



Paul A. and Barbara M.
Erb Family Foundation



WATER CENTER
UNIVERSITY OF MICHIGAN

Green Infrastructure on Vacant Land: Achieving Social and Environmental Benefits in Legacy Cities

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Natalie R. Sampson, Noah J. Webster

NEIGHBORHOOD, ENVIRONMENT, AND WATER RESEARCH
COLLABORATIONS FOR GREEN INFRASTRUCTURE
NEW-GI WHITE PAPER NO. 1 FEBRUARY 15, 2017



Using Research to Build Bridges Neighborhood, Environment, and Water Collaborations for Green Infrastructure

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Natalie R. Sampson, Margaret E. Dewar,
Shawn McElmurry, Noah Webster, Amy J. Schulz,
Alicia Alvarez, Allen Burton, Catherine Riseng



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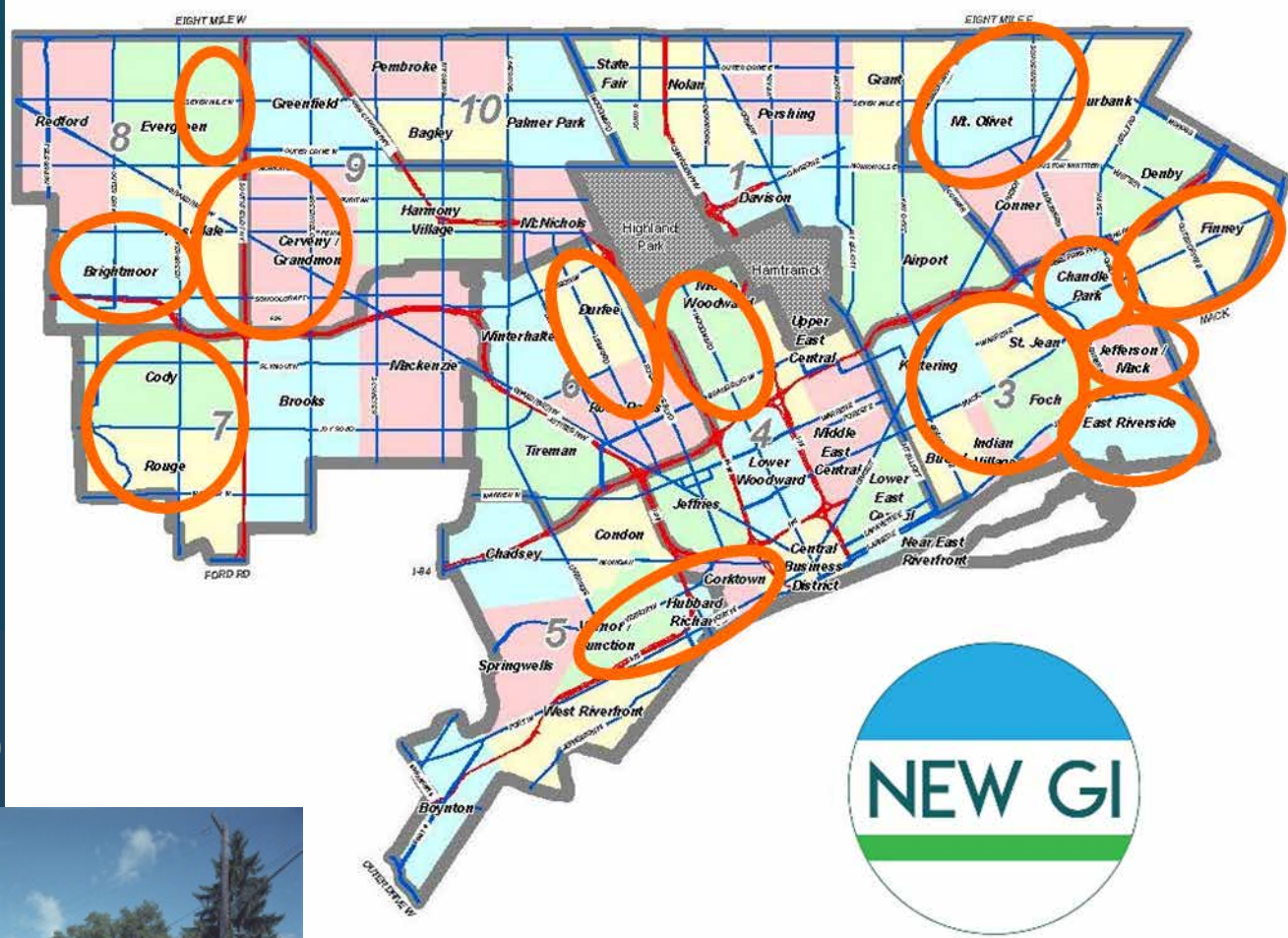
FACT SHEET: http://graham.umich.edu/media/pubs/Detroit-Green-InfrastructureFactsheet_0.pdf

WHITE PAPERS FOR DECISION MAKERS: newgi-contact@umich.edu



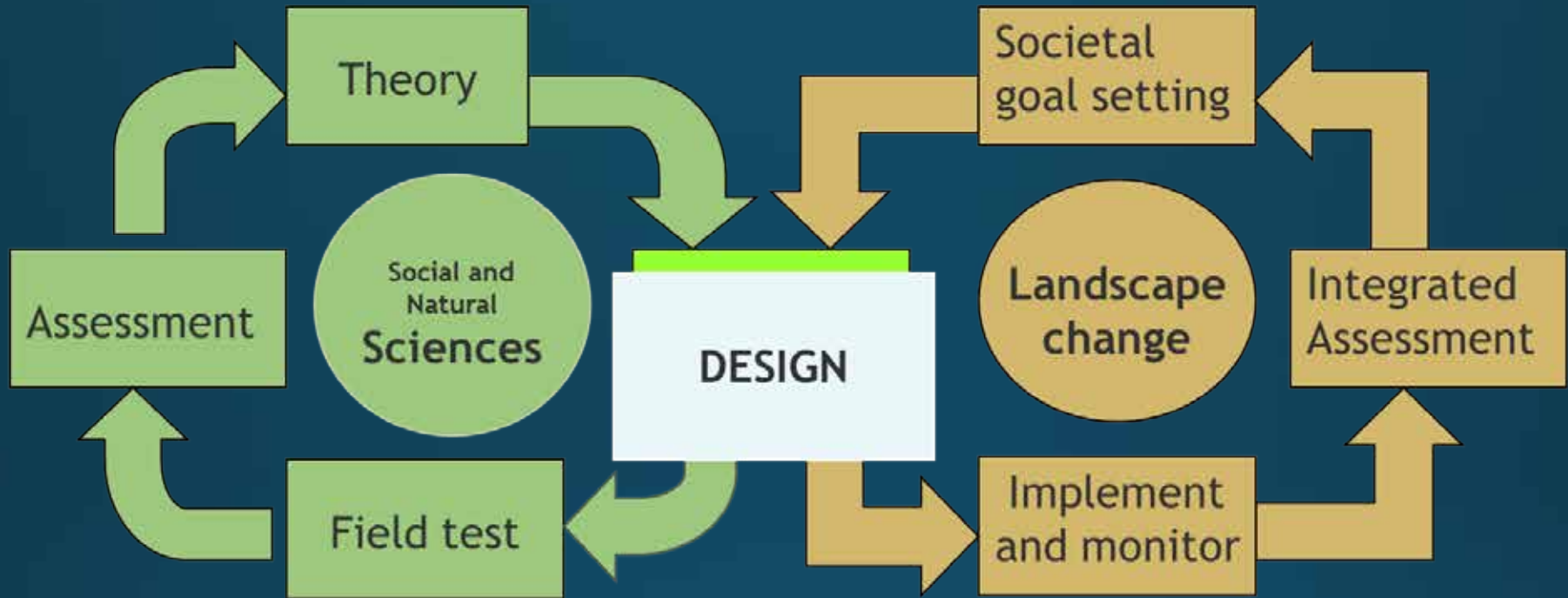
Cody Rouge Community
Action Alliance
Warrendale Community
Organization

Transdiscip



Advisory Committee: Palencia Mobley, P.E., DWSD, Chair.
Darnell Adams, DLBA
Janet Attarian, Detroit Planning and Development Department
Kenyetta Campbell, Cody Rouge Community Action Alliance
Parvez Jafri, DWSD
Erin Kelly, Detroit Planning and Development Department
Barbara Matney, Warrendale Community Organization
Betsy Palazzola, Detroit Department of Housing and Revitalization
Jodee Raines, Erb Family Foundation, ex-officio
Carol Hufnagel, Tetra Tech, ex-officio

Photos: Chris Faust



Design is intentional intervention in landscape change.

We develop approaches to green infrastructure design and governance as integrated hypotheses about “what works” to:

- achieve stormwater management goals,
- enhance residents’ well-being and perceptions of their neighborhood,
- and be practical for managers over the long term.

Nassauer and Opdam. 2008.

Design in science: extending the landscape ecology paradigm. *Landscape Ecology*

Neighborhood, Environment & Water Research Collaborations for Green Infrastructure (NEW-GI) links Detroit's vacant property demolition process with new forms of green infrastructure (GI) designed to manage stormwater and increase resident well-being where vacant property is changing neighborhoods.

PHASE ONE (2014-2015):

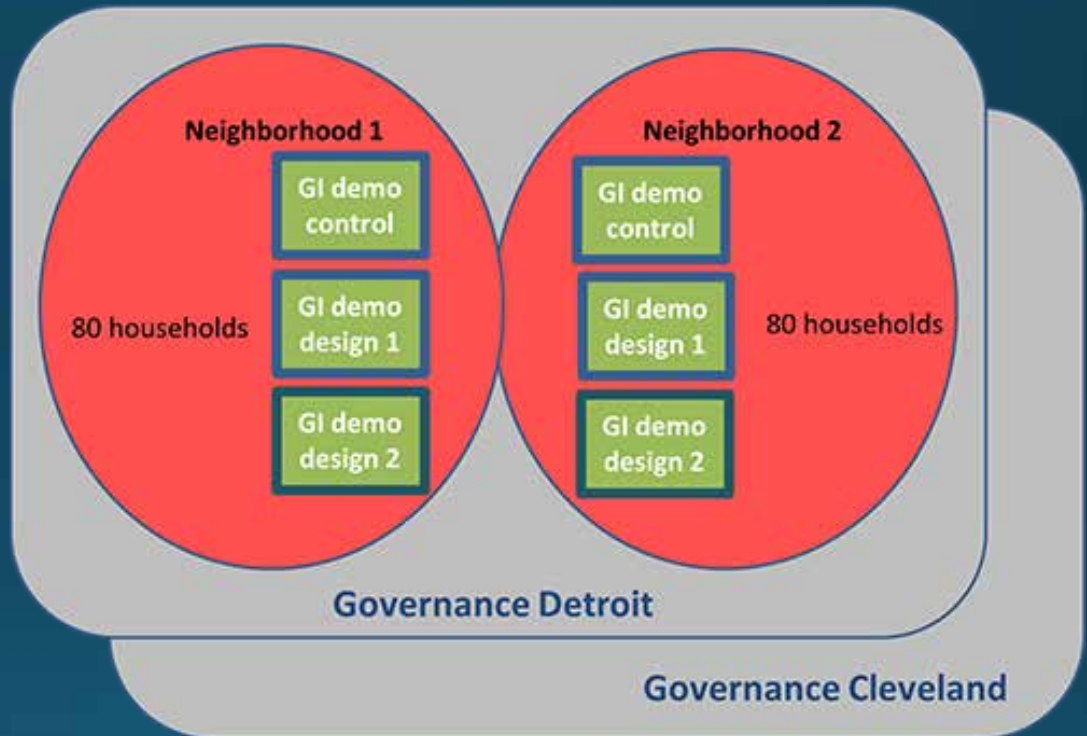
- Developed bioretention flower garden designs and constructed pilot sites including water quality assessment instrumentation
- Initial survey of 164 neighborhood residents living within 800' of pilot sites
- Studied GI and vacant property governance in Detroit and Cleveland

PHASE TWO (2016-2018):

- Assessing pilot gardens' social and environmental performance
- Bringing pilot gardens' design concepts to scale across a CSO watershed
- Reviewing governance of vacant properties as it relates to GI in other legacy cities: Cleveland, Baltimore, Milwaukee, Philadelphia, New Orleans, Gary, Buffalo; Washington, DC, Pittsburgh, Royal Oak, Southfield.
- Reviewing and synthesizing scholarly literature across many disciplines related to GI
- Producing guidance documents for local GI stakeholders: Technical Advisory Report 2016, White Paper 2017, and more to come...
- **For information: newgi-contact@umich.edu**

NEW-GI RESEARCH QUESTIONS

- **WATER:** How do different design and planning strategies for land-based GI affect water quality, aquatic toxicology and, potentially, human health exposures?
- **NEIGHBORHOOD RESIDENTS:** What aspects of design affect residents' perceptions of the attractiveness and desirability of their neighborhood? How does this relate to community engagement? Physical and mental health?
- **GOVERNANCE:** What institutional arrangements affect implementation and maintenance? What might help to ensure that benefits of GI are sustained?



2014 RESEARCH DESIGN

The Design Theory:

Cues to care provide *just enough* visible evidence of human intentions to display a sense of pride, ownership or stewardship. This connotes:



Nassauer, J. I. 2011. Care and stewardship: From home to planet. *Landscape and Urban Planning*. 100: 321-323

Nassauer, J. I. 1995. Messy Ecosystems, Orderly Frames. *Landscape Journal*. 14:2, pp. 161-170.

Nassauer, J.I. 1988. The Aesthetics of Horticulture: Neatness as a Form of Care. *HortSci*. 23:6, pp.973-977.

The land-based green infrastructure design innovation:

Fill the excavation of former basements in demolished buildings with porous soils to retain stormwater drained from the street. Design this form of GI to look like a garden for the enjoyment but not entry of passers-by.

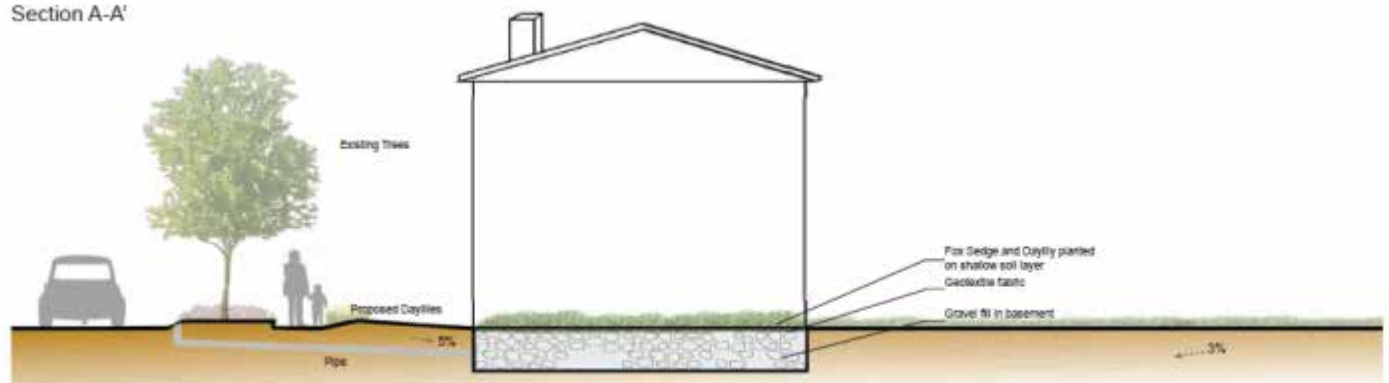


Demolition in progress

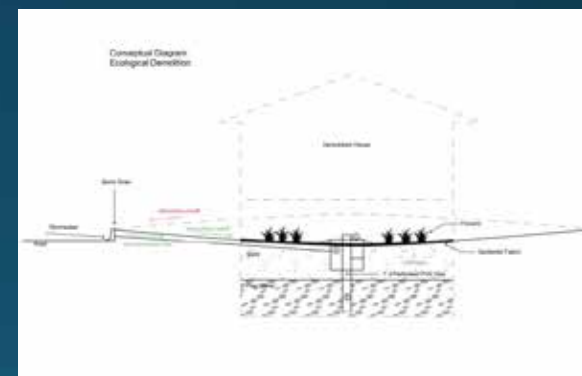
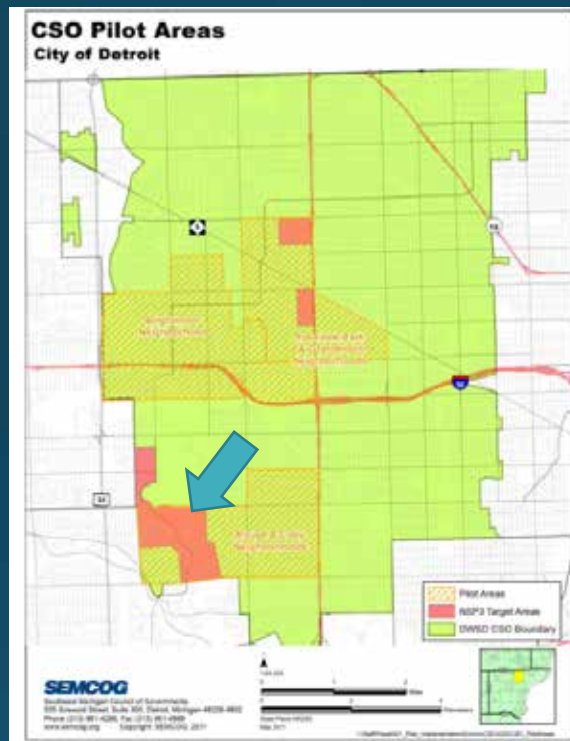
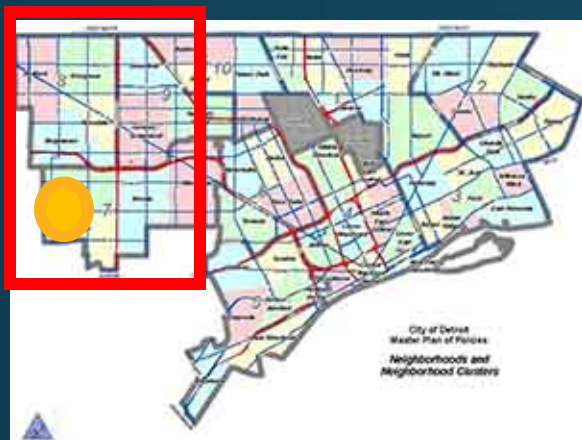


Base Condition: Poor condition (3 or 4 condition) house slated for demolition

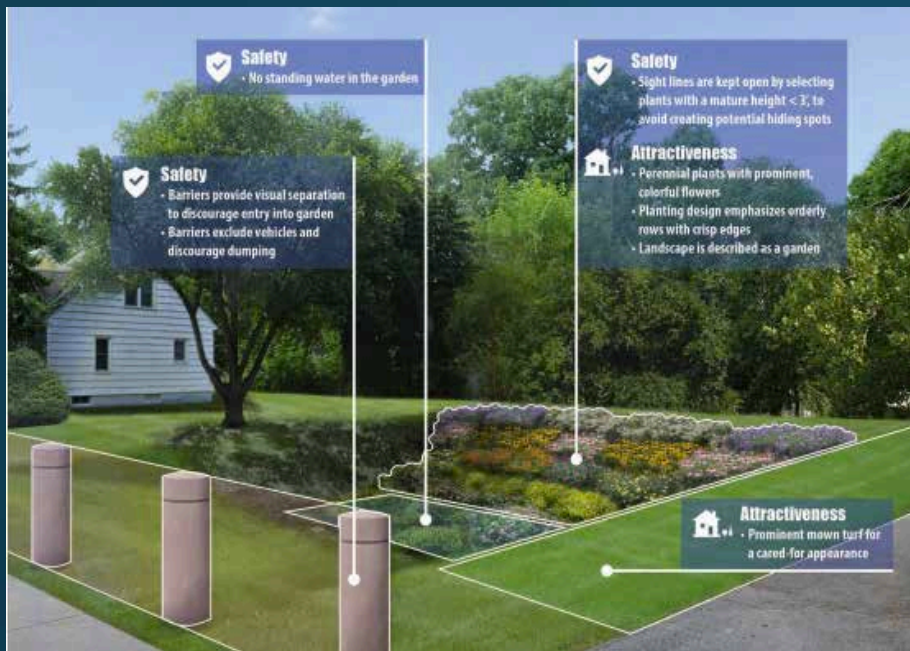
Section A-A'



Site selection: Detroit Land Bank Authority demolition sites with Detroit Water and Sewerage street storm water retention opportunities and City of Detroit advised community engagement



- DWSD's Tetrattech worked with Nassauer design lab , McElmurry environmental engineering lab, and Allen aquatic toxicology to develop design and water sampling specs and let bids for ecological designs and water sampling structures. DWSD worked with DLBA to arrange permitting.
- DLBA and Department of Neighborhoods worked with our team to refine citizen engagement approaches, including engagement of other City departments, including Public Safety.



Neighborhood experience design hypotheses

Stormwater management design hypotheses

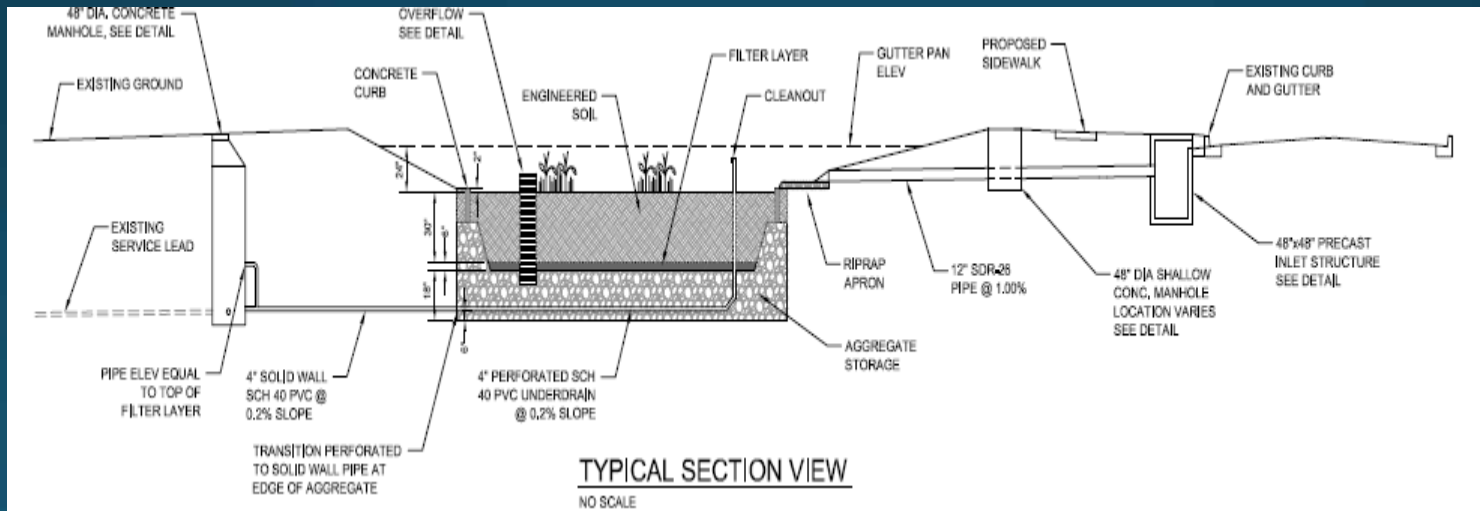


Image and Detail design: Tetra Tech

How do different bioretention garden designs for vacant lots perform compared with control vacant lots in the neighborhood?

We built and are measuring performance on four pilot bioretention sites. For the neighborhood survey about social effects, we also compare with other vacant lot treatments, control sites and a well-mown lawn with no visible bioretention.

Control



Well-mown only



Flowers and bollards with bioretention

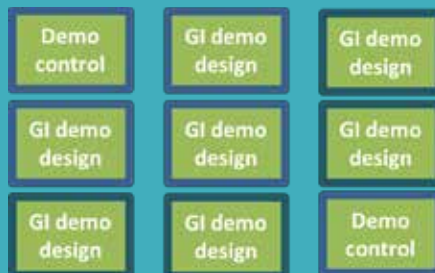


Flowers and berm with bioretention

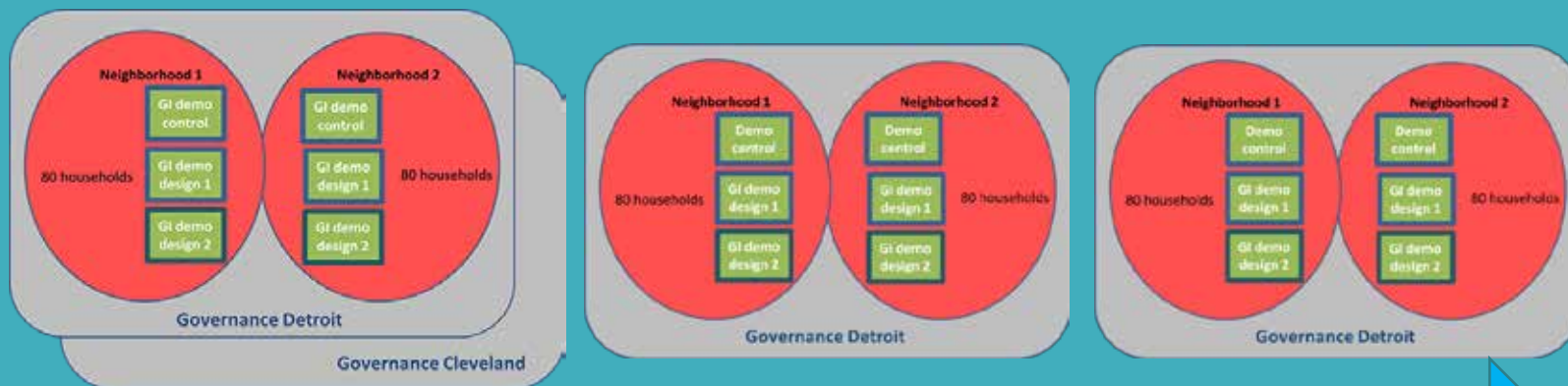


WHITE PAPERS FOR DECISION MAKERS:

Synthesize relevant literature from landscape planning, design, public health, law, engineering, aquatic ecology



Develop a system design concept for watershed wide implementation



Assess neighborhood effects, water quality, and governance over time

Scale up water quality and neighborhood effect measurements to a CSO outlet

NEW-GI PHASE 2 2016-2018

White Paper No. 1 Lessons Learned for Legacy Cities

- GI can address challenges of property vacancy and related disparities
- Maintained GI, designed to respect residents' norms and preferences, can enhance perceptions of neighborhoods and residents' health
- Residents' stewardship – from actual maintenance to reporting issues – can be encouraged.
- Collaborative cross-sector efforts that engage residents are needed.





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