

An aerial photograph of a city coastline, likely Chicago, showing a dense urban grid, a large body of water (Lake Michigan), and a prominent river (the Chicago River) flowing through the city. The image is used as a background for the text.

# Green Infrastructure for Great Cities

FHWA Ecological Webinar

Richard M. Daley  
Mayor

Janet L. Attarian, AIA, LEED AP, Project Director  
Streetscape and Sustainable Design Program



# Livability and Sustainable Communities

The urban form, with its density, public transit and walkable neighborhoods, is a sustainable way for humans to live. Its enhancement and maintenance for the safety and convenience of all users, is fundamental to creating a world where all humans can anticipate a good quality of life without depleting the world's natural resources.



# Old Fashioned and New Fashioned Sustainability



Accommodate the needs of ALL users in a limited amount of space

Minimize impact on land, air and water resources

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# 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.

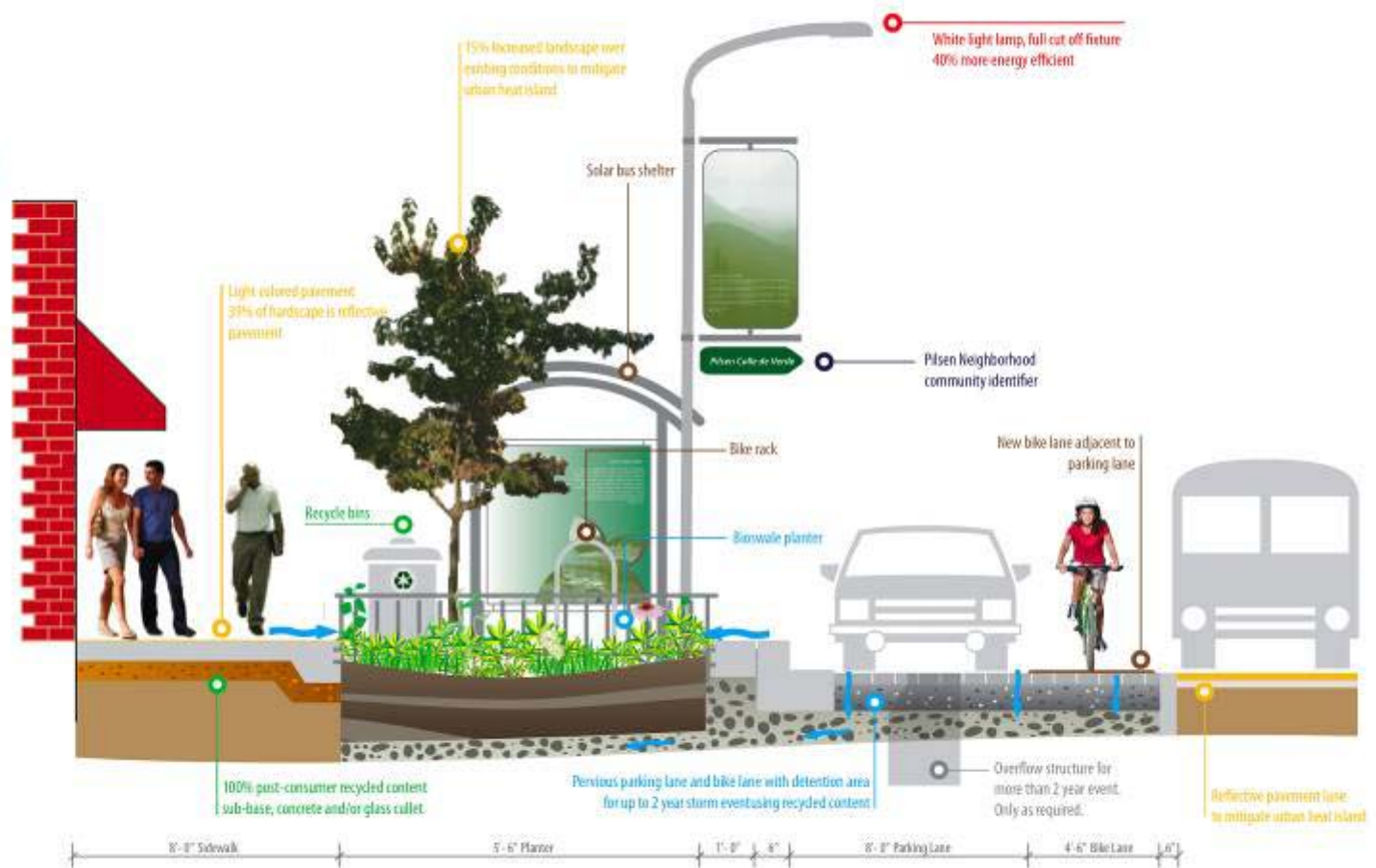
## *Commissioning*

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

# Cermak/Blue Island Sustainable Streetscape

## LEGEND

- **Recycled content**  
 Divert 90% of Construction Waste from Landfills, Specify new materials with a minimum 20% Recycled Content
- **Energy conservation**  
 Meet an energy reduction baseline below the streetscape baseline; select optimal street lights for energy efficiency; use reflective surface on sidewalks/roadways to improve lighting; use renewable energy as designated fixture
- **Storm-water management**  
 Divert 100% of two year storm event from city storm system through the use of pervious pavements, bioswales and recharge of Chicago River through existing outfall
- **Urban heat island mitigation**  
 Reduce ambient summer temperatures on streets and sidewalks through use of reflective pavements on roadways, light colored materials on sidewalks and use of trees for shading
- **Public transportation**  
 Improve bus stops with signage, shelters where possible, and lighting; facilitate use of bikes with lanes along Blue Island, and strategically located bike racks
- **Water efficiency**  
 Limit or eliminate use of potable water sources for irrigation; Specify Native or Climate-adapted, drought tolerant plants for all plantings
- **Education**  
 Provide public outreach materials/ self-guided tour brochure to highlight innovative, sustainable design features of streetscape
- **Monitoring**  
 CDOT is partnering with MWPD (Metropolitan Water Reclamation District)

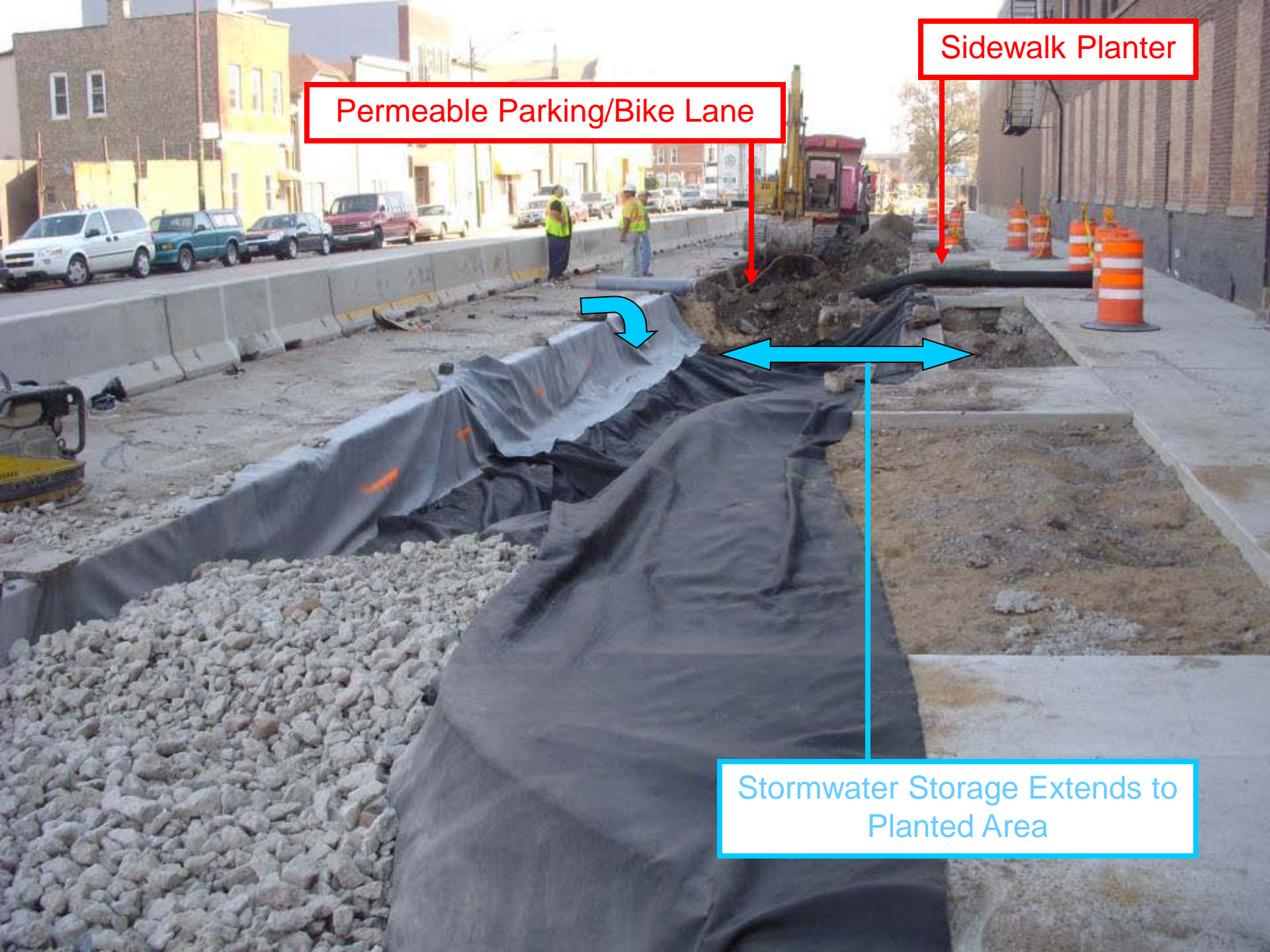


**STREETSCAPE ALONG BLUE ISLAND AVENUE**



**Wight & Company  
Soodan & Associates, INC.**

**Phoenix Architects  
Mactec**



Permeable Parking/Bike Lane

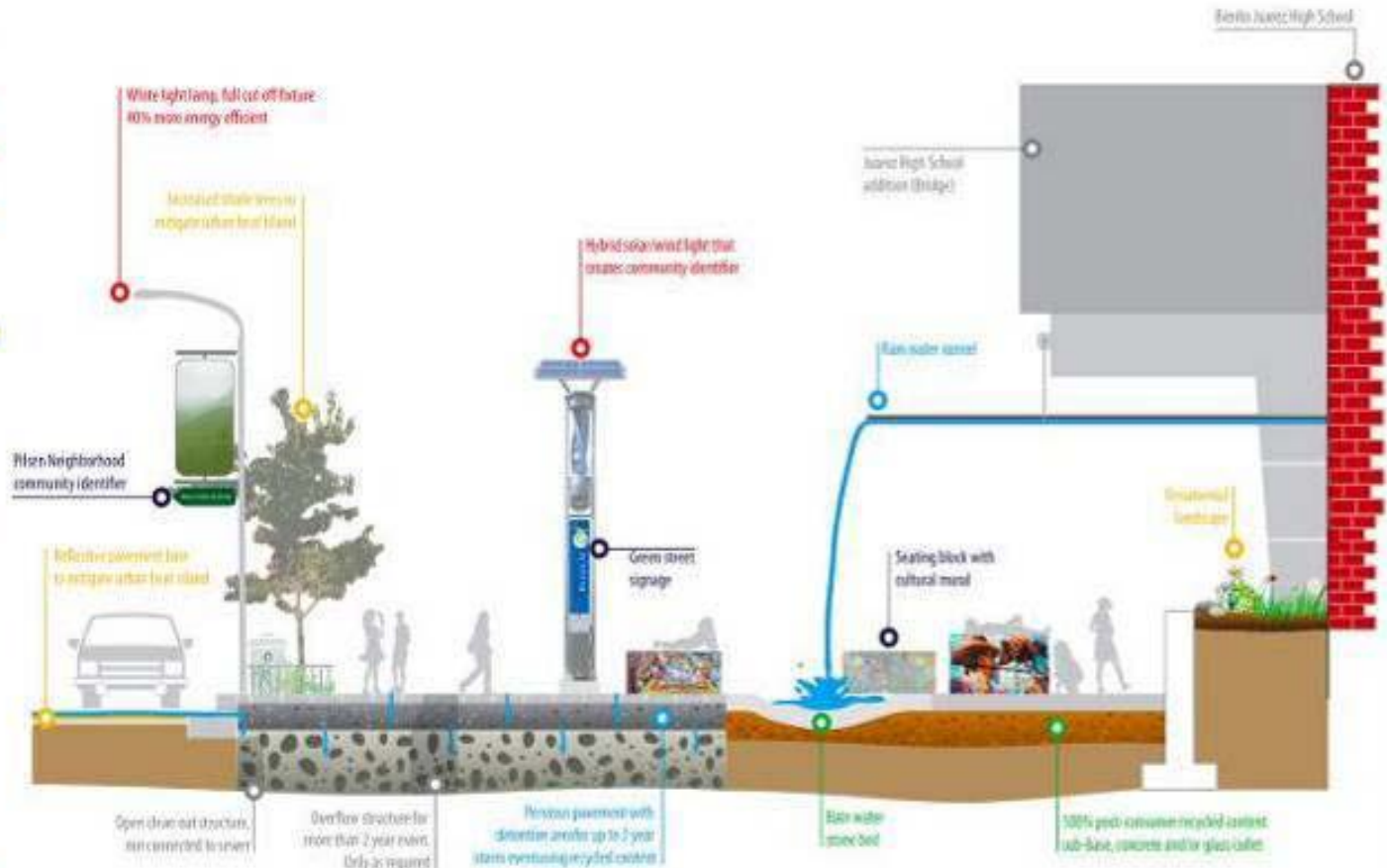
Sidewalk Planter

Stormwater Storage Extends to Planted Area

# North Side of Cermak Road

## LEGEND

- **Recycled content**  
 Meet 60% of construction waste from landfill, specify new materials with at least a 20% recycled content.
- **Energy conservation**  
 Meet an energy reduction baseline for the development baseline, select optimal street light for energy efficiency, use reflective up-lights on sidewalks to reduce energy on lit paved surface.
- **Storm-water management**  
 Over 100% of low flow storm event from city storm system through the use of pervious pavements, bio-retention and recharge of Chicago Basin through existing outlet.
- **Urban heat island mitigation**  
 Reduce sidewalk surface temperature by 20% and sidewalk through use of reflective pavements on sidewalks, light colored shade trees, sidewalks and use of trees for shading.
- **Public transportation**  
 Improve bus stops with signage, shelters where possible, and lighting; facilitate use of bikes with lanes along Blue Island, and strategically located bike racks.
- **Water efficiency**  
 Limit or eliminate use of potable water sources for irrigation. Specify lawn or Green-adapted, drought tolerant plants for all plantings.
- **Education**  
 Provide public outdoor materials/ self-guided tour brochure to highlight innovative, sustainable design features of development.
- **Monitoring**  
 2019 in partnership with NWRI (Northwestern Water Institute)



## BENITO JUAREZ SCHOOL WATER FEATURE

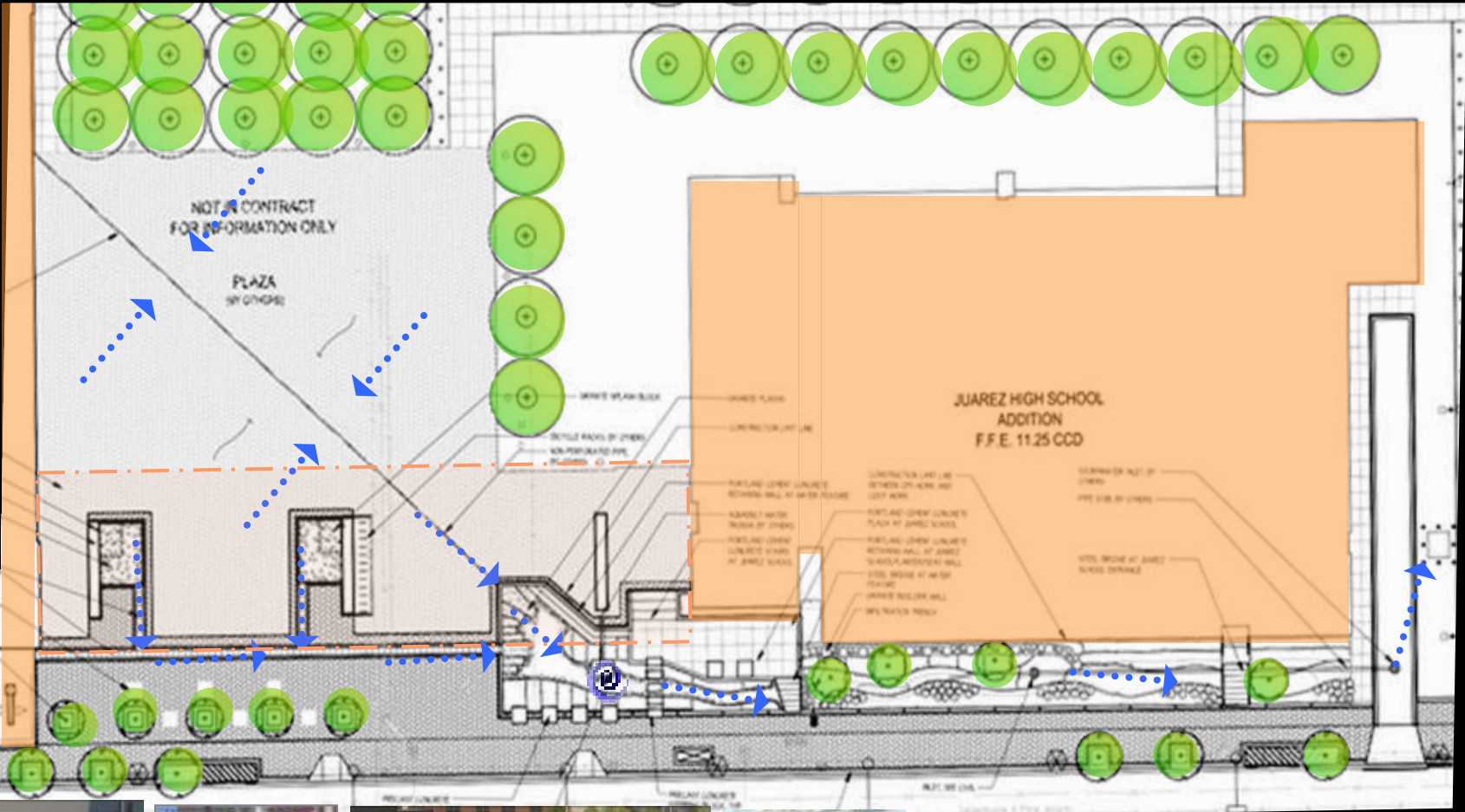


Wight & Company  
Soodan & Associates, Inc.

Phoenix Architects  
Mactec



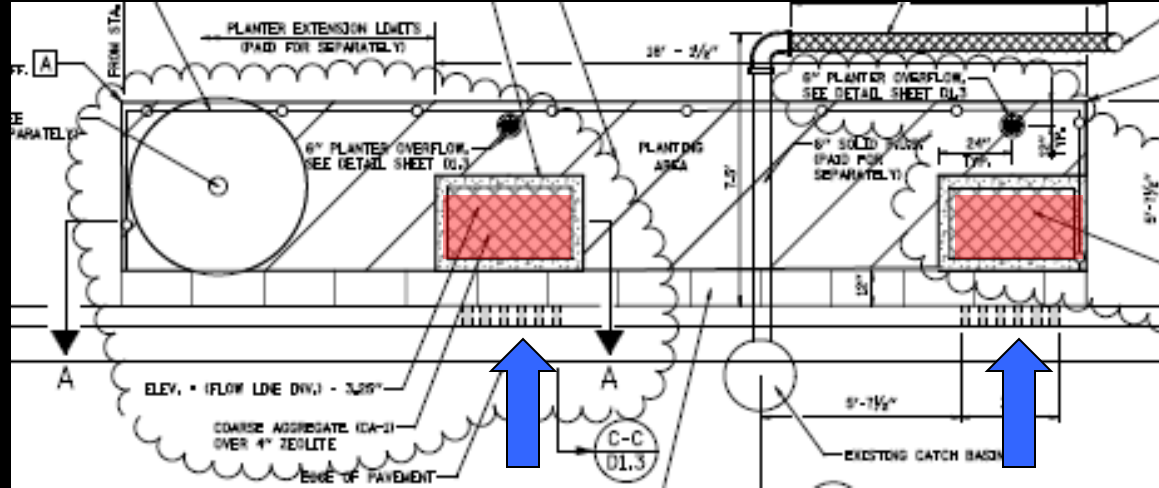
# BENITO JUAREZ HIGH SCHOOL WATER FEATURE



# BENITO JUAREZ HIGH SCHOOL WATER FEATURE



# Cermak Streetscape Infiltration Planter Detail



# Integrated Infrastructure Design Example: Parkway Bioswale

- Stormwater Management
- Pedestrian Buffer
- Landscaped beautification
- Urban Heat Island Reduction
- Water quality
- Reduction in potable water use



# Additional Project Elements

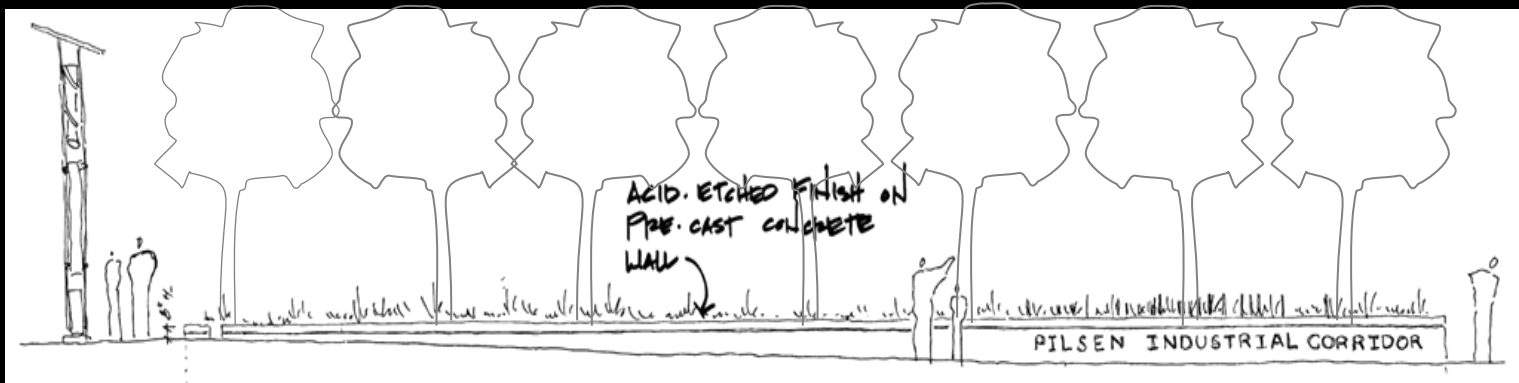


- Concrete with 30% recycled aggregate, recycled wash water and slag – actual 50% recycled aggregate
- N90 Warm mix asphalt with 15% RAP + 10% GTR with high albedo micro-thin concrete overlay - actual 10% FRAP, 20% Course FRAP, 5% RAS and GTR
- Recycled glass in in soil mix

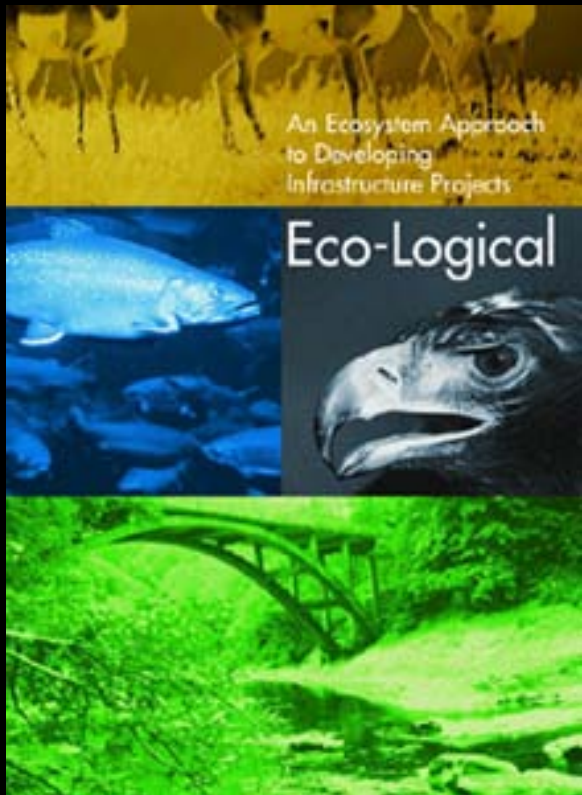
# Beauty and Community Human Scale

Allow for interaction and observation of both people and the natural world

Celebrate culture, history, spirit and place



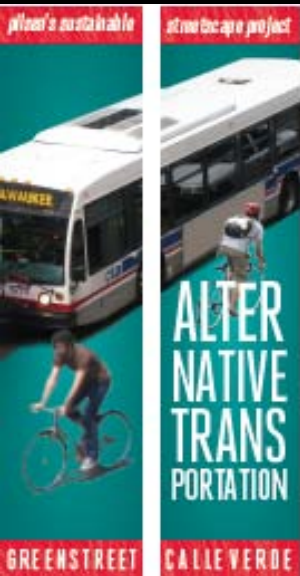
# Ecological Process and Grant Deliverables



Sustainable  
Streetscape  
Education  
Materials

Sustainable  
Streetscape  
Design Manual

# Education: Lightpole Banners Corresponding with Sustainability Goals





# Education: Informational kiosks/identifiers with interpretive graphics

**pilsen's sustainable street experiment**  
**GREENSTREET**  
 experimento sostenible de calle de pilsen

Learn (para saber) all about, consider (considerar) adopting, and do (hacer) temporary (temporal) changes (cambios) at home (en casa) or at work (en el trabajo) to help out in your community (ayudar) to...

**URBAN HEAT ISLAND**  
 El efecto de isla de calor

Learn (para saber) all about, consider (considerar) adopting, and do (hacer) temporary (temporal) changes (cambios) at home (en casa) or at work (en el trabajo) to help out in your community (ayudar) to...

**COMMUNITY & EDUCATION**  
 Comunidad y Educación

Learn (para saber) all about, consider (considerar) adopting, and do (hacer) temporary (temporal) changes (cambios) at home (en casa) or at work (en el trabajo) to help out in your community (ayudar) to...

**MATERIAL RECYCLING**  
 Reciclaje de materiales

Learn (para saber) all about, consider (considerar) adopting, and do (hacer) temporary (temporal) changes (cambios) at home (en casa) or at work (en el trabajo) to help out in your community (ayudar) to...

**ALTERNATIVE TRANSPORTATION**  
 Movilidad de transporte alternativo

Learn (para saber) all about, consider (considerar) adopting, and do (hacer) temporary (temporal) changes (cambios) at home (en casa) or at work (en el trabajo) to help out in your community (ayudar) to...

**STORMWATER MANAGEMENT**  
 Manejo de aguas pluviales

Learn (para saber) all about, consider (considerar) adopting, and do (hacer) temporary (temporal) changes (cambios) at home (en casa) or at work (en el trabajo) to help out in your community (ayudar) to...

**LIGHT POLLUTION & ENERGY EFFICIENCY**  
 Contaminación lumínica y eficiencia energética

Learn (para saber) all about, consider (considerar) adopting, and do (hacer) temporary (temporal) changes (cambios) at home (en casa) or at work (en el trabajo) to help out in your community (ayudar) to...

**WATER EFFICIENCY**  
 Eficiencia en el agua

Learn (para saber) all about, consider (considerar) adopting, and do (hacer) temporary (temporal) changes (cambios) at home (en casa) or at work (en el trabajo) to help out in your community (ayudar) to...

**MICROTHIN CONCRETE OVERLAY**  
 recubrimiento concreto fino

**WHAT IS IT?**  
 ¿QUÉ ES?

If you look out at Central Blvd from where you stand, you'll see how polluted the street looks. Instead of dark gray, that's because there's a lot of dust with a thin layer of light-colored concrete called microthin concrete overlay.

**HOW DOES IT HELP?**  
 ¿QUÉ PUEDE HACER POR NOSOTROS?

**URBAN HEAT ISLAND EFFECT REDUCTION**  
 Reducción del efecto de isla de calor urbano

Excess (exceso) heat (calor) from (de) asphalt (asfalto) and (y) concrete (concreto) surfaces (superficies) can (pueden) make (hacer) the (el) city (ciudad) feel (sentir) much (mucho) hotter (más caliente) on (en) a (un) summer (verano) day (día) than (que) normal (normal). The (el) microthin (microfino) overlay (recubrimiento) can (puede) help (ayudar) to (a) reduce (reducir) the (el) amount (cantidad) of (de) heat (calor) absorbed (absorbido) by (por) the (el) street (calle). With (con) this (este) overlay (recubrimiento), more (más) sustainable (sostenible) streets (calles) can (pueden) help (ayudar) to (a) reduce (reducir) the (el) temperature (temperatura) and (y) light (luz) pollution (contaminación lumínica) effects (efectos).

**MATERIAL RECYCLING**  
 Reciclaje de materiales

You (tú) may (puedes) wonder (preguntarte) what (qué) makes (hace) this (este) concrete (concreto) overlay (recubrimiento) so (tan) light (ligero) to (a) install (instalar). This (este) overlay (recubrimiento) is (es) a (un) type (tipo) of (de) concrete (concreto) overlay (recubrimiento) that (que) can (puede) be (pueden) made (hecho) out (de) of (de) recycled (reciclado) materials (materiales). The (el) overlay (recubrimiento) is (es) made (hecho) of (de) recycled (reciclado) concrete (concreto) and (y) other (otros) materials (materiales). It (ella) keeps (mantiene) the (el) street (calle) from (de) being (siendo) so (tan) hot (caliente) and (y) dirty (sucio) as (como) other (otras) streets (calles) made (hecho) of (de) normal (normal) concrete (concreto).

**ENERGY CONSERVATION**  
 Conservación de energía

With (con) more (más) sustainable (sostenible) streets (calles), the (el) amount (cantidad) of (de) heat (calor) absorbed (absorbido) by (por) the (el) street (calle) is (es) reduced (reducido). This (este) means (significa) that (que) you (tú) can (puedes) save (ahorrar) money (dinero) and (y) energy (energía) by (por) using (usando) the (el) overlay (recubrimiento). The (el) overlay (recubrimiento) can (puede) help (ayudar) to (a) reduce (reducir) the (el) amount (cantidad) of (de) heat (calor) absorbed (absorbido) by (por) the (el) street (calle). This (este) means (significa) that (que) you (tú) can (puedes) save (ahorrar) money (dinero) and (y) energy (energía) by (por) using (usando) the (el) overlay (recubrimiento).

Get (obtener) more (más) information (información) about (sobre) the (el) microthin (microfino) concrete (concreto) overlay (recubrimiento) by (por) visiting (visitando) the (el) website (sitio web) at (en) [www.microthin.com](http://www.microthin.com).

**GREENSTREET**  
 experimento sostenible de calle de pilsen

COOT



# Education: Self-Guided Walking Tour Brochure



## Sustainable Streetscape Technologies

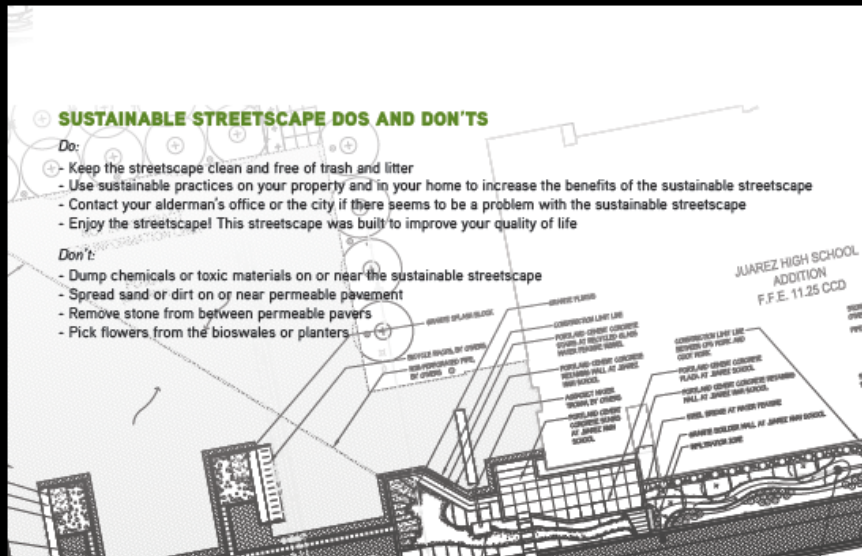
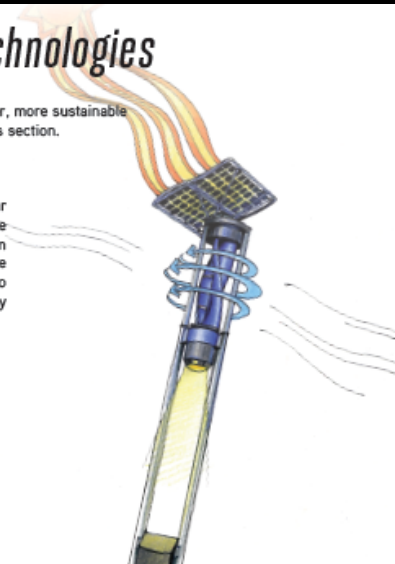
Our streetscapes use cutting-edge technologies to create a cleaner, more sustainable city. You can find out more about the inventions we're using in this section.

### HYBRID LIGHT FIXTURES

Hybrid light fixtures are designed to show how we can harness solar and wind energy. A south-facing solar panel at the top of this device collects energy from sunlight, while a turbine captures energy from the wind. Unlike fossil fuels, these "clean" sources of energy are constantly renewed by nature and release no harmful emissions into the air. This energy powers an LED light - a long-lasting, highly efficient electronic light.

#### Benefits

- Uses renewable energy
- Reduces air pollution
- Conserves energy with a long-lasting, energy efficient LED light
- Increases awareness of alternative energy sources



### 2 ENERGY CONSERVATION

NW corner of Blue Island Ave. and Wood St.

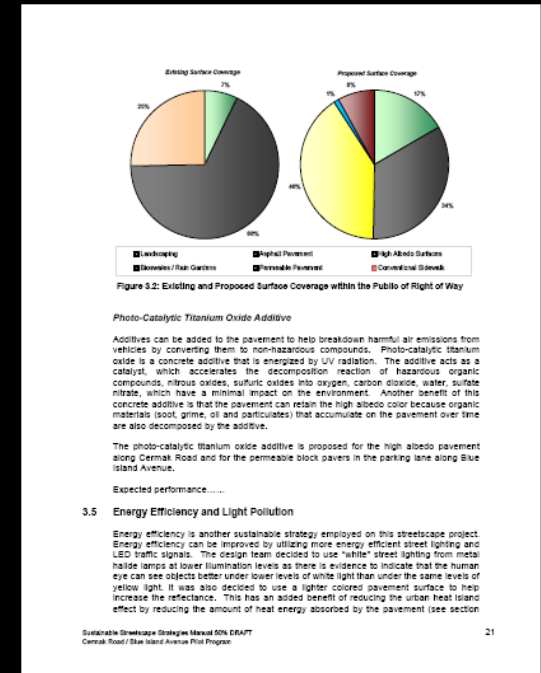
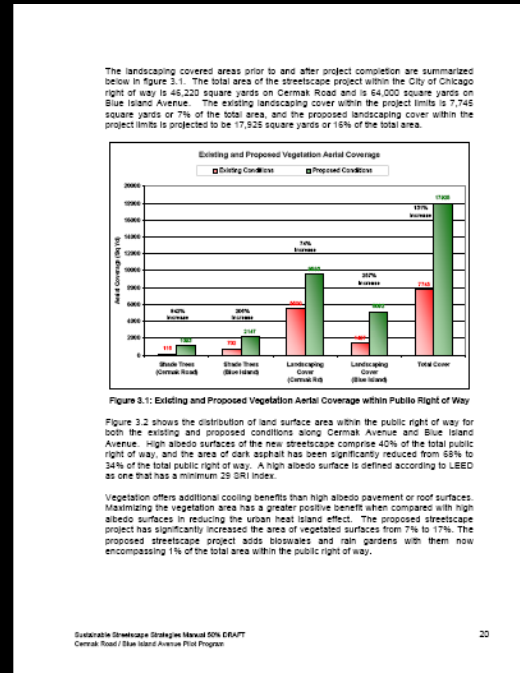
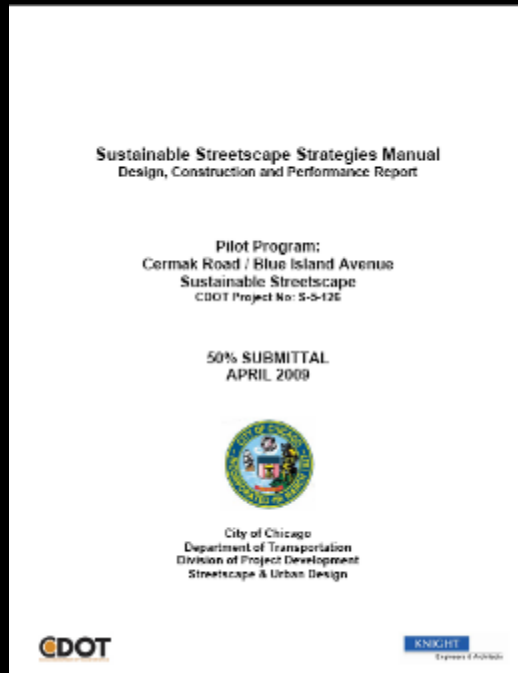
On this corner, you can take a look at the technologies that help conserve energy on our streetscape. Efficient streetlights use less energy to light up the street, while permeable pavers help reduce the amount of energy that the streetlights use by reflecting and strengthening their light. The bus stop and hybrid light fixture here use solar and wind energy, rather than fossil fuels, to power energy efficient lights.

### 3 ALTERNATIVE TRANSPORTATION

SW corner of Blue Island Ave. and Ashland Ave.

Check out the ways we've made taking alternative transportation easy, safe, and fun at this stop. A bus stop and a new bike lane connect the neighborhood to the rest of the city. White light street lamps and beautiful planters along the sidewalk make the street safe and enjoyable. Permeable pavers break down smog and reduce flooding, making your walk or ride even more enjoyable.

# Commissioning – Sustainable Design Manual



- Design, Construction, and Commissioning Performance Report
- Details the Implementation of Sustainable Goals, Including Ideas Not Selected.
- Living Document to Include Construction and Commissioning Reports

# Commissioning – Stormwater Monitoring Plan

- Scope
  - To assess the performance, effectiveness, and efficiency of individual and sequential BMPs relative to stormwater flow and pollutant load reduction.
- This evaluation will include
  - Determining pollutant load and flow control of the BMP(s) under typical operating conditions relative to current background conditions
  - Determining the BMP(s) response to varying storm characteristics and antecedent weather conditions
  - Determining BMP integrity over the course of the study
  - Air quality testing for depolluting pavers



# Commissioning – Construction Goals

As of August 2010 – 10% Project Completion

Category	Overall Project Goal	Percent of Materials Installed as of Aug 2010
Regional Materials	40%	29.94%
Recycled Content	10%	2.00%
Construction Waste	90%	90.03%

Fuel Tracking: 825.55 gallons of ULSD fuel used to date

# Lessons Learned from Eco-Logical / Sustainable Streetscape Implementation

- Integrated design requires new roles within interdisciplinary design teams.
- Technology availability may not always coincide with project schedules.
- Changing “business as usual” within the public right of way requires contact with all public and provide users of the public way.
- Monitoring information of local pilot projects is critical in order to accurately compare grey vs. green infrastructure alternatives.
- Addressing livability issues within the public way involves inherently sustainable practices.

Janet L. Attarian, AIA, LEED AP | Project Director | [Jattarian@cityofchicago.org](mailto:Jattarian@cityofchicago.org)  
Streetscape and Sustainable Design Program | 312-744-5900