

Green City Clean Waters **BLUE STREETS**



This project uses the institutional landscape of Haverford Avenue and its history of wellbeing as the place to conduct a pilot project for stormwater management and community engagement. We use the idea of a “Blue Street” to mean one that carries and detains water through extensive tree trenches and pervious pavement, almost like an underground canal. From the ground, it will look like a green street, with healthy street trees, rain garden bump-outs and areas for planting.

Haverford Avenue is a perfect place for a visible pilot project. The street has a long history, dating back to the eighteenth century, and has long been a key thoroughfare into West Philadelphia. Today, it is still a highly trafficked street, lined with important institutions from the Lee Cultural Center to nursing homes, churches, schools and public housing. The city can lay the infrastructure for the blue street and work with these institutions to develop and maintain the streetscape, and tie stormwater management into their core goals.

In addition to Haverford Avenue’s long history, our transect (Haverford Avenue between 42nd and 49th) has a history of mixed-race and -income residents and neighborhood investment. Though there was a downturn in the neighborhood in the 1990’s and 2000’s, the neighborhood is on an upswing and high rates of ownership lead to residents taking care of their yards and patios, adding planters on the street and sometimes removing street trees when they are disrupting the sidewalk. This is a neighborhood where the city can build on the community actions, while also restoring residents’ faith that the city can provide and maintain urban infrastructure.

We propose three phases on implementation, starting with a large city investment to repave the Haverford Avenue, followed by institutional investment, and ending with ongoing residential and community engagement. We envision the “Blue Street” idea scaling up to the city level--the plan for a Green City and Clean Waters made possible by Blue Streets. Eventually, these Blue Streets will create a network of water detention canals as well as beautiful, pedestrian and bike-friendly streets that will truly make Philadelphia the greenest city in America.

CONCEPT | Haverford Avenue: PHILADELPHIA'S FIRST **BLUE STREET**

Utilizing the institutional landscape
With a history of wellbeing
To conduct a pilot project
For stormwater management
And community engagement



PHILADELPHIA

Welcome to
West Philadelphia's
HAVERFORD AVENUE
BLUE STREET PILOT PROJECT

Philadelphia Water Department

STREETS



PROJECT PLACEMENT | Haverford's Historical Legacy

Haverford's long history as an entrance into the city makes it a perfect place for a visible pilot project. The area can also build on its long history of public health and welfare; it was home to the first humane mental hospital, which was located long Mill Creek. From the horses and trolleys of the past to today's cars, bikes and pedestrians, Haverford remains an important street.

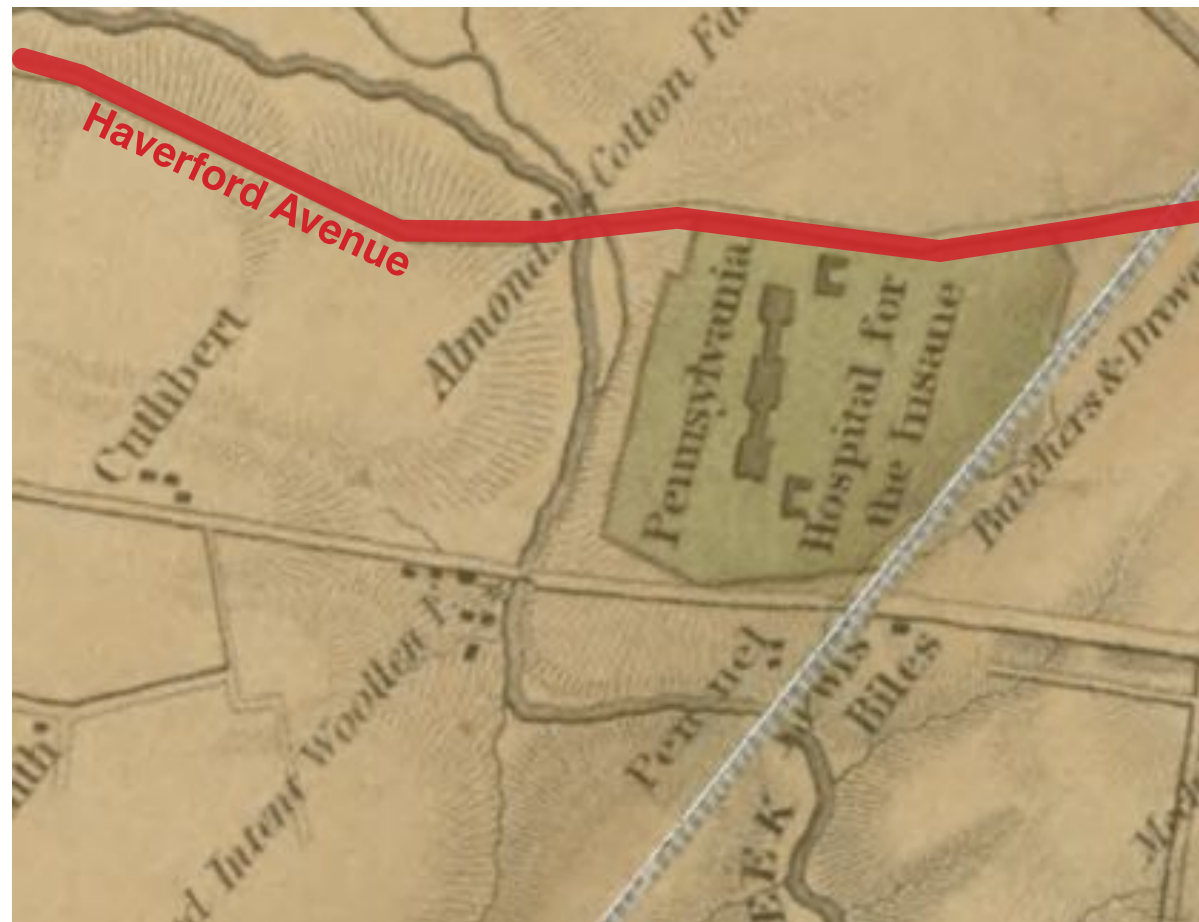


Haverford Avenue runs from Haverford, Pennsylvania into the heart of West Philadelphia, ending at the Spring Garden Street ferry, which is now a bridge into downtown.

In addition to being a main entrance into Philadelphia, Haverford Avenue is a main street in towns outside of the city, as has been for hundreds of years.



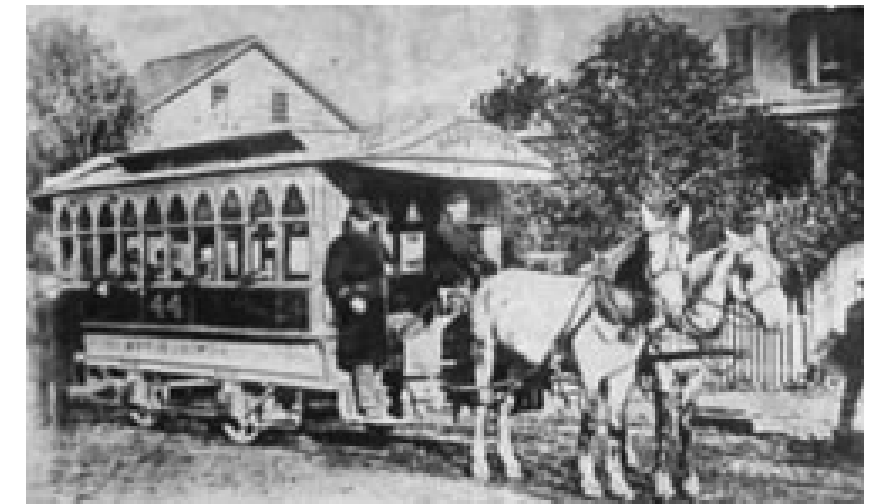
Horse-drawn trolley in front of depot at 41st St. and Haverford Ave., c. 1890



1843 map shows Haverford Ave and Pennsylvania Hospital for the Insane



1914 Evening Ledger shows creation of the Market St. "L", which runs on the other side of our transect as Haverford Avenue. Connections between Haverford and this public transit create opportunities for the site.



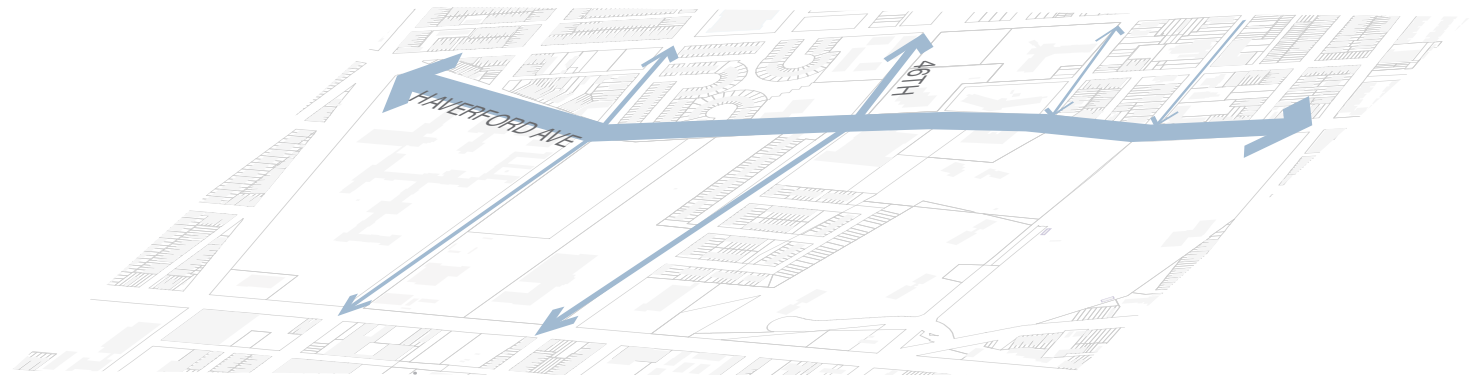
Horse-drawn trolley at 66th St. and Haverford Ave., 1876

Both photos from the West Philadelphia Community History Center

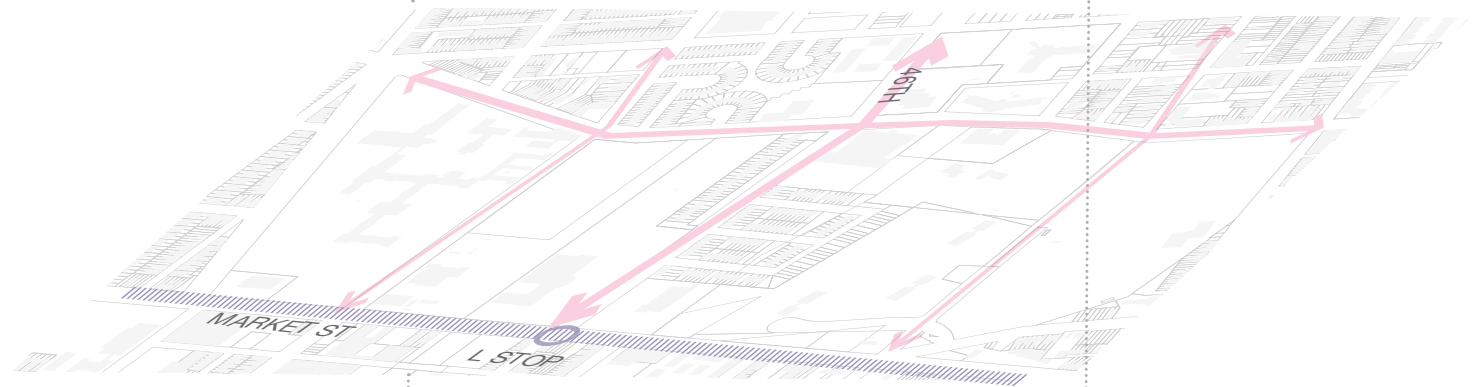
SITE ANALYSIS | Circulation, Landuse, and Water Flows

CIRCULATION

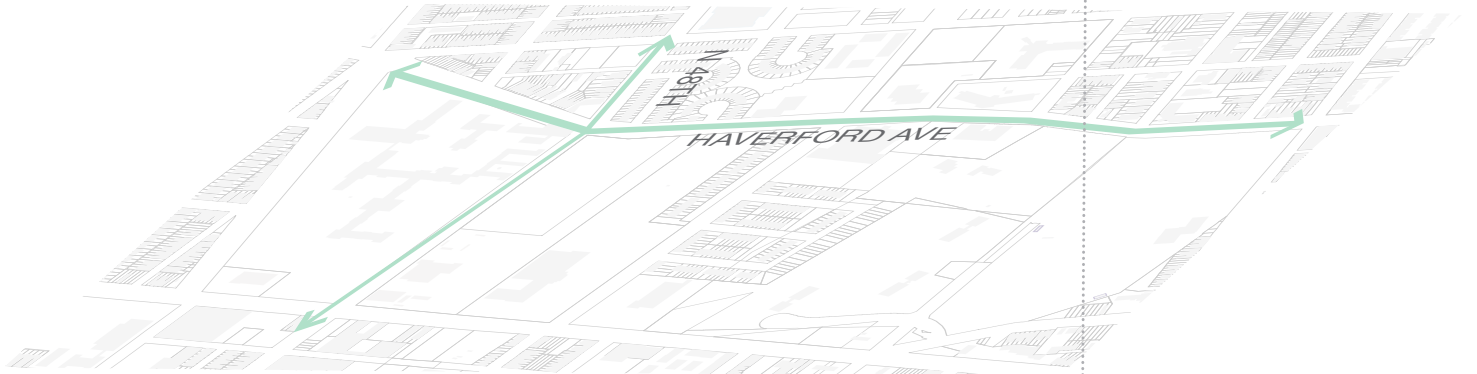
VEHICLE TRAFFIC



PEDESTRIAN TRAFFIC AND PUBLIC TRANSPORTATION

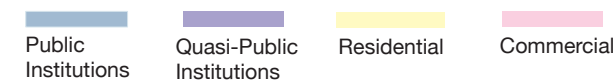


BIKE LANES

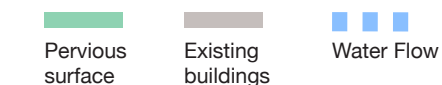


Haverford Avenue is a major vehicle thoroughway that extends from the Schuylkill River to Haverford. Traffic is heavy throughout the day along Haverford Avenue, while most of the pedestrian traffic runs perpendicular to Haverford Avenue, connecting residences to access the L stop on 46th and Market Street. There are bike lanes along Haverford Avenue and 48th street, however, due to lack of separation from traffic, the bikers experience are far from safe and pleasant.

LANDUSE



WATER FLOWS



LANDSCAPE OF INSTITUTIONS

PUBLIC- Lee Cultural Center, Locke Elementary School, Comprehensive Day Care Center, West Park Plaza (public housing), Youth Study Center (for troubled kids; under construction)

QUASI-PUBLIC - The Kirkbride Center (mental health institute), St. Ignatius Church and Nursing Home, Lee Field (Drexel University)

WATER VALLEY

There is a water valley along 46th street as Haverford Avenue slopes inward from 49th street and 42nd street towards 46th street.

Water flowing along Haverford Avenue meets at the intersection of 46th street and Haverford Avenue, then flows down 46th street towards Market street.

SITE ANALYSIS | Existing Conditions

CHALLENGES



VACANT LOTS
There are several vacant lots towards the NW corner of the Haverford Ave transect



SIDEWALK CONDITIONS
Tree breaking through the sidewalk pavement. Along Haverford Avenue, there are signs of street trees being removed.



SUBSIDENCE
Historically, subsidence has been an issue



LACK OF TRUST TOWARDS PUBLIC WORKS
Residents taking into their own hands to do sidewalk repair; the sidewalk was heaved up by the roots of a sheet tree.

OPPORTUNITIES



WIDE SIDEWALKS
Sidewalks are wide, ranging from 18' to 25'.



SIGNS OF PEOPLE ADOPTING THE STREET
There are signs of home owners engaging with beautification of the sidewalk with planters on the sidewalks.



SIGNS OF RAISING AWARENESS ON WATER
Sign of PWD's public awareness campaign near stormwater inlet



A PUBLIC SPACE FOR THE COMMUNITY
Lee Culture Center is one of the few public space utilized by local residents

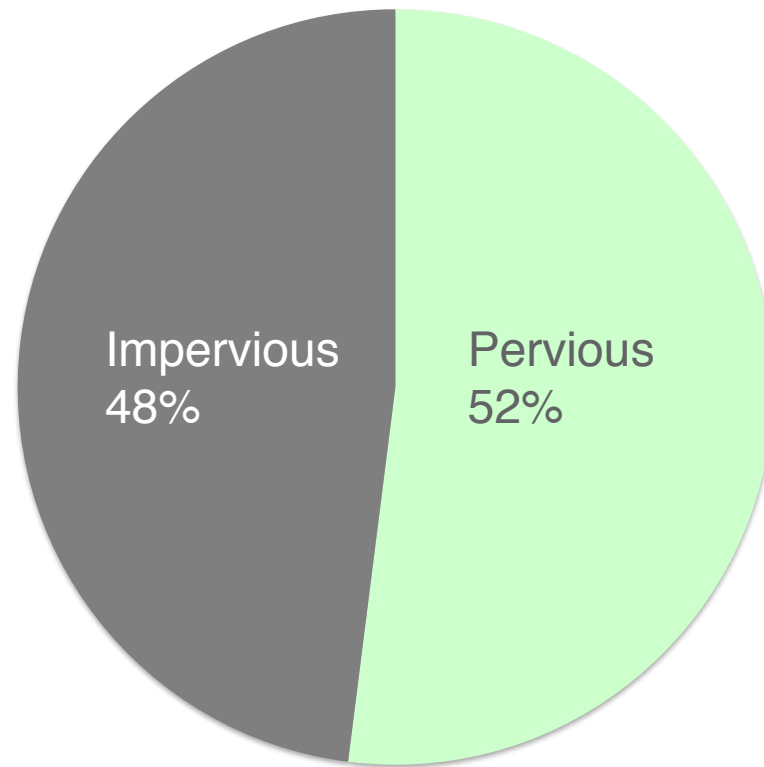
DESIGN CALCULATIONS | Achieving 72% Pervious Surfaces

With the types of stormwater improvements shown on the previous slide, the city can achieve an increase in the total pervious surface from 52% to 72%.

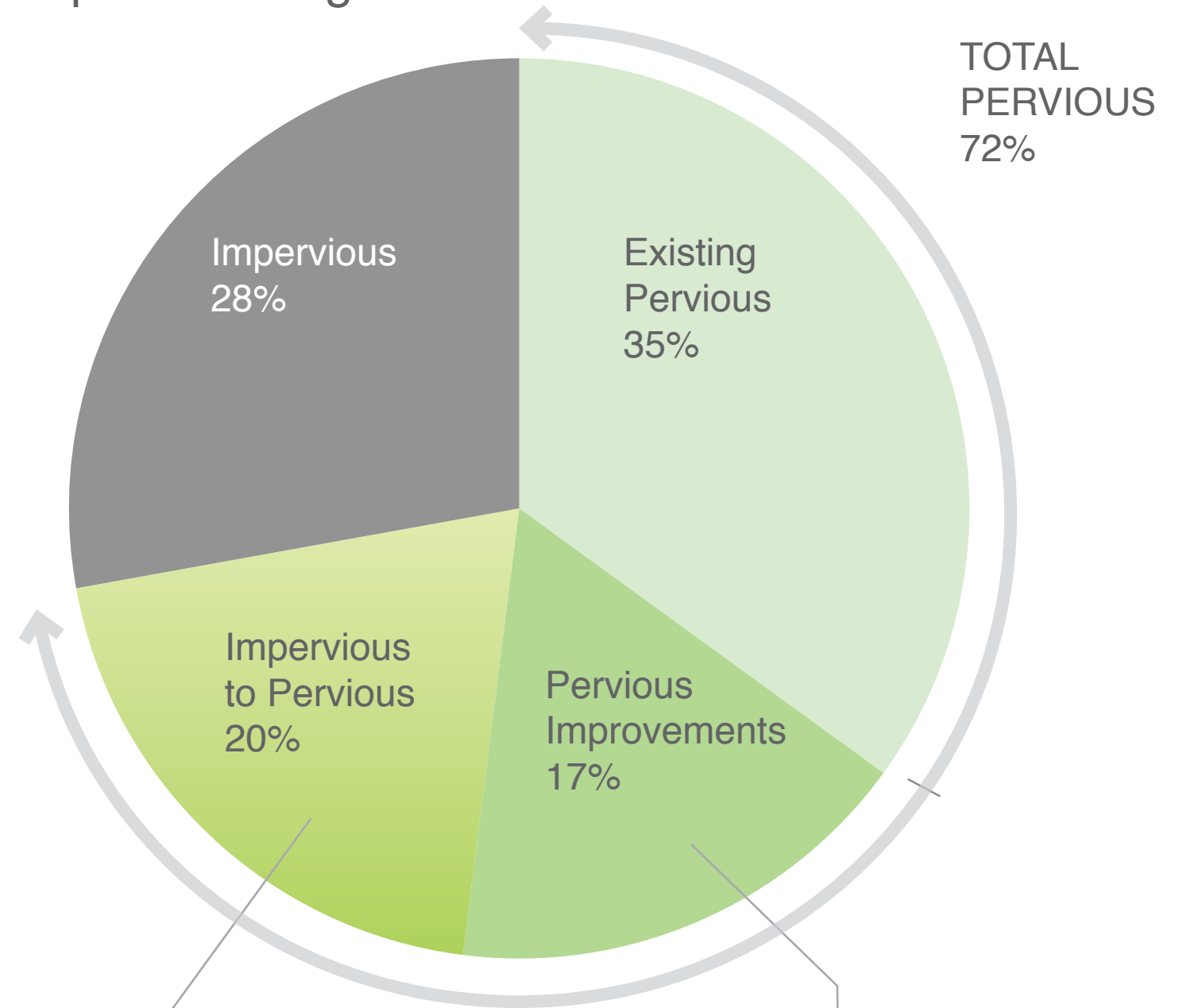
The total amount of surface improved, including both pervious improvements (such as improving soil conditions to allow for water absorption) and impervious surfaces that are remade pervious, is 37% of the total land area.

In total, these interventions can hold 101% of the volume of a 1 inch storm, meaning that the proposed design is slightly above capacity.

Existing Conditions



Proposed Design



Total Site Area: 3,735,820 ft²

To make the calculations straightforward, we used only the rectangular section of our transect below. See Excel sheet for additional information



1000 ft

3698 ft

- Parking lots
- Rain gardens
- Green roofs
- Blue streets
- Playgrounds

- Athletic fields
- Open spaces

STORMWATER STRATEGIES | Percent of Volume Held by each Intervention

Our proposed interventions convert 42% of the existing impervious surface to pervious surfaces, creating a total of 72% pervious surfaces on the site. Looking at the interventions by the amount of volume detained, the blue streets hold almost half of the volume of the 1 inch storm in our transect area. Pervious improvement and green roofs on institutional building account for a significant percent as well. These estimates assume 100% adoption of these interventions by the city and institutions (no residential interventions are included).



TOTAL VOLUME OF 1 INCH STORM DETAINED

101%

PERCENT IMPERVIOUS MADE INTO PERVIOUS (by area)

42%

Existing Pervious Surface
Existing Buildings (Impervious)

IMPLEMENTATION | Three Phases

We propose three phases on implementation, starting with a large city investment to repave the Haverford Avenue, followed by institutional investment and ending with ongoing residential and community engagement.

Before



1

City lays groundwork for blue streets

- Repaves Haverford Ave with permeable paving
- Improves bike lanes
- Signs and branding for Haverford Blue Street
- Adds space for swales and tree pits
- Plants street trees
- Lays foundation for future greening

2

Institutions develop streetscape

- Work with city to plan and develop their streetscapes
- Receive incentives from city to maintain their space
- Incorporate programs (e.g. gardening, youth development, outdoor education)

After



3

Residents engaged by claiming space

- Claim spaces for planters and small gardens
- Couple green infrastructure with other community concerns (gathering space, gardening, aesthetic improvement...)

IMPLEMENTATION I Phase 1 Street Detail

In the first stage, the city will repave the street, adding the in the wide tree trenches that expand under the sidewalk and into the street. Pervious paving over the bike and parking lane will both allow water into the tree trench and marks the lanes.



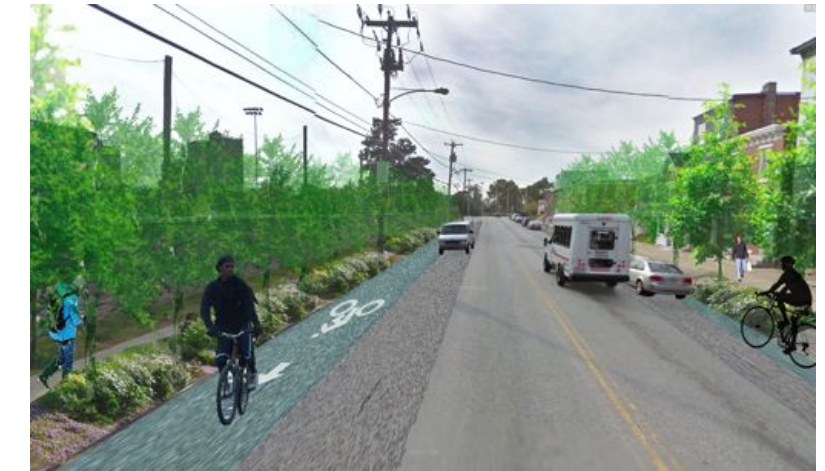
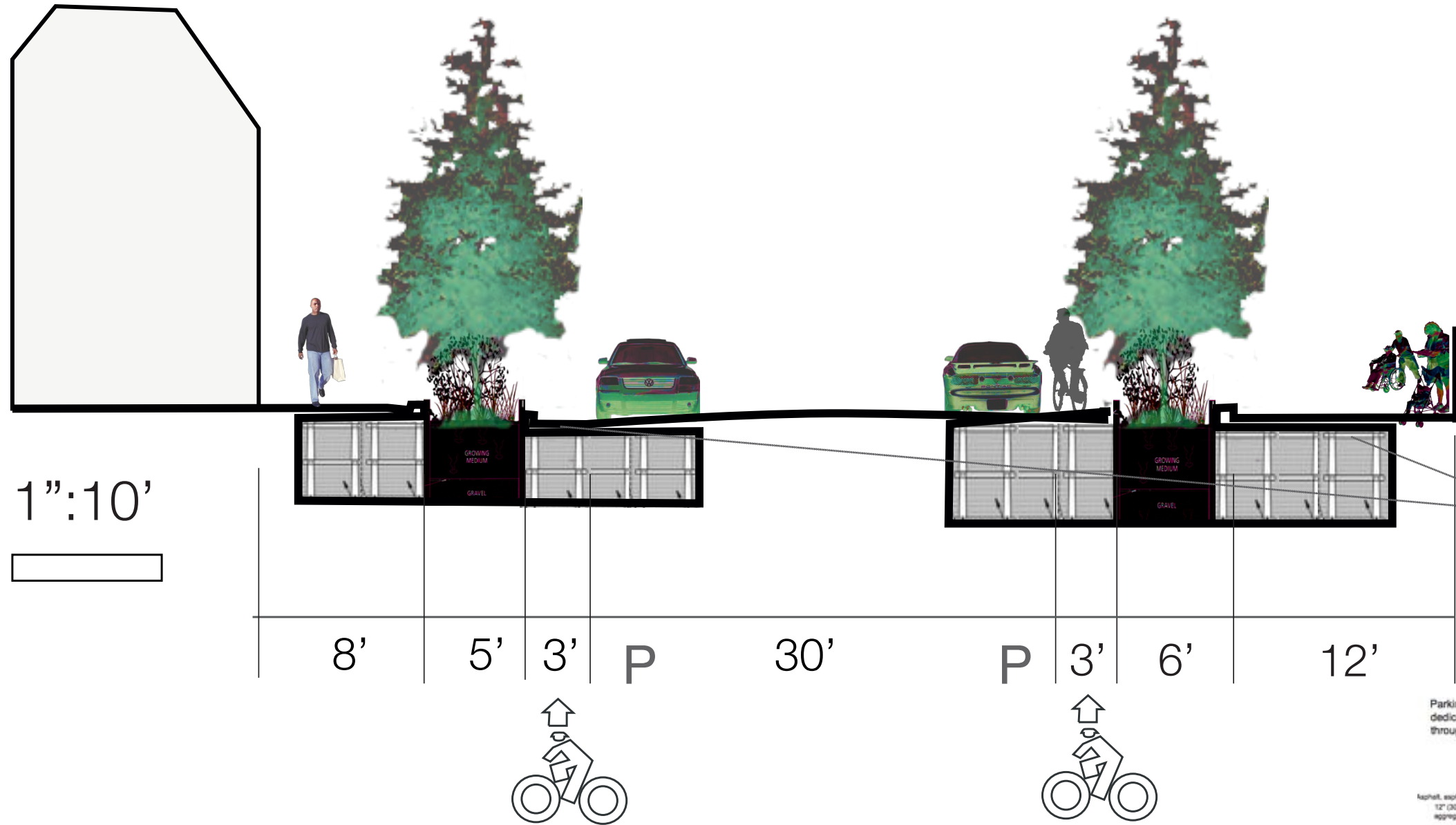
City



Institutions



Residents



Underground structure allows for uncompacted soil and weight-bearing pavement

The city would keep the travel lanes, but repave the parking, bike lanes and sidewalks in a permeable material. This would visually slow traffic, making streets safer for pedestrians and bicyclists.

Structures underground allow for uncompacted soil, promoting healthy street trees and providing space for water detention. Tree pits and trenches have flexible designs that can be adapted by institutions and residents.

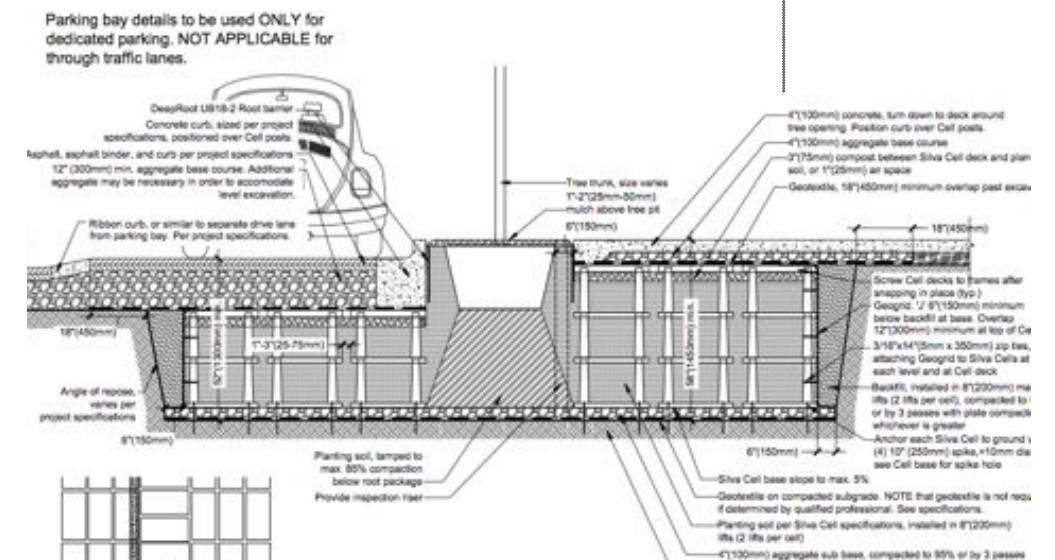


Diagram of the Silva Cell, by DeepRoot (www.deeprooot.com)

IMPLEMENTATION I Phase 1 Four Corners

1

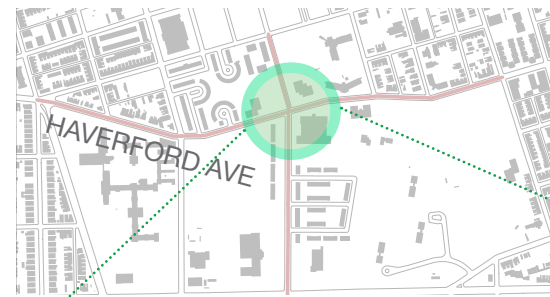
City

2

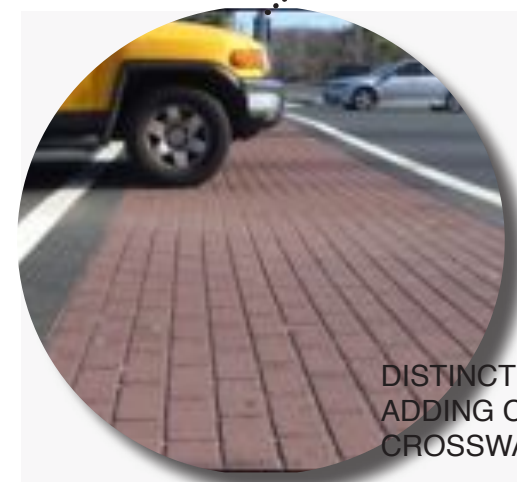
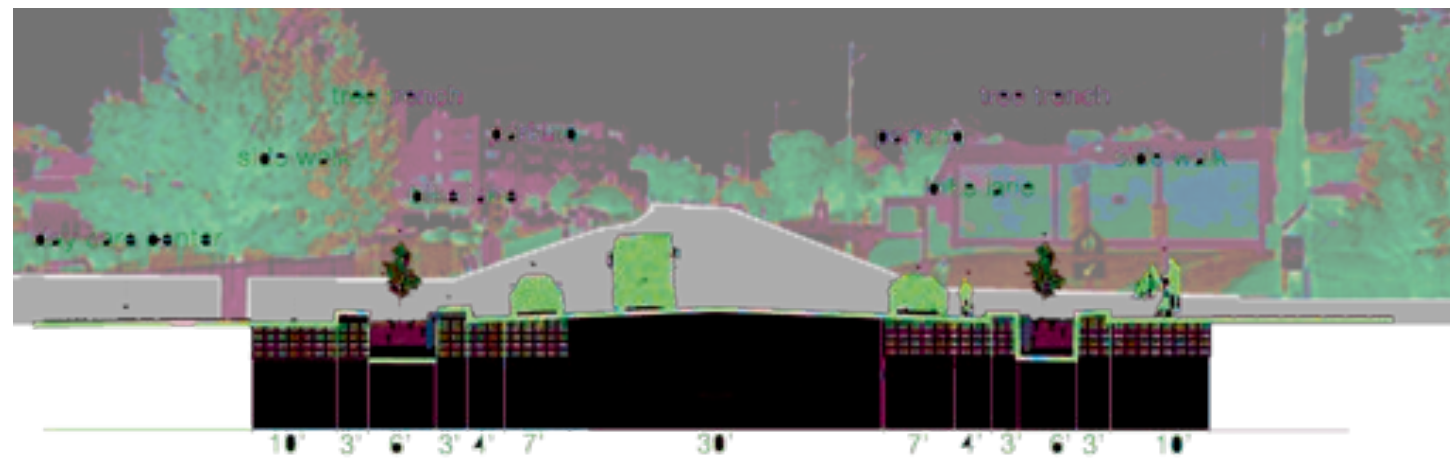
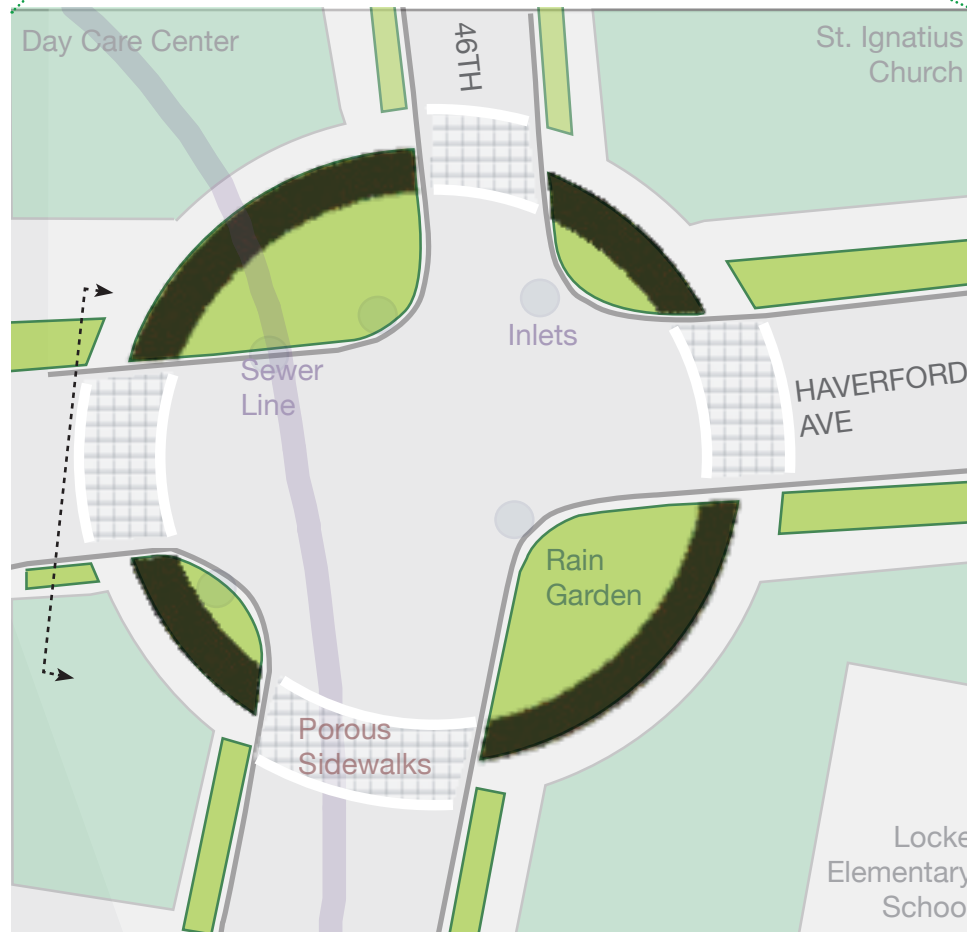
Institutions

3

Residents



The intersection of 46th street and Haverford Avenue would be the center of stormwater management, as it is located in a valley, and serves as the aesthetic symbol of the Haverford Blue Streets project. This type of intersection intervention, creating a strong visual symbol as well as a significant volume of water detention, can be repeated along Haverford and throughout the city.



DISTINCT POROUS PAVEMENT ADDING CHARACTER TO THE CROSSWALKS



VEGETATION THAT IS WATER RESILIENT BUT AESTHETICALLY PLEASANT

IMPLEMENTATION | Phase 2 Institutional Coordination

In the second stage, the city works with institutions, including schools, community centers, and health centers, to connect stormwater and green infrastructure into their missions. Institutions can tie green infrastructure to their core mission, using the space, health benefits, educational opportunities and other positives resulting from stormwater management to create exciting new opportunities that directly support the institutions' individual goals.

1

City

2

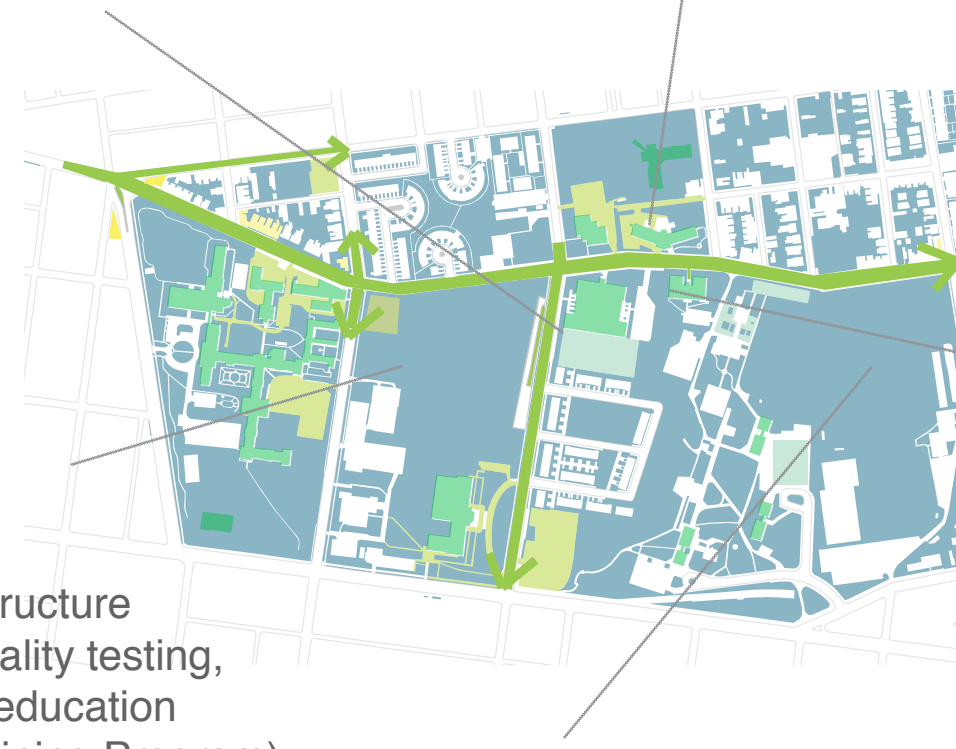
Institutions

3

Residents

Schools: Outdoor education, hands-on experiences, gardening

Nursing Homes: Opportunity for building and aesthetic improvement



Youth Center: Programs for youth development and responsibility - including job training in green infrastructure maintenance and water quality testing, art projects and hands-on education (i.e. Brown Streets Job Training Program)

Health Center: Promoting public health, and marking their entrance as place for health and wellbeing

Universities:

- Drexel can improve existing permeable areas, tying into their new master plan; and provides engineering and research expertise
- Haverford College engages community and
- Bryn Mawr's cities program can add urban planning expertise

Universities can coordinate with the Youth Center and schools on programs where college students train and work with younger children

IMPLEMENTATION | Phase 2 Institutional Incentives from the City

1

City

2

Institutions

3

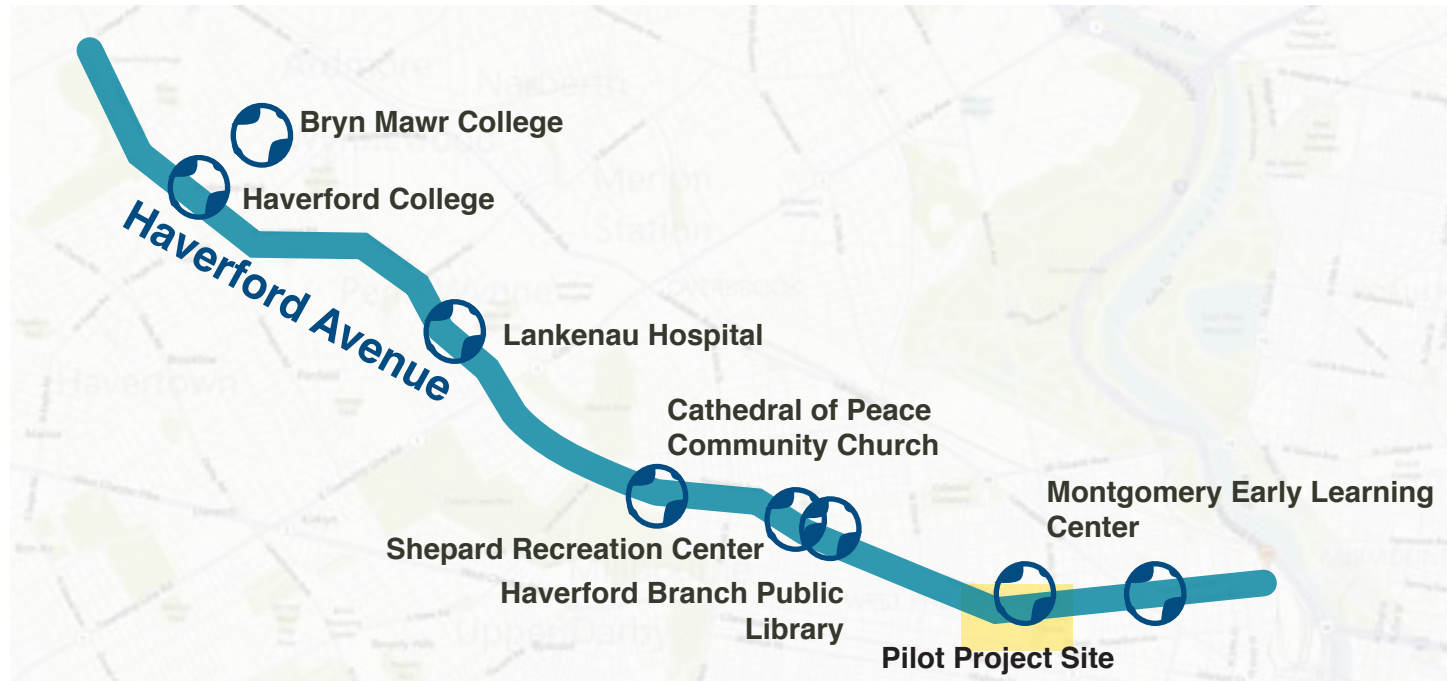
Residents



The Blue Circle

City creates a “Blue Circle” recognition program for institutions that implement storm-water BMPs

Branding can be coupled with the city’s Sustainability program and/or Green City, Clean Waters and will encourage institutions to take part in the program while also providing a visible symbol for residents.



As various institutions and organizations become “Blue Circle” certified, Haverford Avenue as a street will develop a new sense of awareness, identity, and community as the Blue Street.

As part of the program, or as stand-alone initiatives, the City can provide incentives for institutions to adopt stormwater management practices:

- 1. Financial: The city could provide reductions on water bill, low-interest loans for green roofs and permeable landscape
- 2. Construction: Variances and expedited permitting for projects with a green infrastructure component
- 3. Dept. of Ed: Ties education programs to academic requirements, provides lesson plans and equipment
- 4. Parks and Rec: Provides street trees, landscaping assistance, community gardening support (coordinating with Philly Green)

The City can also create supporting regulations to mandate certain important measures:

Although incentive programs help existing institutions adopt new practices, the City can develop supporting legislation and regulations, to mandate adoption of some stormwater management practices for new institutions (or existing institutions as they retrofit and upgrade their facilities), including:

- Mandatory green roof requirements for institutions over a certain size upon new construction or major re-roofing
- Pervious paving for parking lots upon new construction or major reconstruction maintenance

IMPLEMENTATION I Phase 2 Institutions Add and Maintain

①

City

②

Institutions

③

Residents

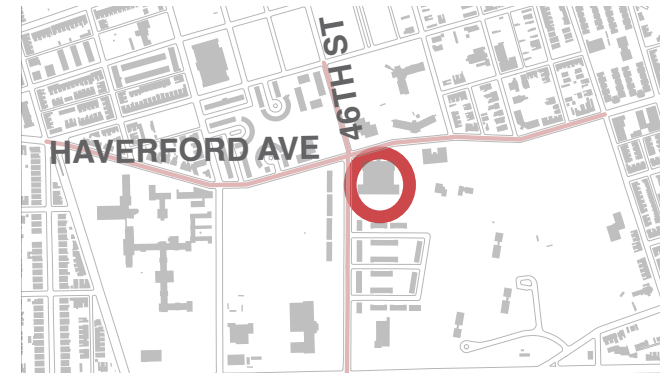
Locke Elementary School

Before



As an example of an institutional investment, the School District can transform a concrete yard into a permeable green space for recreation. Children can play soccer and other field games, it can be used as an outdoor classroom or even to grow vegetables.

Due to concerns about basement flooding, this area would be for detention and would have a collection pipe at the bottom of a permeable basin leading to the sewer.



After



IMPLEMENTATION | Phase 3 Engaging Residents

1

City

2

Institutions

3

Residents



Several residents already make use of their yards to plant vegetables and flowers



High ownership rates in the neighborhood inspire residents to care for the area and make their blocks beautiful.

Residents can extend their yard space by maintaining the tree and corner trenches. (This images shows another Philadelphia neighborhood.)

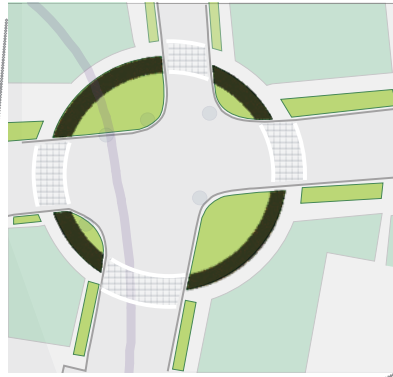


In the third stage of implementation, residents get involved. They can takeover parts of the tree trenches and water detention gardens to plant flowers or install benches and other public amenities. In some areas, residents will be inspired to act because of concerns about subsidence and leaking basements, while in other areas, neighborhood beautification, public spaces or other concerns will inspire engagement. This work will hopefully spill over beyond Haverford Avenue. Residents can take action at home, through landscaping, green roofing, and rain barrels, and in the neighborhood, taking over vacant lots and maintaining existing gardens.

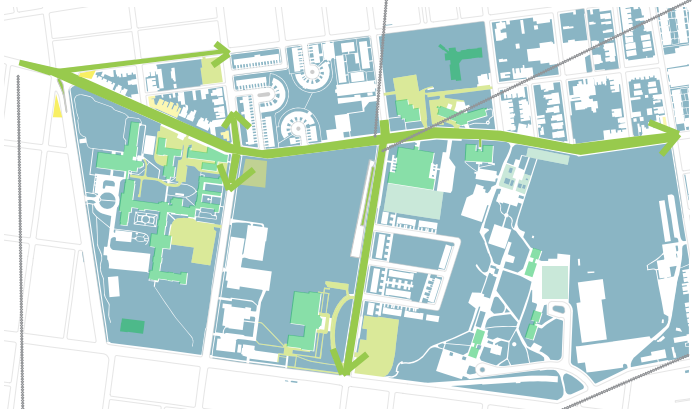
In our transect we saw proof of residents' actions to care for their streetscapes with planters and gardens. The enhanced streetscape of the Blue Street will naturally encourage more activity, and the City (either alone or partnered with Haverford, Bryn Mawr or UPenn) can further engage residents with programs to encourage further activities, including the adoption of vacant lots, creating gathering spaces etc.

SCALING UP | Working from the Site Up to the City

Circle Intersection



Transect



Watershed



Mill Creek watershed image from the West Philadelphia Landscape Project <http://web.mit.edu/wplp/wpdd/demo.htm>

City



The Haverford Avenue Blue Street pilot project will work at many scales. Interventions at specific sites, such as the rain garden plaza at 49th street or the four-corners detention at the low point at 46th street, will mark special areas, amplify stormwater benefits and also provide spaces for the community.

Magnified to the transect, the interventions on Haverford will extend to adjacent streets, particularly 46th st, which leads to the L. This will ripple out to the surrounding institutions and encourage the implementation of green roofs, pervious parking lots and other improvements.

Scaled up to the level of the watershed, this type of blue street intervention will make a huge difference to the Mill Creek watershed and neighborhood. In an area that has long faced problems of leaking basements and subsidence, such a significant water detention strategy will transform the neighborhood and residents' attitude about water.

The city can build on Haverford's success, one street at a time, until all Philadelphia streets are blue streets and the city is the green, healthy city it's people deserve, truly creating a Green City and Clean Waters.