Acknowledgement and Thanks

For information regarding existing site conditions at Monroe Street, Lake Wingra and Wingra Park:

Jim Lorman and The Friends of Lake Wingra
City of Madison Parks Department
City of Madison Engineering
Knothe & Bruce Architects

For sharing their knowledge and inspiration during the past four years:

The Faculty & Staff of the UW-Madison Departments of
Landscape Architecture
Urban and Regional Planning
Horticulture, Botany, Design Studies and Art

For their support:

My Parents
Jonathan Albrecht
and Jennie
If you pay attention to the smaller scale, inviting people to walk and bike, you get a more lively and livable city, a safer city, a more sustainable city. It’s a much healthier lifestyle to have people use their muscles in their day-to-day life. There’s so much to be gained with making people-oriented cities. So what are we waiting for?

Jan Gehl, Danish Architect & Urban Designer
Cities for People
MONROE STREET and WINGRA PARK
Connections | Destinations | Sustainability | Community
Monroe Street: Design for Healthy Neighborhoods and Lakes

Introduction

To fulfill the requirements of the Senior Capstone Design Project in the Department of Landscape Architecture at the University of Wisconsin-Madison, I will investigate how the relationship between the built environment and public health -- and the study of human behavior in streets and public spaces -- can inform the design of a master plan and ‘green’ streetscape for an existing neighborhood commercial corridor in Madison, Wisconsin.

This project is given context and focus by the goals of my capstone project client, the Friends of Lake Wingra (FOLW):

• New Urbanism and ‘Complete Streets’
  • More walkable, bicycle-friendly, mixed-use neighborhoods and activity centers that effectively reduce the volume of traffic.
  • Create a pedestrian-oriented neighborhood that encourages healthy, active transportation choices for people of all ages and reduces vehicle miles traveled (VMT) in the corridor.

In addition, my master plan design will emphasize context-sensitive, mixed-use infill and redevelopment opportunities, as well as improved open spaces. Monroe Street’s Commonwealth Avenue commercial district and adjacent Wingra Park comprise the master plan boundary of this capstone design project.

Project Type: Streetscape, Mixed-Use Infill, and ‘Green’ Stormwater Management Infrastructure

The master plan and streetscape design for Monroe Street and Wingra Park will require the use of ‘green’ Best Management Practices (BMPs) and innovative design to address the requirements of the program elements and goals. The design development is informed by sustainability-related frameworks such as Low Impact Design (LID), Smart Growth, Sustainable Urbanism, and Complete Streets.

‘Green’ Stormwater Infrastructure for Monroe Street

The Friends of Lake Wingra seek to improve the water quality of Lake Wingra by reducing stormwater runoff to the lake. Streets, alleys, parking lots, and sidewalks in the corridor are currently made of impervious materials that prevent rain from soaking into the ground. Rainwater falling on or draining into these streets from neighborhood properties is discharged into nearby Lake Wingra.

This stormwater runoff may be contaminated with a variety of pollutants that impact the ecological balance, health, and water quality of Lake Wingra, such as:

• Petroleum-based products from automobiles
• Phosphates from lawn fertilizers
• Herbicides such as Roundup
• Insecticides and pesticides
• Salt from roads and sidewalks, and
• Particulate matter such as sand from winter road applications or soils from construction sites with inadequate soil erosion control practices.

The City of Madison plans to reconstruct and resurface Monroe Street in 2016. This presents an ideal opportunity to incorporate "green streets" or "high performance infrastructure" into its design, rather than or in addition to conventional gray stormwater management techniques that treat rainwater as a waste product, rather than a resource to be harvested or allowed to infiltrate into the soil and replenish the groundwater supply.

As community stakeholders in the Wingra watershed, the FOLW is advocating for Monroe Street’s reconstruction to include ‘Green Street’ infrastructure and ‘Complete Streets’ design.

Master Plan Goals and Program Elements

This capstone project will support the FOLW’s efforts to incorporate these program elements into the City of Madison’s reconstruction and redesign of Monroe Street.

Additional program elements and goals relate to the creation of a walkable mixed-use activity node and enhanced open spaces, including:

• Design a built environment that supports opportunities for physical activity in terms of everyday bicycling and walking in the corridor, and enhance recreational opportunities, with an eye to improving public health.
• Create context-sensitive, mixed-use urban infill that fills the gaps in the urban fabric, creates a vibrant, active street edge, and provides commercial space and housing opportunities.
• Plan for multifamily housing choices for a mix of ages, family status, incomes, and ownership types.
• Enhance open spaces to provide opportunities for active and passive social interactions that build an individual’s access to a community.
• Move from an automobile-dominated streetscape towards an active, pedestrian-oriented mixed-use activity center.
• Reduce pedestrian injury and introduce traffic-calming measures. Increase pedestrian and bicyclist safety through environmental design. Reduce speeding in the corridor by designing a ‘true’ 20-25 MPH Monroe Street.
• Improve air and stormwater quality by decreasing vehicle miles traveled (VMT) in the corridor.
• Improve connections between existing neighborhood assets and create new destinations in the master plan.
Client Concerns

The Friends of Lake Wingra (FOLW) is a non-profit community organization formed in 1998. Their publication, Lake Wingra: A Vision for the Future describes the challenges in the Wingra watershed.

The majority of the Monroe Street corridor is located within the 3,500 acre Lake Wingra Watershed. Formed 15,000 years ago by the receding glacier that deposited silt, sand and gravel in the area, Lake Wingra was surrounded by wetlands and groundwater springs. The uplands held an extensive oak savannah and prairie ground plane. Over time, the quantity and size of nearby springs have declined due to urbanization and human depletion of the groundwater aquifer (FOLW).

The above 2009 report by the Friends of Lake Wingra describes the challenges in the Wingra watershed and focuses on four goals for the restoration of Lake Wingra and its ecosystem:

1. Clean, Clear Water
2. Restored Spring Flow
3. Abundant Native Plants and Animals
4. Community Stewardship and Enjoyment
Beach Closings and Fish Advisories
Lake phosphorus concentrations associated with lawn fertilizers, eroded topsoil, decaying leaves and goose and pet feces have led to increased aquatic weed growth and blooms of blue-green algae that can be toxic to fish, pets and people.

Untreated storm drain discharge has deposited street sand and other large soil particles that created “islands” in Lake Wingra and Ho-Nee-Um Pond and is causing the Wingra Park Marina to fill with sediment (FOLW).
Regional Context
Monroe Street, Madison, Wisconsin

2010 Population
City of Madison: 236,000
Madison Metropolitan Area: 570,000
State of Wisconsin: 5.7 Million
Regional Land Uses: Greater West and South Madison

- State Capitol Square & Central Business District
- Vilas & Dudgeon-Monroe Neighborhood Boundary (500 acres)
- Streets
- Residential 1-2 Units
- Residential +3 Units
- Commercial
- Institutional
- Parks and Open Space
- Industrial
- Agriculture
STREET NETWORK
Monroe Street is a minor arterial road with average daily traffic counts up to 19,000 in parts of the corridor.

500-acre combined Vilas and Dudgeon-Monroe Neighborhood Boundary

BUS ROUTES & STOPS
Monroe Street is serviced by public bus.

BICYCLE PATHS & ON-STREET ROUTES
B-Cycle Bike Share Station
Existing Bike Path
Existing On-Street Bike Route
Monroe Street Neighborhood Context and Introduction to Analysis

This Project Investigates

- Current Land Uses and Densities; ‘Highest and Best Use’ of land.
- Visual Quality & Aesthetic Character
- Preservation Value
- Opportunities for Context-sensitive Mixed-Use and Multifamily Residential Infill
- ‘Green Street’ Infrastructure to Reduce Stormwater Run-off to Lake Wingra
- Pedestrian-oriented Neighborhood Street Network that Discourages Cut-through traffic and Enhances Connections to Lake Wingra and other Destinations.
- Bicycle Street and Path Infrastructure and Connections
- Open Space Design: Urban Squares and Park Space.
- Streetscape Design
- Parking Configuration

The 1.7-mile Monroe Street Corridor on Madison’s nearwest side.

19-Acre capstone master plan boundary includes Monroe Street’s Commonwealth Avenue commercial node and Wingra Park.

Neighborhood Boundary: Madison’s 500-acre Dudgeon-Monroe and Vilas Neighborhoods.
2010 Population: 5,058. Dwelling units: 1,979 (4 DU/Acre)
Neighborhood Scale Analysis

The 1.7-mile Monroe Street corridor runs between Regent Street and Odana Road and is located 1.5 miles southwest of the Wisconsin State Capitol Square.

Monroe Street is a minor arterial road with average weekday traffic volumes ranging from 13,000 to 19,000 vehicles per day at various blocks of the corridor. It is served by the Madison Metropolitan bus system. The street is bordered by two predominantly single-family residential neighborhoods developed between 1910 and 1940: Vilas neighborhood to the east and Dudgeon-Monroe to the west.

The University of Wisconsin-Madison Camp Randall football stadium is located at the northern end of the corridor at Regent Street. The 1,260-acre University of Wisconsin Arboretum is situated along the southeast edge of the corridor. Other important nearby facilities and public amenities include Wingra Lake and Park, the Southwest Commuter Bike Path (a rails-to-trails project), the Monroe Street Branch Public Library, Edgewood College and Schools, Vilas Park and Zoo, Glenway Public Golf Course, Wingra School, and Randall Public Elementary School.

The two neighborhoods adjacent to Monroe Street (Vilas and Dudgeon-Monroe) encompass 500 acres with a combined population of 5,058 and 1,979 dwelling units. The major land use is single-family residential homes, most of which were constructed between 1910-1940.

Population density is approximately 10 people per acre and housing density 4 dwelling units per acre. Both densities are approximately double those of the City of Madison as a whole. The corridor population was 90% white compared to 75% for the City of Madison (source: City of Madison Neighborhood Indicators).

Average home prices in the two corridor neighborhoods are approximately 50% greater than the Madison average. Of the 6,211 subsidized housing units in Madison, only 3 are located within the neighborhoods adjacent to the Monroe Street Corridor. The neighborhood also lacks racial diversity. The 2011 corridor population was 90% white compared to 75% for the City of Madison [source: City of Madison Neighborhood Indicators].

During the 20th century, Monroe Street contained as many as 12 gasoline service stations, none of which currently sell fuel. Several of these sites are good candidates for redevelopment. My master plan will propose retail or commercial service uses on street level floors along Monroe Street to enhance and reinvigorate a pedestrian-oriented streetscape. Multi-family residential (owner-occupied and rental) and/or office uses are appropriate for upper building levels.

The Monroe Street corridor has three distinct commercial nodes separated by residential and educational uses. Within each of these commercial corridors are opportunities for 3-to-4 story mixed-use infill development in locations where the streetscape is fragmented by gaps in the urban fabric. Uses such as surface parking lots, former gas station stations, single story buildings, and declining rental housing parcels diminish the physical and social cohesion of the pedestrian streetscape. Given relatively high land values in the corridor, these types of properties lack the density and utility that could bring increased social and economic vibrancy through context-sensitive mixed-use, multi-story infill developments more closely aligned with the highest and best use of the land, while providing an alternative to the loss of prime agricultural and park land to sprawling ‘green-field’ development.

The corridor has many positive metrics including high post-secondary education attainment rates and low unemployment, crime, and foreclosure rates. However, the corridor lacks multi-family housing choices, including senior and affordable housing. Average home prices in the two corridor neighborhoods are approximately 50% greater than the Madison average. Of the 6,211 subsidized housing units in Madison, only 3 are located within the neighborhoods adjacent to the Monroe Street Corridor. The neighborhood also lacks racial diversity. The 2011 corridor population was 90% white compared to 75% for the City of Madison [source: City of Madison Neighborhood Indicators].

According to the 2006 Monroe Street Commercial District Plan, a one-half mile urban population of 15,000 to 20,000 is necessary to support retail businesses through pedestrian traffic. As such, broader automobile and bus access is important to the economic viability of businesses in the corridor. However, traffic speeds and pedestrian safety has been a longstanding concern of neighborhood residents. For example, during the month of April 2012, four pedestrians were struck by vehicles while crossing Monroe Street. The district plan stresses the importance of ‘effectively managing traffic in order not to conflict with the adjacent neighborhoods’ desire for traffic calming and control.’ My capstone project’s program elements include redesigning Monroe Street for improved pedestrian and cyclist safety. Calming traffic so that it adheres to the posted 25 MPH speed limit can be accomplished by reconfiguring the street’s physical design.

The Southwest Bike Path, a Rails-to-Trails conversion project with over 3,000 daily users [Bike Federation of Wisconsin], runs parallel to Monroe Street just three blocks away. Ramps and stairwells connect this bike-pedestrian path to the higher elevation neighboring streets at multiple locations within the corridor. Spain bridges overhead display cross-street names to provide orientation. There are also currently three Madison B-Cycle Stations (the city’s bike share program) located on or near Monroe Street.

However, it is noteworthy that Monroe Street is vehicle-centric, lacking adequate bicycle accommodations such as bike lanes, sharrows, and bike racks. Improved bike infrastructure can help to reduce vehicle miles traveled (VMT) within the corridor, by providing safer, more convenient bike access to retail and professional services, schools, and other destinations.
Monroe Street Existing Land Uses and Major Neighborhood Assets

- Three distinct commercial nodes are separated by Edgewood Campus, one of the early developments along the corridor, and single-family residential housing.

- The corridor is bordered by the University of Wisconsin-Madison Camp Randall Football Stadium to the north, the Southwest Commuter Bike Path to the west, and Lake Wingra and the 1,260-acre UW Arboretum to the south and east.

- Monroe Street is both a neighborhood ‘Main Street’ and a Madison-area shopping and dining destination with mostly locally-owned (non-franchise) businesses.

- Commercial uses include neighborhood retail, professional services, and restaurants that serve the adjacent Dudgeon-Monroe and Vilas neighborhoods, and nearby Regent, University Heights, Nakoma, and Westmorland Neighborhoods, as well as the greater Madison community.
1. Conceptual framework for design decisions relating to the master plan include:
   - Relationship between Public Health and the Built Environment
     - Fostering healthy, active lifestyles
   - ‘Sustainable’ Neighborhoods and Streets:
     - Ecology, Economy, and Equality
   - Connections and Destinations: Improving the Urban Fabric of a Neighborhood

2. Evaluating Opportunities and Constraints
   - Existing flows and connections
   - Land Uses and Densities [Highest and Best Uses]
   - Public and Semi-Private Open Spaces that support active and passive interaction and build an individual’s access to a community [Jan Gehl, ‘Places for People’]
   - Visual quality and Cultural or historic significance
Research Topic & Literature Review

In addition to the concerns of my client, my design project is also informed by a review of literature related to my research topic – the relationship between public health and the built environment – with a focus on policies and design strategies that will improve the likelihood of the following project goals:

- Increase physical activity in terms of biking and walking in the Monroe Street Corridor
- Reduce pedestrian injuries through traffic-calming design solutions
- Improve air and water quality by decreasing vehicle miles traveled, and thereby greenhouse gas emissions, in the corridor.
- Create public spaces that enhance the social vibrancy of the community, supporting active and passive social interactions that build an individual’s access to a community.

How can the relationship between public health and the built environment inform the design of a more sustainable urban corridor? A frequently cited definition of sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). Sustainability is also often described in terms of three integrated systems: economic, environmental, and social. The design of the built environment (including infrastructure, streets, open spaces, and buildings) affects not only the economic and environmental systems of a city, but also the health of its residents. The World Health Organization defines health as a “state of complete physical, mental, and social well-being, not just the absence of disease or infirmity’.

When people think of factors that adversely affect their health, they often focus on influences such as poor diet or the need for more exercise. However, land use patterns, housing characteristics, transportation infrastructure, and architectural and urban design standards can also be potential health hazards. Investigation of my research topic has made clear to me that designing communities around automobiles, rather than people, can have a dramatic impact on health and quality of life. Decreased physical activity is associated with increases in obesity and numerous illnesses such as type 2 diabetes, heart disease, hypertension, stroke, depression, and certain types of cancer (Jackson & Kochtitzky).

A study published in November 2012 of national, regional and global trends in adult overweight and obesity prevalence from 1980 and 2008 found 67% of American adults are overweight. Moreover, 36% of adults and 17% of children are not just overweight but obese, meaning they have a Body Mass Index of at least 30 (the equivalent of a 5’9’’ tall person weighing 203 pounds or more). Obesity rates in 2008 were nearly double those in 1980. If current trends continue, by 2030 half of American adults could be obese (Stevens, et al).

The rapid increase in obesity has crossed all socio-economic groups. According to the Centers for Disease Control and Prevention: “American society has become ‘obesogenic,’ characterized by environments that promote increased food intake, nonhealthful foods, and physical inactivity.” It is estimated that obesity accounted for 21% of medical spending or $130 billion in 2005 (Dawley and Meyernhofer). The U.S. is expected to spend $344 billion on health care costs attributable to obesity in 2018 if rates continue to increase at their current levels (Thorpe).

When I first contemplated my client’s goals and corresponding potential program elements for a Monroe Street Corridor master plan, I questioned whether bicycle infrastructure could or should be included in the corridor due to the space constraints and the car-dominated nature of the street. After a semester of reading articles on the relationship between public health and our built environment, I believe that landscape architecture and planning professionals must play a vital role in slowing and reversing the obesity trend by accommodating and prioritizing walking, bicycling and other forms of physical activity within the designed environment. The senior capstone process has broadened my understanding of a central tenant of the American Society of Landscape Architects’ code of professional ethics: ‘dedication to public health, safety and welfare.’

Mixed land uses that allow people to work, shop, go to school and recreate within walking or biking distance of their homes increase opportunities to participate in daily physical activity. Density and mixed-uses affect individual perceptions of accessibility. Greater proximity between residential and commercial uses has a particularly positive impact on the perception that walking or bicycling is a viable alternative to driving. A neighborhood with diverse land uses is more likely to capture trips within the area, thereby facilitating pedestrian, bicycle or transit trips and decreasing vehicle miles traveled and emissions. Street layout, connectivity, and traffic calming devices are design features that have been shown to increase the walkability of a neighborhood. Research shows that pedestrian and bicycle trips, increasing an individual’s perception people are also more likely to walk or bicycle in places where they see other active people. Aesthetic features such as the attractiveness of a place also appear to affect individual perceptions of walkability (Jackson & Kochtitzky).

The built environment can provide both barriers and opportunities to engage in physical activity. Research by the Centers for Disease Control and Prevention (CDC) indicates that two of the main reasons given for not exercising are lack of facilities such as sidewalks and parks, and fears about safety. The CDC national survey of households showed parents reporting two primary barriers to children walking to school: distance and traffic safety (Ewing & Kreutzer).
Analysis found that both child and parent obesity were lowest in neighborhoods with environments that were most favorable to both healthy eating (defined as supermarket proximity and/or lower fast-food restaurant density), and physical activity (defined as having built environments more conducive to walking and access to a higher-quality park).

Seattle Children’s Research Institute
Geographic Information Systems (GIS)-based Spatial Analysis of:
• Nutrition Environment (NE) and
• Physical Activity Environment (PAE)

Seattle Children’s Research Institute study, (American Journal of Preventive Medicine)

• Compared neighborhoods in San Diego and Seattle, found wildly different rates of obesity among children based on "place-related" geographic information systems (GIS) spatial factors.

• Children who lived in walkable areas, with a child-friendly park nearby and access to healthy food (neighborhood grocery store) had 59% lower odds of being obese.

The existing design of the intersection of Monroe Street and Commonwealth Avenue prioritizes vehicles over pedestrians.

After 3 pedestrian are hit by cars within a 10-day period in April 2012, City of Madison Police officers monitor crossings on Monroe Street to raise awareness of safety issues and ticket drivers who fail to yield to pedestrians. Image shows the intersection of Monroe and Knickerbocker Street. Enforcement is only part of the solution. Using physical streetscape traffic-calming design techniques is key to a long-term solution.

Seattle Children’s Research Institute
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• Nutrition Environment (NE) and
• Physical Activity Environment (PAE)

Analysis found that both child and parent obesity were lowest in neighborhoods with environments that were most favorable to both healthy eating (defined as supermarket proximity and/or lower fast-food restaurant density), and physical activity (defined as having built environments more conducive to walking and access to a higher-quality park).
At least 18 people have been hit by cars on Monroe Street since 2004, including:

- In 2008, a 6 year old girl was hit on a tag-a-long bike at Monroe at Chapman.
- A 67 year old crossing guard hit at Monroe at Glenway in 2010
- In April 2012, a 61 year old school teacher was hit on Monroe Street at Knickerbocker Street — in the crosswalk, holding a red pedestrian flag — the third person to be hit by a car on Monroe Street in 10 days.

Monroe Street Connections | Pedestrian and Bicycle Safety Issues

Monroe Street at Sprague Street. Posted speed limit is 25 MPH, but the street is designed for 35-45 MPH speeds. Redesigning and reconfiguring Monroe Street to be a “real” 25 MPH limit corridor would calm traffic and reduce speeding and incidents of failure to yield to pedestrians in the crosswalks. The result would be a safer, more pedestrian-friendly business district and neighborhood, rather than an automobile-centric street. It would also discourage regional cut-through traffic on Monroe Street due to the speed reduction.

Red Pedestrian Flag Program: a band-aid, not a solution, to Monroe Street’s pedestrian safety issues.
The Smart Growth America Complete Streets Coalition defines ‘Complete Streets’ as:

“Streets for everyone. They are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists, and public transportation users of all ages and abilities are able to safely move along and across a complete street. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work. They allow buses to run on time and make it safe for people to walk to and from train stations.”

In accommodating multiple forms of travel, ‘Complete Streets’ not only increase opportunities to participate in daily physical activity, but can also decrease total vehicle miles traveled if people choose transit or non-motorized modes of travel, resulting in a reduction in local greenhouse gas emissions and improved air quality and respiratory health, as well as improved surface water quality from a reduction in vehicle-related pollutants in stormwater runoff.

Sustainable design and development integrates physical activity into daily lives. Pedestrian and bicycle safety enhancements, improved connectivity to green spaces, and measures that decrease the speed and volume of vehicular traffic, will be important components of a ‘sustainable’ master plan for the Monroe Street corridor.

How can the human behavior in streets and public spaces inform the design of a more sustainable urban corridor?

In addition to investigating public health articles, I spent time this semester reading some of the writings of Jan Gehl and William Whyte to further investigate the ‘social’ aspect of sustainability and how their ideas of human behavior in streets and public spaces might inform the design of a master plan and site-scale design for Monroe Street.

Jan Gehl is a Danish urban designer and architect who argues that designs that encourage people to spend time together and make interacting with other people outdoors enjoyable can make a big difference in the quality of urban life. He proposes that outdoor social interactions result from both necessary and optional activities. Since the extent to which people choose to engage in optional activities depends on how enjoyable they find them, he writes that designers can help create lively cities by designing good outdoor spaces, particularly ones that encourage optional time spent outside, from passive to active interactions with others.

Gehl’s theory involves four dualities: designs that assemble or disperse, integrate or segregate, invite or repel, and open up or close in. Gehl advocates design that assemble, integrate, invite, and open up. Gehl believes that people need and want human contact in outdoor public spaces. People-oriented places can build an individual’s access to a community, an important aspect of social sustainability.

Gehl observes what makes cities successful and how they can become more sustainable, vibrant, and safe places to live. Gehl views cities as places that can act as solutions to our contemporary environmental and health crises. He also outlines the relationship between safety and enhancing public space, and argues that street redesigns that make walking and bicycling more accessible and enjoyable can improve the quality of life for people.

A predecessor to Gehl, William H. Whyte used site observations and analysis to better understand what qualities make urban spaces socially active and safe. In his book, “The Social Life of Small Urban Spaces”, Whyte describes the connection between the qualities of a space and the activities of that space. Whyte observed that ‘a good plaza starts at the street corner’. Social interactions started on the street and transition to plazas. These interactions provided opportunities for people watching, an important passive activity that helped to create successful public spaces.

Both Gehl and Whyte agree that wherever there are people, it is generally true that people and human activities attract other people. They gather and move with others and seek to be near others. New activities begin near ones that are already in progress. Gehl writes that ‘the opportunity to see, hear and meet others can be shown to be one of the most important attractions in city centers and on pedestrian streets’.

Multimodal Monroe Street (Jody Schimek)
Elements of ‘Sustainable’ and ‘Livable’ Streets

• ‘Green Street’ – High Performance Infrastructure for stormwater management and aquifer recharge

• Multi-modal ‘Complete’ Streets — public and healthy, active transit alternatives. Reduced Green House Gas (GHG) emissions and improved air quality in the corridor.

• Safe Routes by bike and foot to school, work, shopping, socializing, and recreation.

• ‘Places for People’ – support active and passive social interactions and build an individual’s access to a community.

• Economic vibrancy – employment, services and retail that support the neighborhood and region.

• Mix of Land Uses that provide housing choices – multifamily, senior, affordable, owner-occupied and rental.

• Livability: cleaner air, cleaner water, physical activity, vibrant, safe, and have a ‘sense of place’.

Source: Chicago DOT
### Project Goals
- Manage stormwater runoff at the source and surface.
- Use plants, rock, and soil to slow, filter, cleanse, and infiltrate runoff, replenishing the groundwater supply.
- Aesthetically enhance the community and streetscape.

### Project Facts
- Green Street curb extensions include a series of mini-dams. Water cascades from one “cell” to another within the dams until the curb extensions reach storage capacity.
- Converted 590 sq ft of pavement into permeable, green landscape.
- Manages 225,000 gallons per year (381 gal/sq ft) of stormwater.

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The City of Portland benefits from comprehensive thinking and planning:
- Urban design,
- Multi-modal transportation systems,
- Watershed health,
- Parks and open spaces, and
- Infrastructure systems are all enhanced by integrated planning, design, and budgeting.
The City of Seattle ‘Complete Streets’ Policy

- Advances long-standing City land use, transportation and environmental policy.
- Supports safe travel for all road users
- Promotes active transportation and supports healthy communities.

The City of Seattle defines a ‘Green Street’ as:

- Right-of-way that gives priority to pedestrian circulation and open space over other transportation uses.
- Treatments may include sidewalk widening, landscaping, traffic calming, and other pedestrian-oriented features.
- The purpose of a Green Street is to enhance and expand public open space, and to reinforce desired land use and transportation patterns on appropriate City streets.
The City of Portland is a leader in green street facility design and has integrated Green Street facilities into city policy with these goals:

- manage stormwater at its source
- protect surface and groundwater quality
- replenish groundwater supplies
- cool the air
- improve air quality
- provide urban green spaces.

Portland Green Street Guiding Principles

1. Manage stormwater runoff at the source and the surface.
2. Use plants and soil to slow, filter, cleanse, and infiltrate runoff.
3. Design facilities that aesthetically enhance the community.

Stormwater bio-retention planters adjacent to on-street parking with 3-ft egress zone, permeable pavers and educational signage.
The size and number of the springs near Lake Wingra were largely responsible for early First Nations village sites and a large number of effigy mounds on its shores. The name Wingra ('Duck') comes from the language of the Ho-Chunk (Winnebago) Nation, the most recent First Nations people to settle in the area. Up to the 1920s small groups of Ho-Chunk returned to campsites near Lake Wingra for seasonal hunting and fishing.

In 1935 the University of Wisconsin Arboretum was founded on 1,300 acres along the south and east shores of Lake Wingra, preserving some of the natural shoreline, woodlands, and oak savannah from further development as Madison expanded. The Arboretum became the location of pioneering work and research in the field of ecological restoration and the area’s native ecosystems.

The 1938 Wheeler Council Ring by renowned prairie-style landscape architect Jens Jensen is located next to active springs in the UW Arboretum woods near Arbor Drive and Monroe Street. It is a memorial to Jensen’s grandson, Kenneth Wheeler. The 25-foot diameter open ring is constructed of native limestone. Jensen saw the Council Ring as representative of vernacular traditions that evoke the Viking past of his Danish ancestors and Native American egalitarianism. A group sitting in the council ring gathers in a continuous circle, a community without hierarchy where all present are equals.

The promise of egalitarianism, along with the curvilinear forms of Jensen’s council rings and use of local limestone in their construction, provide inspiration for my master plan and site design, connecting the past, present, and future of Lake Wingra and Monroe Street.

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The 1938 Wheeler Council Ring by renowned prairie-style landscape architect Jens Jensen is located next to active springs in the UW Arboretum woods near Arbor Drive and Monroe Street. It is a memorial to Jensen’s grandson, Kenneth Wheeler. The 25-foot diameter open ring is constructed of native limestone. Jensen saw the Council Ring as representative of vernacular traditions that evoke the Viking past of his Danish ancestors and Native American egalitarianism. A group sitting in the council ring gathers in a continuous circle, a community without hierarchy where all present are equals.

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"If we can develop and design streets so that they are wonderful, fulfilling places to be – community building places, attractive for all people – then we will have successfully designed about one-third of the city directly and will have had an immense impact on the rest."

- Alan Jacobs, Great Streets
Sample of Destinations
- Wingra Park (Active Rec & Playground)
- Lake Wingra
- Wingra Boat House
- Michael’s Frozen Custard Shop
- Bike Paths
- Arboretum & Wheeler Council Ring
- Edgewood School Campus
- Temple Beth El
Master Plan Development | Connecting the Urban Fabric

- Master Plan Boundary
- Street
- Monroe Street - Bus Route, Commercial Node
- Commonwealth Ave. - Bus Route
- New Street Connection
- Dead End or T-Street in Master Plan Boundary
- New Bike-Pedestrian Path
- Southwest Bike Path
- Bike Route

Sample of Destinations
- Wingra Park (Active Rec & Playground)
- Lake Wingra
- Wingra Boat House
- Michael's Frozen Custard Shop
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- Edgewood School Campus
- Temple Beth El
Lakeshore path terminates

Erosion caused by foot path along lakeshore.

View of Wingra Park from pier looking northwest towards Monroe Street.

Main entrance and parking lot adjacent to burr oak grove.

Plaque on boulder near park entrance.
Wingra Boat Livery, open seasonally.

View of active recreation fields looking south toward Lake Wingra.
Master Plan Development | Massing Model for Mixed-Use Activity Center

Existing Conditions

Smart Growth Infill and Enhanced Multi-modal Street Network

- Existing Building
- Approved Multifamily Infill Project
- Street
- Monroe Street

- Existing Building
- Multifamily Residential Infill
- Mixed-Use Commercial and Multifamily Residential Infill
- Enhanced Open Spaces (Public and Private)

New Street Connection
Existing Buildings and Car-Oriented Monroe Street

- Surface Parking Lot
- Street
- Monroe Street

- Several buildings with low floor-to-area ratios (Building Footprint-to-Lot ratio)
- Streetscape edge is largely dominated by asphalt parking lots
- Fragmented street network.

Smart Growth Infill and Pedestrian-Oriented Streetscape and Neighborhood

- Shared interior block public/private parking lots
- Mixed-Use Commercial and Residential Infill with enhanced street connections
- Expanded street network to enhance connections and fabric of the neighborhood

- Multifamily Residential
- Commercial
- Mixed-Use (Commercial/Residential)
- Enhanced Open Space
- Institutional
Master Plan

- Stormwater Infiltration Planters
- Crossing Enhancements
- Jens Jensen Square
- Woonerf ‘Shared Street’ Extension and Gateway to Wingra Park
- Tree Allee
- Metered Interior Block Parking

Intersection Redesigned
Commonwealth Ave. Extension
Laurel Tavern Beer Garden
Access Alley
Michael’s Custard Plaza
Metered Interior Block Parking
Edible Community Orchard
Arbor Drive Extension
Relocated Playground
Wingra Park Gateway
Bike-Ped Path Network
Five Lakes Oak Grove and Council Ring
Bike-Ped Path Network
Erosion Control Shoreline Plantings
Black Locust Wood Boardwalk

Additional Trees and Path Extension
Improved Crossing

Temple Beth El
Olin Oak Savannah
Active Rec Sports/Soccer
Existing Basketball
Picnic
Boat House
Great Lawn
UW Arboretum

100 Ft North

Intersection Redesigned
Commonwealth Ave. Extension
Laurel Tavern Beer Garden
Access Alley
Michael’s Custard Plaza
Metered Interior Block Parking
Edible Community Orchard
Arbor Drive Extension
Relocated Playground
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Existing Basketball
Picnic
Boat House
Great Lawn
UW Arboretum

100 Ft North
Master Plan
Bird's Eye Perspective
Woonerf is a Dutch word for an area, usually residential, where motorists and other users share the street without boundaries such as lanes and curbs. The term can be translated as “residential yard,” reflecting its popularity in the Netherlands where private space is limited. In a woonerf, people on bikes and on foot have access to the whole street, not just sidewalks. The street functions as a public living room, where adults gather and children play safely because vehicle speed is kept to a minimum. [Source: streetswiki.wikispaces.com/Woonerf].

The Wingra Woonerf shown above would create a new gateway to Wingra Park and provides vehicular access to infill buildings.
• A new lakeview limestone council ring is nestled in a stand of five swamp white oak trees that evoke the land pattern of the five lakes in the Madison-area Yahara Watershed.

• The oaks and council ring create an axis from the Woonerf and new Wingra Park Gateway, providing a focal point in the distance, leading the eye outwards towards Lake Wingra.
• New neighborhood open spaces along Monroe Street support active and passive social interactions, building an individual’s access to the community.

• The curvilinear forms of the seat-height limestone planter seat walls echo the nearby Wheeler and Glenway Council Rings designed by Jens Jensen.

• A soft canopy of serviceberry trees create a sense of overhead enclosure at the neighborhood square.

• A water feature and public art add visual and auditory interest.

• The ‘woonerf’ shared street enhances the urban fabric of the neighborhood, while creating a multi-modal gateway to Wingra Park and Lake Wingra views.

• Metered interior block shared parking allows for more efficient parking allocation in the 2500 block of Monroe Street.
New neighborhood square with lannonstone seat wall planters. Permeable pavers allow stormwater infiltration, reducing run-off into Lake Wingra.

New promenade and gateway into Wingra Park, can be closed for street festivals and neighborhood events.

Multimodal Monroe Street and enhanced intersection design.

As an alternative to sprawl, the project identifies ‘Smart Growth’ mixed-use urban infill opportunities.

3-to-4 story multifamily housing choices for a variety of ages, incomes, family status, and rental and owner-occupied opportunities.

Down-size or up-size between single family homes and multi-family options in a walkable, bikeable mixed-use neighborhood with transit access.
Site Perspectives

Northeast view of Jensen Square from existing mixed-use building.

View from Monroe Street of existing site conditions.

Site Perspectives

Southwest view from window of a new mixed-use building adjacent to Michael’s Frozen Custard. Stone seat wall planters, plaza, and Woonerf with Monroe Street in the distance.

Monroe Streetscape and stormwater infiltration planter near Michael’s Frozen Custard Shop and Jensen Square.

Jens Jensen Square with seat-height limestone planters inspired by the curvilinear forms of Jensen’s council rings.
Before and After views from Monroe Street at Sprague Street looking southeast towards Lake Wingra.

The Sketchup rendering to the right depicts the new neighborhood square and Woonerf gateway to Wingra Park.
Multi-modal Monroe Street Design

- Monroe Street vehicular travel lanes are reduced from 4 to 3 lanes, each 10 feet wide. There is one northbound and one southbound lane, slowing traffic speeds and discouraging cut-through traffic from larger arterial roads.

- The center vehicle lane is designated for left turns only or center planter medians that calm traffic speeds by narrowing the perceived street width.

- 2 designated bicycle lanes, each 5-feet wide, support active transit in the Monroe Street corridor and improved bike connections along the mixed-use activity center and business district.

- 7-foot wide on-street parking lane and ‘green’ stormwater infiltration planters share the street perimeter, narrowing the perceived width of the street and calming traffic.

- Improved pedestrian crossings include pattern-stamped, colored concrete or colored pavers at widened crosswalks and curb extensions (bulb-outs) at designated intersections.
'If you plan cities for cars and traffic, you get cars and traffic.
If you plan for people and places, you get people and places.'

Fred Kent
Project for Public Spaces
www.pps.org
• As an alternative to sprawl, the project identifies ‘Smart Growth’ infill opportunities in the Commonwealth Avenue node of Monroe Street.
• 3-to-4 story multifamily housing choices for a variety of ages, incomes, family status, and rental and owner-occupied opportunities.
• Down-size or up-size between single family homes and multi-family options in a walkable, bikeable mixed-use neighborhood with transit access.
• Green Street infrastructure to reduce stormwater discharge to Lake Wingra and increase groundwater recharge.
• Multi-modal Complete Street, Enhanced Bicycle Infrastructure
• Enhanced Neighborhood Walkability.
• Calmer Traffic and Reduced Vehicular Speeds
• Created outdoor living and gathering areas to support community-building opportunities and neighborhood connections.
• Aesthetic character informed by the historic character and pedestrian scale of the corridor.
• Plaza and gateway features, including local limestone finishes and plant palette, connect the urban fabric of the neighborhood to Wingra Park and Lake.
• Enhanced park programming provide more opportunities for active and passive recreation and enjoyment of Lake Wingra.
’A good city is like a good party:
You stay much longer than you planned.’

- Jan Gehl, Danish Urban Designer & Architect
Site Planting Plan | Trees

- Autumn Brilliance Serviceberry (Amelanchier x grandiflora 'Autumn Brilliance')
- Aristocrat Pear (Pyrus calleryana 'Aristocrat')
- White Fringetree (Chionanthus virginicus)
- Autumn Blaze Maple (Acer x freemanii 'Jeffersred')
- Princeton Sentry Ginkgo (Ginkgo biloba 'Princeton Sentry')
- Ivory Silk Japanese Tree Lilac (Syringa reticulata 'Ivory Silk')
Site Planting Plan | Perennials

- Shenandoah Switch Grass (Panicum virgatum ‘Shenandoah’)
- Hosta ‘Frances Williams’
- Bevan’s Cranesbill (Geranium macrorrhizum ‘Bevan’s Variety’)
- Bergenia cordifolia ‘Rotblum’
- Rudbeckia fulgida ‘Blovi’ (Viette’s Little Suzy)
- Japanese Pachysandra (Pachysandra terminalis)
Shenandoah Switch Grass
(Panicum varigatum 'Shenandoah')

Winter King Hawthorn
(Crataegus viridis 'Winter King')

Swamp White Oak
(Quercus bicolor)

Autumn Brilliance Serviceberry
(Amelanchier x grandiflora 'Autumn Brilliance')
Diagram shows cut and fill for the 864 and 866-foot contour lines that run through the plaza site at the 2500 block of Monroe Street.

<table>
<thead>
<tr>
<th></th>
<th>Cut [sf]</th>
<th>Fill [sf]</th>
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<td>x Contour Interval Factor [2-ft]</td>
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<tr>
<td>x Compaction Factor [1.25 for Fill]</td>
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<tr>
<td>Cubic Feet Total</td>
<td>25,640</td>
<td>1,968</td>
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</table>
Site Grading Plan

Diagram shows grading along the 864 and 866-foot contour lines that run through the plaza site at the 2500 block of Monroe Street.

- 2-Ft Contour Interval
- Soil Angle of repose: 3:1
- Minimum Distance required between contour lines is 6 feet.

The street is graded for a longitudinal slope of 2% typically and a cross slope of 2.4%. A horizontal distance of 100 feet between 2-foot contour lines provide a 2% slope.

Stormwater is directed away from buildings and towards bioinfiltration devices. Interior parking lot is graded to sheet drain into adjacent vegetated bioswales.
**Construction Details**

Notes:

- Do not scale from drawings
- Installation to be completed in accordance with manufacturer’s instructions.
- All elements are continuous unless otherwise noted.
- Concrete shall be Type 1, 2500 PSI w/ 28 day cure, 4” max slump. Concrete shall fall no greater that 5 feet for proper placement.
- All poured surfaces shall be free of depressions, bulges, exposed aggregate, holes and have uniform texture.
- All dimensions typical unless otherwise noted.

---

**Curb Extension Infiltration Planter**

Scale 3/16” = 1’0”
Construction Details

2 Infiltration Planter Inlet and Splash Pad

SCALE 1/4" = 1'-0"

Notes:
- See Detail 1 Notes

3 Infiltration Planter Check Dam

SCALE 1/4" = 1'-0"

Notes:
- See Detail 1 Notes
- Compact 3/4" crushed stone to 95% proctor
Seat Wall Planter and Permeable Plaza Pavers

**Notes:**
- See Detail 1 notes
- Do not scale from drawings
- Installation to be completed in accordance with manufacturer's instructions.
- All materials are continuous unless otherwise noted.
‘Stakeledge’ Buff Lannon Stone, a form of natural limestone veneer by ‘Halquist Stone’ is specified for the masonry stone on seat wall planters at the plaza areas (see Detail 4), at the Wingra Park Gateway walls, and the Five Lakes Council Ring.

‘Eco-Priora’ Permeable Pavers by Unilock

Unilock “EcoPave” products have an increased joint spacing that allows rapid rainwater infiltration.

Benefits of permeable paving

- No pooling of water on the surface
- Weeds cannot sprout in the joints very easily
- Can be used to harvest rainwater for later use
- Reduces storm water load
- Eliminates thermal pollution of streets and rivers
- Filters contaminants from water naturally
- Replenishes the water table – important for trees

(Source: Unilock Product Catalog, Hengestone Holdings, Inc. 2011)
<table>
<thead>
<tr>
<th>Pre-Q Discharge Rate</th>
<th>Coeff. of Runoff</th>
<th>Intensity</th>
<th>Area</th>
<th>Discharge Rate</th>
<th>Discharge Volume</th>
</tr>
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<tbody>
<tr>
<td>G-Hour, 10-year Storm Event</td>
<td>C</td>
<td>I</td>
<td>A</td>
<td>G (CIA)</td>
<td>3-hr cu ft</td>
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<td>ASPHALT/CONCRETE</td>
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<td>12,777</td>
<td>0.28</td>
<td>0.89</td>
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<td>0.50</td>
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<td>Michaels</td>
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<td>0.59</td>
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<td>Bike Path - Asphalt</td>
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<td>0.14</td>
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<td>BUILDINGS</td>
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<td>Apartments Bldg</td>
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<td>Apt. Bldg Covered Parking Structure</td>
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<td>12,703</td>
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<td>1.19</td>
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<td>Laurel Tavern</td>
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<td>2,793</td>
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<td>3,202</td>
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<td>0.21</td>
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<td>PLANTED AREAS</td>
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<tr>
<td>Street/Terrace Planting Areas</td>
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<td>3</td>
<td>500</td>
<td>0.01</td>
<td>0.01</td>
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<tr>
<td>Wingra Park Area - Lawn and Trees</td>
<td>0.30</td>
<td>3</td>
<td>35,621</td>
<td>0.62</td>
<td>0.74</td>
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<td>Wingra Park - east of NS bike path</td>
<td>0.30</td>
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<td>35,621</td>
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<td>0.74</td>
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<td>Misc. Planting Areas</td>
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<td>155,168</td>
<td>4.08</td>
<td>8.21</td>
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**Notes**

- **C** = Runoff Coefficient
- **I** = Rainfall Intensity in inches per hour
- **Area** = Divided by 43,560 sq ft
- **Discharge Rate** = Divided by 43,560 sq ft
- **Discharge Volume** = Divided by 43,560 sq ft
- Use 10-year storm event in inches/hour
- Use G = Rate * 80 sec/min * 80 min/hr * 3 hrs
### Stormwater Calculations and Bioretention
#### Post-Development (Post-Q)

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<tr>
<th>Post-Q Discharge Rate</th>
<th>Coeff. of Runoff</th>
<th>Intensity</th>
<th>Qty.</th>
<th>Surf. Area</th>
<th>Area</th>
<th>Post-Q Discharge Rate cu ft/sec</th>
<th>Discharge Volume (3-hr) cu ft</th>
<th>Notes</th>
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<td><strong>BUILDINGS</strong></td>
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<tr>
<td>Retail Adj. North Bld (w/ Green Roof)</td>
<td>0.95</td>
<td>3</td>
<td>2,590</td>
<td>0.01816</td>
<td>0.18</td>
<td>1.901</td>
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<td>Residential Infill Bldgs (w/ Green Roofs)</td>
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<td>18,770</td>
<td>0.00201</td>
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<td>Mid Monroe Retail (Laurel to Michaela)</td>
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<td>Monroe St</td>
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<td>3</td>
<td>7,750</td>
<td>0.1789</td>
<td>0.51</td>
<td>5.507</td>
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<td>New North Rd &amp; Walks</td>
<td>0.95</td>
<td>3</td>
<td>18,376</td>
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<td>Wooster with Parking</td>
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<td>Mid Pavement</td>
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<td><strong>Permeable Pavement</strong></td>
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<td>Plaza East and Walks - Pervious</td>
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<td>3</td>
<td>7,444</td>
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<td>0.15</td>
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<td>3</td>
<td>5,239</td>
<td>0.0744</td>
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<td>Parking with Drive Lanes (KBI Flex-Pave)</td>
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<td>Plaza</td>
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<td>Infiltration Planters (110 of typ)</td>
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<td>0.0179</td>
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<td>Terrace Planting Bed</td>
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<td>0.0353</td>
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<td>0.74</td>
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<td>6.99</td>
<td>88,529</td>
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#### Change in Stormwater Discharge:

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<th>Volume</th>
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<td>[cu ft/sec]</td>
<td>[cu ft]</td>
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<tr>
<td>Pre-Q:</td>
<td>8.21</td>
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<tr>
<td>Post-Q:</td>
<td>8.25</td>
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<tr>
<td>Delta Q Before Detention:</td>
<td>-1.86</td>
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#### Detention Opportunities:

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<tr>
<th>Surf Area</th>
<th>Depth</th>
<th>% Void</th>
<th>Detention</th>
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</thead>
<tbody>
<tr>
<td>[sq ft]</td>
<td>[ft]</td>
<td>Space</td>
<td>Volume (cu ft)</td>
</tr>
</tbody>
</table>

- **Bioretention Areas**
  - Surf Area: 5,181.0
  - Depth: 6
  - % Void: 40%
  - Detention Volume: 12,479

- **Street, Infiltration Planters (Green Infrastructure)**
  - Surf Area: 1,462.0
  - Depth: 6
  - % Void: 40%
  - Detention Volume: 3,749

- **West Plaza Basin**
  - Surf Area: 1,628.0
  - Depth: 6
  - % Void: 40%
  - Detention Volume: 4,387

**Total Detention Capacity (Cu Ft):** 20,814
## Senior Capstone Time Log

<table>
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<th>Hrs Worked</th>
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**Total:** 631
Reference and Reading List


Edgewood College Sustainability Leadership Program, August 2012. “Stakeholder Engagement for the Planned Monroe Street Reconstruction Project.” PDF.


