

# GREENING AMERICA'S CAPITALS: HARTFORD CONNECTICUT





## **GREENING AMERICA'S CAPITALS: NEXT STEPS MEMO**

Greening America's Capitals is a project of the Partnership for Sustainable Communities between EPA, the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Transportation (DOT) to help state capitals develop an implementable vision of distinctive, environmentally friendly neighborhoods that incorporate innovative green building and green infrastructure strategies. EPA is providing this design assistance to help support sustainable communities that protect the environment, economy, and public health and to inspire state leaders to expand this work elsewhere. Greening America's Capitals will help communities consider ways to incorporate sustainable design strategies into their planning and development to create and enhance interesting, distinctive neighborhoods that have multiple social, economic, and environmental benefits.

Hartford, Connecticut, was chosen as one of the first five state capital cities to receive this assistance beginning in the fall of 2010, concluding with a site visit in early 2011.

More information at <http://epa.gov/smartgrowth/greencapitals.htm>

## I. EXECUTIVE SUMMARY

Hartford, Connecticut's Capitol Avenue corridor is home to many important historical and cultural assets, including the State Capitol and Legislative Office, the State Supreme Court, three churches, Bushnell Park, and the Bushnell Center for the Performing Arts. Capitol Avenue and the surrounding neighborhoods have the potential to serve as a more pedestrian-friendly, economically active, and environmentally friendly core of the city. The U.S. Environmental Protection Agency's (EPA) Greening America's Capitals program worked with citizens, design experts, city staff, state government representatives, local businesses, and other stakeholders to outline both a long-term vision that will give this corridor a strong sense of place, as well as near-term actions that can start to energize the streetscape and public spaces.

This report provides Hartford with a new vision for Capitol Avenue that highlights existing assets and fills in missing gaps along the mile-long area of focus and into the surrounding neighborhoods. This comprehensive vision includes seven design concepts that together work to improve underused properties, integrate green infrastructure into streets and parking lots, and create new parks and public spaces. Green infrastructure is defined as working landscapes—such as bioswales, rain gardens, and bioretention meadows—that mimic natural systems by absorbing stormwater back into the ground (infiltration), using trees and other vegetation to convert it to water vapor (evapotranspiration), and using rain barrels or cisterns to capture and reuse stormwater. The design offered in this report address goals identified in a public workshop, including linking nearby neighborhoods and destinations to one another, better managing stormwater, improving the pedestrian environment, and stimulating future redevelopment. The city of Hartford can use the designs proposed in this report, as well as the next steps provided, to begin to revitalize the Capitol Avenue corridor.

## II. PROCESS AND GOALS

### PROJECT GOALS

The goal of the Greening America's Capitals project was to re-imagine a mile-long portion of Capitol Avenue, a focal point of the city that includes the Connecticut State Capitol and Legislative Building, the State Library, the Supreme Court, and the State Armory, as well as residential and retail areas. The project team included city of Hartford staff, EPA staff, and experts from Nelson Byrd Woltz Landscape Architects. The project team held a three-day workshop in February 2011 that invited stakeholders from the city and the state to provide input on a redevelopment plan for the Capitol Avenue corridor and nearby locations, such as the Frog Hollow neighborhood and a proposed New Britain-Hartford Busway Sigourney Street Station. The primary goals for the workshop were to explore specific sites along Capitol Avenue and create design options that could make walking easier and more pleasant; create a stronger sense of place; better manage stormwater; and make connections between neighborhoods, cultural districts, downtown, and future transit stops. The proposals that came out of the workshops primarily address the design of public open spaces, such as parks, state building grounds, streets, and alleys. In addition, the community identified underused parking lots along the Capitol Avenue corridor that could be improved using green infrastructure techniques.

Leveraging the existing cultural assets and weaving different scales of green infrastructure technologies through the existing civic landmarks along Capitol Avenue will create a vibrant cultural and ecological corridor. This project will build on existing social and cultural capital to reinvigorate the capital core and improve environmental performance.

The project team developed site diagrams and initial design concepts—examples of which can be found in the following pages—which demonstrated current site conditions and solutions with the public, city and state staff, and other stakeholders. Photographs of existing locations within the Capitol Avenue corridor were used as bases for drawings that illustrate how interventions such as permeable paving, bioswales, and rain gardens can have a transformative effect on the public realm while providing habitat for urban wildlife and managing stormwater runoff. The draft concept designs also show complete street improvements such as narrowing lanes, adding bulb-outs at crosswalks, and adding markers for shared bike lanes.



Figure 1

- - - - - ARTERIAL    
 - - - - - COLLECTOR    
 - - - - - LOCAL    
 - - - - - ALLEY

This diagram reveals the network of diversely scaled streets along the Capitol Avenue corridor and the potential for bicycle and pedestrian linkages between the residential neighborhood and Capitol Avenue. One might imagine a cycling network that links Capitol Avenue via Broad Street or Putnam Street to the north and south and an enhanced streetscape that encourages residents to walk through the neighborhood.



Figure 2

This diagram shows the total area that falls within a five-minute walk (1/4 mile) of the front steps of the Capitol Building. Popular cultural and entertainment destinations, such as the Bushnell Center for the Performing Arts, and the Firebox Restaurant at Billings Forge, are less than a ten-minute walk from each other.





Figure 3





Figure 3A



Figure 4



Figure 4A



Figure 5



Figure 5A

### III. SITE INVENTORY AND ANALYSIS

#### CONTEXT

Hartford is rich in cultural and historical resources, yet the city presents only a modest interpretation of its significant role in American history. Hartford is located at the confluence of the Park River and the Connecticut River. One of the oldest cities in the United States, Hartford was originally settled in 1635 and has played a significant role in American history through the present day. Hartford is home to the nation's oldest public park (Bushnell Park), oldest public art museum (Wadsworth Athenaeum), and the oldest continuously published newspaper (The Hartford Courant). A catalogue of architectural gems and civic monuments—from the State Capitol Building to the Armory to Billings Forge—are sprinkled throughout the city landscape.

Hartford's location on the Connecticut River is a significant factor in the evolution of the city: it defined its historic rise as a state capital, and the city's hydrology determined its urban pattern. The Park and Connecticut Rivers originally flowed freely through Hartford, dividing the city into four sectors (North, South, West, East), but significant flooding in the early 20th century led to the channelization and ultimate relocation underground of a significant portion of the Park River. Following World War II, Hartford followed a trajectory similar to other post-industrial American cities. The suburbs of Hartford prospered while the inner city experienced a decline. The construction of highways through the center of the city of Hartford supported a commuter-based workforce and contributed to the physical isolation of the inner city. An economic boom in the early 1980s was not enough to revitalize the central parts of the city. Although major skyscrapers were planned, they were never built, and many sites still sit abandoned or function as parking lots. A fragmented, yet rich, set of properties still exists, and is fertile ground for new ideas and civic energy.

The Greening America's Capitals program is well-timed to coordinate multiple community-led, government-led, and private sector-led projects slated for the next 20 years in Hartford (Appendix A). While some of these projects have a long time frame, others are "shovel ready" and in some cases are already underway, including the iQuilt project, which proposes updating existing public spaces and weaving the city's cultural institutions together with pedestrian and bicycling routes running from Bushnell Park to the Connecticut River. This potential for coordination between projects has triggered a palpable optimism among Hartford residents to see real change in their streets and neighborhoods, as witnessed at the Greening America's Capitals three-day design charrette at the State Capitol Building in February 2011. This project is an opportunity to restore a sense of pride and empowerment and build on the growing momentum in the community. This report and its design concepts identify potential connections with ongoing projects and offer potential next steps for implementation.

#### ECOLOGY

Hartford's location on the Connecticut River directly links the city to the regional ecosystem. The Connecticut River is a major tributary of Long Island Sound, which suffers from fish kills and other problems triggered by too much nitrogen flowing into it. The sound provides critical habitat for a wide array of fish and wildlife within one of the most densely populated regions of the United States. Anadromous fish that migrate upriver from the sea to spawn rely on being able to move between the sound and its tributaries, and good water quality is essential to their health. Over the years, people have drastically changed Hartford's hydrologic system, largely through increased runoff from impervious surfaces such as rooftops, parking lots, and roads. This results in the release of gallons of untreated, nitrogen-rich stormwater into the Connecticut River annually. It also drastically diminishes groundwater recharge, resulting in high peak flows after rain events that trigger devastating erosion in streams and rivers within the watershed. With almost 50 inches of precipitation distributed evenly throughout the year, this has a disastrous effect on habitats within the larger regional ecosystem, which includes the Connecticut River and its tributaries, one of which is the Park River. Fortunately, well-tested and implementable techniques exist to manage this excess of stormwater. Additionally, conservation efforts, such as preserving and maintaining existing trees, have the potential to create memorable places for community. These natural processes manage stormwater runoff in a way that maintains or restores an area's natural hydrology.

The figures on the following pages show existing conditions photographs and site analysis maps that were used to establish a shared understanding of the current state of the study area. These images helped the project team elicit feedback from stakeholders during the charrette about the goals for the Capitol Avenue corridor and nearby neighborhoods.



Figure 7

View from Hartford Office Supply looking east down Capitol Avenue



Figure 8

Frog Hollow Neighborhood: Residential Street



Figure 9

Parking under the I-84 Viaduct



Figure 10

View looking towards the Capitol Building and the Bushnell



Figure 11

Frog Hollow Neighborhood: The Firebox Restaurant and Billings Forge Community Center



Figure 12

Proposed location of Sigourney Street BRT Station



Figure 6

STUDY AREA EXISTING STREET TREE CANOPY BUILDINGS PAVED AREAS







Figure 13

■ IMPERVIOUS SURFACES

— STUDY AREA





Figure 14



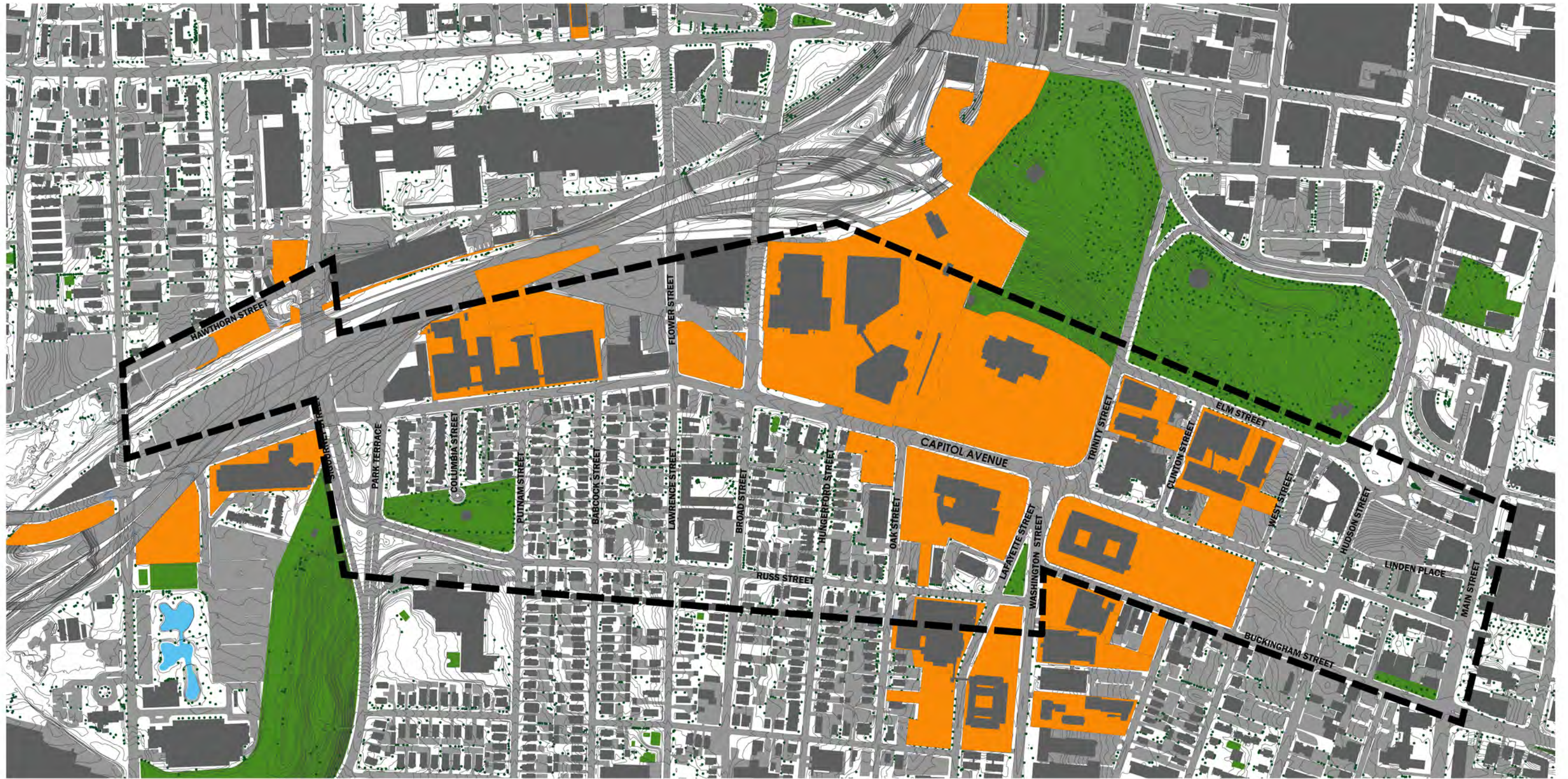
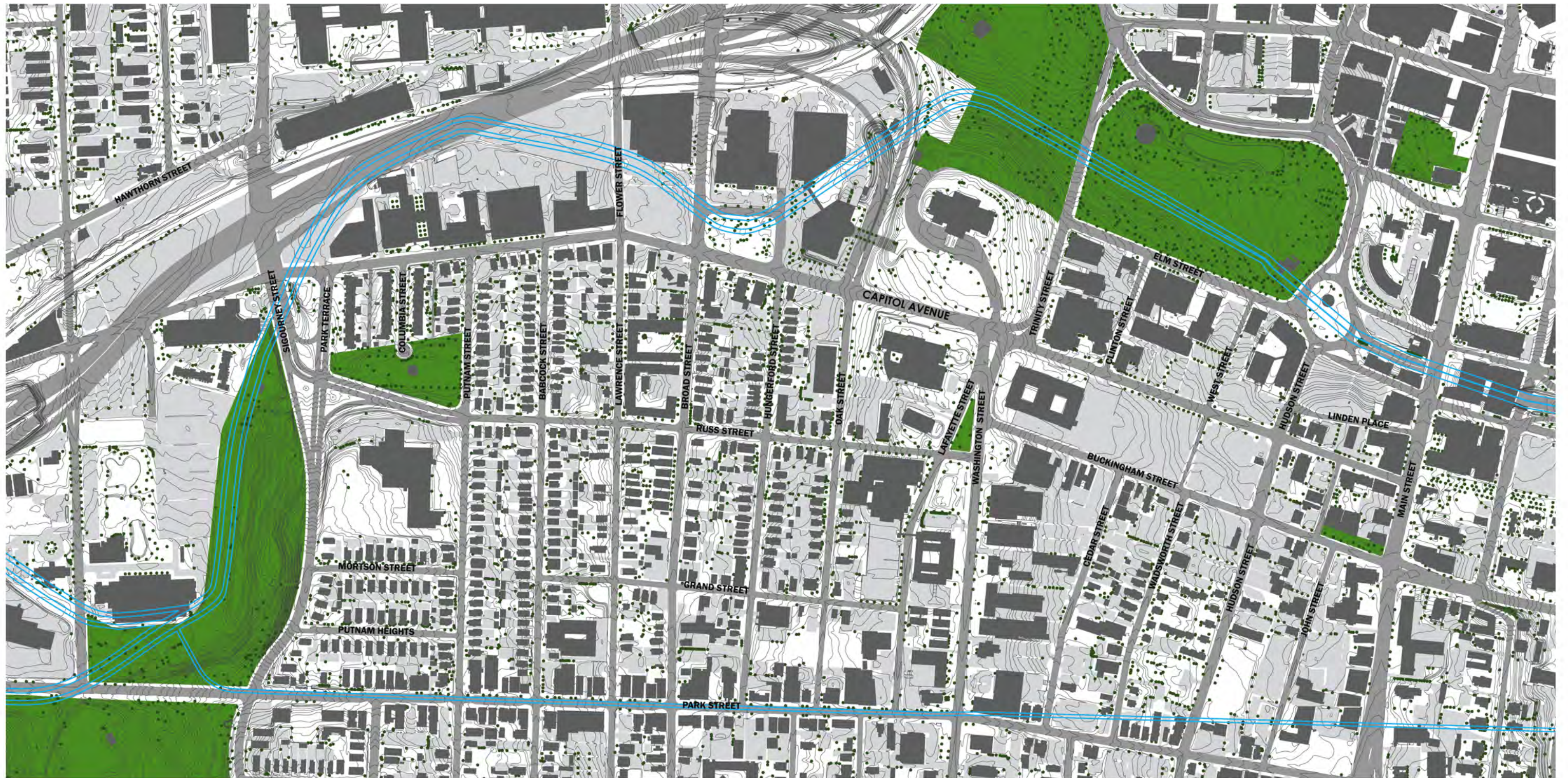


Figure 16






 Park River Conduit (Underground)

Figure 17

## IV. DESIGN PROPOSALS

An ecological-cultural narrative of place and passage provides the conceptual framework for the following design interventions. A language of collectors and conveyors links hydrology, ecology, and community. The interventions described below are the result of site analysis, initial design concepts and discussions, feedback, and direction provided by community and government leaders and other stakeholders who participated in the February charette.

Diagram Key:

1. Little Sigourney Park
2. Frog Hollow Streetscape
3. BroadFlower Park
4. Armory Park
5. Capitol Grounds
6. Capitol Grounds
7. Connecticut Square



Figure 18



Figure 19

The intersection of Capitol Avenue, Park Terrace, and the Sigourney overpass currently offers an inhospitable connection between residential neighbors and the proposed New Britain-Hartford Busway Sigourney Street Station. This area is at a low point in the study area and has a history of flooding. Stormwater drains off of paved surfaces into combined sewer outfalls directly into the Park River conduit.





Figure 19A

This park operates both as a “collector” and a “conveyor” of people and water. It provides a route from the Frog Hollow neighborhood to the planned New Britain-Hartford Busway Sigourney Street Station. It would also provide a gathering space for residents, as well as a collection point for water at the low point of the Capitol Avenue corridor. A future wetland meadow would collect stormwater runoff, calling to mind the former path of the Park River, which currently passes under the site in a concrete conduit. The design also proposes public art that might include framing views to the capitol, highlight migratory patterns of fish native to the Connecticut River and its tributaries, and help to transform the inhospitable walk under the viaduct with an artful lighting installation.



In the Frog Hollow neighborhood and others, there has been minimal investment in the urban tree canopy in recent years. Stormwater drains directly off of impermeable surfaces into the city's combined sewer and water treatment system.

Figure 20

This concept proposes a green infrastructure prototype that could be used on residential streets around the city. A bioswale would run between the sidewalk and the curb line, with intermittent connections to the street provided by permeable pavers that could collect stormwater runoff. The plantings in the bioswales would enrich the street with native plants. A street tree planting on the opposite side of the street could add to Hartford's tree canopy and shade a bike lane that links to a larger regional cycling network.



Figure 20A



Figure 21

This poorly maintained parking lot between Broad Street and Flower Street is an unattractive view terminus for travelers on Capitol Avenue in both directions and a barrier to those looking to walk between neighborhoods, commercial areas, and civic and cultural amenities. The surface parking creates a vast area of impermeable surface sending stormwater directly into the city's overtaxed system.

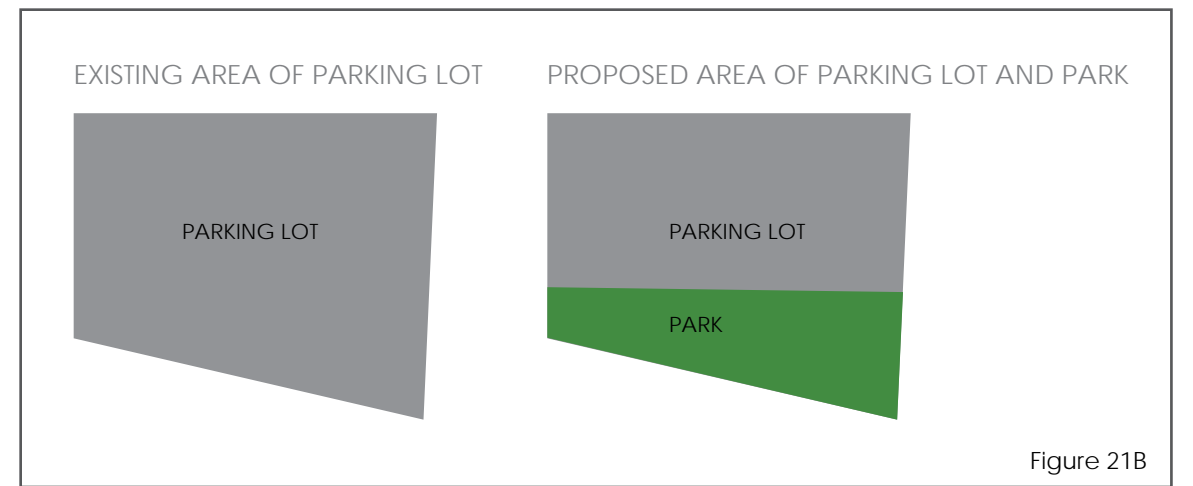


Figure 21B



Figure 21A

The BroadFlower Park concept proposes a retrofit of a poorly maintained parking lot at the knuckle of the Capitol Avenue Corridor study area. This proposed park would sit at a shared viewpoint on Capitol Avenue seen from both the east and the west, and therefore has significant symbolic value. The site is also a hydrological collector, as it sits at a low point along the corridor, thereby serving well as a terminus for the proposed bioswale along Capitol Avenue. Its position at the intersection of the Frog Hollow and Asylum Hill neighborhoods provides passage between the two communities and could connect the two. BroadFlower Park would convert the parking area closest to Capitol Avenue to a park, while maintaining well over half of the current parking spots on site with a more efficient parking configuration (see Figure 21B). The community’s enthusiasm for the development of this site suggests that it might be a strategic first project.



Figure 22

This existing open space provides a clear view of the impressive façade of the State Armory and Arsenal but offers little refuge from the vast spaces surrounding it. This large open space currently offers no seating, has very few trees, and provides no additional stormwater treatment.



Figure 22A

Adjacent to BroadFlower Park, this redesign of an existing open space would create usable civic space on the “front lawn” of one of Hartford’s architectural gems—the State Armory and Arsenal. Armory Park would allow for passive uses, such as seating and picnics, and active uses, such as sports. It would be bounded by a lush bioswale, dense tree planting, and the grand façade of the Armory building. The addition of trees and green infrastructure would contribute to improved stormwater management.



Figure 23

Although it is a symbolic civic space, the front lawn of the Capitol Building creates an isolating experience for the pedestrian. Rather than being drawn into the space, the pedestrian is relegated to the sidewalk at the edge of the lawn, directly adjacent to a busy travel lane on Capitol Avenue. While the lawn does provide infiltration for stormwater, fescue is an irrigation-intensive plant and demands frequent mowing, which means that the lawn requires a significant amount of water and maintenance and has minimal habitat value.



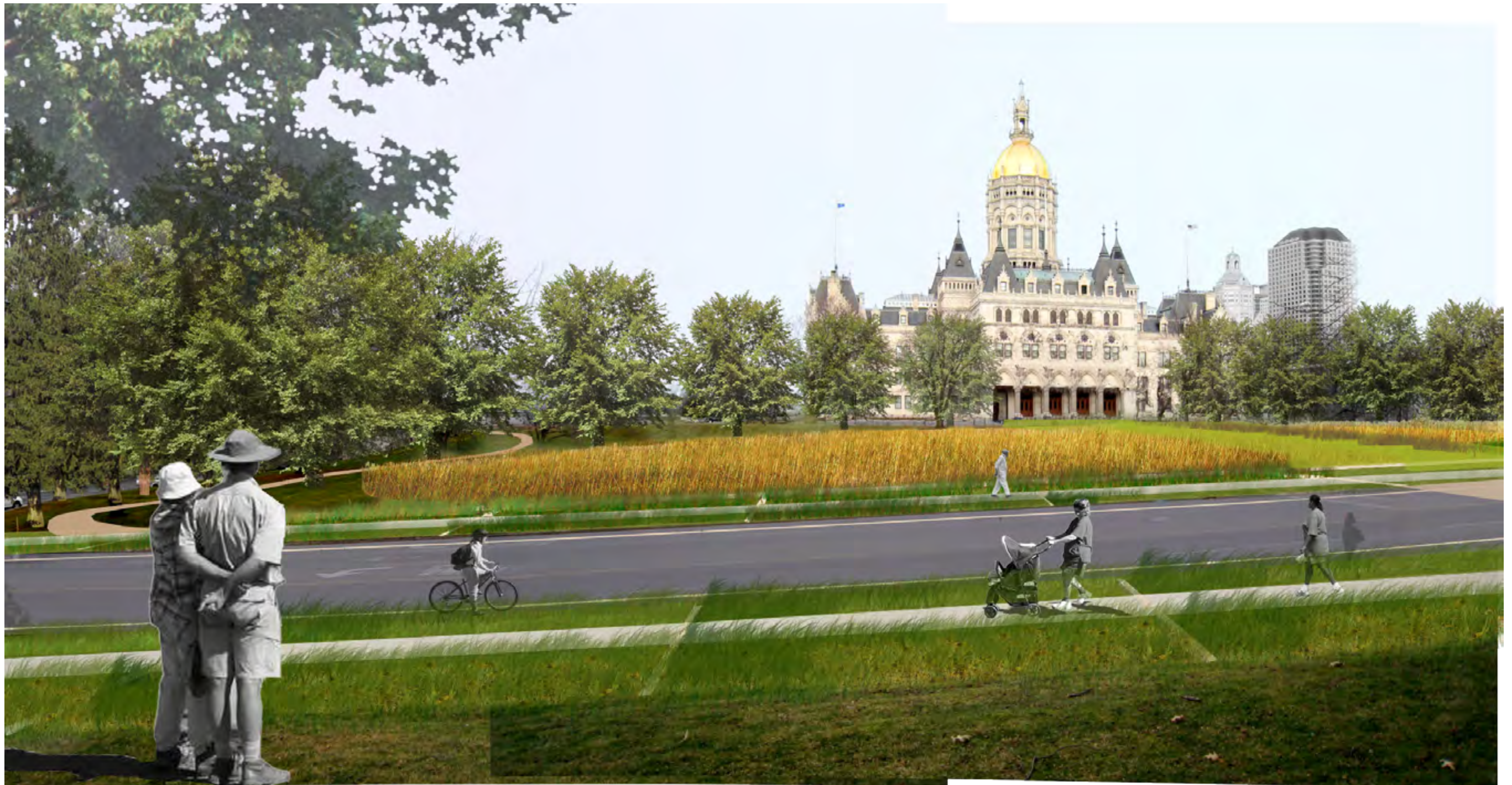
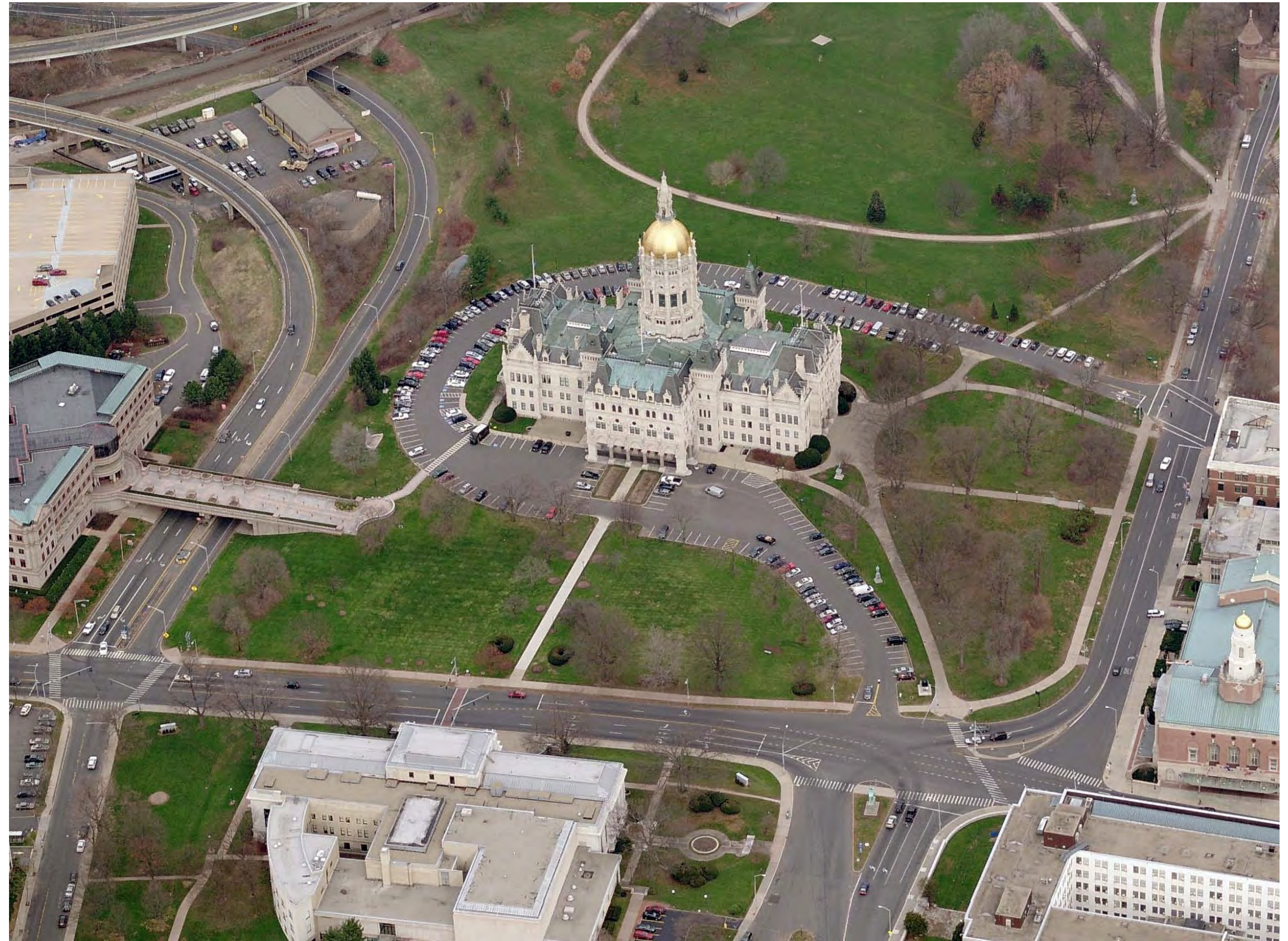


Figure 23A

The landscape at the Capitol Grounds plays a symbolic role as the welcome mat to Connecticut's State Capitol building. A range of green infrastructure techniques—a bioswale along Capitol Avenue, permeable bike lanes along Capitol Avenue traveling in both directions, and a meadow rich with flowers that provides habitat for pollinators as an alternative to fescue on the lawn of the Capitol—layer to create a rich ecological and cultural matrix. The introduction of native vegetation would start to reintroduce and recall the natural history of Connecticut and recreate a habitat that existed when Hartford was first settled. A path under the canopy of trees would wind its way around the west of the Capitol building, connecting Capitol Avenue with the transit hub at Hartford's Union Station.



The current circulation pattern at the Capitol Grounds prioritizes the automobile. The site is in a highly visible location and occupies the space between the State Library, the west end of Bushnell Park, and Asylum Street and Union Station at the northwest corner of the park. Rather than facilitating circulation between these critical cultural and civic nodes, the Capitol Grounds act as a blockade to pedestrians and cyclists who wish to make these connections. The broad width of Capitol Avenue in front of the Capitol Building diminishes the symbolic civic and cultural link between the Capitol Building and the State Library.

Figure 24



This proposal suggests eliminating the vehicular entrance from Capitol Avenue and creating a loop drive around the Capitol Building, with an entrance and exit onto Trinity Street. This unifies the grounds of the Capitol Building along Capitol Avenue, strengthens the axis between the Capitol Building and the State Library, and creates a welcome environment for pedestrians. Historic drawings and photographs of the Capitol Grounds show that this loop road is similar to the original circulation pattern at the Capitol.

Figure 24A



Figure 25

The streetscape along this block of Capitol Avenue, just east of the State Office Building and the Bushnell Center for the Performing Arts, does not offer a hospitable pedestrian experience, provides minimal ecologic value, and suffers from a lack of maintenance. Street lighting is sparse, and the planting of street trees on the inner edge of the sidewalk gives the impression that the street is overly wide. Furthermore, the adjacent 150,000 square foot asphalt parking lot that serves state employees during the work week sits vacant during evenings and weekends, contributing to the isolated and neglected feel of this block.



Figure 25A

An inventive shared-use parking lot could simultaneously meet the needs of state employees during working hours Monday through Friday and support the programs of nearby cultural institutions in the evenings and on weekends. Permeable pavers in a new parking lane provide more interesting aesthetic qualities than asphalt and could help to transform the community's perception of these public spaces while managing stormwater runoff. An investment in green infrastructure along the perimeter of the parking lot in the public right-of-way would improve landscape aesthetics while allowing for adaptability to future development or other land uses. This project is a component of the iQuilt Master Plan for Hartford.

## V. IMPLEMENTATION

The era of single objective funding is over. Investing in multiple goals, and building meaningful coalitions of community groups, civic institutions, the business community, preservationists, and governmental representatives is essential for cities like Hartford trying to build projects that are fiscally, socially, and environmentally long-lasting. Particularly in these difficult economic times, intergovernmental collaboration and outreach can help garner legislative support. Fortunately, there are multiple efforts underway in Hartford that this Greening America's Capitals project can build upon for implementation of the design proposals.

- The city's Plan of Conservation and Development, called **One City, One Plan** provides the civic foundation for the designs in this report. One of the recommendations of One City, One Plan is to "[i]mprove the Capital Avenue Corridor by creating a mixed-use neighborhood, replacing surface parking with structured parking, and developing available land with new buildings." This report provides implementable designs for achieving that goal.

- The iQuilt Plan** identified approximately \$50 million worth of upcoming projects that will make improvements to the Capitol Avenue area. The designs in this report could capitalize on those iQuilt efforts to implement a unified vision for Capitol Avenue and its vicinity. Representatives from the **Bushnell Center for Performing Arts** were active participants in the Greening America's Capitals workshop, and the project team worked closely with iQuilt to ensure effective coordination among the designs, goals, and implementation plans.

- The **Metropolitan District's (MDC) Clean Water Project** is intended to eliminate sewage overflows to the Connecticut River and other waterways and to improve water quality. According to the MDC, this cleanup project is estimated to cost \$1.6 billion, of which \$800 million will be spent in Phase I. Projects will include new sewer and drainage systems as well as greater wastewater treatment capacity and new storage.

The Clean Water Project could fund some of the green infrastructure practices described in this report and illustrated in the designs. MDC has expressed interest in integrating green infrastructure technology to offset the cost of combined sewer upgrades and in making green infrastructure a functioning component in the drainage system. MDC could also save a significant amount of money if regular maintenance could occur in more easily accessible space outside of the travel way, for example, in a bioswale instead of in a pipe beneath a street or sidewalk. Green infrastructure installations need to be sited carefully, however, since much of Hartford is underlain by clay soils that reduce the opportunities for infiltration. There are many examples of cities that have successfully used green infrastructure to infiltrate through compacted or clay soils by amending soils with compost. In addition, many of Hartford's underground sewer pipes are more than a century old, with cracks that allow groundwater to flow into them. Green infrastructure should be designed and sited where it will not cause additional groundwater to flow into these pipes, exacerbating the overflow problem that exists today. For example, bioswales can be fitted with linings and underdrains that limit seepage into underground pipes and still allow a majority of runoff to evapotranspire.

- The **New Britain-Hartford Busway** is being designed by the **Connecticut Department of Transportation (CT DOT)** with funding from the **Federal Transit Administration**, and will have a stop at Sigourney Street, at the west end of this section of Capitol Avenue. Although the design for the station is completed and ends at the point where CT DOT would need to build a level, handicapped-accessible pathway to the street, there may be opportunities for improving pedestrian connections between Capitol Avenue and the Sigourney Street station, similar to the designs shown in this report.

- CT DOT owns and operates **Connecticut Transit**, which provides local bus service in Hartford and other cities, and it also runs the free shuttle service (Star Service) in Hartford, which runs fuel cell-powered buses. CT DOT indicated that it could work with the city to improve bus service by adjusting traffic signals to allow buses to travel more quickly, making them a more appealing mode of transportation than cars. In addition, CT DOT is willing to work with the city to make bus stops more attractive, implementing new designs incrementally along routes, including those in the Capitol Avenue area. The design options provided in this report could be used to continue conversations with CT DOT about the location and design of future bus stops.

- The city of Hartford and the **Capitol Regional Council of Governments (CRCOG)** are working with a committee of stakeholders to explore alternatives to reconstruct, replace, or remove the Interstate 84 Viaduct, which cuts through Hartford and its neighborhoods. No final plan for the viaduct has been agreed upon, but the designs developed through the Greening America's Capitals process can support ultimate decisions for the Interstate 84 Viaduct by helping to improve the quality of life in surrounding neighborhoods, support existing businesses, and promote economic development. In addition, CRCOG is a member of the consortium that will receive the **HUD Sustainable Community Regional Planning grant**, and could provide additional support for these designs using that resource and planning process.

In addition to linking the design proposals to ongoing efforts, the city could undertake low-investment steps at the scale of individual buildings or neighborhood blocks that can be catalysts for larger change. A simple public mural project or painting a parking space green can begin to bring art into the public realm and show citizens and visitors that change is happening. The city could educate residents about simple, affordable steps they could take to improve the aesthetics and environmental performance of their properties, like holding workshops on creating rain gardens, offering rain barrels to interested residents, and starting a small grant program to encourage investments in private alleys.

Another step that could be implemented early in the follow-up process is to plan a walking tour of Capitol Avenue and the Frog Hollow neighborhood. Stakeholders in the design charette suggested that Governor Dannel Malloy, state legislators, and city officials could take a walking tour of the area to get a complete picture of the current state of Capitol Avenue's pedestrian environment. Charlotte, North Carolina's city-wide Complete Streets program gained support after Charlotte Department of Transportation staff gave a walking tour to city council members. Hartford already has historic walking tours, and community members who attended the workshop agreed to organize a tour for elected officials of the Capitol Avenue area that focuses on walkability, environmental performance of streets and open spaces, and the potential for greening improvements that would benefit residents, visitors, and businesses.

Implementation of the design proposals offered in this report would require participation across disciplines; among different city and state agencies; and of local residents, property owners, and other stakeholders. The enthusiasm evident among participants representing these diverse constituencies during the February charette for the concepts embodied by the design proposals—stronger cultural, historical and ecological connections, a safe and enriched pedestrian and cyclist environment, and the utilization of green infrastructure—speaks to their commitment to the project, and positions these design interventions as catalysts for urban revitalization in Hartford.

**VI. GREEN INFRASTRUCTURE CASE STUDIES**

# LYNCHBURG RIVERFRONT IMPLEMENTATION PLAN, LYNCHBURG, VIRGINIA

WHO: Nelson Byrd Woltz Landscape Architects

WHAT: Lynchburg Riverfront Implementation Plan and full design services for specific projects, totaling 14 acres

WHEN: Implementation plan completed adopted by the City of Lynchburg September 2006  
Jefferson Street North project opened to public in June 2010

COST/FUNDING SOURCES: \$2.4 million

CONTACT/MORE INFORMATION: NBW Landscape Architects  
Park Ave South, Suite 920  
York, New York 10003  
www.nbwla.com

## VISION:

NBW was selected by the City of Lynchburg to develop an Implementation Plan for the revitalization of the Downtown Riverfront in 2006. NBW assessed the existing conditions in relation to the proposed master plan for the entire downtown area (by Sasaki Associates in 2002). This four-month effort culminated in a plan that identifies and prioritizes a series of achievable projects between Commerce Street and the riverfront. Included in the plan are a new 8-acre Riverfront Park and the renewal of nearby urban streets with multiple spaces for recreation, interpretive facilities, and gathering. It includes a re-imagined mixed-use pedestrian corridor, restored streets, and public ways with dedicated outdoor café spaces, play areas, a large canal basin, fountains, and an events plaza. The design process involved several meetings with City and private stakeholders and was endorsed by City Council in 2006.

Specific projects were identified within the Implementation plan and a phasing plan was developed. The first Riverfront Park project, Jefferson Street North, was opened to public in June 2010. NBW is working on the construction documents for a second phase of the project, Jefferson Street South, that will complete the streetscape adjacent to Riverfront Park. The Lower Bluff Walk Corridor is also in the construction document phase. This pedestrian arts and dining corridor will connect Main Street and the Riverfront. Included in this work are design guidelines for the site development and architecture in the area. As part of this project, NBW initiated a detailed stormwater strategy that will help the downtown in its stewardship of the James River Watershed and provide a model for sustainable practices. Inherent in this project is the re-direction of runoff from the overburdened combined City sewer system to new porous parking areas and extensive rain gardens. The rain gardens have flowering native plants and interpretive signage and are an educational and aesthetic asset to the park.



Figure 46

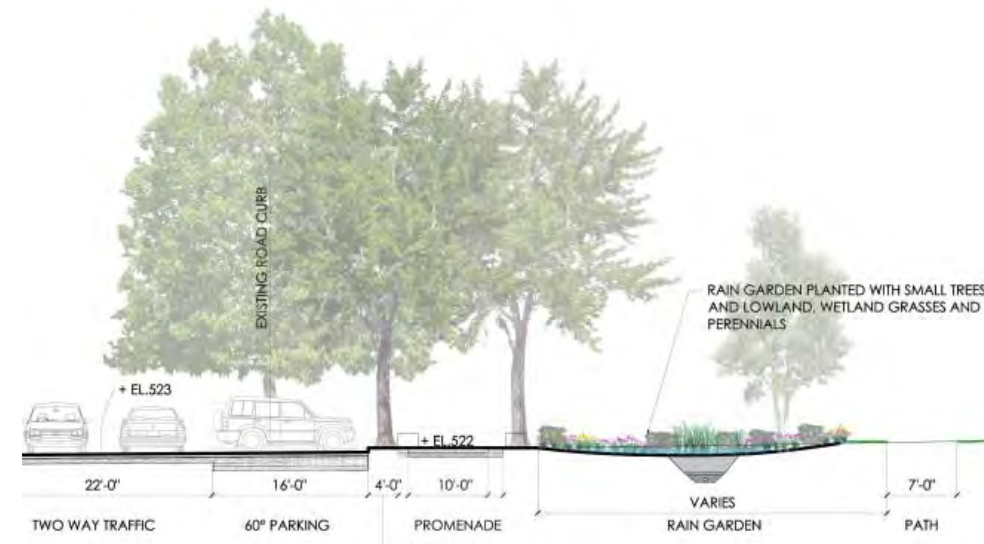


Figure 47



Figure 48



Figure 49



Figure 50



Figure 51





Figure 52



Figure 53



Figure 54



Figure 55

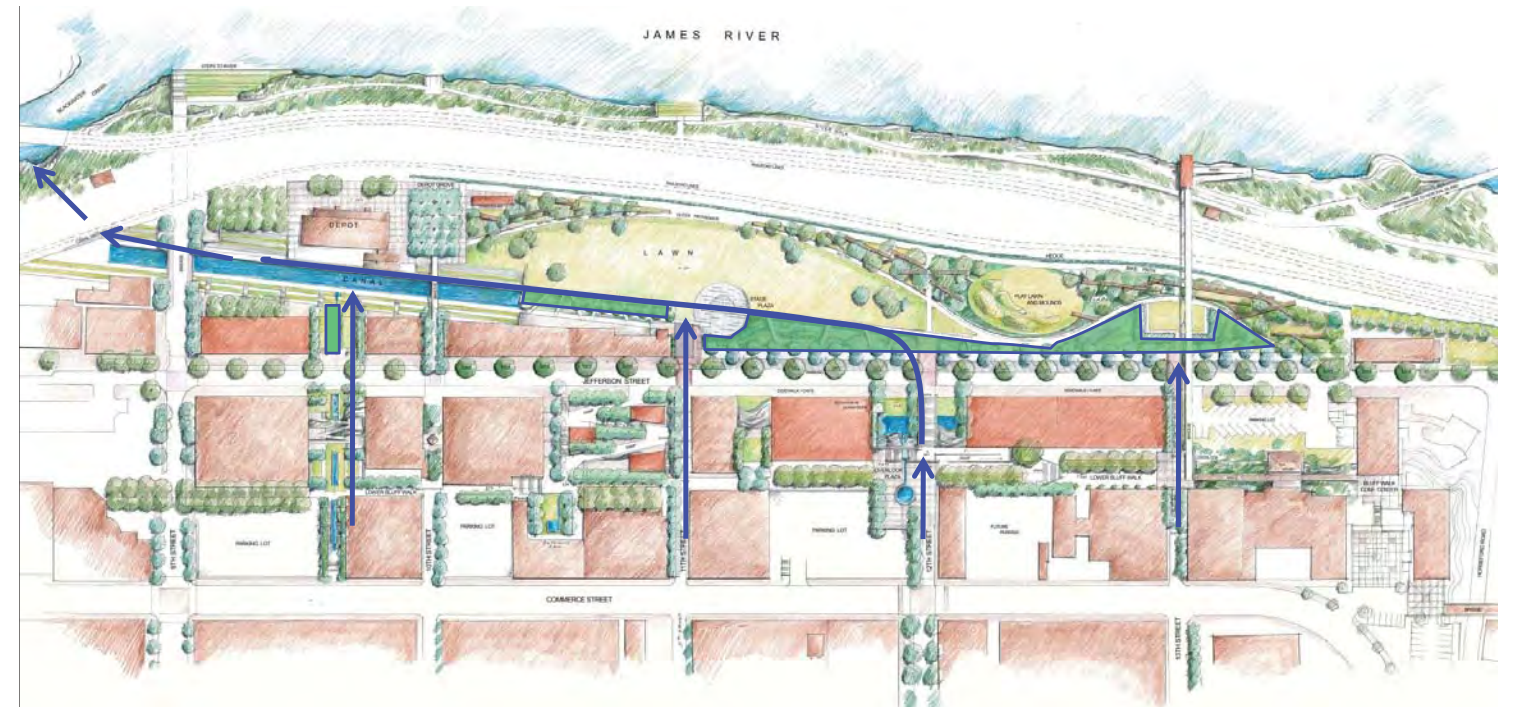


Figure 59



Figure 56



Figure 57

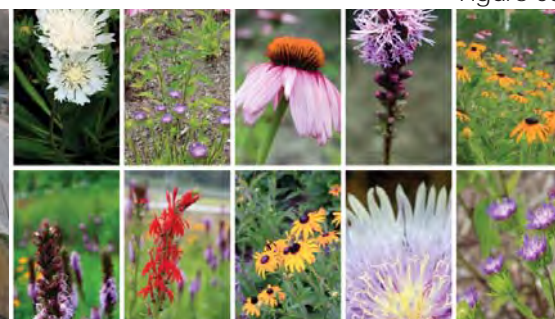


Figure 58

## NEW YORK CITY : HIGH PERFORMANCE LANDSCAPE GUIDELINES

WHO: Design Trust for Public Space and City of New York Parks and Recreation

WHAT: Comprehensive design manual for sustainable, 21st century New York City parks, including best practices for design, construction, maintenance and operations, soil, water, and vegetation

WHEN: Launched in January 2011

Implementation Period: ongoing

COST/FUNDING SOURCES:

The Design Trust for Public Space

City of New York Parks and Recreation

CONTACT/MORE INFORMATION:

Design Trust for Public Space

West 39th Street, 10th floor

York, NY 10018

[www.designtrust.org](http://www.designtrust.org)

VISION:

“Often thought of as the ultimate urban environment, New York City is actually the greenest city in the country. Over 15% of the city is parkland, managed by the New York City Department of Parks and Recreation (Parks).

Parks is poised to undertake its largest infrastructure improvement initiative since the 1930s, giving rise to an extraordinary opportunity to rethink traditional park design and construction. Seizing this opportunity, the Design Trust forged a partnership with the Parks Department to create High Performance Landscape Guidelines: 21st Century Parks for NYC for sustainable park construction (published January 2011). These guidelines will become Parks' standard specifications, and will revolutionize how our green spaces are conceived and constructed.

The High Performance Landscape Guidelines will build on the Design Trust's groundbreaking work in sustainable design and construction, as the third in our trilogy of sustainable design manuals. The Design Trust's previous publications, High Performance Building Guidelines (1999) and High Performance Infrastructure Guidelines (2005) set the stage for a paradigm shift in the way New York City is constructed. These two publications led directly to the enactment of local laws that encourage high performance construction, and also paved the way for Mayor Bloomberg's recent sustainability initiatives.”

source: High Performance Landscape Guidelines (2011); [www.designtrust.org](http://www.designtrust.org)

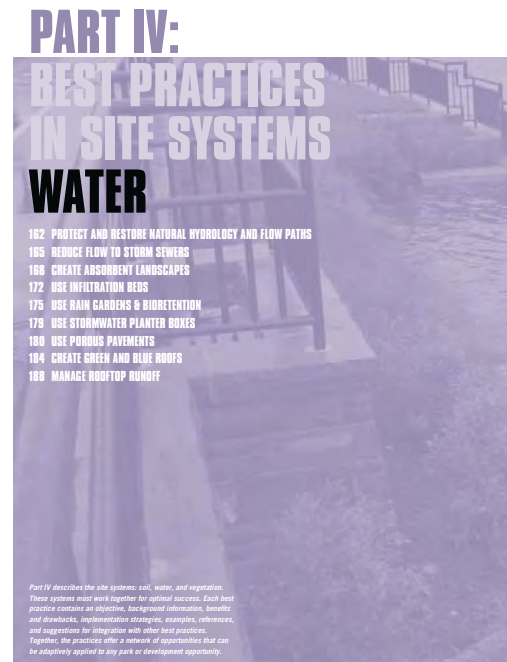


Figure 60



Figure 61



Figure 62



Figure 63



Figure 64

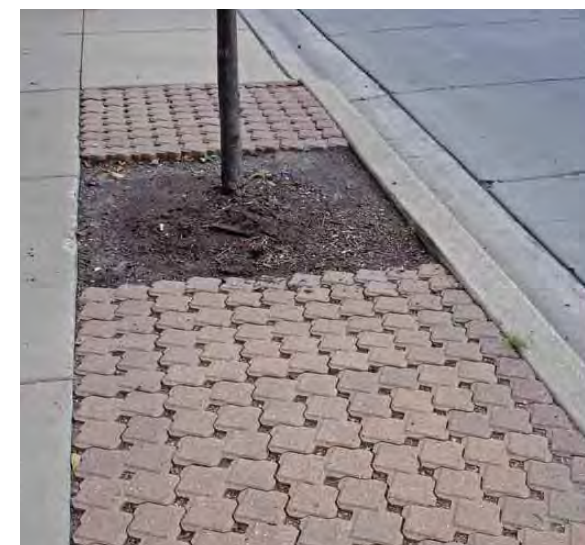


Figure 65



Figure 66

**PHILADELPHIA : GREEN CITY, CLEAN WATERS PROGRAM**

WHO: Philadelphia Water Department (PWD)

WHAT: Program for Combined Sewer Overflow Control

WHEN: Initiated September 1, 2009

Initial Foundation Period: 5 years

Implementation Period: 20 years

COST/FUNDING SOURCES:

\$336 million committed to date

\$1.6 million invested by PDW by 20-year mark

\$3 billion through the addition of leveraged activities

CONTACT/MORE INFORMATION:

Office of Watersheds  
 Water Department  
 1101 Market Street, 4th Floor  
 PA 19107  
[www.phillywatersheds.org](http://www.phillywatersheds.org)

VISION:

Large-scale implementation of green stormwater infrastructure to manage runoff at the source on public land and reduce demands on sewer infrastructure

Requirements and incentives for green stormwater infrastructure to manage runoff at the source on Philadelphia

A large-scale tree program to improve appearance and manage stormwater at the source on City streets

Increased access to and improved recreational opportunities along green and attractive stream corridors and waterfronts

Preserved open space utilized to manage stormwater at the source

Converted vacant and abandoned lands to open space and responsible development

Restored streams with physical habitat enhancements that support healthy aquatic communities

Additional infrastructure-based controls when necessary to meet appropriate water quality standards



Figure 67

PILOT PROJECT: GERMANTOWN / EAST MT. AIRY NEIGHBORHOOD



rain barrel



Figure 68 porous concrete sidewalk

Figure 69



rain garden



Figure 70 green roof

Figure 71



stormwater planter

Figure 72



Figure 73



Figure 74

## APPENDIX A: EXISTING PROGRAMS FOR POTENTIAL COLLABORATION

	Community /Private	City of Hartford	State/ Federal
<b>SHORT TERM</b>			
MDC Clean Water Project		X	
MetroHartford Alliance - Hartford Branding	X		
iQuilt	X		
CMAQ Bike Rack Project			X
Capital Design District Guidelines		X	
Broad Street Streetscape Project			X
Broad Street Parking lot (busway)			X
East Coast Greenway	X		
Tree Ordinance		X	
Green Ribbon Task Force		X	
Green Capitol Building Project : Phase 2			X
Corridor of Hope / Capitol Avenue West of Sigourney	X		
Big Belly Trash compactors	X		
One City, One Plan		X	
City Façade Program and Front Porch Program		X	
Farmington Avenue Streetscape: Phase 1	X		
Urban Agriculture: Billings Forge; SODO Community Agriculture	X		
<b>MID TERM</b>			
Hartford Office Supply/390 Capitol Avenue		X	
Farmington Avenue Streetscape: Phase 2	X		
HUD Sustainable Communities Regional Planning Grant			X
<b>LONG TERM</b>			
CRCOG I-84 Viaduct Study / Hub of Hartford			X
North Branch Park River Watershed Study (DEP)			X
Busway/Sigourney Street + Aetna Connection / Close Flower Street			X
Pope Park Master Plan	X		
Amtrak - NHHS	X		

### Project Coordination for Schematic Design Proposals:

#### Little Sigourney Park (Design Concept 1)

Pope Park MasterPlan  
I-84 Viaduct Study  
BRT Station

#### Frog Hollow Streetscape (Design Concept 2)

Urban Forest Program

#### BroadFlower Park (Design Concept 3)

DOT Parking Lot Improvement (as part of BRT system design)  
Broad Street Streetscape

#### Armory Park (Design Concept 4)

Broad Street Streetscape

#### Capitol Grounds (Design Concept 5,6)

EPA Green Capitols Program  
MDC Clean Water Program

#### Connecticut Square (Design Concept 7)

iQuilt  
MDC Clean Water Program

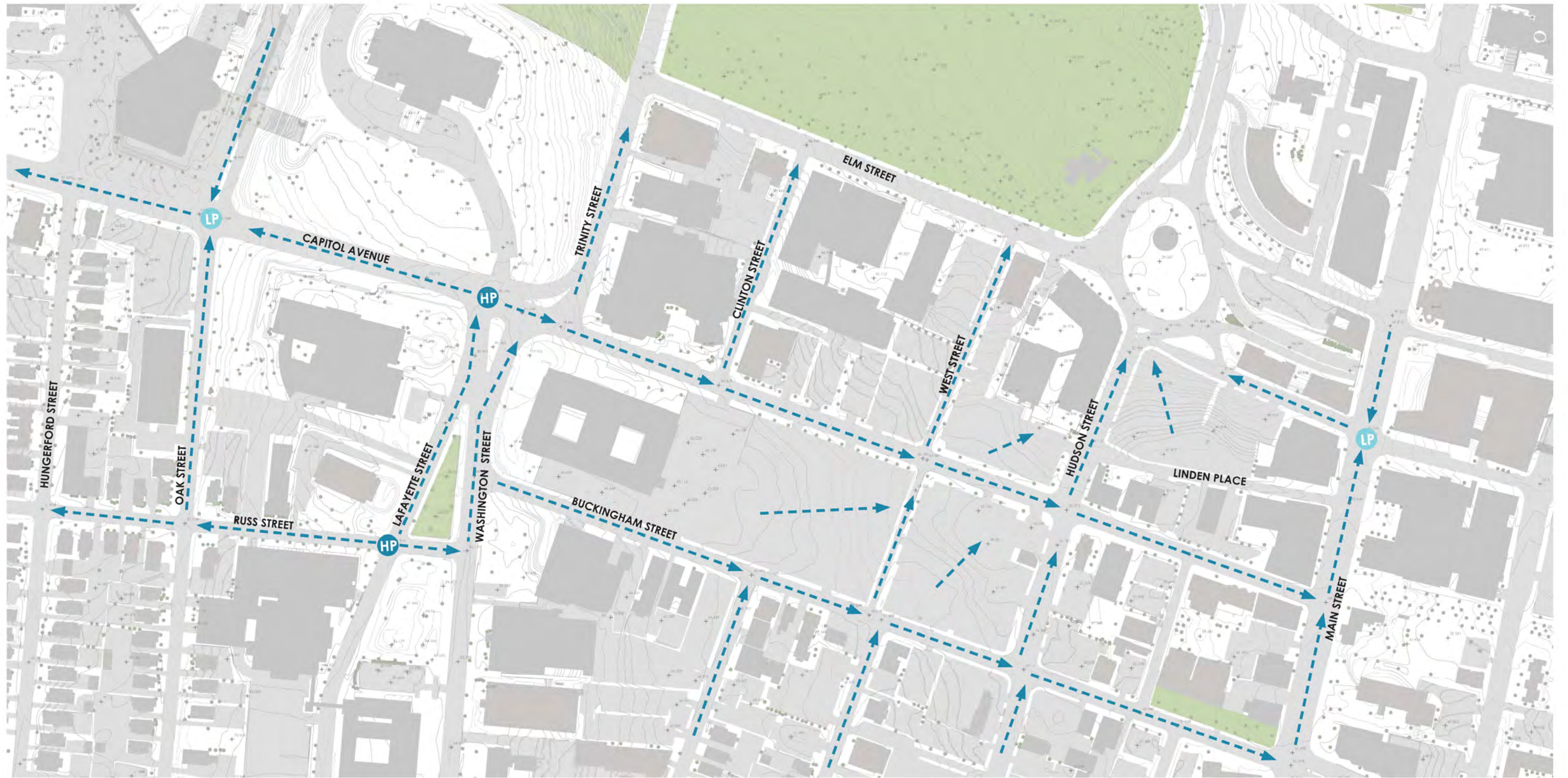
## APPENDIX B: CAPITOL AVENUE CORRIDOR WATERSHED ANALYSIS



HP High point (stormwater runs off from high points to low points)

LP Low point (stormwater collects at low points)

Figure 27



HP High point (stormwater runs off from high points to low points)

LP Low point (stormwater collects at low points)

Figure 26

## APPENDIX C: GREEN INFRASTRUCTURE EXAMPLES

### BIOSWALES



Figure 28

Stormwater runoff is collected in this trench drain along a residential street and then is directed into a bioswale for groundwater infiltration.



Figure 29

Permeable pavers are used in conjunction with a bioswale in a parking lot to mitigate stormwater runoff. Water that does not infiltrate the permeable pavers flows into the bioswale through intermittent cuts in the concrete curb.



Figure 30

A bioswale is a garden that provides a specific hydrologic function. Using native grasses and trees in a bioswale planting ensures the longevity and functionality of the bioswale and provides significant habitat value, as well as an immersive landscape experience.

## RAIN GARDENS



Figure 31



Figure 33



Figure 32



Figure 34

Rain gardens collect stormwater runoff during and immediately following rainstorms, holding the water until it is able to directly infiltrate into groundwater. Rain gardens function at varying shapes and sizes. They can be highly constructed and linear where space is limited and more like gardens in areas where space is available. The vegetation planted in a rain garden thrives despite the fluctuations in water level because the plants are well-adapted to handling both inundation periods and periods of drought. Because the water is absorbed directly by plants and soil, the rain garden filters the stormwater before it reaches the groundwater reservoir.



## PERMEABLE PAVING



Figure 35



Figure 36



Figure 37



Figure 38

Permeable pavers can be used on some vehicular and pedestrian surfaces in place of asphalt or concrete to allow for the infiltration of rainwater as soon as it hits the ground. Permeable pavers can function on their own but can also be a part of a larger stormwater management strategy that includes planted strips and a diversity of surface material. In most cases, a gravel storage bed sits below the permeable paver installation to filter particulate matter and to slow down the water before it enters an existing stormwater sewer system.

**LAWN ALTERNATIVES**



Figure 39



Figure 40



Figure 41



Figure 42

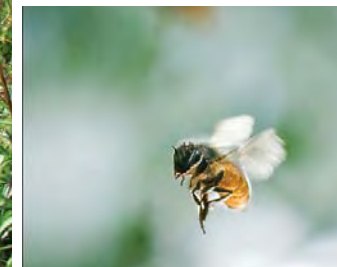


Figure 43



Figure 44



Figure 45

People can use lawn alternatives such as meadow plantings to make landscapes more attractive, to save on watering, save time and money on upkeep, attract wildlife, absorb stormwater runoff, and create landscapes with ecological richness.

## APPENDIX D

### RESOURCES AND FUNDING TO SUPPORT PROPOSED DESIGN IMPLEMENTATION

#### EPA Tools and Resources

EPA offers a number of useful tools, scorecards, and education/outreach resources to help communities implement smart growth principles and techniques. Specific examples are listed below, and more can be found at <http://www.epa.gov/smartgrowth/>.

##### *Essential Smart Growth Fixes for Urban and Suburban Zoning Codes*

Offers 11 Essential Fixes to help local governments amend their codes and ordinances to promote more sustainable development. [http://epa.gov/smartgrowth/essential\\_fixes.htm](http://epa.gov/smartgrowth/essential_fixes.htm)

##### *Green Infrastructure Municipal Handbook*

The Municipal Handbook is a series of documents to help local officials implement green infrastructure in their communities. Handbook topics cover issues such as financing, operation and maintenance, incentives, designs, codes and ordinances, and a variety of other subjects. <http://cfpub.epa.gov/npdes/greeninfrastructure/munichandbook.cfm>

##### *Parking Spaces / Community Places: Finding the Balance Through Smart Growth Solutions*

Highlights proven approaches that balance parking with broader community goals. <http://epa.gov/smartgrowth/parking.htm>

##### *Sustainable Design and Green Building Toolkit for Local Governments*

Addresses the local codes of ordinances that affect the design, construction, renovation, and operation and maintenance of a building and its immediate site to help local governments, the development community, and other building professionals identify and remove barriers to sustainable design and green building in their permitting processes. <http://www.epa.gov/region4/recycle/green-building-toolkit.pdf>

##### *Water Quality Scorecard*

This scorecard offers policy options for protecting and improving water quality across different scales of land use and across multiple municipal departments. [http://epa.gov/smartgrowth/water\\_scorecard.htm](http://epa.gov/smartgrowth/water_scorecard.htm)

#### Other Tools and Resources

##### *i-Tree Tools*

i-Tree is a state-of-the-art, peer-reviewed software suite from the U.S. Forest Service that provides urban forestry analysis and benefits assessment tools. i-Tree tools help communities of all sizes to strengthen their urban forest management and advocacy efforts by quantifying the structure of community trees and the environmental services that trees provide. <http://www.itreetools.org>

#### Funding Opportunities

In addition to local and project-specific funding sources listed in the Implementation section, there are other local, regional, state, and federal sources of funding that could support the immediate and long-term success of the design proposals developed in this project.

##### *Connecticut Fund for the Environment*

The Connecticut Fund for the Environment works to protect and improve the land, air, and water of Connecticut and Long Island Sound. <http://ctenvironment.org/>

##### *EPA Regional, State, and Local Funding Opportunities*

EPA has developed a guide of regional, state, and local funding resources to assist local and state governments, communities, and non-governmental organizations who are addressing the varied aspects of smart growth. Please note that this list is not an exhaustive compilation of all possible funding resources in the smart growth arena. It lists state government programs and directories of funding sources maintained by outside organizations. [http://epa.gov/smartgrowth/state\\_funding.htm](http://epa.gov/smartgrowth/state_funding.htm)

##### *Leveraging the Partnership: DOT, HUD, and EPA Programs for Sustainable Communities*

In June 2009, the Partnership for Sustainable Communities was formed by the U.S. Department of Housing and Urban Development (HUD), the U.S. Department of Transportation (DOT), and the U.S. Environmental Protection Agency (EPA). This resources lists funding and technical assistance programs provided by DOT, HUD, and EPA because of their connection to the principles of the Partnership for Sustainable Communities. [http://epa.gov/smartgrowth/pdf/2010\\_0506\\_leveraging\\_partnership.pdf](http://epa.gov/smartgrowth/pdf/2010_0506_leveraging_partnership.pdf).

Regular updates to the list of funding sources and other resources and tools for communities can be found at <http://www.sustainablecommunities.gov>

## REFERENCES

1. iQuilt: <http://theiquiltplan.org/>
2. One City, One Plan: Hartford's Plan of Conservation and Development, Hartford Planning and Zoning Commission, 2010, <http://planning.hartford.gov/oneplan/pocd.aspx>
3. [http://www.themdc.com/clean\\_water\\_project.shtml](http://www.themdc.com/clean_water_project.shtml)
4. "Design Principles for Stormwater Management on Compacted, Contaminated Soils in Dense Urban Areas," U.S. EPA Brownfields, 2008, <http://epa.gov/brownfields/tools/swdp0408.pdf>
5. "Case Studies for Stormwater Management on Compacted, Contaminated Soils in Dense Urban Areas," U.S. EPA Brownfields, 2008, <http://www.epa.gov/brownfields/tools/swcs0408.pdf>