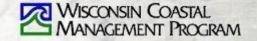
Green Street Standards Communication, File 121336

City of Milwaukee

January 23, 2013



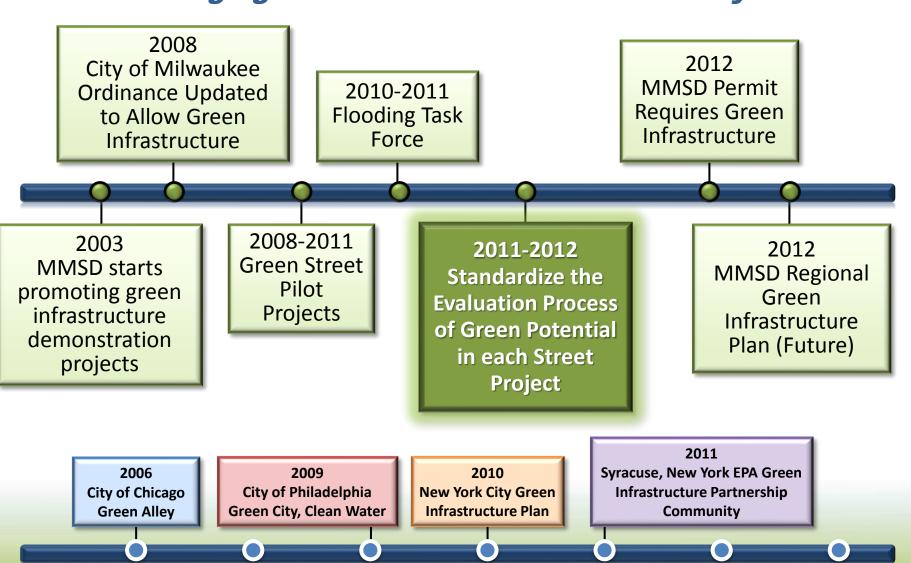






Green Infrastructure History in Milwaukee

Emerging National trend over the last 10 years



6

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

















6

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



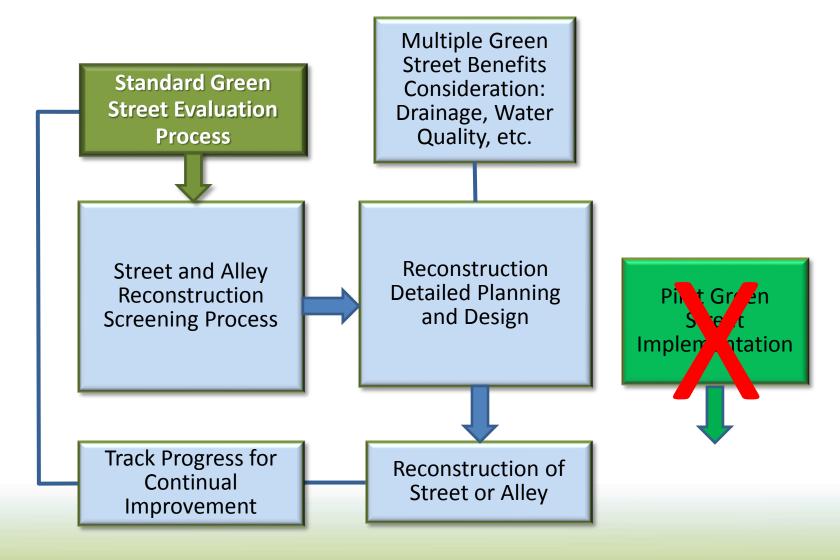




Why a Green Street Standard?

- 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



Reviewing Street Candidates

| Potential / Prospective | O Stormwater | evaluation | O Final design |
|---------------------------|--------------|---------------|---|
| | | Vac2 | ı |
| Median Bioret | | Yes? | |
| Avg. width (ft.) Cost \$ | 0.00 | | nis a reconstruction? |
| Avg. length (ft.) | lbs/yr | | istance from face of curb to property line > 12 feet? |
| Area 0.00 TSS reduct | 0.0000 | | nere a median? |
| Treatable 0 Phosp. reduct | 0.0000 | ✓ Is m | nedian greater than 5 feet? |
| | | | |
| Tamara Bianat | | | s project have sidewalk? |
| Terrace Bioret | | | idewalk full walk? |
| Avg. width (ft.) Cost \$ | 0.00 | ✓ Is f. | ace of curb to sidewalk width greater than 6 feet? |
| Avg. length (ft.) | lbs/yr | | |
| Area 0.00 TSS reduct | 0.0000 | | |
| Treatable 0 Phosp. reduct | 0.0000 | ✓ Is t | nere open space adjacent to the project? |
| | | | pen space wider than 5 feet? |
| Open Space Bioret | | | perispace was dian a rees |
| Cost \$ | | | |
| Cost | | Strategy | recommendations: |
| | lbs/yr | _ Me | dian Bioretention |
| Area TSS reduct | | | race Bioretention |
| Treatable Phosp. reduct | | Op- | en Space Bioretention |
| | | | |
| Porous Pavement | | | |
| Cost \$ | | | |
| | lbs/yr | Select re | ason(s) for changes to strategy recommend |
| Area TSS reduct | | Utili Utili | ty conflict |
| Treatable Phosp. reduct | | Cos | t constraints |
| Tricop. reduct | | Slop | oe e |
| | | | ography constraints |
| Tree Trench | | | ident preference |
| Avg. width (ft.) Cost \$ | 0.00 | | fic patterns or traffic loadings |
| Avg. length (ft.) | lbs/yr | Adj. | acent open space property owner not supportive |
| Area 0.00 TSS reduct | 0.0000 | Notes | |
| Treatable 0 Phosp. reduct | 0.0000 | | |
| | | | |

- 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



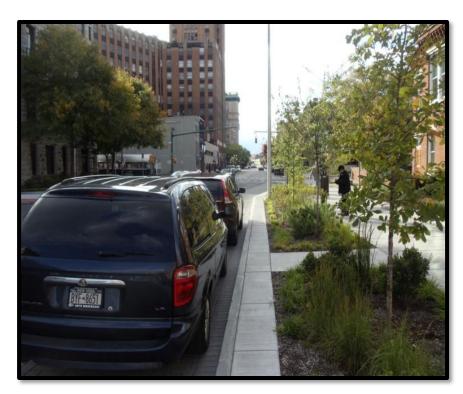
(2012) Green Street Median
W. Grange Ave. (Howell to Freeway)
Milwaukee, WI



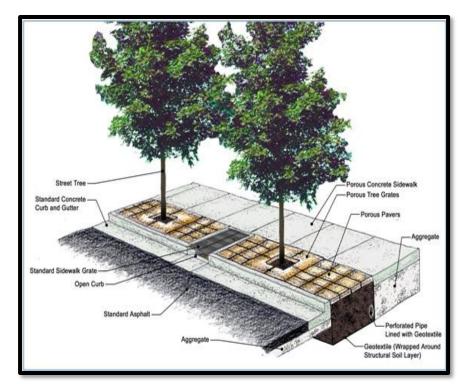
(2010) Green Street MedianGrange Ave.
Milwaukee, WI



Top Green Street Opportunities: Tree Trenches



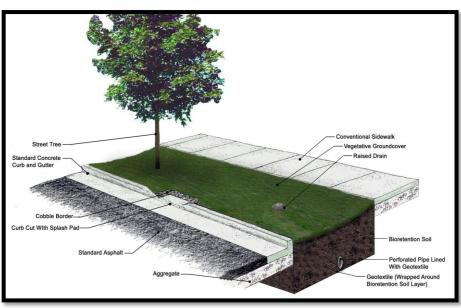
Urban street with tree trench and bioretention, Syracuse, NY

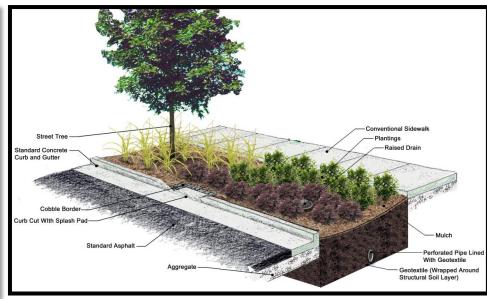


Conceptual tree trench components



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



Backup Slides

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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)