, as they return more stormwater to its natural drainage patterns.

Chicago's extensive built infrastructure of gutters, sewer pipes, and the Metropolitan Water Reclamation District's (MWRD) Deep Tunnel cannot handle the amount of water that falls during very large storms. Streets and homes flood due to the limits of our infrastructure, which cannot convey the water downstream as fast as it comes into the system. In storms with high rainfall, untreated water from the sewers is discharged directly into the regions' rivers and canals. When these waterways fill to capacity, water is released directly into Lake Michigan. During these unfortunate occasions, what flows into the lake—the source of drinking water for millions—is the diluted sewage of homes and businesses.

In more natural circumstances, where land is covered by meadows, marshes and woods, rainwater soaks into the earth. But today, approximately 42 percent of the land in Cook County is covered by some sort of impervious surface—that is, a surface that repels rather than absorbs rainfall. Examples of impervious surfaces include parking lots, expressways, roofs, and sidewalks. Even mowed turf grass is fairly impervious, when compared with plantings of deep-rooted flowers, trees and shrubs.

Managing stormwater through artificial means requires enormous amounts of energy, much of it from fossil fuels. This increases greenhouse gas emissions. The less wastewater MWRD has to process, the better it is for the environment. MWRD's annual electric bill to operate the many pumps and blowers in its wastewater treatment plants is $30 million.

Green infrastructure techniques for stormwater allow rain to soak slowly into the ground, nourishing plants and replenishing water tables. Although by themselves, green techniques will not solve Chicago's stormwater issues, they reduce the burden on the sewer systems, diminish the severity of flooding, decrease the amount MWRD ratepayers spend on energy, and reduce greenhouse gas emissions.

Attributes of Green Stormwater Features

Instead of handling rainwater as a waste product that must be captured and removed, green stormwater management features treat rainwater as a valuable resource. The water from storms is retained and used on site. It sustains decorative plantings and educational gardens and reduces or eliminates the need for irrigation.

Green stormwater management techniques help increase biodiversity—that is, the variety of plants and animals. They can be used to teach valuable lessons about the water cycle and the environment. They also provide shade, beauty and an overall improvement in the appearance of the grounds.

Planning & Design

When planners are working on a site design for a campus park, they must accommodate student, teacher, and community activities. Fields, tracks, courts, and playlots provide areas for recreation, while gardens, pocket parks, and sitting areas accommodate quieter activities, including outdoor classes. Park designers take into account student arrivals and departures by foot, bike and car; paved surfaces for teacher parking; trash storage, and many other functions.

Green stormwater management features are integrated into the site design in ways that enhance rather than impede the daily activities and functions of the site. They also provide educational opportunities.

Educational Opportunities

With their extensive plantings, green stormwater management methods invite nature onto campus parks. Native flowering plants bring in butterflies and other native insects; trees and shrubs provide resting spots for migrating birds.

Campus park gardens and plantings for stormwater management can be used by teachers as on-site, outdoor classrooms to aid in teaching lessons about hydrology, botany, climate, geology, physics and art. Stormwater management features can be used to demonstrate to high school students how civil engineering and landscape architecture shape the built environment and mitigate the effects of urban development. Perhaps most importantly, students of all ages can learn to protect the environment not only in urban settings and in their own back yards.

Resources on how to start using these and other outdoor education opportunities are listed in the back of this document.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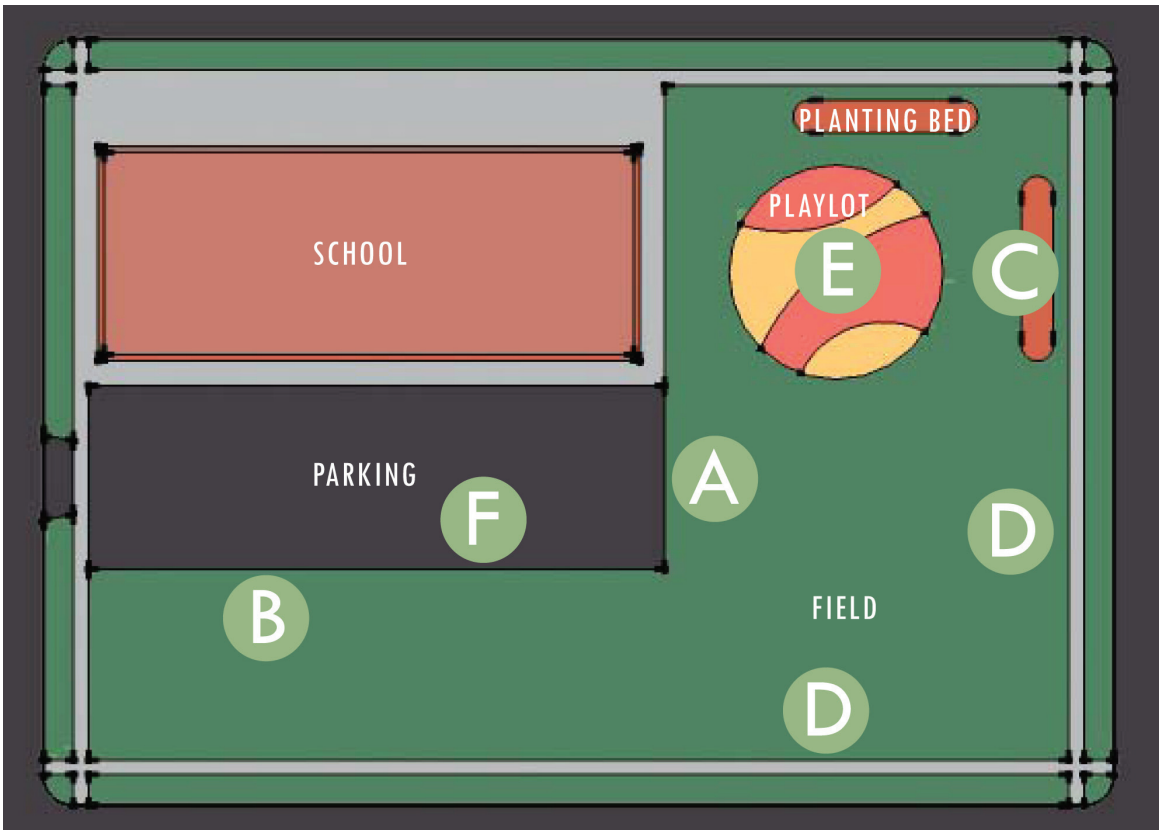
Features Used on Campus Parks

The following is a list of possible stormwater management strategies described in greater detail within this section of the guidelines:

A. Drainage Swale
B. Filter Strip
C. Planting Bed
D. French Drains
E. Playlot Underdrainage
F. Strategic Ponding



A: Drainage Swale

Description

A drainage swale is a densely planted ditch that drains stormwater away from parking lots and helps water seep into the soil. The swale itself absorbs water, and may also be graded so it redirects stormwater runoff to another area where it either infiltrates the ground or is detained before entering a storm sewer system.

Drainage swales are implemented in different ways, depending on the setting and the budget. In some cases, the drainage swale is planted with a palette of native plants well-adapted to the environmental conditions of a swale: short periods of standing water, long periods of wet soils, and occasional drought. Such native plants are evolved to absorb and utilize great volumes of rainwater. An attractive selection of native flowers and grasses provides a modest amount of habitat for wildlife; in particular, the flowers may provide nectar sources for butterflies. Some drainage swales at public schools support such native plantings.

In other cases, drainage swales are planted with turf grass or a mix of grass and low-growing yard plants. The disadvantage of this type of planting is that turf grass does not absorb stormwater as well as the swale filled with native plants would. Its advantage is that it is less expensive to install initially.

Maintenance of the drainage swale depends on the needs of the plants growing there.

Maintenance Actions

- If the swale is planted to natives, weed out invasive plants. (A guide to invasive plants is available online. In general, weeds that push their way into native plantings are the same ones that invade yards and vegetable gardens: white sweet clover, foxtail, tree-of-heaven seedlings, lamb's, thistles, etc.)
- If the swale is planted primarily with turf grass, mow as needed.
- Watch to see if eroded channels start to form. If they do, re-sod, reseed and/or replant.
- Remove litter and other obstructions.
- Inspect periodically, and correct problems as they arise.

B: Filter Strip

Description

A filter strip is a planting that abuts the edge of a hard surface, such as a parking lot. The filter strip separates the parking lot from the gutter or drain structure. By the time rainwater flows off of the parking lot, across the filter street, and into gutter, much of the water has already soaked into the filter strip. This reduces the load on the sewer system.

Different plant palettes may be used for filter strips. The filter strip may have been planted with native flowers, grasses or shrubs; or it could simply be lawn, or a linear gravel patch. The actions taken for maintenance depend on the type of plants present.

Maintenance Actions

- If natives are present, weed occasionally, getting rid of invasive plants.
- If there are shrubs, prune them occasionally.
- If it is mostly lawn, mow as needed.
- Inspect the filter strip and the level spreader periodically and address problems.
- Remove sediment and litter that may have accumulated.
- Correct grading, if needed. (If the filter is not sloped in the proper direction toward the gutter, it will need to be regraded.)

A

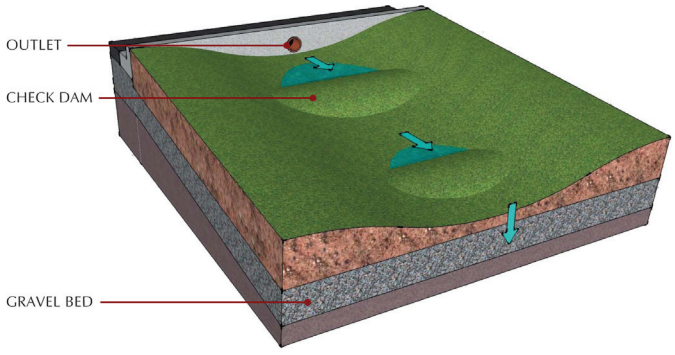


Diagram A: Drainage Swale

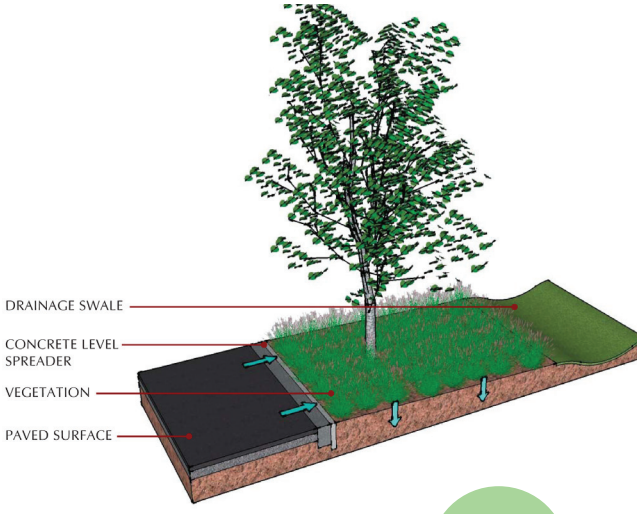


Diagram B: Filter Strip

B

C: Planting Bed

Description

Planting beds are swaths of loose, fertile soil where trees, shrubs, flowers and grasses grow. Placed at the edges of campus parks, they slow runoff and provide a location where stormwater can infiltrate the ground.

Maintenance Actions

- Irrigate during the first year while plantings are getting established. In subsequent years, provide water during sustained droughts.
- Weed, prune, mulch, trim and otherwise maintain plants in planting beds.
- Inspect plants periodically for damage or distress.
- Inspect the soil, and maintain as needed.

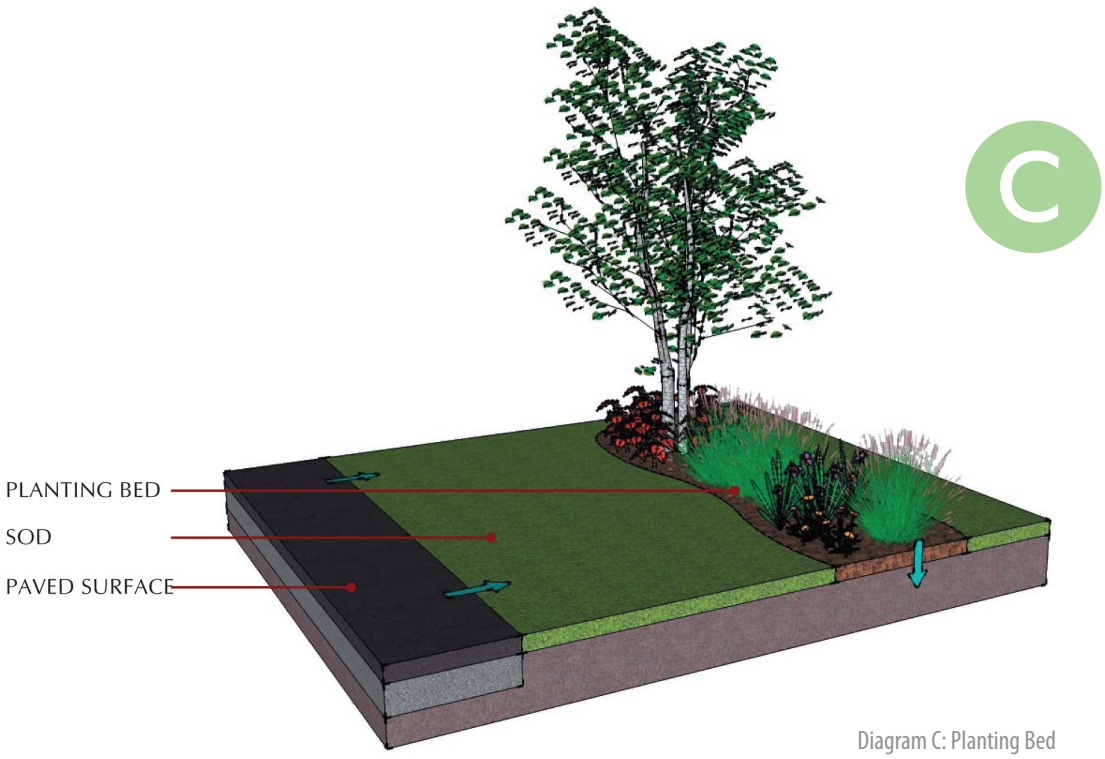


Diagram C: Planting Bed

D: French Drains

Description

A French drain is a gravel-filled trench with a perforated pipe installed in the bottom. The trench is topped with sod or plantings, making it virtually indistinguishable from other landscape features at the surface. Rainfall collects in the trench; the perforated pipe conveys infiltrated water to the sewer.

Maintenance Actions

- Clean out the perforated pipe's filter periodically; make sure the perforated pipe sock is installed and working.
- Maintain plantings in a way consistent with other plantings on the grounds.

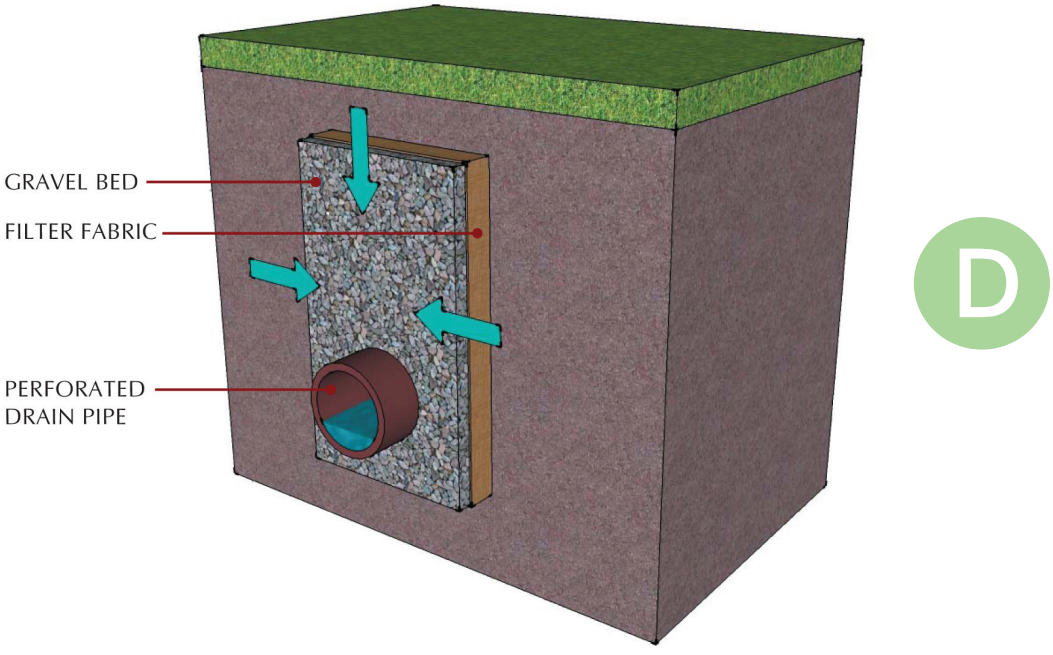


Diagram D: French Drains

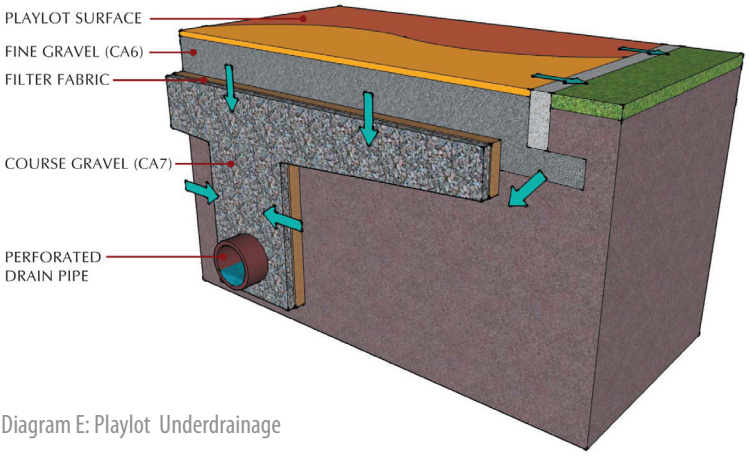
E: Playlot Underdrainage

Description

Similar to the French drain, playlot underdrainage is installed beneath the rubber surface of a contemporary playlot. A perforated pipe is laid at the bottom of a course gravel bed. Water seeps through the permeable playlot surface into the drain.

Maintenance Actions

- Clean out perforated pipe periodically.
- Utilize the perforated pipe sock to prevent future maintenance needs.



E

Diagram E: Playlot Underdrainage

F

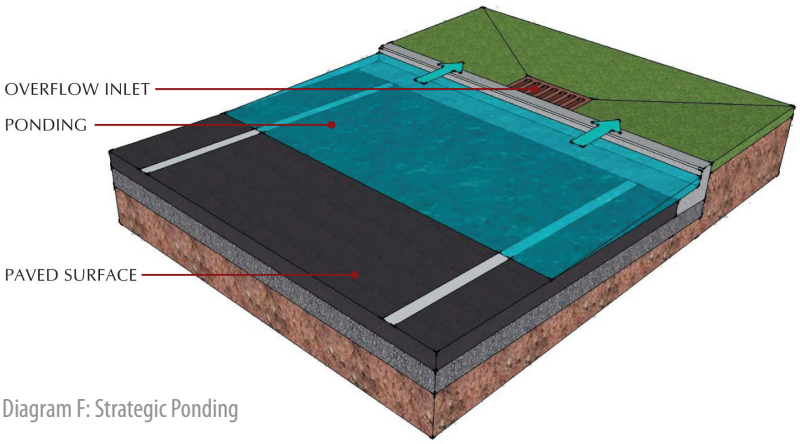


Diagram F: Strategic Ponding

F: Strategic Ponding

Description

Strategic ponding allows rainwater to form a pool on top of the paved surface, basically making a large puddle. A strategic pond is a shallow basin that is intentionally constructed into a parking lot or other paved surface.

When constructing a lot where strategic ponding will be utilized, the edge of the paved lot's surface slopes downward toward a curb. Stormwater collects in the basin until it rises high enough to spill over the curb. Once it leaves the lot, it is either drained by an inlet into a conventional gutter or it is conveyed through a vegetated filter strip or drainage swale.

Like other green stormwater management methods, strategic ponding temporarily stores water on-site and slows the speed of stormwater rushing to the sewer system. Unlike the other methods, the water pools on the pavement itself rather than off to the side.

Of all the green stormwater management methods, strategic ponding is the one that has the potential to annoy people using the parking lot. No one wants to walk through deep puddles, and if the water freezes into ice, it can become a genuine hazard. When strategic ponding is used, great care must be taken in the design phase to keep it away from pedestrian traffic.

Maintenance Actions

- Clear dirt and debris away from the basin where strategic ponding occurs.
- Inspect the overflow outlets, and inflow inlets and clear out material that may cause clogging
- Inspect the paved surface periodically for structural problems.

Resources: How to Learn More

Chicago 2010 Stormwater Management Ordinance Manual *http://www.cityofchicago.org/content/dam/city/depts/water/general/Engineering/SewerConstStormReq/2010StrmWtrMnul.pdf*

Chicago Climate Action Plan *http://www.chicagoclimateaction.org/filebin/pdf/finalreport/CCAPREPORTFINAL.pdf*

Chicago Department of Environment *http://www.cityofchicago.org/city/en/depts/doe.html*

Chicago Department of Zoning and Land Use Planning *http://www.cityofchicago.org/city/en/depts/zlup.html*

Chicago Department of Streets and Sanitation, Bureau of Forestry *http://www.cityofchicago.org/city/en/depts/streets/provdrs/forestry.html*

Chicago Department of Transportation *http://www.cityofchicago.org/city/en/depts/cdot.html*

Chicago Department of Water Management *http://www.cityofchicago.org/city/en/depts/water.html*

Chicago Adding Green to Urban Design Plan *http://www.cityofchicago.org/city/en/depts/zlup/supp_info/green_urban_design.html*

Chicago Mayor's Office for People with Disabilities *http://www.cityofchicago.org/city/en/depts/mopd.html*

Chicago Park District *http://www.chicagoparkdistrict.com*

Chicago Public Schools *http://www.cps.edu/Pages/home.aspx*

Chicago Trees Initiative *http://www.chicagotrees.net*

Chicago Zoning Ordinance *http://www.amlegal.com/library/il/chicago.shtml*

Guide to Chicago Land-Based Invasive Plants *http://www.cityofchicago.org/content/dam/city/depts/doe/general/NaturalResourcesAndWaterConservation_PDFs/InvasiveSpecies/LandbasedInvasivePlantBrochure2009.pdf*

Guide to the Chicago Landscape Ordinance *http://www.cityofchicago.org/content/dam/city/depts/zlup/Code_Enforcement/ChicagoLandscapeOrdinanceGuide.pdf*

Illinois Accessibility Code *http://www.cdb.state.il.us/forms/download/iac.pdf*

Public Building Commission of Chicago *http://www.pbcchicago.com*

The Sustainable Sites Initiative *http://www.sustainablesites.org*

United States Green Building Council *http://www.usgbc.org*

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