

# Urban Development

Washington D.C.

Potomac  
River

Anacostia  
River



# LID Urban Retrofit

“First Define Your Goals!”

Water Quality

Water Supply

Fisheries

Recreational Use

ESA

CSO

Flood Control

# Urban LID Lot Level Control Opportunities

- Roofs
- Buildings
- Down Spouts
- Yards
- Sidewalks
- Parking Lots
- Landscape Areas
- Open space
- Amended Soils

## *Multifunctional Infrastructure*

**Retention**

**Detention**

**Filtration**

**Infiltration**

**Timing**

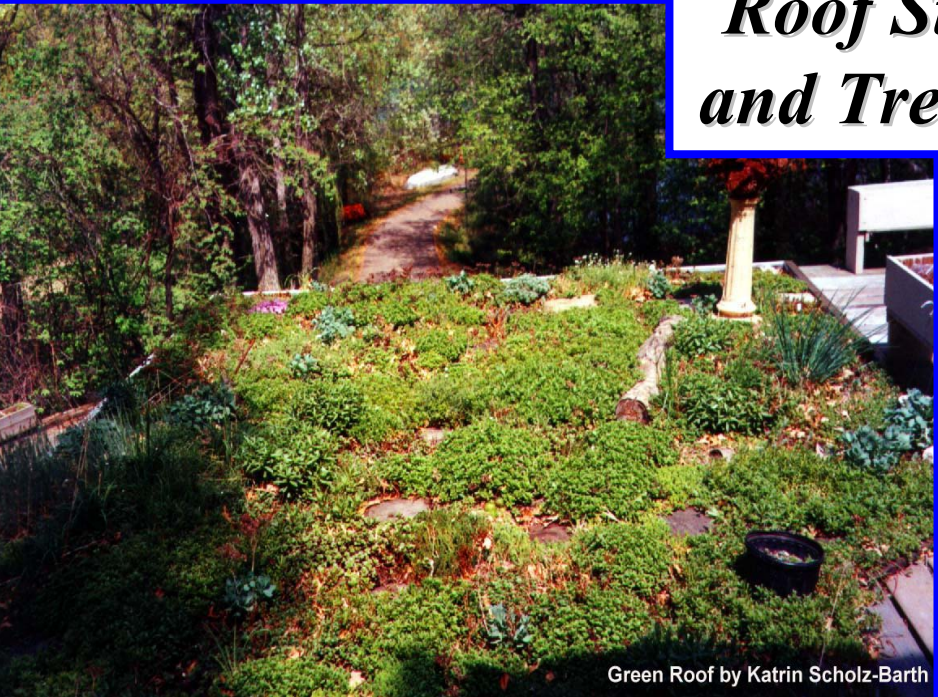
**Water Use**

**Prevention**

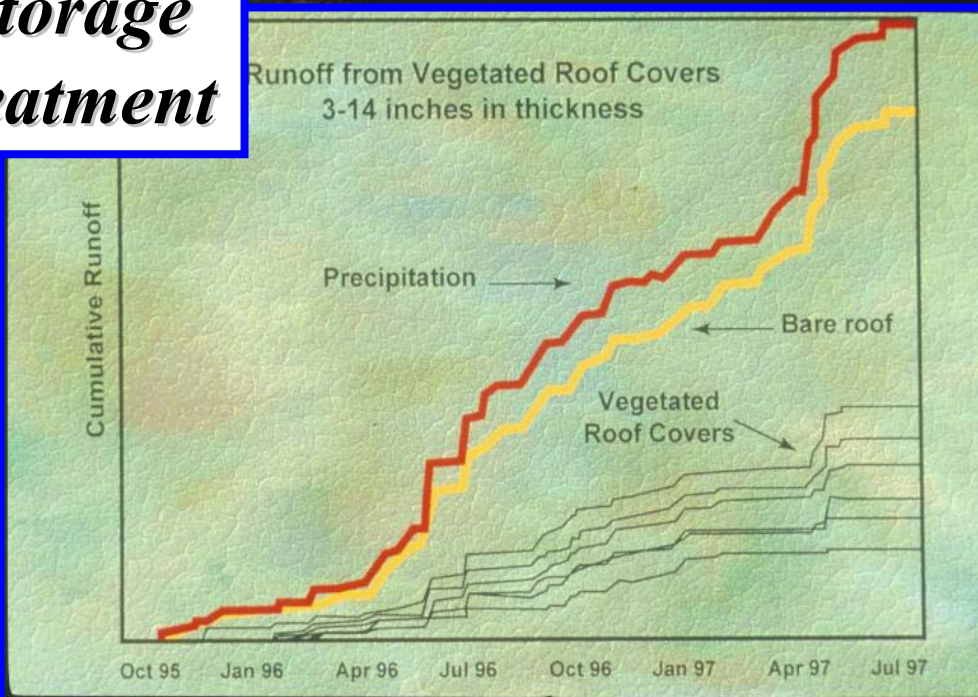




# *Roof Storage and Treatment*



Green Roof by Katrin Scholz-Barth







**MAY 29 2001**









# *Buildings Design*

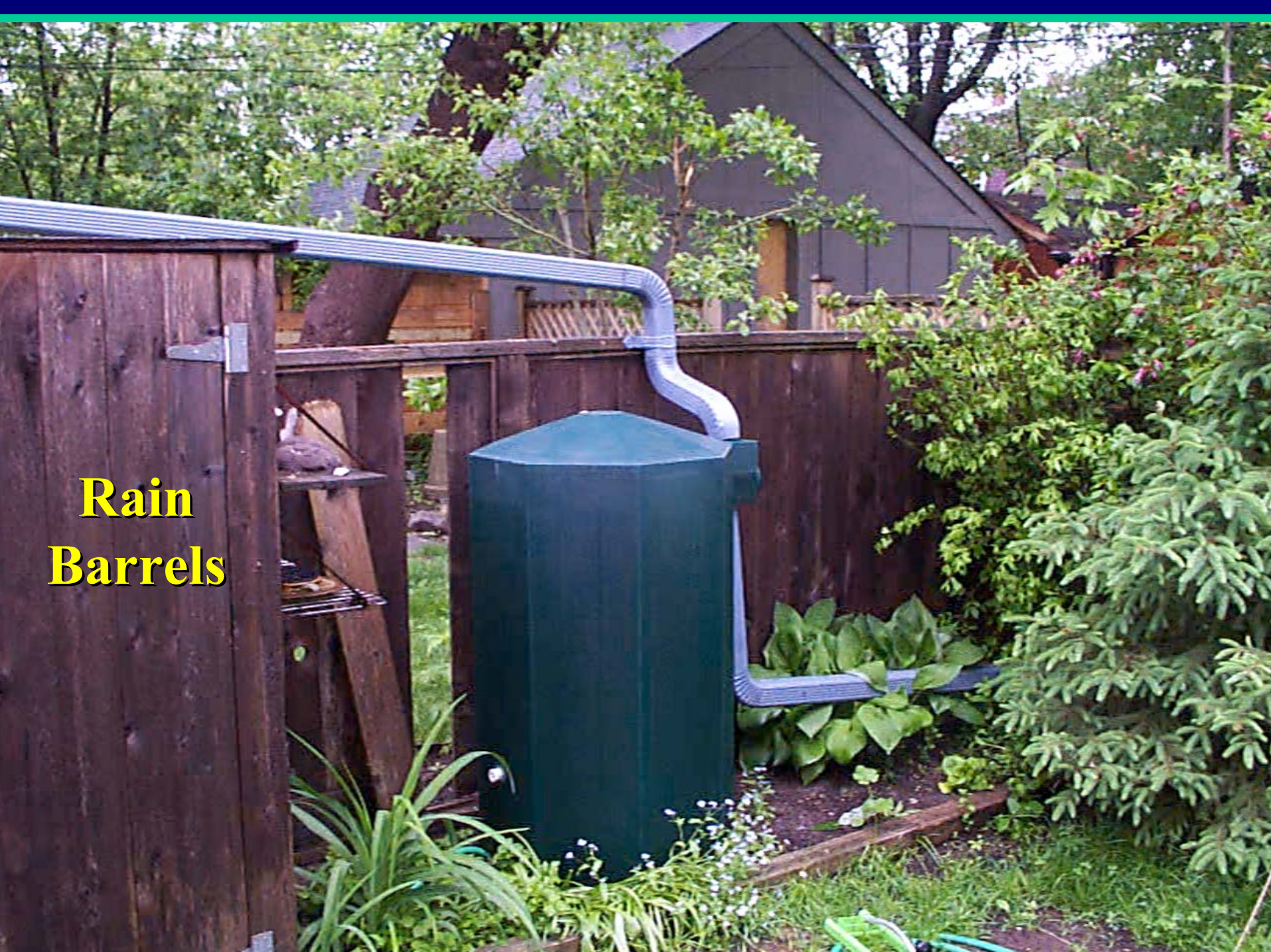


## *Downspouts Disconnect / Water Use*





# Rain Barrels





# Urban Canopy



## Multiple Benefits

- \* Reduce Stormwater Runoff
- \* Improve Air Quality
- \* Reduce Energy Consumption
- \* Reduce Urban Heat Island
- \* Carbon Storage
- \* Habitat Value





# Weep Wall Filter





NORTHWESTERN HIGH SCHOOL  
7000 ADELPHI ROAD

MYRTTETOWN, MARYLAND







**Buckman Heights courtyard with infiltration garden**



# Rain Gardens



MAY 21 2001











# Functional Landscape

“SEA” Street  
Seattle, WA



SEA Streets - After Construction  
2nd Ave NW - NW 117th St to NW 120th St





Fat Street





Skinnny Street with Fat Person





**Maximized space for filtration, recharge and landscape elements**





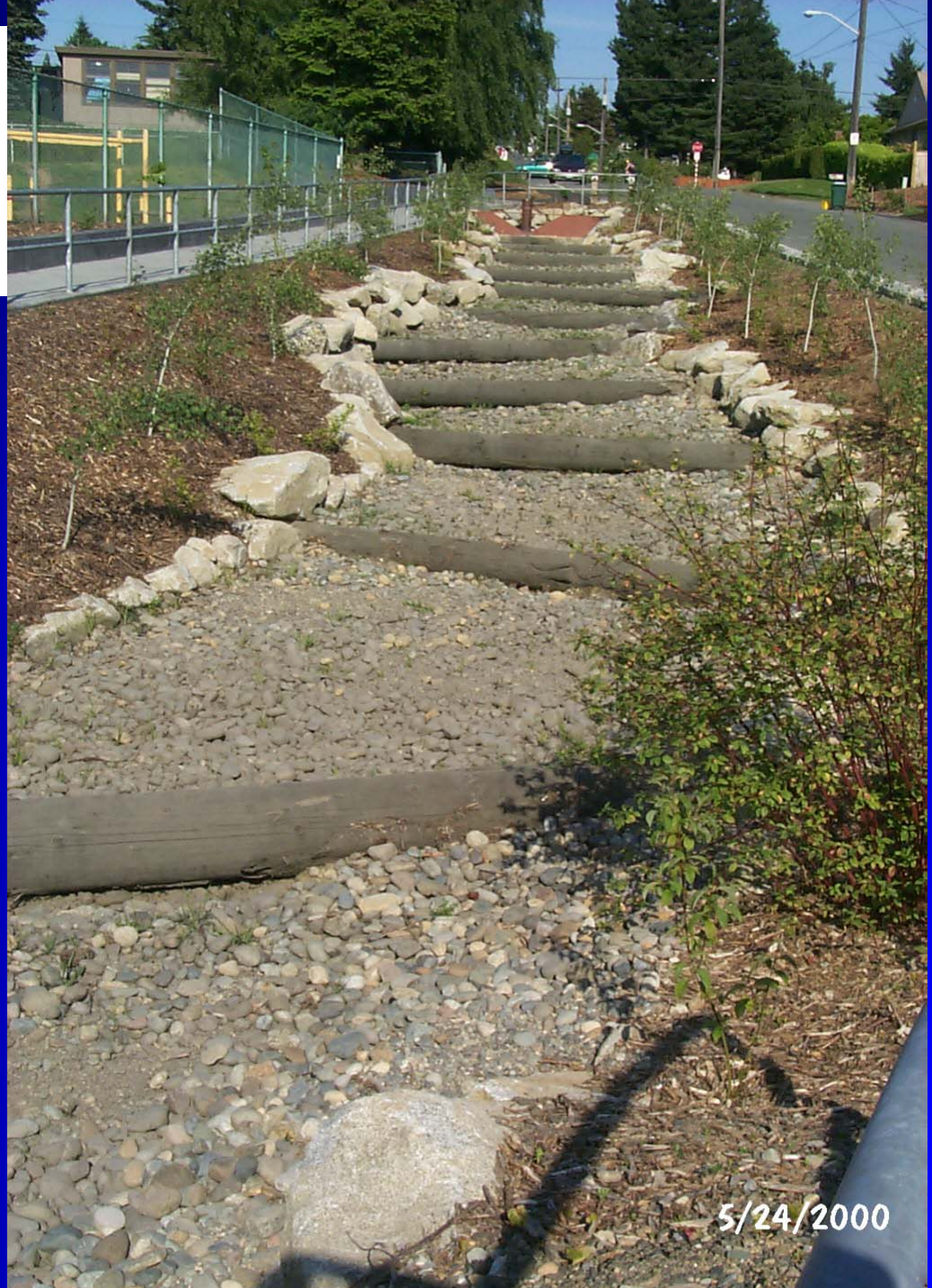






# Infiltration Cells

- Maximize surface area available
- Achieved approx. 1900 CF volume







# Infiltration and Conveyance trench

6/22/2000



# Filtering by Vegetation





# Washington DC

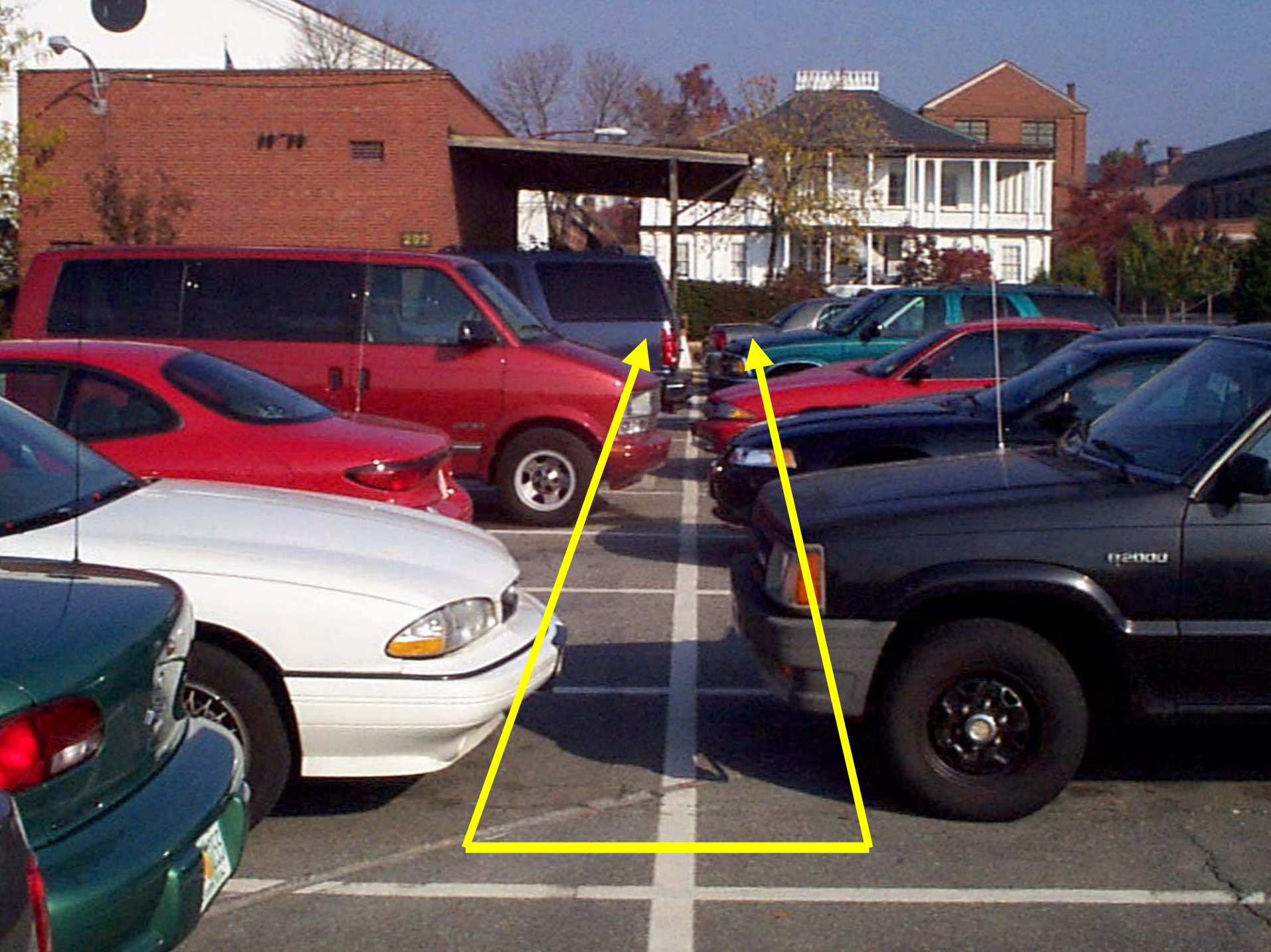
## Pilot Projects

- Willard Park Parking Area
- Power Plant Parking Lot
- Street Tree Filters
- Street Sweeping Demonstration
- Roof Leader Disconnect
- Museum Bioretention Retrofit
- Inlet Floatables Removal
- Inlet Timing Project
- Inlet Ponding Modification
- Permeable Pavers Installation



## Navy Yard LID Retrofits

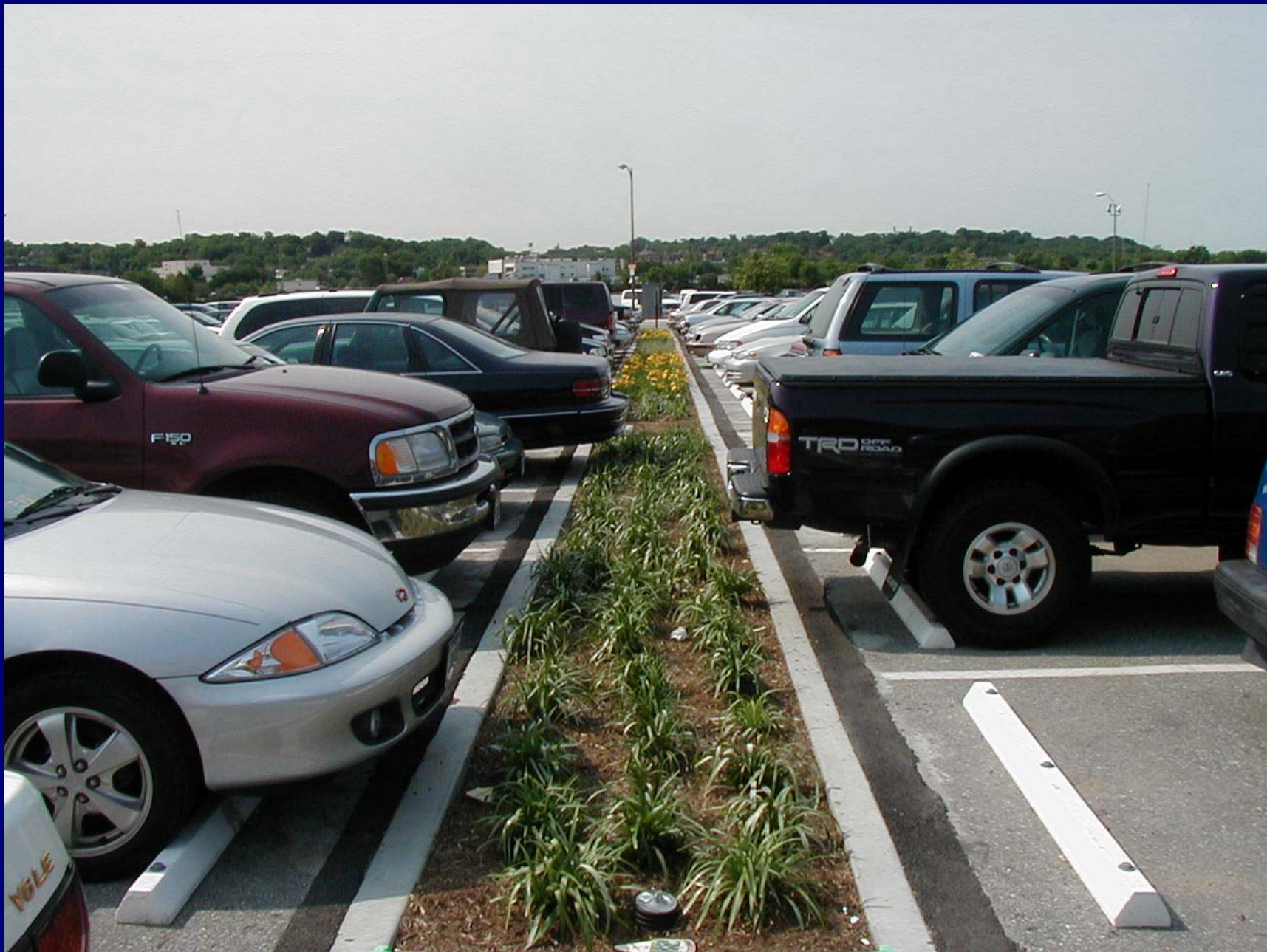
















***Building 166 Permeable Pavement***





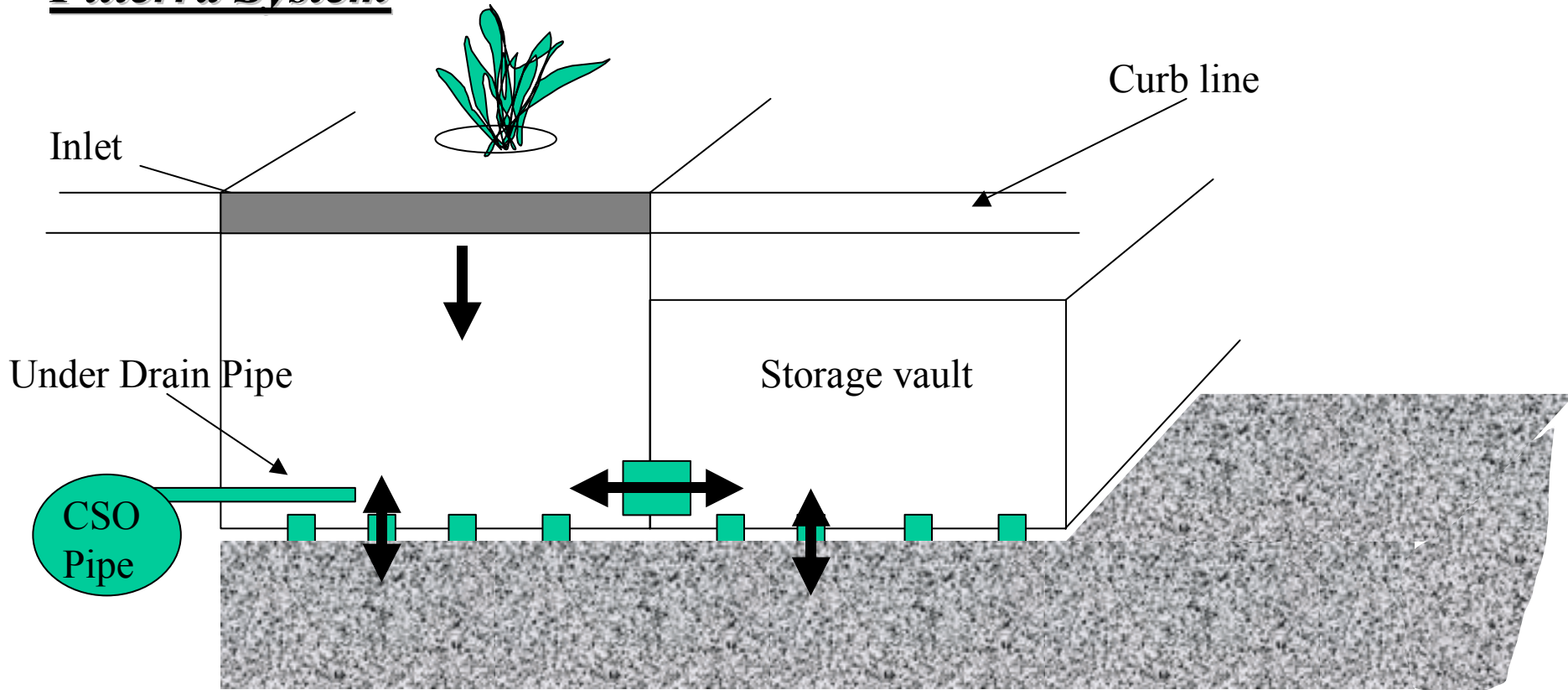
DANGER







# *Profile of Combined CSO Control Storage / Detention / Infiltration Filtrerra System*



As filtered water passes to the bottom of the box the under drain pipe constriction flows forcing water to go into the storage vault. Both the vault and the filter box have holes in the bottom to allow for infiltration. Additional infiltration / storage capacity can be obtained by placing the entire system on an extensive gravel bed. Eventually the entire system would drain via infiltration or through the under drain pipe.

















@ CherryBlossomGardens.com

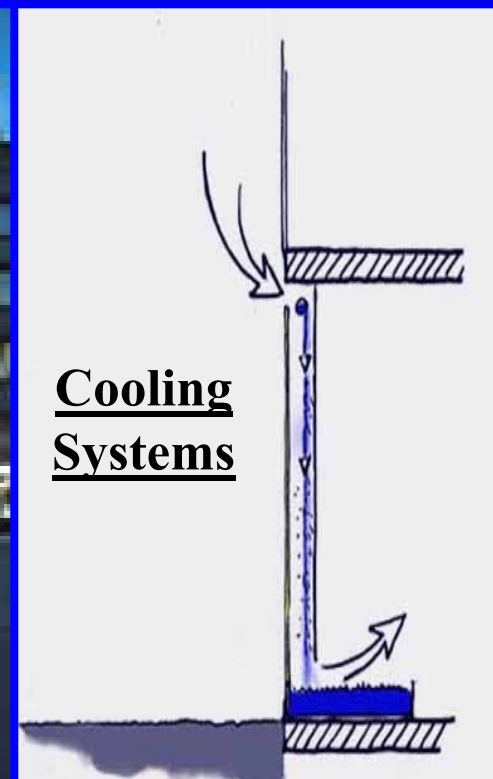










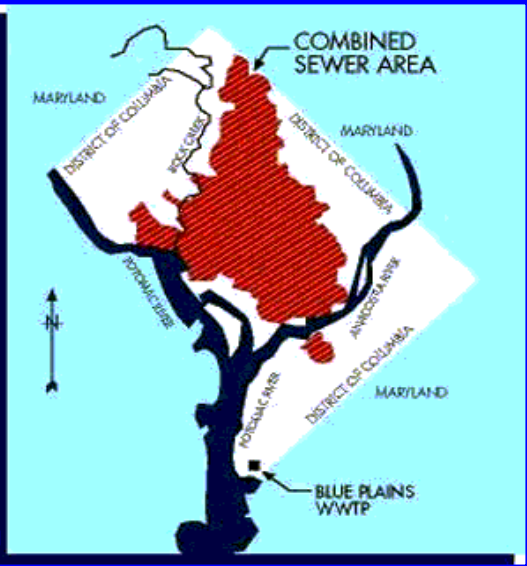


Berlin Potsdamer Platz Regenwassermanagement





# Combined Sewer Overflows



Buckman Heights courtyard with infiltration garden





# LID Implementation

## Retrofit Existing Development

- **Government by Example**
  - **Capital Improvement Program**
    - **Restoration Projects (EPA 319 Grants / Corps of Engineers)**
  - **Facility and Infrastructure Maintenance Programs**
  - **Revitalization Programs (Streetscapes)**
  - **Brownsfields**
  - **New Facility Construction**
  - **Redevelopment Codes**



# **LID Implementation**

## **Retrofit Existing Development**

- **Other Institutions (Entities with / Programs with Resources)**
  - **Environmental Groups**
  - **Business Associations**
  - **Churches**
  - **Private Property Owners**
  - **DOT**
  - **DOD**
  - **HOA's**
  - **Media**
  - **Developer Participation**
  - **Community Policing Programs**



# Alliance Members



**EPA**

**US Navy**

**DC DOH**

**MDE**

**Acad of Nat Sciences**

**ATSDR**

**Bolling AFB**

**FWS**

**GSA**

**ICPRB**

**Prince George's Co.**

**Montgomery Co.**



**NOAA**

**NPS**

**USGS**

**PEPCO**

**Wash Gas**

**DC Metro**

**Riverkeeper**

**Univ of DC**

**George Mason U**

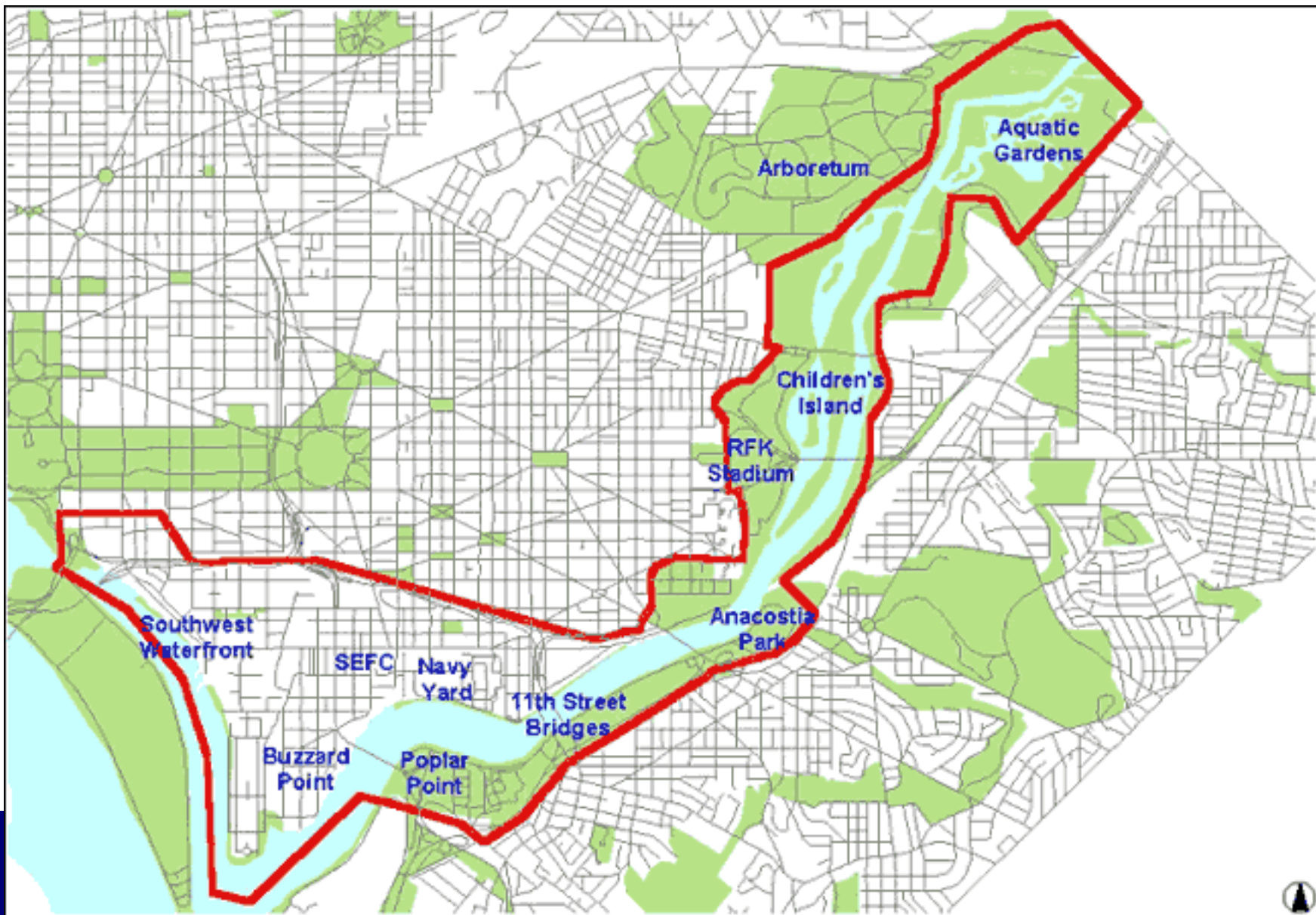
**WASA**

**Wash. COG**

**Anac Wat Society**



# Anacostia Waterfront Initiative





# INNOVATIONS IN STORM WATER QUALITY TREATMENT AND MANAGEMENT

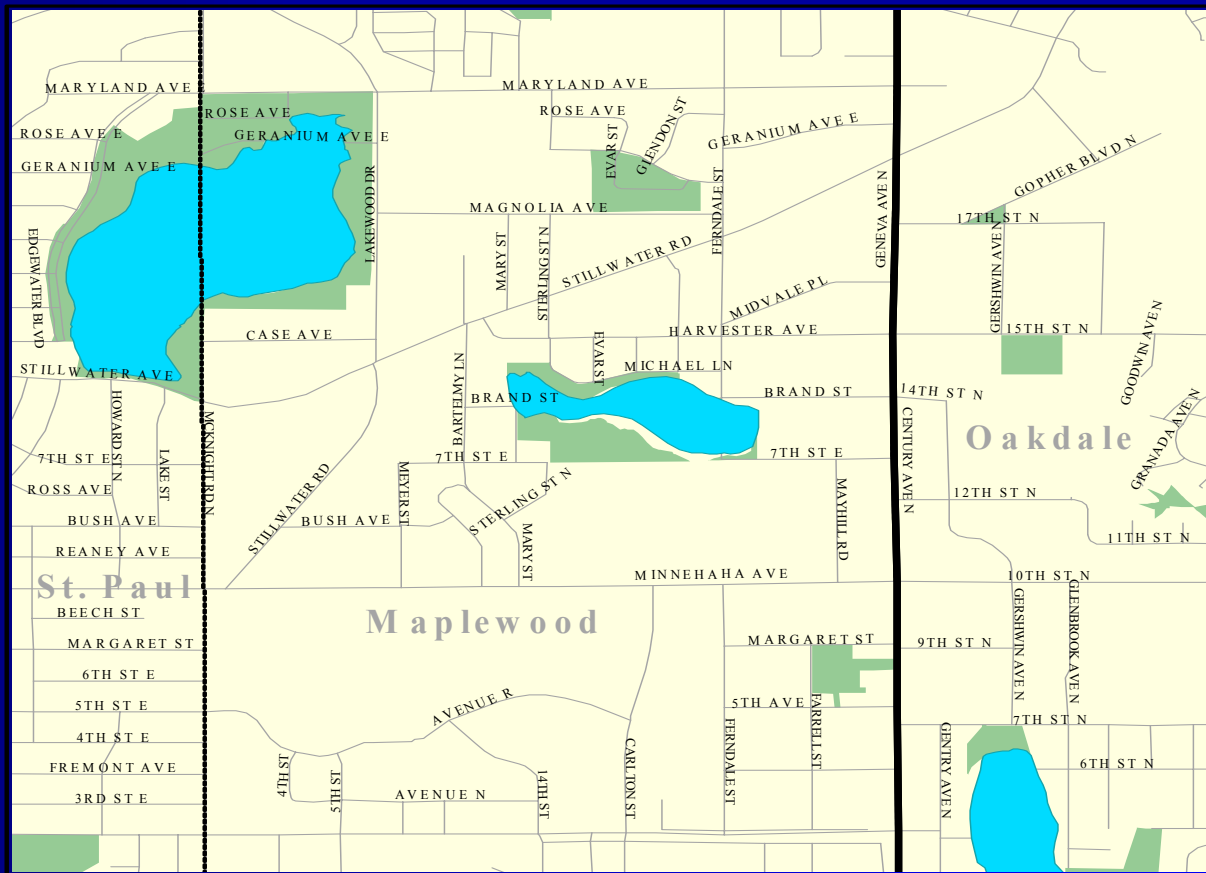
Presented by

Jack Frost - Watershed Coordinator

Metropolitan Council Environmental Services

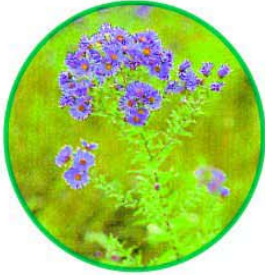


# Maplewood Century and Harvester 1999 Construction





**8** New England Aster  
(*Aster novae-Angliae*)  
Height: 4-5 Feet  
Space: 2 Feet  
Blooms: Midsummer to frost



**1** Hearts Afire Daylily  
(*Hemerocallis 'Hearts Afire'*)  
Height: 30 inches  
Space: 24 inches  
Blooms: June - July



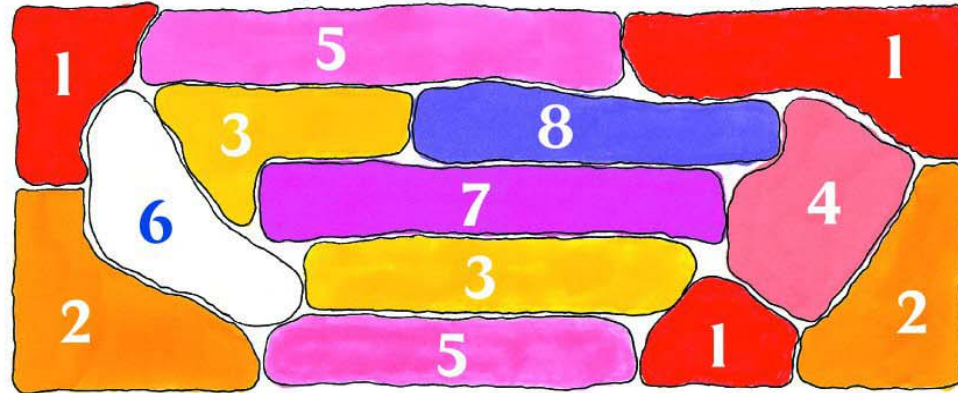
**2** Happy Returns Daylily  
(*Hemerocallis 'Happy Returns'*)  
Height: 18 inches  
Space: 12 inches  
Blooms: June to frost



**3** Oxeye Sunflower  
(*Heliopsis helianthoides*)  
Height: 3-5 feet  
Space: 30 inches  
Blooms: All Summer



## An Easy Daylily Garden Layout



**7** Marsh Milkweed  
(*Asclepias incarnata*)  
Height: 3-5 Feet  
Space: 1 foot  
Blooms: June through August



**4** Catherine Woodbury Daylily  
(*Hemerocallis 'Catherine Woodbury'*)  
Height: 33 inches  
Space: 24 inches  
Blooms: June - August



**6** Gentle Shepherd Daylily  
(*Hemerocallis 'Gentle Shepherd'*)  
Height: 28 inches  
Space: 24 inches  
Blooms: June - July



**5** Autumn Joy Sedum  
(*Sedum X 'Autumn Joy'*)  
Height: 18-24 inches  
Space: 18 inches  
Blooms: Late summer to frost







**1** Blue Flag Iris  
(Iris versicolor)  
Height: 2 feet  
Space: 1 foot  
Blooms: May - June



**2** Yarrow  
(Achillea millefolium)  
Height: 1-2 feet  
Space: 1 foot  
Blooms: May to frost



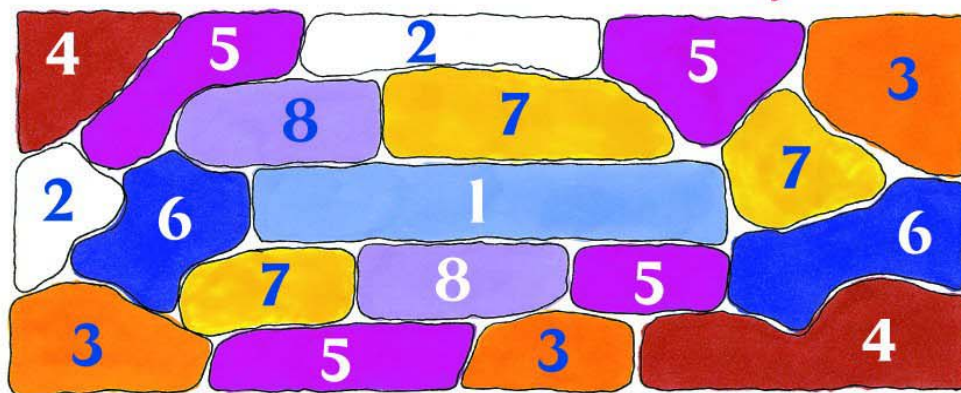
**3** Black-Eyed Susan  
(Rudbeckia hirta)  
Height: 1-2 feet  
Space: 1 foot  
Blooms: May to frost



**8** New England Aster  
(Aster novae-Angliae)  
Height: 4-5 feet  
Space: 2 feet  
Blooms: Midsummer to frost



## Minnesota Prairie Garden Layout



**4** Little Bluestem  
(Schizachyrium scoparium)  
Height: 2-4 feet  
Space: 18 inches  
Blooms: May to frost

**Bonestroo  
Rosene  
Anderlik &  
Associates**  
Engineers & Architects  
Garden & Brochure Design



**7** Oxeye Sunflower  
(Heliopsis helianthoides)  
Height: 3-5 feet  
Space: 30 inches  
Blooms: All Summer



**6** Blue Vervain  
(Verbena hastata)  
Height: 3 feet  
Space: 2 feet  
Blooms: June to frost



**5** Purple Coneflower  
(Echinacea purpurea)  
Height: 3 feet  
Space: 2 feet  
Blooms: June to frost

  
**MAPLEWOOD**  
Together We Can







**1** Compact American Cranberrybush  
(*Viburnum trilobum* 'Bailey Compact')  
Height: 4-5'  
Space: 4' o. c.  
Blooms: White flowers in May.  
Deep red fall foliage. Red berries into winter.  
Blooms: May



viburnum trilobum fruit



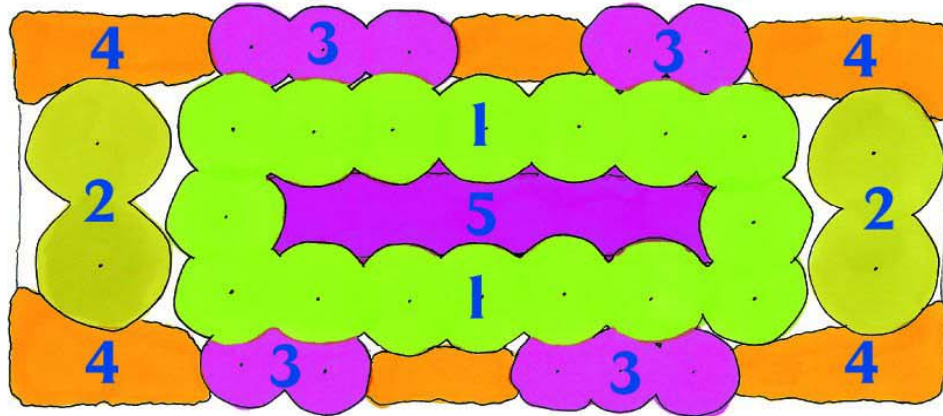
viburnum trilobum flowers



viburnum trilobum fall color

## The Easy Shrub Garden Layout

**5** Marsh Milkweed  
(*Asclepias incarnata*)  
Height: 3-5 feet  
Space: 1 foot  
Blooms: June through August



**2** Annabelle Hydrangea  
(*Hydrangea arborescens* 'Annabelle')  
Height: 4-5'  
Space: 4' o. c.  
Blooms: white flowers  
June - July



**4** Stella de Oro Daylily  
(*Hemerocallis* 'Stella de Oro')  
Height: 15 inches  
Space: 15 inches  
Blooms: May to Frost



**3** Anthony Waterer Spirea  
(*Spirea x bumalda* 'Anthony Waterer')  
Height: 2-3'  
Space: 3' o. c.  
Blooms: June - July rose-pink flowers  
Red leaves in fall











**10** Stella de Oro Daylily  
(*Hemerocallis 'Stella de Oro'*)  
Height: 15 inches  
Space: 15 inches  
Blooms: May to frost



**9** New England Aster  
(*Aster novae-angliae*)  
Height: 4-5 feet  
Space: 2 feet  
Blooms: Midsummer to frost

**1** Butterfly Milkweed  
(*Asclepias tuberosa*)  
Height: 1-2 feet  
Space: 1 foot  
Blooms: May - June



**2** Moonshine Yarrow  
(*Archillea filipendula 'Moonshine'*)  
Height: 2-3 feet  
Space: 18 inches  
Blooms: June to frost



**3** Black-Eyed Susan  
(*Rudbeckia hirta*)  
Height: 1-2 feet  
Space: 1 foot  
Blooms: May to frost

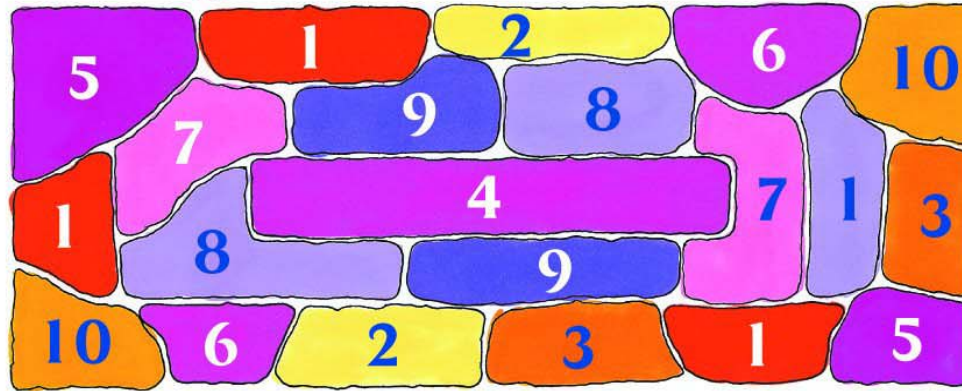


**MAPLEWOOD**  
Together We Can

**4** Marsh Milkweed  
(*Asclepias incarnata*)  
Height: 3-5 feet  
Space: 1 foot  
Blooms: June through August



## Butterflies and Friends Garden Layout



**8** Bee Balm; Bergamot  
(*Monarda fistula*)  
Height: 2-3 feet  
Space: 18 inches  
Blooms: late May to fall



**7** Joe Pye  
(*Eupatorium maculatum*)  
Height: 4-5 feet  
Space: 2 feet  
Blooms: June - frost



**6** Blazing Star  
(*Liatris spicata*)  
Height: 2-3 feet  
Space: 18 inches  
Blooms: June to frost



**5** Fire King Yarrow  
(*Achillea millefolium 'Fire King'*)  
Height: 1-2 feet  
Space: 1 foot  
Blooms: May to frost



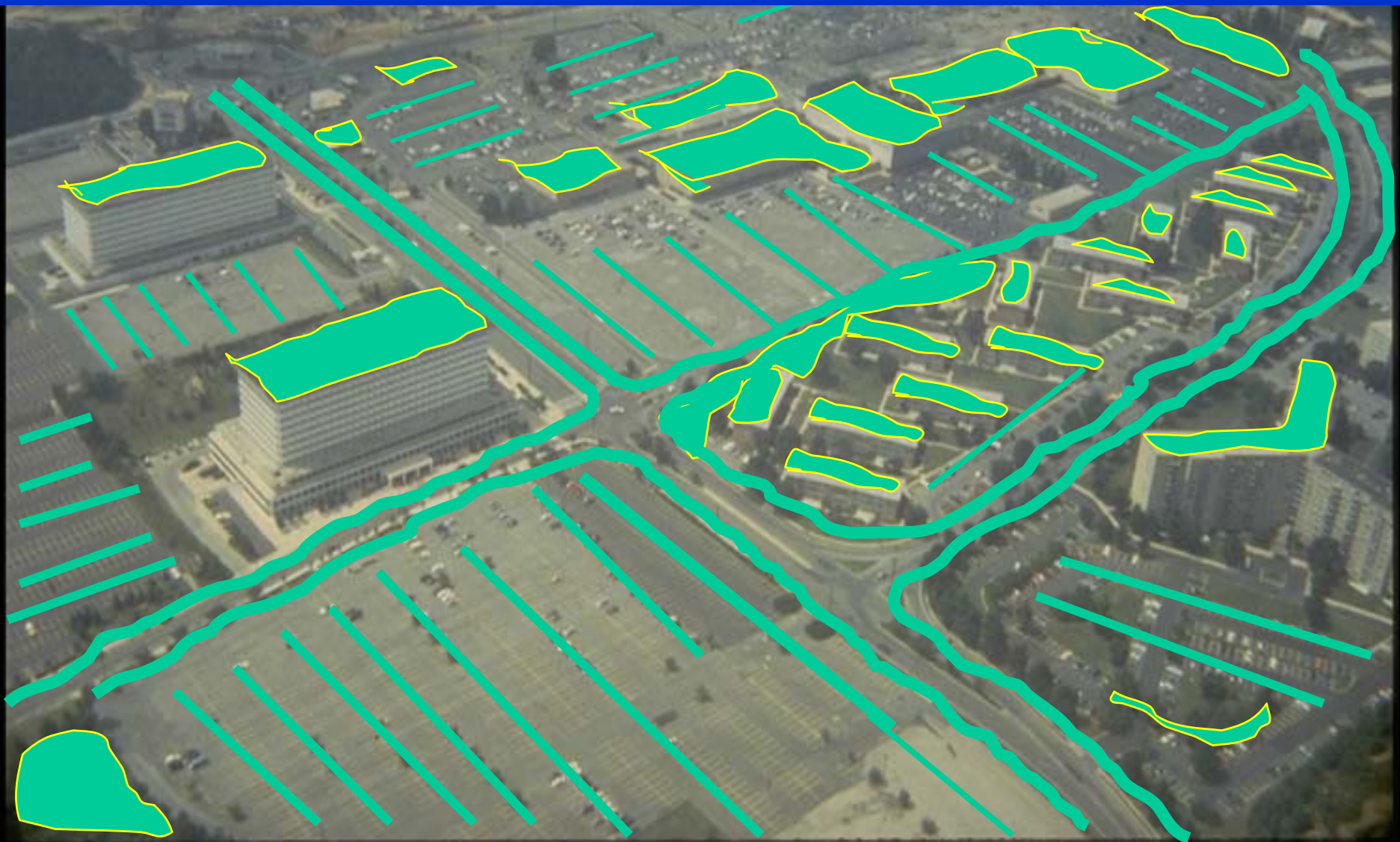








**Urban LID -- Rooftop Storage, Bioretention Landscaping, Parking Lot Storage, Longer Flow Paths, Swales, Water Use, Pollution Prevention .....**





# *Runoff Use*



EMERGENCY  
VEHICLES  
ONLY

▲ Daily Parking  
Continental  
Holiday  
Northwest  
Park  
←  
Rental Car Return  
1233

# Possibilities & Opportunities