

The Chicago Green Alley Handbook

An Action Guide to Create a Greener, Environmentally
Sustainable Chicago

Printed on recycled paper, 30% post-consumer waste



Richard M. Daley, Mayor
City of Chicago

Cheri Heramb, Acting Commissioner
Department of Transportation





Welcome to the Green Alley Program



OFFICE OF THE MAYOR
CITY OF CHICAGO

RICHARD M. DALEY
MAYOR

GREETINGS

Thank you for your interest in the Green Alley Handbook.

With more miles of alleyways than any other city in the world, Chicago has a unique network of infrastructure integrated into the very fabric of our city. Recognizing this advantage, we have established new alley designs that help conserve our resources and improve our environment.

Green Alley designs showcase innovative, environmental technologies to help manage stormwater, reduce heat in urban areas, promote recycling and conserve energy. The *Green Alley Handbook* will introduce you to each of these benefits while highlighting ideas that are applicable in varied parts of the city.

The Green Alley program is just one of the ways that the City of Chicago is working to protect the environment and improve the quality of life in our communities. I encourage you to investigate this handbook and take simple steps to benefit the environment on your property. Working together, we can conserve Chicago and build a sustainable city for generations to come.

Sincerely,

A handwritten signature in black ink that reads "Richard M. Daley". The signature is stylized and fluid, with the first letters of each word being larger and more prominent. Below the signature, the word "Mayor" is printed in a smaller, sans-serif font.

Mayor



About the Green Alley Program

The Green Alley Program is a new approach to CDOT's existing alley program. Alleys provide a great benefit for the City, but like all infrastructure, they also require maintenance and periodic reconstruction. Flooding is often an issue in alleys because many alleys in the City were built without a connection to the City's combined sewer and stormwater system.

While one solution to this problem is to install expensive connections to the City sewer system, the Green Alley Program also looks at other more sustainable solutions. In particular, where soil conditions are appropriate, water is allowed to infiltrate into the soils through permeable pavement or infiltration basins, instead of being directed into the sewer system or onto adjacent property. This not only solves a persistent problem, but it also provides an environmental benefit by cleaning and recharging the ground water. Furthermore, by not sending additional water to the combined sewer system a green alley can help alleviate basement and other flooding issues.

You, the adjacent property owner, can make a difference by instituting other best management practices (BMPs) on your property. These can range from recycling to installing your own rain garden, which can help alleviate flooding even further.

This handbook will explain why the city is interested in sustainable alley design, illustrate the BMP techniques the City will use in green alley design, and provide sample layouts of how these elements have been combined in pilot applications. In addition, information and resources are provided for property owners interested in implementing their own environmental BMPs.



Existing alley with impermeable paving



Why is the City Interested in Green Alleys?

With approximately 1,900 miles of public alleys, Chicago has one of the most extensive and important pieces of infrastructure of any city in the world. That's approximately 3,500 acres of paved impermeable surface that provides an opportunity to better manage our resources and improve our environment.

Stormwater Management

Imagine if all of the alleys in Chicago were green alleys. Up to 80% of the rainwater falling on these surfaces throughout the year could pass through permeable paving back into the earth, thereby reducing localized flooding, recharging groundwater and saving taxpayer money that would otherwise be spent treating stormwater.

Heat Reduction

Imagine if all the alleys had a light, reflective surface (high albedo) that reflected heat energy, staying cool on hot days and thereby reducing the "urban heat island effect", a condition where dense urban areas become several degrees warmer due to the density of buildings and amount of heat-absorbing paved areas.

Material Recycling

Imagine if all of the alleys were constructed with recycled materials, thereby reducing the amount of construction and industrial waste hauled to landfills and reducing the burden on our natural resources.

Energy Conservation and Glare Reduction

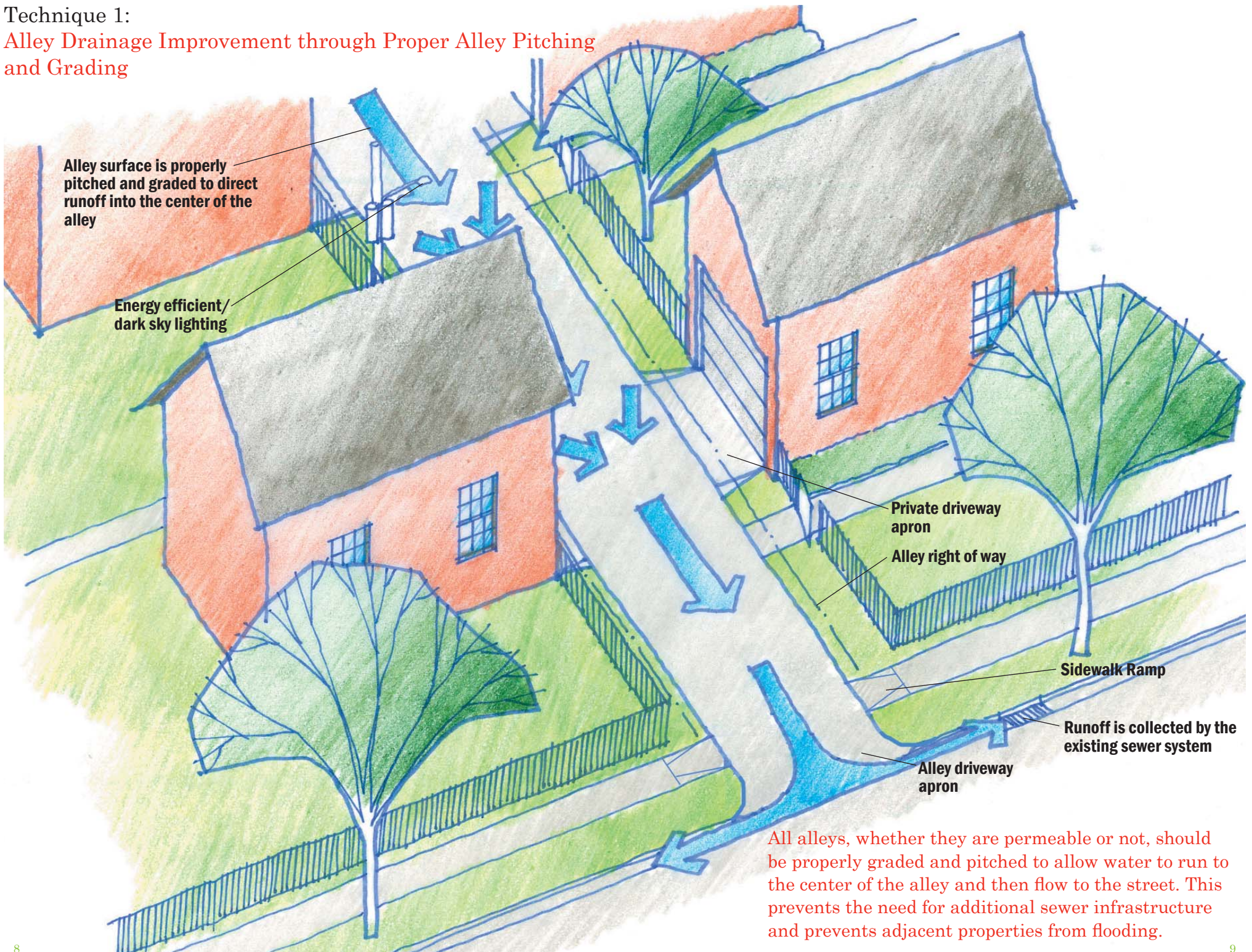
Imagine if the thousands of light fixtures that provide a safe environment in the alleys were energy efficient and reduced glare and light pollution to the point where you could see the stars at night.

All of these benefits can be accomplished within the alley's right of way! In this document you can learn what you can do to increase the benefits of the green alley by implementing your own sustainable practices on your property.

The City is committed to creating a greener, more sustainable environment by using best management practices in alley improvements and construction. Some or all of the following techniques will be used when designing green alleys.

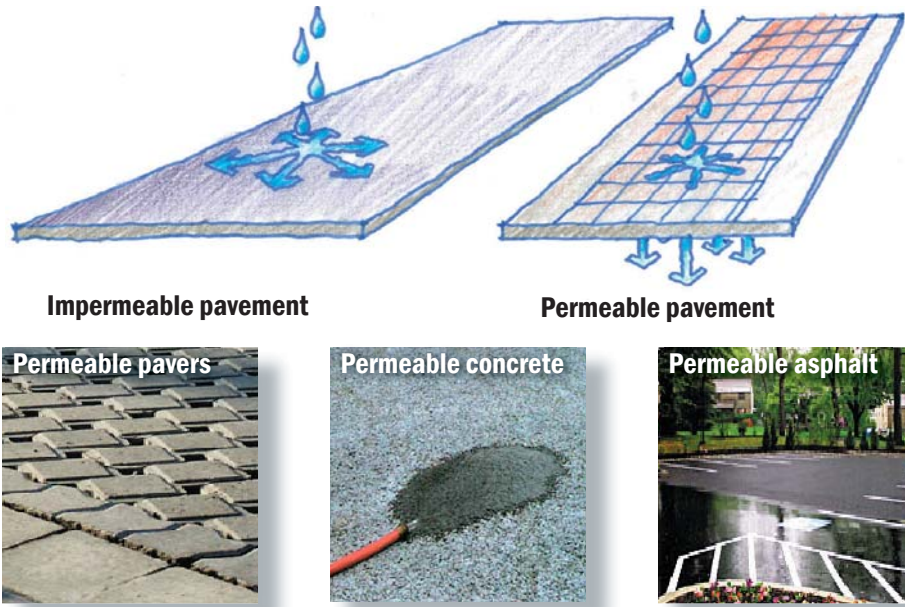
*Sustainable Solutions
within the Alley Right of Way*

Technique 1:
Alley Drainage Improvement through Proper Alley Pitching
and Grading



All alleys, whether they are permeable or not, should be properly graded and pitched to allow water to run to the center of the alley and then flow to the street. This prevents the need for additional sewer infrastructure and prevents adjacent properties from flooding.

Technique 2: Permeable Pavement

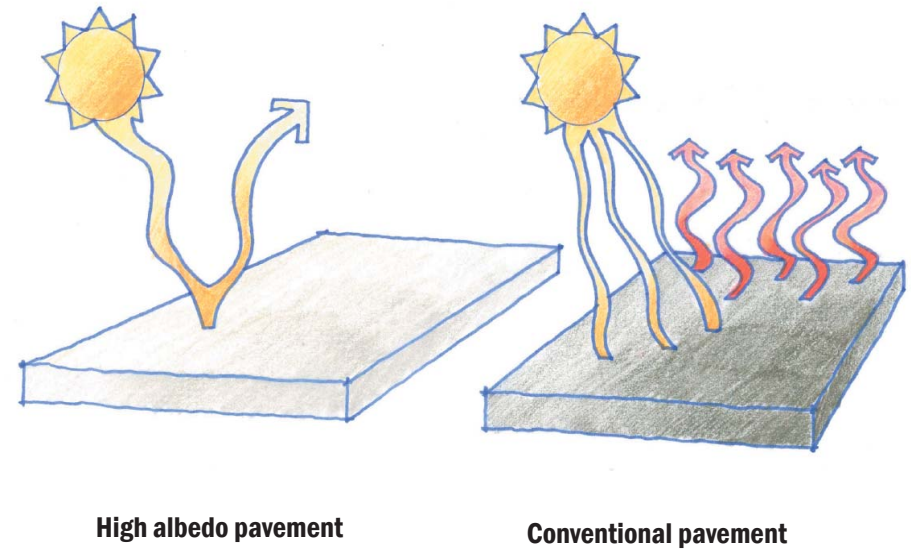


Permeable pavement has pores or openings that allow water to pass through the surface and percolate through the existing subsoil. Permeable pavement comes in the form of permeable asphalt, permeable concrete, and permeable pavers. In areas where soils do not drain freely, permeable pavement can be used in combination with subsurface drainage systems, like pipe underdrains or stormwater infiltration trenches to slow runoff and reduce stress on the combined sewer system.

Potential Benefits

- Reduces the rate and quantity of stormwater runoff
- Reduces stress on the sewer system
- Recharges ground water
- Filters silt, pollutants and debris

Technique 3: High Albedo Pavement

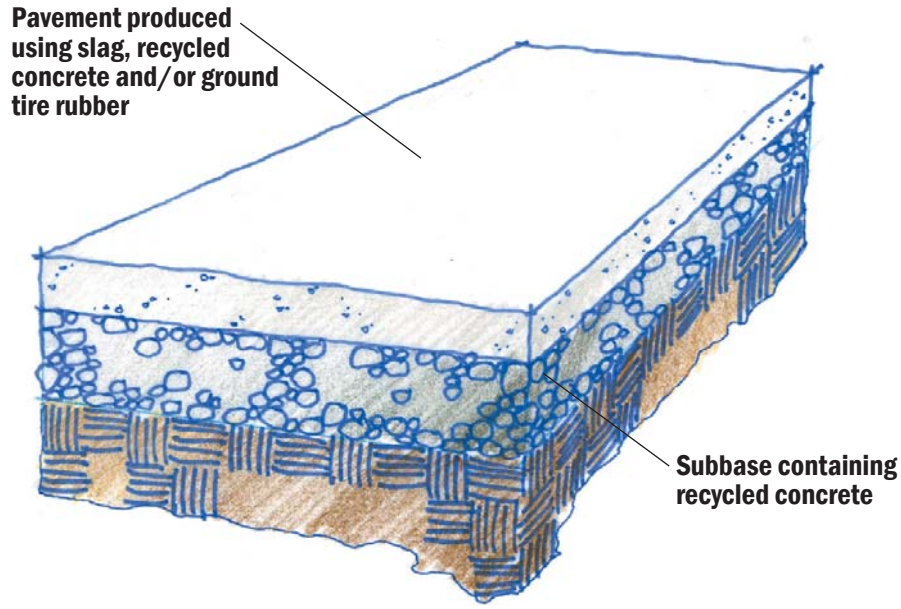


High albedo pavement material is light in color and reflects sunlight away from the surface. With less sunlight absorbed by pavement, less heat is radiated by the pavement. High albedo pavement therefore reduces the urban heat island effect. This reduces cooling costs, helps the survival of urban vegetation, and improves air quality, which can help reduce the symptoms of some respiratory diseases.

Potential Benefits

- Reduces the urban heat island effect
- Can be used under a wide variety of site conditions
- Conserves energy by reducing cooling costs
- Improves air quality

Technique 4: Recycled Construction Materials

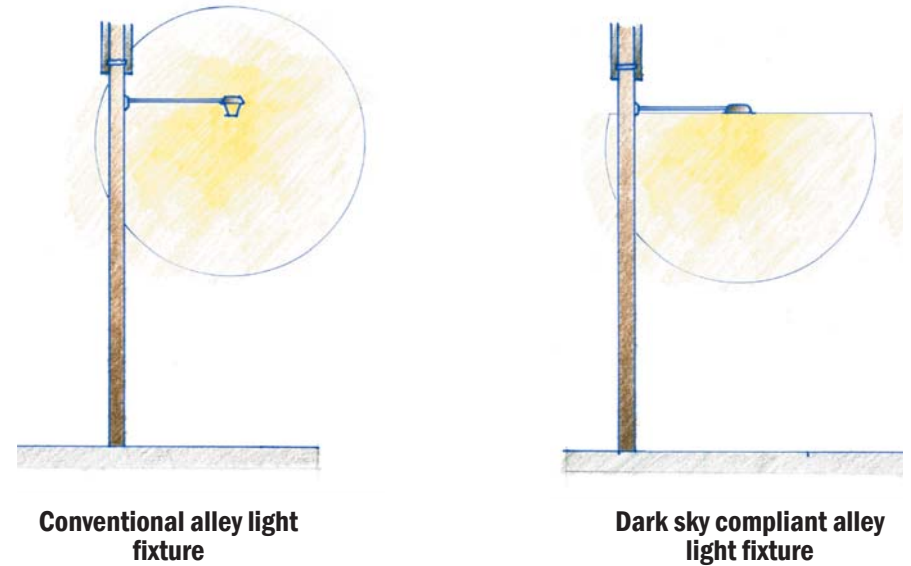


Recycled construction materials can be incorporated in a variety of ways in green alleys. Recycled concrete aggregate can be used in the concrete mix and as a base beneath surface paving. Also, slag, a by-product of steel production, can be used as a component of the concrete mix, reducing industrial waste. Ground tire rubber can be used in porous asphalt and reclaimed asphalt pavement in non-porous asphalt.

Potential Benefits

- Reduces waste hauled to landfills
- Reduces the need to extract virgin natural resources
- Develops new technologies and saves money

Technique 5: Dark Sky Compliant Light Fixtures



Energy efficient, dark sky compliant light fixtures are specially designed to direct light downward, focusing light where it's needed. These fixtures can also incorporate the latest technologies in energy efficiency while maintaining adequate light levels. New alley fixtures will also use metal halide lamps, which produce white light, instead of the yellow light produced by the existing high-pressure sodium fixtures. This will help people to be able to distinguish color at night.

Potential Benefits

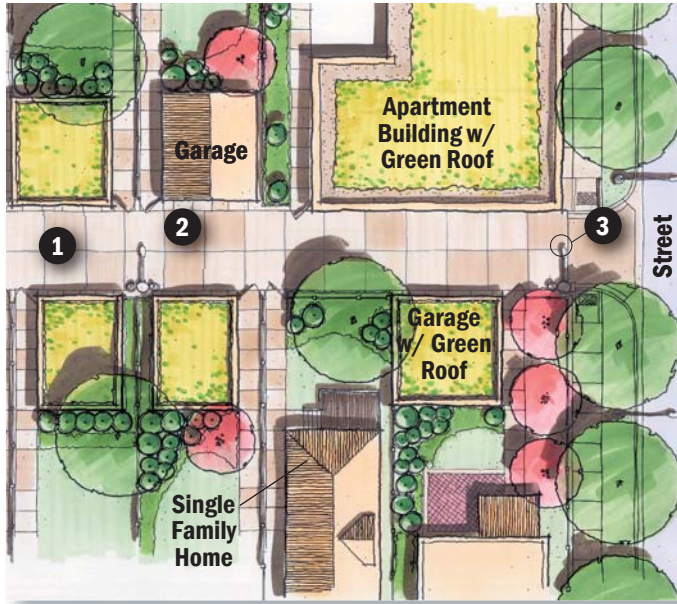
- Reduces light pollution from site
- Reduces glare and provides better light uniformity
- White light produced by metal halide fixtures has a high "color rendition index" and therefore allows people to perceive color more accurately

Green Alley Pilot Approaches

The following four pilot approaches illustrate how different combinations of green alley techniques can be used to suit a variety of site conditions.

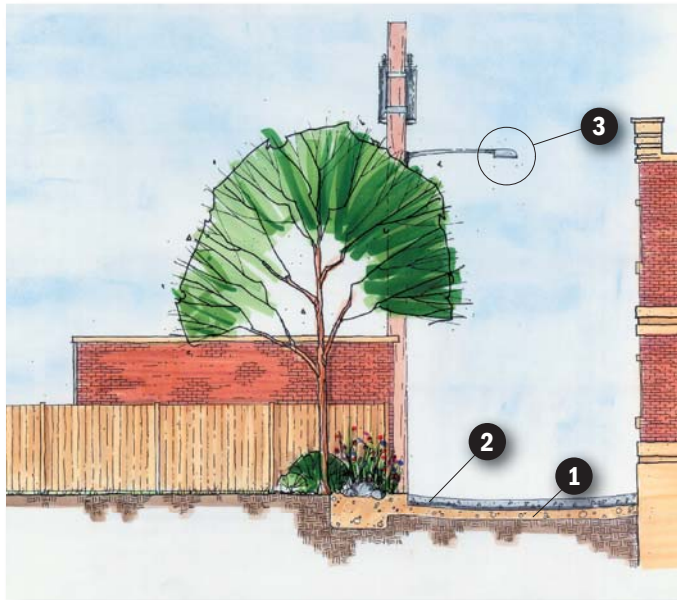
Green Alley Pilot Approach #1: Green Pavement Materials with Conventional Drainage

- 1** Properly graded and pitched alley surface directing stormwater towards the center of the alley, into adjacent streets, and finally into the existing sewer system
- 2** High albedo concrete paving with recycled aggregate and slag
- 3** Energy efficient dark sky compliant light fixture



Plan

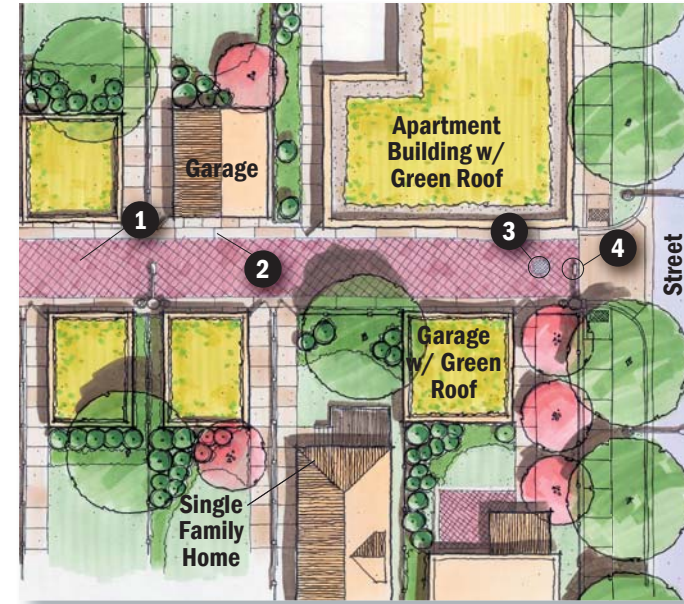
- 1** Recycled concrete base material
- 2** High albedo concrete paving with recycled aggregate and slag
- 3** Energy efficient dark sky compliant light fixture



Section

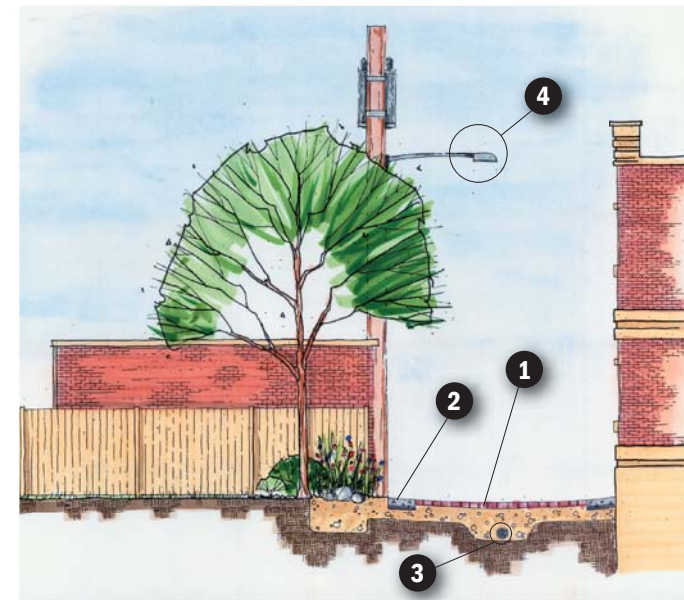
Green Alley Pilot Approach #2: Full Alley Infiltration Using Permeable Pavement

- 1** Permeable pavement material (permeable asphalt, permeable concrete, or permeable pavers)
- 2** High albedo concrete paving with recycled aggregate and slag
- 3** Optional inlet structure with pipe under drain
- 4** Energy efficient dark sky compliant light fixture



Plan

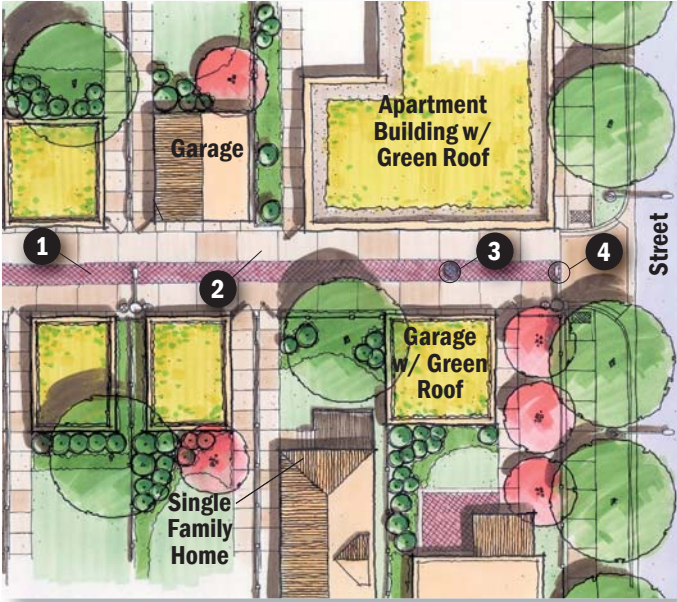
- 1** Permeable pavement material (permeable asphalt, permeable concrete, or permeable pavers)
- 2** High albedo concrete paving with recycled aggregate and slag
- 3** Optional pipe under drain
- 4** Energy efficient dark sky compliant light fixture



Section

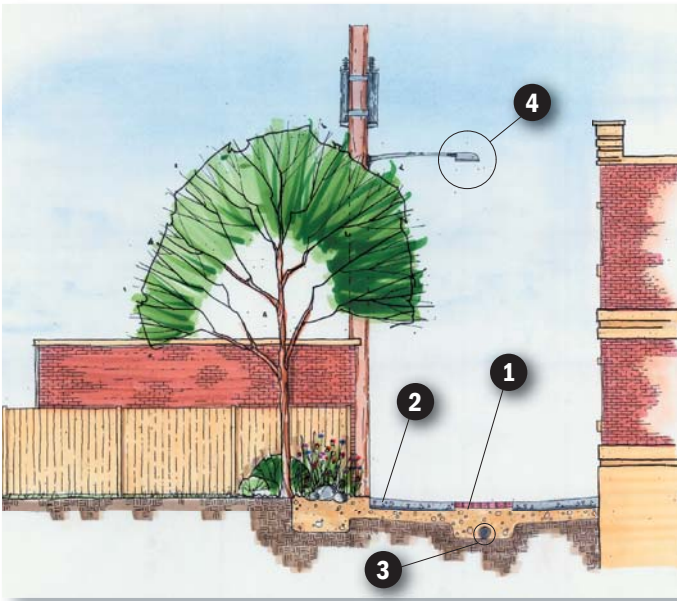
Green Alley Pilot Approach #3: Center Alley Infiltration Using Permeable Pavement

- 1** Permeable pavement material (permeable asphalt, permeable concrete, or permeable pavers)
- 2** High albedo concrete paving with recycled aggregate and slag
- 3** Optional inlet structure with pipe under drain
- 4** Energy efficient dark sky compliant light fixture



Plan

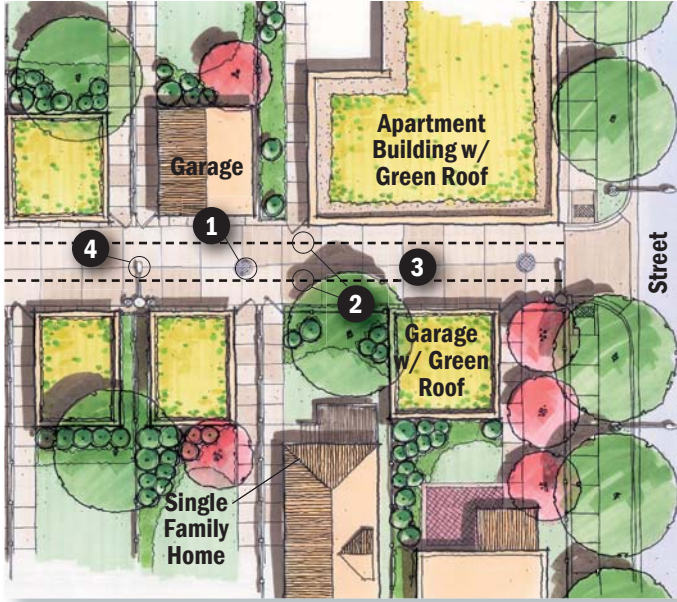
- 1** Permeable pavement material (permeable asphalt, permeable concrete, or permeable pavers)
- 2** High albedo concrete paving with recycled aggregate and slag
- 3** Optional pipe under drain
- 4** Energy efficient dark sky compliant light fixture



Section

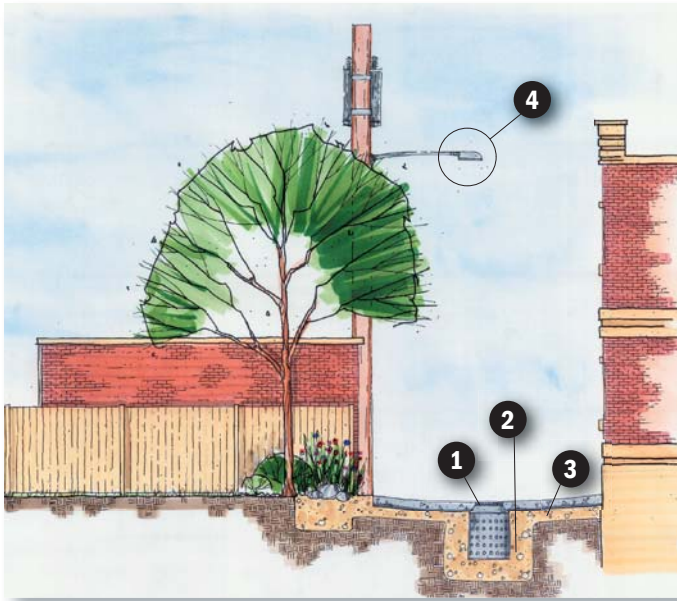
Green Alley Pilot Approach #4: Green Pavement Materials with Subsoil Filtration System

- 1** Inlet structure with perforated sides
- 2** Limits of infiltration trench below for additional storage capacity
- 3** High albedo concrete paving with recycled aggregate and slag
- 4** Energy efficient dark sky compliant light fixture



Plan

- 1** Inlet structure with perforated sides
- 2** Stormwater infiltration trench
- 3** Recycled concrete base material
- 4** Energy efficient dark sky compliant light fixture



Section

Green Alley Dos and Don'ts

Don't:

- Dump chemicals or toxic materials on or near the green alley
- Spread sand or dirt on or near permeable paving in the green alley
- Remove stone from between permeable pavers
- Seal permeable asphalt or concrete

Do:

- Keep your green alley clean of dirt and debris
- Install rain gardens and bioswales to absorb and filter water before reaching the alley
- Implement other sustainable BMPs on your own property to increase the performance of the green alley
- Shovel or plow alley as required, salt can be used in moderation

What to Expect During Alley Construction

- The Chicago Department of Transportation will notify you in advance of an alley improvement project.
- Access to garages and driveways will be temporarily restricted.
- Garbage pickup will be temporarily relocated.

Frequently Asked Questions

Q: What do I do if my green alley does not appear to be draining?

A: Contact your Alderman's office or call 3-1-1 to report any problem with your alley.

Q: Will my green alley overflow during large storms?

A: Each green alley is designed to allow almost all rainfall to infiltrate into the subsoil. In the case of an uncommonly large rain event, each alley is designed so that water will run into the adjacent streets and into the storm sewer.

Q: What will happen when it snows?

A: If needed, a green alley can be plowed like any other street. Rock salt can be used in the winter, however, fine particles such as sand, gravel or kitty litter can clog the openings in pervious pavement surfaces and should not be used.

Q: Will ice be a problem in the winter?

A: In most cases, icing will be reduced because melting snow can permeate through the alley pavement.

Q: Will water still infiltrate in freezing temperatures?

A: The voids in the permeable paving and sub-base will allow water to infiltrate even when the ground is frozen. In general, a permeable alley is "warmer" than a traditional alley in winter because it allows air to circulate to the earth below, which is a constant 55 degrees Fahrenheit.

Q: Will access to my alley be restricted during construction?

A: Yes, access will be restricted during construction. CDOT will work with your Alderman's office to ensure that all residents are notified in advance and parking and garbage needs are coordinated.

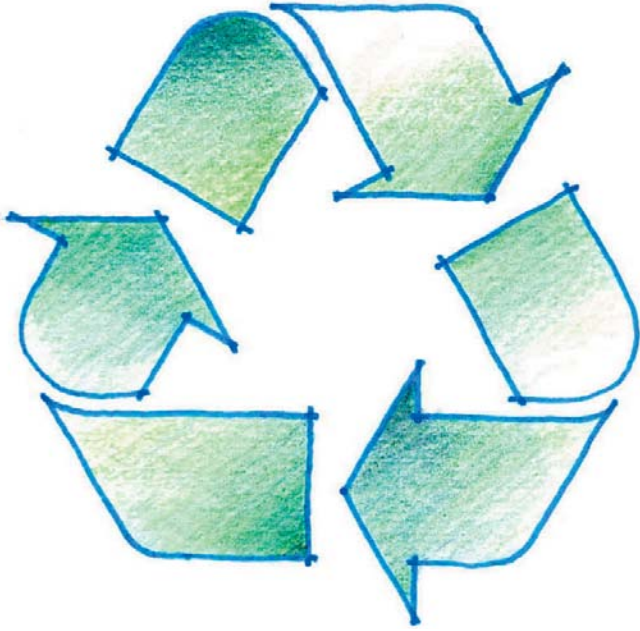
Q: Will my alley be darker with dark sky compliant full cutoff light fixtures?

A: No, the same number of alley lights and the same footcandles (brightness) will be provided, but the new fixtures will direct light downward and outward instead of upward. In addition, the light will be white (metal halide) instead of yellow (high pressure sodium). White light has a high "color rendition index," which means that it allows people to perceive colors more accurately.

Property owners can play a significant role in helping to create a greener, more sustainable Chicago, and further enhance the performance of their green alley by implementing the variety of best management practices illustrated on the following pages.

Sustainable Solutions for Adjacent Properties

Technique 1	Recycling			
\$5-\$10 per month	✓ Residential	✓ Commercial	✓ Industrial	

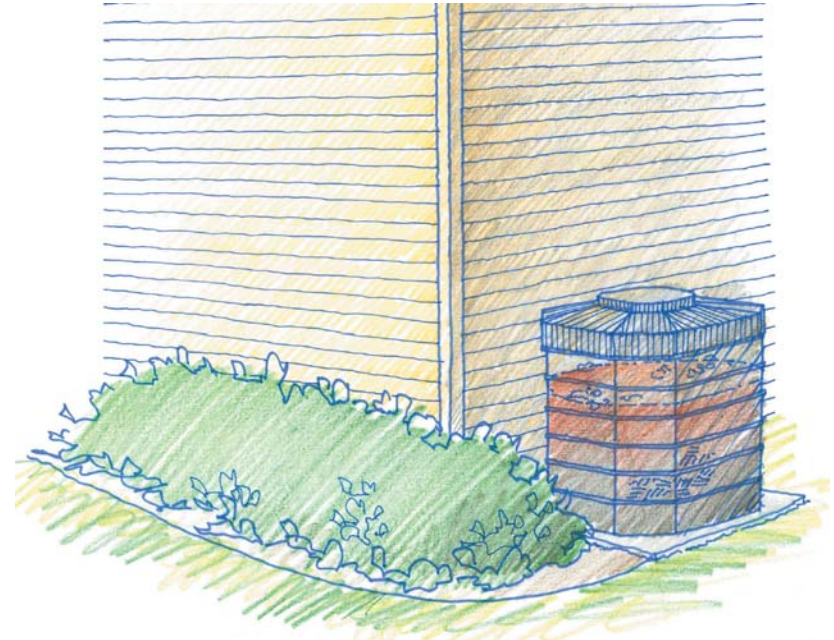


Recycling products like glass, plastic, and metal containers through the Chicago Blue Bag Recycling Program or through your local collection center, is a simple and inexpensive way to reduce waste hauled to landfills, while saving energy and natural resources.

Potential Benefits

- Reduces waste hauled to landfills
- Reduces the need to extract virgin natural resources
- Requires little cost to the homeowner

Technique 2	Composting		
\$50-\$250	✓ Residential	Commercial	Industrial



Kitchen scraps, yard waste and even some paper products can be placed into an inexpensive composting bin to decompose. With very little maintenance, the waste will soon break down into a rich, organic material that can be mixed directly into garden soil or used as fertilizer for trees and shrubbery. Not only does composting save space in our garbage trucks and landfills, but its product also provides a nutrient boost to poor urban soils.

Potential Benefits

- Reduces waste hauled to landfills
- Reduces the need to extract virgin natural resources
- Requires little or no cost to the property owner
- Improves soil structure
- Provides natural fertilizer to plants

Technique 3	Plant a Tree			
\$50-\$500 each	✓ Residential	✓ Commercial	✓ Industrial	



Shade trees can play a large part in reducing the urban heat island effect and improving air quality. Planting a tree near the alley shades the alley and thereby reduces the amount of thermal energy emitted by the pavement.

Potential Benefits

- Reduces the urban heat island effect
- Provides habitat for birds and wildlife
- Reduces energy costs for heating and cooling if placed appropriately
- Improves air quality

Technique 4	Native Landscaping			
\$0.10-\$5 per square foot	✓ Residential	✓ Commercial	✓ Industrial	

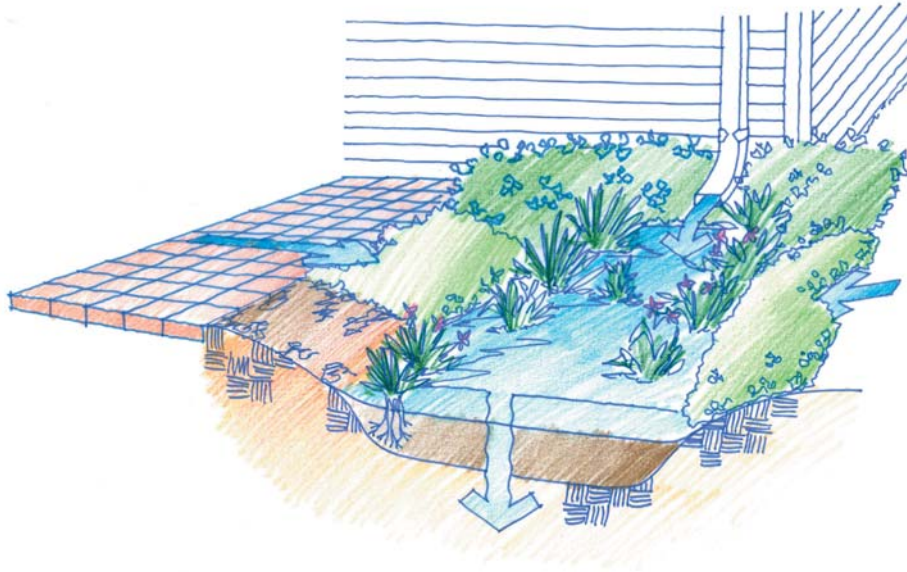


Plants and trees native to northern Illinois are uniquely adapted to the local weather, water and soil conditions. Choosing these species for your landscaping can reduce the amount of watering, fertilizing and maintenance required on your property.

Potential Benefits

- Reduces the urban heat island effect
- Reduces energy costs for heating and cooling if placed appropriately
- Provides habitat for birds and wildlife
- Requires little or no irrigation once established
- Requires little or no fertilizer, pesticides or herbicides
- Low maintenance once established

Technique 5	Rain Garden		
\$3-\$6 per square foot	✓ Residential	✓ Commercial	✓ Industrial

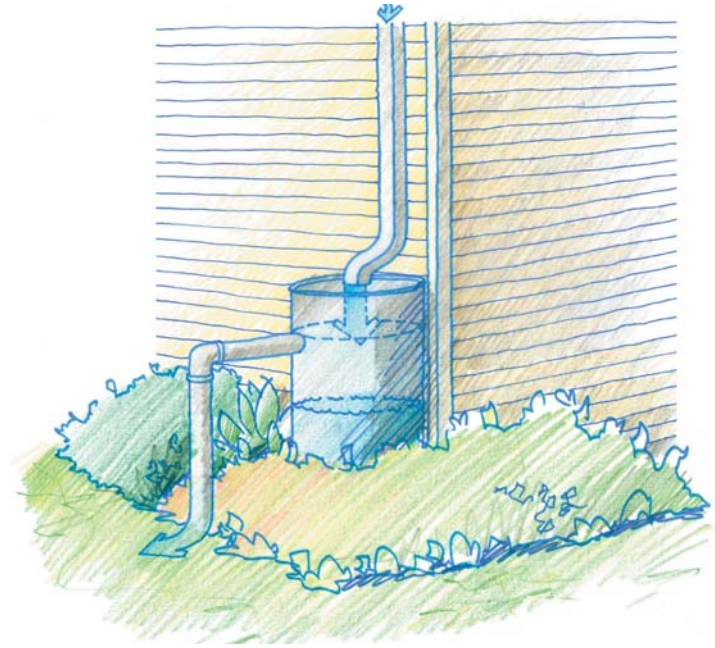


A rain garden is a landscape feature that is planted with native perennial plants used to slow down the stormwater runoff from impervious surfaces (such as roofs, sidewalks and parking lots) and allow it to infiltrate back into the soil.

Potential Benefits

- Provides attractive garden area to receive discharge from down spouts
- Filters silt, pollutants and debris
- Reduces rate and quantity of stormwater entering the sewer system
- Recharges ground water
- Provides habitat for birds and wildlife
- Can help reduce localized flooding

Technique 6	Rain Barrel / Cistern		
\$10-\$5,000	✓ Residential	✓ Commercial	✓ Industrial

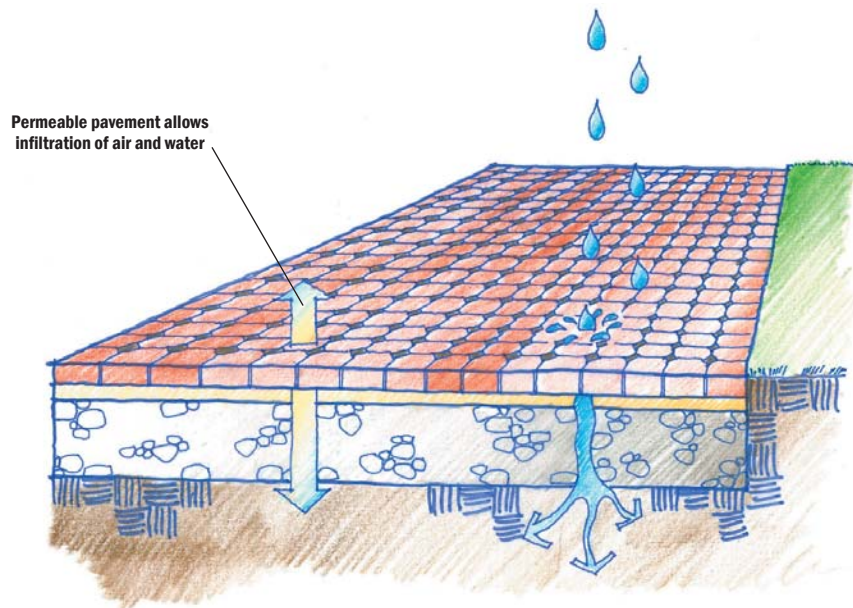


A rain barrel or cistern is a container used to collect and store rainwater from a building roof for various uses including irrigating plants.

Potential Benefits

- Recycles rain water
- Conserves water
- Reduces the quantity of stormwater runoff
- Can provide water for plant irrigation

Technique 7	Permeable Pavement					
\$3-\$15 per square foot	✓ Residential	✓ Commercial	✓ Industrial			

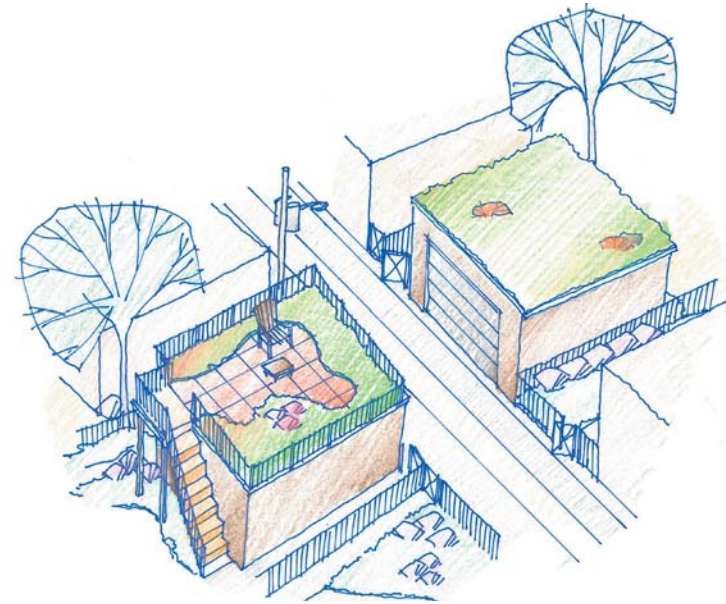


Permeable paving allows rainwater to penetrate through the surface and stone base material and infiltrate into the soil below. It is ideal for small areas of outdoor household paving such as patios, driveways and parking slabs.

Potential Benefits

- Reduces the rate and quantity of stormwater runoff
- Recharges ground water
- Filters silt, pollutants and debris
- Reduces the urban heat island effect
- Provides paving options for site specific applications

Technique 8	Green Roof					
\$10-\$30 per square foot	✓ Residential	✓ Commercial	✓ Industrial			

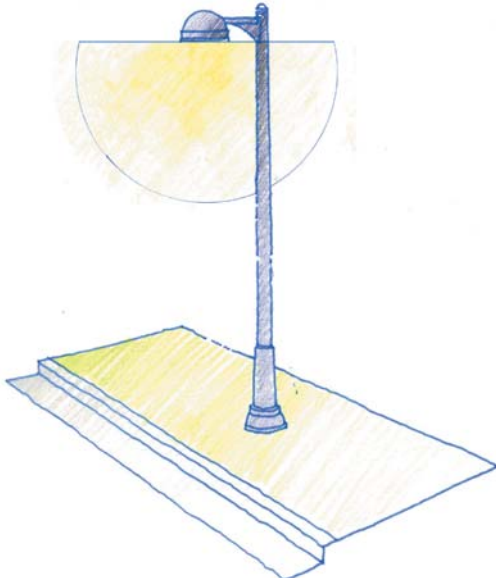


A “green roof” is a roof that is partially or completely covered with plants. A green roof system includes waterproofing, a drainage system, soil and plants. Green roofs can be installed on most flat roofs and are well-suited to garages, provided that they are constructed to accommodate the structural load.

Potential Benefits

- Reduces the rate and quantity of stormwater runoff
- Reduces the urban heat island effect
- Reduces energy costs for heating and cooling
- Increases longevity of roofing materials
- Provides habitat for birds and wildlife
- Provides opportunity for accessible garden space
- Increases rent or property value of units with views or access

Technique 9	Energy Efficient / Dark Sky Lighting		
\$200-\$5,000+ each	✓ Residential	✓ Commercial	✓ Industrial

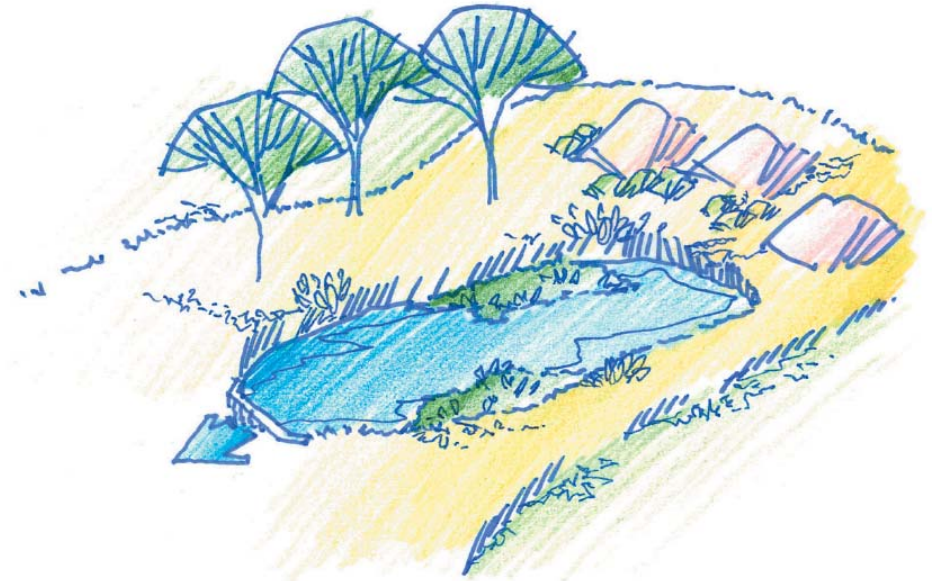


Energy efficient/dark sky light fixtures are designed to direct lamp light downward and outward where it is useful rather than upward where it wastes energy and contributes to glare and light pollution.

Potential Benefits

- Reduces energy costs
- Reduces light pollution from site
- Reduces glare and provides better light uniformity

Technique 10	Naturalized Detention		
\$.07-\$.14 per square foot	Residential	✓ Commercial	✓ Industrial

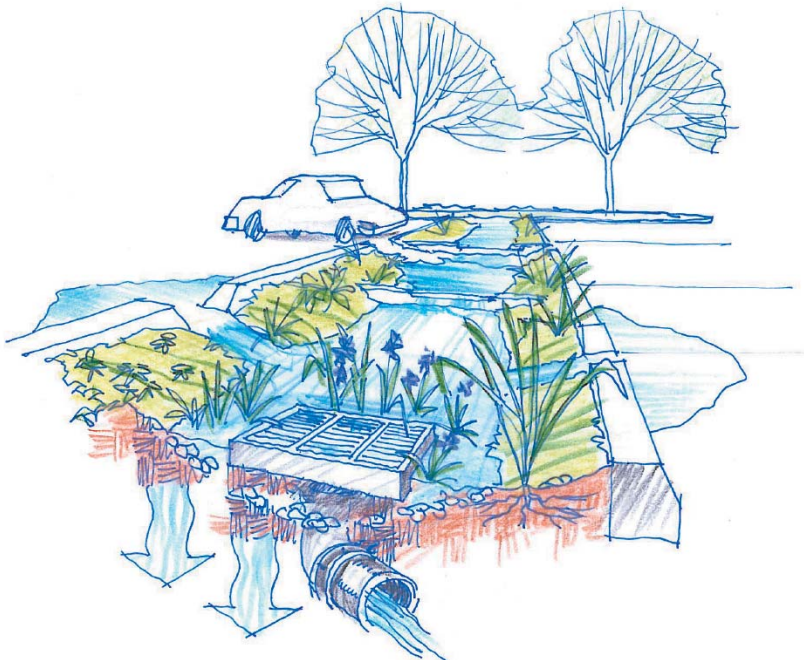


Naturalized detention is an area used to temporarily store stormwater on site and slowly release it at a controlled rate. These areas are intended to look and function as native wetlands and include native plants growing both above and below the normal water level.

Potential Benefits

- Reduces the rate and quantity of stormwater runoff
- Filters silt, pollutants and debris
- Reduces erosion of pond edges
- Provides an attractive amenity
- Provides habitat for birds and wildlife

Technique 11	Bioswales and Vegetated Swales				
\$8-\$30 per linear foot	Residential	✓	Commercial	✓	Industrial



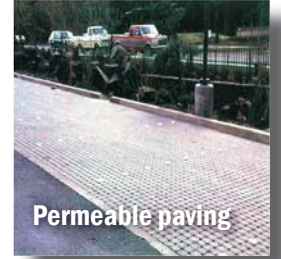
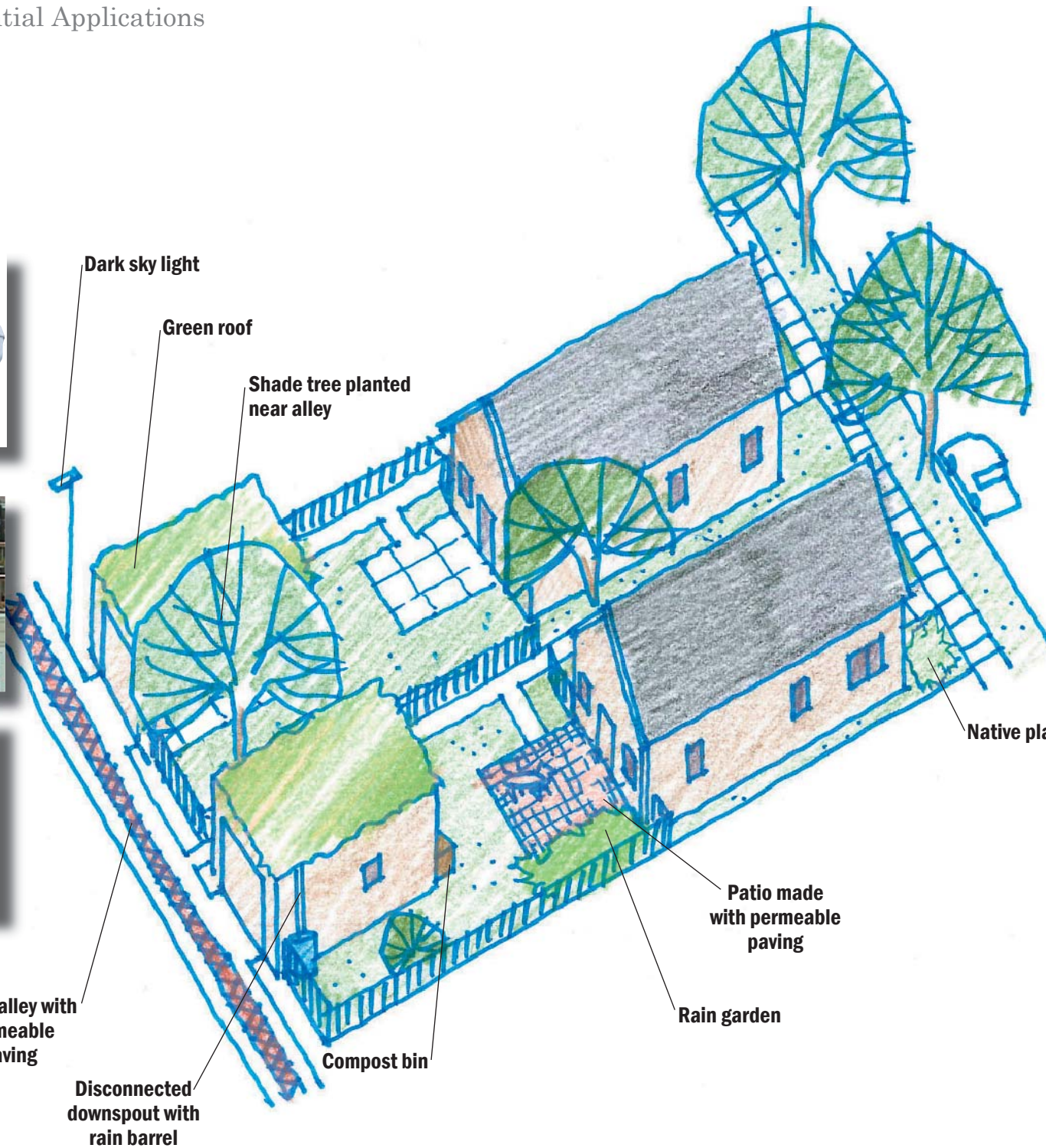
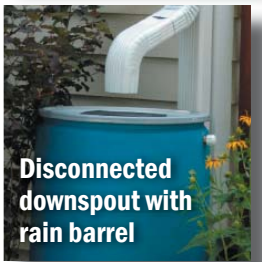
Example Applications

A bioswale or a vegetated swale is a shallow trench or shoulder landscape with native plants used to slow the speed of surface runoff and allow stormwater to infiltrate back into the ground instead of flowing directly into storm sewers.

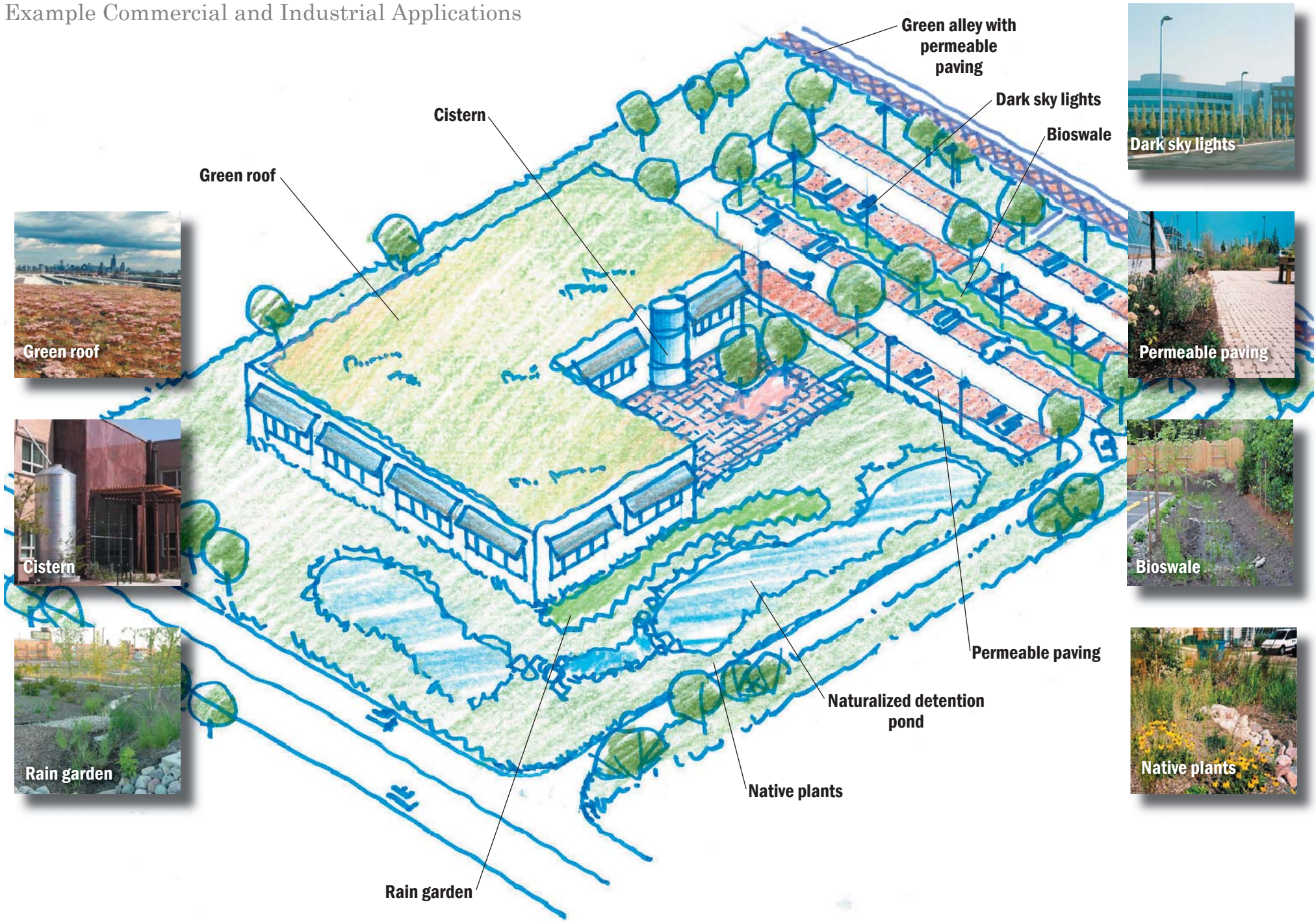
Potential Benefits

- Filters silt, pollutants and debris
- Reduces rate and quantity of stormwater entering sewer system
- Recharges ground water
- Reduces storm sewer piping and structures
- Can reduce detention requirements
- Provides opportunity for wildlife habitat

Example Residential Applications



Example Commercial and Industrial Applications



How Do I Identify a Green Alley?



You will be able to easily identify a green alley because the image above will be stamped into the driveway aprons at either end. Furthermore, if a catch basin is open to the subsoils and not connected to the storm sewer system it will be labeled “infiltration: no dumping - only rain down the drain” for easy identification.

Glossary of Terms

Best Management Practices (BMPs)

Design solutions used to reduce adverse effects of development such as pollution, the “urban heat island effect” and stormwater runoff.

Dark Sky Light Fixture

A light fixture designed to allow no light trespass beyond 90 degrees from the center line of the fixture.

Green Alley

An alley designed and constructed incorporating best management practices of environmentally sustainable design.

Green Roof

A planted roof system composed of waterproofing, a drainage system, planting soil and plants.

High Albedo Pavement

Pavement with a high level of light reflectance used to reduce the amount of thermal energy released from pavement materials contributing to the “urban heat island effect”.

Permeable Pavement

Pavement that allows water to infiltrate into the subsoil. Materials can include concrete permeable pavers, concrete and asphalt.

Slag

A by-product of steel production that can be used as a component of concrete mix to reduce the amount of industrial waste that goes to the landfill and lighten the color of concrete.

Sustainability

The concept of meeting today’s needs without compromising resources for future generations.

Urban Heat Island Effect

The phenomenon of higher temperatures in dense urban areas resulting from thermal energy given off by pavement and buildings.

Publications

Permeable Pavers

Paver Search.

www.paversearch.com/permeable-pavers-menu.htm

High Albedo Pavement

Lawrence Berkeley National Laboratory. *Cool Pavements Lower Temperatures*

<http://eetd.lbl.gov/HeatIsland/>

Dark Sky Lighting

International Dark Sky Association

www.darksky.org

Green Roofs

City of Chicago Department of Environment. *Chicago's Green Rooftops: A Guide to Rooftop Gardening*

www.cityofchicago.org/Environment

City of Chicago Rooftop Garden

www.cityofchicago.org/Environment

Bioswales

United States Environmental Protection Agency. *Post-Construction Storm Water Management in New Development & Redevelopment: Grassed Swales*

<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

Rain Gardens

Raingardens.org

www.raingardens.org

Naturalized Detention

United States Environmental Protection Agency. *Post-Construction Storm Water Management in New Development & Redevelopment: Wetponds*

<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

Native Landscaping

Wild Ones. *Native Plants, Natural Landscapes*

www.for-wild.org

Rain Barrels

Rain Barrel Guide. *Harvesting Rainwater with Rain Barrels, an Old Idea with a New Following*

www.rainbarrelguide.com

Composting

Compost Guide. *Why Make Compost?*

www.compostguide.com

How To Compost

www.howtocompost.org

Additional City of Chicago Resources

Chicago Department of Transportation
30 N. LaSalle Street, 11th Floor
Chicago, IL 60602
(312) 744-3600
www.cityofchicago.org/transportation

Chicago Center for Green Technology
445 N. Sacramento Boulevard
Chicago, IL 60612
(312)746-9642
[www.cityofchicago.org/Environment/
GreenTech](http://www.cityofchicago.org/Environment/GreenTech)

Chicago Department of Environment
30 N. LaSalle Street, 25th Floor
Chicago, IL 60602
(312) 744-7606
www.cityofchicago.org/environment

Chicago Department of Water
Management
1000 E. Ohio, Suite 104
Chicago, IL 60611
(312)744-7001
[www.cityofchicago.org/
WaterManagement](http://www.cityofchicago.org/
WaterManagement)

Questions?

Please address all questions and concerns to:
Chicago Department of Transportation
30 N. LaSalle Street, 11th Floor
Chicago, IL 60602
(312) 744-3600

City of Chicago Service Request Line
311

Or Your Local Alderman's Office



City of Chicago
Richard M. Daley, Mayor

Department of Transportation
Cheri Heramb, Acting Commissioner

The Green Alley Project was prepared
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Department of Transportation

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Material Testing