REVITALIZING AN INDUSTRIAL NEIGHBORHOOD THROUGH LANDSCAPE INTERVENTIONS

EAST SPRINGFIELD NEIGHBORHOOD
CITY OF SPRINGFIELD, MA

University of Massachusetts Amherst Department of Landscape Architecture & Regional Planning
Graduate Urban Design Studio, Spring 2016
Collaboration with the City of Springfield Office of Planning and Economic Development

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Introduction
Introduction: REGIONAL CONTEXT
East Springfield is one of the 17 Neighborhoods that make up the City of Springfield, Springfield is the largest city in western Massachusetts

This studio focused on understanding the history, urban fabric, and community perception of the East Springfield neighborhood in order to develop responsible urban design solutions that address concerns related to public health and place making. The East Springfield neighborhood’s vibrant heritage of fostering industry and manufacturing resonates deeply in the community. The industrial heritage of the neighborhood has provided its residents with a sense of pride and continues to shape current redevelopment efforts. East Springfield’s rich history of industry was an instrumental component in the team’s exploration of the site through the lens of urban ecology and public health. Throughout the design process the studio researched issues such as urban soils, air and water systems to assess how the historical and active presence of industry has potentially affected the quality of life in this neighborhood.
Understanding the Industrial Landscape
These photos depict early housing and infrastructure necessary to accommodate a streetcar running along Page Boulevard. The road construction ushered in a new era for East Springfield as an early streetcar suburb. The abundance of land and public transportation acted as a catalyst which allowed for industry and manufacturing to take root in this neighborhood. As manufacturing in the community flourished, the neighborhood continued to grow as more individuals left the city’s downtown and surrounding rural agricultural areas to be closer to new jobs and therefore benefit from the many amenities that were being introduced and provided by the new companies of the area such as the Westinghouse Corporation.
Page Boulevard
The implementation of modern vehicular infrastructure and public transportation

Infrastructure improvements along Page Boulevard included the implementation of streetlights, dedicated areas for parking, lanes for two-way vehicular traffic and an electric streetcar. Pedestrian friendly footpaths lined by mature street trees acted as a buffer between the street and the neighborhood's dense housing development. In this image other modernizations are apparent including electric power lines and a traffic signal.
Founded in 1777 as a military supply depot, the Springfield Armory was a catalyst of industry and manufacturing for the city, it was recognized as an armory in 1794.

Founded in 1852 by Horace Smith and Daniel B. Wesson in the city of Springfield. Smith & Wesson is a firearms manufacturer.

In 1901, Frank Duryea partnered with gun maker Stevens Arms to form the Stevens-Duryea automobile manufacturing company.

Closing of Stevens-Duryea Plant. Opening of the New England Westinghouse Plant.

Westinghouse moves to Springfield in 1915 and employs hundreds of people.
The Rich Manufacturing Tradition in Springfield

Dates Back to the Revolutionary War

The Springfield Armory was a catalyst of industry and manufacturing for the city

1921

WBZ radio started broadcasting from East Springfield plant.

Springfield Street Railway Co. extended to East Springfield.

1940

Smith & Wesson relocates its headquarters to East Springfield.

1942

During WWII, Westinghouse is the city's largest employer.
Understanding the Industrial Landscape: HISTORY

Lucy Mallory Village was constructed as Defense Housing.

Westinghouse closes the East Springfield plant permanently.

Packard Development Co. proposed shopping center on former Westinghouse site.

Lucy Mallory Village repurposed by the city as affordable housing.
2011
Westinghouse site demolished for Ameristar Casinos, Inc.

2014
China Railway Rolling Stock Corp (CRRC) chosen to develop on the former Westinghouse site.

2016

2016
China Railway Rolling Stock Corporation (CRRC) development begins at former Westinghouse site.

East Springfield Ushers in a New Era of Manufacturing with the Development of the CRRC
The CRRC manufacturing plant will manufacture new train cars for Boston’s MBTA
Understanding the Industrial Landscape: EXISTING CONDITIONS

Image "A," taken at Saint James Boulevard when approaching from the West, shows the main entrance to East Springfield. The area is dominated by vehicles and as a result lacks a sense of human scale, which affects its desirability. As Saint James Boulevard transitions into Page Boulevard, there is often significant traffic congestion, which is seen in image "B." This area is the convergence of a major industrial transportation route that continues down Page Boulevard to the State Highway 291. Page Boulevard also supports a small commercial strip, as well as bounds a dense residential neighborhood. There is a general concern within the community about the lack of lane definition along the roadway, which contributes to unsafe situations for bicyclists and pedestrians. Additionally, while parking is generally restricted along Page Boulevard, the lack of definition in the roadway and lack of signage also results in many people illegally parking down the corridor, which also heavily impacts the flow of traffic. In image "C" the extent of impervious surfaces and undefined edge conditions is clearly depicted. In this desolate view of the streetscape the nonexistence of street trees and vegetation is also emphasized.
Page Boulevard is the Spine of East Springfield,
As a major hub for industrial transportation and commercial activity it does not provide a pedestrian friendly environment.
Understanding the Industrial Landscape: EXISTING CONDITIONS

East Springfield is Situated Between the Chicopee River & Connecticut River

The watershed of this area directs flows from the neighborhood to these major natural systems, which emphasizes the neighborhood’s impact on the overall health of these larger ecosystems.

The industrial heritage of East Springfield may pose hazards to public and environmental health now and in the future. Throughout the studio, the students analyzed how this industrial history has potentially impacted the health of the Chicopee and Connecticut Rivers by studying the natural systems of the neighborhood including the topography, drainage, waterways, forested areas, and conservation land. The analysis provided an understanding of the deleterious impact of development to the local environment especially when looking at stormwater. As stormwater accumulates on the impermeable surfaces of the neighborhood it collects surface pollutants and discharges them directly into the local watershed, resulting often times in erosion at discharge locations and the potential pollution of local species of flora and fauna.
The contrast in the building footprints depicted indicates the juxtaposition between the small-scale housing in comparison to large-scale industrial and commercial development. While nearly half of the area is appropriated to commercial and industrial use the remaining half is housing. The residents of the area, many of whom have grown up or have lived in close proximity to these enterprises for years, value the heritage of the neighborhood and are proud of the manufacturing history. The street patterns of the neighborhood also highlight the relationship between the people living in the area and the industrial use. The roadways, reflective of typical 1940’s and 1950’s planning, represent a tree-like pattern with St. James and Page Blvd. making up the trunk with streets branching off into the subsequent neighborhoods. Page Blvd. is the defining element that has continued to organize the East Springfield neighborhood.

Scale and Spacing of the Built Environment

The Nolli map represents the spacing and organization of the neighborhood, which depicts a clear juxtaposition of two major building and site scales in the neighborhood: the industrial sites towards the east, and the residential areas to the west, separated by Page Boulevard.
The housing patterns represent the diverse strategies of development that have been adopted overtime including affordable housing, single family and multifamily residences. Affordable housing is depicted with large footprints and repeating geometries, these structures often redefine roadways as seen in Mallory Village, a development originally constructed as Defense Housing. Single family residences, which include ranches, cape style homes and bungalows are much smaller, they are double loaded along secondary roads and are centered on plots providing front and rear yards. There are also some multi-family residences, which are found mixed in the neighborhoods. The multifamily structures found in East Springfield are often in close proximity to the industrial buildings and represent some of the oldest housing in the community, as they were built to house the workers of the early factories. The variety of housing typologies in proximity to one another can indicate financial stratification, help understand home ownership, and provide clues about the population density.
The land use map provides a depiction of the neighborhood's makeup. By color-coding the figure ground map based on the building typologies, roadways, and land uses we can see the dominance of areas dedicated to single programmatic functions, including housing, industry, commercial use, open space and civic use. The graphic depicts how major transportation routes such as Page Blvd. (depicted in white, oriented SW to NE) divide the two primary land uses of housing (depicted in yellow) and industry (depicted in purple) and support a commercial band (depicted in magenta) along its length. This map also indicates the presence of large areas dedicated to conservation (depicted in green) that are nested within the residential areas. The image also depicts the dominating presence of Highway 291 (depicted in white, oriented N to S), which effectively bisects the industrial area running parallel to the Boston and Albany Railroad corridor, which supported the earliest industries of the neighborhood.

Almost Equal Distribution of Land Dedicated to Housing and Industrial Manufacturing
Major arteries define the land use within the neighborhood.
The bus stops indicated on the map express how essential Page Blvd. is to the residents of the community who rely on public transportation. There currently is no access to public transportation beyond Page Blvd. The map indicates the prominence of highway 291 within the neighborhood with its on and off ramp on Page Blvd. in the NE quadrant of the neighborhood; and the potential source of vehicle congestion in the SW quadrant of the neighborhood with the convergence of three major roads at the Carew Street Triangle, both areas are very important as they represent the main entry and exits to the neighborhood.
While primarily dedicated to housing, industry, and commercial development, there are a handful of key landmarks that are important to this community. There are several religious centers; two elementary schools the Samuel Bowles Park School and the Mary O. Pottenger School. A single historic structure at the former Westinghouse Industrial plant remains intact as well as a small neighborhood public library. However, the most visited place by members of the community is Marshall Roy Park, the only dedicated space for outdoor recreation found in the neighborhood.
Understanding the Industrial Landscape: COMMUNITY ENGAGEMENT
During the community engagement component of this process, the studio developed strategies to engage a diverse group of neighborhood residents. The studio generated a flyer in English, Spanish and Chinese inviting community members to attend a meeting. The flyers were posted at several locations in the neighborhood and distributed by hand to members of the community. As a result, 30 individuals attended the community meeting. The meeting consisted of a short introductory presentation given by the studio members as well as activities where residents were asked to participate in a series of information gathering exercises, which included a mapping exercise, a question and answer session, and an open format visioning activity.
Understanding the Industrial Landscape: COMMUNITY ENGAGEMENT
The community workshop sought to better understand the East Springfield neighborhood from the residents’ perspective. Through mapping exercises and dialogue with the community members, areas of concern and areas of high use were identified. This information was carried through the design process.
Understanding the Industrial Landscape: COMMUNITY ENGAGEMENT
The word cloud is reflective of the resident's emphasis on making changes to Page Blvd., traffic and parking.

This illustration is a visualization of the word usage collected during the question and answer portion of the community meeting. The word cloud represents the words that appeared most frequently in the resident's responses to the studio's questions. This graphic reveals the community's desire to make changes to Page Boulevard as they indicate that traffic, parking, lights, and traffic lanes are some of the biggest concerns in the neighborhood.
The attendance and active participation by members of the East Springfield Community revealed a great interest by residents in being involved in the conversation in regard the future development of their community. The information and data collected during this engagement process were carried throughout the studio and are represented in the design proposals produced by the graduate students.

30 Residents Attend a Revitalization Workshop, The East Springfield Neighborhood Council hosted the event.
"This is our Springfield - first, a stake in the wilderness, then a town, then the mother of towns, then a city, and, with the continuing favor of Providence, the mother of cities."

Mason A. Green
Springfield, May 25, 1838
$36,283
Median Household Income (2010)

Understanding the Industrial Landscape: NEIGHBORHOOD DEMOGRAPHICS

- Springfield: $34,731
- East Springfield: $36,283
- Chicopee: $47,276
- Longmeadow: $108,835

East Springfield: $36,382
Massachusetts: $67,846
2.4
Neighborhood Demographics

6,207
Population (2010)
Understanding the Industrial Landscape: NEIGHBORHOOD DEMOGRAPHICS

64.5%
Percentage of Owner Occupied Housing (2010)

<table>
<thead>
<tr>
<th>Location</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Springfield</td>
<td>47.8</td>
</tr>
<tr>
<td>Chicopee</td>
<td>56.9</td>
</tr>
<tr>
<td>East Springfield</td>
<td>64.5</td>
</tr>
<tr>
<td>Longmeadow</td>
<td>90.4</td>
</tr>
</tbody>
</table>
26%
Percentage of Individuals Living Below the Poverty Line (2010)

- Longmeadow: 5.3%
- Chicopee: 12.9%
- East Springfield: 28%
- Springfield: 30.1%

East Springfield: 28%
Massachusetts: 11.6%
Public & Environmental Health
[Air, Water, Soil]
Public & Environmental Health: AIR

Sources of Potential Air Pollution,
Transportation routes & known brownfield sites
Traffic and Manufacturing are Major Sources of Air Pollution in the Urban Industrial Landscape

The studio focused on understanding the connection between the existing site conditions and their effect on human health. The East Springfield neighborhood, with its historical and continuously evolving relationship to industry, provides a rich ground for understanding the role of contaminants found in urban ecosystems and their effect on human health. In this project, the studio identified major sources of pollutants found in air, water and soil systems of urban environments that affect public health. The goal of this research was to identify opportunities for urban landscape interventions that could be employed to improve the health and well-being of its residents.
Western MA
Sources of Air Pollution

East Springfield
Sources of Air Pollution

Public & Environmental Health: AIR

Map showing Springfield and surrounding areas with marked sources of air pollution.

Miles

Source: EPA Toxic Inventory Database

Springfield Air Pollution Point Sources

- 796 Lbs.
- 255 Lbs.
- 1,624 Lbs.
- 4 Lbs.
- 214,922 Lbs.
East Springfield has the Highest Concentration of Point Sources of Air Pollution in Western MA, Holyoke and Chicopee are at close second and third.

The following maps and diagrams identify key public health issues related to air quality in East Springfield. Air pollution is characterized as mixtures of solid particles and gases in the air that contain elements that are hazardous to human health. Car emissions, chemicals from factories, dust, pollen, and mold spores are the most commonly found suspended particles found in polluted air. The Springfield area has one of the highest concentrations of air pollution in the state of Massachusetts.
16.1%
Percentage of Springfield Population with Asthma

Public & Environmental Health: AIR

16.1% Springfield
11.8% Massachusetts

Percentage of Springfield Population with Asthma
Springfield has the 2nd Highest Pediatric Asthma Rate in Massachusetts, after Holyoke, MA.

Childhood asthma (pediatric asthma) is the most common serious chronic disease in infants and children. The most common cause of pediatric asthma is exposure to environmental factors most commonly air pollution especially in urban environments. The general ailments of children with asthma include; wheezing, coughing, rapid breathing, labored breathing, chest pain, energy reduction and feeling weak.
Public & Environmental Health: WATER

EAST SPRINGFIELD

Chicopee River

CT River

Van Horn

Abbey Brook

Poor Brook

Carlisle Brook
The City of Springfield has a Combined Sewer Overflow (CSO) System, The map indicates the highest volumes of potential untreated stormwater, which discharge into the Chicopee (North) and Connecticut River (East).

A combined sewer system is a sewage collection and treatment system that jointly treats sewer and stormwater runoff. During heavy rain events, this system can lead to serious water pollution problems. When the flow of water exceeds the working capacity of a sewage treatment plant, untreated sewage and stormwater is released into large waterways. This untreated water can have a negative effect on the health of the waterway and related ecosystems.
Comparison of Impervious Surface Areas

- Springfield: Urbanized Regulated Area (20,000 acres), Impervious Surface Area (8,000 acres)
- Chicopee: Urbanized Regulated Area (10,000 acres), Impervious Surface Area (4,000 acres)
- Holyoke: Urbanized Regulated Area (6,000 acres), Impervious Surface Area (2,000 acres)
- Longmeadow: Urbanized Regulated Area (5,000 acres), Impervious Surface Area (1,000 acres)
Impervious surfaces are areas covered with roads, parking lots, roofs and other surfaces that do not allow water to be absorbed into the ground. The result is a significant increase in the volume of stormwater that runs off the land, which can significantly impact local waterways. Many sources indicate that streams are impaired when impervious surfaces reach a level of 10% of a watershed. The increase in impervious surfaces in an area can contribute to increased peak flooding, streambed erosion, loss of vegetation, increased presence of pollutants, as well as loss of wildlife habitats.

34% of Springfield is Impervious Surface
The impervious surface area in Springfield is more than twice that of any other city in Western Massachusetts.
Stormwater in East Springfield is Directed to Three Primary Conservation Areas, Abbey Brook, Delta Hills and a wooded area that abuts the town of Chicopee is where bulk stormwater is directed; these areas drain directly into the Chicopee and Connecticut rivers.

The color-coded map indicates the stormwater drain infrastructure of the neighborhood and diagrammatically shows where stormwater that accumulates in specific areas of the neighborhood is directed to during a storm event. The illustration also indicates points where the stormwater is being discharged into the local streambeds, it is likely that at these locations have experienced substantial erosion, contain elevated levels of pollution, and have endured a loss in vegetation and wildlife habitat.
The diverse makeup of the East Springfield neighborhood consists of three primary conditions in which stormwater is handled: the residential neighborhoods, industrial sites, and the street conditions. Diagram one (left) depicts the residential area of the neighborhood which allows some rain to infiltrate into the yards resulting in a smaller percentage of runoff and few instances of source pollution. Diagram two (center) depicts the former Westinghouse Industrial site which has a higher concentration of impervious surface resulting in less infiltration; however, this area has a much higher risk for source contaminants due to its former land use. Diagram three (right) depicts Page Boulevard and has the highest percentage of impervious surface and almost no vegetation which results in a high level of stormwater runoff and due to its use as a major transportation route it is characterized as a high risk area for source contaminants.
70% of Urban-related Water Pollution in the United States is due to Stormwater Runoff,
High volumes of stormwater directed to drains can overpower effective pre-treatment systems and can have a negative health effect on ecosystems and the water table.
East Springfield has Several Documented Brownfield Sites
The highest concentration of brownfield areas in the East Springfield are found along Highway 291.

A brownfield is a property that has been documented by the EPA as one that is known to have a presence of a hazardous substance, pollutant, or contaminant found most frequently in the soil of that site. Brownfields are often abandoned, closed or under-used industrial or commercial facilities, such as an abandoned factory in a town's former industrial section or a closed commercial building or warehouse in a suburban setting. According to the EPA there are presently over half a million brownfields in the United States, but this number only includes sites for which an ESA has been conducted. The actual number of brownfields is certainly many times greater.
The illustration depicts a hierarchy of some of the most likely sources of pollutants, which have potentially contributed to portions of the East Springfield neighborhood being documented as a brownfield site. Brownfields are often the result of hazardous materials and chemicals used in the manufacturing process leaching into the earth overtime such as what could have been experienced at the former Westinghouse Manufacturing site, heavy emissions of vehicular traffic and petrochemicals that are a result of major roadways such as Page Boulevard and Highway 291 as well as possible leaks attributed to the deterioration of existing infrastructure including the Westinghouse Manufacturing site or the Boston & Albany Railroad corridor. Any and all of these scenarios potentially can contribute to the contamination of a site.

High Risk Areas for Potential Soil Contamination,
High traffic areas, gas stations, vehicle maintenance enterprises, paved parking areas, areas dedicated for manufacturing and railroad corridors.
Phytotechnologies: PRIMARY PROCESSES

- **Phytometabolism**: Plants use contaminants in their growths.
- **Phytovolatilization**: Plants release contaminants as gas.
- **Phytodegradation**: Plants destroy contaminants.
- **Phytostabilization**: Plants hold contaminants in place.
- **Phytohydraulics**: Plants pull up water containing contaminants.

Contaminants:
- Heavy Metals
- Organic Compounds
- Petroleum
- Road Salts
- Nitrates
The Processes of Degradation and/or Removal of Contaminants by Plants
There are many effective processes that plants use to remove pollutants from the air, water and soil.

This phase of the studio focused on research related to the implementation of phytotechnologies and green infrastructure strategies for improving the environmental quality of the East Springfield neighborhood. Phytotechnologies and green infrastructure strategies use vegetation to capture or remove pollutants from the environment. By understanding plant-science and the ability of vegetation to remove contaminants from the landscape, designers can incorporate vegetation strategies that can positively impact on public health in urban environments.

Phytotechnologies are specific to the contaminants they process. It is therefore important to understand the chemical properties of the contaminants whether they are inorganic or organic, and know the media in which the contaminants are present, to best devise planting strategies that would be most effective in handling the pollutants. The design proposals developed by the studio embody the principles behind these technologies and demonstrate how they can be applied in the East Springfield neighborhood to improve the quality of air, soil and water.
Phytotechnologies: PRIMARY PROCESSES

**Pytodegredation**
Breaks Down Pollutants

Metabolic process that breaks down or degrades contaminants into simpler molecules or elements.

**Phytohydraulics**
Draws Pollutants through the Plant from the Soil and Water

A process where the plant pulls up water, and with it both organic and inorganic pollutants. This is one way that groundwater can successfully be treated.

**Phytoextraction**
Pollutant Absorption and Removal

In this process inorganic contaminants do not break down. Instead they are stored in the plant and the plant later needs to be harvested or removed and transported to an appropriate alternative site.
Phytometabolism
Pollutants Become Part of the Plant

In this process plants break down contaminants into non-toxic materials which are then used by the plant as nutrients.

Phytoaccumulation
Pollutants are Collected on Plants Leaves

In this process a plant’s leaves have the ability to hold airborne pollutants which are then stored and used by the plant.
70-80% of a Plant’s Root System is found in the First 2 Feet of Soil
This root zone is often the most effective area for phytotechnologies to be most active.

Understanding a plant’s root system is an important factor when considering appropriate planting strategies. A plant’s root system is most effective in handling contaminants found in the soil and groundwater. Innovative technologies, such as the use of boreholes, have been designed to allow root systems to go further under the ground’s surface, processing contaminants in a deeper section of earth to improve groundwater quality.
Phytotechnologies: AIR, EFFECTIVE PHYTO PLANTS

- Large Leaf Lime (Tilia platyphyllos)
- Common Linden (Tilia)
- Ginkgo (Ginkgo biloba)
- Tulip Tree (Liriodendron)
A plant's surface area plays a large role in processing airborne contaminants. For this reason mature trees that have large leaves, are more effective in capturing and processing contaminants through phytotechnologies such as phytoaccumulation. The following plant species that are considered some of the most effective found in the North East.

**Effective Northeast Plant Species that Remove & Treat Contaminates Found in Air**, Generally through the process of phytoaccumulation

- English Elm (Ulmus minor 'Atinia')
- Dawn Redwood (Metasequoia glyptostroboides)
- American Sycamore (Platanus occidentalis)

Common Ash (Fraxinus)
Phytotechnologies: WATER, EFFECTIVE PHYTO PLANTS

Eastern Red Cedar (Juniperus Virginica)

Red Mulberry (Morus rubra)

Black Willow (Salix nigra)

Red Fescue (Festuca rubra)
The treatment of contaminated stormwater is an important issue in most urban environments. The following plants, regionally specific to New England, are considered some of the most effective plants for treating contaminants found in water. While some of these plants are water resilient and can survive long periods of time where they are exposed to direct contact with water, which allow more time to process contaminants generally found in stormwater-runoff, others rely on high biomass or methods of plant density where vegetation has the ability to blanket the ground’s surface as an active filter. Many of the plants found in this category are successful due to their root systems that either run deep under the ground’s surface which allows the plant to handle pollutants located closer to groundwater, or the root density located just under the ground’s surface creating substantial buffer for contaminants to be intercepted before entering deeper into the soil.
Phytotechnologies: SOIL, EFFECTIVE PHYTO PLANTS

- Sunflower (Helianthus annuus)
- Hydrangea (Hydrangea macrophylla)
- Blue Tongue (Melastoma Affine)
- Kale (Brassica oleracea var. sabellica)
Effective Northeast Plant Species that Remove & Treat Contaminates Found in Soil,
Generally through the processes of phytoextraction and phytometabolism.

Pollutants can be found in soils after spills or after log-term accumulation of repeated small releases. For phytotechnologies to be considered for soil remediation, the pollution must be located at a depth that plants can reach. Most herbaceous plant species have a maximum root depth of 2 feet, with taprooted tree species maximizing root depth at 10 ft. (ITRC, 2009). Soil pollution within 10 feet of the soil surface is about the maximum depth where phytotechnologies should be considered. Soil contamination within the top 3 feet is the most effective zone for phytotechnologies.
Strategies | Approach: PLACE-MAKING
Placemaking
Provision of destinations and gathering areas for the general public

Placemaking is both an overarching idea and a hands-on approach for improving a neighborhood, city, or region, through design. It is a process that inspires people to collectively re-imagine and reinvent the public spaces that are at the heart of the community. Placemaking aims to strengthen the connection between people and the places they share. More than just promoting better urban design, placemaking facilitates creativity, paying particular attention to the physical, cultural, and social identities that define a place and support its ongoing evolution. In order to rekindle a sense of community in the East Springfield neighborhood, designers incorporated placemaking strategies in their proposals.
Stormwater Management,
A design approach that relies on responsible water management that protects, restores, or mimics the natural water cycle.

- Infiltration Planters
- Flow Through Planters
- Stormwater Berms
- Vegetated Bioswales
- Vegetated Dry Swales
- Trees & Ground Cover
Site Design & Engineering,
Design strategies geared toward a site’s ability to be resilient and manage stormwater and other environmental forces by mimicking natural systems.

In recent years onsite stormwater management has become an important design problem for landscape architects as record rainfall, flooding and drought have become common in our landscapes. The ability to treat stormwater in urban landscapes is especially important due to the extent of impermeable surfaces, and the growing cost and challenge of treating large amounts of stormwater in city facilities. Contemporary green infrastructure methods use innovations in site engineering and landscape architecture to filter, buffer, retain, redirect and repurpose stormwater.
Proposals: TEMPORARY DESIGN INTERVENTIONS
Placemaking stimulates a dialogue between the visitor and a space, enhancing the experience, and transforming the relationship one has with that place. A newly adopted tool in placemaking is the integration of tactical urbanism where potentially bold visual and experiential design features are employed to engage the public with the landscape. Tactical urbanism often is low cost, experimental and temporary interventions, which allow the designs to be flexible and adaptive to the public needs and aspirations overtime.
Deployable Container Gardens,  
Reusing shipping containers for onsite stormwater management.

Shipping containers become stormwater planters that connect to existing roof drains, 
treating water captured on the rooftops of existing buildings. Modularity increases efficiency 
and provides the ability to easily move and replace the system along existing hardscape 
conditions. By repurposing shipping containers for the raised bed gardens the site is able 
retain and redirect stormwater from stormwater drains and use it as a necessary resource to 
provide irrigation for planting initiatives.
Proposals: TEMPORARY DESIGN INTERVENTIONS

Infiltrates stormwater runoff
Provides clean water for irrigation
Helps improve air quality
Improves aesthetics

Improves aesthetics
Infiltrates stormwater runoff
Provides clean water for irrigation
Educates public
Helps improve air quality

New England Aster
Native
Blooms in Fall
Grows up to 6 feet

Bowles Golden Sedge
Not Native (Japan)
All Seasons
Grows up to 2 Feet

Switch Grass
Native
All Seasons
Grows up to 6 Feet

Sedum ‘Autumn Joy’
Native
Blooms Summer and Fall
Grows up to 3 Feet

Amur Maple
Not Native (Japan)
Blooms Summer and Fall
Grows up to 25-30 Feet

Retains approximately 40% of water

Growing Medium
48"
Drainage Rock
16"
Water Accumulation Section
8"

Proposal 1: Temporary Design Interventions

- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Helps improve air quality
- Improves aesthetics

- Improves aesthetics
- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Educates public
- Helps improve air quality

Proposal 2: Temporary Design Interventions

- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Helps improve air quality
- Improves aesthetics

- Improves aesthetics
- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Educates public
- Helps improve air quality

Proposal 3: Temporary Design Interventions

- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Helps improve air quality
- Improves aesthetics

- Improves aesthetics
- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Educates public
- Helps improve air quality

Proposal 4: Temporary Design Interventions

- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Helps improve air quality
- Improves aesthetics

- Improves aesthetics
- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Educates public
- Helps improve air quality

Proposal 5: Temporary Design Interventions

- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Helps improve air quality
- Improves aesthetics

- Improves aesthetics
- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Educates public
- Helps improve air quality

Proposal 6: Temporary Design Interventions

- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Helps improve air quality
- Improves aesthetics

- Improves aesthetics
- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Educates public
- Helps improve air quality

Proposal 7: Temporary Design Interventions

- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Helps improve air quality
- Improves aesthetics

- Improves aesthetics
- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Educates public
- Helps improve air quality

Proposal 8: Temporary Design Interventions

- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Helps improve air quality
- Improves aesthetics

- Improves aesthetics
- Infiltrates stormwater runoff
- Provides clean water for irrigation
- Educates public
- Helps improve air quality
The map indicates possible sites where the container gardens could be deployed throughout the neighborhood. Sites are primarily located in vacant lots or adjacent to structures where there is a good opportunity to collect rainwater from roofs as a pre-treatment method for handling stormwater. The use of reclaimed containers as the planter structure offers an opportunity for re-greening while aesthetically reinterpreting the neighborhood’s industrial heritage. The containers are versatile as they are strong enough to handle large loads, are easy to transport and can be joined to one another to create larger connected networks.

Filtering Stormwater,
By redirecting stormwater away from stormdrains we can begin to introduce pretreatment strategies.
Proposals: TEMPORARY DESIGN INTERVENTIONS

- Roof: 4,800 Sq Ft
- Rain: 3 inches
- Run Off: 8,977 Gallons
- Planter Size: 1,200 Cubic Ft

Retains approximately 40% of water
Excess Water

Proposals: TEMPORARY DESIGN INTERVENTIONS
The following image depicts a site located at the Carew Triangle located between Carew Street, Saint James Avenue and Saint James Boulevard where the container gardens could easily be installed. The highlighted building is a vacant property with two large paved areas on both side, and an alley in the rear. The following diagram uses the surface area of this structure to determine the appropriate size of a deployable container garden. The diagram depicts how the system would be assembled and how it could later be used as a system to water other vegetation in the area including new street trees.
Proposals: TEMPORARY DESIGN INTERVENTIONS

- HONEY LOCUST
- SWITCHGRASS
- LITTLE BLUESTEM
- PURPLE PRAIRIE
The concept behind “Weed, While You Wait,” was to physically and mentally connect riders with the landscape through an interactive process. The concept re-thinks a rider’s experience while waiting for the bus. At these bus stops, riders who participate in this therapeutic process are also educated about methods of phytotechnologies as all plant species used in the design were selected for their outstanding ability for processing potential contaminants.
This deployable design was geared for bus stops, because these areas were determined early on that needed the studio’s attention. As bus stops are a destination for many members of the community it provided a perfect opportunity to have a positive impact on a greater number of people in the community who rely of community programs such as public transportation. This rendering depicts how the bus stop could possibly stimulate other community initiatives including public art and more substantial planting initiatives such as re-greening entire corridors in the neighborhood.
Proposals: PUBLIC SPACE DESIGN
Providing Space for the Community
Reconfiguring streets and existing infrastructure to better accommodate public use.

During the community workshop the residents voiced their concerns about the lack of public spaces and general safety of pedestrians and bicyclists in the neighborhood. The primary goal of the following projects was to propose strategies that responded to these concerns while creatively reacting to the existing conditions of problematic areas of the neighborhood; specifically the Carew Street Triangle and the north east entrance to the neighborhood near the Highway 291 on and off ramps on Page Blvd. The designer’s strategies for reworking the existing street patterns while introducing specific planting strategies demonstrate how the use of landscape architecture can begin to provide human scale, public accessibility, and much needed public space in the East Springfield community.
Proposals: PUBLIC SPACE DESIGN
The Carew Street Triangle is an area in the neighborhood that experiences great congestion, as it is the intersection of Carew St., Saint James Blvd. and Saint James Ave. The Triangle is the transition point where traffic is directed toward downtown Springfield, Chicopee or Highway 291. The area around the triangle hosts senior housing, private residences and a commercial area. While the Triangle is a destination, as it currently hosts a Walgreens Pharmacy, it offers many obstacles. The planning of the area is especially difficult to navigate due to complex traffic patterns, such as the traffic islands along the southwest end, created to provide vehicles with the ability to change direction. As a result, the area is fragmented and has become generally unsafe for drivers and pedestrians. The undesirability of the area is emphasized by the photos of the existing conditions, which depict the abundance of paved areas dedicated to parking, alleys filled with dumpsters, and vacant buildings. The focus of the design was to re-imagine the triangle’s identity as a gateway or threshold for the neighborhood by providing public space and infill planting strategies.

Redesigning the Carew Street Triangle, Addressing the high traffic volume often creating unnecessary congestion and unsafe environments especially for pedestrians and bicyclists.
Proposals: PUBLIC SPACE DESIGN

Carew Street Triangle Proposal,
Redesigning the intersection to provide a new public space.

The proposed design for the Carew Street Triangle is a reaction to the existing street design of the area, which in the public’s eye is a source of congestion resulting in an unsafe experience. The new design unifies the fragmented streetscape providing residents with a safe place to be outdoors in their community. The design language used in the public park is iconic due to its triangulated mounding which is a re-interpretation of the former WBZ tower, which was an important landmark for the East Springfield neighborhood. The mounds both visually and physically remove visitors from the bustling roadways creating a microenvironment where people can pause and enjoy the reflecting pools and gardens.
Stormwater Amphitheater,
A dedicated program and a multifunctional public space.

Angular mounds and terraced seating create a depression in the landscape, which not only serves as a dedicated area for the outdoor performances, but also doubles as a possible stormwater reservoir in the event of a large storm. The change in the topographical profile of the site allows for public gathering and simultaneously addresses the need for onsite stormwater management. An integrated irrigation strategy helps to promote biodiversity and a vibrant planting strategy, which is currently nonexistent in this area. The planting strategies are introduced in a manner that will promote replication especially with a continuation of street trees along the three major roadways. The parklet aims to knit together the multiple zones of land use found in this area by restructuring that traffic design, and creating a safe zone for pedestrian accessibility and circulation.
Reflecting Pool,
Creating a microenvironment.

Throughout the studio the question of how to provide adequate public open space for residents given the extent of paved area found in the neighborhood, became highly important. In this design, the focus was geared toward reclaiming space dedicated to parking and road design as potential public spaces.

The perspective and section depict a water feature for children’s play. The public gardens and pools provide a necessary break for pedestrians from the bustling street of Saint James Blvd., and provide a welcome contrast to the existing conditions or predominately paved surfaces. Vegetation depicted around the new space’s periphery buffers the sound pollution resonating from the street and simultaneously creates a microenvironment where trees over shade, street noise is replaced with the sound of children playing and water splashing and residents are able to safely sit and admire the new landscape.
The focus area for this design was located on Page Blvd. near the Highway 291 on and off ramp where the goal was to reconfigure the existing street. By eliminating the traffic island at the intersection of East Street and Prentice Street and introduce two separated intersections with orthogonal transitions to Page Blvd. The design intent was aimed at mitigating vehicular congestion at this currently problematic intersection, while introducing a defined pedestrian way and integrated public space that would serve as the gateway to the neighborhood. As this end of the roadway hosts several fast food eateries including a McDonalds, Burger King, and a Dunkin Donuts the program of the new public space was developed in a manner that was also focused on food. The program of the new space was designed with a dedicated area where food trucks could gather as well as an open air café for people would be able to gather and meet outside. The intention of this area to be a gateway for the community relied heavily on the design aesthetic of the.
site, which was derived in response to the former WBZ radio tower. The tower which was formerly located at the Westinghouse manufacturing plant, and was recently removed was an iconic symbol for the neighborhood’s rich Industrial Heritage. In this new landscape design the triangulated tower form was re-interpreted as a tactical landscape intervention that would draw in the neighborhood as well as from traffic from the highway. The towers are intended to symbolize both the historic ideals of the neighborhood as well as usher in a new era of innovation in for the community.
Proposals: PUBLIC SPACE DESIGN
The historic photo depicts the former WBZ radio tower, which before its controversial demolition in 2000 was an iconic structure in the community embodying the rich industrial heritage of the neighborhood. The tower was responsible for the first public radio broadcast of the World Series of baseball, the biggest sporting event of the time. In this design proposal a series of tower-like structures were integrated into the landscape as a method of space activation. The new towers provide the public space with several functions including framing a food truck cafe, climbing elements for children to play on as well as an iconic aesthetic that would draw the attention of the public outside the neighborhood traveling on highway 291 to East Springfield.

Iconic Heritage  a Source for Design Inspiration
Responding to the former WBZ Radio Towers located the Former Westinghouse Site
The landscape design employs a series of green infrastructure strategies including rain gardens, raised planting beds, natural berms and bioswales in order to actively manage onsite stormwater. The section also depicts a relatively mature tree canopy, a representation of how the new planting strategy may appear over time. The infill tree planting would serve as a welcoming break from the mostly barren streetscape seen in the existing conditions of the site. The drawing also depicts a variety of spaces created by the designer in the landscape in order to provide the neighborhood residents with a diverse public experience.
Activating Public Space
Using an appealing and playful design element to draw the public’s attention
Proposals: PUBLIC SPACE DESIGN
The rendering depicts a playful landscape where colorful interpretive pyramidal forms are now reduced in scale and have become shading elements and climbing surfaces for children to play. People congregate around. The rendering successfully captures the designer’s reaction to the dreary and abandoned space seen in the images above which have been replaced with a very active microenvironment. Even the tree canopies begin to show how a dense planted buffer can be employed to combat the harsh visual connection of the streetscape by focusing the views inward. The sections also compliment these ideas by continuing to articulate the designer’s intention for integrating unique public spaces with successful green infrastructure interventions.
Proposals: GREENWAY CORRIDOR DESIGNS
Page Blvd. is the primary roadway in the neighborhood. The street’s abundance of impervious surface and sole dedication to vehicular traffic has greatly contributed to it being an undesirable public way. Analysis of the existing streetscape revealed several instances where green infrastructure strategies could be implemented in order to address this existing condition of the roadway and provide a safe and accessible pedestrian corridor for the residents. The primary goal of this design approach was to activate the barren landscape by adopting complete street guidelines for the major artery.
Proposals: GREENWAY CORRIDOR DESIGNS
The master plan and section depict the designer’s strategy for providing pedestrians and bicyclists with a safe vegetative buffer that separates them from the vehicular traffic. The proposed street design uses these planted buffers or rain gardens as a pre-treatment strategy for handling stormwater. While the new design reduces the number of lanes dedicated for vehicular traffic it aims to also reduce vehicular congestion by clearly defining the new lanes and eliminating the potential of people parking along the roadway. The design also encourages more residents to seek alternative modes of transportation in the neighborhood. The planting strategy is anchored in reintroducing a continuous band of street trees along Page Blvd. as a method for combating the negative effects of large areas of paved surfaces or hardscapes, the street trees will also provide potential habitat for small wildlife and comfortable and aesthetically pleasing spaces for residents along the street.
The existing conditions found along Saint James Blvd. as depicted in the plan and section express the irregularity in the tree planting along the roadway, lack of lane definition and poor articulation of appropriate crossing locations for pedestrians. While the section shows an existing pedestrian sidewalk it does not express the level maintenance required to make this a desirable route for walking or riding a bicycle.
The proposed design for Saint James Blvd. addresses the existing issue of lane definition by focusing on developing a multimodal roadway for the neighborhood residents. The new design introducing a center planting strip along the road that acts as a traffic calming strategy and provides dedicated lanes for bicycle traffic and walking. The proposal’s dense planting strategy aims to create a vibrant experience for all users.
The rendering depicts the former Westinghouse Industrial plant, one of the only historic structures that still remain in the community. The design intent was to activate the sidewalk in this location by integrating a historic timeline as a public engagement strategy. The goal of the design would be to not only encourage residents to walk through their neighborhood, but would also strive to introduce the residents to their community’s heritage. The illustration also depicts the commercial band along the roadway with two story structures, which reveals the designers aspirations for also activating the roadway by promoting density by either providing more commercial space or additional housing units on second levels.

Proposals: GREENWAY CORRIDOR DESIGNS

Sidewalk Timeline
Paying homage to the Westinghouse Industrial Plant and to the men and women of the East Springfield neighborhood who worked there.
The goal behind the complete street guidelines and green infrastructure strategies is that over time they could eventually be applied to the community universally. The rendering depicts how a rain garden along Page Blvd. could eventually line the pedestrian way and could potentially manage stormwater from adjacent buildings and even private parking areas. The design emphasizes the importance of maximizing an area’s potential for managing stormwater especially in an urban context. The biodiversity and riverbed rain gardens expose natural processes to residents, an intentional strategy used by the designer aimed at promoting community awareness toward local ecological health.
The section reveals how Page Blvd, an existing four lane paved surface might be re-imagined in order to provide residents of the East Springfield with a safe neighborhood destination. While the design introduces methods for defining the lanes of the new corridor to accommodate multimodal use we can see that it primarily relies on planting. The illustration reveals how dynamic the street might be just by introducing planting and providing more pervious areas. The proposed design does a wonderful job in creating an experience that would successfully complement the abutting residential neighborhood.
Understanding the Natural Systems,
By mapping the topography, forested areas and the interconnected network of natural drainage systems from a regional perspective.

The Natural Systems map looks at the finer grain of the exposed systems found in the neighborhood. The graphic illustrates the topography of this landscape by mapping the 10’ contours of this region, which allows the opportunity to see three main systems that play a large role in how water flows in the neighborhood: Abbey Brook, a stream that runs from the North East corner of the neighborhood, and Poor Brook. These systems are critical for promoting design interventions targeted on providing healthy water that can be deployed in the community and have a dramatic positive impact on the Chicopee River ecosystem.
Diagramming the Natural Drainage of Stormwater, Allows designer’s to understand the impact site design has on larger ecosystems.

When design interventions are targeted to address issues related to public health and healthy water systems, it is important to look at their impact on the community at a larger scale. The map depicts how East Springfield is positioned between the Chicopee River to the North and the Connecticut River to the West and shows the natural drainage of the neighborhood into these two larger river systems. This graphic is important because it demonstrates how in this one neighborhood water moves to six potential areas, indicating that positive changes to water health could have a dramatic impact on improving water quality in the city of Springfield.
This mapping exercise was used early in the design process to identify and diagram potential patterns and spatial organization of the neighborhood. The map uses hierarchical linetypes and hatching to indicate land use, major transportation routes, and depict key landmarks, open spaces, impervious areas, natural systems and forested land. The diagram also reveals important neighborhood boundaries and edge conditions reflective of the neighborhood’s development over time. The goal of the drawing was to gain a better understanding of the dynamic contextual relationships found in East Springfield.
The graphic depicts the contrast between the proportions of the built and unbuilt neighborhood. The diagram's organization clearly depicts a hierarchy of land use achieved by removing it from its context. This process confirmed comments heard during the community meeting which were that areas dedicated to open space or for outdoor recreation were limited. This claim becomes even more evident when one considers that many residents also stated that they did not know there was conservation land in their neighborhood. When considering design interventions through the lens of public health it was apparent that residents needed to be connected to these unidentified and untapped areas that could easily foster outdoor recreation and public awareness of healthy ecosystems.
Early in this process it was clear that it was essential to connect residents to areas dedicated to outdoor recreation when advocating for public health. The map indicates a proposed network of corridors that would begin to knit together the fragmented neighborhood by connecting them to these three primary areas. The routes were derived from secondary streets that would be desirable for bikers and walkers, which would also support existing destinations including Marshall Roy Park, and the Public Library. The residual alley that runs along Page Blvd., highlighted in red served as the prototype area for these design interventions.
Understanding Existing Drainage Infrastructure, And the ecological effects on local conservation areas.

The map of stormwater drains confirms certain preconceived notions in regard to how important these three conservation areas are to the health of the neighborhood. The map indicates how stormwater flows to these areas while the photos highlight instances of up-rooted trees, tires and debris due to flash flooding. These graphics indicate how current stormwater management efforts are failing to provide the neighborhood with healthy environments, which is an even greater concern when considering the known industrial heritage of the neighborhood and the likely potential for non-visible pollutants that are potentially entering the rivers, soil and water table.
The alley, which is highlighted in red, was selected as the prototype area for this design intervention due to its critical location in the neighborhood. The alley is situated between a dense residential area, the public library, the former Westinghouse historical site, a successful commercial block, and Page Blvd. The alley is a secondary or residual space that acts as a buffer separating the commercial band that runs down Page Blvd. and a dense residential neighborhood. The intent of the design in this location was to use this available underutilized space to tie the two areas together with a pedestrian safe bike path. The photos above indicate how the alley is currently used for storing tires, dumpsters, and oil drums.
The idea behind the pedestrian path was to provide residents with a safe and vibrant atmosphere while supporting existing neighborhood destinations. In the proposal, a new program was introduced to include an outdoor reading area for the library, a dog park for the Soapy Dog Spa, and a shared outdoor cafe for the block's two eateries. The design is rooted in stormwater management that educates residents about the importance of environmental health by mimicking and highlighting natural processes including pretreatment, retention, filtration, and phyto-remediation using vegetated bioswales and pervious pavers.

Placemaking

Using design intervention to bring the community together by creating gathering spaces, dedicated areas for additional program that are inspired by public health and safety.
Site Specific Stormwater Management, Using stormwater data as a design tool

The prototype design for this area reflects stormwater data collected from local databases and metrics found in research related to green infrastructure and water-based phytotechnologies. The design of the site area (in gray) reveals that a connected network of vegetated bioswales (shown in green) can effectively retain and treat the volume of stormwater experienced in a 25-year storm equivalent to 5.5 inches of rainfall in a 24hr period. By managing the stormwater onsite in the swales it reduces the stress on the city’s combined sewer overflow system which when overpowered by large storms can release untreated urban runoff and sewage into large bodies of water and associated ecosystems.

Proposals: GREENWAY CORRIDOR DESIGNS
Transforming an Alley into a Pedestrian Friendly Bike Path,

Vegetated bioswales frame the new bike path to provide riders with a safe corridor away from traffic congestion as well as noise and air pollution.

The enlarged plan and section of the prototype pedestrian corridor located along the former residual alley reveal how the path will knit the neighborhood together, blurring the defined edges of the commercial strip along Page Blvd. with the residential area. The path will provide new public spaces and pedestrian-friendly access to existing infrastructure including the public library. The graphic also expresses how the dense planting strategies of the vegetated rain gardens will aim to create microenvironments for plant-life highlighting effective strategies of water management and showcasing many of the natural processes foreign to the urban area as a public education tool.
Proposals: GREENWAY CORRIDOR DESIGNS

Designing Stormwater Pavers,
A process of melding landscape design, community engagement, and public health promoting public health awareness through an interactive product design.

Average Rain Storm in MA = .35 in
1 Year Rain Storm in Massachusetts = 2.65 in / 24hr
Stormwater Paver can Retain 15% of 1 Year Storm
LG = 48 cubic in, SM = 24 cubic in

Stormwater Paver Delays Water from Entering Combined Sewer, Channels Bulk Water to Areas for Pretreatment, Allows Soil Recharge & Maintains a Solid Dry Walking Surface for Pedestrians

Top Face Distributed from Paver Center, Max Gravel Spacing 2/3 unit or 4.5in
Surface Area = 40% for Large Pavers & 35% for Small Pavers while Maintaining Volume Req. of 75%

Exposing strategies for stormwater management to the public was an idea that transcends all scales in this prototype design. The photos on the right depict four paver units that were designed as a tactical/public engagement component to this process where members of their community would be able to fabricate and install personalized permeable pavers for the new public spaces. The design utilized several innovative strategies including using a formula based on stormwater data used to maximize a pavers ability to channel stormwater while maintaining a solid dry surface. The pavers were developed using 3D modeling software, which worked in tandem with a CNC router that carved the forms that were then used in the casting of each unit.
The rendering depicts the proposed reading nook in context with the existing public library where a series of arching retention/seating elements channel stormwater toward the vegetated rain gardens. The seating elements emerge from the ground offering spaces for residents to gather, sit and eat while simultaneously directing them to the new pedestrian corridor. The graphic also provides the viewer with a glimpse of what the field of the semi-pervious hardscape generated by the community might look like and how it could create a very unique experience in these public spaces. The hardscape is intended to be equally aesthetically provoking and functional.
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Resources & References

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