

An aerial photograph of a city coastline, likely Chicago, showing a dense grid of streets and a large body of water (Lake Michigan) to the right. The image is used as a background for the text.

# Pervious Pavement and Pavers in a Municipal Environment

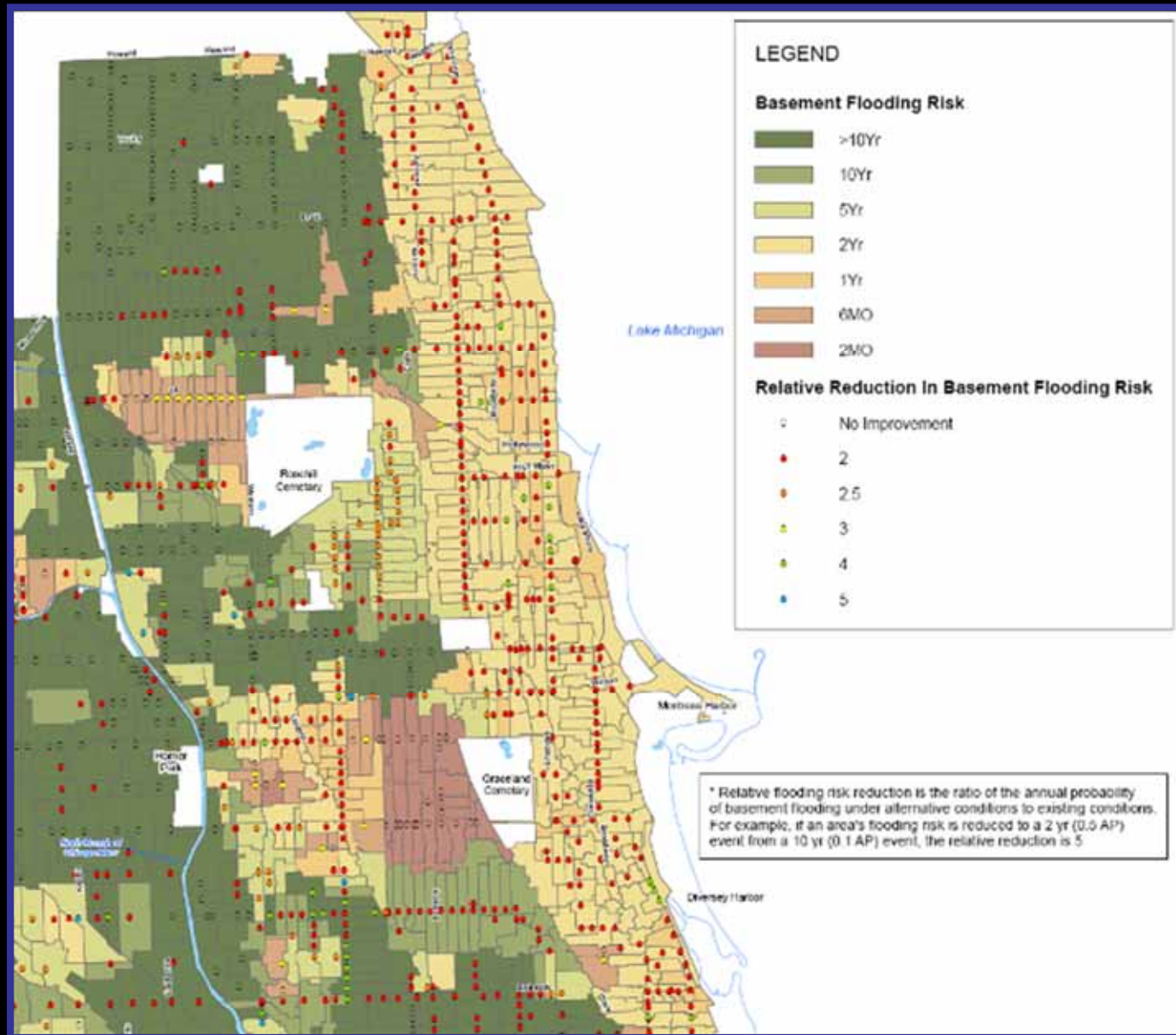
## Municipal Water Star Webinar

City of Chicago  
Rahm Emanuel  
Mayor

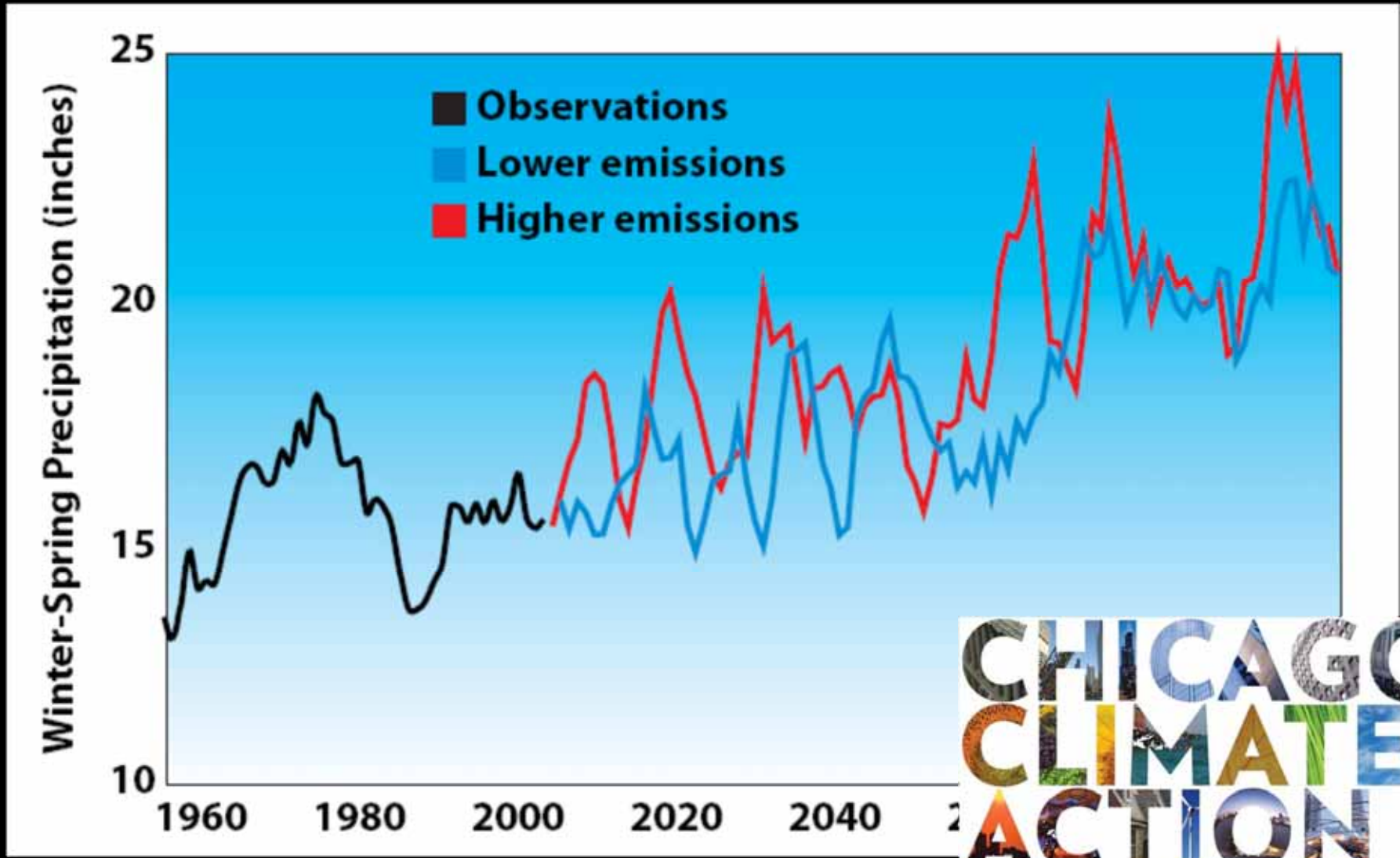
Janet L. Attarian, AIA, LEED AP | Project Director  
Streetscape and Sustainable Design Program  
Chicago Department of Transportation

# Combined Sewer System and Basement Flooding

Risk Reduction - 25% Removal of Impervious Area



# Chicago Climate Action Plan: Adaptation and Mitigation



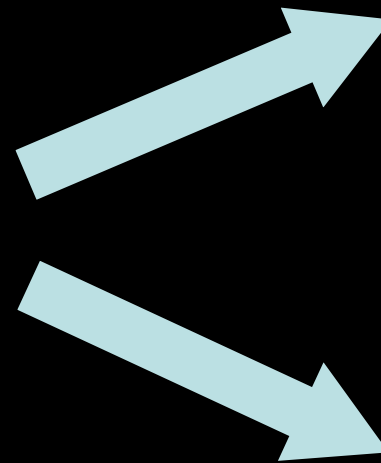
Source: CCAP

# Leadership: Chicago Climate Action Plan

Over 215,000 sq. ft. as of late 2010



Permeable Pavement



Adaptation  
(Infiltration)

Mitigation  
(Energy use)

# Green Alley Program



- Six pilot locations, and over 150 locations citywide
- Program includes use of permeable pavements, recycled materials, high-albedo pavements, and dark-sky lighting.
- Improves stormwater management and energy use through infrastructure improvements



# Green Alley Program

## Development of Permeable Asphalt and Concrete:

- Best Practices
- Material Testing
- Trial Batches
- Recycled Content- Slag/GTR

## The Ground Tire Rubber Solution:

- Approx 600 tires recycled per alley
- Solved cohesion problem



# Lessons Learned

#1: Permeable pavement requires maintenance

#2: Maintenance occurs during design as well as post-construction

# Lessons Learned: Design

- Ratio of permeable to impermeable



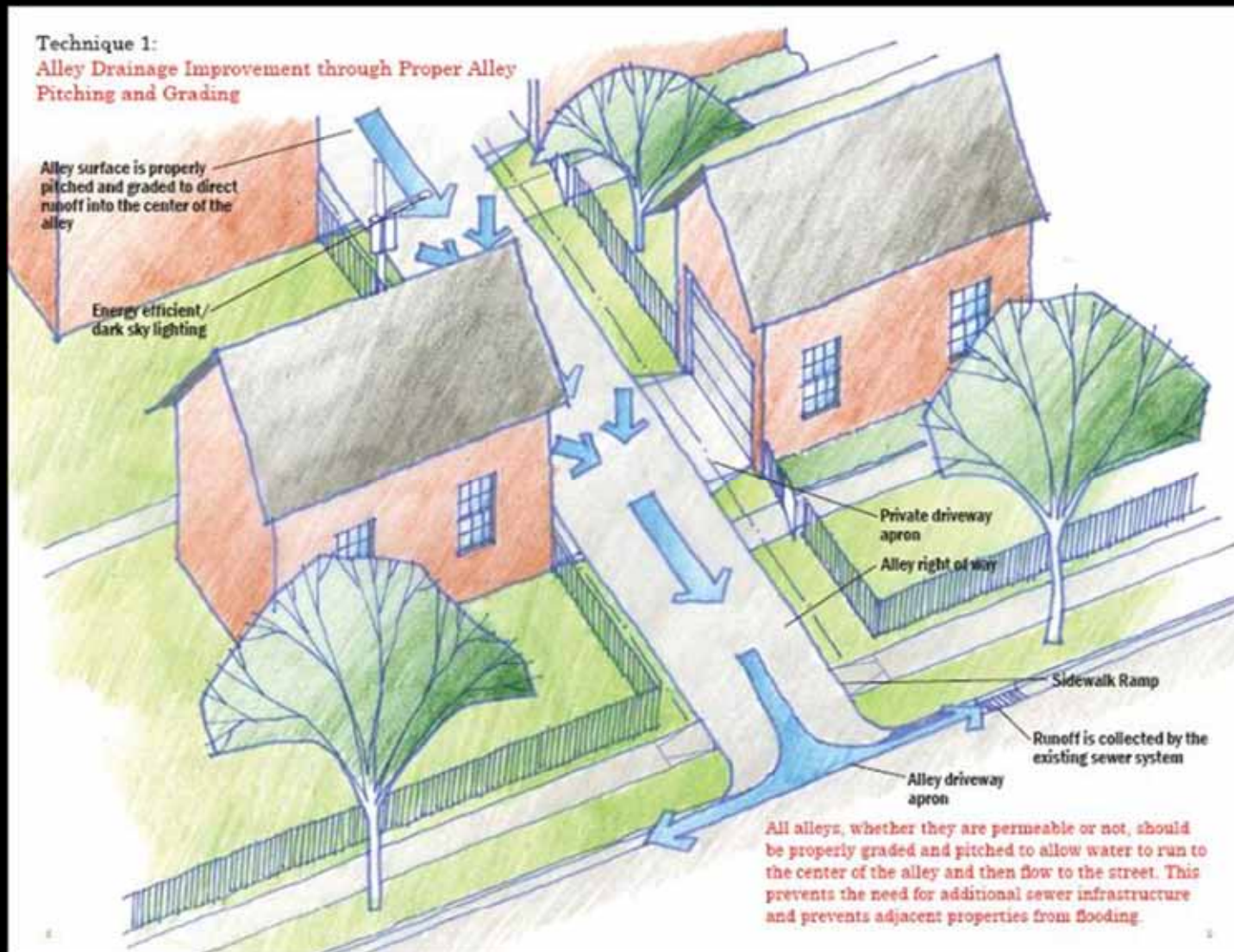
Center Trench  
Design



Full Width Design

# Lessons Learned: Design

- Ensure overflow for surface runoff



# Lessons Learned: Post-Construction Green Alleys



Eagle



Power  
Washing



Tymco



Pelican



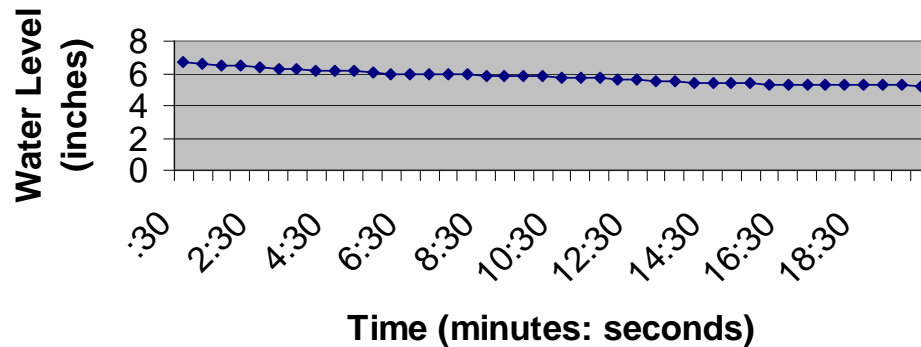
Johnston



Little  
Wonder

# Green Alley Maintenance Monitoring

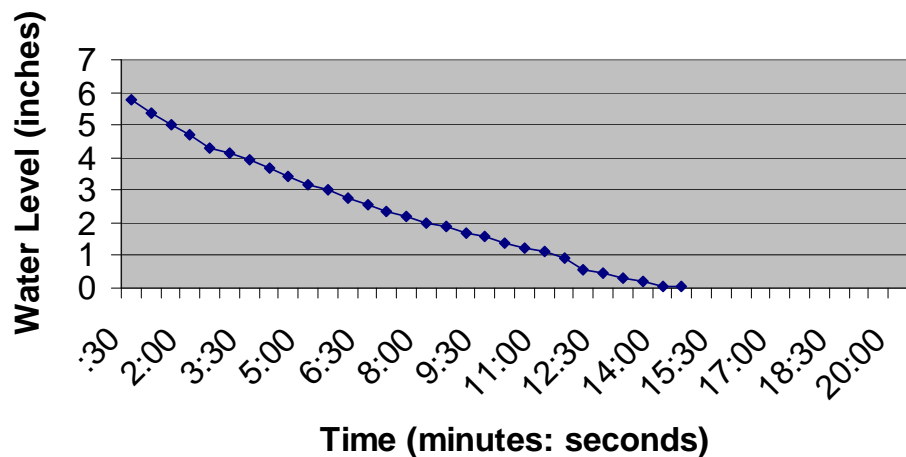
**Before Cleaning:  
Glenwood North Leg**



**23%  
Improvement**



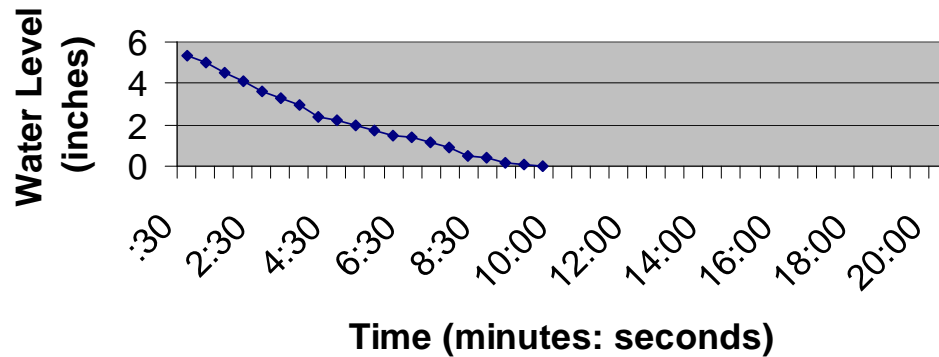
**After Cleaning:  
Glenwood North Leg**



- Pavement Cores
- Infiltration Testing of Pavement and Subbase

# Green Alley Maintenance Monitoring

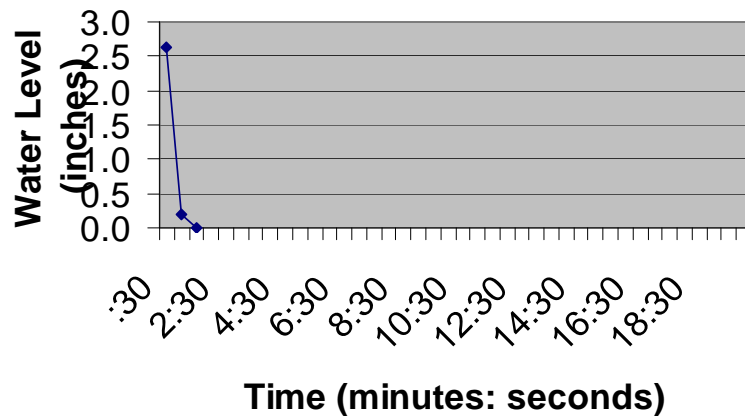
**Before Cleaning:  
Catalpa "New" Section**



**89%  
Improvement**



**After Cleaning:  
Catalpa "New" Section**



- Pavement Cores
- Infiltration Testing of Pavement and Subbase

# Green Alley Maintenance Protocol

## Chicago Green Alley Sweeping Procedures



1- Identify Alley by Green Alley Stamp in Apron



2- No Spray



3- Low Speed



4- Double Pass with Brushes Positioned over Permeable Pavement

## Chicago Green Alley Design Types



Permeable Concrete Center Trench in Concrete or Asphalt Alley



Full Width Permeable Concrete, Asphalt, or Brick Paver Alley



# Wider Implementation



Ward Yard



Sidewalk Parkways



Pocket Parks



Residential Parking Lanes

# Wider Implementation



Pedestrian Way



Market Plaza



Diagonal Parking



Parking/Bike Lanes

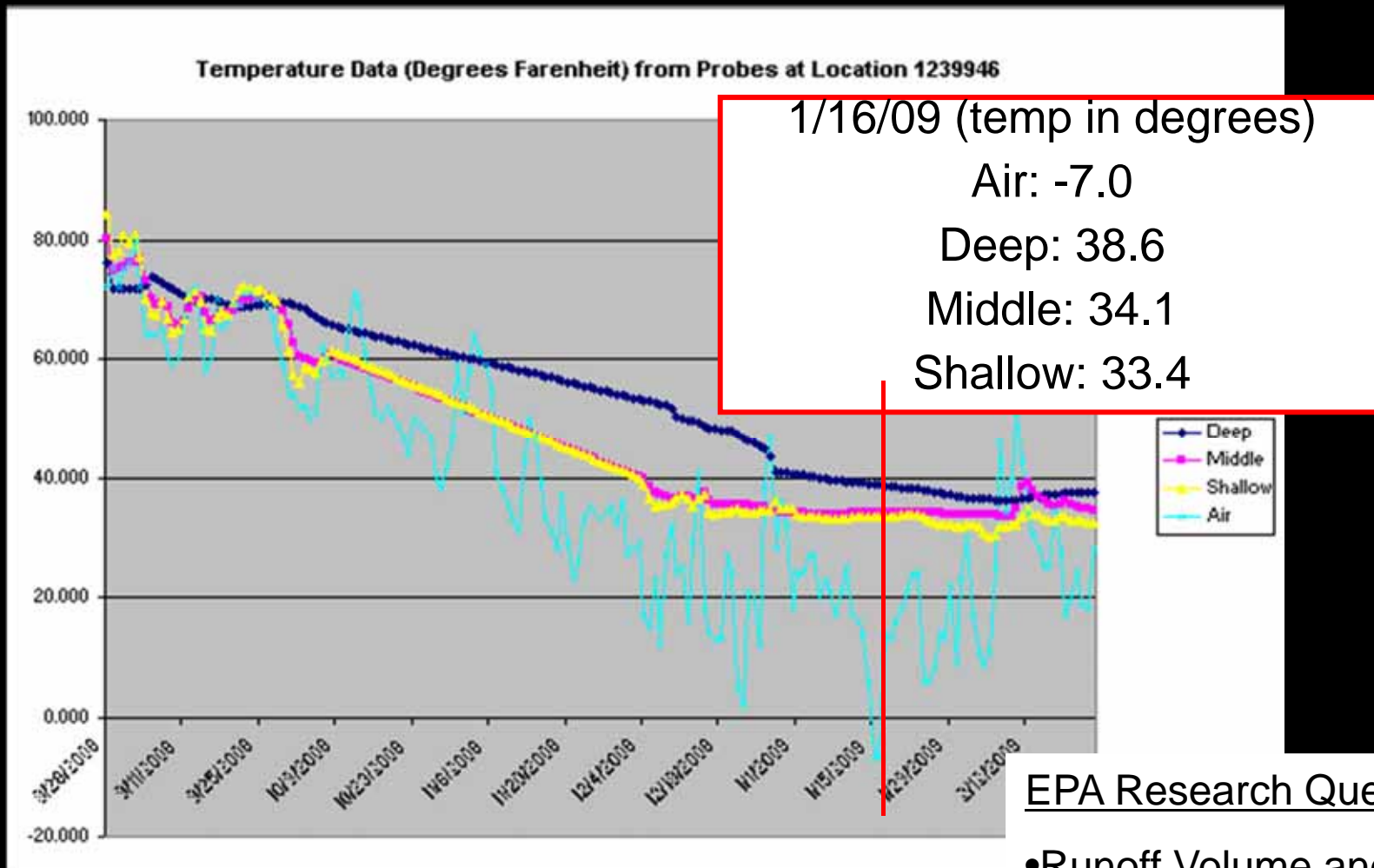
# Maxwell Street Permeable Market Plaza



- .89 acres of permeable, high albedo pavers

- Pavers have initial SRI of .30 or 32%

# Market Plaza: Preliminary Monitoring Results

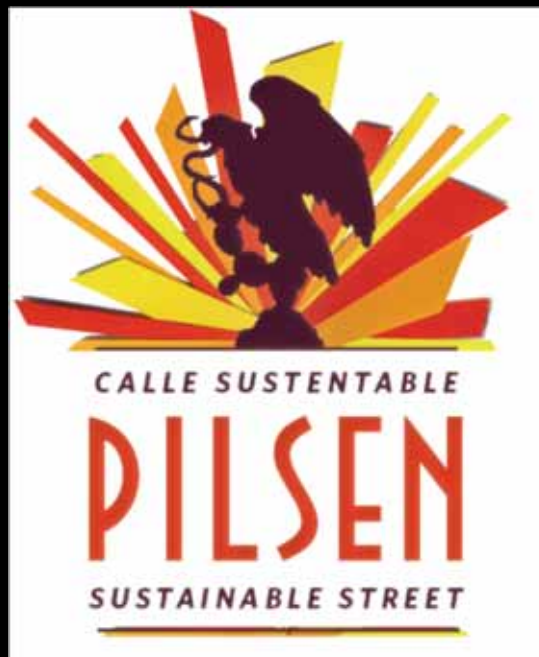


Sept 2008- Feb 2009

## EPA Research Questions

- Runoff Volume and Rate
- Surface Water Quality
- Ground Water Quality
- Freeze/Thaw Performance

# The Cermak / Blue Island Streetscape



# Cermak/Blue Island Sustainable Streetscape

## Project Sustainable Goals

### *Stormwater Management*

Divert 80% of the typical average annual rainfall and at least 2/3 of rainwater falling within catchment area into stormwater best management practices.

### *Water Efficiency*

Eliminate use of potable water for irrigation, specify native or climate adapted, drought tolerant plants for all landscape material.

### *Transportation*

Improve bus stops with signage, shelters and lighting where possible, promote cycling with new bike lanes, improve pedestrian mobility with accessible sidewalks.

### *Energy Efficiency*

Reduce energy use by min. 40% below a typical streetscape baseline, use reflective surfaces on roads/sidewalks, use dark sky-friendly fixtures. Min. 40% of total materials will be extracted, harvested, recovered, and/or manufactured within 500 miles of the project site.

### *Recycling*

Recycle at least 90% of construction waste based on LEED NC criteria, Post/Pre- Consumer recycled content must be min. 10% of total materials value.

### *Urban Heat Island, Air Quality*

Reduce ambient summer temperatures on streets and sidewalks through use of high albedo pavements, roadway coatings, landscaping, and permeable pavements. Require ultra low sulfur diesel and anti-idling.

### *Education, Beauty & Community*

Provide public outreach materials/self-guided tour brochure to highlight innovative, sustainable design features of streetscape. Create places that celebrate community, provide gathering space, allow for interaction and observation of people and the natural world.

### *Commissioning*

Model Stormwater BMP's in Infoworks to analyze and refine design. Monitor stormwater BMP's to ensure predicted performance and determine maintenance practices.

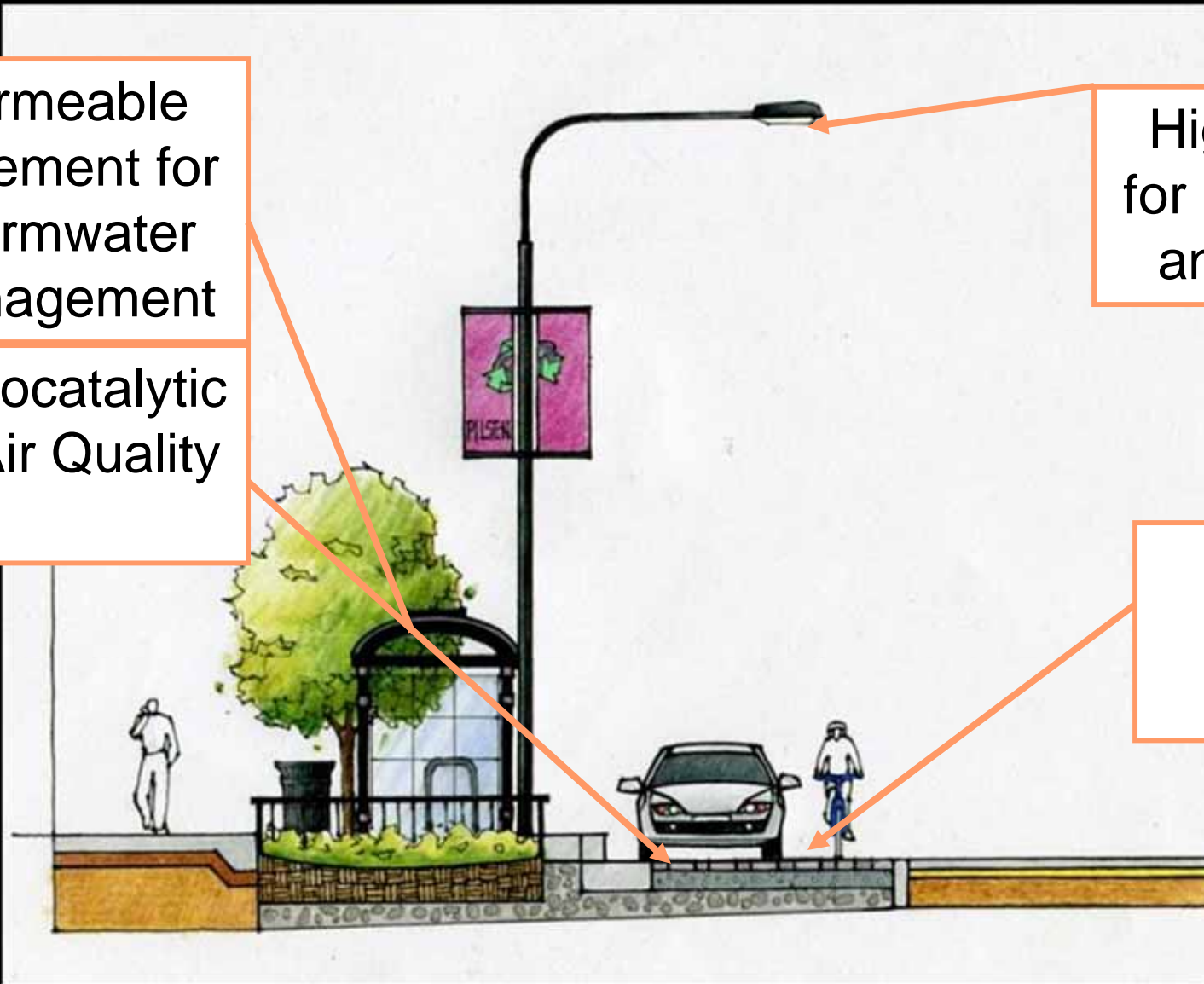
# Integrated Infrastructure Design Example: Blue Island Cross-section

Permeable  
Pavement for  
Stormwater  
Management

Photocatalytic  
for Air Quality

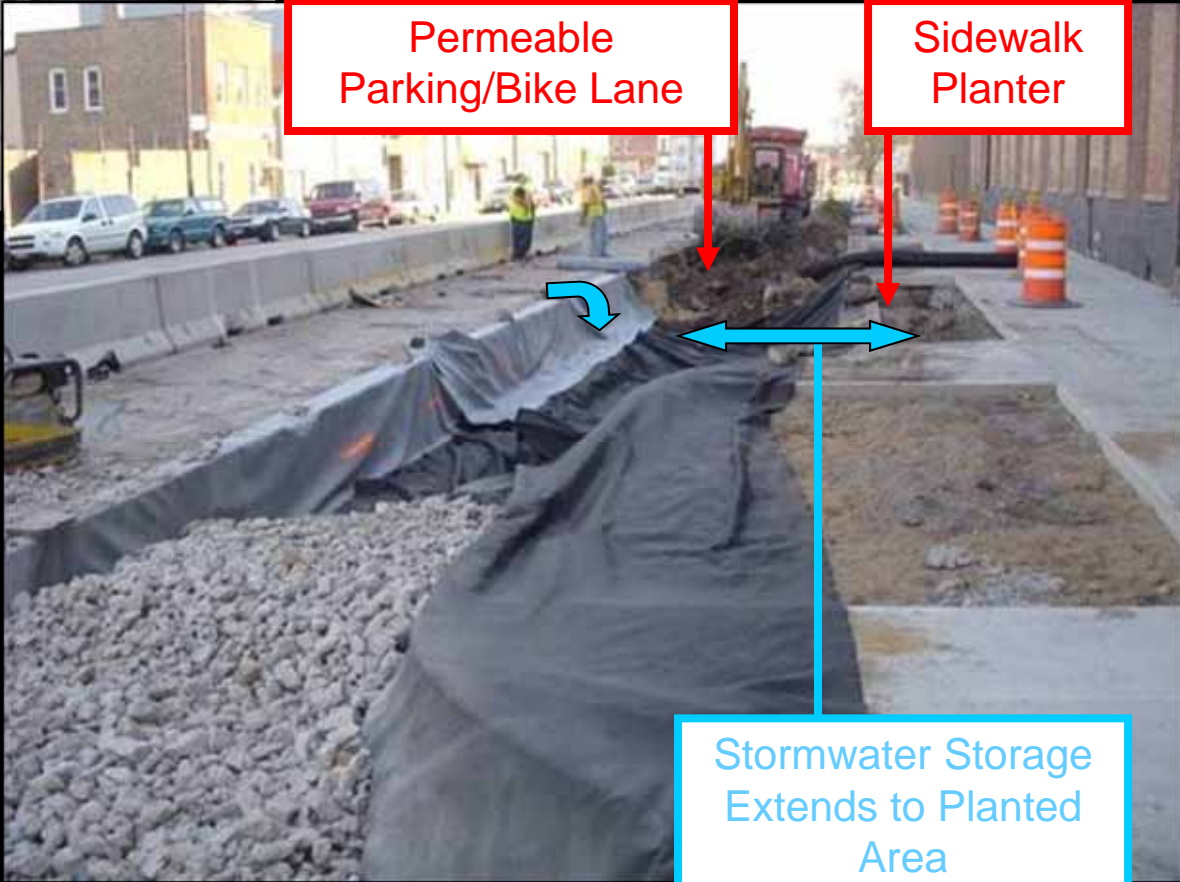
High SRI  
for Lighting  
and UHI

Bike/  
Parking  
Lane



# Blue Island Details

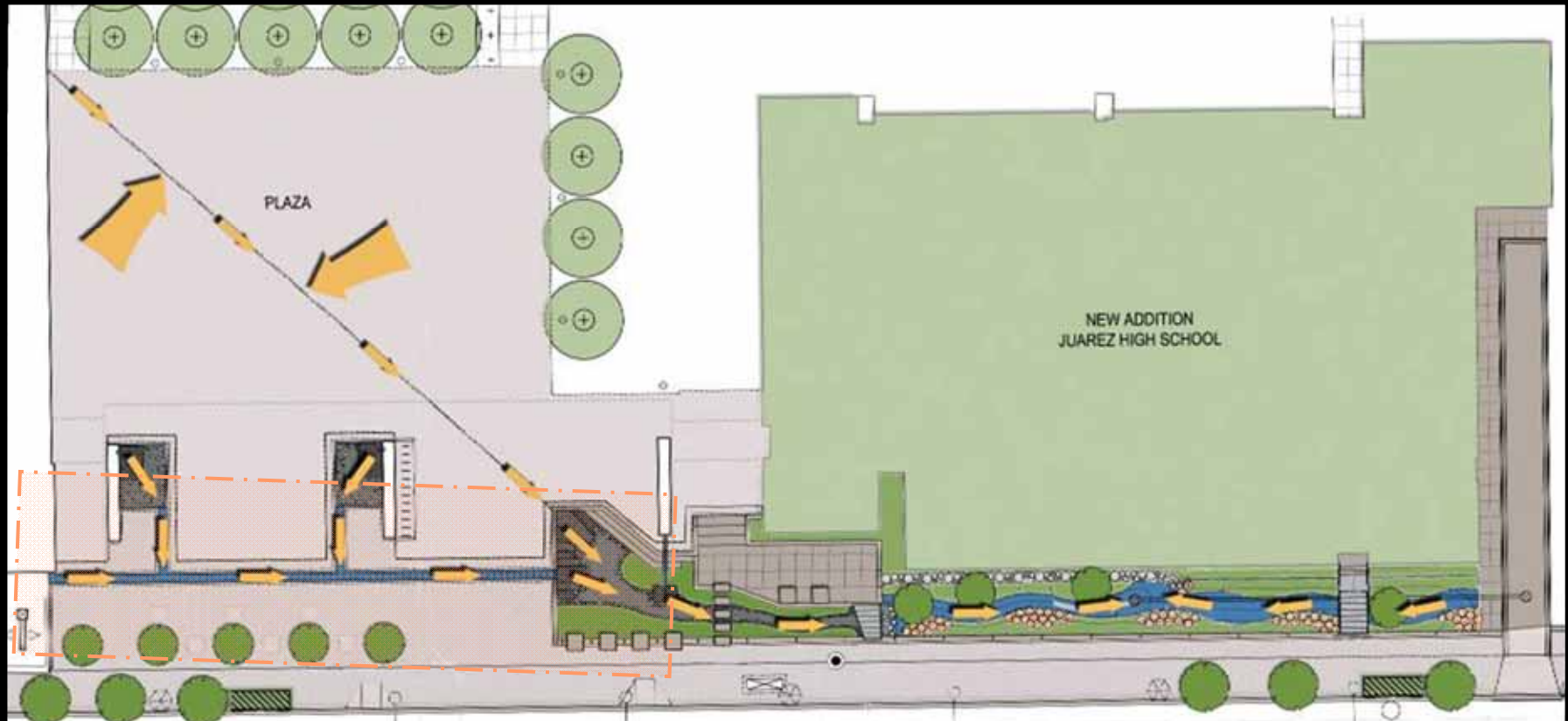
- Permeable, photocatalytic, high albedo pavers
- Infiltrating planters
- Belt and suspenders
- Landscape survival



1/2 Inch  
Paver  
Facemix



# Juarez Community Academy Water Feature



# Water Feature Details



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