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ENHANCING EQUITABLE OUTCOMES ASSESSMENT FOR THE JOE LOUIS GREENWAY IN DETROIT:

A COMMUNITY-CENTERED DIGITAL MONITORING SYSTEM

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A Master's Project for Partial Fulfillment of the Degrees of Master of Science, Master of Landscape Architecture, and Master of Urban and Regional Planning

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ABSTRACT

The Joe Louis Greenway (JLG) is a central part of Detroit's response to major economic and social shifts, from industrial growth to decline and disinvestment. This multi-phase redevelopment initiative aims to revitalize the city, expand access to green space, and reconnect communities. However, concerns exist about whether these projects will be broadly beneficial. Urban greening initiatives have historically contributed to gentrification and displacement, making equitable access a key issue. This project evaluated the first phase of the JLG, assessing its effectiveness in promoting transportation equity and community engagement.

We used a multi-method approach, combining digital monitoring, community engagement, and environmental design strategies. A web-based system was developed to visualize spatial data, collect user feedback, and enhance accessibility. Community surveys, including intercept interviews and a city-wide survey, assessed public perceptions and demographics. Additionally, we explored climate-responsive landscape designs to optimize the greenway's resilience and usability.

Our research provided evidence-based recommendations to improve accessibility, sustainability, and inclusivity. By combining data-driven analysis with community input, we aimed to broaden knowledge and perspectives that could contribute to subsequent greenway planning. This initiative sought to enhance the JLG and create a replicable framework for evaluating similar projects, promoting equitable urban development and long-term community benefits.

Key Words: Urban Greenway, Detroit, GIS Analysis, Feedback Systems, Urban Infrastructure, Urban Planning, Community Engagement and Development, Equitable Access, Parks and Green Space, Sustainability

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Figure 1: Team Members (left to right) Shiru Xu, Chi Sun, Gail Lyons, Saj Elle McBurrows, Yidan Chang, and Jing Yan

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ABBREVIATIONS

ADA - Americans with Disabilities Act
DEGC - Detroit Economic Growth Corporation
GIS - Geographic Information Systems
GSD - General Services Department
JLG - Joe Louis Greenway
JLGP - Joe Louis Greenway Partnership
MDOT - Michigan Department of Transportation
PPGIS - Public Participation Geographic Information Systems

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Figure 2: The Warren Gateway Park of the Joe Louis Greenway



1 INTRODUCTION

1.1 Background of the Joe Louis Greenway

The 27.5-mile-long Joe Louis Greenway (JLG) (Figure 2) is planned to be one of the most significant urban green infrastructure projects in Detroit in recent years (Detroit Greenways Coalition, 2021). When finished, it will not only connect multiple neighborhoods across the city but also serve as an important experiment in environmental sustainability and social equity. Moreover, it aims to restore connections between communities, improve residents' quality of life, and promote economic growth. Climate change impacts and the risks of gentrification may be barriers to these goals. In this section, we provide an overview of how the JLG can serve as a model for integrating climate resilience and gentrification mitigation into large-scale urban infrastructure projects. Drawing on site analysis, public survey data, and precedent studies, we outline design recommendations that address key environmental and social challenges. Our approach emphasizes nature-based solutions, inclusive access, and community-centered development, aiming to ensure that the greenway benefits all residents, especially those historically marginalized by disinvestment and displacement.

1.1.1 Historical Context: Industrial Rise and Community Development

From the late 19th to the early 20th century, the prosperity of the automobile industry attracted a massive influx of immigrants, leading to rapid urban expansion. However, with the acceleration of deindustrialization in the mid-20th century, numerous factories closed, manufacturing jobs declined, and Detroit's economy entered a prolonged recession, which disproportionately impacted neighborhoods of color. Additionally, urban renewal projects, such as the demolition of the Black

Bottom neighborhood, further exacerbated the struggles of low-income residents (Encyclopedia of Detroit).

At the same time, white flight in the 1950s and 60s resulted in resources being diverted to the suburbs, increasing poverty rates in the city center. Research indicates that between 1970 and 1980, over 310,000 white residents left Detroit, increasing the proportion of Black residents from 43.7% to 67.1% (Foster, 2023). This demographic shift contributed to further economic decline and urban decline. Against this backdrop, the construction of JLG is not only an improvement in urban infrastructure but also an effort to restore community connectivity and cultural identity.

1.1.2 Climate Change Context: Environmental Challenges and Sustainability

As global climate change intensifies, Detroit faces increasingly extreme weather events. High summer temperatures, rising precipitation levels, and air pollution have severely impacted residents' quality of life (Immergluck & Balan, 2018). The urban heat island effect is particularly severe in low-income communities with aging infrastructure and limited green spaces. Furthermore, the frequency of heavy rainfall has increased in recent years, exacerbating urban flooding, while traditional drainage systems have struggled to cope with these challenges (Brummet & Reed, 2019).

To address these environmental issues, the JLG integrates sustainable design elements, including rain gardens, permeable pavement, and tree planting, to mitigate the heat island effect and improve air quality (Doucet, 2020). The project also promotes low-carbon transportation by encouraging cycling and walking, thereby reducing reliance on cars and cutting carbon emissions. There is growing concern over whether adaptation and mitigation strategies are flexible enough to respond to the unpredictable and evolving nature of climate change. Equity and environmental justice considerations are particularly critical, as historically marginalized communities are often most vulnerable to climate impacts and must not be excluded from the benefits of green infrastructure. Without deliberate efforts to ensure access, representation, and affordability, climate interventions risk reinforcing existing inequalities.

Residents of neighborhoods surrounding the JLG are similarly concerned that the greenway's development could attract outside investors, subsequently driving up rents and property prices (Maciag, 2015). In response, the Detroit city government has implemented several measures, including the introduction of an anti-speculation tax, rent stabilization policies, and the encouragement of community land trusts to protect housing affordability for low-income residents. Additionally, the JLG promotes local employment policies and small business support programs to ensure that economic growth benefits not only incoming middle-class residents but also long-term low-income communities. However, the effectiveness of these policies requires ongoing monitoring and adjustments.

1.1.3 Partnerships in the Joe Louis Greenway Project

There is broad acceptance that if the JLG is to be transformative, it will require collaboration among government agencies, community organizations, private sector partners, and academic institutions to promote economic development, social equity, and environmental sustainability.

To date, government agencies such as the Detroit General Services Department (GSD), Michigan Department of Transportation (MDOT), and Detroit Economic Growth Corporation (DEGC) have overseen planning, funding, and infrastructure development. Community organizations, including the Detroit Greenways Coalition and Friends of the JLG, ensure equitable access and resident participation. The city itself has led numerous community engagements to inform and integrate community feedback into planning. Philanthropic and private sector support, notably from the Ralph C. Wilson, Jr. Foundation and Kresge Foundation, has provided financial and technical resources, while national partners like Rails-to-Trails Conservancy contribute expertise in trail connectivity and planning.

However, long-term monitoring of such transformative impacts on the community has consistently been a challenge, one that the city acknowledges is likely beyond its current capacity (personal communication, Juliana Fulton, Urban Parks Planner, City of Detroit). To help fill this gap, the City of Detroit partnered with the University of Michigan to develop a 2024 SEAS Capstone project focused on designing and assessing a monitoring system for the JLG.

1.2 Objectives

The primary objective of this project was to evaluate the first phase of the JLG. We specifically addressed awareness of the greenway by the Detroit public, accessibility, use, and concerns about how its development might change the neighborhood around it. We also attempted to assess how best to involve the community in the design of green space in an effort to ensure that public input is meaningfully incorporated into the planning and implementation process. Through multi-methods research, we aimed to gain feedback from the local community on how to create inclusivity, minimize displacement risks, and align with the broader objectives of sustainable urban development. Additionally, this project sought to create a replicable framework for evaluating subsequent phases and similar urban greening initiatives in other cities, contributing to a broader discourse on how to capture feedback on equitable urban planning and sustainability efforts.

Specifically, we aimed to:

- Develop a comprehensive set of equitable access metrics to measure the impact of the JLG on transportation, recreational opportunities, public health, and ecosystem services

- Engage with local residents and stakeholders through digital and in-person monitoring tools to capture community perspectives and experiences
- Analyze potential risks of gentrification and displacement resulting from the greenway development and provide recommendations for mitigation strategies
- Establish a web-based GIS (Geographic Information Systems) platform that visualizes data, facilitates real-time community engagement, and promotes transparency in the project's impact assessment
- Provide insights and policy recommendations that assist city officials and urban planners in making informed decisions about future urban greening initiatives

1.3 Scope

This project encompassed the assessment and analysis of the first phase of the JLG development, focusing on equitable access, community engagement, and potential displacement effects. The scope includes the following key areas:

1. Geographic Scope:
   - The study focused on the neighborhoods surrounding Phase I of the JLG in Detroit, assessing how the greenway impacts local communities in terms of accessibility and usage.
   - City-wide survey, and crowdsourcing
   - Visitor ZIP-code statistics visualization

2. Methodological Scope:
   - Data Collection: A combination of community surveys, field observations, and mapping were used to gather insights into the greenway's impact.
   - Community Engagement: Surveys, interviews, and interactive web-based platforms were employed to involve residents, businesses, and local organizations in the evaluation process.
   - Digital Monitoring System: A web-based GIS platform was developed to track and visualize key metrics, enabling real-time feedback collection and analysis. This system included interactive mapping tools that allow residents to report issues, suggest improvements, and share their experiences.
   - Quantitative and Qualitative Analysis: Case studies of similar urban greening projects in other cities were incorporated to provide comparative insights and best practices.

3. Deliverables:
   - A comprehensive report summarizing research findings, community feedback, and policy recommendations
   - A community-centered website to facilitate ongoing dialogue and data sharing, integrating user-generated content and feedback
   - Digital storytelling materials to document the project's process and findings for the JLG

2 LITERATURE REVIEW



Figure 3: The Unity Towers at the Warren Gateway Playground of the Joe Louis Greenway

2.1 Participatory-Based Planning for Greenways

2.1.1 Methods

Greenways have become a key feature in sustainable urban planning that offer many benefits, from improving public health to providing ecological corridors in cities. Successful greenway projects require careful planning, especially when it comes to involving the community. The extensive engagement with the public on the design of the first phase of the JLG, and its completion present an opportunity to take stock of the public's perspectives and engagement with the greenway design and programs. It also offers a chance to incorporate this feedback into guiding principles for future phases, ensuring that development aligns with public needs and priorities. In this section, we present a literature review of approaches for gaining these valuable participatory insights.

Methods for Capturing Feedback on Greenways

Literature to date is increasingly acknowledging the diversity of experiences of those visiting and engaging with parks and greenways. For example, Keith et al. (2018) examine how different urban populations use and perceive greenways, providing insights for trail planning and management. Their research highlights how greenway usage patterns vary based on demographic factors such as race, ethnicity, income, and transportation access. Some groups prioritize greenways for exercise and leisure, while others emphasize safety, connectivity, and cultural relevance. The study highlights the need for inclusive trail designs that accommodate diverse preferences, improve accessibility, and address safety concerns.

O'Connell (2024) builds on this by analyzing public participation processes in urban greenway projects. The study highlights the importance of hybrid participation formats to capture these diverse interests, combining multiple engagement methods to enhance

flexibility and inclusivity. These strategies can help mitigate challenges such as political resistance, lack of funding, and competing stakeholder interests. The research also emphasizes the need for clear communication and a long-term commitment to community involvement. This approach is particularly relevant for Detroit, where historical disinvestment and planning inequities may make community trust a significant barrier to participation (Kyttä et al., 2023).

Such approaches need specialized tools like Public Participation Geographic Information Systems (PPGIS) that can capture specific priority locations, experiences, and concerns. Digital literacy can be a hindrance to collecting information using these tools, and they often need in-person training and engagement to collect the data. However, crowdsourcing the data might be highly relevant to planning and city practitioners, where the data can be used to target interventions and projects. The study demonstrates how spatial data can be leveraged to identify critical areas for greenway development, ensuring that planning efforts are aligned with local priorities.

Both Keith et al. (2018) and O'Connell (2024) stress that the biggest challenge in participatory planning is overcoming barriers that limit community involvement and buy-in. Barriers might include a lack of trust in the planning process, limited access to resources like technology, and competing interests among different groups. The research also emphasizes the need for clear communication and a long-term commitment to community involvement.

These findings are particularly relevant to the JLG, as ensuring equitable access and meaningful community engagement will be essential to the project's success. Incorporating a range of engagement tools, from public meetings to digital platforms, can help ensure that all voices are heard in shaping the JLG. This approach is particularly useful for projects like the JLG, where different neighborhoods may have varying needs and expectations. By integrating PPGIS data into the planning process, decision-makers can enhance transparency, foster trust, and ensure that the greenway serves the diverse communities of Detroit.

Participation in Detroit

The planning of greenways, especially projects like the JLG, greatly benefit from an inclusive and participatory approach. Engaging the community in every step of the process helps to ensure that the greenway meets local needs, fosters a sense of ownership, and aligns with broader sustainability goals. However, the challenges of overcoming barriers to participation, such as political resistance and resource limitations, should not be underestimated. Successful greenway planning, particularly in cities with complex social and economic landscapes, requires planners to be committed to long-term engagement, clear communication, and the active inclusion of all voices. It may also include mixed methods to reach a diverse set of individuals.

In Detroit, these issues may be exacerbated by a history of disinvestment and a lack of civic engagement in certain neighborhoods. Overcoming these challenges requires planners to be flexible in their approach and actively reach out to all segments of the community, especially those who may not typically participate in planning processes. One key takeaway from these studies is the importance of community ownership of greenway projects. Greenways that are co-designed with residents tend to have greater community support and are more likely to be well-maintained. When people feel a sense of ownership and pride in a project, they are more likely to take care of it. This is crucial for long-term success, particularly in a city like Detroit, where residents have seen both positive and negative impacts of urban development. By creating greenways that are truly community-driven, planners can ensure that projects like the JLG continue to serve residents for years to come.

2.1.2 Feedback Loops

Feedback loops are one way to engage residents in community development. The feedback loop process may include consistent and open participation in meetings, providing a space for needs to be expressed, strategizing goals for targeting community needs, and collecting the resources necessary to implement the decided-upon strategies (Jackson et al., 2018). Neighborhood revitalization is often an important goal for community members and residents as they strive to enhance their quality of life and provide public spaces where neighbors can thrive (Jackson et al., 2018).

Feedback loops are essential to the development of the JLG as the project is being conducted in phases, which allows for monitoring and evaluation of the initial phases to make adjustments and recommendations for future phases of the project. Traditional methods of feedback loops in participatory planning rarely think long term, as after the construction of the development or the implementation of a solution, the feedback loop often breaks and turns into a one-way provision of information (Wilson et al., 2019). One such solution to this broken feedback loop is digital monitoring systems and digital participatory platforms such as social media, feedback hotlines, and real-time information dashboards, resulting in user-activated feedback loops through the use of mobile devices (Lee et al., 2015). The goal for the implementation of these digital feedback loops in participatory planning is to ensure that there is constant communication between the community and the developer, whether that is the city or another entity, that extends past the completion of the initiative. Although these digital dashboard systems are relatively popular, there is a tension between the use of previously established platforms such as the social media platform Facebook or the neighborhood app NextDoor and these newer technologies that planning professionals tend to prefer (Wilson et al., 2019).

Falco & Kleinhaus (2018) found that these digital feedback platforms tend to allow for three different levels of engagement and participation: information sharing, interaction, and civic engagement. At the most basic engagement and participation level, there is a one-way communication system in which the government informs citizens of important information to aid in decision-making (Falco & Kleinhaus, 2018). One step higher at the interaction level, a two-way communication feedback loop is established to allow for information to flow both ways (Falco & Kleinhaus, 2018). Finally, the goal level of engagement and participation is the level of civic engagement, interaction, and collaboration where the feedback loop goes beyond information and instead relies on co-production in which assets and resources are optimized and pooled between the public sector and the citizens. Similarly, Bugs et al. (2010) recognized four categories for technology-mediated participatory planning: information distribution, transparency, solutions through participation, and consensus building. The JLG development is one such initiative that can benefit from the implementation of a digital monitoring platform to create a two-way communication feedback loop between the City of Detroit and the neighborhoods surrounding the greenway.

2.2 Greenway Websites

2.2.1 The Role of PPGIS in Greenway Planning

Miller et al. (1998) highlight the indispensable role of GIS in greenway planning, emphasizing its ability to integrate complex and diverse datasets. GIS facilitates multi-objective suitability analysis by combining biophysical, socio-economic, and ecological data into cohesive models. This structured approach allows planners to evaluate land capability systematically, addressing critical factors such as wildlife habitat preservation, recreational opportunities, and riparian corridor management. Through detailed spatial analysis, GIS ensures precision in identifying suitable locations, providing an evidence-based method to balance ecological conservation with urban development.

Miller et al. (1998) provide a practical example from Prescott Valley, Arizona, where spatial data on land use, vegetation, soil type, slope, and population density were collected and integrated into GIS software for analysis. Three primary greenway functions including wildlife habitat, recreation, and riparian corridor preservation were analyzed using weighted criteria. GIS was employed to overlay datasets and produce suitability maps categorizing areas based on their capability (high, moderate, or low). This approach demonstrated GIS's ability to pinpoint critical areas, such as antelope habitats and riparian ecosystems, ensuring these natural resources are prioritized in planning. The study's results underscore GIS's value in enabling spatially informed decisions that align with ecological and community objectives.

Pekin Timur and Barış (2014) explore GIS's application through various case studies, including the Concord, North Carolina greenway project, where GIS was used for overlay maps and suitability analysis to identify potential greenway locations. Similarly, in Ankara, Turkey, GIS facilitated a five-step greenway planning method, incorporating hub area identification, suitability analysis, and connectivity evaluation. These projects utilize GIS's spatial analysis and overlay tools to produce detailed suitability maps, ensuring alignment with environmental priorities and user needs. The "Hub and Spoke" model, often applied in such studies, highlights GIS's ability to efficiently identify critical hubs (e.g., forests, parks) and connecting corridors (e.g., riverbanks, trails).

Cetin (2015) underscores GIS's importance in urban green space planning, particularly in rapidly urbanizing cities like Kutahya, Turkey, where industrialization and population growth strain green resources. GIS enables planners to digitize, analyze, and map green spaces, providing insights into their distribution and accessibility. In evaluating 167 parcels of urban parks in Kutahya, GIS analysis revealed uneven distribution, with 28% of parcels smaller than 1500 m^2, limiting their ecological and recreational potential. The study identified accessibility gaps, particularly in western and eastern urban regions, using a 500-meter walking buffer zone standard. These findings advocate for integrated green space networks to enhance accessibility and fulfill ecological and recreational roles.

Stessens et al. (2017) present a GIS-based model designed as a spatial decision-support tool for urban green space planning. Focusing on the Brussels-Capital Region, the study integrates proximity and quality indicators into a single framework, facilitating nuanced assessments of green space provision. The model utilizes a multi-layered GIS approach, analyzing proximity through functional levels (e.g., neighborhood, city) and evaluating green space quality based on attributes like biodiversity and spaciousness. Findings revealed significant inequalities in green space accessibility and quality, with approximately 62% of the population residing in areas with below-average green space quality. This study highlights the potential of GIS to support informed urban planning by identifying disparities and guiding targeted interventions.

While these studies collectively demonstrate the powerful capacity of GIS to support data-driven planning, they also expose a key limitation: a lack of direct community voice in the analysis itself. Most GIS-based greenway planning frameworks rely on top-down datasets and expert-defined criteria, which may miss local nuances, cultural context, or on-the-ground priorities. This gap is particularly problematic in post-industrial and historically disinvested cities like Detroit, where planning decisions without community input can inadvertently perpetuate inequities or trigger displacement.

To address this, PPGIS has emerged as a necessary extension. PPGIS integrates traditional spatial analysis with direct community feedback, which enables residents to contribute their knowledge, perceptions, and needs into a spatial format. By embedding this input into the GIS workflow, planners can not only identify where green infrastructure is needed but also understand how it should function and for whom.

In the case of the JLG, incorporating PPGIS would allow the City of Detroit to go beyond just mapping land suitability; it would empower the city to map community aspirations, perceived safety, amenity gaps, and desired programmatic uses. This is especially important as the city attempts to both promote sustainability and guard against the risks of gentrification. Capturing community-based spatial feedback through tools like interactive web maps, digital surveys, and real-time reporting creates a two-way channel between residents and planners, building trust and promoting long-term stewardship.

In summary, while GIS offers a robust technical foundation for greenway planning, it is no longer sufficient on its own. Public input via GIS, especially in the form of PPGIS, is essential to ensure that development is equitable, reflective of community needs, and adaptive over time. For cities like Detroit, which are actively reshaping their public realm, the integration of participatory mapping is not only innovative, it is imperative for just and sustainable urban transformation.

2.2.2 Existing Greenway Monitoring Systems

The High Line website (Figure 4) integrates GIS-based features and public engagement tools to support greenway monitoring and analysis, offering a model for sustainable urban infrastructure management (The High Line). Through interactive mapping, event tracking, and multimedia documentation, the platform functions as a decision-support tool for greenway accessibility and quality enhancement.

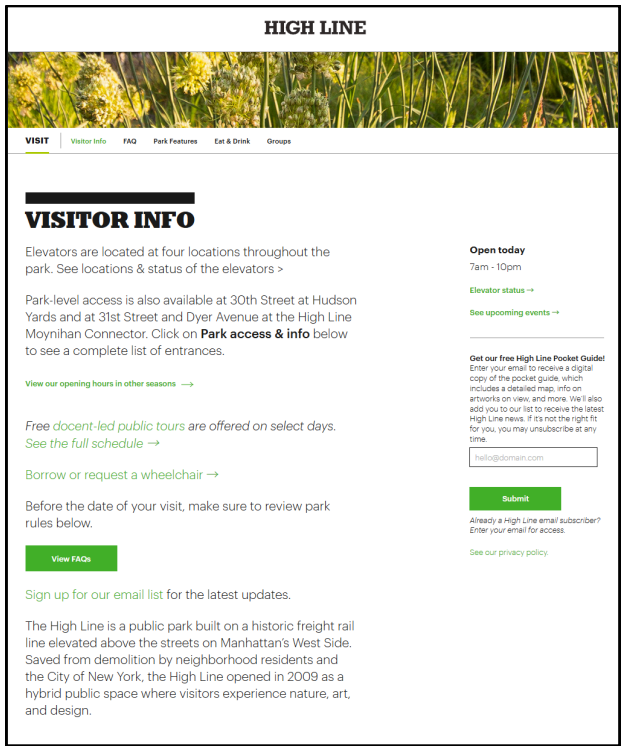

Figure 4: The High Line website (Friends of the Highline, 2025)

The interactive mapping tool provides spatial visualization of the greenway, enabling users to explore features, amenities, and surrounding areas. Event tracking integrates temporal data with spatial insights, allowing users to

assess the impact of events on the greenway. Additionally, photo and video galleries aid in visual monitoring and documenting seasonal changes and maintenance needs. By facilitating public engagement through newsletters and feedback forms, the platform gathers qualitative data for decision-making purposes.

The Atlanta Beltline website employs GIS-based features and tools for greenway monitoring, urban planning, and spatial analysis (Atlanta Beltline). The site's interactive map allows users to explore the trail system, parks, and points of interest. Greenway accessibility insights connect users with parks and trails using proximity-based tools. Real-time updates on construction and community projects enhance transparency in urban redevelopment efforts. Educational resources emphasize the Beltline's historical and ecological aspects, leveraging GIS analysis to highlight its impact on urban sustainability. This framework underscores the Atlanta Beltline's role in fostering community connectivity and ecological stewardship through advanced spatial analytics.

The 606 website (Figure 5) integrates GIS-based tools and public engagement features to support greenway monitoring and sustainability (The 606). The interactive mapping tool enables users to explore access points, amenities, and surrounding neighborhoods, supporting spatial analysis for accessibility and maintenance. Community-focused tools, such as event listings and the "Plan Your Visit" section, provide insights for greenway management. Public engagement is further enhanced through user-submitted photos, geotagged visual content, and educational resources. By combining spatial visualization, user engagement, and real-time data integration, the platform supports the

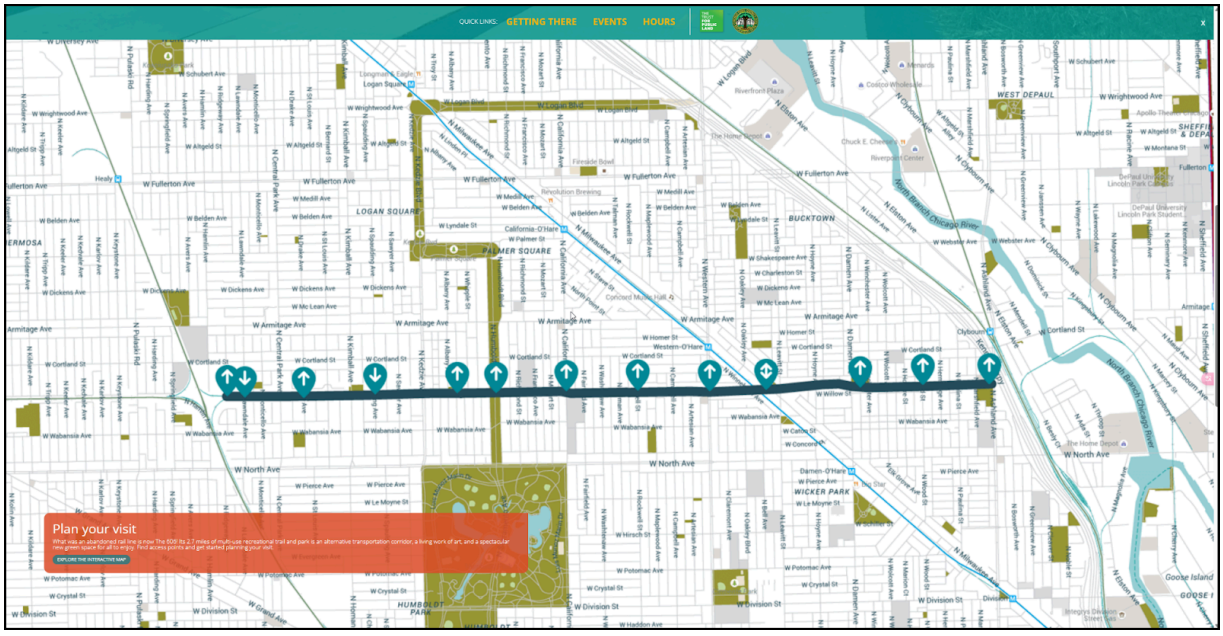

Figure 5: The 606 website (The 606, 2025)

sustainable growth of urban green spaces.

These cases demonstrate how the accessibility and maintenance of urban greenways can be improved through the use of interactive mapping technology and real-time event tracking. By enhancing public participation and ensuring transparent communication, these platforms effectively monitor the progress of urban redevelopment while promoting community engagement and data-driven decision-making. This approach highlights the critical role of technology integration and community engagement in promoting sustainable development and ecological management of urban green spaces, providing a reference for similar projects in other cities.

2.3 Physical Greenway Design

2.3.1 Case Studies

Urban greenways can play a crucial role in improving the quality of life in high-density residential areas by providing space for recreation, transportation, and social interaction (Chi & Lin, 2019). Landscape architects are specifically interested in what design elements best meet these needs, and there are numerous examples of existing greenway projects that offer valuable insights into their long-term impacts on communities and the environment. These case studies highlight diverse approaches to repurposing urban spaces and their environmental impacts, and how they do or do not match the unique historical and cultural contexts of the places they aim to transform. In the following, we will provide examples of greenway development in other cities and give an overview of the key lessons from their design that can potentially inform the development of the JLG.

The 606 Greenway, Chicago

The 606 (Figure 6), also known as the Bloomingdale Trail, is a 2.7-mile elevated greenway in Chicago that repurposes a former rail line into a multifunctional public space. The design emphasizes connectivity by linking diverse neighborhoods and providing accessible trails for bikers, runners, and walkers. It integrates art installations and landscape design to create an urban oasis, reflecting the community's cultural identity and promoting social interaction.



Figure 6: Community engagement on the 606 Greenway (Vibrant Cities Lab, 2025)

Specific design features include pedestrian-scale lighting, seating nodes, native pollinator gardens, permeable trail surfaces, and sound-buffering vegetation to reduce adjacent rail noise. The use of native plant species supports ecological sustainability, aligning with

environmental values. A major aim of the park was to connect diverse neighborhoods and increase social interaction while promoting inclusivity (Quayle, 1995). The greenway features public art installations along the trail that reflect the area's cultural identity, while native landscaping supports ecological sustainability.

Greenbelt Walkway, South Portland

The South Portland Greenbelt Walkway (Figure 7) is a 5.6-mile paved trail that has become a popular destination, attracting thousands of residents and visitors annually for activities such as walking, running, cycling, and wildlife observation. The city's One Climate Future plan outlines collaborative strategies with neighboring Portland to achieve a carbon-neutral future over the next 30 years. This plan emphasizes enhancing resilience in neighborhoods, infrastructure, ecosystems, and the economy to combat climate impacts.



Figure 7: Coastal trail with sustainable design along the Greenbelt Walkway (City of South Portland, 2022)

It was designed to reflect the region's maritime heritage and multicultural character, offering spaces for cultural festivals and community gatherings. Sustainable design elements, including rain gardens and permeable surfaces, effectively manage stormwater and mitigate environmental impacts. Specific design features include wayfinding signage, bike racks, boardwalk sections over wetlands, shaded rest areas, and native plant buffers that support pollinators and reduce heat buildup.

Schuylkill River Trail, Pennsylvania

The Schuylkill River Trail (Figure 8) is one of the most iconic multi-use greenways in Pennsylvania, with a planned total length of approximately 120 miles, over 75 miles of which are currently open to the public. The trail connects numerous communities between Frackville and Philadelphia, passing through the Schuylkill River National and State Heritage Area, and provides residents and visitors with sustainable transportation options such as cycling, walking, jogging, and commuting.

The Schuylkill River Trail strategically repurposes abandoned railway corridors, preserving key elements of the region's industrial heritage, including historic canals, rail infrastructure, and former steel facilities. At the same time, it offers access to scenic natural landscapes and serves as a valuable platform for public history and environmental education. Specific design features include interpretive signage highlighting industrial landmarks, riverside overlooks, fitness

stations, canoe/kayak launches, and shaded picnic areas with native tree plantings. Beyond its cultural significance, the trail has acted as a catalyst for local economic development, stimulating growth in small businesses along its route and contributing to broader efforts in urban revitalization and ecological restoration.

From an environmental perspective, the trail integrates numerous sustainable design features, such as rain gardens, native vegetation, and permeable paving surfaces, which collectively help mitigate stormwater runoff and reduce urban heat island effects. Moreover, the Schuylkill River Trail plays a critical role in climate adaptation. Studies suggest that the Schuylkill River watershed may experience declining water availability due to future climate change scenarios (Kali et al, 2023). In this context, the trail's green infrastructure provides essential support for regional climate resilience, reinforcing the area's capacity to cope with environmental stresses.

Four Mile Run Trail, Virginia

The Four Mile Run Trail is a multi-use greenway located in Arlington County, Virginia, extending approximately 6.3 miles along the Four Mile Run stream. It begins at Wilson Boulevard in Arlington and connects to the Mount Vernon Trail near Ronald Reagan Washington National Airport.

This trail has provided significant economic, environmental, and social benefits to the local community. According to a report by the Capital Trails Coalition, trails in Arlington



Figure 8: Schuylkill River Trail pedestrian boardwalk (Circuit Trails, n.d.)

County generate approximately $56 million in total economic impacts annually and contribute around $9 million in annual property tax revenues.

Environmentally, Arlington County and the City of Alexandria collaborated on the Four Mile Run Restoration Project, which restored a historic 2-acre tidal wetland. This project reintroduced native vegetation, improved water quality, and provided habitats for fish and waterfowl. Specific design features include boardwalks over wetland areas, streamside overlooks, bioswales for stormwater filtration, interpretive signage on ecological restoration, and integrated seating areas for rest and reflection.

Additionally, the Four Mile Run Valley area integrates the environmental stream corridor, parks, cultural facilities, trails, residential areas, and industrial and service businesses. The area's planning aims to maximize the advantages of these diverse uses, creating an improved and cohesive future vision.

The 606 in Chicago transforms a former rail line into a cultural corridor that fosters neighborhood connectivity through public art and native landscaping. South Portland's Greenbelt Walkway demonstrates how sustainable design, such as rain gardens and permeable surfaces, can effectively manage stormwater while reflecting regional identity. The Schuylkill River Trail combines industrial heritage preservation with green infrastructure, supporting both ecological education and economic revitalization. Likewise, the Four Mile Run Trail highlights the benefits of ecological restoration, including wetland rehabilitation and enhanced water quality, while generating measurable economic impacts.

As a result, the future planning of the JLG should integrate native vegetation and rain gardens to strengthen climate resilience. Simultaneously, it would benefit from multifunctional public spaces and community-based commercial zones to reduce gentrification pressures. Incorporating public art and promoting resident-driven engagement will ensure that the greenway reflects Detroit's unique character. Together, these strategies can shape an inclusive, adaptable, and culturally rooted green corridor that supports both environmental and social resilience.

2.3.2 Assessment

The evaluation of these case studies highlights the key factors that contribute to the success of greenway projects. An effective greenway must integrate cultural, environmental, and economic considerations while also addressing practical challenges, including maintenance, safety, and connectivity (Ahern, 1995; Fabos, 2004). These insights provide valuable guidance for the design and development of the JLG, ensuring that it is both functional and impactful (Lindsey et al., 2001).



Figure 9: Motown musicians representing Detroit's African American cultural heritage (Getty Images, 2014)



Figure 10: Community gathering space proposed in the Joe Louis Greenway design (DeGiulio, 2023)

Cultural Significance

Greenway projects like Chicago's 606 illustrate the importance of incorporating community identity and cultural heritage into design. The 606 features public art installations and spaces for cultural events, reflecting the unique history and character of the surrounding neighborhoods. For the JLG, the design could meaningfully incorporate elements that celebrate Detroit's vibrant African American heritage, the legacy of Motown music, and its historic role in the automotive industry (Figure 9). Features such as interpretive signage, community murals, public art installations, and shared gathering spaces would create platforms for storytelling, cultural memory, and local expression. By embedding these narratives into the landscape, the greenway has the potential to foster a strong sense of pride, identity, and ownership among residents. As a result, this cultural integration may lead to greater community engagement, increased use across diverse age groups, and the creation of a unifying public space that reflects and strengthens the city's collective identity (Figure 10).

Ecological Impact

Ecological restoration and sustainability are key to creating resilient greenways that benefit both people and the environment. South Portland's Greenbelt Walkway (Figure 11) demonstrates how degraded landscapes can be transformed into thriving ecological systems through the use of native plantings, stormwater management practices, and habitat restoration (City of South Portland, 2022). These approaches support biodiversity, provide ecosystem services such as flood mitigation, and improve air and water quality.

In the JLG project, the incorporation of ecological restoration features, such as rain gardens, bioswales, and native vegetation, has produced substantial environmental benefits for the community. These green infrastructure

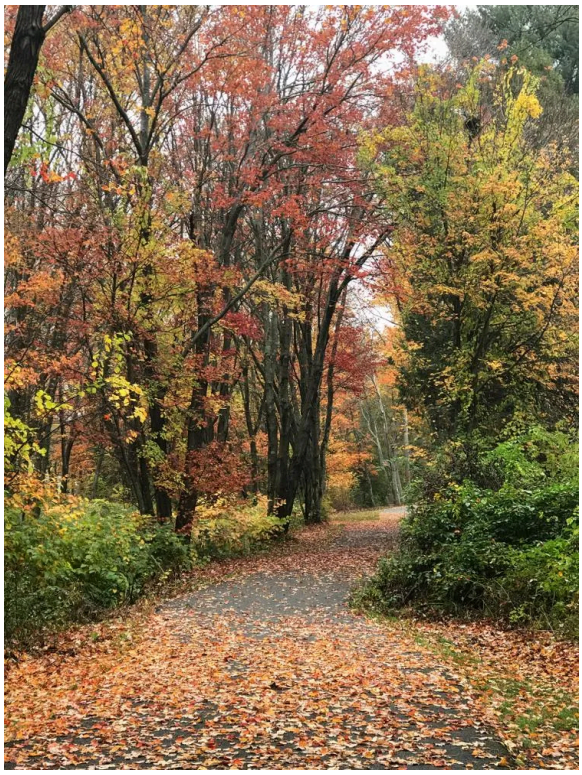

Figure 11: Forest trail with native vegetation and restored habitat (Polfus, 2022)

strategies have contributed to improved stormwater management, enhanced urban biodiversity, and mitigation of the urban heat island effect. Beyond their ecological value, such interventions have also strengthened the functionality of the urban ecosystem and generated long-term environmental assets for the Detroit community.

Ensuring the long-term sustainability of ecological systems like those in the JLG requires overcoming challenges such as high maintenance costs, limited public awareness, funding uncertainties, and inadequate monitoring. To prevent a decline in performance, it is crucial to integrate forward-thinking strategies early in the design process, promoting community involvement, environmental education, and reliable financial and technical support. Through this holistic approach, the greenway can maintain its ecological functions while delivering lasting social benefits.

Connectivity and Accessibility

Successful greenway projects are often characterized by seamless integration between neighborhoods, public transit systems, and recreational spaces. A notable example is Chicago's 606 Greenway, which exemplifies inclusive access by ensuring that residents of all ages, physical abilities, and socioeconomic backgrounds can benefit equally from the greenway infrastructure.

For the JLG, it is essential to adopt universal design principles, including the implementation of ADA-compliant (Americans with Disabilities Act) pathways to accommodate users with varying mobility needs. In addition, enhancing the greenway with dedicated bike lanes and pedestrian-friendly crossings can significantly improve safety and usability. These interventions not only promote active modes of transportation, such as cycling and walking, but also contribute to reducing carbon emissions and alleviating urban traffic congestion.

Furthermore, by functioning as a "green spine" within the urban landscape, the greenway has the potential to physically and symbolically reconnect fragmented communities, bridging social and spatial divides. In doing so, it can foster a renewed sense of belonging, accessibility, and shared civic identity

among Detroit's diverse populations. Through a combination of equitable infrastructure and thoughtful spatial planning, the JLG can become a model for socially inclusive and environmentally sustainable urban development.

Economic and Recreational Benefits

The JLG is poised to revitalize the local economy and enhance residents' quality of life by integrating recreational amenities with ecological spaces. By repurposing underutilized land and introducing multifunctional recreational nodes, such as playgrounds, fitness stations, and scenic viewpoints, the greenway provides spaces for health, leisure, and social interaction. The greenway also attracts visitors and boosts the city's image and neighborhood vitality. At the same time, by supporting local small businesses, hosting community markets, and organizing cultural events, the greenway can generate new employment opportunities and foster micro-scale economic development throughout Detroit.



3 METHODS AND STRATEGY

3.1 Digital Monitoring System

To begin, we developed a JLG website (http://www.joe-louis-greenway-umseas.com/index.html) to showcase how a digital system could enhance access to information, serve as an exemplar for communicating about the JLG, and facilitate interactive community engagement. This system features location background information, and user feedback collection, supporting both public engagement and impact analysis.

Our overarching questions for the Digital Monitoring System were:

1. How can we effectively present spatial and operational information about the JLG in an accessible and interactive format?
2. What digital tools can enhance users' understanding of available facilities at Warren Gateway Park?
3. How can we integrate community feedback seamlessly into the monitoring and development process of the greenway?

Figure 12: Joe Louis Greenway path from Tireman Ave to Joy Rd (City of Detroit, 2025)

First, we designed and deployed a web application and server using AWS EC2, ensuring scalability and reliability for real-time data access. The platform provides location-based information about the JLG, including key operational details of managing organizations and affiliated partners. This information is structured to offer an intuitive overview of greenway resources, promoting transparency and accessibility for both the public and city planners.

Second, we developed an interactive facilities webmap for Warren Gateway Park with ArcGIS SDK, allowing users to visually explore available amenities. This feature integrates geospatial mapping with real-world imagery, offering an intuitive way to understand the placement and accessibility of park features such as bike stations, rest areas, and public art installations. By overlaying real images with map-based positioning, the system enhances the user's spatial awareness and engagement with the site.

Third, we incorporated a rating and commenting system into the interactive map. Users can directly click on specific locations to leave ratings and comments regarding their experiences, concerns, or suggestions for improvements. This feedback mechanism is connected to a private database, which serves as the primary data repository for community responses. This design ensures that feedback is continuously logged, enabling the JLG team to analyze trends and address user concerns effectively.

Through this system, we aimed to provide an intuitive, data-driven platform that not only improves public awareness of the greenway but also fosters a continuous dialogue between the community and decision-makers to inform future enhancements.

3.2 Community Surveys

To better understand how people use greenways, we collected data through intercept interviews and a city-wide survey. In addition to understanding use, we wanted to evaluate the awareness of the greenway to the Detroit public, whether the greenway is easily accessible to the surrounding neighborhoods and broader Detroit community, and the potential concerns of how future development will impact the area. The social and interactive functions of the JLG were evaluated to identify what spatial elements make a successful greenway. Moreover, the community feedback gathered provides insight for the creation of models and future recommendations for greenway construction.

Our overarching questions about the JLG were:

1. How do the people of Detroit (and surrounding areas) utilize the JLG?
2. Are there differences in the demographic composition of the users of the JLG? Are they local residents or not?
3. How well are Detroit residents familiar with the JLG? What are their overall opinions and understanding of the space?

4. How do users think the surrounding neighborhoods will be affected by the current and future development of the JLG?

To answer these questions, we chose to administer two surveys–one on the first phase of JLG, in person, and one targeted to residents of the entire city, electronically. We felt these surveys were critical to our goal of utilizing elements of participatory planning in our research. Surveys are one method of participatory planning and provide an objective statistic of public opinion that can be compared to better understand the priorities of different groups (Glenn, 2003). We hope to encourage a positive feedback loop system with the City of Detroit, the Joe Louis Greenway Partnership (JLGP), and the residents of the surrounding neighborhoods of the Warren Gateway of the JLG. Following data collection, we conducted a comprehensive analysis by reviewing and cross-referencing all survey responses to identify emergent trends. Given the partially open-ended nature of the intercept interviews, we developed a codebook to systematically evaluate these qualitative responses.

First, we conducted brief intercept surveys at the Warren Gateway of the JLG. We spent approximately 96 hours (calculated by the number of hours for each individual surveying) across multiple days collecting intercept interviews at this location. We scheduled our visit dates around the JLGP's planned events to maximize the number of people we could survey. Some of the events we attended included *Design Day at the Greenway* (Sept 14), a collaboration of various vendors and groups including GM Design and MetroParks, *Pink on the Greenway* (Oct 12), a breast cancer awareness event (Figure 13), and *Fall Harvest Festival* (Oct 31), a celebration of the autumn season and Halloween (Figure 14). In total, we collected 64 responses. Our intercept survey questions focused mainly on park use and recommendations for improvements to the Warren Gateway of the JLG, which we used to inform our analysis.



Figure 13: Team members (from left to right) Saj Elle McBurrows and Gail Lyons at the *Pink on the Greenway* event



Figure 14: Warren Gateway pavilion during the *Fall Harvest Festival* event

Next, we sent out a city-wide survey that targeted questions to Detroit residents related to the use, perception, and future scenarios of the Warren Gateway of the JLG. We inquired about how people interact with green spaces more generally. The city-wide survey was more detailed and lengthy, as we hoped to engage a broader audience. To ensure a strong response rate, we compensated participants, resulting in a 100% completion rate. Our overarching goal of the city-wide survey was to gauge people's perceptions of possible outcomes for the surrounding neighborhoods. The survey was sent out in March, was available for a total of 10 days, and received 123 responses.

3.3 Future Development Design and Recommendations

To develop a climate-responsive and user-centered landscape design for the JLG, we conducted a comprehensive evaluation focusing on environmental resilience, functionality, and spatial planning. Our primary objective was to explore how landscape design can mitigate the impacts of climate change while ensuring the greenway effectively serves its intended purposes. Through site analysis, environmental impact assessments, and user feedback, we identified key areas for improvement and developed a set of strategic recommendations for optimizing the greenway's design.

Our overarching questions for the landscape design were:

1. How can landscape interventions mitigate climate change impacts, such as urban heat and stormwater challenges?
2. What spatial strategies can enhance the greenway's functionality while supporting ecological and social connectivity?
3. How can digital modeling tools (e.g., Rhino 3D) be used to simulate and optimize future landscape scenarios?

To explore design solutions for the JLG, we developed a conceptual approach that combines climate-responsive interventions, site-based visualization, and digital modeling techniques to guide and inspire future greenway phases.

Firstly, to mitigate the impacts of urban heat and stormwater challenges, various climate adaptation strategies were introduced. Expanding tree canopies, installing architectural pergolas, and incorporating vertical green walls were prioritized to reduce heat retention and enhance pedestrian comfort. Tree species were carefully selected based on their drought tolerance and seasonal adaptability to ensure long-term viability. Additionally, bioswales, permeable pavements, and rain gardens were strategically positioned to capture, filter, and redirect stormwater runoff, reducing flood risks while enhancing groundwater recharge. By analyzing wind flow, temperature variations, and shading effects, microclimate optimization techniques were employed to create a more comfortable and adaptive outdoor environment.

Secondly, to inspire and inform future phases of the greenway, we developed a

conceptual site plan aimed at improving usability, accessibility, and ecological connectivity. A well-structured multi-use pathway system was proposed, ensuring designated lanes for cyclists, pedestrians, and runners to reduce congestion and accommodate diverse user needs. These pathways were widened in high-density areas to improve flow and safety. Furthermore, seating areas with shading, hydration stations, and interactive wayfinding signage were introduced to enhance user comfort and navigation. To strengthen ecological connectivity, biodiversity corridors were integrated, incorporating native plant species and wildlife habitats to support pollinators, birds, and resilient vegetation while maintaining low-maintenance landscapes. Additionally, placemaking elements were emphasized by introducing open plazas and flexible event spaces, encouraging community engagement, recreational activities, and local commerce within the greenway.

To ensure these strategies are responsive to user needs, we conducted a Chi-square test to examine relationships between perceived greenway qualities and demographic factors such as age, income, education, gender, and race. Results revealed significant associations in select categories; for instance, public art and cultural features showed a notable correlation with race and gender, while greenery and natural beauty varied significantly by gender. These findings suggest that demographic characteristics shape user priorities and perceptions, underscoring the importance of inclusive design that accommodates a wide range of experiences. This data-driven insight reinforced the need for spatial equity and culturally responsive elements within the design.

To develop the visual materials, we used Rhino 3D and Grasshopper to create conceptual site layouts and represent pathway alignments and landscape elements. These tools helped us visualize different design ideas and communicate spatial relationships, rather than conduct detailed simulations or optimization modeling.

Additionally, GIS mapping and environmental analysis enabled a comprehensive study of topography, land use patterns, and flood-prone zones, assisting in the strategic positioning of green infrastructure elements. To further refine climate mitigation strategies, parametric simulations were conducted to analyze the urban heat island effect and wind flow dynamics, allowing for the optimal placement of shading structures and vegetation.

4 ANALYSIS

4.1 Survey Analysis

4.1.1 Intercept Survey

Introduction

The intercept survey relied on engaging individuals present at the park during specific events, offering a snapshot of JLG visitors at a given time. However, this method may have introduced self-selection bias, as only those willing and available to participate were included. To supplement this and gain a broader understanding of community awareness and perceptions of the JLG, we also used a city-wide electronic survey, which allowed for more diverse participation. Another key limitation involved the timing and logistics of in-person data collection. Since travel to Detroit was required, we tended to collect data on days with favorable weather, which potentially biased our sample toward visitors on pleasant days. Additionally, our visits aligned with JLGP's event schedule, resulting in irregular intervals between collection efforts.

To analyze how the Warren Gateway park might broaden access to the greenway, we mapped resident participation data collected from intercept surveys. Specifically, displaying the ZIP codes of survey respondents, illustrating the geographic distribution of visitors and providing insight into the communities benefiting from the greenway. This map (Figure 15) aims to help assess whether the greenway effectively serves local residents or if additional outreach and accessibility improvements are needed.

We surveyed 64 parkgoers at JLG Warren Gateway over 4 days. Respondents came from a wide range of ZIP codes that might have come to the park for these events. Specifically, Michigan residents who were comfortable sharing their ZIP codes are visualized. As the Warren Gateway Park is located in ZIP code 48210, the largest proportion of residents (11 visitors) came from the surrounding neighborhood. Furthermore, the neighboring ZIP codes of 48228 and 48204 both had four visitors each. Based on the data, the Warren Gateway Park is largely serving the surrounding neighborhoods and communities as was intended with the creation of the greenway. Twenty-eight additional ZIP codes had at least one person attend an event at the Warren Gateway of the JLG. Therefore, not only does the park serve the surrounding neighborhood, but it also provides an opportunity for the entire Detroit metro area to gain access to green space.

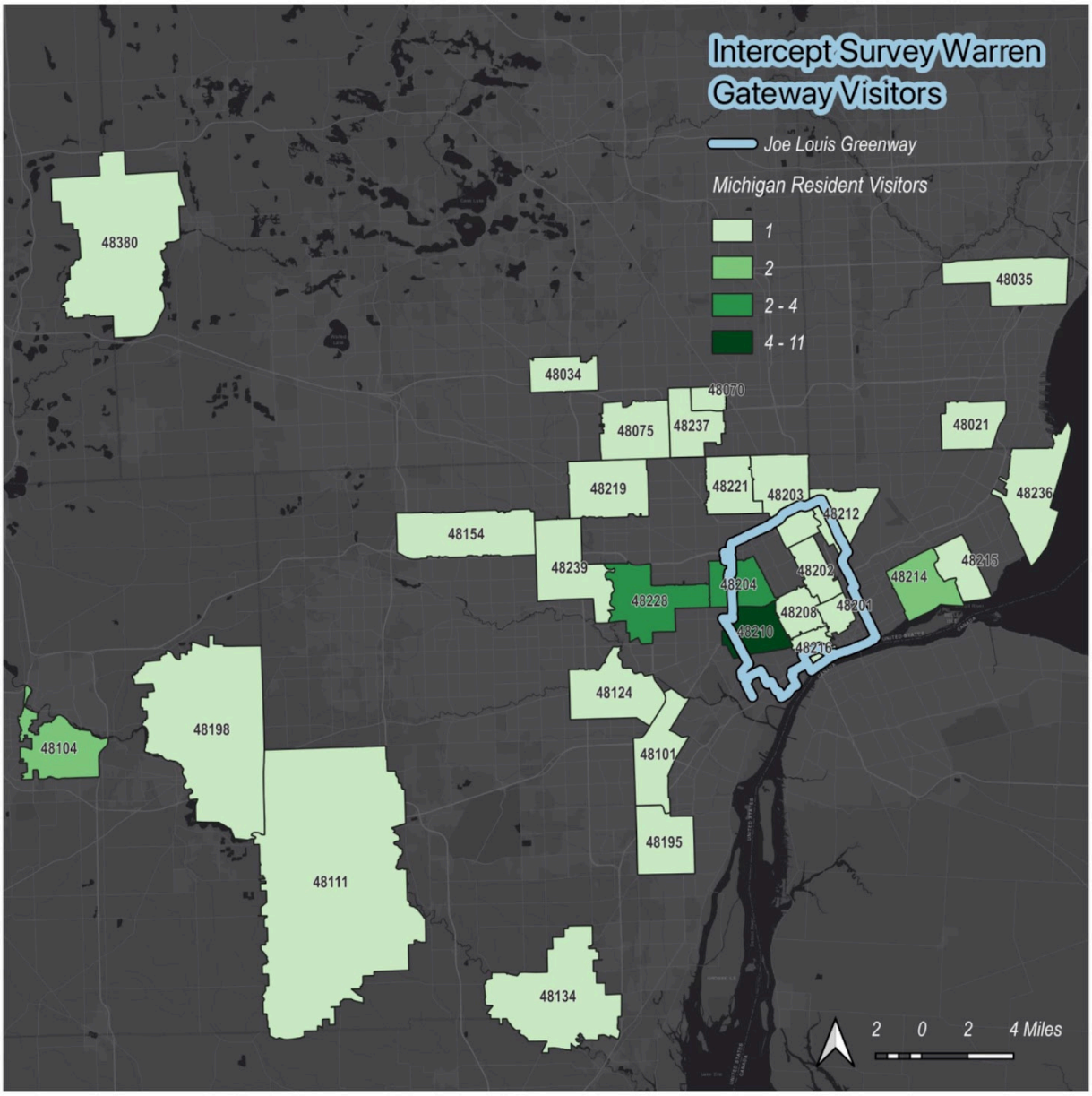

Figure 15: Michigan resident visitor ZIP codes from the intercept survey at the Warren Gateway

Demographics

Assessing the representativeness of respondents, we found a majority of visitors identified as female (39 visitors) as compared to those who identified as male (13 visitors), non-binary (1 visitor), and transgender (1 visitor). Respondents were from diverse age groups (Figure 16). Visitors over the age of 54 constitute the largest proportion of parkgoers, with 27.8%. Visitors between the ages of 35-44 make up 25.9% of parkgoers.

The intercept survey found that 49.1% of visitors received a post-secondary education, while 39.6% have received a high school diploma (Figure 17).

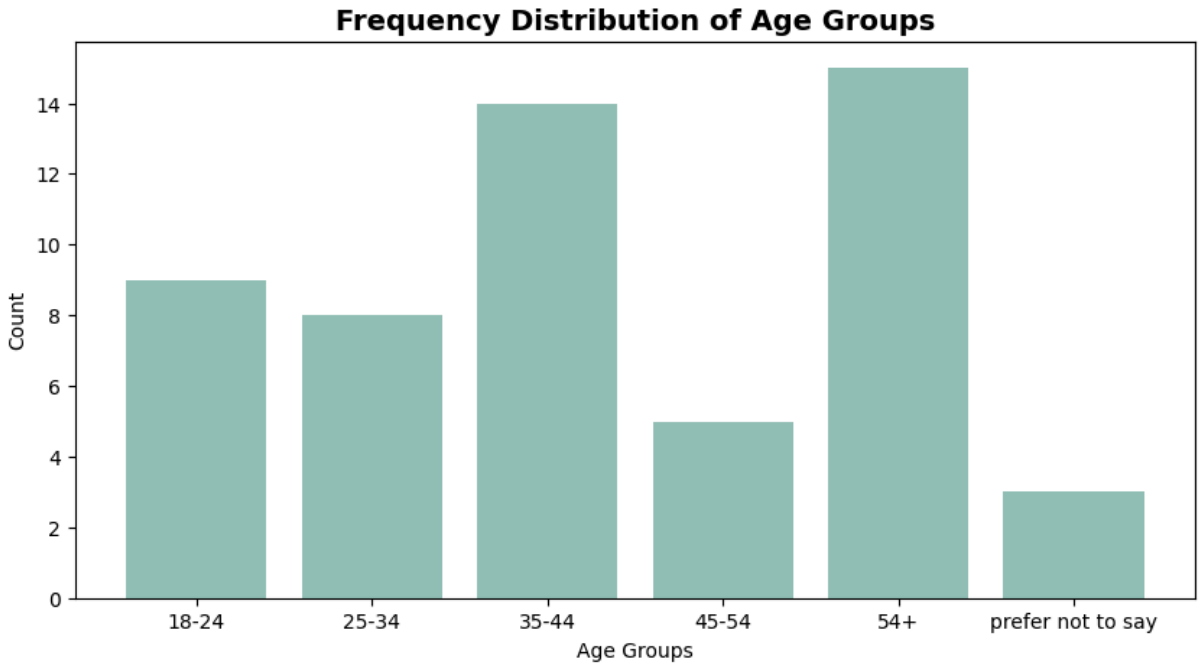

Figure 16: Distribution of age groups

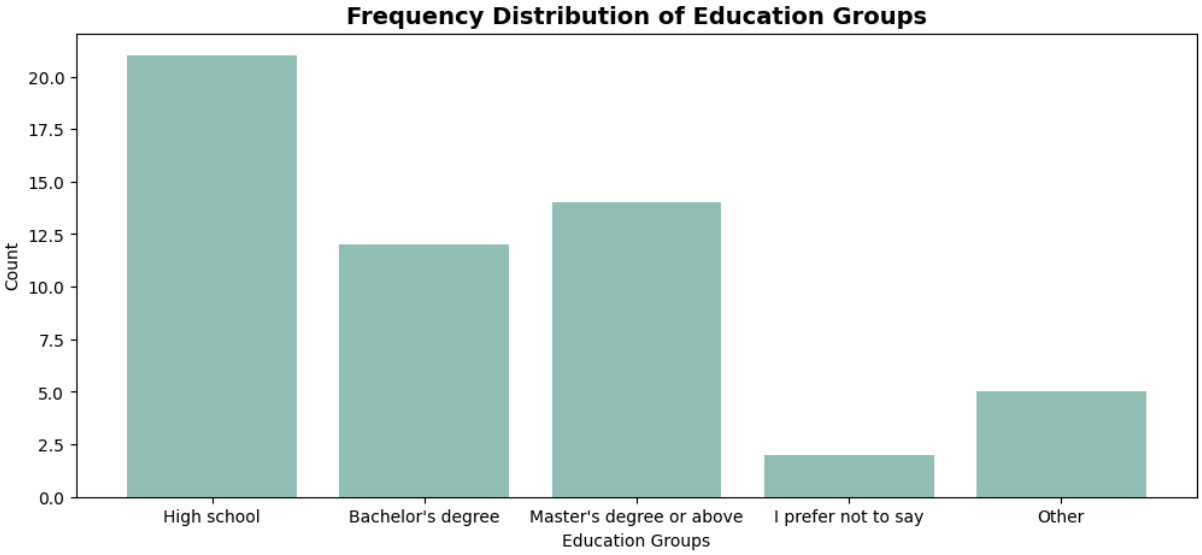

Figure 17: Frequency distribution of education groups

13.2% of participants indicated that they prefer not to say or identified with another education group.

The majority of respondents to our intercept survey were Black or African American (57.1%), with the next most identified race being White (26.8%) (Figure 18). As the primary racial background in the surrounding ZIP codes of the JLG is Black or African American, it can be inferred that the JLG is serving its community members, which is essential as research has shown that racial minorities often have less access to parks and green spaces.

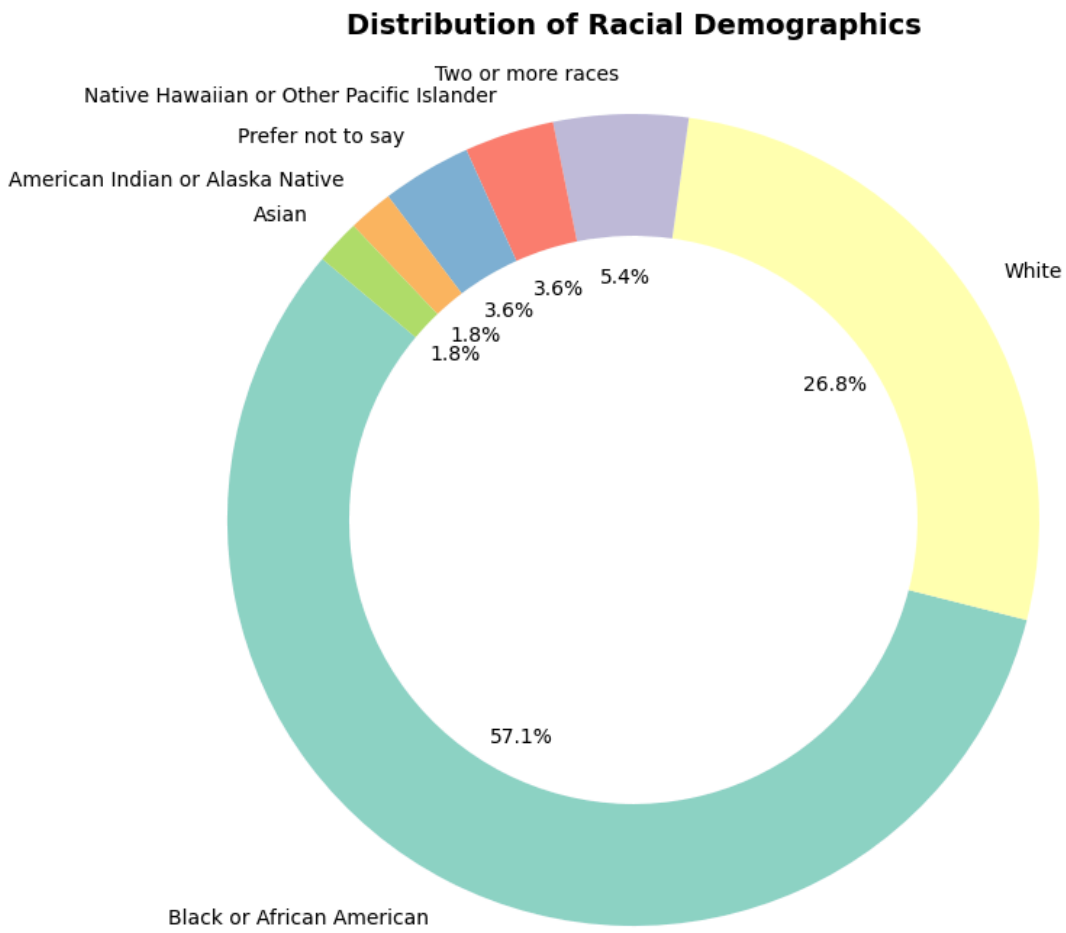

Figure 18: Distribution of racial demographics

Barriers

When visitors were asked what barriers might prevent them from visiting any park they highlighted concerns about safety, maintenance, and accessibility (Figure 19).

Visitors were asked to rank how safe they felt at the JLG on a scale from 1-10, with 10 being the safest. Results show that safety scores ranged from 7-10 (Figure 20). These scores are relatively high and it could be attributed to the Warren Gateway having ample lighting and safety monitoring cameras that can directly call the police to the area. Visitors might also feel safer during community events. However, further research is necessary to identify why parkgoers felt safe.

Awareness & Perception of the JLG

When asked to compare the JLG's Warren Gateway to other parks in Detroit, a majority of visitors found the park much better than other parks (55.8%) (Figure 21). One-quarter of respondents found it slightly better than other parks, while 17.3% ranked it about the same. A small number of respondents (1.9%) rated the park slightly worse than other parks (Figure 21).

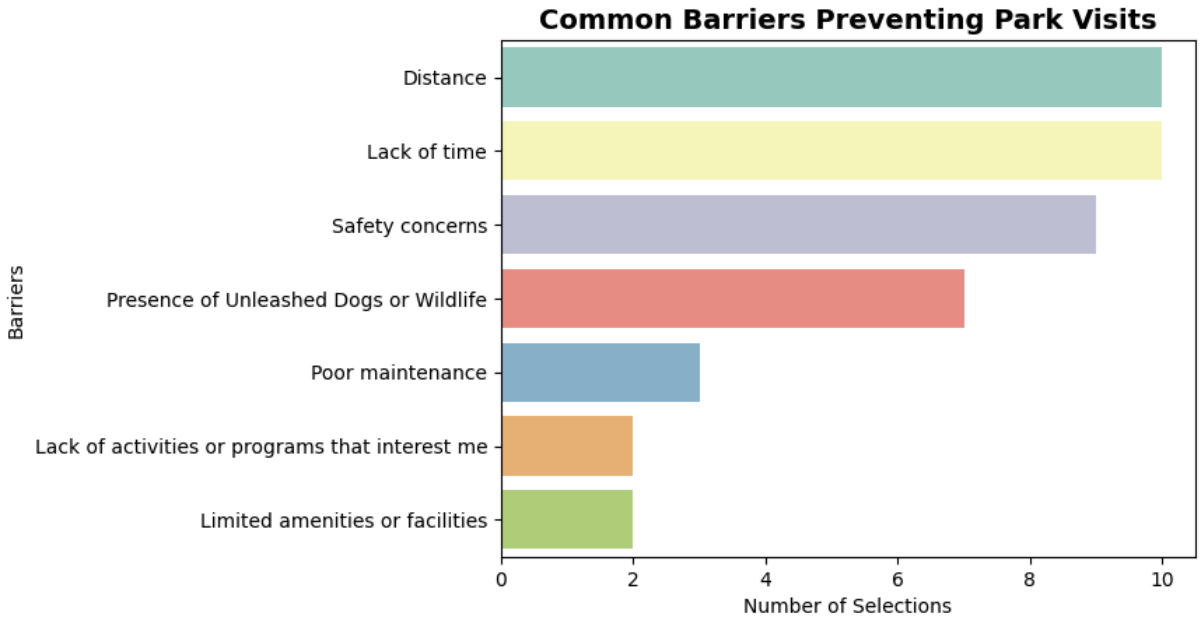

Figure 19: Common barriers preventing park visitors

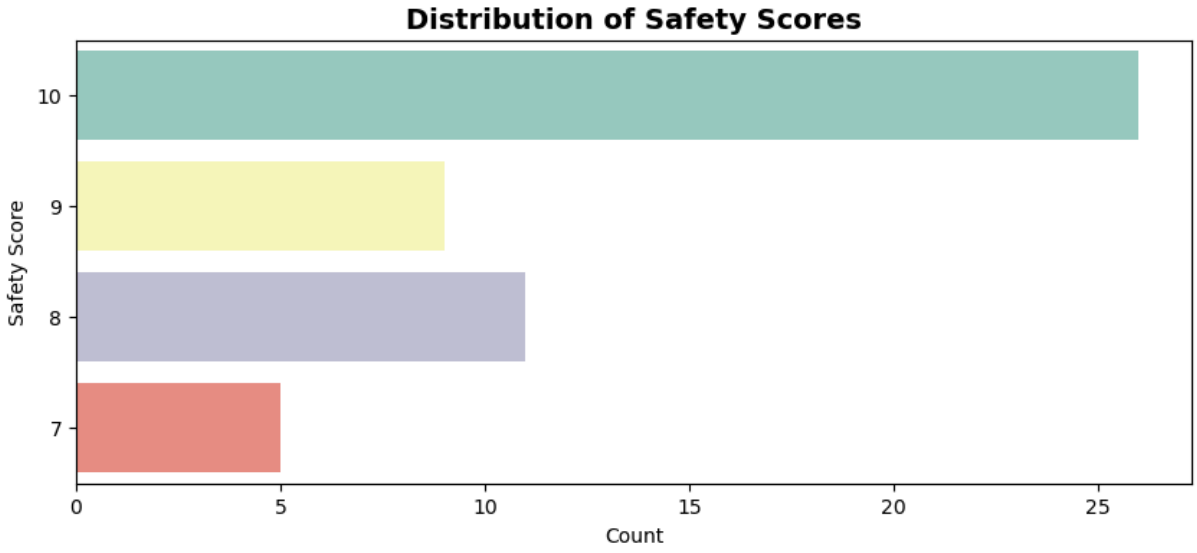

Figure 20: Distribution of safety scores

When asked about safety at the JLG, respondents cited a need for an increase in lighting in dimly lit areas to improve nighttime safety, more trash and recycling bins to maintain cleanliness, and additional shaded areas to enhance comfort during warmer months. Additionally, while many respondents praised the greenway's connectivity, others point out gaps in infrastructure, particularly in underserved neighborhoods, though it was noted that the construction of the greenway is still underway.

Park Usage Behavior

The intercept survey results indicate that the Detroit residents (and even

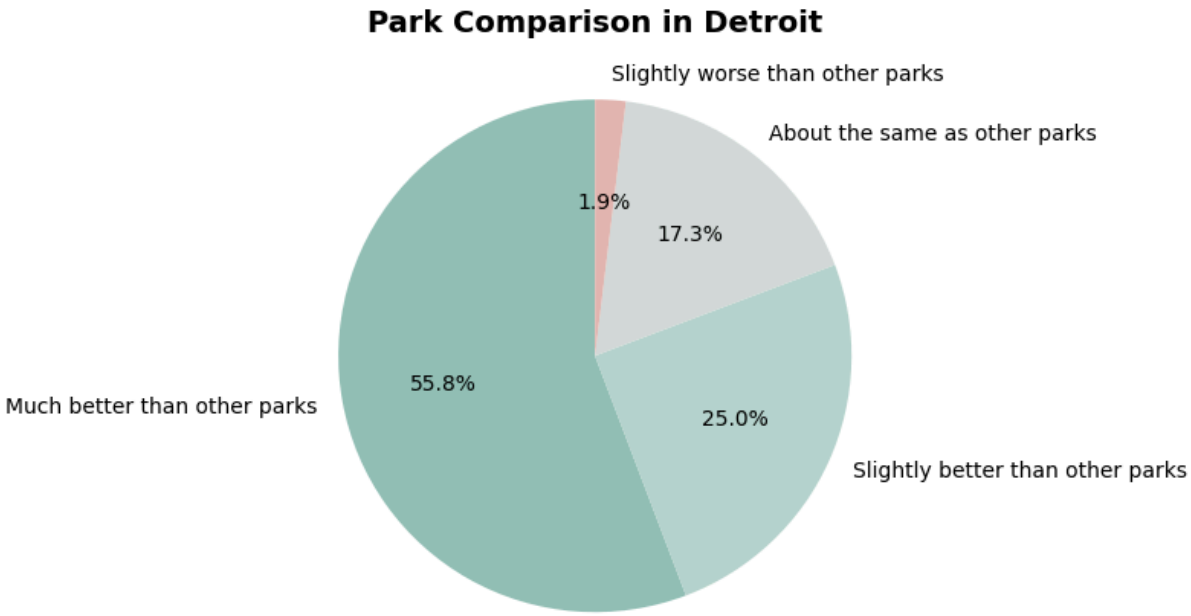

Figure 21: Park comparison in Detroit

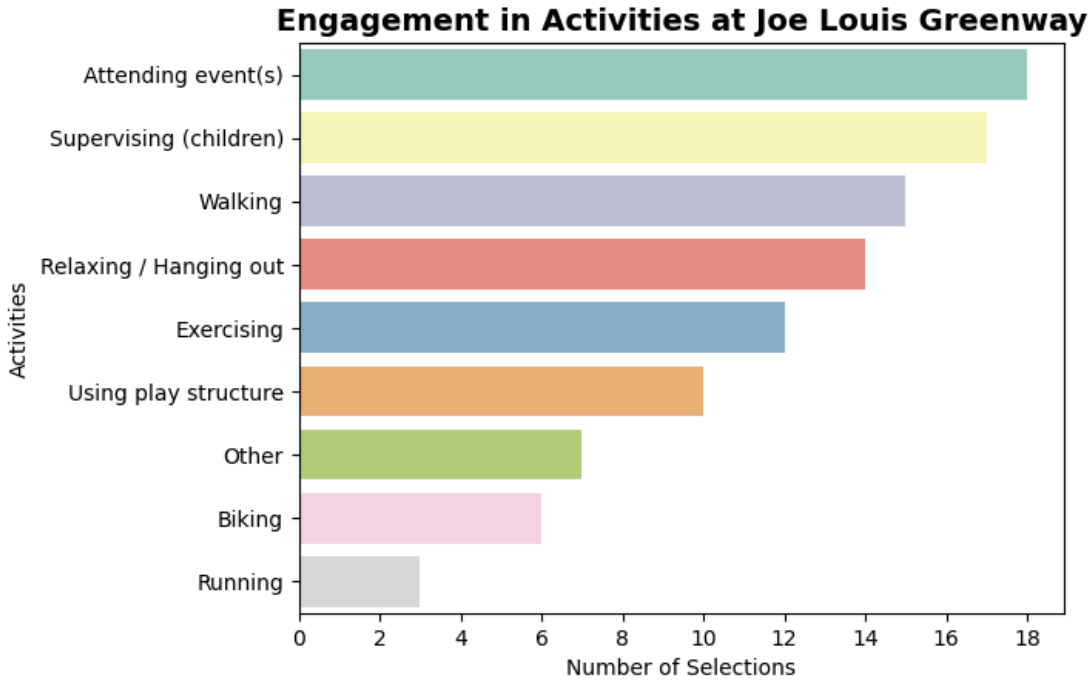

Figure 22: Engagement in activities at JLG

outside visitors) value the JLG, particularly for recreation, social gatherings, and community events (Figure 22). The two most common activities among respondents were attending events and supervising children, highlighting the greenway's role as a family-friendly space. Moreover, the JLGP plays a large role in the activities that the park provides to residents, and

a majority of surveyed parkgoers chose to come to the Warren Gateway of the JLG to attend an event hosted by the JLGP. We noted a gap in representing broader perspectives on the park as we were not able to survey children under the age of 18 years old due to IRB constraints. Common activities by parkgoers suggest that improved infrastructure, such as including additional bike lanes, more benches, and more playground equipment, could enhance accessibility and increase usage beyond current levels.

Younger respondents primarily use the greenway for social gatherings and events, often utilizing its open spaces for informal meetups and community activities. In contrast, older respondents reported using it more frequently for leisure and exercise, for example, walking, jogging, or cycling.

Conclusion

Comparing these findings to other studies on greenways, similar themes emerge regarding equity, accessibility, and safety concerns in shared-use spaces. Research on urban greenways highlights that well-maintained and equitably distributed infrastructure is key to ensuring that green spaces serve all community members effectively (O'Connell 2024). Studies have shown that investments in safety measures, like increased lighting, emergency call stations, and community-led security initiatives, can improve perceptions of safety and increase usage, particularly among women and older adults (Keith et al. 2018). Additionally, accessibility improvements, such as the inclusion of ADA-compliant pathways, wayfinding signage, and multimodal transportation connections can enhance the usability of greenways for individuals with mobility challenges. As seen in the literature review, cities that have successfully addressed these concerns have done so through a combination of targeted infrastructure investments and community-driven planning efforts, ensuring that greenway development aligns with the needs of diverse populations.

Overall, the intercept survey highlights the importance of ongoing community input in shaping the future of the greenway. Addressing concerns raised in the survey could significantly improve both user experience and engagement. However, our findings also point to the importance of social and cultural inclusivity, not just physical access. Parks are socially constructed spaces, shaped by social practices, symbols, and interactions, which influence who feels welcome and who does not (Low, 2006; Bonilla Porras, 2018). The presence of culturally relevant signage, multilingual communication, inclusive programming, and staff representation all contribute to whether users feel a sense of belonging.

Moving forward, further research, like follow-up surveys and interviews, may be necessary to refine recommendations and track the impacts of improvements and interventions. Additionally, engaging local organizations, residents, and advocacy groups in the planning process will be crucial to ensuring that the greenway continues to evolve as an inclusive and accessible public space

that meets the needs of the communities it serves. While our intercept survey offered valuable insight from current park users, we recognize that it may not fully capture the perspectives of residents who do not currently use the greenway due to barriers such as safety concerns, lack of awareness, or accessibility challenges. This method should be seen as one tool within a broader participatory framework. Several respondents expressed appreciation for community events and programming at the greenway, noting that these activities helped them feel more welcome. Others shared concerns that without continued community involvement, the space could become disconnected from the identity of the neighborhoods it serves. By addressing both the physical and social dimensions of access, the greenway can serve as a model for equitable public space development in Detroit and beyond.

4.1.2 City-Wide Survey

Introduction

The city-wide survey provided insight into residents' perceptions of the greenway beyond those who actively visit the Warren Gateway. While the intercept survey primarily captured park-goers who were attending events at the Warren Gateway, the city-wide survey aimed to gather broader community feedback, regardless of direct park usage.

A broad demographic range from various neighborhoods throughout Detroit was represented in the results. The survey received a total of 123 responses, with a nearly equal gender ratio (Female: 51.2%, Male: 47.9%). Age distribution ranged from 18 to 54+, with the highest representation from the 25-34 age group (29.3%). Most respondents reported a high school education (61%) and income levels below $100,000, with 78 participants earning less than $50,000 annually.

Park Usage Behavior

When asked, "How frequently do you visit a park in Detroit?", most respondents indicated they visit either frequently (more than once a week) or occasionally (once a month) (Figure 23). Transportation methods for visiting a park were predominantly walking and driving, suggesting accessibility through various means (Figure 24). This mirrors findings from the intercept survey, where walking was also identified as a primary method of access.

The most commonly reported activities within parks were walking, relaxing, and socializing. These activities highlight the greenway's role as both a recreational and social space, serving as a community hub for informal gatherings and personal wellness. Respondents highly valued greenery, natural beauty, walking and biking trails, and shaded seating areas. These preferences suggest a desire for spaces that are aesthetically pleasing while also promoting health and relaxation; however, further research is necessary to better understand why parkgoers valued these elements.

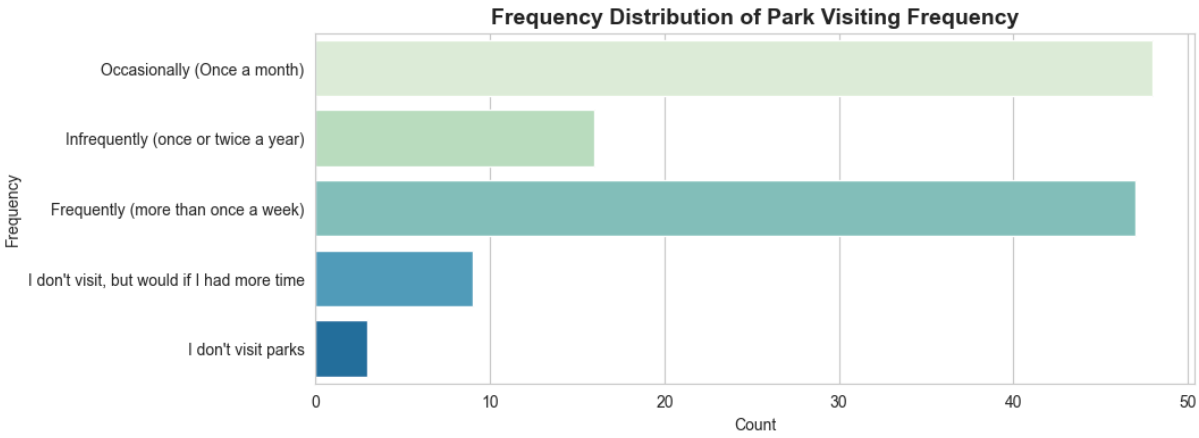

Figure 23: Frequency distribution of park visiting frequency

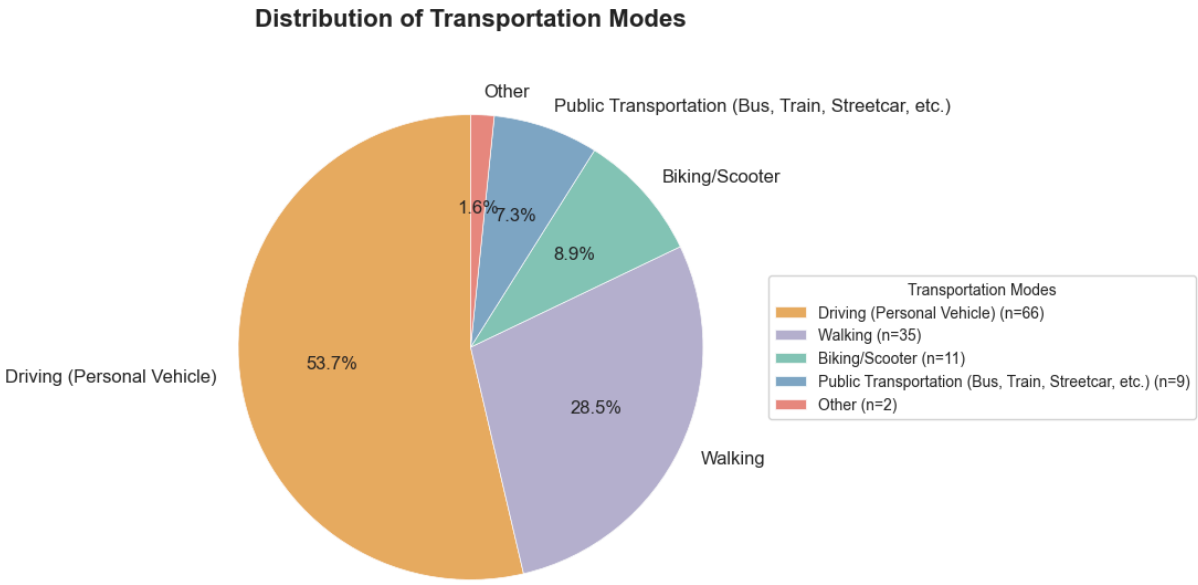

Figure 24: Distribution of transportation modes

Barriers

Despite these positive attributes, several barriers were noted by survey respondents when asked what might prevent them from going to a park (Figure 25). Concerns about safety, poor maintenance, and cleanliness were frequently mentioned, with these factors serving as deterrents for more regular park use. Safety was a particularly prominent issue, especially for women and older adults. Approximately 75% of women identified cleanliness as a barrier compared to around 50% of men. Additionally, women were more likely than men to cite poor accessibility as a concern.

Older respondents (aged 54+) expressed heightened concern about limited amenities and accessibility, with 85% indicating dissatisfaction with available amenities. Alternatively, younger adults, particularly those aged 25–34, were less

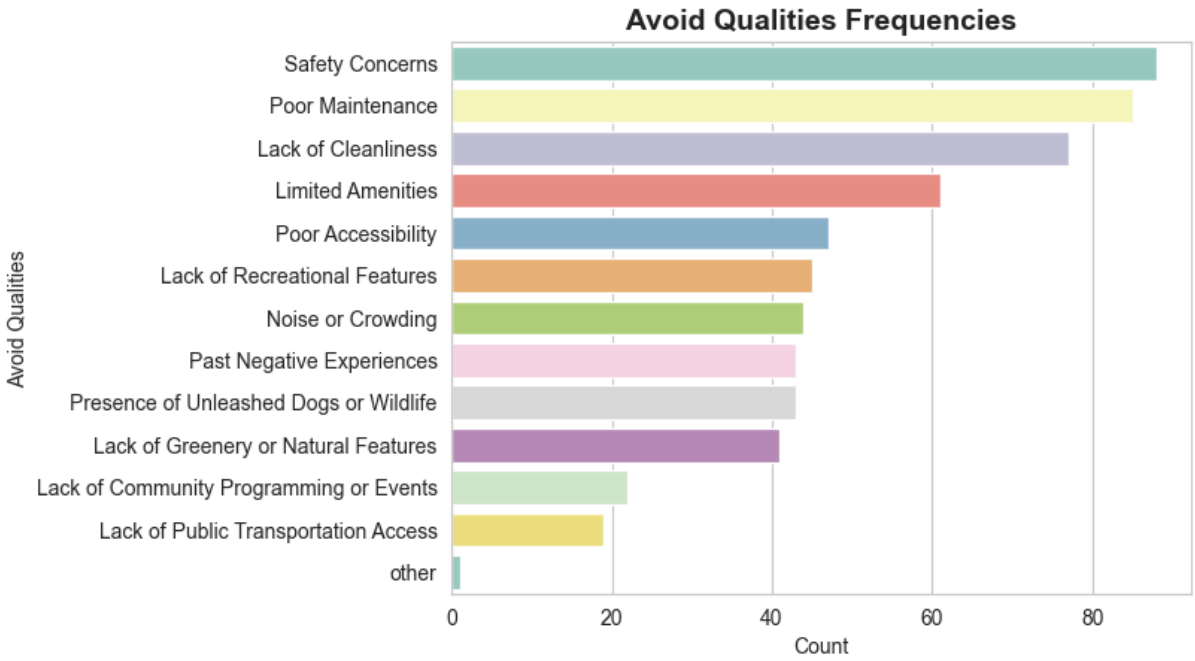

Figure 25: Avoid qualities frequencies

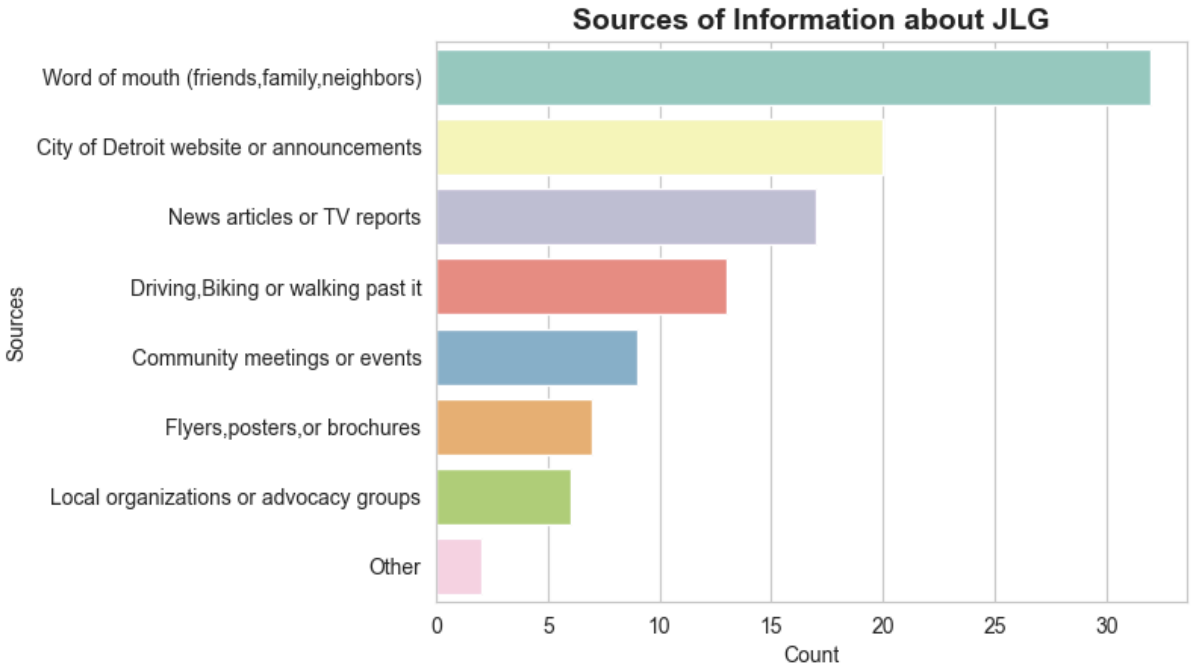

Figure 26: Sources of information about JLG

concerned about unleashed dogs or wildlife but voiced a desire for enhanced amenities such as drinking fountains and shaded seating.

Awareness & Perception of the JLG

Only 37.4% of participants had heard of the JLG, highlighting a need for increased outreach and education. Awareness primarily stemmed from

word of mouth, the City of Detroit's website, announcements, news articles, and TV reports (Figure 26). Among those aware of the JLG, half had visited, and 43.75% were interested in visiting in the future. The willingness to recommend the JLG was strong, with 52.2% of respondents indicating they were extremely likely to do so and 30.4% somewhat likely to do so. This suggests a generally positive perception among those familiar with the JLG.

Attitudes Toward Park Development

Participants generally supported adding more shade structures in parks and developing businesses and housing near parks. However, concerns were raised about increased costs and rising property values, indicating that economic impacts may require careful consideration during development planning (Figure 27).

Chi-square Test Results

Analysis of demographic variables against park development attitudes (Figure 28) revealed only one statistically significant result. Income level was significantly associated with respondents' attitudes toward development that would raise property values. This indicates a potential economic divide in how developments are perceived. Lower-income respondents may feel more threatened by rising costs associated with new developments. Other demographic variables, including age, gender, education, and race, did not show statistically significant results, suggesting broad support for shade structures and development across these groups. These findings point to an economic divide in how redevelopment is perceived and highlight the need to consider income-based concerns as we

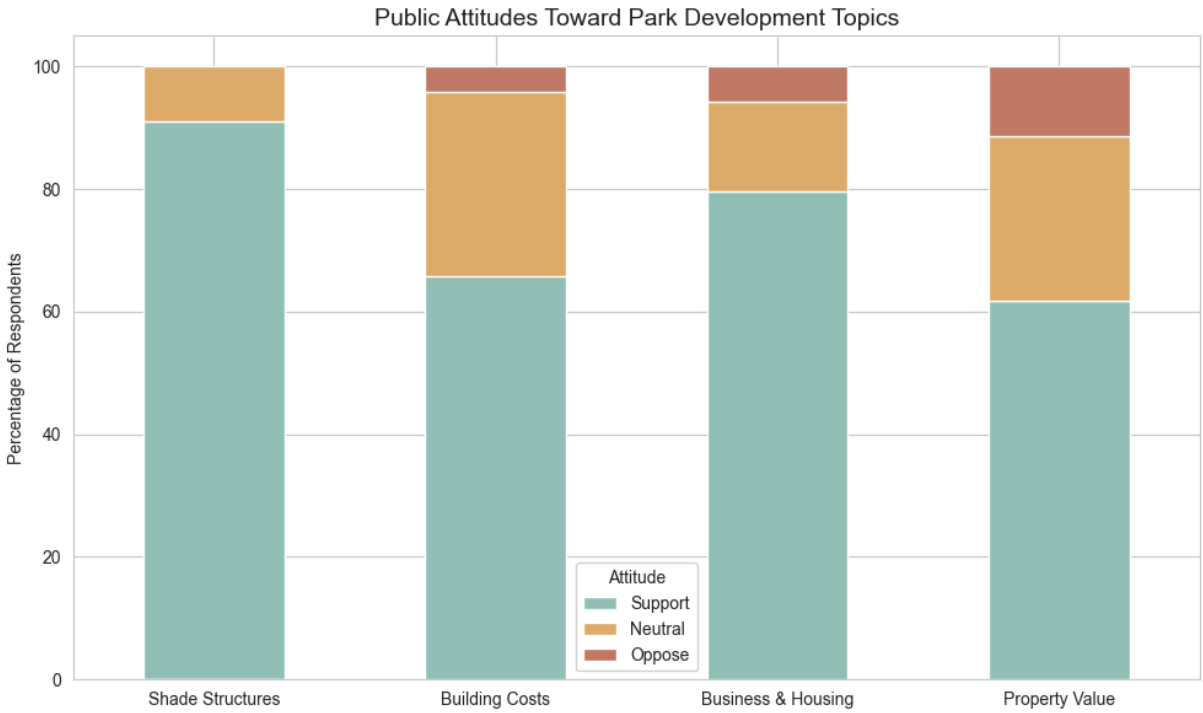

Figure 27: Public attitudes toward park development topics

explore the potential impacts of gentrification in future planning.

To explore how different attitudes around development, affordability, and policy trade-offs relate, we conducted a correlation analysis of selected survey responses. This helped us identify patterns in how respondents may link economic opportunity with concerns about displacement or rising costs.

Correlation Analysis:

- Support for policy to allow new businesses and housing showed a moderate positive correlation with support for development, even if such development leads to higher property values (r = 0.51). This suggests that respondents who value economic growth and increased amenities are generally more open to the potential trade-offs associated with gentrification, such as rising housing costs.
- Concern over cost was also positively associated with concerns about property value impacts (r = 0.43), indicating that financial apprehension tends to cluster. Those worried about building affordability are also more likely to view rising property values as a potential burden rather than a benefit. This points to a shared sensitivity around economic displacement and long-term affordability among certain respondent groups.
- Views on shade structures, while generally positive, showed only weak to moderate correlations with other survey items, particularly those related to cost concerns (r = 0.31). This weaker association implies that while shade structures are widely supported, they may be seen as a

Demographic Variable	Support for Shade Structures	If Shade Raises Cost	Support Businesses & Housing	If Development Raises Property Values
Gender	0.74	0.07	0.48	0.55
Age	0.84	0.45	0.69	0.45
Income	0.47	0.81	0.48	0.02
Education	0.6	0.19	0.09	0.58
Race	0.08	0.47	0.95	0.08

Figure 28: Chi-square test p-values for demographic variables and development attitudes

more neutral or universally beneficial improvement, less tied to the broader economic implications of large-scale development. It also suggests that respondents may compartmentalize their opinions, supporting smaller, immediate improvements without necessarily endorsing broader development strategies that come with greater financial consequences.

These correlations indicate that respondents who support commercial and residential developments near parks may also be more willing to accept higher property values resulting from such developments.

Open-Ended Feedback

In response to the open-ended question "What specific ways would you like to provide input or be represented in park design decisions?", many respondents offered practical suggestions, such as increasing the availability of benches, restrooms, and drinking fountains, and improving safety (Figure 29). Some respondents also expressed interest in participating in future planning efforts through surveys, community meetings, and email feedback.

Conclusion

The city-wide survey offers insights into how diverse demographic groups perceive and interact with the JLG. While overall support for greenway improvements is strong, concerns about safety, accessibility, and economic displacement remain prevalent. Increased outreach, especially to underrepresented communities, will be essential to ensure that future developments are equitable and inclusive.

Moving forward, efforts to enhance safety, provide culturally relevant amenities, and address economic concerns will be critical to the long-term success of the JLG. By addressing these issues through targeted improvements and continued community engagement, the JLG can better serve all Detroit residents and fulfill its vision of connecting neighborhoods through accessible, inclusive, and welcoming green spaces.



Figure 29: World clouds of participation and suggestions on public facilities

4.1.3 Recommendations

Based on the results of both the intercept and city-wide surveys, we recommend a series of targeted improvements for the continued success of the JLG.

First, to enhance accessibility and comfort, additional shade structures, seating, drinking fountains, and ADA-compliant features could be added. Infrastructure investments such as improved lighting, more trash/recycling bins, and expanded bike and pedestrian amenities would address key concerns expressed in both surveys.

Second, an increase in cultural representation is necessary to reflect Detroit's communities. Public art, multilingual signage, and community-created installations can support a more inclusive and welcoming atmosphere. Respondents identifying as "Two or More Races" in the surveys were especially interested in cultural features, suggesting this could promote broader engagement and satisfaction.

Third, awareness of the JLG remains limited, with only 37.4% of respondents to the city-wide survey saying that they had even heard of the greenway. Expanding outreach, such as through local schools, community centers, and media, could improve visibility. These efforts, combined with digital monitoring tools and in-person engagement, could strengthen participatory planning and positive feedback loops.

Finally, while overall support for the greenway was high, concerns about affordability and potential displacement emerged in both the city-wide survey and open-ended responses. For example, participants expressed concern that new developments near parks could lead to rising property values, with lower-income respondents showing significantly more concern about this than other groups. Several open-ended comments also emphasized the need for the JLG to reflect the needs of existing residents rather than attract outsiders. These findings suggest that community-driven planning efforts, including protection of affordable housing and support for locally-owned businesses, are critical to ensuring that the JLG's expansion benefits long-term residents. Grounding future development in continued public input will help the JLG remain not only accessible and inclusive but also aligned with the values and priorities of the communities it serves.

4.2 Future Design

4.2.1 Site Analysis

In the final part of this JLG project, we sought to provide a vision for how the first phase might integrate public suggestions and illustrate scenarios for how the surrounding areas could change over time. The goal was to provoke reflection on long-term planning and encourage consideration for the adjacent communities. For instance, adjacent, abandoned industrial sites, and vacant lots could be incorporated into broader plans, and underutilized infrastructure into a continuous public green corridor

that reconnects fragmented communities across Detroit. While these ideas are forward-looking, they are based on community feedback collected during the intercept survey, where participants expressed a desire for more connected green spaces and better integration of vacant land into usable public areas.

However, based on our site analysis, the location faces multiple complex challenges, including visible signs of environmental degradation, frequent flooding due to aging drainage systems, and limited shaded pedestrian pathways, all of which contribute to discomfort during extreme weather conditions. Although we did not conduct a formal environmental assessment, team observations during field visits noted large areas with minimal tree canopy and visible stormwater pooling after rainfall. These conditions were also reflected in user comments about discomfort during hot weather and concerns about standing water. As development progresses, the city's existing socio-economic disparities and housing affordability issues become more pronounced, raising the risk of displacement among long-term residents in the absence of appropriate policy interventions. This concern was echoed by several survey respondents who expressed fears that new development could increase property values and rents, making it harder for existing residents to remain in the neighborhood.

In response to these challenges, our design strategy focuses on two key pillars: climate resilience and gentrification mitigation, further refined through insights derived from public survey data. Statistical analysis reveals that some people are significantly more concerned with cleanliness, accessibility, and shaded areas (Figure 30). These findings validate the inclusion of green infrastructure such as green roofs, rain gardens, permeable paving, and shaded rest areas in our design. These ecological interventions not only improve microclimate and stormwater management but also greatly enhance the overall comfort and accessibility of the greenway, particularly for vulnerable groups, thereby advancing both environmental resilience and spatial equity.

To assess potential disparities in park usage, we conducted a chi-square analysis to explore whether demographic characteristics (age, income, education, gender, or race) are associated with preferences for specific park qualities. These characteristics might influence why certain groups avoid using parks. The results revealed only one statistically significant relationship: race showed a meaningful association with preferences for public art and cultural features ($p = 0.042$), which underscores the importance of cultural representation in achieving spatial justice (Figure 31). In response, our proposal incorporates site-specific art installations and inclusive public spaces that celebrate Detroit's cultural heritage through community-driven curation. On the commercial front, affordable storefronts (e.g., a neighborhood Starbucks) and mixed-income housing are integrated into the corridor to spark conversation about the types of local economic activity that are desired.

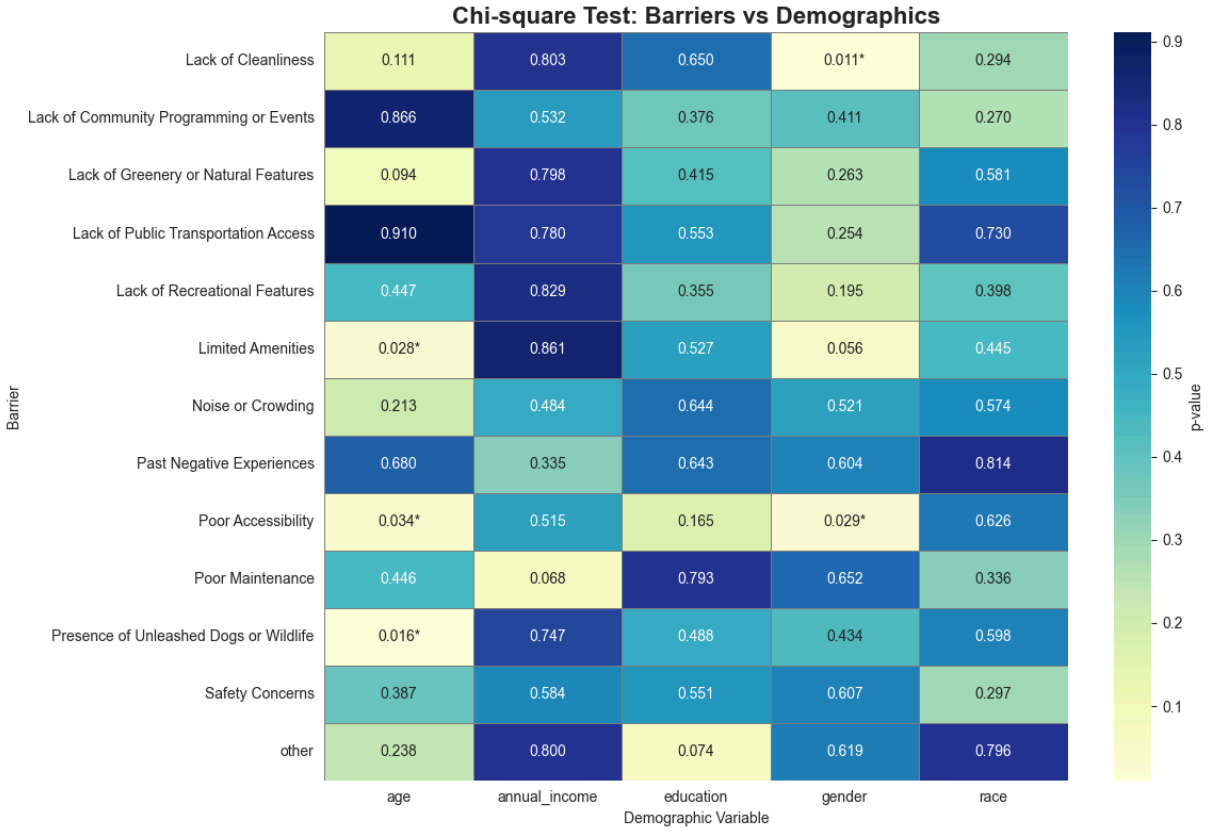

Figure 30: Chi-Square test result for barriers to visiting parks vs demographics

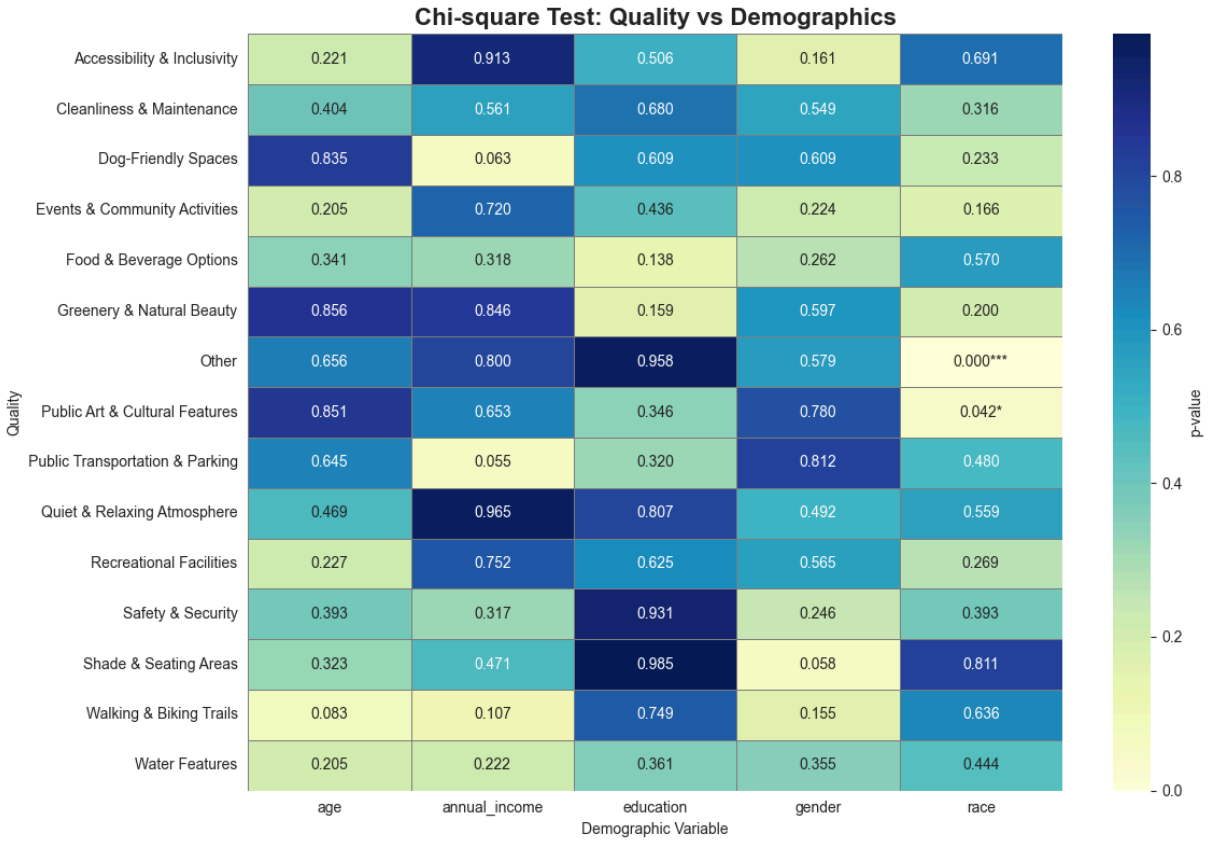

Figure 31: Chi-Square test result for park quality ratings vs demographics

Additionally, the inclusion of high-density housing raises important questions about gentrification and whether, or how, low-income residents will have access to these new developments.

By closely integrating quantitative survey insights with spatial strategies, our design offers a comprehensive and data-informed framework centered on equity, climate adaptability, and community identity. The JLG is envisioned not only as a physical corridor for mobility but also as a cultural landscape that fosters belonging, reinforces social cohesion, and supports Detroit's transition toward a more sustainable and inclusive urban future.

4.2.2 Design Implementation

Climate Resilient Design

Our team suggests transforming the JLG into a climate-resilient corridor by implementing nature-based solutions that address stormwater management, heat reduction, and ecological health. One of our key interventions is the integration of rain gardens along pedestrian pathways to capture and filter stormwater, reducing runoff and preventing urban flooding. These gardens will feature native plant species that absorb excess water, support biodiversity, and enhance soil infiltration. Additionally, we plan to use permeable paving materials for cycling and walking paths, allowing rainwater to seep into the ground rather than creating surface runoff (Figure 32). This approach will reduce flooding risks while also minimizing pavement overheating, creating a more comfortable and resilient public space.



Figure 32: Rendering of permeable paving design

To further improve environmental sustainability, we will introduce vertical green walls in high-density urban areas to cool building facades and improve air quality. Our design includes tree canopies, shaded pavilions, and vegetated pergolas, strategically placed to provide shade along walking and seating areas, mitigating the urban heat island effect and ensuring year-round usability of the greenway (Figure 33). Additionally, we will create shaded rest areas with drought-resistant and fast-growing vegetation, offering pedestrians and cyclists comfortable microclimates while enhancing carbon sequestration and local biodiversity. Through these interventions, our team aims to transform the JLG into a climate-adaptive corridor, improving both the urban ecosystem and the long-term sustainability of Detroit's public infrastructure.



Figure 33: Rendering of shaded wooden pergola

Gentrification Mitigation and Inclusive Urban Development

Our team aims to ensure that the JLG remains an inclusive public space by implementing urban design strategies that mitigate gentrification and displacement risks. A key component of our design is the integration of affordable housing adjacent to the greenway, preventing the displacement of long-term residents as the area undergoes revitalization. We propose a mix of co-living spaces, rental units, and subsidized housing, ensuring that diverse income groups can continue to live within the community. By incorporating low-cost residential developments, we seek to balance urban growth with housing accessibility, preventing the greenway from becoming an exclusive space for wealthier newcomers.

To further support economic diversity and community engagement, our team envisions a commercial corridor along the greenway that fosters local entrepreneurship and cultural interaction (Figure 34).



Figure 34: Mixed-use streetscape design addressing gentrification through inclusive commercial spaces

This includes small business spaces, community markets, and retail establishments, offering opportunities for local vendors and small businesses to thrive. We also plan to integrate anchor tenants, such as Starbucks, to attract visitors and activate public spaces while ensuring commercial diversity (Figure 35). Additionally, community-oriented plazas, gathering spaces, and flexible event areas will provide residents with free access to cultural and recreational activities, hosting local markets, festivals, and public art installations. By prioritizing affordability, business diversity, and inclusive public spaces, our design ensures that the JLG remains an accessible, vibrant, and community-centered urban corridor for all Detroit residents.

Master Plan

Our master plan for the JLG reflects a holistic approach to climate resilience



Figure 35: Conceptual Starbucks café adjacent to the greenway walkway

and inclusive urban development, ensuring that both environmental sustainability and socio-economic equity are addressed. As shown in the plan, the layout integrates key elements such as rain gardens, green roof shelters, and a continuous bike lane to support sustainable mobility and stormwater management (Figures 36 & 37). On the social side, we included affordable housing, a community park, and multi-use buildings to ensure accessibility and promote neighborhood stability. Additional features like an event center, playground, and commercial spaces such as markets and cafes provide opportunities for recreation, cultural engagement, and economic activation. Together, these components create a multifunctional and equitable public space that serves both environmental and community needs.

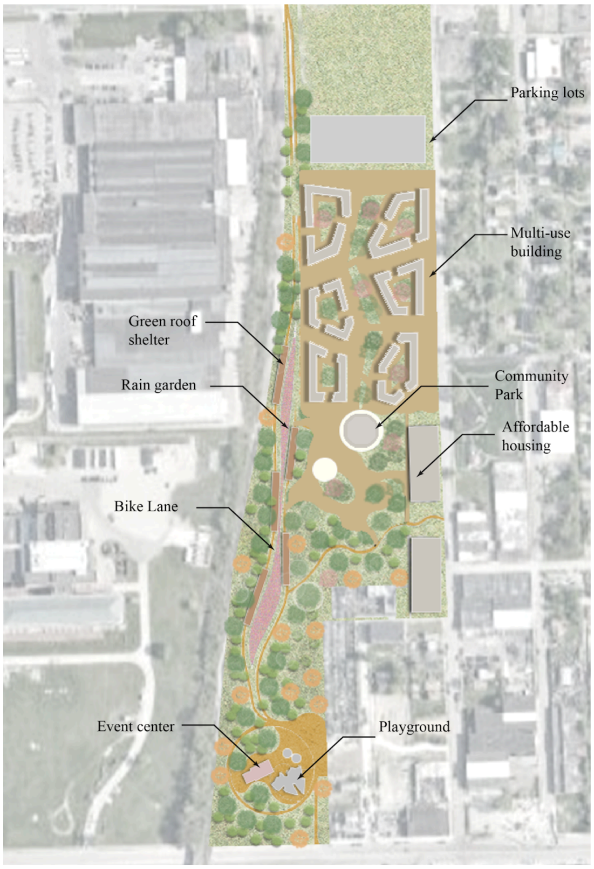

Figure 37: JLG Master Plan rendering



Figure 36: Bird's-eye view of the JLG Master Plan rendering

5 LONG-TERM EVALUATION & NEXT STEPS

5.1 The Joe Louis Greenway Partnership

The Joe Louis Greenway Partnership (JLGP) plays a crucial role in the long-term success of the greenway. As the greenway transitions from initial development to ongoing use and further expansion, the JLGP is positioned to lead continuous evaluation and community engagement.

As a next step in our collaboration with the JLGP, we recommend the transfer of the web-based system to their team to support ongoing evaluation. This platform can serve as a centralized tool for visualizing community input and monitoring the greenway's impact over time, including accessibility, usage patterns, and public perception. In addition, we will compile and share the survey findings, including insights from intercept interviews and the city-wide questionnaire, to help inform future programs offered at the greenway, enhance outreach strategies, and event planning. By equipping the JLGP with both digital infrastructure and a community feedback system, we aim to empower the efforts to create more inclusive, responsive, and community-driven initiatives across the greenway. In doing so, the JLGP will be better able to adapt to evolving community needs, strengthen transparency and collaboration, and ensure that the greenway continues to serve as an equitable public asset for all Detroit residents and surrounding members.

5.2 Digital Monitoring System

5.2.1 Evaluating User Interaction with the Digital System

On our homepage (Figure 38), we offer a concise overview of the JLG and feature the Warren Gateway segment, its first constructed trailhead. Visitors can easily learn about amenities such as picnic areas, shelters, water fountains, playgrounds, parking, and bike-sharing stations. By consolidating these details, the homepage serves as an accessible starting point for anyone wishing to understand the greenway's background, discover its available facilities, and plan their visit.

A central part of our monitoring system is the interactive map (Figure 39), which helps users locate amenities, assess route conditions, and plan their trips. We track feature usage patterns and collect feedback to improve usability. The map's route classifications include

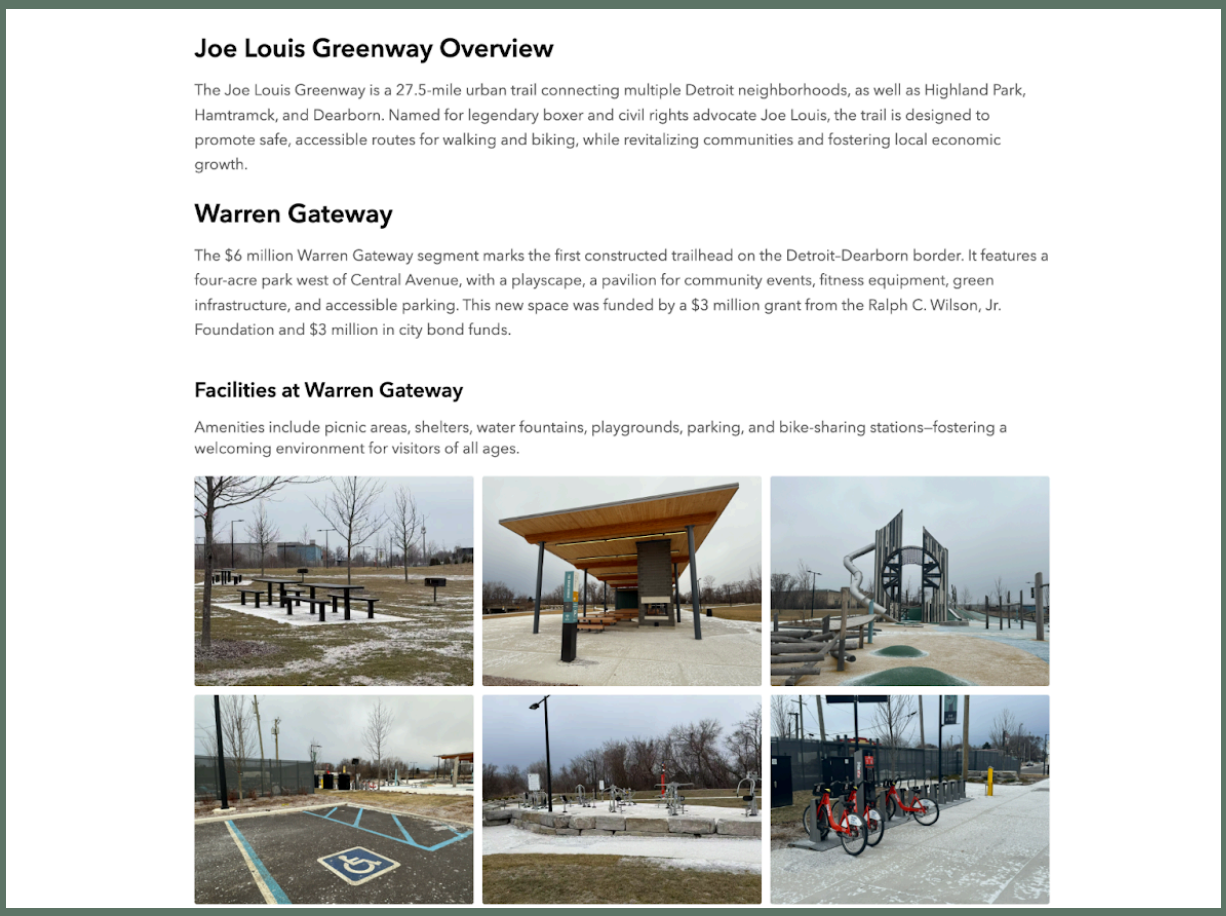

Figure 38: Home page of our website

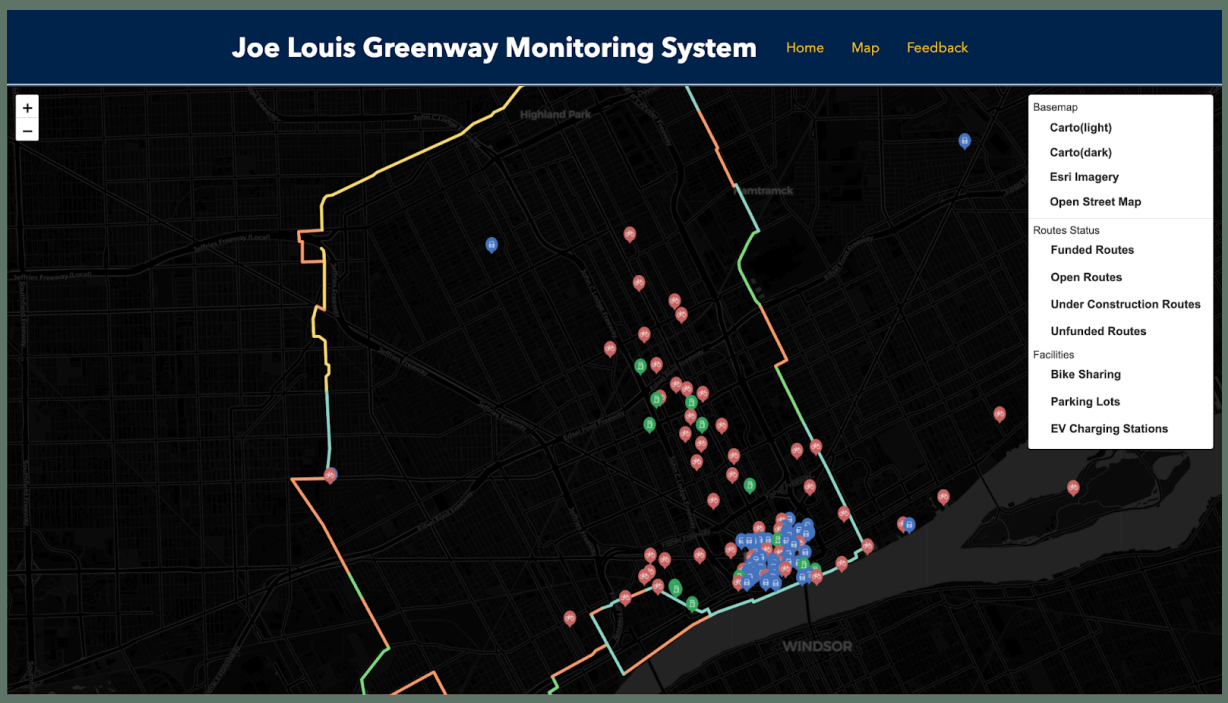

Figure 39: Interactive map for amenities around JLG

open, under construction, funded, or proposed, which make it easier for users to navigate and plan confidently. This information directly supports better mobility and encourages more frequent use.

A key feature of the map is the point-to-point feedback system (Figure 40), which allows users report issues or suggestions by clicking on specific locations. This tool provides real-time, location-specific input, which we analyze to guide improvements. It has become an essential part of our approach, helping ensure that updates are timely and user-informed.

5.2.2 Comparing Feedback Collection Methods

To evaluate the effectiveness of our feedback system, we have compared three main methods: in-person surveys, online forms, and digital map-based input. Using a mix of these methods helps us engage a wide range of users and continuously refine the system based on real-world needs.

In-person surveys, collected through intercept surveys, have the advantage of reaching individuals who may not have internet access or who prefer face-to-face communication. These methods often yield rich, qualitative data and allow for clarification and follow-up. However, they are labor-intensive and may have limited geographic and demographic reach.

Online forms, such as city-wide surveys distributed via online platforms or social media, are easier to scale and can reach a broader audience quickly. Yet, participation depends on awareness and willingness, and results may be skewed toward those with higher digital literacy.

Digital feedback, collected directly through the interactive map, allows for ongoing, location-specific input. Users can report trail conditions, access points, or facility needs directly on the map. This tool has become a core part of the monitoring system, providing both convenience and actionable insights.

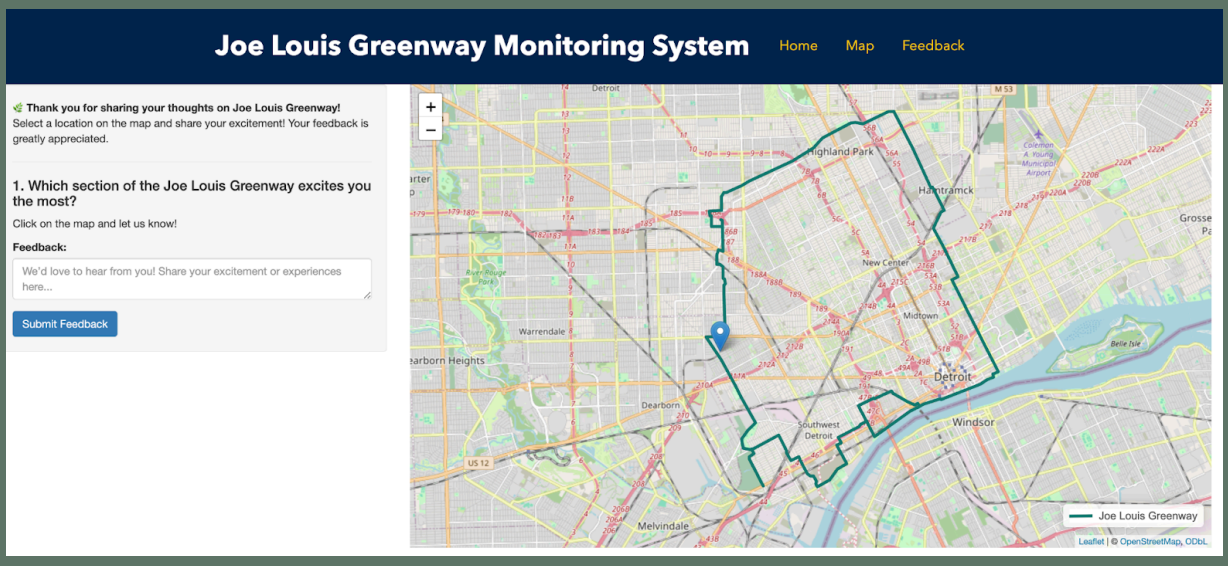

Figure 40: Community feed-back tool

5.2.3 Using Feedback to Guide Future Development

Looking ahead, we are committed to using community feedback to guide the ongoing evolution of the JLG. The interactive map will continue to be updated with more detailed route information, real-time construction updates, and new layers as additional facilities are added.

Feedback has already shaped key decisions, for example, highlighting the need for shade structures, restrooms, improved signage, and better lighting. These insights help us prioritize enhancements and plan future trail segments.

Transparency is also essential. We will continue sharing feedback summaries with the community to show how their input informs action. This not only builds trust but helps us time maintenance and upgrades where they’re needed most.

Through ongoing investments in GIS technology and data analytics, we aim to not only improve the greenway’s functionality, but also strengthen its role as a community-driven public space.

THE TEAM



Saj Elle McBurrows is a dual Master's degree student in Urban and Regional Planning and Environment and Sustainability at the University of Michigan, specializing in Environmental Policy and Planning, with a Bachelor of Arts in Sustainable Development and a concentration in Public Health from Columbia University in 2023. Her interests lie in transportation and physical planning, and more specifically, the intersection of transit corridors and access to green space. In this project, she served as the project lead, coordinating team efforts and guiding the group through key stages of development to ensure successful project completion.



Gail Lyons is a Master's degree student in Environment and Sustainability at the University of Michigan, specializing in Environmental Justice and Sustainability and Development, with a Bachelor of Arts in Environmental Science and a concentration in Sustainable Urban and Community Development from the University of Michigan in 2024. Her interests lie in promoting sustainable urban planning practices that prioritize community wellbeing and resilience. In this project, she focused on designing and analyzing both intercept and city-wide surveys, and also supported the editing and review process.



Chi Sun is a dual Master's degree student at the University of Michigan, pursuing a Master of Science in Environment and Sustainability and a Master of Science in Robotics. He was awarded a Bachelor of Engineering in Geomatics from Wuhan University in 2023. His research interests center on environmental perception and visualization, with a strong academic background in robotics and machine learning. In this project, he focused on website backend architecture and data processing, exploring community-informed design through digital tools and participatory mapping.



Yidan Chang is a Master's degree student in Environment and Sustainability at the University of Michigan, specializing in Geospatial Data Sciences, with a Bachelor of Engineering in Urban-rural Planning from Wuhan University in 2023. Her interests include web-based GIS, interactive mapping, and using data-driven tools to support sustainable decision-making and accessible planning solutions. In this project, she was responsible for front-end web design and data analysis.



Shiru Xu is a Master's degree student in Environment and Sustainability at the University of Michigan, specializing in Landscape Architecture, with a Bachelor of Landscape Architecture from Iowa State University. His interests lie in 3D models and renderings. In this project, he used 3D models to develop the visual renderings, master plan, and aerial perspective.



Jing Yan is a dual Master's degree student at the University of Michigan, pursuing a Master of Landscape Architecture and a Master of Science in Geospatial Data Science. She holds a Bachelor of Landscape Architecture from Nanjing Agricultural University. Her work focuses on green infrastructure and the integration of ecological and cultural values in urban spaces. In this project, she led 3D site modeling and visual renderings to illustrate future design scenarios.

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APPENDICES

Appendix A: Joe Louis Greenway Intercept Survey

Project Description: Our research team at the University of Michigan is conducting a survey to gain deeper insights into how residents and visitors of Detroit engage with parks and greenways. We're excited to invite you to participate!

Time Involvement: This survey includes 24 questions, and should take less than 5 -10 minutes to complete.

Risks and Benefits: The survey is quick and straightforward, and your responses will remain confidential. There are no foreseeable risks to participating in this study. You will be entered into a drawing for 1 of 3 Amazon gift cards. We will require your email for this drawing, but we will delete this information afterwards.

Participants' Rights: By beginning this survey, you've chosen to participate in our project. Your involvement is voluntary, and you can withdraw your consent or stop participating at any time. The research findings may be presented at scientific meetings or published in journals. Your responses, with identifiable private information removed, could be used for future studies or shared with other investigators. Your contribution is vital to our research, and we appreciate your participation.

Contact Information: If you have any questions or concerns about this research, please contact Derek Van Berkel (dbvanber@umich.edu)

Multiple Choice Questions

1. How often do you visit the Joe Louis Greenway/this park?
    a. Weekly
    b. Monthly
    c. This is my first time
    d. Other __
2. How long is your average visit?
    a. 30 minutes to 1 hour
    b. 1 to 2 hours
    c. More than 2 hours

3. What time of day are you most likely to visit? (select all that apply)
    a. Morning
    b. Noon
    c. Afternoon
    d. Evening
4. Is the greenway close to any other important destinations for you?
    a. Yes
    b. Somewhat
    c. No
5. What activities do you usually engage in while using the Joe Louis Greenway? (select all that apply)
    a. Walking
    b. Running
    c. Biking
    d. Supervising (children)
    e. Using play structure
    f. Relaxing/Hanging out
    g. Working
    h. Exercising
    i. Attending event(s)
    j. Other __
6. What issues keep you from visiting parks more? (select all that apply)
    a. Lack of time due to work or personal commitments
    b. Distance—the park is too far from my home or work
    c. Safety concerns, especially at certain times of day
    d. Limited amenities or facilities, such as restrooms or seating
    e. Poor maintenance—the park is not clean or well-kept
    f. Crowded—the park is often too busy or noisy
    g. Lack of activities or programs that interest me
    h. Weather—the climate or seasonal changes make it uncomfortable to visit
    i. None of the above
7. How would you compare this park to others you have visited in Detroit?
    a. Much better than other parks in Detroit
    b. Slight better than other parks in Detroit
    c. About the same as other parks in Detroit
    d. Slightly worse than other parks in Detroit
    e. Much worse than other parks in Detroit
8. Who do you believe this park was designed to serve or benefit the most?
    a. Children
    b. Community members
    c. Other __

9. What feedback do you have for the events and programs hosted by the Joe Louis Greenway organization? (select all that apply)
    a. Offer more events focused on environmental education and sustainability
    b. Increase the frequency of community engagement and feedback sessions
    c. Enhance accessibility and inclusivity for all community members
    d. Collaborate with local businesses and artists to enrich event content
    e. Expand the variety of recreational activities available
    f. Improve marketing and outreach to increase community awareness and participation
    g. No suggestion at this time
    h. Other __
10. Do you think the Joe Louis Greenway will have a positive or negative impact on the surrounding neighborhood?
    a. Strongly positive
    b. Somewhat positive
    c. Strongly negative
    d. Somewhat negative
    e. Unsure / no opinion

<u>Open-ended Questions</u>

11. What amenities would you like to see added to the Joe Louis Greenway?
12. How safe do you feel while using the Joe Louis Greenway on a scale from 1-10, ten being the safest?
13. How could safety be improved on the Joe Louis Greenway? (if applicable)
14. What types of programs or activities would you like to see offered in this park?
15. How do you think the neighborhood will change?

<u>Demographics and Related</u>

16. How many people are in your group?
17. What is your ZIP code?
18. How do you identify?
    a. Female
    b. Male
    c. Transgender/Trans woman
    d. Transgender/Trans Man
    e. Non-binary
    f. Not listed __
    g. Prefer not to say

19. What is your age?
    a. 18-24
    b. 25-34
    c. 35-44
    d. Over 54
    e. Prefer not to say
20. I am (select all that apply)
    a. White
    b. Black or African American
    c. American Indian or Alaska Native
    d. Asian
    e. Native Hawaiian or Pacific Islander
    f. Two or More Races
    g. Other __
    h. Prefer not to say
21. I am Spanish, Hispanic or Latino
    a. Yes
    b. No
    c. Prefer not to say
22. What is the highest level of education you have completed?
    a. Master's degree or above
    b. Bachelor's degree
    c. High School
    d. Other __
    e. Prefer not to say
23. What is the level of your annual household income?
    a. Less than $25,000
    b. $25,000 - $50,000
    c. $50,000 - $100,000
    d. More than $200,000
    e. Prefer not to say
24. Email (for purposes of the amazon gift card)

Appendix B: Joe Louis Greenway City-Wide Survey

Project Description: Our research team at the University of Michigan is conducting a survey to gain deeper insights into how residents and visitors of Detroit engage with parks and greenways. We're excited to invite you to participate!

Time Involvement: This survey includes 20-24 questions, and should take less than 10 minutes to complete.

Risks and Benefits: The survey is quick and straightforward; your responses will remain confidential. There are no foreseeable risks to participating in this study.

Participants' Rights: By beginning this survey, you've chosen to participate in our project. Your involvement is voluntary, and you can withdraw your consent or stop participating at any time. The research findings may be presented at scientific meetings or published in journals. Your responses, with identifiable private information removed, could be used for future studies or shared with other investigators. Your contribution is vital to our research, and we appreciate your participation.

Contact Information: If you have any questions, concerns, or complaints about this research, its procedures, risks, or benefits, contact Derek Van Berkel (dbvanber@umich.edu.)

General Questions

1. How often do you visit a park in your neighborhood?
    a. Frequently (more than once a week)
    b. Occasionally (once a month)
    c. Infrequently (once or twice a year)
    d. I don't visit, but would If I had more time
    e. I don't visit parks
2. How do you use parks or greenways in Detroit? Choose all that apply.
    a. 🚶Walking
    b. 🏃Running
    c. 🚴Biking
    d. 🧺Picnicking
    e. ⚽ Playing
    f. 🪑Relaxing
    g. 🎭Outdoor events
    h. 🚇 Using it for commuting
    i. 🐕 Dog walking
    j. 🗣️ Socializing with friends/family
    k. Other (please write your own answer) __
3. How do you primarily travel to parks? (Select one option that best applies.)
    a. 🚶 Walking
    b. 🚲 Biking/Scooter
    c. 🚗 Driving (Personal Vehicle)
    d. 🚊 Public Transportation (Bus, Train, Streetcar, etc.)
    e. Other __

4. What qualities do you seek when visiting a park in Detroit? You can choose more than one if they apply.
    a. Greenery & Natural Beauty (e.g., trees, gardens, scenic views)
    b. Walking & Biking Trails (e.g., paved paths, accessible trails, dedicated bike lanes)
    c. Recreational Facilities (e.g., playgrounds, sports courts, picnic areas)
    d. Water Features (e.g., lakes, ponds, fountains, splash pads)
    e. Shade & Seating Areas (e.g., benches, covered pavilions, shaded picnic tables)
    f. Accessibility & Inclusivity (e.g., wheelchair-friendly paths, ADA-compliant features)
    g. Safety & Security (e.g., well-lit paths, visible security, low crime rates)
    h. Events & Community Activities (e.g., farmers' markets, concerts, festivals)
    i. Cleanliness & Maintenance (e.g., well-maintained restrooms, litter-free spaces)
    j. Dog-Friendly Spaces (e.g., designated dog parks, pet-friendly areas)
    k. Public Art & Cultural Features (e.g., murals, sculptures, historic markers)
    l. Food & Beverage Options (e.g., food trucks, cafes, vending machines)
    m. Public Transportation & Parking (e.g., easy access via bus, train, or ample parking)
    n. Quiet & Relaxing Atmosphere (e.g., peaceful spaces, meditation areas)
    o. Other __
5. What specific ways would you like to provide input or be represented in park design decisions? (open-ended question)
6. How important is it to you that community voices, including your own, are represented in the design and planning of parks in Detroit?
    a. Extremely important
    b. Somewhat important
    c. Not very important
    d. Not important at all
7. What qualities of a park have made or would make you avoid visiting a park in Detroit? (You can choose more than one if they apply.)
    a. Poor Maintenance (e.g., litter, broken equipment, overgrown vegetation)
    b. Safety Concerns (e.g., crime, lack of lighting, presence of suspicious activity)
    c. Lack of Cleanliness (e.g., overflowing trash, graffiti, unclean restrooms)

d. Poor Accessibility (e.g., difficult to reach, lack of parking, uneven pathways)
e. Limited Amenities (e.g., no restrooms, no benches, no picnic areas)
f. Lack of Recreational Features (e.g., no playground, trails, or sports facilities)
g. Bad Air or Water Quality (e.g., pollution, unpleasant odors, dirty water)
h. Presence of Unleashed Dogs or Wildlife (e.g., aggressive animals, excessive geese)
i. Lack of Greenery or Natural Features (e.g., too much concrete, no trees/shade)
j. Noise or Crowding (e.g., too many people, loud music, disruptive behavior)
k. Lack of Community Programming or Events (e.g., no activities or organized events)
l. Past Negative Experiences (e.g., harassment, conflicts, unpleasant encounters)
m. Lack of Public Transportation Access
n. Other (please write your own answer) __

8. Have you ever heard of the Joe Louis Greenway?
    a. Yes
    b. No
        i. If Yes is selected:
            1. Have you ever visited the Joe Louis Greenway?
                a. Yes, I frequently visit Joe Louis Greenway
                b. Yes, occasionally
                c. Yes, but only once or twice
                d. No, but I intend to
                e. No, I have no plans to
                    i. If Yes, I frequently; Yes, occasionally; or Yes, but only once or twice is selected:
                        1. How likely are you to suggest the Joe Louis Greenway to others?
                            a. Extremely unlikely
                            b. Somewhat unlikely
                            c. Neither likely nor unlikely
                            d. Somewhat likely
                            e. Extremely likely
            2. How do you feel about the Joe Louis Greenway, based on what you've heard or seen?
                a. Very positive
                b. Positive
                c. Neutral
                d. Negative
                e. Very negative

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Future Designs and Construction

Visitors to the Joe Louis Greenway are excited about the park, but they have also expressed concerns regarding its future use and changes that might result from its development. The next questions asks for your opinion on parks in Detroit and their surrounding neighborhoods.

Scenario 1: Many visitors to the park have noted feeling overheated on hot days and anticipate that this issue may become more intense in the future. One potential solution is to add additional shaded areas, as shown in the image below, to enhance comfort and usability.







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1. How would you feel about adding structures and trees to provide shade in Detroit parks?
    a. Very positive
    b. Positive
    c. Neutral
    d. Negative
    e. Very Negative
2. Would you feel the same if it raised the cost of building parks and greenways?
    a. Very positive
    b. Positive
    c. Neutral
    d. Negative
    e. Very Negative

Scenario 2: Another concern is that the park might attract new development, such as businesses catering to parkgoers and residential projects aimed at those seeking to live near park amenities. How would you feel about allowing such developments, like those pictured here? (answer on next page)



3. How would you feel about allowing new businesses and housing near parks?
    a. Very positive
    b. Positive
    c. Neutral
    d. Negative
    e. Very Negative
4. How would you feel about these developments if they raised land and home values in the surrounding neighborhoods?
    a. Very positive
    b. Positive
    c. Neutral
    d. Negative
    e. Very Negative

Demographics & Related

5. How do you identify?
    a. Female
    b. Male
    c. Not listed __
    d. Prefer not to answer
6. What is your age?
    a. 18-24
    b. 25-34
    c. 35-44
    d. Over 54
    e. Prefer not to say
7. I am
    a. White
    b. Black or African American
    c. American Indian or Alaska Native
    d. Asian
    e. Native Hawaiian or Pacific Islander
    f. Two or More Races
    g. Other __
8. I am Spanish, Hispanic, or Latino
    a. Yes
    b. No
9. What is the highest level of education you completed?
    a. Master's degree or above
    b. Bachelor's degree
    c. High School
    d. Other __
    e. I prefer not to say

10. What is the level of your annual household income?
    a. Less than $25,000
    b. $25,000 - $50,000
    c. $50,000 - $100,000
    d. More than $200,000
    e. I prefer not to say
11. How many times do you visit a National Park or protected area each year?
    a. Never
    b. Once a year or less
    c. 2-3 times a year
    d. Once a month
    e. Multiple times a month
12. Generally speaking, do you usually think of yourself as a Republican, a Democrat or an Independent?
    a. Strong Democrat
    b. Weak Democrat
    c. Independent
    d. Weak Republican
    e. Strong Republican
    f. Prefer not to say

Appendix C: Input Variables & Data Code

Our code can be find on our github: https://github.com/chi-qhsun/JoeLouisGreenway.git

Deploying the Web Server on AWS Free Tier

Step 1: Set Up an EC2 Instance

- Log in to the AWS Management Console.
- Navigate to EC2 and click Launch Instance.
- Select Ubuntu 22.04 LTS as the AMI.
- Choose t3.micro (eligible for free tier).
- Configure security groups to allow SSH (port 22), HTTP (port 80), and HTTPS (port 443).
- Click Launch and download the key pair for SSH access.

Step 2: Connect to the EC2 Instance

```
ssh -i your-key.pem ubuntu@your-ec2-public-ip
```

Step 3: Install Node.js and Nginx

```
sudo apt update && sudo apt upgrade -y
sudo apt install -y nodejs npm nginx
```

Step 4: Deploy the Web Server
mkdir myapp && cd myapp
nano server.js

Step 5: Install PM2 and Start the Server
npm install express
sudo npm install -g pm2
pm2 start server.js --name myapp
pm2 save
pm2 startup

Step 6: Configure Nginx as a Reverse Proxy
sudo nano /etc/nginx/sites-available/default
Modify the file to include:

```
server {
    listen 80;
    server_name your-ec2-public-ip;

    location / {
        proxy_pass http://localhost:3000;
        proxy_http_version 1.1;
        proxy_set_header Upgrade $http_upgrade;
        proxy_set_header Connection 'upgrade';
        proxy_set_header Host $host;
        proxy_cache_bypass $http_upgrade;
 }
}
```

Save and restart Nginx:
sudo systemctl restart nginx

Server is now accessible at http://your-ec2-public-ip.
Your-ec2-public-ip is customizable and can be determined by the developer.