Green Infrastructure History in Milwaukee

Emerging National trend over the last 10 years

- **2003**
  - MMSD starts promoting green infrastructure demonstration projects

- **2008**
  - City of Milwaukee Ordinance Updated to Allow Green Infrastructure

- **2008-2011**
  - Green Street Pilot Projects

- **2010-2011**
  - Flooding Task Force

- **2011-2012**
  - Standardize the Evaluation Process of Green Potential in each Street Project

- **2012**
  - MMSD Permit Requires Green Infrastructure

- **2012**
  - MMSD Regional Green Infrastructure Plan (Future)

- **2006**
  - City of Chicago Green Alley

- **2009**
  - City of Philadelphia

- **2010**
  - New York City Green Infrastructure Plan

- **2011**
  - Syracuse, New York EPA Green Infrastructure Partnership Community
What is a Green Street?

• Manages stormwater in the street right-of-way
• Fresh look at typical design protocols
• Utilize green space where available
• Incorporate innovative pavement types
• Green Streets provide benefits without sacrificing roadway function
Green Street Features

Vegetated Areas
• Median
• Terrace
• Adjacent Open Spaces

Pavement
• Street
• Parking Lane (recommended)
• Alleys (recommended)

Trees
• Trees with drainage components
Why Green Streets?

• Streets represent 20-25% of the total urban area
• Measurable water quality and drainage benefits
• DNR Permit compliance
• Opportunities for collaboration and partnerships
• Aligns with City’s Green Team and Flooding Task Force recommendations
• Can be incorporated into the standard street design processes
Why a Green Street Standard?

• Framework to Provide Consistent Guidance Across DPW

• Improve Drainage
  – 2010 Flooding Task Force
  – Provides decentralized storage and infiltration
  – Opportunity in highly urbanized area

• Reduce the Cost of Implementation
  – Retrofits are costly
  – Integrating into the planning and design process provides cost savings
    • Realizes 20 to 40 percent cost savings
  – Multiple benefits with comparable cost to traditional controls

• Achieve Multiple Benefits
  – Help City adapt to climate change
  – Improved air and water quality
  – Reduced heat island effect
  – Improved neighborhood aesthetics
  – Improved drainage
Green Street Evaluation Built Into the Standard Design Process

- **Standard Green Street Evaluation Process**
- **Street and Alley Reconstruction Screening Process**
- **Multiple Green Street Benefits Consideration: Drainage, Water Quality, etc.**
- **Reconstruction Detailed Planning and Design**
- **Reconstruction of Street or Alley**

- **Track Progress for Continual Improvement**

- **Pilot Green Street Implementation**
Reviewing Street Candidates

- Add screening criteria into city’s street database

- Positive Criteria include wide medians, wide terraces, availability of adjacent land, etc

- Negative criteria include utility conflicts, steep slopes, etc
Top Green Street Opportunities: Bioretention in Median

(2012) Green Street Median
W. Grange Ave. (Howell to Freeway)
Milwaukee, WI

(2010) Green Street Median
Grange Ave.
Milwaukee, WI
Top Green Street Opportunities: Tree Trenches

Urban street with tree trench and bioretention, Syracuse, NY

Conceptual tree trench components
Option Limited by Terrace Width: Bioretention in Terrace
Grass or Natural Landscaping

Typical cross section of a bioretention facility with an underdrain, overflow, and tree and grass plantings

Typical cross section of a bioretention facility with an underdrain, overflow, and native plantings
Green Street Opportunity:
Example: Bioretention & Tree Trench in Highly Urban Street—Cincinnati, OH
Cost Effective Maintenance Strategy

• First two years of maintenance included in construction contract
• Switch maintenance from mowing to landscape maintenance
• Periodic observation to verify performance as expected
• Vacuum sweeping for porous pavement requires new equipment, but sweeping frequency is no greater than what already occurs
Green Street Policy Summary

• Utilize right-of-way for multiple benefits
• Incorporate into standard street planning and design process
• Cost effective
• Adaptation for climate change
• Improves water quality
• Improves drainage
Example: Bioretention with Trees

Urban street before, Syracuse, NY

Urban street after curb extension, bioretention with tree planting, and overflow, Syracuse, NY
Example: Porous Pavement

Before

After
Example: Porous Pavement Alleys

Before (July 2011)

Conventional reconstruction (8-inch reinforced concrete):

After (February 2012)

Green alley retrofit (permeable pavers with infiltration trench)