

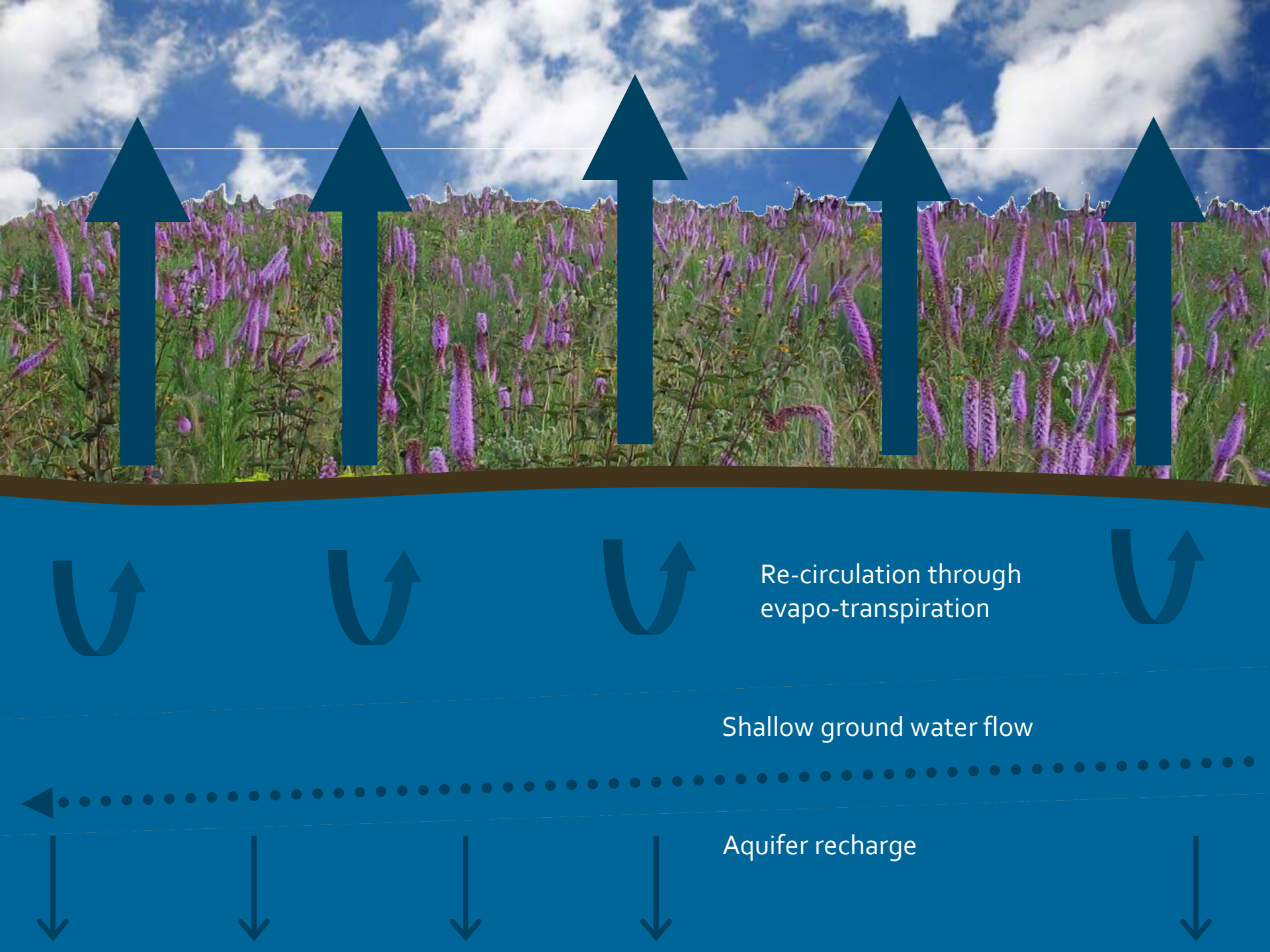
Gray vs. Green: Integrated Green Infrastructure Solutions that Manage Resources and Enrich Communities

CDF
15 years of sustainability

James Patchett, FASLA, LEED AP
Conservation Design Forum, Inc.







Re-circulation through
evapo-transpiration

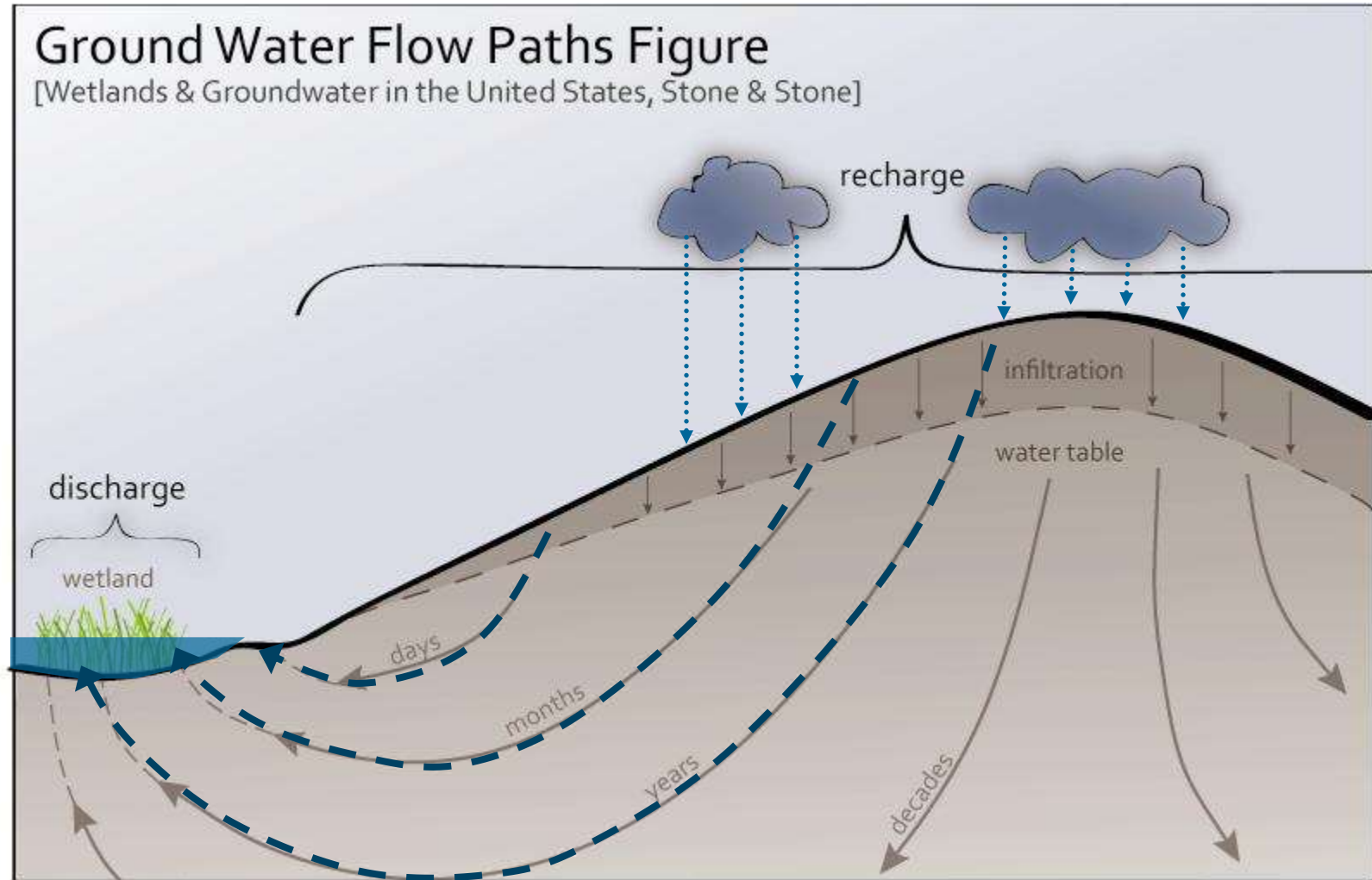
Shallow ground water flow

Aquifer recharge

Historical Patterns of Hydrology

Recharge Zone: Uplands

Discharge Zones: Lowlands – rivers, streams, ponds, wetlands



Constant, clean discharge flows, year round to sustain stable surface water hydrology with constant water temperature and chemistry

The Botanical Law

“Plants Grow in Habitats to Which They are Adapted”

Bluff Springs Fen
Elgin, Illinois





Bluff Springs Fen
Elgin, Illinois



Bluff Springs Fen
Elgin, Illinois



Loss of system stability and biodiversity in flood prone habitats



Floodwater from Poplar Creek
Hoffman Estates, Illinois

Water in Contemporary Urban, Suburban & Rural Environments



Traditional Stormwater Management Approach: Collect and convey water away from the site just as quickly and efficiently as the law will allow through enclosed storm sewer systems designed with concentrated points of discharge that generate a velocity and volume of flow that is nearly impossible to mitigate.



Everywhere USA Today











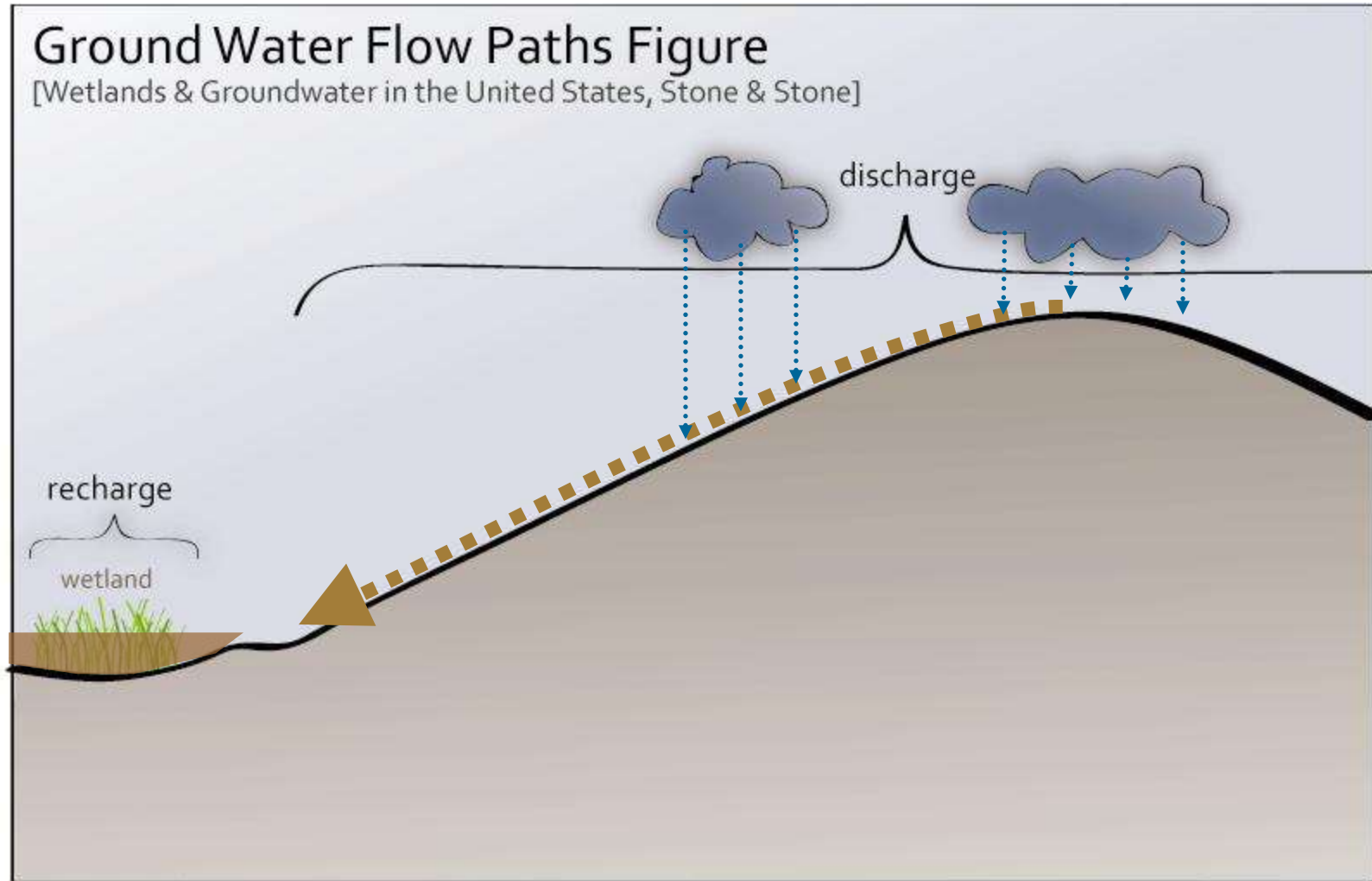
According to USEPA, 40-60% of nitrogen applied to lawns ends up in surface and groundwater systems



Contemporary Hydrology

Upland becomes discharge zone

Natural wetlands are expected to function as recharge zones

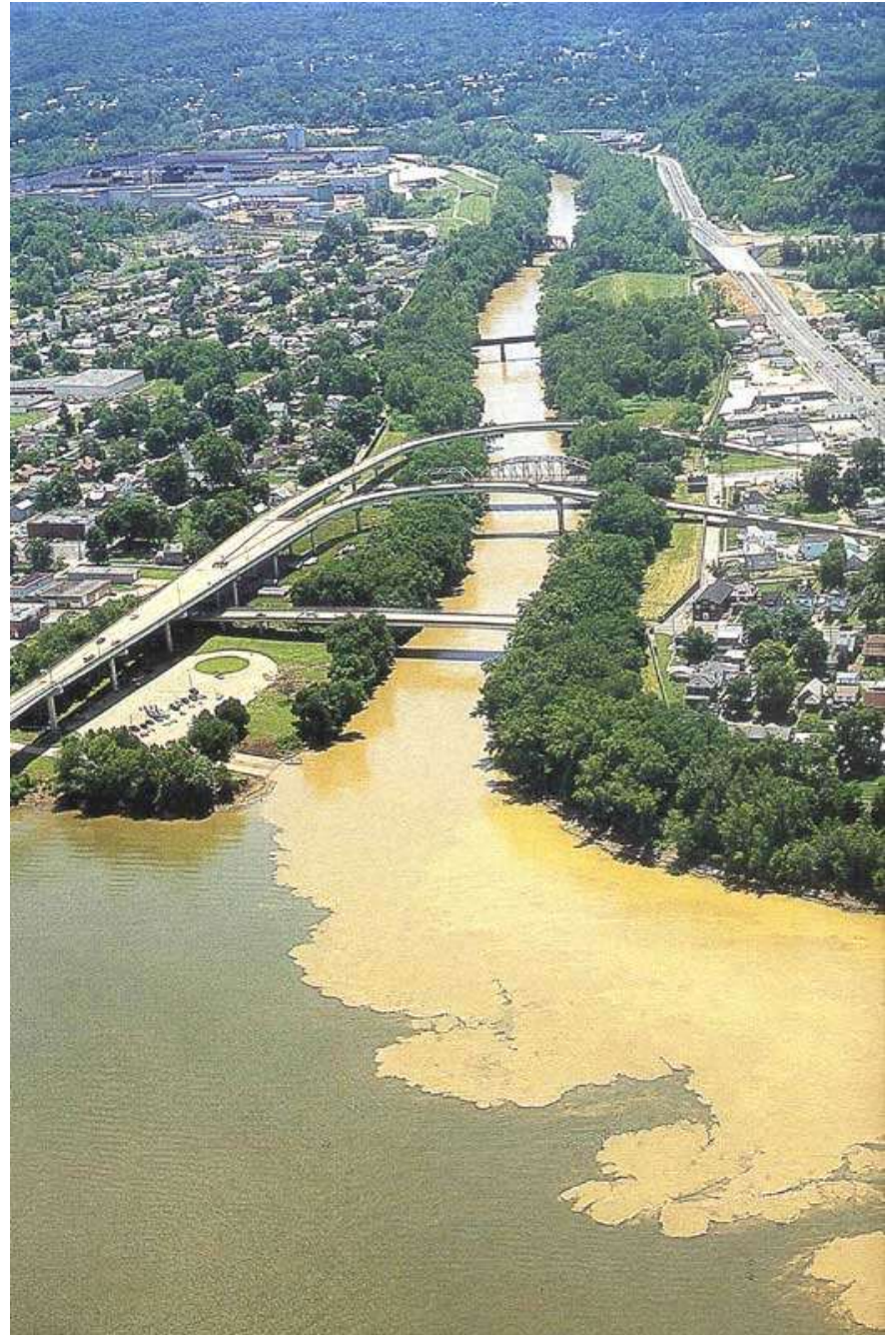


Reversed hydrological pattern results in runoff containing sediments, oils, greases, salts, fertilizers, pesticides, and higher water temperatures that inundate historical systems adapted to completely different hydrological and water quality conditions

The Physics of Design

“For every design ‘action’ there are environmental, social, and psychological ‘reactions’ to be observed.”

[Newton’s third law of physics applied to design]



Iowa floods of 2008



[Photos taken or compiled by Dr. Tom Weingeist]

We blame it on too much rain...



Severe erosion of stream and river systems caused by excessive runoff



The hydrology of boom...



and bust



The Mathematical Problem

You can't continue to send $\frac{3}{4}$ or more of your annual precipitation away in the form of polluted surface water runoff, dramatically reduce recharge, while you continue to expand withdrawals from limited groundwater reserves, and think you'll never run out of fresh water

CDF Philosophy and First Principles

The Foundation for Sustainable Design

BEGINS WITH WATER



First Principles of Sustainable Design



Doctrine

All water is a valuable resource; it should never be squandered or treated as a waste product in any of its forms or contexts.



Approach

Replicate, to the degree possible, the historical natural and cultural processes to which local ecosystems are adapted.

Integrated Green Strategies

Distributed Rainwater Management Strategies for all land use cover surfaces with applications appropriate for scale and context;

Replicate natural hydrology and provide multiple benefits on all land use surfaces:

1. Green roof systems
2. Porous pavement systems
3. Bio-retention systems
4. Rainwater harvesting and re-use
5. Wastewater recycling and re-use
6. Native landscape systems



Green Strategies

Green Roof Systems

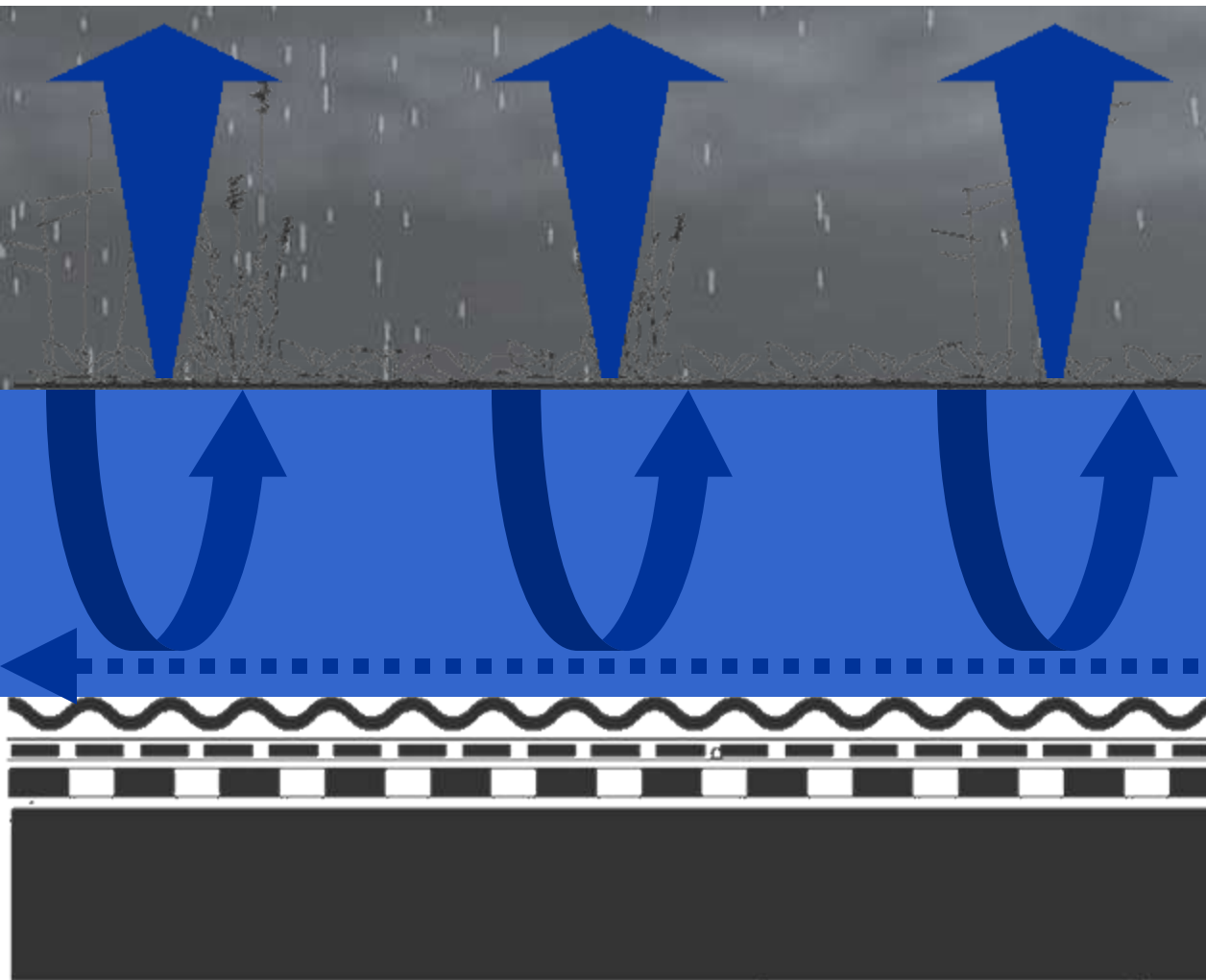


Chicago City Hall Green Roof
Chicago, Illinois



ASLA Green Roof
Washington DC





Growing medium

Media separator

Drainage layer

Water proofing

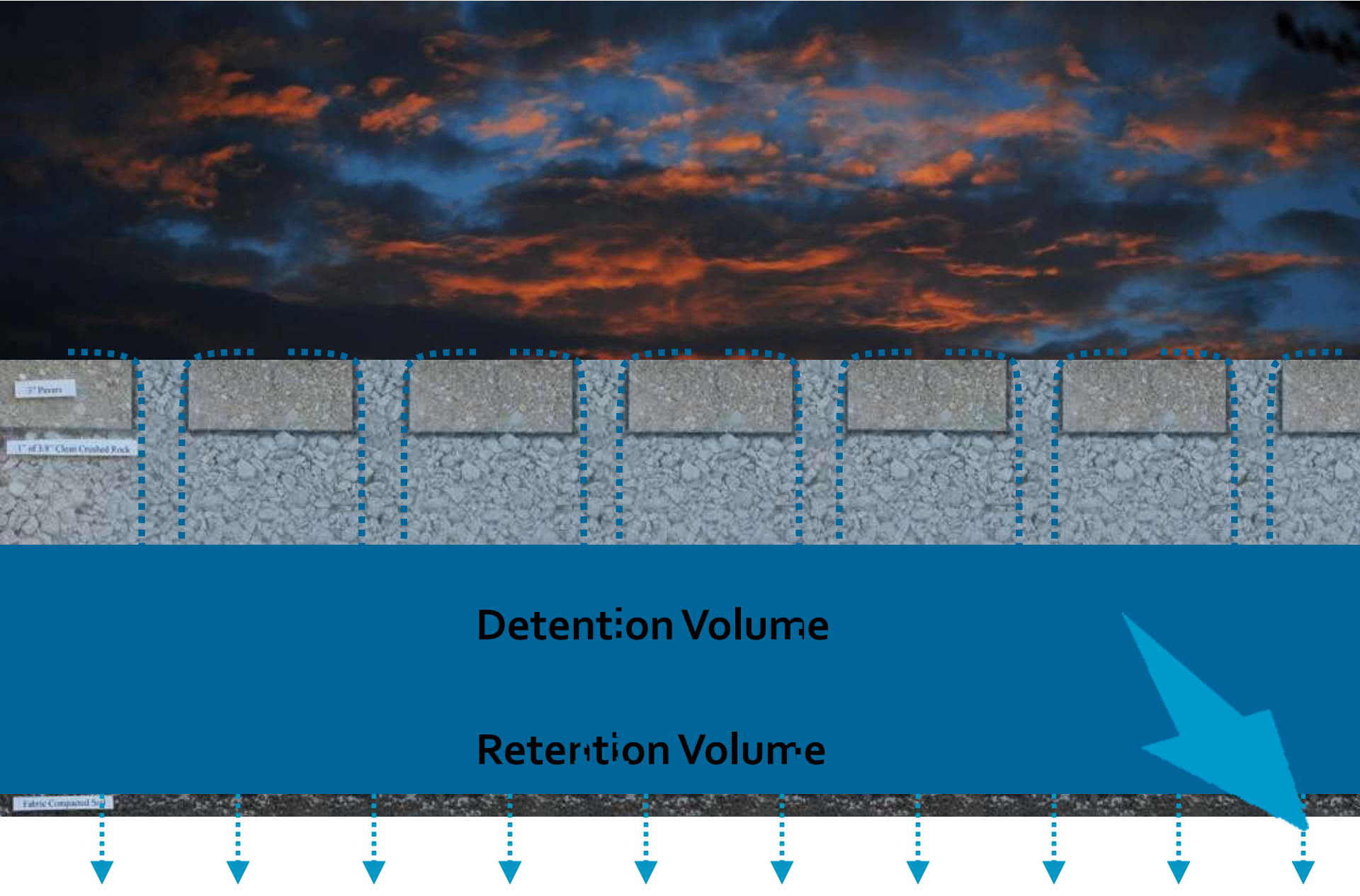
Roof deck

Green Strategies

Porous Pavement Systems



Porous Pavement: Infiltration (Retention) and Detention Capacity

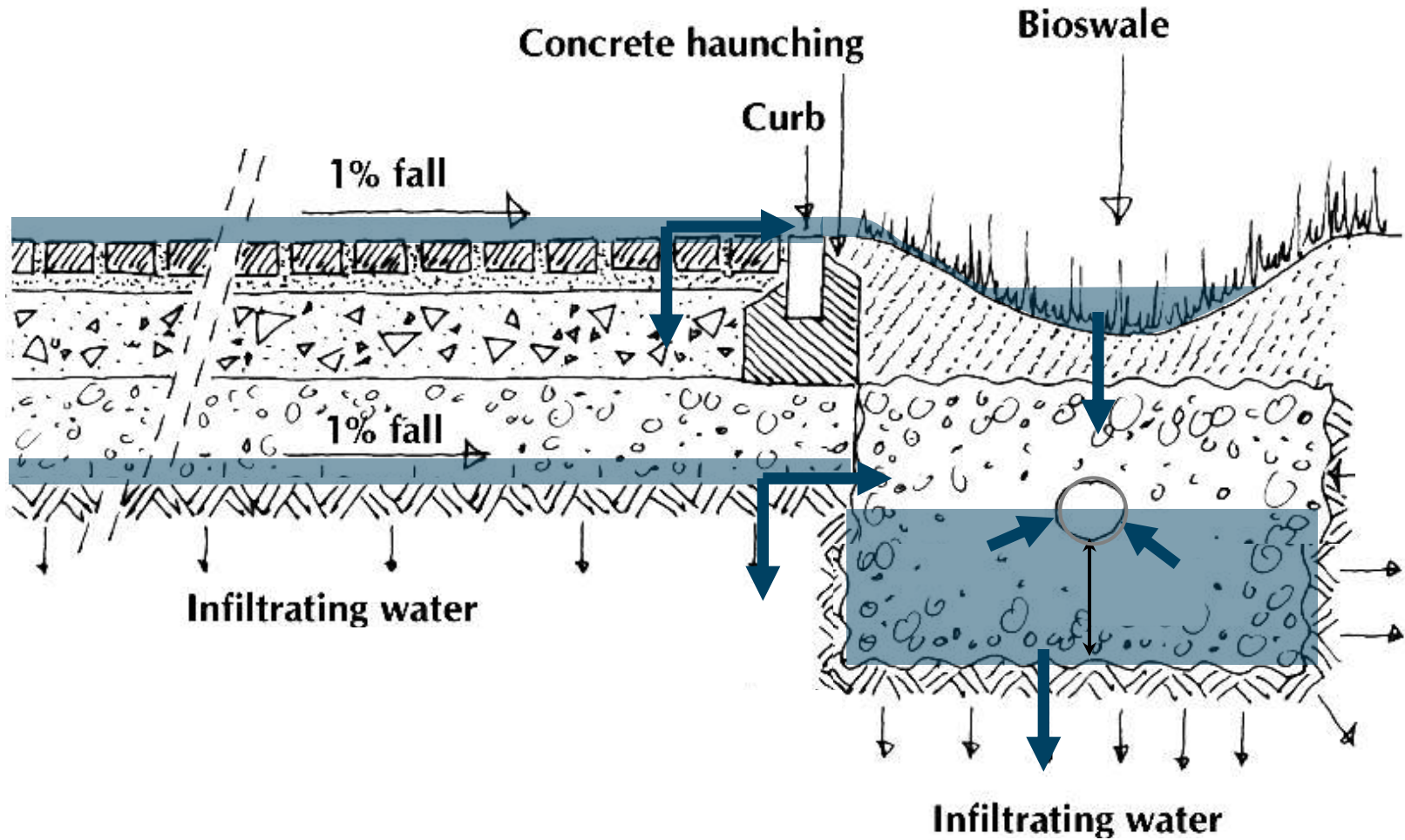


Green Strategies

Bio-retention Systems



Porous pavement + bioswales/rain gardens



Green Strategies

Rainwater Harvesting and Re-use Systems



Green Strategies

Wastewater Harvesting and Re-use Systems



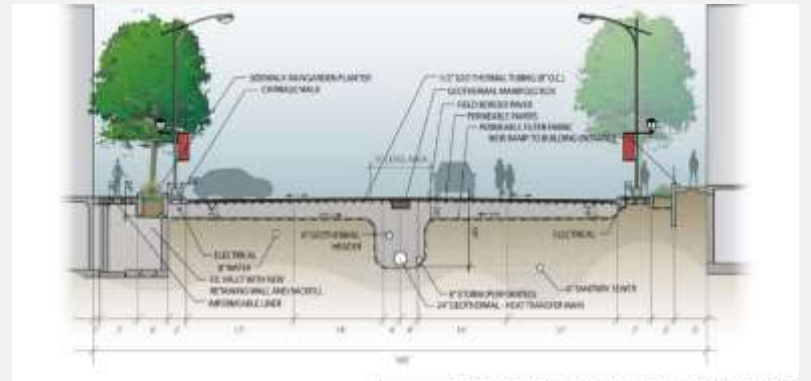
Green Strategies

Native Landscape Systems



Restorative Green Infrastructure Solutions for any Environment





IOWA GREEN STREETS - SECTION C - NORTH VINE ST.

WEST UNION, IA



L-3.02

Complete Green Streets w/ District Energy Systems

Iowa's Green Streets Pilot Project

A Sustainable Vision for West Union, Iowa



The City of West Union

Main Street West Union

Iowa Department of Economic Development

TeKippe Engineering, P.C.

Conservation Design Forum





Iowa's Green Streets Pilot Project

West Union, Iowa



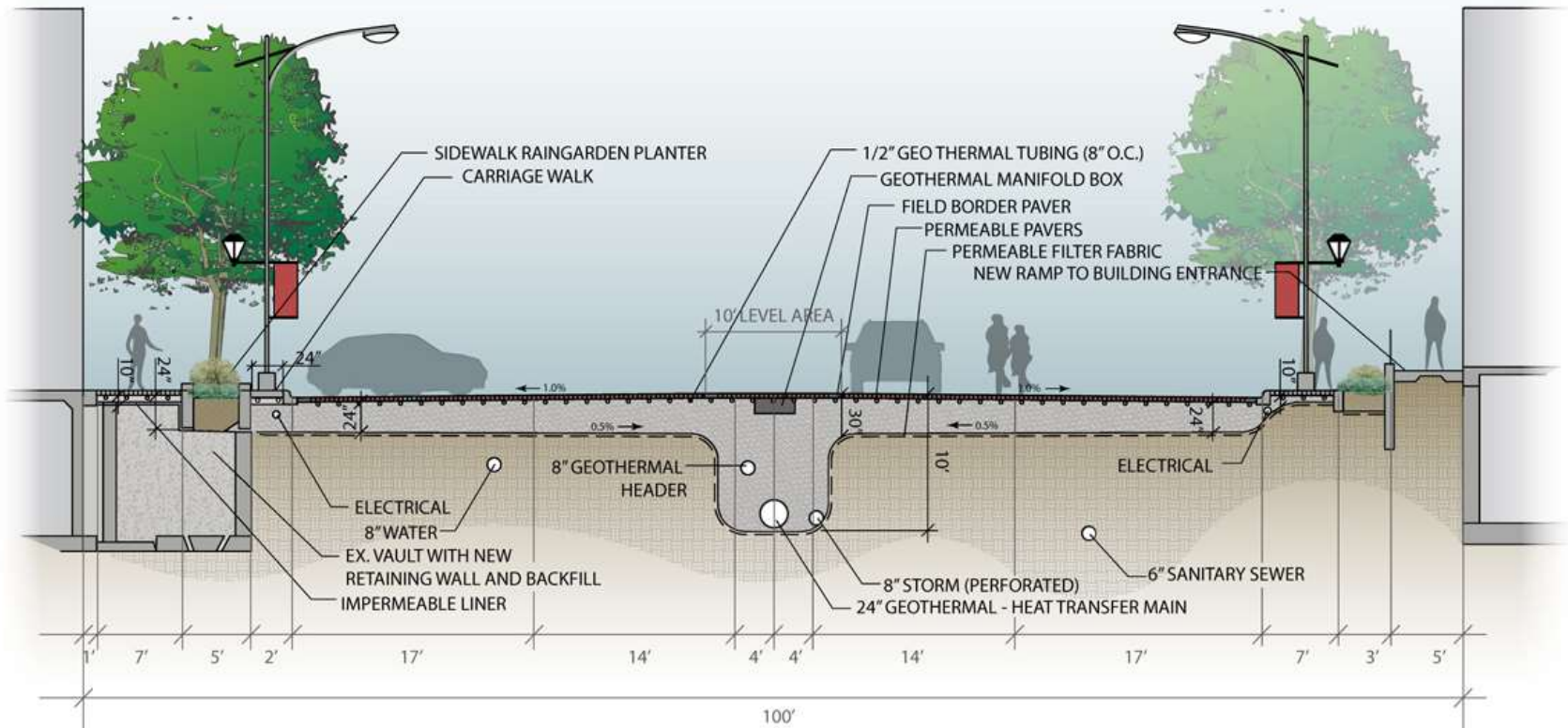
- LEGEND**
- SIDEWALK PAVEMENT
 - SIDEWALK FLEX-SPACE
 - ROADWAY PAVEMENT
 - ROADWAY MEDIAN PAVEMENT
 - INTERSECTION ACCENT
 - BUMPOUT RAINGARDEN
 - SIDEWALK PLANTER

WEST UNION, IA

IOWA GREEN STREETS - CONCEPT PLAN

0 50 100
FEET

L-1.00



IOWA GREEN STREETS - SECTION C - NORTH VINE ST.

WEST UNION, IA

Project Number:
09032.01
Date:
06-01-2009
SCALE: 1/8" = 1'-0"



CONSERVATION DESIGN FORUM

Landscape Architecture
Community Planning
Ecological Restoration
Water Resource and
Ecological Engineering
375 West First Street
Eldon, MO 64525
630.559.2000 phone
630.559.2030 fax
www.cdfinc.com

L-3.02



















WELCOME TO
THE CITY OF WEST UNION AND FAYETTE COUNTY



WELCOME TO
THE CITY OF WEST UNION AND FAYETTE COUNTY

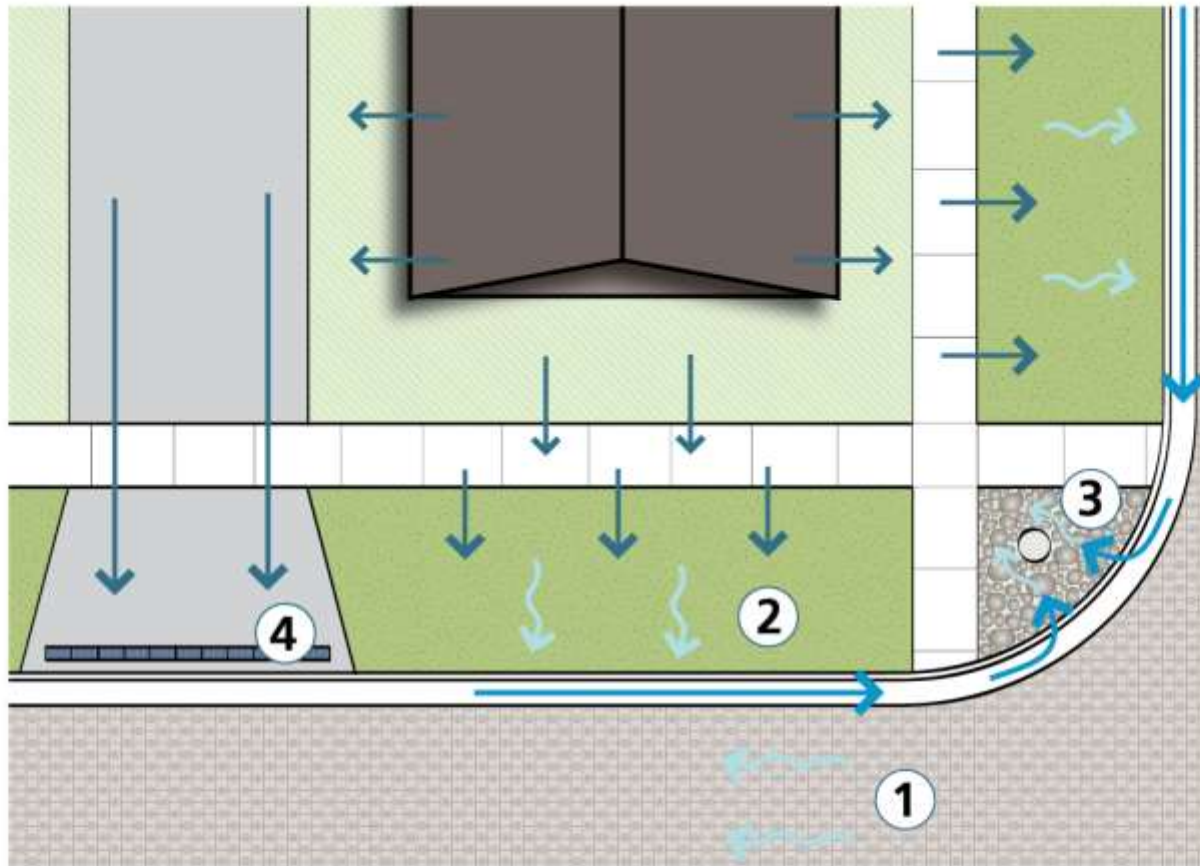




Integrated Green Street Solutions for Neighborhood Scale Applications



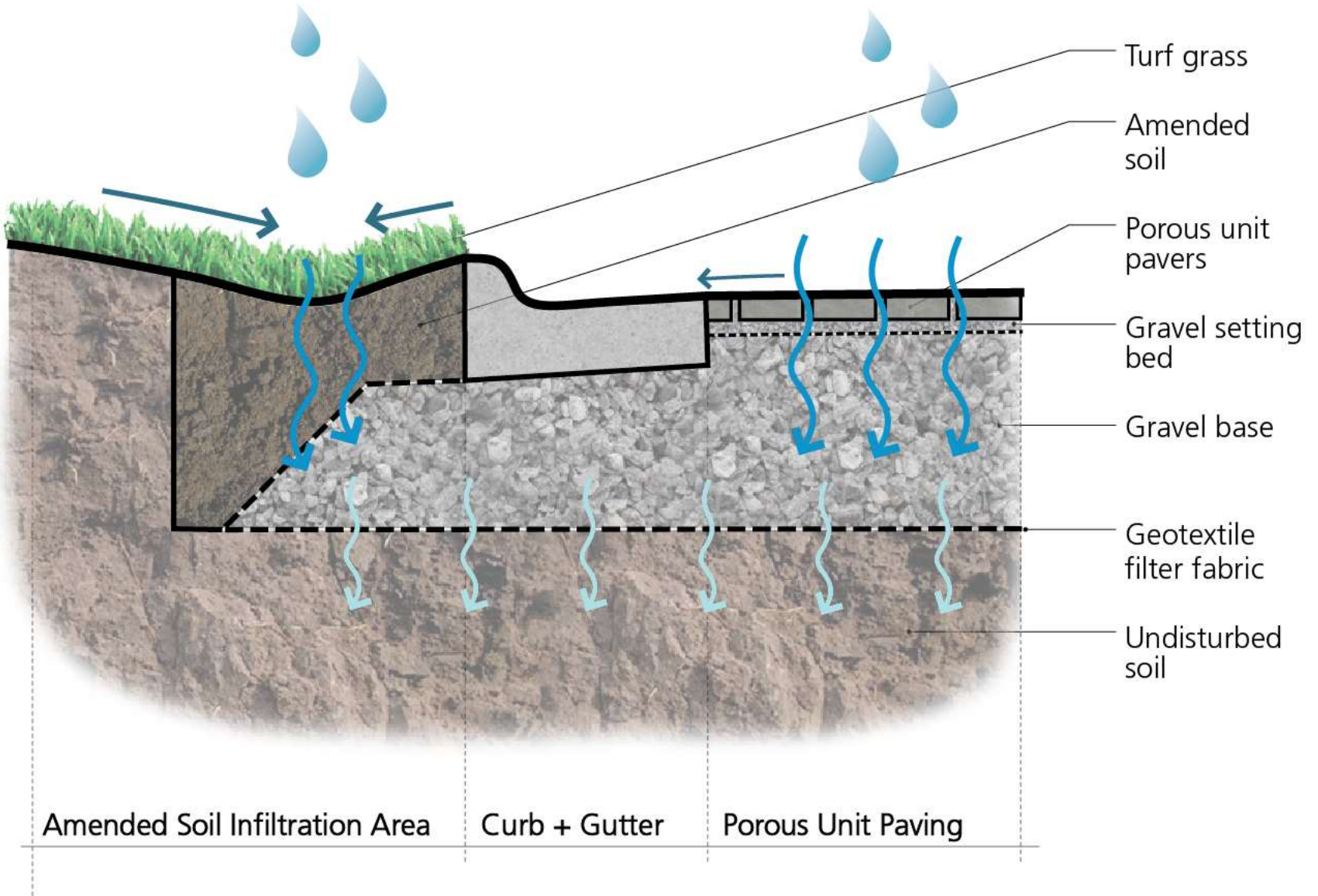
5. 21. 2009



Rainwater falling within the project area is collected and treated by the four rainwater system BMPs. See below for a description of each system component.

- ① Porous Unit Paving
- ② Amended Soil Infiltration Areas
- ③ Cobble Infiltration Areas
- ④ Alley Trench Grate

b. Porous Unit Paving + Amended Soil







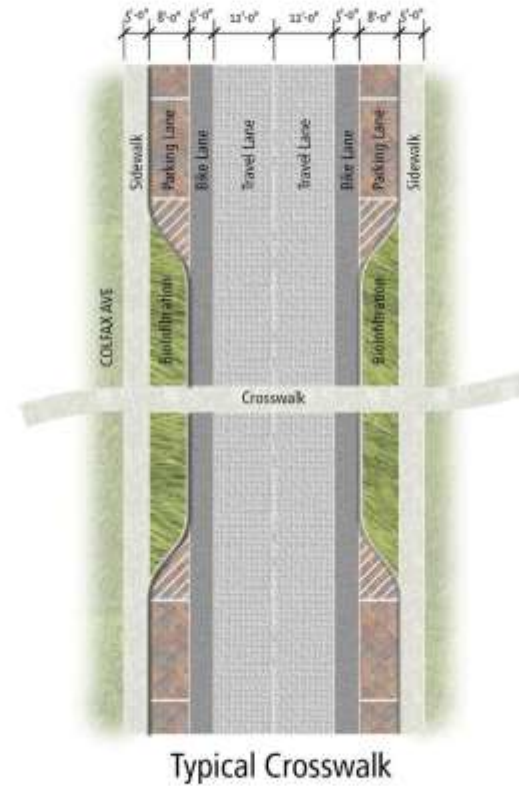
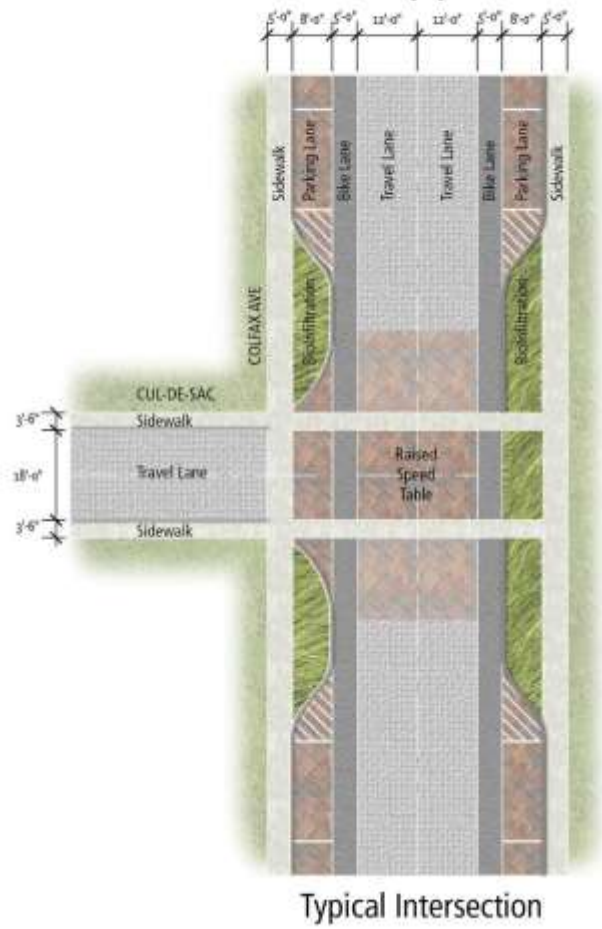






Charles City Green Streets
Charles City, Iowa

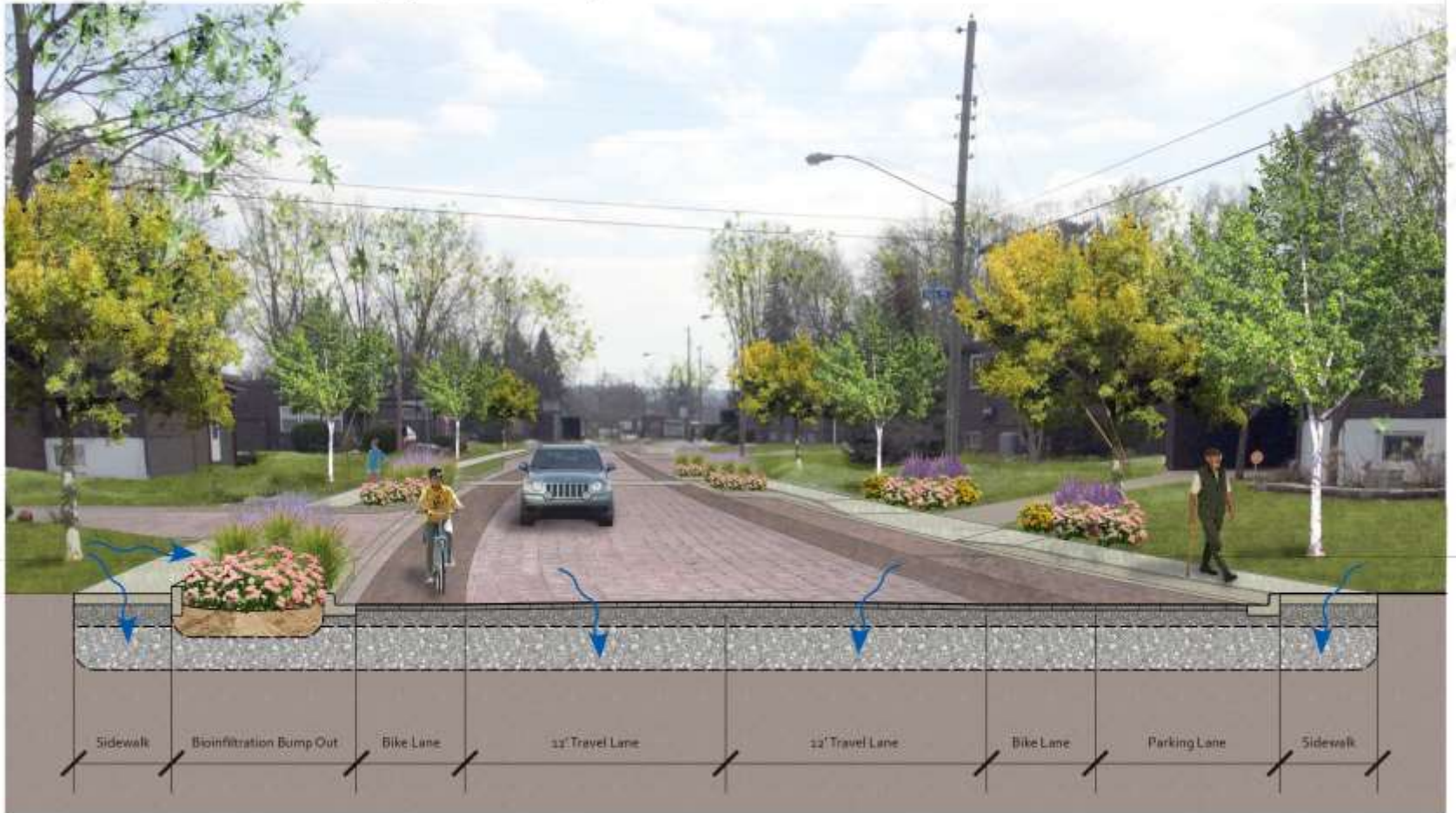
Walnut Grove Mutual Housing Association Green Infrastructure Opportunities



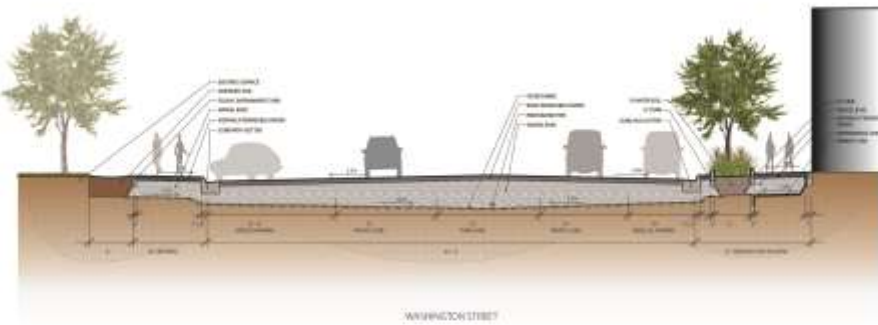
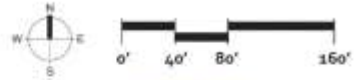
Walnut Grove Mutual Housing Association
Green Infrastructure Opportunities | *Colfax Avenue Before*



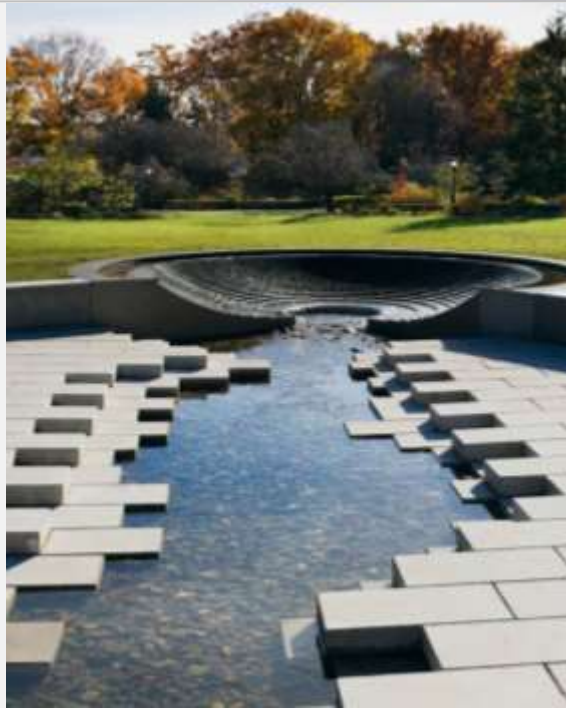
Walnut Grove Mutual Housing Association Green Infrastructure Opportunities | Colfax Avenue Cross Section



Plan: Courthouse Area



Complete Green Streets Project Bloomfield, Iowa



Water as a Resource & Source of Beauty – Never a Waste Product

Ann Arbor Municipal Center

ann arbor, michigan

Client: City of Ann Arbor

Completion: on-going

LEED: Platinum (anticipated)

Team: Quinn Evans Architects, InSite Design Studio, Atelier Dreiseitl





Ann Arbor Municipal Center
Ann Arbor, Michigan



Ann Arbor Municipal Center
Ann Arbor, Michigan

Queens Botanical Garden

flushing, new york

Client: Queens Botanical Garden

Completion: 2002 (master plan), 2009 (administration building and gardens)

Awards: Illinois ASLA Merit Award, 2009 (administration building and gardens)

New York Green Building Design Award, 2004

Illinois ASLA Merit Award, 2003 (master plan)

LEED Platinum, 2008

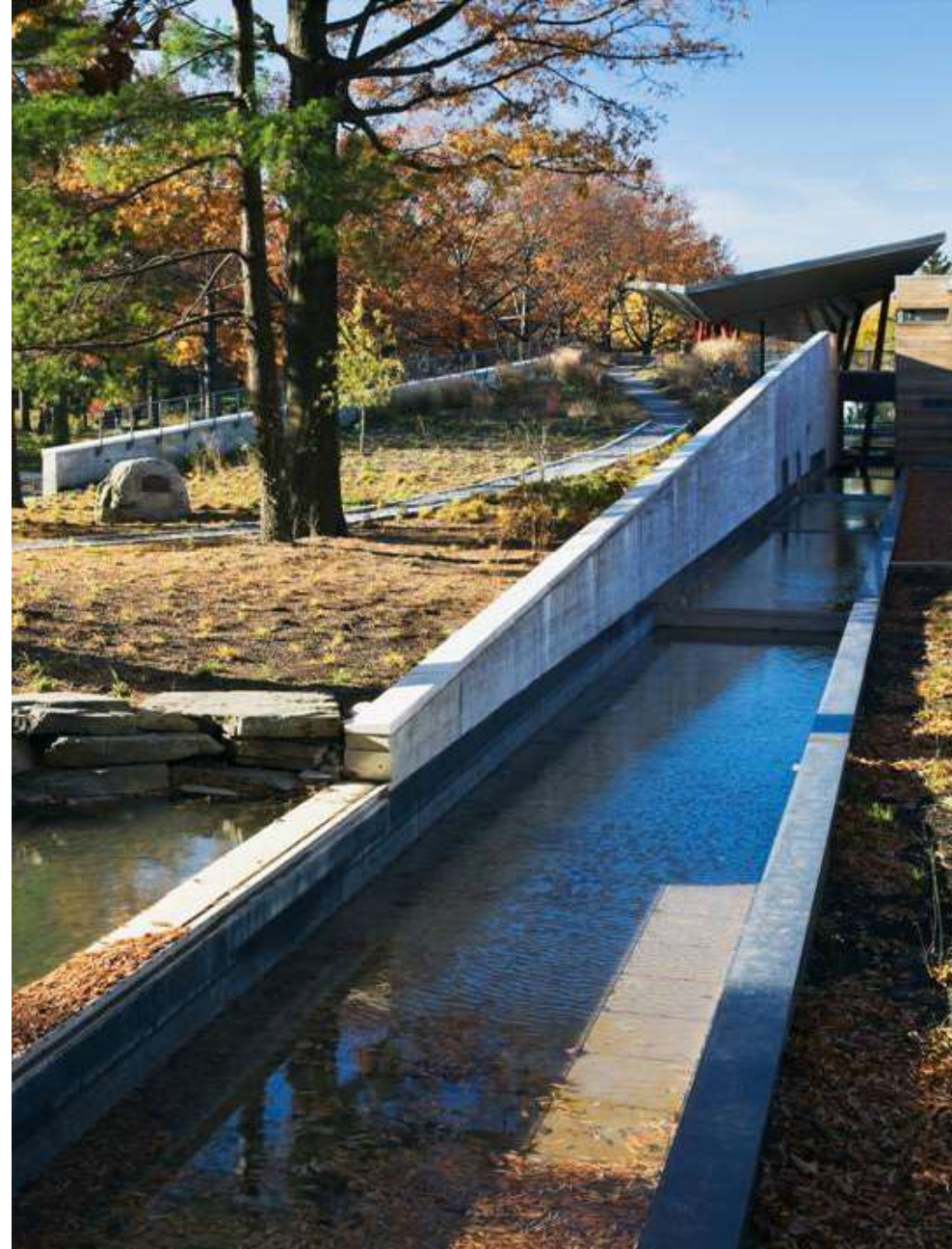
Team: Atelier Dreiseitl, BSK Architects



Queens Botanical Garden
Flushing, NY



Queens Botanical Garden
Flushing, New York



Queens Botanical Garden
Flushing, New York



Destinations for Restoration, Research, Education, & Recreation

Education: colleges + universities



Iowa State University College of Design



Waubensee Community College



Walsh College



Iowa State University College of Design

Kresge Foundation Headquarters

troy, michigan

Client: Kresge Foundation

Completion: 2006

Awards: Michigan ASLA Merit Award, 2009

ACEC NY Honor Award, 2007

Michigan Barn Commission Award for Innovative Use of Barn Reuse, 2007

AIA Chicago Distinguished Building Award, 2006

LEED Platinum, 2007

Team: Valerio Dewalt Train, Farr Associates, ARUP



Porous paving parking lot



Kresge Foundation Headquarters
Troy, MI

Connection to nature



Kresge Foundation Headquarters
Troy, MI



Kresge Foundation Headquarters
Troy, Michigan

Client and Public Education



Kresge Foundation Headquarters
Troy, MI

Lutheran General Hospital Patient Tower

park ridge, illinois

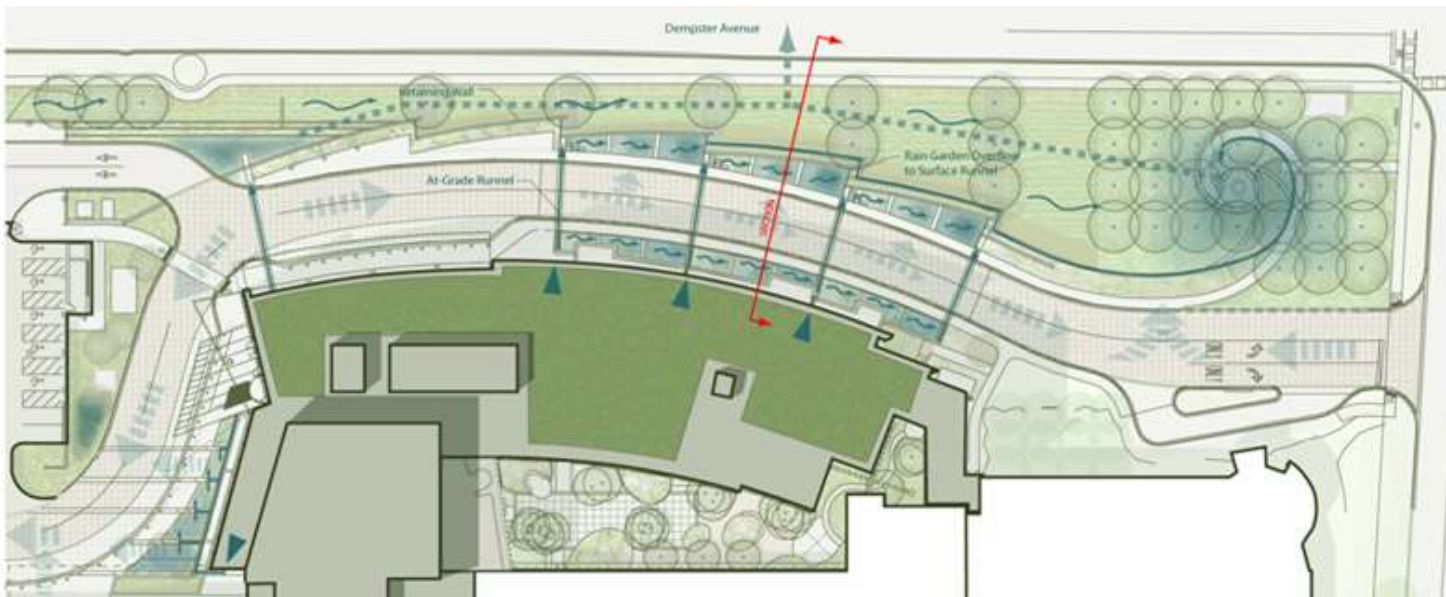
Client: Advocate Health Care

Completion: 2009

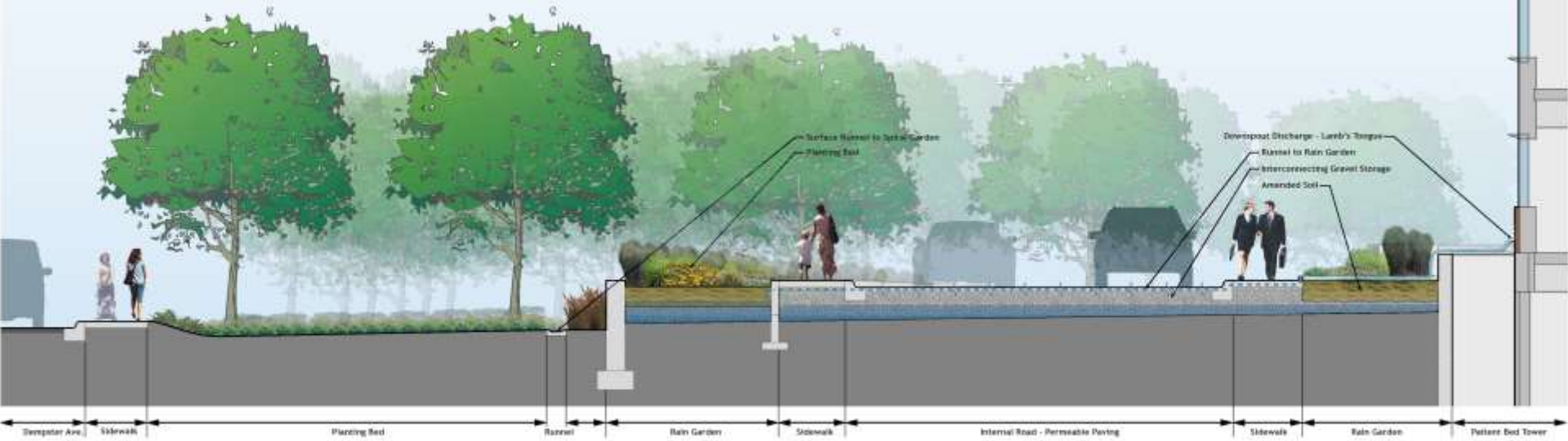
LEED Gold, 2010

Team: Cannon Design, Gewalt Hamilton Associates





Advocate Lutheran General Hospital
Park Ridge, IL



Lutheran General Hospital Tower
 Park Ridge, Illinois

Johnson Controls Headquarters

glendale, wisconsin

Client: Johnson Controls, Inc.

Completion: 2009

Awards: Wisconsin Builder Magazine Top Projects award, 2009

LEED: Platinum (anticipated)

Team: Gensler





Johnson Controls Headquarters
Glendale, Wisconsin





Johnson Controls Headquarters
Glendale, Wisconsin



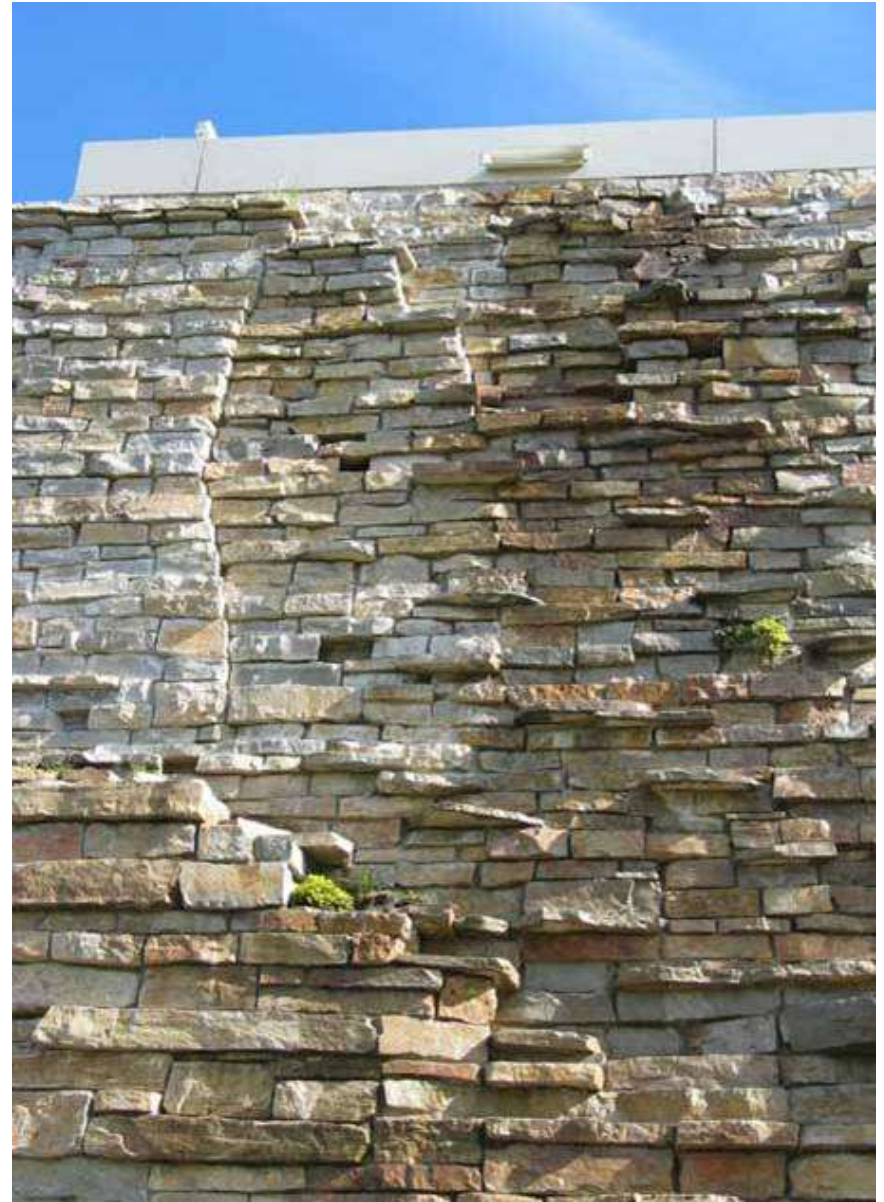
Peggy Notebaert Nature Museum
Chicago, IL



Peggy Notebaert Nature Museum
Chicago, IL



Peggy Notebaert Nature Museum
Chicago, IL



Peggy Notebaert Nature Museum
Chicago, IL



Peggy Notebaert Nature Museum
Chicago, IL

Omega Center for Sustainable Living

rhinebeck, new york

Client: Omega Institute for Holistic Studies

Completion: On-going

Awards: AIA/COTE Top Green Project Award, 2010

LEED: Platinum (anticipated)

Team: BNIM, John Todd Ecological Design, The Chazen Companies



| Air flow

| Energy flow

| Water flow



Omega Center for Sustainable Living
Rhinebeck, New York



Omega Center for Sustainable Living
Rhinebeck, New York



Omega Center for Sustainable Living
Rhinebeck, New York



Place-based Restorative Community Development



New Settlements Authentic to Place, People, and Culture



Innovation for World Class Design, Development, Construction, Management, & Financing



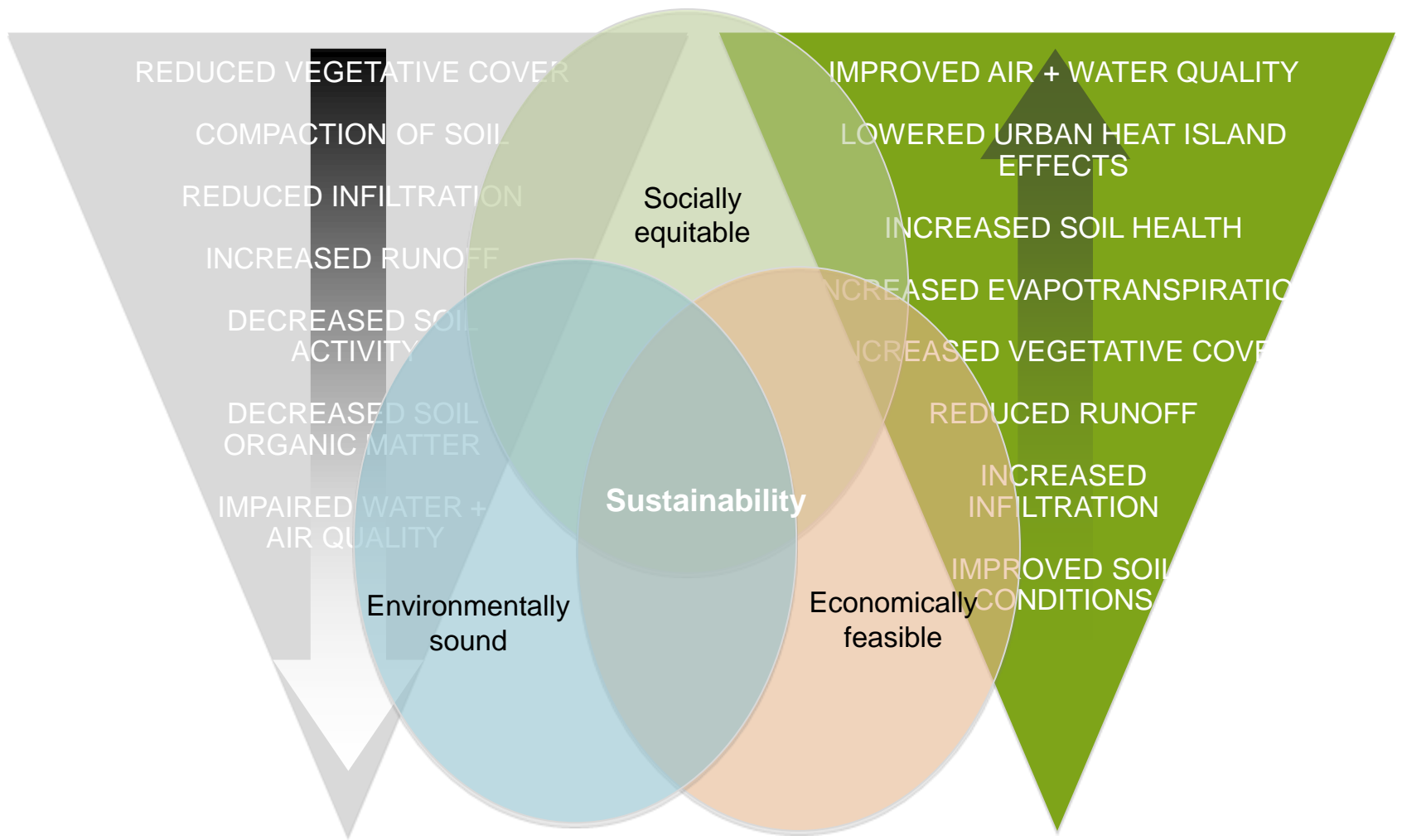


January 2015 - Current **Whole Systems Integration (WSI) Consortium** Partner Firms are as follows:

For more information, please explore our individual firm websites:

- A- One Geothermal www.a-onegeothermal.com/
- Conservation Design Forum www.cdfinc.com/
- Conservation Land Stewardship www.conservationlandstewardship.com/
- DAC Studios, Ltd. www.dacstudios.com/
- Davey Resource Group www.davey.com/services/davey-resource-group/
- Jeffrey L. Bruce & Company www.jlbruce.com/
- John Todd Ecological Design www.toddecological.com/
- KCL Engineering www.kclengineering.com/
- Kenny International Consulting, LLC [website under construction](#)
- Kestrel Design Group www.kestreldesigngroup.com/
- LRB Global, LLC www.lrbglobal.com/
- LEDoLas www.ledolas.com/
- Mead & Hunt www.meadhunt.com/
- Northern Filter Media www.northernfiltermedia.com/
- Prefense LLC www.prefense.com/
- Restorative Water & Energy Solutions [website under construction](#)
- Solutions in the Land www.solutionsintheland.com/
- Terrapin Bright Green www.terrapinbrightgreen.com/

Whole Systems Integration (WSI) Management www.wsimanagement.com/



Credit: Sustainable Sites Initiative (SITES)

Restorative solutions for truly sustainable places



A New Paradigm in Wastewater Treatment – Zero Waste

Step 1 - Restorer Lagoons



After channel treatment, the water will be diverted to a lagoon for further polishing by Lagoon Restorers. This low cost, low energy method of water polishing has proven to help meet current as well as emerging EPA discharge parameters for the removal of more complex contaminants of concern such as personal care products, pharmaceuticals, and most recently restorers have proven effective at the removal of petroleum hydrocarbons. The floating restorers can be sized and configured to accommodate any volume of wastewater discharge and incorporated into a wide range of lagoon types and shapes. This versatility facilitates the use of restorer systems as an integral component of a whole new concept in wastewater facility design.

Tyson Chicken Plant - Berlin, Maryland

Large scale industrial wastewater restorer application.



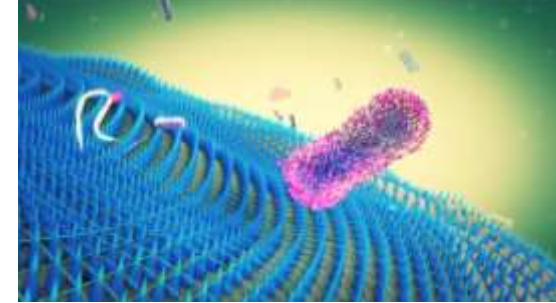
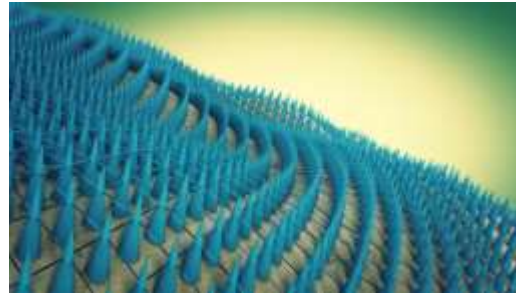
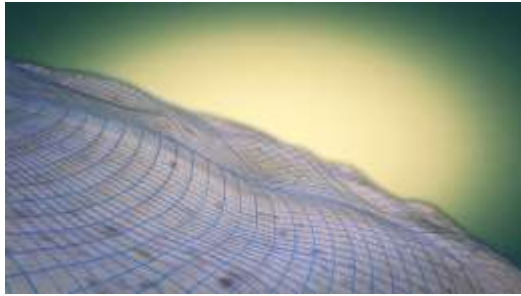


Step 2 - Nutrient Harvesting Channels



The images above illustrates a channel that is constructed to receive waste water that has passed through the treatment plant. The channel is comprised of gabions filled with a specialized blend of filtration media including Zeolite. The addition of Zeolite is particularly beneficial due to its superior filtration capability, coupled with its outstanding nutrient and water retention properties for later plant uptake. The filter blend will systematically absorb the nutrients through the creation of an ionic bond with the remaining phosphors and nitrogen. Once saturated, the gabion will be removed and the nutrient rich media will be harvested for use as a locally produced high performance soil amendment, thus reducing the need for the importation and application of energy intensive fertilizers, while allowing the municipality to reach compliance with new EPA nutrient discharge parameters.

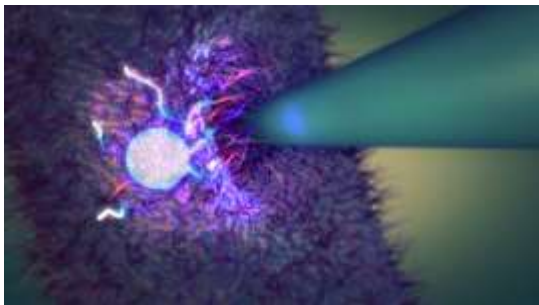
Our Technology – How it Works



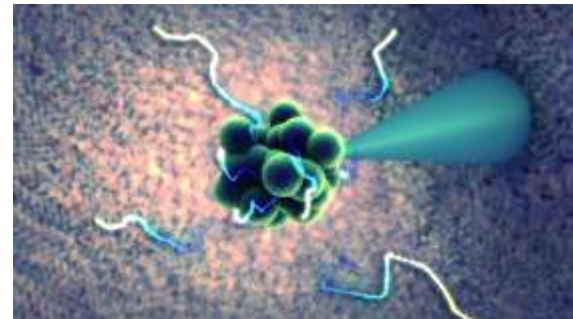
- Application onto surface triggers self formation of strongest bond in nature to surface

- As this flexible layer forms, the “sword” portion that actually kills the pathogens assembles facing outward to meet the pathogens

- This permanently attached “sword” carries a positive charge which attracts negatively charged pathogens



- The pathogen is drawn onto the “sword” which pierces the cell wall of the pathogen through lysis



- The pathogen is drawn onto the “sword” and finally electrocuted by the positive charge of the sword at the base. The pathogen physically explodes.

Sustainable Sites for Residential Applications



Residential Porous Pavement and Rain Garden Application Elmhurst, IL





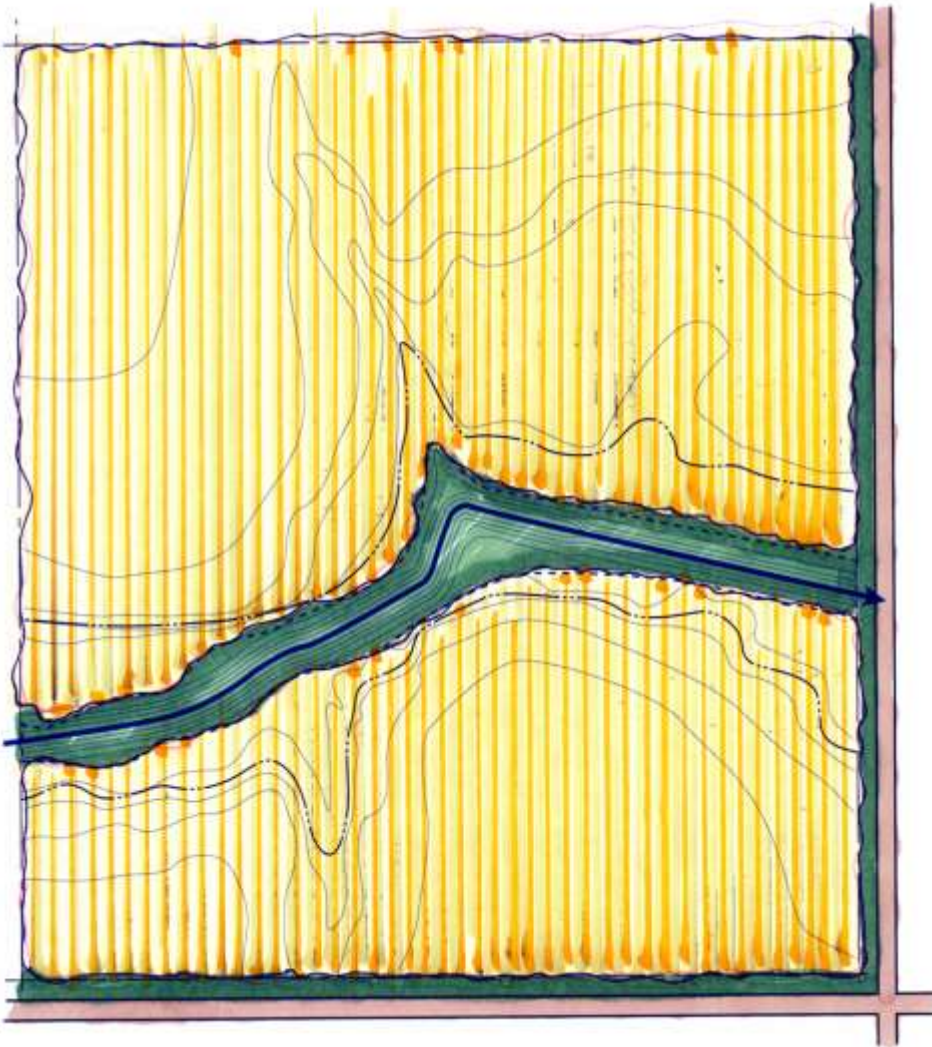


McDonalds Green Prototype

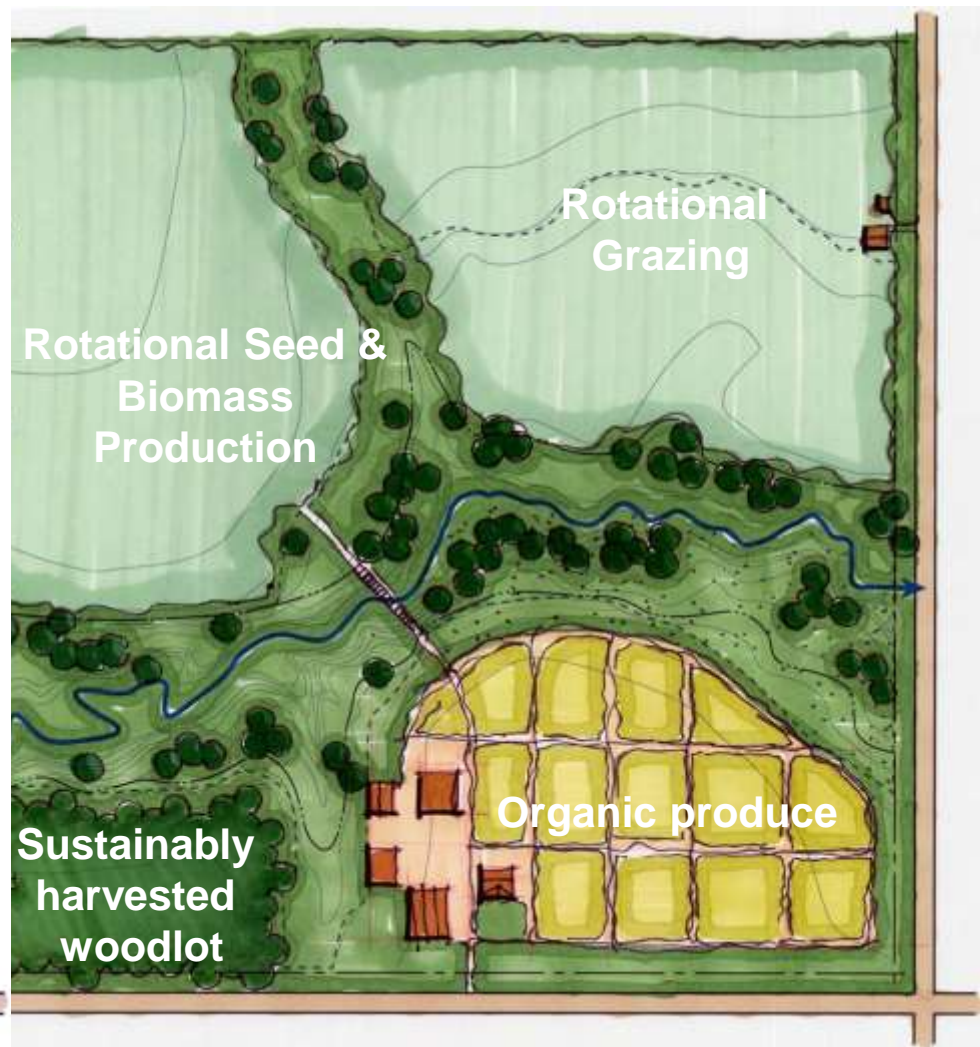
Chicago, IL



Unsustainable Row Crop Agriculture



Restorative Agriculture





CDF

20 Years of Sustainability

James Patchett

(630) 559-2025

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www.cdfinc.com